Double beam spectrophotometer

UH5200/UH5210

HITACHI
Inspire the Next

UH5200/5210

Science for
a better tomorrow

Convenient, reliable measurements and a large color LCD screen

Hitachi's double beam spectrophotometers are used in a broad range of scientific and technological disciplines.

Hitachi's exacting quality control standards ensure that we deliver only the highest-reliability instruments to our customers.
User-friendly software makes these instruments easy to use in a wide variety of settings—from research and development to quality control and environmental monitoring.
The UH5200 series instruments have served as analytical workhorses in a broad range of scientific disciplines, including environmental science, food and beverage science, bioscience, medical science, materials science, and chemistry.

Application

Research and development

- Concentration control for functional components of beverages and foodstuffs
- Protein analysis and quantitative measurement of nucleic acids
- Characterization of functional materials (including paints and light-absorbing agents)

Quality control

- Confirming absence of hazardous substances (including RoHS-regulated hexavalent chromium)
- Analyzing food additives (including colorants, preservatives, sweeteners, and anti-oxidants)
- Controlling purity and ingredient volumes for pharmaceuticals

Environmental monitoring

- Measuring hazardous substances in tap water and in waste water
- Measuring nutrient salts (such as phosphorus and nitrogen) in lakes, rivers, and other bodies of water

UH5200/5210

Concept

- Large color LCD screen is convenient to use*1
- Keypad ensures accurate data input*1
- Both standalone and PC-controlled models available*2
- Sample compartment is compatible with previous-generation U-2900/2910 models

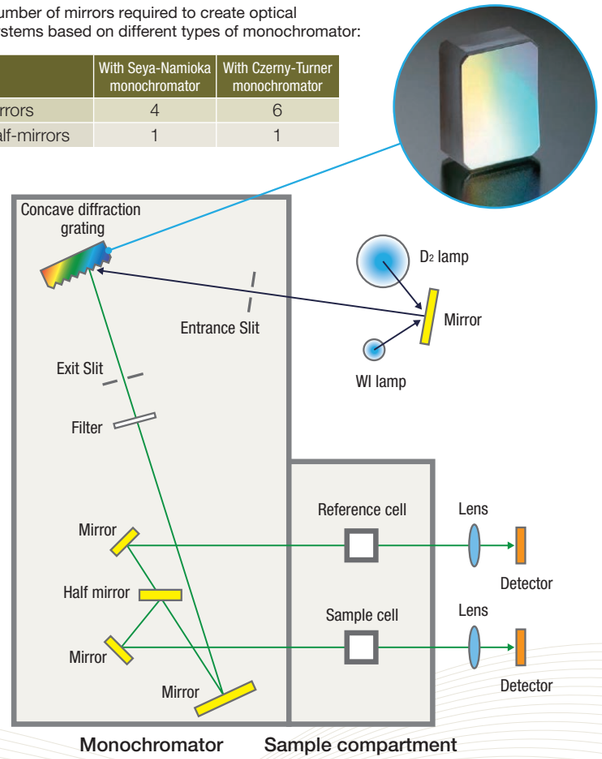
*1 UH5200 only
*2 PC control enabled by optional UV Solutions Plus software available for the UH5200 (includes USB cable)

Double-beam optical system for high stability

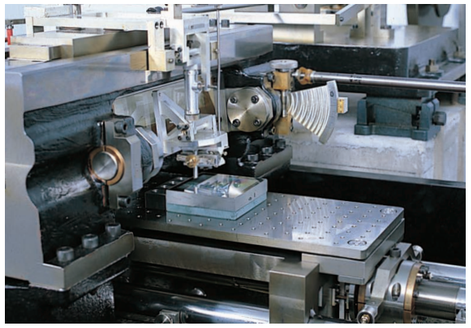
UH5200 UH5210

■Number of mirrors required to create optical systems based on different types of monochromator:

	With Seya-Namioka monochromator	With Czerny-Turner monochromator
Mirrors	4	6
Half-mirrors	1	1



