207-90563
Sep. 2019

Shimadzu Spectrophotometer

UV-1900i

Instruction Manual

Operation Guide

Read this manual thoroughly before you use the product.
Keep this manual for future reference.

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Introduction

Read this Instruction Manual thoroughly before using the instrument.

Thank you for purchasing this instrument.

This manual describes the operation of this instrument and the software.

Read this manual thoroughly before using the instrument and operate the instrument in accordance with the instructions in this manual.

Use the instrument in accordance with the manual's instructions. Keep this manual for future reference.

Important

- If the user or usage location changes, ensure that this manual is always kept together with the product.
- If this manual or a product warning label is lost or damaged, immediately contact your Shimadzu representative to request a replacement.
- To ensure safe operation, read all "Safety Instructions" P.iv thoroughly before using the product.
- To ensure safe operation, contact your Shimadzu representative if product installation, adjustment, re-installation (after the product is moved), or repair is required.

Notice

- Information in this manual is subject to change without notice and does not represent a commitment on the part of the vendor.
- Any errors or omissions which may have occurred in this manual despite the utmost care taken in its production will be corrected as soon as possible, although not necessarily immediately after detection.
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Original version is approved in English.

Components of This Manual

The following manuals are supplied with this product.

Document Name	Document No.	Description
UV-1900i Instruction Manual (Operation Guide)	S207-90563	Describes operation of the UV-1900i software.
UV-1900i Instruction Manual (Installation and Maintenance Guide)	S207-90555	Describes installation and maintenance of the UV-1900i.
UV-1900i Basic Operation Guide	S207-90571	Describes basic operation of the UV-1900i.
UV-1900i Important Information – Please Read	S207-90578	Describes the instructions for using the UV-1900i safely.

Indications Used in This Manual

Warnings, Cautions, and Notes are indicated using the following conventions:

Indication	Meaning
⚠ WARNING	Indicates a potentially hazardous situation which, if not avoided, could result in serious injury or possibly death.
⚠ CAUTION	Indicates a potentially hazardous situation which, if not avoided, may result in minor to moderate injury or equipment damage.
NOTE	Emphasizes additional information that is provided to ensure the proper use of this product.

The following symbols are used in this manual:

Indication	Meaning
Prohibition	Indicates an action that must not be performed.
Instruction	Indicates an action that must be performed.
Reference	Indicates the location of related reference information.

Safety Instructions

To ensure safe product operation, read these important safety instructions carefully before use and follow all WARNING and CAUTION instructions given in this section.

■ Product Applications

⚠ WARNING

Safety regulations and standards

For notifications on installation and safety controls, follow the necessary procedures in compliance with the laws and regulations applicable in the country where the product is used.

Use the instrument ONLY for the intended purpose.

This instrument is a UV-Vis spectrophotometer.
Using this instrument for any other purpose could cause accidents.

■ Installation Site

⚠ WARNING

When using flammable or toxic samples, install the UV-1900i in a room with adequate ventilation.

Inadequate ventilation may cause a serious accident.

⚠ CAUTION

The weight of the main body is 16.6 kg. Install the instrument on a desk or a stand that can sufficiently support the total weight of the instrument including peripherals and has a flat and stable surface with at least 600 mm depth.

If the installation site does not have sufficient strength or stability, the instrument may tip over or fall down, causing an accident.

Do NOT install the UV-1900i in an area with corrosive gases or a dusty place.

It may cause decline in performance or shorten the life.

Do NOT install the UV-1900i near an instrument that produces strong magnetic fields.

Strong magnetic field may cause instrument malfunction.
Filters may be added to the power supply lines to reduce any electrical noise.

⚠ CAUTION

Instruction

To ensure instrument performance, the installation site should meet the following requirements.

- The ambient temperature must be between 15 °C and 35 °C with minimal temperature variations.
- Air currents from air conditioners and heating systems must be avoided.
- Exposure to direct sunlight must be avoided.
- The site must be free from vibration.
- Humidity must remain between 35 % and 80 %. No condensation. However, keep the humidity under 70 % when the ambient temperature is higher than 30 °C.

Instruction

Ensure that there is at least 100 mm of clearance between the left side of the main body and the wall.

The power supply unit and the light source unit cooling fan are located on the left side of the main body.
If the space is insufficient, the air cooling system with a fan may work improperly, overheating the instrument and deteriorating its performance.

NOTE Install the product in an indoor location under the following classifications: installation category II, pollution level 2, and altitude 2,000 meters max.

■ Installation

⚠ WARNING

Instruction

To ensure safe operation, contact your Shimadzu representative if product installation, adjustment, or re-installation (after the product is moved) is required.

Installing, adjusting, or re-installing the product by yourself may cause an injury or equipment failure, or affect stable operation of the product.

Instruction

Take countermeasures to prevent toppling over due to an earthquake, etc.

If the instrument topples over due to vibration, it may cause an injury.

⚠ WARNING

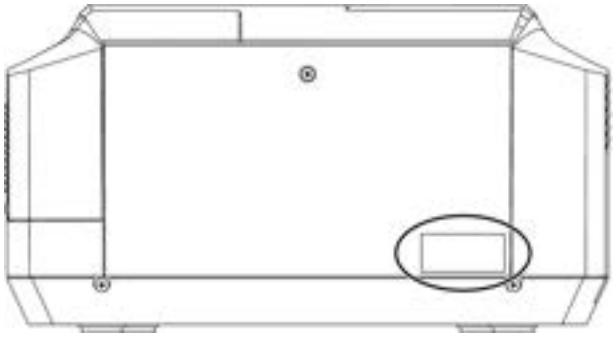
Instruction

The following table shows power supply voltage and power consumption of the UV-1900i. Be sure to connect the power supply that meets the indicated specifications.

Failure to do so may result in fire, electric shock, and instrument malfunction. Unstable power supply voltage or insufficient power capacity may deteriorate the performance.

Power Supply Voltage (Indication on product nameplate)	Power Consumption	Frequency	Short Circuit Current Rating
100 VAC to 240 VAC (~100-240 V)	140 VA	50/60 Hz	50 A

The power supply voltage is also indicated on the rear side of the main body.



Instruction

Ground the instrument.

- If the instrument is not grounded, it may cause malfunction and electric shock in case of current leakage.
  It is also important for stable operation of the instrument.
- Use the same ground for all units to achieve equipotential grounding when using a computer or electric attachments.

Instruction

Be sure to use the power cord that was included with the instrument.

Instruction

Leave space to access the power switch on the right side of the main body and the power cord on the left side of the main body.

In case of emergency, you need to disconnect the instrument from the power supply.
Allow sufficient space around the instrument to immediately access the instrument and turn off the power switch on the right side of the main body or disconnect the power cord from the AC power connector on the left side of the main body.

⚠ WARNING

Do NOT place heavy objects on the power cord. Keep thermal appliances away from the power cord.
Do NOT modify or forcefully bend or stretch the power cord.
Hold the power plug when inserting in and removing the cable from the power outlet.

Damage of the cable may result in fire, electric shock, and instrument malfunction.
When you find a damage of the cable, immediately contact your Shimadzu representative or our authorized service center.

■ Operation

⚠ WARNING

Wear protective gloves and glasses, etc. when handling toxic/biohazardous samples.

Do NOT use a flammable gas spray (hair spray, insecticide spray, etc.) near the instrument.

If the gas catches fire, it may result in fire.

⚠ CAUTION

If the sample is spilled, dispose of it according to handling and disposal methods described in the SDS (Safety Data Sheet) of the sample.

When using electronic equipment with the UV-1900i, be careful not to spill liquid (sample, etc.) on the equipment.

Do not use a cell phone or a smartphone near the instrument.

It may cause abnormal data.

Do NOT place a printer or reagents on the instrument.

- The load may affect data.
- If reagents spill on the instrument, they may contaminate or corrode the instrument.

When using a USB memory device, perform virus scan before connecting it to the instrument to make sure the device is virus-free.
Confirm also that it is not damaged.

■ Inspection and Maintenance

⚠ WARNING

Unless otherwise specified, be sure to turn "OFF" the UV-1900i and remove the power plug from the outlet before performing inspection, maintenance, or replacement of parts.

If the instrument is powered, it may result in fire, electric shock, accidents due to short circuits and instrument malfunction.

Do NOT remove the cover of the main body.

Touching the inside parts may cause injuries or instrument malfunction. Normal maintenance and inspection do not require to remove the main body cover. For repair that requires to remove the main body cover, ask your Shimadzu representative or our authorized service center.

When the pins of the power plug and the surface where the pins are attached are dusty, unplug the power plug and clean them with a dry cloth.

If they are dusty, it may result in fire.

When replacing parts, always use the parts specified. Refer to "1.1 UV-1900i Configuration" or "6.2 Maintenance Parts" in "UV-1900i Instruction Manual (Installation and Maintenance Guide)".

Other parts may cause damage of parts or malfunction and prevent proper operation.

Do NOT leave any spilled water on the UV-1900i. Do NOT use alcohol or paint thinner solvents for cleaning.

If water or a solvent is left on the instrument, it may cause rust or discoloration.

Process waste fluids properly according to regulations and instructions provided by the management department.

■ Repair, Disassembly and Modification

⚠ CAUTION

Do NOT modify or disassemble the UV-1900i.

If you touch the inside of the instrument or carry out abnormal operation, it may result in fire, electric shock, and instrument malfunction.

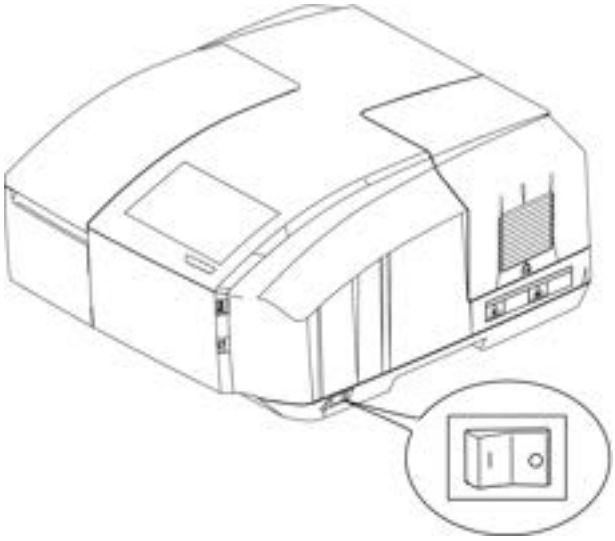
For repair, contact your Shimadzu representative or our authorized service center.

If you repair the instrument by yourself, it may result in fire, electric shock, and instrument malfunction.

■ In an Emergency

In an emergency situation, perform the following operations.

1 Press the "○" side of the power switch located on the right side bottom of the UV-1900i to turn OFF the instrument.



2 Disconnect the power cord from the AC power connector on the left side of the main body.

■ During a Power Outage

In case of electrical failure, perform the following operations.

1 Press the "○" side of the power switch located on the right side bottom of the UV-1900i to turn OFF the instrument.

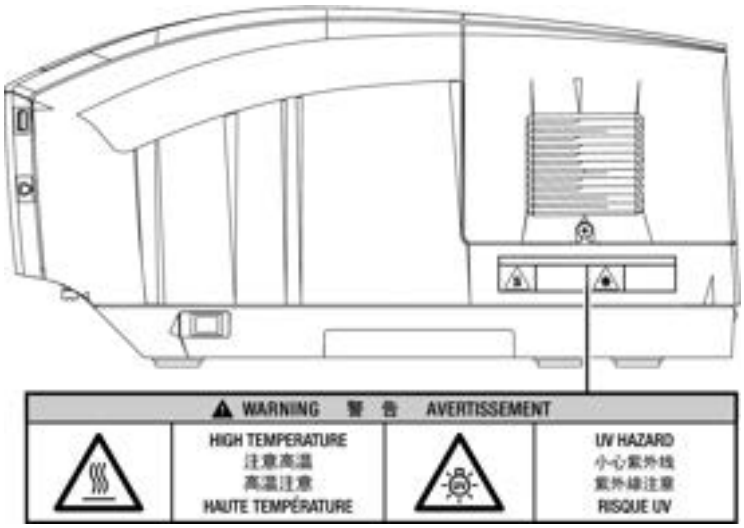
2 After the power comes back on, start up the UV-1900i normally by following "Installation" P.v and "Operation" P.vii.

Warning Labels

In order to ensure safety, warning labels are attached in places requiring caution.

If a warning label is lost or damaged, obtain a new label through your Shimadzu representative and attach it in the correct position. See "Warning Labels on the Equipment" in this Instruction Manual for details on the positions where the labels are attached.

Right side

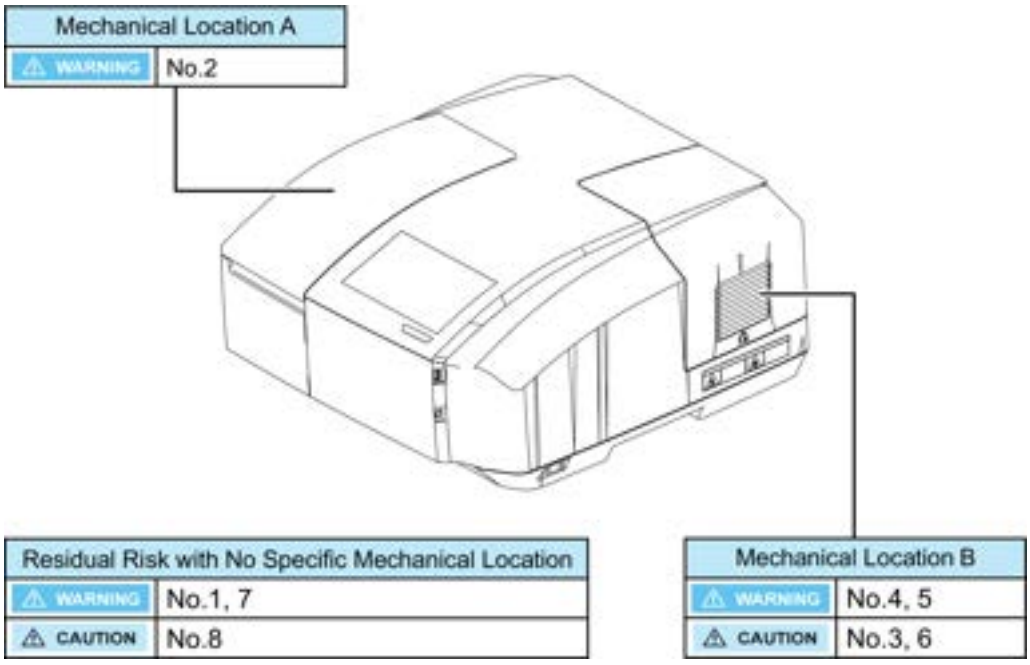


Residual Risk Information

A residual risk indicates a risk that could not be reduced or eliminated in the process of design and manufacture. Check the risk locations in "Residual Risk Map", and take the relevant protective measures described in "List of Residual Risks".

■ Residual Risk Map

The "Mechanical Location" and "No." indicated below are in accordance with those in "List of Residual Risks". For details, see "List of Residual Risks".



■ List of Residual Risks

The "No." and "Mechanical Location" indicated below are in accordance with those in "Residual Risk Map". Be sure to check the actual "Mechanical Location" referring to "Residual Risk Map".
Furthermore, read through and understand the content in "Reference" to take appropriate protective measures.

Preparation

No.	Mechanical Location	Description	Protective Measure taken by machine user	-	-
1	No specific location	⚠WARNING Vaporized sample may catch fire. Vaporized toxic material may do harm.	When using flammable or toxic samples, provide adequate ventilation.	Reference	"Installation Site" P.iv
				Operation Category	Sample installation
				Required Qualification/ Education	Qualified person received training to use the instrument
2	A	⚠WARNING The sample may spill on your body because the cover closes during cell replacement and it may result in harm.	Wear protective gloves when using toxic/biohazardous samples.	Reference	"Operation" P.vii
				Operation Category	Sample installation
				Required Qualification/ Education	Qualified person received training to use the instrument

Operation

No.	Mechanical Location	Description	Protective Measure taken by machine user	-	-
3	B	⚠CAUTION If the lamp is dirtied by fingerprints, or overheats the lamp may damage the instrument or explode.	Wear protective gloves when replacing the lamp to prevent it from being soiled by fingerprints, etc.	Reference	"3.4.2 Lamp Replacement Procedure" in "UV-1900i Instruction Manual (Installation and Maintenance Guide)"
				Operation Category	Lamp lighting
				Required Qualification/ Education	Qualified person received training to use the instrument

Maintenance

No.	Mechanical Location	Description	Protective Measure taken by machine user	-	-
4	B	⚠WARNING If the lamp is replaced while it is turned on, it may cause burns or electric shock.	When replacing the lamp, turn "OFF" the power and remove the power plug from the outlet.	Reference	"3.4.2 Lamp Replacement Procedure" in "UV-1900i Instruction Manual (Installation and Maintenance Guide)"
				Operation Category	Lamp replacement
				Required Qualification/ Education	Qualified person received training to control the instrument
5	B	⚠WARNING If the lamp is replaced while it is hot, it may cause burns.	When replacing the lamp, turn "OFF" the power and remove the power plug from the outlet. Then, leave it until the lamp cools down.	Reference	"3.4.2 Lamp Replacement Procedure" in "UV-1900i Instruction Manual (Installation and Maintenance Guide)"
				Operation Category	Lamp replacement
				Required Qualification/ Education	Qualified person received training to control the instrument
6	B	⚠CAUTION Lamp damage or explosion, due to careless handling during replacement, may result in injury.	Comply with instructions in the manual during lamp replacement. Be careful not to bump the lamp against other objects.	Reference	"3.4.2 Lamp Replacement Procedure" in "UV-1900i Instruction Manual (Installation and Maintenance Guide)"
				Operation Category	Lamp replacement
				Required Qualification/ Education	Qualified person received training to control the instrument

Installation

No.	Mechanical Location	Description	Protective Measure taken by machine user	-	-
7	No specific location	WARNING Vibration due to an earthquake may cause toppling over of the instrument and it may result in an injury.	Take countermeasures to prevent toppling over.	Reference	"Installation" P.v
				Operation Category	Instrument installation
				Required Qualification/ Education	Instrument manager
8	No specific location	CAUTION Falling or dropping may cause an injury.	The weight of the main body is 16.6 kg. Install the instrument on a desk or a stand that can sufficiently support the total weight of the instrument including peripherals and has a flat and stable surface with at least 600 mm depth.	Reference	"Installation Site" P.iv
				Operation Category	Instrument installation
				Required Qualification/ Edcation	Instrument manager

Warranty

Shimadzu provides the following warranty for this product.

1. **Period:**

   Please contact your Shimadzu representative for information about the period of this warranty.

2. **Description:**

   If a product/part failure occurs for reasons attributable to Shimadzu during the warranty period, Shimadzu will repair or replace the product/part free of charge. However, in the case of products which are usually available on the market only for a short time, such as personal computers and their peripherals/parts, Shimadzu may not be able to provide identical replacement products.

3. **Limitation of Liability:**

   (1) In no event will Shimadzu be liable for any lost revenue, profit or data, or for special, indirect, consequential, incidental or punitive damages, however caused regardless of the theory of liability, arising out of or related to the use of or inability to use the product, even if Shimadzu has been advised of the possibility of such damage.

   (2) In no event will Shimadzu's liability to you, whether in contract, tort (including negligence), or otherwise, exceed the amount you paid for the product.

4. **Exceptions:**

   Failures caused by the following are excluded from the warranty, even if they occur during the warranty period.

   (1) Improper product handling

   (2) Repairs or modifications performed by parties other than Shimadzu or Shimadzu designated companies

   (3) Product use in combination with hardware or software other than that designated by Shimadzu

   (4) Computer viruses leading to device failures and damage to data and software, including the product's basic software

   (5) Power failures, including power outages and sudden voltage drops, leading to device failures and damage to data and software, including the product's basic software

   (6) Turning OFF the product without following the proper shutdown procedure leading to device failures and damage to data and software, including the product's basic software

   (7) Reasons unrelated to the product itself

   (8) Product use in harsh environments, such as those subject to high temperatures or humidity levels, corrosive gases, or strong vibrations

   (9) Fires, earthquakes, or any other act of nature, contamination by radioactive or hazardous substances, or any other force majeure event, including wars, riots, and crimes

   (10) Product movement or transportation after installation

   (11) Consumables and equivalent items

   Recording media such as CD-ROMs are considered consumable items.

* If there is a document such as a warranty provided with the product, or there is a separate contract agreed upon that includes warranty conditions, the provisions of those documents shall apply.

After-Sales Service and Availability of Replacement Parts

■ After-Sales Service

If any problem occurs with this product, perform an inspection and take appropriate corrective action as described refer to "5 Troubleshooting" in "UV-1900i Instruction Manual (Installation and Maintenance Guide)".

If the problem persists, or the symptoms are not covered refer to "5 Troubleshooting" in "UV-1900i Instruction Manual (Installation and Maintenance Guide)", contact your Shimadzu representative.

■ Replacement Parts Availability

Replacement parts for this product will be available for a period of seven (7) years after the product is discontinued. Thereafter, such parts may cease to be available.

Note, however, that the availability of parts not manufactured by Shimadzu shall be determined by the relevant manufacturers.

Maintenance, Inspections, and Adjustment

In order to maintain the instrument's performance and obtain accurate measurement data, daily inspection and periodic inspection are necessary.

- For daily maintenance, inspection, and replacement parts, refer to "3 Maintenance" in "UV-1900i Instruction Manual (Installation and Maintenance Guide)".
- Periodic inspection should be requested to your Shimadzu representative.
- Replacement cycles described for periodic replacement parts are a rough estimate. Replacement may be required earlier than the described replacement cycles depending on usage environment and frequency.

Disposal Precautions

- The instrument includes batteries.
  To dispose of the instrument, commission an industrial waste disposal contractor to dispose of it according to the local laws and regulations.
- Dispose of the instrument and D2 (deuterium) lamp as industrial waste.
  Materials used for the D2 (deuterium) lamp include metal (tungsten), quartz glass, ceramic, and plastic.
  When disposing of the instrument and the lamp, do so in accordance with the processing standards determined by law, or ask an industrial waste disposer officially licensed for hazardous waste disposal.