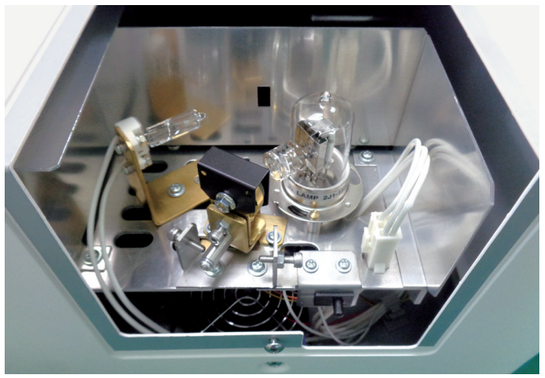
Optical system for UH5200/5210 spectrophotometer



Ruling engine used to fabricate diffraction gratings

The UH5200/5210 optical system is based on a Seya-Namioka monochromator, a widely-used type of concave diffraction-grating monochromator.
Concave diffraction gratings serve both to focus and to disperse light, reducing the number of mirrors needed for the optical system—and thus reducing optical losses suffered by light traveling through the spectrophotometer, shortening the optical path length and increasing the overall brightness. Diffraction gratings fabricated with Hitachi's proprietary ruling-engine technology eliminate aberration to yield sharp, vivid optics. The double-beam design of the optical system—in which a half-mirror is used to split the optical path in two—compensates for energy-conversion processes, including at the light source, ensuring long-term stable operation.

Lamp-control modes improve safety and reduce environmental impact



Lamp House

- Lamp turned on and off automatically — UH5200
- Lamp-stability indicator notifies user when measurements may begin — UH5200
- Safety features for opening and closing the lamp cover — UH5200 UH5210

Accurate spectrophotometric measurements require stable lamp operation over long periods of time.
The UH5200 automatically turns the lamp on and off to avoid unnecessary on-time. The instrument also offers a convenient indicator to notify users when the lamp has stabilized so measurements may begin. A new sensor automatically detects when the lamp cover is opened or closed, ensuring user safety when replacing the lamp.

Choose the control interface best suited to your needs

UH5200 UH5210

Standalone/PC-controlled*1 — UH5200

Control interface

The UH5200 is a standalone instrument that may also be controlled from a PC by installing the optional UV Solutions Plus software package.*1

Support for external input devices

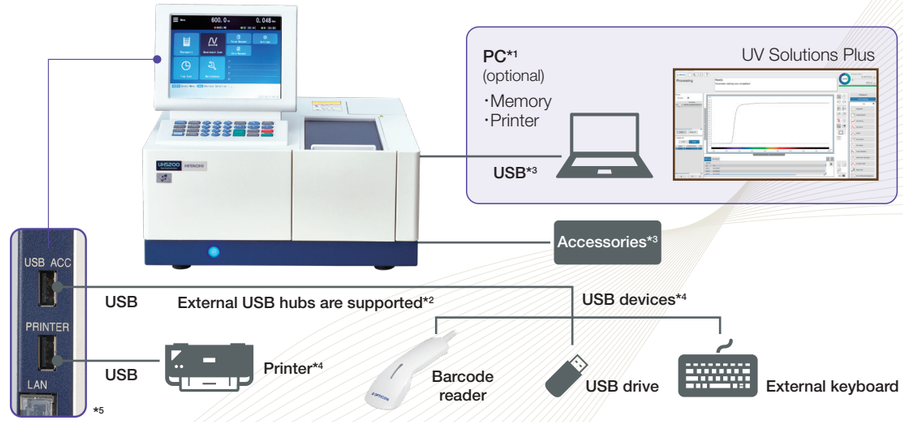
External input devices such as keyboards and barcode readers may be connected via USB ports.*2 Barcode readers eliminate the need to enter names for measurement samples.

Data output

Measured data may be stored in the instrument's on-board memory or on USB drives.*3 Built-in conversion capabilities allow measured data to be exported to text-format files for import into commercially available spreadsheet applications.