For California, USA Only

⚠ CAUTION

This product contains a battery that contains perchlorate material.
Perchlorate Material - special handling may apply.
See www.dtsc.ca.gov/hazardouswaste/perchlorate

Electromagnetic Compatibility

Descriptions in this section apply only to the following models:

• 207-25700-58 UV-1900i

This product complies with European standard EN61326, class B for electromagnetic interference (Emissions) and industrial immunity test requirements (Immunity).

NOTE This product complies with the basic immunity test requirements (Immunity) only when used with the optional instruments CPS-100 and TCC-100.

■ EN55011 Emissions (Electromagnetic Interference)

This is a class B product.

■ EN61326-1 Immunity (Electromagnetic Susceptibility)

Compliance with these standards does not ensure that the product can operate at a level of electromagnetic interference that is stronger than the level tested. Interference stronger than the values specified above may cause the product to malfunction.

When connecting this product to the optional instruments CPS-100 and TCC-100, pay extra attention to the following items especially in industrial environments.

Locate the product away from any device emitting strong levels of electromagnetic noise. Use a power source that is separated from the power source of any device emitting strong levels of electromagnetic noise.

To prevent static electricity:

Prior to touching the product, the operator should be sure to discharge the static electricity stored in their body by first touching a grounded metallic structure.

Do not touch any terminals or connectors that are not connected to cables while the product is turned ON.

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3 Selecting Measurement Mode and Function Menu

4 Common Operations

5 Managing Files (Copy, Delete, Save in a CSV Format)

6 Photometric (One-Wavelength)

12 Time Course

13 Bio Method

14 Data Processing

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1 Overview of the Instrument

1.1 How to Operate the Instrument

The instrument can be operated using the touch panel screen or a personal computer (PC).

1.1.1 Operation Using the Touch Panel Screen

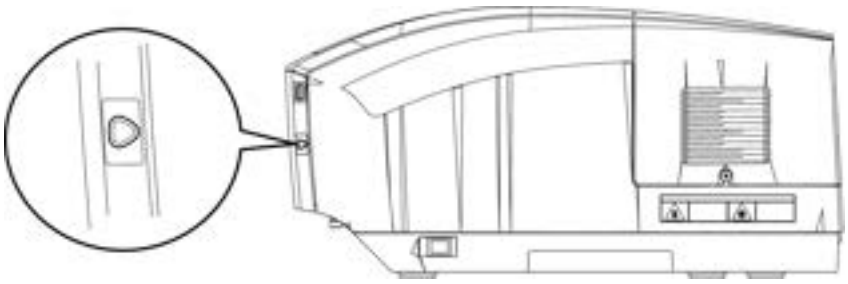
Operate the instrument by tapping (touching softly) items and buttons displayed on the screen with the supplied touch pen.

⚠ CAUTION

Prohibition

Do NOT press the screen using a sharp-tipped instrument such as ballpoint pen.
It may damage the screen.

The touch pen is initially held in the pen holder on the right side of the main body. Take out the touch pen from here when using the instrument for the first time.



- To take out the touch pen, lightly push the touch pen in, and then leave it. The touch pen comes out and you can pull it out.
- To put it back, push it until it clicks.

1.1.2 Operation Using a Personal Computer (PC)

Set the instrument to the external control mode to control it using a PC.

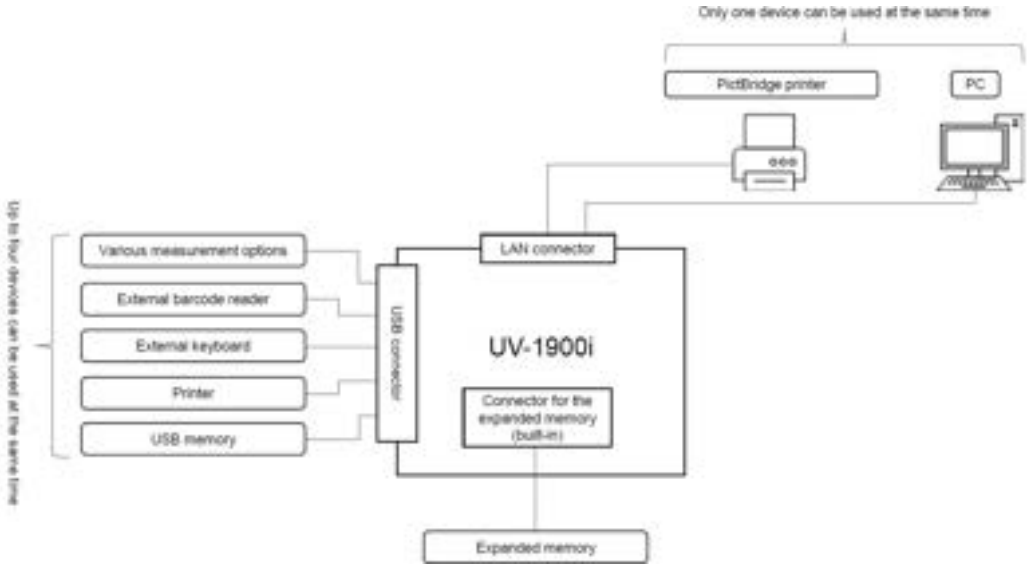
Reference "18 PC Control Mode" P.427

1.2 Connection to the Instrument and Necessary Devices

For typical systems that use UV-1900i, this section outlines how to connect them and available functions.

1.2.1 Operation on the Touch Panel Screen (without Connection to the Network)

The connection method is as shown below.



Purchase the necessary devices to use the functions listed in the table below.

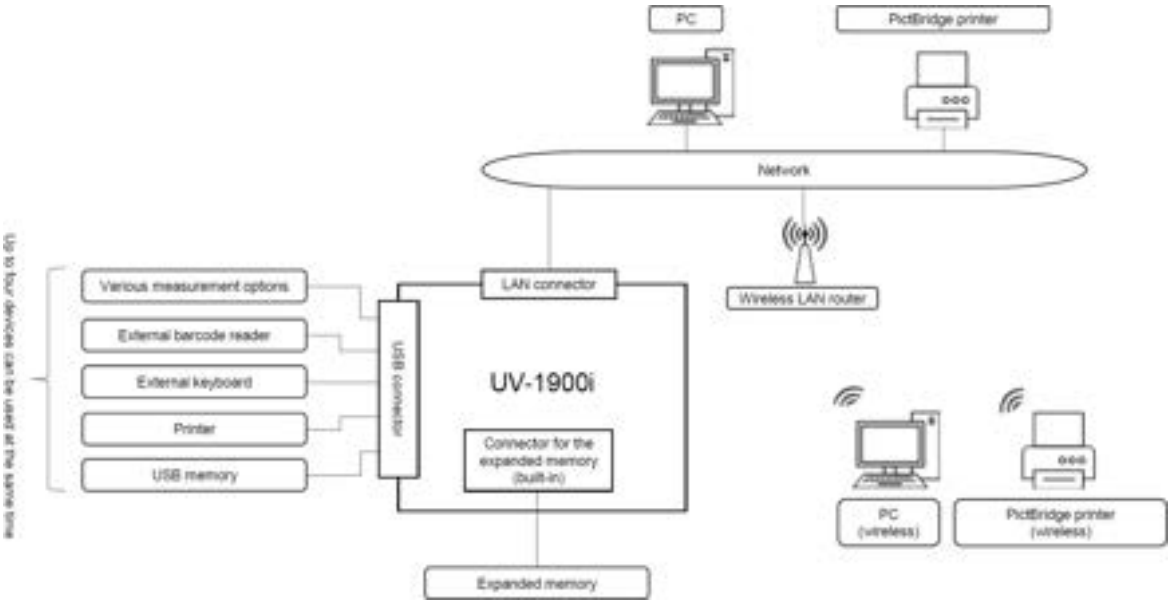
Function	Necessary Devices	Used Connector	Remarks
Printing by PictBridge printer	PictBridge printer LAN cable	LAN connector	PictBridge printer and the PC for data transfer cannot be connected at the same time.
Transfer of measured data in text format to the PC by Telnet client software NOTE The only measurement modes that can be used are Spectrum and Photometric (one-wavelength measurement).	PC for data transfer LAN cable		
Acquisition of files in the expanded memory by the PC with FTP client software	PC for data acquisition Expanded memory LAN cable		

Function	Necessary Devices	Used Connector	Remarks
Measurement using various measurement options	Various measurement options	USB connector Optional device connector Multi-cell driver connector	Up to four USB connectors can be used at the same time.
Using an external keyboard (optional)	External keyboard	USB connector	
Using an external barcode reader (optional)	External barcode reader		
Printing by a printer (optional)	Printer		
Saving/copying data in a USB memory (optional)	USB memory		
Saving/copying data in the expanded memory (optional)	Expanded memory	Connector for the expanded memory (built-in)	The installation of the expanded memory is performed by our authorized service personnel.

NOTE PictBridge is a registered trademark of the Camera & Imaging Products Association.

1.2.2 Operation on the Touch Panel Screen (with Connection to the Network)

The connection method is as shown below.



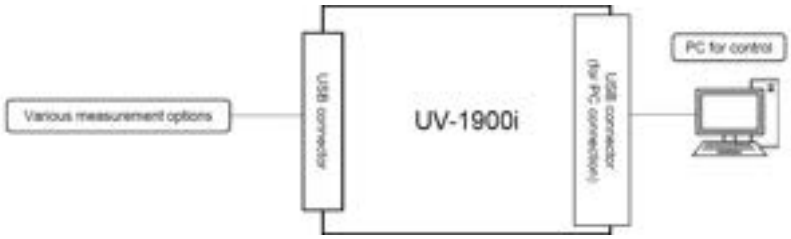
Purchase the necessary devices to use the functions listed in the table below.

Function	Necessary Devices	Used Connector	Remarks
Printing by PictBridge printer	PictBridge printer LAN cable	LAN connector	• PictBridge printer and the PC for data transfer on the network can be used at the same time. • Since this instrument does not have a wireless LAN function, a LAN cable is required to connect to the network.
Transfer of measured data in text format to the PC by Telnet client software **NOTE** The only measurement modes that can be used are Spectrum and Photometric (one-wavelength measurement).	PC for data transfer LAN cable		
Acquisition of files in the expanded memory by the PC with FTP client software	PC for data acquisition Expanded memory LAN cable		

Function	Necessary Devices	Used Connector	Remarks
Measurement using various measurement options	Various measurement options	USB connector Optional device connector Multi-cell driver connector	Up to four USB connectors can be used at the same time.
Using an external keyboard (optional)	External keyboard	USB connector	
Using an external barcode reader (optional)	External barcode reader		
Printing by a printer (optional)	Printer		
Saving/copying data in a USB memory (optional)	USB memory		
Saving/copying data in the expanded memory (optional)	Expanded memory	Connector for the expanded memory (built-in)	The installation of the expanded memory is performed by our authorized service personnel.

1.2.3 Operation Using a Personal Computer

The connection method is as shown below.



Purchase the necessary devices to use the functions listed in the table below.

Function	Necessary Devices	Used Connector	Remarks
Measurement using various measurement options	Various measurement options	USB connector Optional device connector Multi-cell driver connector	-
Control by the provided software LabSolutions UV-Vis	PC for control USB cable	USB connector (For PC control)	• Only one software can communicate with the instrument at the same time. • Communication via LAN cable is not possible.
Control by optional software (UVProbe, UV Performance Validation, etc.)			

2 Before Operating

2.1 Application of Power

2.1.1 Operation Precautions

■ **Precautions before operation**

⚠ CAUTION

Instruction

Before turning "ON" the power switch, make sure that nothing is placed in the sample compartment and the cell holder.

If the power is turned "ON" when a sample cell is mounted into the UV-1900i, Light Source Energy Check and WL Check function may detect it as an error since the light beam is obstructed.
Turn "OFF" the power and remove the cell before operation, and then turn "ON" the power.

Instruction

When the "Sipper 160" (optional) is mounted, drain the sample in the flow cell and fill it with distilled water before operation.

If the sample remains halfway within the cell, Light Source Energy Check and WL Check function may detect it as an error since the beam is refracted or scattered on the remaining sample.
Perform the following procedures.

1. Turn "ON" the power.
   Initialization starts.
2. When the message below appears, tap [Yes] and hold down the sipper 160 suction lever.
   If you do not tap anything for 5 seconds after the message is displayed, the next initialization process automatically starts.

3. Suction distilled water from the sample suction port.
4. When distilled water starts to drain, release the lever.
   The suction operation completes, and initialization restarts.

■ Precautions during operation

⚠ CAUTION

Keep the sample compartment cover closed during measurement or Auto Zero operation.

If the sample compartment cover opens, outside light is detected on the spectrometer and interferes with accurate measurement and correction.

NOTE Performing Auto Zero corrects the current photometric value to 100 % for transmittance measurement, and 0 Abs for absorbance measurement, with respect to the currently set wavelength. Performing this correction only for the specified wavelength is called "Auto Zero", and performing within the specified wavelength range is "Baseline Correction" ([Base Corr.] in the buttons of the instrument).

2.1.2 Turning ON Power and Initialization

When the instrument power is turned ON, the UV-1900i starts executing various checks and initializations.

For details on this procedure, refer to "2.5 Turning ON/OFF the Power and Initialization" in "UV-1900i Instruction Manual (Installation and Maintenance Guide)".

2.2 Login and Logout

The UV-1900i has a security function that limits function availability according to user level.

When the security function is enabled, login is required after completing initialization at power-on and logging out of the current user level.

> **NOTE** The initial password for all user levels of "Administrator," "Developer," and "Operator" is set to "Shimadzu".

Reference "16.4 Security Mode" P.274

2.2.1 Changing User Level and Login

1 **Select the user level for login.**

1. Tap the user level selection field.
2. Tap the user level for login.
   There are 3 types of user level: [Administrator], [Developer], and [Operator].

2 Enter the password.

1 Tap the [Password] entry field.

2 Enter the password.

Reference Text Input Screen ("4.2.1 Text Input Screen (Keyboard)" P.27)

3 Tap [Login].

After login, the [Mode Menu] screen ("3.1 Mode Menu Screen" P.18) appears.

2.2.2 Logout

1 **Tap [Log Out] while logged in.**

Logout is completed and the login screen appears "2.2.1 Changing User Level and Login" P.9.

2.3 Using USB Memory

A commercially available USB memory disk can be connected to the instrument to save files and to transfer them to a PC.

The USB connector for connecting the USB memory is located on the right side of the main body ("1.2.3 Main Body, Right Side View" in "UV-1900i Instruction Manual (Installation and Maintenance Guide")).

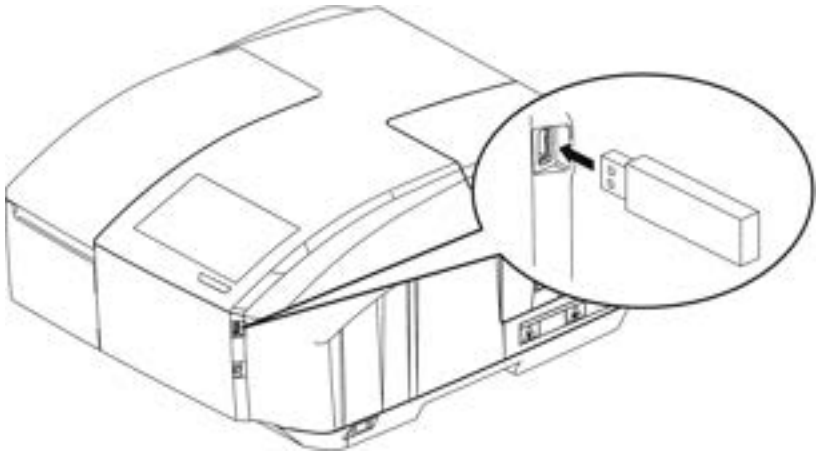
⚠ CAUTION

Instruction

When using a USB memory device, perform virus scan before connecting it to the instrument to make sure the device is virus-free.
Confirm also that it is not damaged.

NOTE

- The USB memory can also be connected to the USB connector located on the left side of the main body. ("1.2.2 Main Body, Left Side View" in "UV-1900i Instruction Manual (Installation and Maintenance Guide))".
  However, the UV-1900i can only recognize one connected USB memory device at a time.
- For details on the procedure for using the USB memory device, refer to the instruction manual of the USB memory device.



If files on the instrument are copied to the PC using a USB memory, you can:

- Backup parameters file and measurement data file.
  Copy files to hard disc of the PC and save them as backups.
  For details on the way to save parameters file and measurement data file, see "4.3 Saving Files" P.32.
- Read measurement data file on a spreadsheet software.
  The UV-1900i can convert the measurement data file to a CSV format file, which can be read on any software supporting the format.
  For details on CSV conversion of the measurement data file, see "5 Managing Files (Copy, Delete, Save in a CSV Format)" P.48.

NOTE Precautions for connecting the USB memory

- When a USB memory is connected, USB Status icon illuminates.

- The USB memory can be connected or removed regardless of the power ON/OFF status of the UV-1900i.
  However, removal during data communication may damage the data.
  While  is displayed in USB Status, do not remove the USB memory.
- Number of files which can be saved in the USB memory depends on its capacity.
- UV-1900i uses 3 file types: Parameters File, Curve Data File, and Table Data File. The instrument can display limited number of files in the USB memory. 999 files can be displayed for each file type. Files are displayed in alphabetical order.

2.4 Using Expanded Memory

The expanded memory (optional) can be connected to the instrument to save files used for the instrument and to acquire the saved files from the PC.

NOTE The connector to which the expansion memory is attached is inside the instrument. Therefore, contact your Shimadzu representative or our authorized service center to use the connector.

Reference For the functions available when files in the instrument are transferred to the PC, see "2.3 Using USB Memory" P.12.

NOTE Precautions for connecting the expanded memory

- When the expanded memory is connected, "Expanded Memory: Available" is displayed on [Format Expanded Memory] in the General Settings menu.

- Number of files which can be saved in the expanded memory depends on its capacity.
- UV-1900i uses 3 file types: Measurement Parameters File, Curve Data File, and Table Data File. The instrument can display limited number of files in the expanded memory. 999 files can be displayed for each file type. Files are displayed in alphabetical order.

2.4.1 Acquisition of Files in the Expanded Memory by the PC

Data saved in the expanded memory can be acquired from a PC with FTP client software. This section explains operation procedures when the OS of the PC is Windows.

NOTE
- To use this function, the instrument and the PC should be connected with a LAN cable (including via the network).
- Data cannot be copied from the PC to the expanded memory.

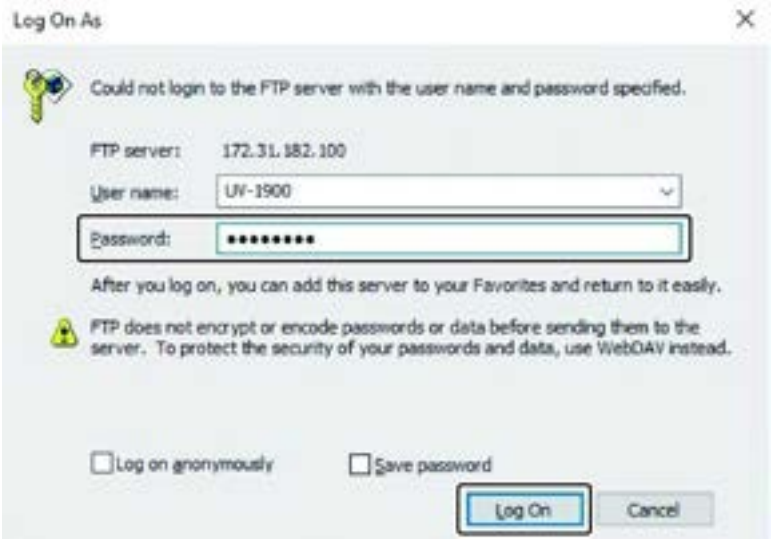
1 **Turn ON the power of the instrument.**

2 **Turn ON the power of the PC.**

3 **Enter "ftp://UV-1900@xxx.xxx.xxx.xxx (IP address of the instrument)" in the address bar of the Explorer and go there.**

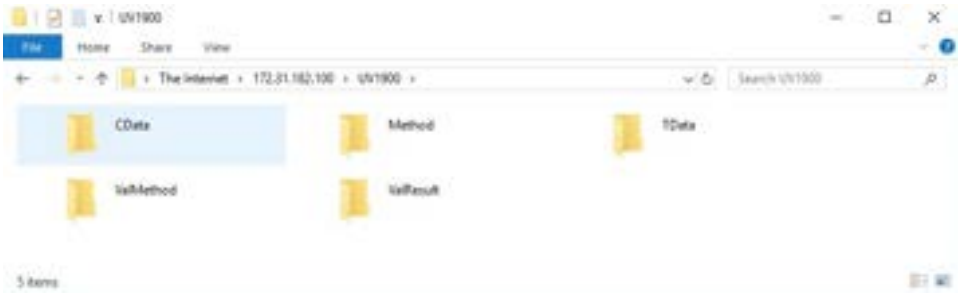
Reference "15.6 Network Settings" P.245

4 **The password entry screen appears. Enter "Shimadzu" and click [Log On].**



5 **Open the folder named [UV-1900] that appears on the Explorer.**

Folders containing various data are displayed on the Explorer. Various data can be copied to the PC.



Reference The storage destination of the data is shown in "4.3.3 Destination Folder When Using a USB Memory/Expanded Memory" P.33.

2.5 Processing for Measurement Data

When performing measurement, the UV-1900i normally obtains data containing more decimal places than those displayed on the screen.
For curve data, obtained actual data is saved. For table data, the instrument processes photometric value as follows, calculate concentrations, etc. and then display and save them.

- Abs (Absorbance): Rounded to four decimal places (i.e. the fifth decimal place is rounded off).
- %T (Transmittance): Rounded to two decimal places (i.e. the third decimal place is rounded off).
- %R (Reflectance): Rounded to two decimal places (i.e. the third decimal place is rounded off).

NOTE

- The number of digits of the data displayed on the screen is in accordance with the set value of [Number of Decimals] in the [General Settings] screen ("15.11 Setting the Number of Decimals" P.251).
- In the methods that calculate the concentration by multiplying measurement data by the factor, such as K Factor method, values are displayed in the range of -9999.9 to 9999.9.
  If values are out of displayable range, "######" is displayed.

3 Selecting Measurement Mode and Function Menu

3.1 Mode Menu Screen

After completing initialization at power-on, the [Mode Menu] screen is displayed.