Printing

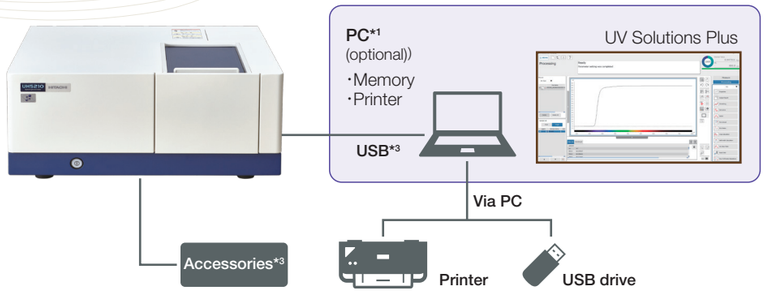
The spectrophotometer can connect to a commercially available PC printer through its USB PRINTER port.*4



PC-controlled — UH5210

Control interface

The UH5210 is an exclusively PC-controlled instrument equipped with the UV Solutions Plus software package to support a wide variety of measurements. Measured data may be printed using any Windows-compatible printer.



*1 PC control is enabled by the optional UV Solutions Plus software package available for the UH5200 (includes USB cable).
*2 The instrument is equipped with a single USB port for peripheral devices. Multiple devices may be connected to the instrument through a user-provided USB hub.
*3 PC and accessory connectors are located on the instrument's left side panel.
*4 Printer to be provided by user. Please contact us for further information on Hitachi-recommended printers and peripheral devices.
*5 LAN port not currently supported.

Redesigned measurement-control screen

The UH5200's 26.4 cm, 800×600-pixel backlit color LCD screen improves on the display resolution of the previous-generation U-2900 spectrophotometer, presenting measured spectra and calibration curves in vivid detail. The screen layout retains the basic design of previous-generation instruments to preserve familiar operating sequences—but with enhanced readability thanks to a new and improved graphic design.

Main menu

Configuring measurement settings

Keypad ensures accurate data input

Another familiar design feature retained from the U-2900 is a dedicated keypad to ensure accurate data input.

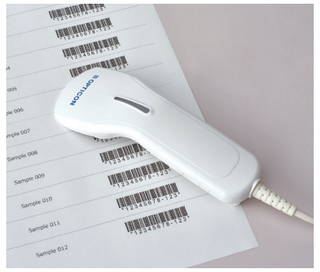
Barcode reader supported for standalone operation

External input devices such as keyboards and barcode readers may be connected via USB ports.* Barcode readers eliminate the need to enter names for measurement samples. USB ports may also be used to save measured data on USB drives.

*USB devices to be provided by user.

Please contact us for further information on Hitachi-recommended printers and peripheral devices.

*LAN port not currently supported.



Overview of measurement modes

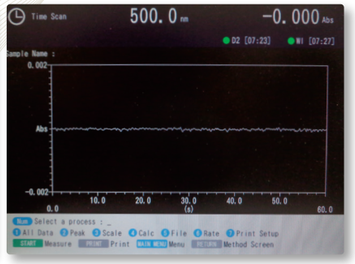
Photometry

For samples of unknown concentrations, this mode may be used to measure concentrations by comparison to standard samples of known concentrations. Concentration calculations may be carried out using linear and quadratic regression calibration curves and line-chart approximate calibration curves (for as many as 20 test samples). Determination of upper and lower concentration thresholds may also be configured, and numerical coefficients may be specified to enabled quantitative analysis.

Wavelength scan

In this mode, the wavelength is scanned over an arbitrary user-specified range between 190 and 1,100 nm and the resulting measured spectrum is displayed. This allows the physical properties of samples to be investigated via the characteristic spectral properties of individual substances. Measured spectra may be further analyzed post-processing operations including smoothing and peak-searching. Scans may be repeated sequentially to trace the trajectories of chemical reaction processes—and baseline-correction capabilities are available as well.

Time scan



In this mode, the wavelength is fixed at a single value to measure the temporal evolution of the optical response of the sample. This is useful for analysis of enzyme reactions, with the temporal variation in optical absorption over a prespecified time interval serving as a measure of enzyme activity.

Automated calibration and self-diagnostic capabilities

The UH5200 incorporates a variety of automated calibration and self-diagnostic capabilities—including memory checks, wavelength-drive checks, lamp-illumination checks, wavelength auto-calibration, and a lamp on-time display feature—to ensure stable operation of the instrument.