On the [Mode Menu] screen, you can select measurement mode and function menu. And the status of the instrument is displayed on Status Bar in the upper part of the screen.

> NOTE If the Security Mode ("16.4 Security Mode" P.274) is enabled, the login screen is displayed after completing initialization.
> For the login procedure, see "2.2.1 Changing User Level and Login" P.9.

No.	Name	Description
❶	Status Bar	Displays the status of UV-1900i. Reference "Status Bar" P.20

No.	Name	Description
❷	Measurement Mode	• [Photometric] Displays the screen to select Photometric mode ([Photometric] or [Photometric 8λ]). Reference • "6 Photometric (One-Wavelength)" P.52 • "7 Photometric 8λ (Multi-Wavelength)" P.62 • [Spectrum] Displays Measurement Mode screen of Spectrum mode. Reference "8 Spectrum" P.72 • [Quantitation] Displays Measurement Mode screen of Quantitation mode. Reference "9 Quantitation" P.89 • [Kinetics] Displays the screen to select Kinetics mode ([Kinetics] or [Kinetics Rate]). Reference • "10 Kinetics" P.122 • "11 Kinetics Rate" P.143 • [Time Course] Displays Measurement Mode screen of Time Course mode. Reference "12 Time Course" P.159 • [Bio Method] Displays Measurement Mode screen of Bio Method mode. Reference "13 Bio Method" P.175
❸	Function Menu	• [Parameters File] Displays stored parameters files. You can copy or delete the files. Reference "5 Managing Files (Copy, Delete, Save in a CSV Format)" P.48 • [Data File] Displays stored measurement data files. You can copy or delete the files. Reference "5 Managing Files (Copy, Delete, Save in a CSV Format)" P.48 • [Maintenance] Displays the screen for maintenance of the UV-1900i (e.g. validation and usage time check for the light source lamp), as well as security function settings. Reference "16 Maintenance" P.269 • [PC Control] Switches the instrument to the PC Control mode. Reference "18 PC Control Mode" P.427 • [General Settings] Displays the screen for general settings. Reference "15 General Settings" P.235

■ Status Bar

Displays the status of parts of the instrument, date and time.

No.	Name	Description
❶	Instrument Status	Displays the status of UV-1900i.
❷	Multi-Cell Status	[-] is displayed when not using optional 6-position Multi-Cell and MMC-1600, while the cell number is displayed when using them. ▶▶ Reference "19 Setting Attachments" P.449
❸	USB Status	Illuminates when a USB memory is connected. USB Is displayed while data communication with a USB memory is established.
❹	Lamp Status	• [WI] Illuminates when WI lamp (halogen lamp) is selected for the light source. • [D2] Illuminates when D2 lamp (deuterium lamp) is selected for the light source.
❺	User Level	Displays the logged in user's level.
❻	Date and Time	Displays date and time.

3.2 Overview of Measurement Mode and Function Menu

On the Mode Menu screen, 6 types of measurement mode and 5 types of function menu are available.

The overview of each mode and menu is described below.

3.2.1 Overview of Measurement Modes

■ Photometric Mode

Measures absorbance, transmittance, and reflectance of a sample at particular wavelengths.
The following 2 measurement methods are available.

- Photometric

  Reference "6 Photometric (One-Wavelength)"

- Photometric 8λ
  (Up to eight wavelengths can be set at the maximum.)

  Reference "7 Photometric 8λ (Multi-Wavelength)"

In multi-wavelength measurement, it is possible to select one of the following five equations based on the photometric values obtained at up to four wavelengths and then output the calculation results:

- A1-A2
- A1/A2
- dA(A1 to A3)
- (K1A1+K2A2+K3A3+K4A4)×K5
- K5×(K1A1+K2A2)/(K3A3+K4A4)

■ Spectrum Mode

Measures the absorbance, transmittance, and reflectance spectra of the sample by performing the wavelength scan.
Single beam energy measurement can also be performed.
Data processing such as peak pick, smoothing, and arithmetic operations may be applied to the measured spectrum.

Reference "8 Spectrum"

■ Quantitation Mode

Creates a calibration curve from a standard sample and quantitates an unknown sample. The following 4 measurement methods are available.

- 1-wavelength measurement
- 2-wavelength measurement
- 3-wavelength measurement
- Derivative method

In addition, the following 3 methods are available for calibration curve method.

- K Factor
- 1 Point Curve
- Multi-Point Curve

Reference "9 Quantitation"

■ Kinetics Mode

Calculates enzyme activity from the time dependent change in absorbance.
Up to 16 samples can be measured at once using a multi-cell holder (optional).
The following 2 measurement methods are available.

- Kinetics measurement
- Rate measurement

Reference "10 Kinetics"
"11 Kinetics Rate"

■ Time Course Mode

Measures the change in absorbance, transmittance, reflectance, or energy over time at the fixed wavelength.
Up to 16 samples can be measured at once using a multi-cell holder (optional).
Data processing such as arithmetic operations may be applied to the photometric values.

Reference "12 Time Course"

■ Bio-method Mode

In the Bio-method mode, the following 2 measurement methods are available.

- DNA Quantitation
- Protein measurement

The DNA Quantitation obtains the DNA and protein concentrations based on the measured absorbances.

The following 5 methods are available for protein quantitation.

- Lowry Method
- BCA Method
- CBB Method
- Biuret Method
- UV Method

Reference "13 Bio Method"

3.2.2 Overview of Function Menu

■ Parameters File/Measurement Data File Display Function

Displays stored files. You can copy or delete them, or save them in CSV format (only table data file and curve data file).

Reference "5 Managing Files (Copy, Delete, Save in a CSV Format)" P.48

■ Maintenance Function

Setting and operation for maintenance are available.
<Instrument performance/status check>

- Instrument Validation function
- Lamp illumination time manage

<Instrument calibration/correction>

- Wavelength recalibration

<Set/enable limits for function availability according to user level>

- Security Settings

<Update System Program>

- Update System Program

Reference "16 Maintenance"

■ PC Control Function

This mode allows the UV-1900i to be controlled by an external computer. Select this mode when using the "LabSolutions UV-Vis" software included with this instrument.

Reference "18 PC Control Mode"

■ General Settings Function

You can set or change operation conditions of the UV-1900i.

Reference "15 General Settings"

4 Common Operations

4.1 Common Operations on the Measurement Mode Screen

After selecting measurement mode, the following screen is displayed.
This section explains screen operations common among measurement modes.

No.	Name	Description
❶	Tab for Switching Screens	Switches displayed screen. Types of tab vary according to the measurement mode.
❷	Wavelength Setting	Set the wavelength of light to be irradiated to the sample. Tap the input field to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29).
❸	Data	Displays photometric value of the current sample.
❹	Home Button	Returns to the Mode Menu screen.
❺	[Print]	Prints measurement results and captures a screen shot which saves displayed screen as an image file. ▶▶ Reference "4.5 Print/Hard Copy/Screen Shot" P.40
❻	[Auto Zero]	Performs Auto Zero (to set absorbance at zero, or to set transmittance or reflectance at 100 % under the current condition).
❼	[Base Corr.]	Performs baseline correction in the specified wavelength range.
❽	Save Files button	Saves set measurement parameters and results as a file. The button name varies according to the tab. ▶▶ Reference "4.3 Saving Files" P.32
❾	Load Files button	Loads set measurement parameters and results. The button name varies according to the tab. ▶▶ Reference "4.4 Loading Files" P.37

No.	Name	Description
⑩	[Start] or [Stop]	Starts measurement using set measurement parameters. It changes to [Stop] during measurement.

NOTE In the Photometric (1-wavelength) mode, Wavelength Setting (❷) and Data (❸) are displayed at the center of the screen ("[WL / K Factor Settings] subtab" P.53).

■ Selecting subordinate items

Tap an item with ▽ to display the list of subordinate items.

No.	Name	Description
❶	Page Switching button	When selectable items continue for more than one page, tap this button to switch displayed page.
❷	[Cancel]	Closes the screen canceling the change.
❸	Selectable items	The list of selectable items.

4.2 Entering Text and Numbers

Tap a text or numeric input field to display the input screen.

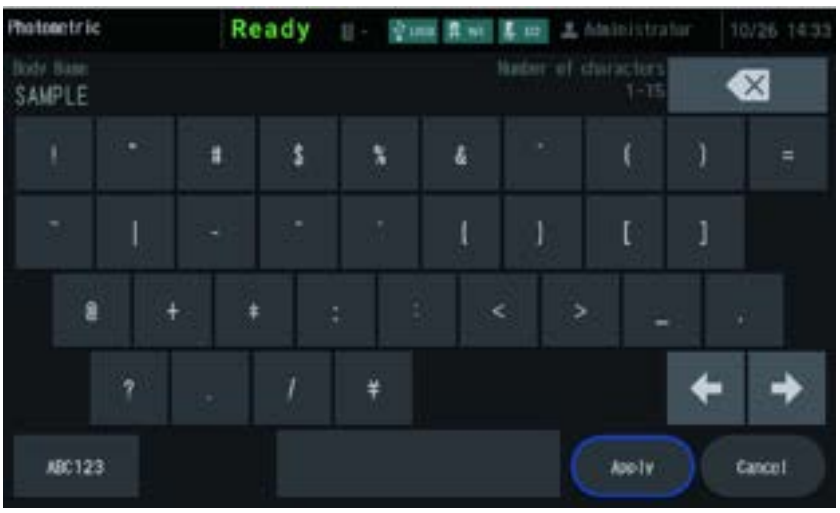
Text input screen where you can enter letters of the alphabet, numbers, and symbols (keyboard) and numeric input screen where you can enter only numbers (10-button keypad) are available.

4.2.1 Text Input Screen (Keyboard)

When tapping an input field such as Sample Name, text input screen (keyboard) is displayed.

Alphanumerics

Symbols



No.	Name	Description
❶	Display field	Displays entered text. A character is entered at the place of blue cursor.
❷	Input button	Inputs the character on tapped button.
❸	[Number of characters]	Shows the range of number of characters you can enter. When number of characters reaches the upper limit, you cannot enter any character.
❹	Backspace button	Deletes the character before the cursor.
❺	Character Type Shift button	Switches between alphanumerics and symbols.
❻	Case Shift button	Switches between uppercase and lowercase characters.
❼	Space button	Enters a space.
❽	[Apply]	Confirms entered text and closes the window.
❾	Cursor-control button	Moves the cursor in the display field to the left or right.
❿	[Cancel]	Discards entered text and closes the window.

4.2.2 Numeric Input Screen (10-button Keypad)

When tapping an input field to enter a number and value, etc., numeric input screen (10-button keypad) is displayed.

No.	Name	Description
❶	Display field	Displays entered number.
❷	Input range	Shows the range of number you can enter. Any number outside the range cannot be entered.
❸	Input button	Inputs the character on tapped button. [.] (decimal point) and [-] (minus) are not available for some fields.
❹	[Apply]	Confirms entered number and closes the window.
❺	Backspace button	Deletes the number before the cursor.
❻	[Cancel]	Discards entered number and closes the window.

4.2.3 Input Using an External Keyboard/Barcode Reader

You can connect a keyboard/barcode reader (optional) of USB connection type to the instrument and use it to enter characters/numeric values.
To use a keyboard/barcode reader, set the keyboard language using the [Keyboard layout] button in the General Settings menu.