Validation checks

These checks verify basic instrument performance, including the following items:

- Wavelength accuracy
- Wavelength repeatability
- Spectral Bandwidth
- Baseline flatness
- Baseline stability
- Noise level

Automated calibration and self-diagnostic features

Memory checks, wavelength-drive checks, and lamp-illumination checks are performed during instrument initialization.
The instrument also incorporates automated wavelength-calibration capabilities with the bright line of the D_2 lamp used as a reference wavelength.
To facilitate operational maintenance, the instrument also displays the total accumulated on-time for the WI and D_2 lamps.

Simple operation flow and abundant data processing features make analysis pleasant

New and improved control and data-processing software: UV Solutions Plus

Our new software platform extends the highly popular UV Solutions package with a host of new features, including data lists, data-processing results displayed in tabular format, report-layout capabilities, and performance checks.

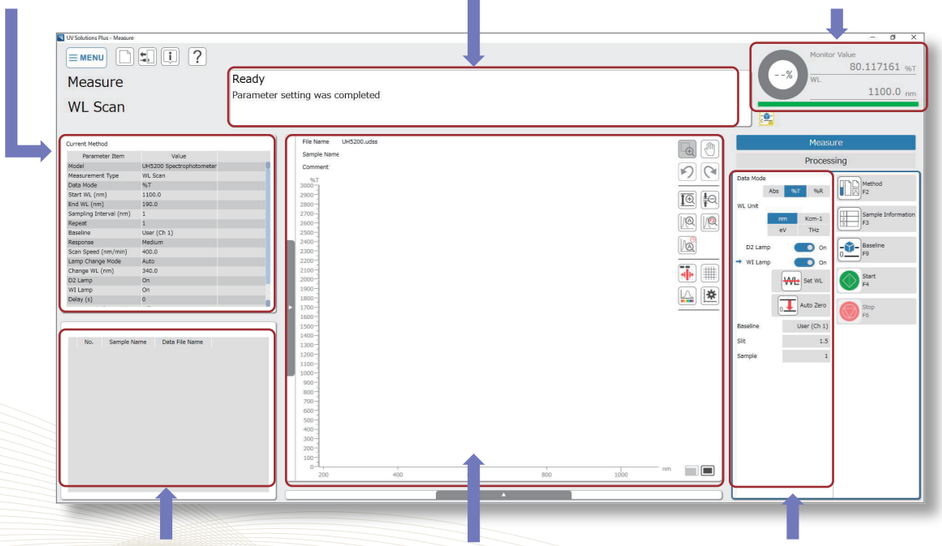
Measurement parameter display

Displays parameters for the current measurement.

Displays measurement guidance.

Measurement progress display

Shows a pie chart indicating the progress of the current measurement.



Sample information

Displays the name of the current measurement sample.

Measured data

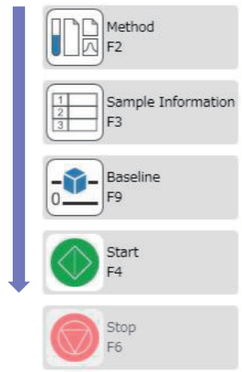
Displays the spectrum for the current measurement.

Measurement control display

Allows the display mode to be changed even during measurements.

Operation flow

The measurement operation buttons are located on the right side. A measurement can be made using basic operations in four steps.



❶ Configure analysis condit
Press Analysis Conditions and set the conditions.

❷ Configure sample information
Detailed conditions related to the measurement sample, the storage location for data, and other parameters can be set.

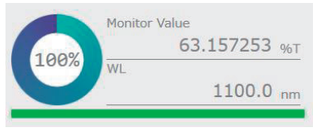
❸ Baseline
Perform baseline correction.

❹ Start measurement
Start the measurement.