Reference "15.14 Setting the Keyboard Layout" P.260

NOTE Precautions when using the external keyboard/barcode reader

- You can enter only ASCII characters.
  When you use a barcode reader, set the character code to output one-byte alphanumeric characters.
  Reference For details, refer to the instruction manual of the barcode reader.
- The buzzer of the instrument does not sound when using an external keyboard/barcode reader.
- The only barcode reader interface available is USB-HID.

■ Available screens/tabs

Screen/Tab name	Mode	Remarks
Text Input Screen (Keyboard)	Common	-
Text Input Screen (10-button Keypad)	Common	-
Save Files screen	Common	NOTE The following characters cannot be entered. ", |, *, : , <, >, ? , . , /, \
[Photo. Table] tab	Photometric (One-Wavelength) Photometric 8 λ (Multi-Wavelength)	[Sample Name] can be edited.
[Unk. Table] tab	Quantitation Bio Method	[Sample Name] can be edited.

■ Common operations (keyboard only)

- [Alphabet] button: Lower-case alphabetic characters

> NOTE Upper-case alphabetic characters are displayed when CapsLock is enabled.

- [Shift] + [Alphabet] button: Upper-case alphabetic characters

> NOTE Lower-case alphabetic characters are displayed when CapsLock is enabled.

- [Numbers] button: Numbers

> NOTE You cannot enter numbers when NumLock is enabled.

4.3 Saving Files

Settings of measurement parameters and results can be saved as a file.

4.3.1 Types of Saved Files

Files to be created depends on measurement mode.

File type		Mode	Maximum*
Normal Measurement Parameters File	Measurement Parameters File	All measurement modes	100 in total
	Template File	• Quantitation • Bio Method	
Curve Data File		• Spectrum • Kinetics • Kinetics Rate • Time Course	16
Table Data File		• Photometric • Photometric 8λ • Quantitation • Kinetics • Kinetics Rate • Bio Method	16
Validation Parameters File		Validation	10
Validation Results File			3

* The maximum number of files you can save in built-in memory.

4.3.2 Extensions of Files

Saved files have the following extensions.

Mode Type	File			
	Normal Measurement Parameters File		Curve Data File	Table Data File
	Measurement Parameters File	Template File		
Photometric	*.mp0	-	-	*.pho
Photometric 8λ	*.mp1	-	-	*.pho
Spectrum	*.ms0		*.spc	-
Quantitation	*.mq0	*.tq0	-	*.pho
Kinetics	*.mk0	-	*.tmc	*.kit
Kinetics Rate	*.mk1	-	*.tmc	*.rat
Time Course	*.mt0	-	*.tmc	-
Bio-method (DNA Quantitation)	*.md0	-	-	*.dna
Bio-method (Lowry)	*.mq1	*.tq1	-	*.pho
Bio-method (BCA)	*.mq2	*.tq2	-	*.pho
Bio-method (CBB)	*.mq3	*.tq3	-	*.pho
Bio-method (Biuret)	*.mq4	*.tq4	-	*.pho
Bio-method (UV method)	*.mq5	-	-	*.pho

4.3.3 Destination Folder When Using a USB Memory/Expanded Memory

When a USB memory or expanded memory is specified as the destination, files are saved in the following folders. If the destination folder does not exist, the UV-1900i creates it automatically.

File type	Folder Location
Measurement Parameters File	\UV1900\Method
Template File	
Curve Data File	\UV1900\CData
Table Data File	\UV1900\TData
Validation Parameters File	\UV1900\ValMethod
Validation Results File	\UV1900\ValResult

4.3.4 Saving Files

Tap  button on the Measurement Mode screen to save files.

File types you can save depends on displayed tab, and the name of displayed button changes as follows.

- [Save Params]: Saves parameters files.
- [Save Curve]: Saves curve data files.
- [Save Table]: Saves table data files.

Procedures are common for all file types.

> **NOTE** Curve data obtained from the following measurement is saved as the same number of files as used cell and consecutive numbers (01, 02...) are added at the end of file name.
>
> - Repeated measurement in several spectrum modes (when a USB memory or expanded memory is connected and Auto File is performed ("8.2.3 Auto File Function"))
> - Measurement using multiple cells in the Kinetics/Time Course mode

1 **Tap  button.**

2 Make necessary settings changes and save the file.

No.	Name	Description
❶	[Location]	Specifies the destination location of the file. You can select [Built-in Memory], [USB Memory], or [Expanded Memory].
❷	[File Name]	Specifies the file name. Tap the input field to display text input screen ("4.2.1 Text Input Screen (Keyboard)" P.27).
❸	[File Format]	Specifies the file format (Only for Measurement Results file, and Parameters file of Quantitation/Bio Method (CBB Method, Lowry Method, Biuret Method, BCA Method)). The file will be created in checked format.
❹	[Save]	Saves the file and returns to the previous screen.
❺	[Close]	Discards the file and returns to the previous screen.

NOTE When the file cannot be saved because capacity of the destination location is insufficient, a message appears. Delete unnecessary files according to "When [The built-in memory (or USB memory, expanded memory) capacity is low. ...] is displayed" P.36 or connect a USB memory with sufficient free space.

■ When [The built-in memory (or USB memory, expanded memory) capacity is low. ...] is displayed

When the file cannot be saved because capacity of the destination location is insufficient, a message that requires you to delete unnecessary files appears.

To delete files, perform the following procedures.

Deleting unnecessary files in the built-in memory

1 **When the following screen is displayed, tap [Yes].**

2 **Delete unnecessary files.**

Reference "5.1 Display and Operation of Files" P.48 Step 2

You cannot copy the files or save the file in CSV format.

Deleting unnecessary files in a USB memory

1 **When [The USB memory (or expanded memory) capacity is low. Please delete unnecessary files.] is displayed, perform either of the following procedures.**

- Connect a USB memory to the PC and delete unnecessary files.
- Connect a USB memory with sufficient free space.
- Format the expanded memory.

Reference "15.15 Setting the Expanded Memory" P.261

NOTE If you perform formatting, all saved files will be deleted.

4.4 Loading Files

Tap button on the Measurement Mode screen to load saved files for measurement.

File types you can load depends on displayed tab, and the name of displayed button changes as follows.

- [Load Params]: Loads Parameters File.
- [Load Curve]: Loads Curve Data File.
- [Load Table]: Loads Table Data File.

Procedures are common for all file types.

> **NOTE** The instrument can display limited number of files in the USB memory and the expanded memory. 999 files can be displayed for each file type. Files are displayed in alphabetical order.

1 Tap button.

2 Specify the location of the file to be loaded.

3 Select and load a file.

No.	Name	Description
❶	[Location]	Specify the location of the file to be loaded. You can select [Built-in Memory], [USB Memory], or [Expanded Memory].
❷	File List	Saved files are listed. Selected file is highlighted in blue. Number at the upper right shows the ordinal number of selected file and total number of saved files. The four buttons on the right operate as follows: •  Moves to the previous or next page when the list continues for more than one page. •  Selects the previous or next file.
❸	[Open]	Loads the selected file.
❹	Graph Display button	Displays the graph. This function is available when tapping [Load Curve] to load Curve Data File.

No.	Name	Description
❺	Preview button	Displays the details of the selected file. Displayed items depend on the file type.  • When the items continue for more than one page, switch pages using ▲ ▼ at the right of the screen. • Tap [Close] to close the screen.
❻	Multiple Selection button	Tap this button to enable the function (highlighted in blue) to select multiple files. Tap a selected file to cancel the selection when multiple files are selected.
❼	[Close]	Cancels the file loading and returns to the previous screen.

4.5 Print/Hard Copy/Screen Shot

Connect optional or commercially available printer to the UV-1900i to print measurement results.

You can save displayed screen as an image file by connecting a USB memory.

4.5.1 Data Print

Prints measurement results as a numerical data table and graph.

Two types of data print are available: Auto Print, which prints results after every measurement and Manual Print, which prints results manually. Printed items depend on the measurement mode and print type.

■ Available Printer

The UV-1900i supports the following printers.

- Printer for screen copy DPU or MPU (optional)

> NOTE The instrument does not support screen copy printing function (a function to print displayed screen) of the printer for screen copy. If you need hard copy of the screen, save displayed screen in a USB memory using Screen Shot function ("4.5.3 Screen Shot (Saving an Image)" P.44) and then print it using the PC.

- Commercially available printers which support EPSON printer control code ESC/P-24
- Some commercially available printers which support EPSON printer control code ESC/P Raster
- Some commercially available printers which support Hewlett-Packard printer control code PCL

> NOTE Consult your Shimadzu representative for available printers.

- Commercially available printers which support the printing standard PictBridge

> NOTE For error messages associated with PictBridge printer, refer to the instruction manual of the printer.

⚠ CAUTION

Instruction

To plug the USB printer cable to another port or computer after (or while) using ESC/P Raster (ESC/P-R) printer, be sure to turn OFF the printer power beforehand.

If the USB cable is unplugged before the printer head returns to its home position, printing cannot be accepted.

■ Auto Print

Print Type	Details
Automatic table data	Prints table data after every measurement. This function is automatically enabled when the printer for screen copy (optional) is connected and [DPU] or [MPU] is selected in [Printer Type]. Reference "15.13 Setting the Printer" P.253 This function is available in modes other than Spectrum and Time Course modes.
Automatic graph	Prints graph data after every measurement in Spectrum and Time Course modes. [Auto Print] should be enabled when setting measurement parameters. Reference • "[Scan Settings] subtab" P.73 • "[Wavelength Settings] subtab" P.160

■ Manual Print

Print Type	Details	Supported mode
Measured data	Prints measurement results.	• Photometric ("6.3.2 Manual Print" P.61) • Photometric 8λ ("7.3.2 Manual Print" P.71) • Spectrum ("8.3.2 Manual Print ([Measurement] Tab)" P.85) • Quantitation ("9.7.2 Manual Print" P.118) • Time Course ("12.3.2 Manual Print ([Measurement] Tab)" P.171) • Bio Method ("13.3.2 Manual Print" P.193)
Measured data - Table data	Prints all measurement results as a numerical data table.	• Kinetics • "10.3.2 Manual Print (Table Data)" P.137 • "10.3.3 Manual Print (Curve data)" P.139 • "10.3.4 Manual Print (Curve Total Plot)" P.141 • Kinetics Rate • "11.3.2 Manual Print (Table Data)" P.154 • "11.3.3 Manual Print (Curve data)" P.155 • "11.3.4 Manual Print (Curve Total Plot)" P.157
Measured data - Curve data	Prints curves and measurement parameters of curve data.	
Measured data - Curve total plot	Prints time and absorbance at all plots (point where data is obtained) of measurement results in a numerical data table.	

Print Type	Details	Supported mode
Calculation data	Prints calculation data for curve data.	• "14.3.2 Printing the Results (Arithmetic Operations)" P.203 • "14.4.3 Printing the Results (Derivative)" P.211 • "14.5.3 Printing the Results (Peak Pick)" P.217 • "14.6.3 Printing the Results (Point Pick)" P.225 • "14.7.3 Printing the Results (Peak Area)" P.231
All test data/ Test data	Prints results of validation.	• "17.10.1 Test Data Print (Each Test)" P.404 • "17.10.2 Test Data Print (All Data)" P.405

4.5.2 Hard Copy

Prints displayed screen by the printer.