Many added features that follow in the footsteps of existing operability

- Change the wavelength unit of a monitored value during measurement
- Measurement progress display
- Photometric value unit conversion (Abs, %T, %R, etc.)
- Direct display of the concentration calculated from coefficients
- Batch data processing of multiple files, and more

Measurement progress display

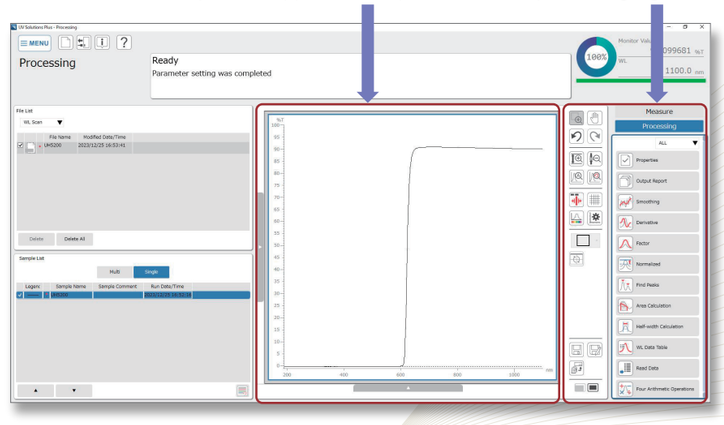


*The menu for data-processing algorithms displayed here includes some algorithms from optional packages.

Sample data-processing display window

Display and scale may be adjusted as necessary for the application in question.

Extensive menu of data-processing algorithms

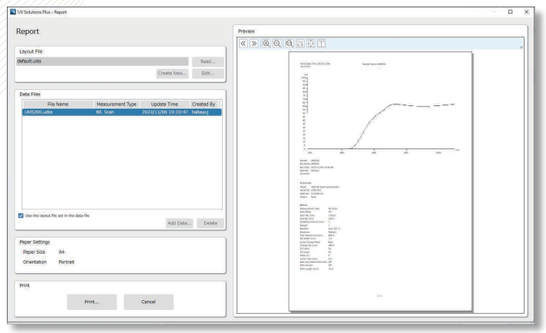


List display feature for data processing results

Specific wavelength data, area calculation data, half-value width calculation data and other data across multiple samples can be displayed in tabular form. Comparing data between samples can be done easily. In addition, you can return to raw data after storing processed data.

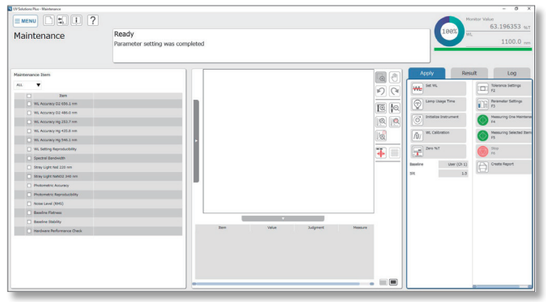
Reporting function

More effective for preparing reports.
You can freely lay out printable items such as analysis conditions, data processing results, spectra, etc. with the report layout feature, which did not exist in the UV Solutions software in the past. You can also print designated image data (jpg, png, and bmp).



Standard installation of performance confirmation feature

This feature can check for proper function and performance on a daily basis.
Performance confirmation feature items: wavelength accuracy, wavelength setting repeatability, noise level (RMS), baseline flatness, baseline stability, spectral band width, photometric accuracy, stray light, group editing of performance confirmation items, graphical display of performance confirmation results history.



*The UH5200 may be PC-controlled by installing the optional UV Solutions Plus software package (includes USB cable).

Accessories

A broad lineup of instrument accessories to support specialized measurements— including multi-sample measurements and measurements of micro-volume samples

Auto sipper

(P/N 2J1-0100)

Computer-controlled auto sipper useful for sample recovery and other purposes. May be connected to an auto sampler to automate and streamline measurements. Cannot be temperature-controlled.

Specifications

Minimal sample volume	0.6 mL*
Carryover	1% or less
Cell capacity	Approximately 50 µL
Optical path length	10 mm
Objective side	Supports mounting of 10-mm rectangular cells

*For temperatures in the range 25 to 35 °C.
The value is 0.9 mL for temperatures in the range 15 to <25 °C.

AS-1010 auto sampler

(P/N 2J1-0121/0122)

Used with auto sipper and for multi-sample measurements for flow-injection analysis. Suction needle allows three-dimensional (X, Y, and Z) position adjustments.

Specifications (not including test tube)

Test tube dimensions	Outer diameter 15 mm, height 105 mm (requires optional accessory)
	Outer diameter 12 mm, height 105 mm

Flow cell unit

(210-2173)

The design of this cell is optimized to minimize clouding and bubble formation in the liquid contained in the flow cell.

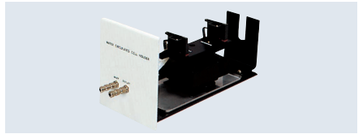
Specifications

Cell capacity	600 µL
Optical path length	When used with 5-mm G5 quartz flow cell
Feed tube	Fluororesin tube (outer diameter 4 mm, inner diameter 3 mm)
Objective side	5-mm rectangular cell (standard accessory)

Water circulated cell holder

(P/N 210-2111)

Heated water is circulated through this cell holder to maintain the cell at a constant temperature.



Specifications (not including cell or circulated-water heater)

Temperature range	Room temperature to 40 °C
Temperature stability	Within ±0.3°C

Micro cell holder

(P/N 122-0060)

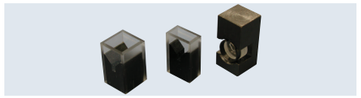
Used in medicine, biochemistry, and other disciplines to measure samples for which only micro volumes are available.

Specifications (not including special-purpose cell, also required)

Wavelength range	220 to 950 nm
Baseline flatness	Within ±0.0025 abs (when used with 50-µL trace-sample cell)

Micro cell

The following trace-sample cells may be used with the trace-sample cell holder (P/N 122-0060) listed above.

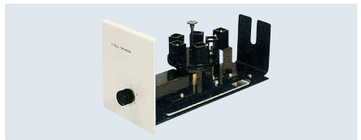


Part No.	Product name	Capacity	Optical path length
130-0622	50-µL trace-sample cell	50 µL	10 mm
130-0623	25-µL trace-sample cell	25 µL	5 mm
130-0621	5-µL trace-sample cell	5 µL	0.5 mm

5 Position turretcell holder

(P/N 210-2110)

Allows five 10-mm rectangular cells to be mounted on the sample side. Micro-cell masks (P/N 200-1537) may be inserted into each cell holder. (Cells and micro-cell masks not included). Recommended for use with a five-sample cell.



124-0352	10-mm quartz cell set (set of 5)
124-0378	10-mm glass set (set of 5)

4 Position rectangular long path cell holder

(P/N 150-0940)

Allows four long rectangular cells to be mounted on the sample side.
Cells may be replaced from the outside.

Specifications

Cell length	Supports cells of length 10, 20, 30, 40, 50, or 100 mm.

Rectangular long path cell holder

(P/N 210-2107)

Allows high-sensitivity measurement of low-concentration samples.

Long rectangular cell specifications:

Optical path length	10, 20, 30, 40, 50, 100 mm
Outer width	12.75 mm

Glass-filter holder

(P/N 210-2109)

Used to measure transmissivity and absorption for glass filters and other slab-shaped solid samples.

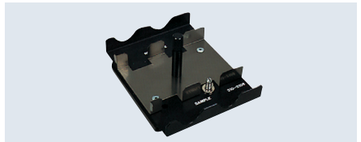
Specifications

Sample thickness	0.5 to 5 mm
Sample size	12×25 mm to 55×100 mm

Cylindrical long path cell holder

(P/N 210-2108)

Used to measure samples in cylindrical cells.



Film holder

(P/N 210-2112)

Used to measure film samples.

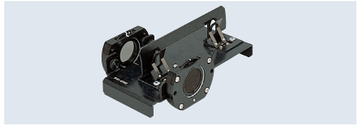
Specifications

Film frame	Width 25 mm, height 30 to 50 mm
Flux portal	Width 12 mm, height 20 mm

Polarizer holder

(P/N 210-2130)

Linearly polarizes sample light flux to study optical polarization. May be used to study optical rotation by placing sample between polarizer and detector.