> NOTE This function is available only when PictBridge printer is connected.

1 **Tap [Print] on the screen to be printed.**

2 **Tap [Hard copy].**

Displayed screen is printed by the printer.

4.5.3 Screen Shot (Saving an Image)

Saves displayed screen in a USB memory as an image file. To use this function, connect a USB memory.

1 **Tap [Print] on the screen to be saved as an image file.**

2 **Tap [Screen Shot].**

Displayed screen is saved as an image file.

NOTE To save an error message as an image file, tap [Screen Shot] shown in the message.

If [Screen Shot] is not displayed, connect a USB memory to display it.

4.6 Transfer of Measurement Data to the PC

Measurement data in Photometric (one-wavelength measurement) and Spectrum mode can be transferred to the PC in text format by Telnet client software.

> NOTE To use this function, the instrument and the PC should be connected with a LAN cable (including via the network).

■ About connection

The login name and password are requested when you connect to the instrument. Enter the following items.

Login name	UV-1900
Password	Shimadzu

■ About commands

To transfer data, send the command "dataout on" to the instrument.
To complete the data transfer, send the command "dataout off" to the instrument.

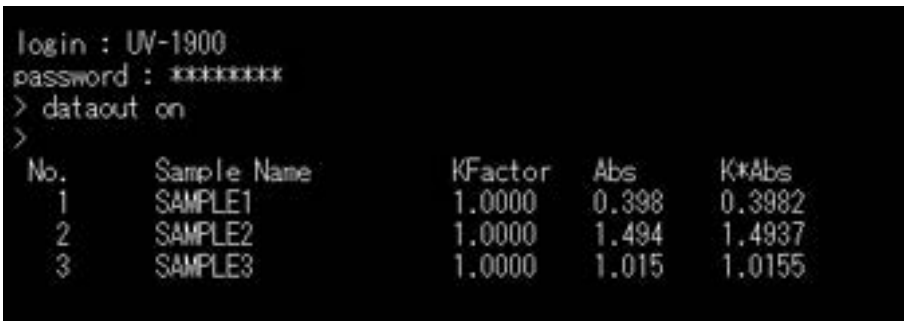
■ Transfer procedure

For Photometric (one-wavelength measurement) mode

Data is automatically transferred each time measurement is performed.
The output format is the print format for auto printing of Photometric (one-wavelength measurement) mode plus the KFactor column.

Reference "6.3.1 Auto Print" P.60

> NOTE Measurement conditions cannot be output.



For Spectrum mode

1 **Tap [Print] in the [Measurement] or [View] tab.**

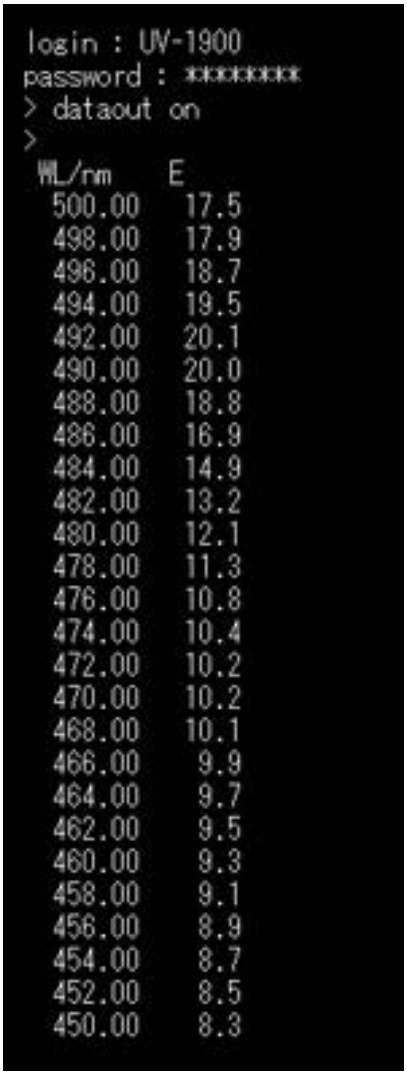
2 **Tap [Transfer measurement data].**

Measurement data is transferred.

The output format is the same as the print format when the [Data Print] function of [Operations] is executed.

Reference "14.8 Data Print" P.233

NOTE
- Measurement conditions cannot be output.
- If [Repetitions] is set to two or more, only the last measurement data can be transferred.
- When multiple cells are measured using the multiple cell holder, only the last measured cell data can be transferred.


login : UV-1900
password : xxxxxxxxx
> dataout on
>
WL/nm E
500.00 17.5
498.00 17.9
496.00 18.7
494.00 19.5
492.00 20.1
490.00 20.0
488.00 18.8
486.00 16.9
484.00 14.9
482.00 13.2
480.00 12.1
478.00 11.3
476.00 10.8
474.00 10.4
472.00 10.2
470.00 10.2
468.00 10.1
466.00 9.9
464.00 9.7
462.00 9.5
460.00 9.3
458.00 9.1
456.00 8.9
454.00 8.7
452.00 8.5
450.00 8.3

5 Managing Files (Copy, Delete, Save in a CSV Format)

You can displays saved files and copy or delete them, or save them in CSV format.

5.1 Display and Operation of Files

1 **Tap [Parameters File] or [Data File].**

Tap [Parameters File] to display parameters file.

Tap [Data File] to display curve data file or table data file.

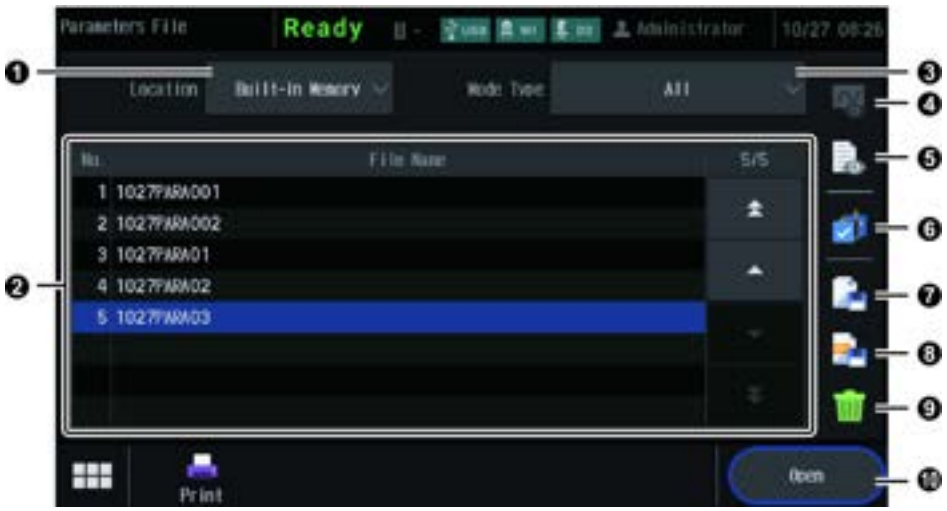
2 **Tap the saving destination of the file to be loaded.**

You can select [Built-in Memory], [USB Memory], or [Expanded Memory].

> NOTE The expanded memory is an optional item.

3 Select a file and perform necessary operation.

The following screen is [Parameters File] screen. On [Data File] screen, operation procedures are the same.



No.	Name	Description
❶	[Location]	Specify the location of the file to be loaded. You can select [Built-in Memory], [USB Memory], or [Expanded Memory].
❷	File List	Saved files are listed. Selected file is highlighted in blue. Number at the upper right shows the ordinal number of selected file and total number of saved files. The four buttons on the right operate as follows: •  Moves to the previous or next page when the list continues for more than one page. •  Selects the previous or next file. NOTE If the file name includes double-byte characters, the file is not displayed.
❸	[Mode Type]	Specify the type of the file to be loaded. • All • Photometric • Photometric 8λ • Spectrum • Quantitation • Kinetics • Kinetics Rate • Time Course • DNA Quantitation • Lowry Method • BCA Method • CBB Method • Biuret Method • UV Method
❹	Graph Display button	Displays the graph. This button is enabled when curve data file is selected.
❺	Preview button	Displays the details of the selected file.

No.	Name	Description
❻	Multiple Selection button	Tap this button to enable the function (highlighted in blue) to select multiple files. Tap a selected file to cancel the selection when multiple files are selected.
❼	Copy (File) button	Copy selected file to the other location. • When not using the expanded memory Files in the built-in memory are copied to a USB memory and files in a USB memory are copied to the built-in memory. • When using the expanded memory Specify the destination. You can select [Built-in Memory], [USB Memory], or [Expanded Memory]. Tap the destination to copy selected file to the destination. NOTE Copied file cannot be saved in the same directory as the original file.
❽	Saving in CSV Format button	Converts selected curve data or table data file to a CSV format text file and saves it in a USB memory. The original file is maintained. For details on CSV format files, see "To save CSV format files" P.51. NOTE When parameters file is displayed, this button is disabled.
❾	Delete button	Deletes the selected file.
❿	[Open]	Displays the file selected in the file list.

■ To save CSV format files

Curve data or table data file obtained by the UV-1900i can be converted to a CSV (Comma Separated Values) format text file and saved in a USB memory.

When using the expanded memory, you can select the USB memory or expanded memory as the destination.

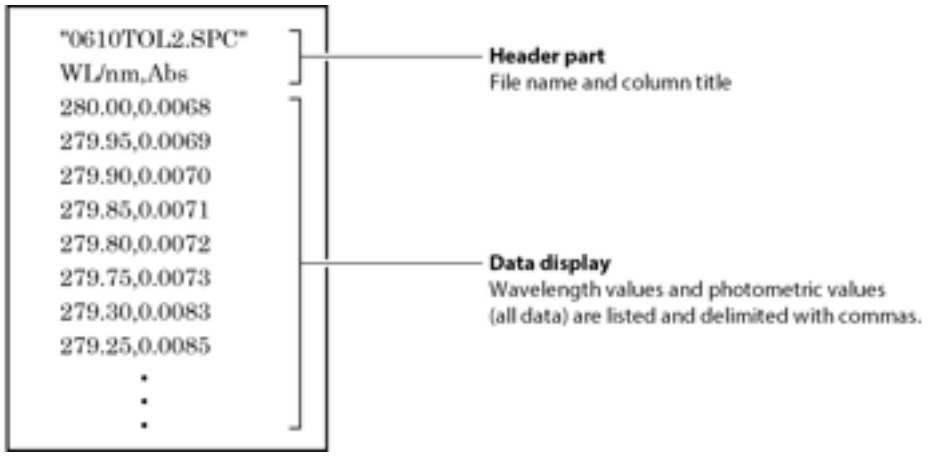
CSV format files can be copied to the PC and used on any commercially available software that supports CSV format.

Created CSV format file has the same name as the original file and is saved in the following folders in the USB memory or expanded memory. If the destination folder does not exist, the UV-1900i creates it automatically.