Specifications

Wavelength range	400 to 750 nm
Sample thickness	0.5 to 5 mm
Sample size	12 × 25 mm (minimum) 55 × 100 mm (maximum)

Electronic thermostatted cell holder

(P/N 131-0306/0307)

Standard-equipped with a magnet stirrer to maintain a constant sample temperature in each cell. Temperature can be indicated down to a minimum 0.1˚C scale. Because of an electronic thermostatted type using forced air cooling, this cell holder is capable of quick heating and cooling. A thermostatic chamber is unnecessary.
(Temperature control: S only)

Specifications

Control temperature range	10°C to 60°C (settable in steps of 0.1°C) (normal temperature 25°C)
Temperature setting accuracy	Within ±2°C*(difference between set temperature and sample temperature)
Temperature stability	Within ±0.5°C*

* Room temperature: 25°C, sample: distilled water

Micro-cell mask

For insertion into standard 10-mm rectangular cell holder.

200-1537	Mask width 1.5 mm
200-1538	Mask width 1.2 mm

Micro-cell

124-0357	Micro 10-mm quartz cell (set of 2)
200-0551	Black micro 10-mm quartz cell (set of 2)

Thermoelectric cell holder with program function

(Thermostatted water bath is needed separately)
(P/N 131-0301/0302)

In the measurement of protein or nucleic acid fusion, a sample temperature can be changed continuously to determine variation in absorbance. Being of an electronic thermostatted type, this cell holder is capable of quick heating and cooling. Sample temperature can be increased and decreased isothermally. In addition, the set temperature can be maintained evenly inside a cell, because a stirrer is provided.
(Temperature control: S and R)

Specifications

Control temperature range	0°C to 100°C (settable in steps of 0.1°C) (normal temperature 25°C)
Temperature setting accuracy	Within ±2°C*(difference between set temperature and sample temperature)
Temperature stability	Within ±0.5°C*

* Room temperature: 25°C, sample: distilled water, circulatory water temperature: 22°C, set temperature: -10 to 105°C
A circulating thermostatic chamber needs to be prepared separately.

Hitachi certified 10 mm cell

(P/N 210-1462)

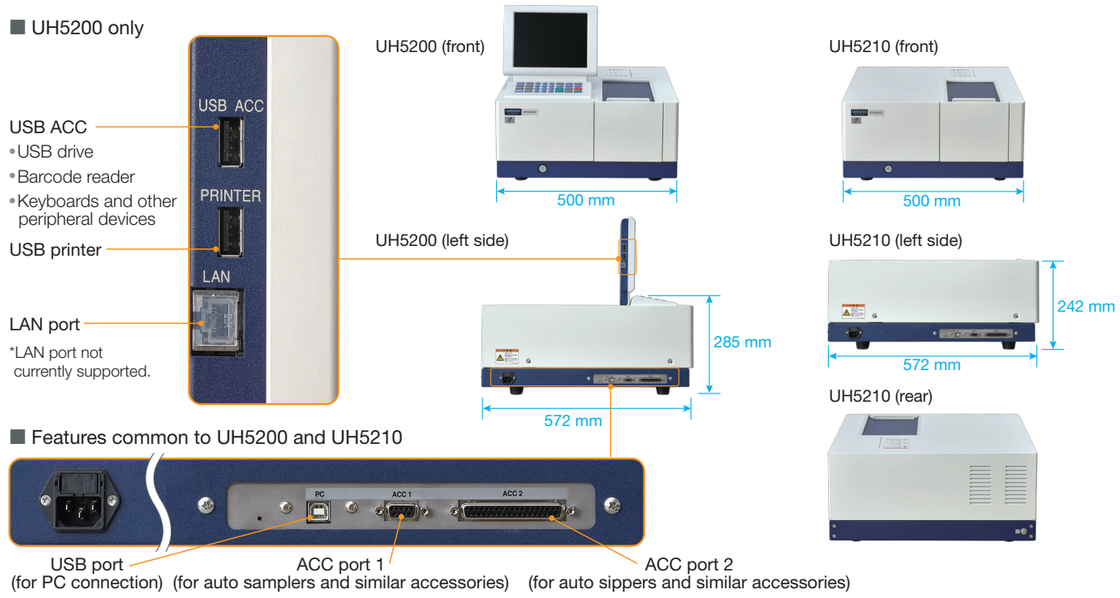
Displays optical path length at 21 points on the cell surface of a three-dimensional measurement instrument, with measurements (in units of millimeters) accurate to the fourth decimal place.

UV Solutions Plus software

(P/N 2J1-0180)

Software platform for PC control of measurement instruments. (Includes USB cable).

Instrument dimensions and port layouts



UH5200/UH5210

Specifications

Optical system	Double beam
Wavelength range	190 to 1,100 nm
Spectral bandwidth	1.5 nm
Stray light	0.05 % or less (220 nm NaI, 340 nm $NaNO_2$)
Wavelength accuracy	±0.3 nm (at 656.1 nm, after wavelength calibration)
Wavelength setting repeatability	±0.1 nm
Photometric range	−3 to 3 Abs
	0 to 300 %T
Photometric accuracy (certified according to NIST SRM 930*1)	±0.002 Abs (0 to 0.5 Abs)
	±0.004 Abs (0.5 to 1.0 Abs)
	±0.008 Abs (1.0 to 2.0 Abs)
	±0.3 %T
Photometric repeatability (certified according to NIST SRM 930*1)	±0.001 Abs (0 to 0.5 Abs)
	±0.002 Abs (0.5 to 1.0 Abs)
	±0.004 Abs (1.0 to 2.0 Abs)
	±0.1 %T
Wavelength scan speed	10, 100, 200, 400, 800, 1,200, 2,400, 3,600 nm/min
Response	Fast, standard, slow
Baseline stability	0.0003 Abs/h (for wavelength 500 nm, measured 2 h after instrument powered on)
Noise level	0.00004 Abs (RMS、500 nm、0 Abs)
Baseline flatness	±0.0006 Abs (200 to 950 nm)
Light sources	WI and D_2 lamps
Light source switching	Auto (user selectable from 325 to 370 nm)
Detector	Silicon photodiode
Display	UH5200: backlit 26.4 cm color LCD screen
Printer interface	USB
PC connection interface	USB (use UV Solutions Plus*2 software for PC control)
Dimensions (main unit)*3	UH5200: 500(W) × 572(D) × 285(H) mm (with LCD screen retracted)
	UH5210: 500(W) × 572(D) × 242(H) mm (not including PC or printer)
Weight (main unit)	UH5200: 31 kg ／ UH5210: 28 kg
Power	UH5200: 100 to 240 V, 160 VA, 50/60 Hz
	UH5210: 100 to 240 V, 160 VA, 50/60 Hz
Power consumption	UH5200:140 W or less ／ UH5210:135 W or less
UV Solutions Plus software	Standard software (optional for UH5200, standard for UH5210)

*1 Uncertainties in filters must be taken into account when making these measurements.
*2 The UH5200 may be PC-controlled by installing the optional UV Solutions Plus software package (includes USB cable).
*3 Excluding connectors and other protruding components.

Software functions*

- Measurement mode
  - Photometry
  - Wavelength scan
  - Time scan
  - Multiple wavelength
- Ratio (260/280)
- Type of calibration curve
  - Linear
  - Quadratic
  - Polygonal line
  - Input K-factors
- Calculation of correlation coefficient
- Concentration unit input
- Rate calculation
- Print spectrum or calibration curve
- Spectrum display
- Peak/valley detection
- Tracing
- Scale Enlarge / reduce
- Smoothing
- Differentiation
- Area calculation
- Fundamental arithmetic calculations between spectra
- Data saving
- Validation function
- Automatic wavelength calibration
- Optical path-length correction
- Lamp usage time

*Capability available for standalone operation of the UH5200. Similar capabilities are also available for PC-controlled operation.

Science for a better tomorrow

CAUTION: For correct operation, follow the instruction manual when using the instrument.
Specifications in this catalog are subject to change with or without notice, as Hitachi High-Tech Science Corporation continues to develop the latest technologies and products for its customers.
NOTICE: The system is For Research Use Only, and is not intended for any animal or human therapeutic or diagnostic use.
These data are an example of measurement; the individual values cannot be guaranteed.

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