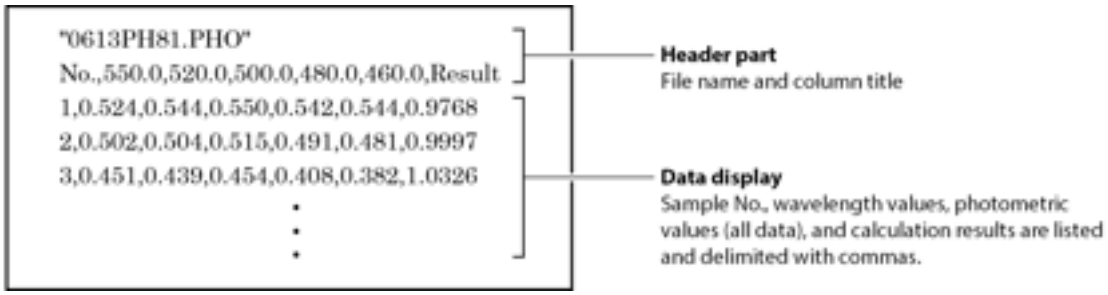
File Type	Folder Location
Curve data file converted to the CSV format (*.csv)	\UV1900\CData
Table data file converted to the CSV format (*.csv)	\UV1900\TData

Hint Values in the CSV format file are saved as the decimal place values specified in [Number of Decimals] ("15.11 Setting the Number of Decimals" P.251) in the General Settings screen.

• (Conversion example of curve data)



• (Conversion example of photometric 8λ table data)



6 Photometric (One-Wavelength)

In the Photometric (one-wavelength) mode, photometric value at a specified wavelength is obtained. Format of the photometric value can be selected from [Absorbance (Abs)], [Transmittance (%T)], and [Reflectance (%R)].

Results of 400 measurements can be displayed in a list and saved as a file.

Quantitation by K-factor method is also available. This is a simple quantitation method using the fact that absorbance is generally proportional to concentration. A sample concentration C is expressed as C = K × Abs, and when the value for K (K = Conc. of Std / absorbance of Std) is already known, you can enter the value for K and measure the concentration of unknown samples.

6.1 Setting Measurement Parameters

1 Display the measurement mode screen of Photometric mode.

1 Tap [Photometric].

2 Tap [Photometric].

The measurement screen is displayed.

2 Set measurement parameters in the [Parameters] tab.

The [Parameters] tab has 2 subtabs. Select the subtab and make necessary settings changes.

Hint Tap [Load Params] to load saved measurement parameters ("4.4 Loading Files" P.37).

[WL / K Factor Settings] subtab

No.	Name	Description
❶	Tab for Switching Screens	Switches displayed tab. Switch to the [Attachments] tab to set attachments ("19 Setting Attachments" P.449). Switch to the [Photo. Table] to see measurement results.
❷	[Photometric Type]	Switches the format of photometric value. Tap to select [Absorbance (Abs)], [Transmittance (%T)], or [Reflectance (%R)]. **NOTE** [Reflectance (%R)] is available when using a specular reflectance attachment in combination.
❸	Subtab	Switches setting items in the [Parameters] tab.
❹	[Wavelength]	Sets the desired wavelength. This item also sets the wavelength of light irradiated to the sample compartment. Tap the input field to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29).
❺	[K Factor]	Specifies K factor to be multiplied to photometric value. Tap the input field to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29). **NOTE** In the methods that calculate the concentration by multiplying measurement data by the factor, such as K Factor method, values are displayed in the range of -9999.9 to 9999.9. If values are out of displayable range, "######" is displayed. Reference "6.2.3 Quantitation by K-factor Method" P.57
❻	[Data]	Displays photometric value of the current sample.
❼	[K * Data]	Displays the value obtained by multiplying photometric value by K Factor.

[Edit Sample Name] subtab

No.	Name	Description
❶	[Name] [Start Number]	Displays the sample name of the measurement result. The sample name will be [Name] + [Start Number] such as "SAMPLE1". In [Start Number], enter a number to be used for the first measurement result. The number increases by 1 every measurement. Tap the input field of [Name] to display text input screen ("4.2.1 Text Input Screen (Keyboard)" P.27). Tap the input field of [Start Number] to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29). **NOTE** • Up to 15 characters can be entered in [Name]. The value of [Start Number] (up to 999) is added to this, therefore, the number of characters of sample name is 18 at the maximum. • The value entered in [Start Number] increases to 999 at the maximum. When 999 is exceeded, it returns to 1.

Hint
- To set attachments, see "19 Setting Attachments" P.449.
- Tap [Save Params] to save measurement parameters ("4.3 Saving Files" P.32).

Reference After setting measurement parameters, perform measurement according to "6.2 Measurement" P.55.

6.2 Measurement

6.2.1 Performing Measurement

Performs measurement using set measurement parameters.

Hint A maximum of 400 measurements can be performed.

1 **Before the first measurement after setting or changing measurement parameters, set a blank sample in the cell and tap [Auto Zero].**

In the cases described above, blank correction should be performed before measuring unknown samples.

Hint This step can be skipped when the same parameters are used for the measurement.

The photometric value will be set to 0 Abs (100 % T).

2 **Tap [Start].**

The [Photo. Table] tab is displayed and measurement starts using set measurement parameters.

Operation other than [Stop] is disabled during measurement.

6.2.2 Checking Measurement Results

After measurement, the results are displayed.

No.	Name	Description
❶	[No.]	Displays the order of measurement.
❷	[K]	Displays K Factor applied to selected measurement results.
❸	[Sample Name]	Displays sample names (up to 18 characters). Sample name will be "Name + Start Number" set in the [Edit Sample Name] subtab.
❹	Photometric value	Displays photometric value of each sample.
❺	K * Photometric Value	Displays the value obtained by multiplying photometric value by K Factor.
❻	The number of results and selection/page button	Number in the top line shows the ordinal number of selected measurement result and total number of saved measurement results. The four buttons on the right operate as follows: •  Moves to the previous or next page when the list of measurement results continues for more than one page. •  Selects the previous or next measurement results.
❼	[Recalc.]	Changes K Factor and recalculates the concentration for selected measurement results. Tap it to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29). Even if K Factor is changed here, K Factor set in the [WL / K Factor Settings] subtab does not change.
❽	Multiple Selection button	Tap this button to enable the function (highlighted in blue) to select multiple measurement results. Tap a selected measurement result to cancel the selection when multiple results are selected.

No.	Name	Description
❾	Delete button	Deletes selected measurement results.
❿	All Delete button	Deletes all measurement results.
⓫	Sample Name Change button	Changes the sample name of selected measurement results. Tap it to display text input screen ("4.2.1 Text Input Screen (Keyboard)" P.27).

Hint

- Tap [Save Table] to save measured data ("4.3 Saving Files" P.32).
- Tap [Load Table] to load saved table data file ("4.4 Loading Files" P.37).
- Tap [Print] to print measured data ("6.3.2 Manual Print" P.61).

6.2.3 Quantitation by K-factor Method

You can use a simple quantitation method (K-factor method) when the absorbance and concentration are directly proportional (Concentration = K × Absorbance), and a conversion factor K is given.

1 **Tap the input field of [K Factor] in the [WL / K Factor Settings] subtab ("[WL / K Factor Settings] subtab" P.53).**

Numeric keypad is displayed ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29).

2 **Enter K Factor.**

The value in the input filed of [K Factor] is changed.

3 **Tap [Auto Zero] setting nothing or a blank sample in the sample compartment.**

Blank correction starts. After completion, proceed to the next step.

4 **Place the unknown sample in the sample compartment.**

5 **Tap [Start].**

Measurement starts.
After measurement, photometric value and the result of quantitation (K × photometric value) are displayed.

■ Recalculating measurement results

Recalculation can be performed after measurement by resetting K Factor for a certain measurement result.

1 Select measurement results to be recalculated.

2 Tap [Recalc.].

Numeric keypad is displayed.

3 Enter K Factor.

Reference "4.2.2 Numeric Input Screen (10-button Keypad)" P.29

Measurement result is recalculated. And the value in [K] changes to reset value.

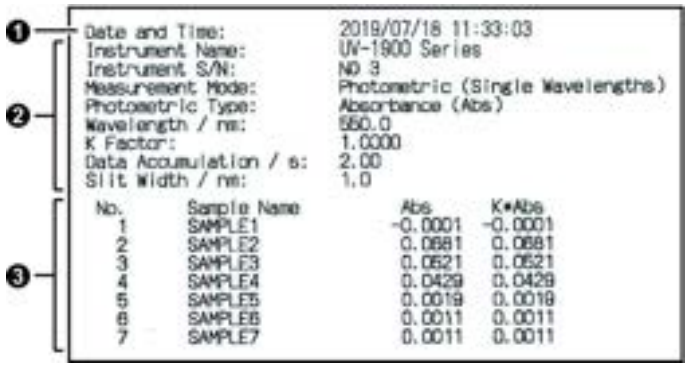
6.3 Printing Measurement Results

Measurement results can be printed.

6.3.1 Auto Print

If a hard copy printer (optional) is connected, the measurement results will be printed on the printer for every measurement.

After the first measurement, date, time, measurement parameters, and the first measurement results will be printed. After that, the measurement results will be printed for every measurement.



No.	Name	Description
❶	Date and time	The date and time when the first measurement is completed are printed.
❷	Measurement parameters	Measurement parameters are printed.
❸	Results	In order from left, sample number, set sample name, photometric value, and concentration are printed.

6.3.2 Manual Print

All measurement results, or all the data within the currently-loaded table data file will be printed as a numeric data table.

1 **Tap [Print].**

2 **Tap [Measured data].**

A numeric data table is printed.
The format is the same as "6.3.1 Auto Print" P.60.

7 Photometric 8λ (Multi-Wavelength)

The [Photometric 8λ] (multi-wavelength measurement) allows you to specify a maximum of 8 arbitrary wavelengths and then measure photometric values at those wavelengths. Format of the photometric value can be selected from [Absorbance (Abs)], [Transmittance (%T)], and [Reflectance (%R)].

It is also possible to select one of the following 5 equations based on the data obtained at up to 4 wavelengths and then output the calculation results.

- Two-wavelength calculation
  The ratio and difference between the photometric values at two wavelengths are calculated.
  This process is applicable for eliminating the effect of any interfering component (difference), scattering due to turbidity, and floating of the baseline due to the production of small bubbles, and also for evaluating the purity (ratio).

Reference "Two-wavelength quantitation method"

- Three-wavelength calculation
  This process is performed as follows: where WL1 to WL3 are measurement wavelengths (arbitrary numbers are to be entered) and A1 to A3 are absorbance (or transmittance/reflectance) values at the measurement wavelengths.

  A2 - Ad (where Ad =((WL1 - WL2) × A3 + (WL2 - WL3) × A1)/(WL1 - WL3))

  Three-wavelength quantitation also eliminates the effects of interfering components, and is also useful in eliminating "floating" of sloped baselines due to dust, etc.

Reference "Three-wavelength quantitation method"

- Equation calculation with four-wavelength data
  This process is performed as follows:

  (K1 × A1 + K2 × A2 + K3 × A3 + K4 × A4) K5

  ; or

  K5 × (K1 × A1 + K2 × A2) / (K3 × A3 + K4 × A4)

  where K1 to K5 are coefficients (arbitrary numbers are to be entered)
  and A1 to A4 are absorbance (or transmittance/reflectance) values at measurement wavelengths (WL1 to WL4).

  For the calculation of this equation, the measurement wavelengths and coefficients are specified freely. In addition, A1 to A4 can be measured while selecting different samples. This provides high versatility.

NOTE
- The measurement data at each wavelength is rounded to four decimal places (i.e. the fifth decimal place is rounded off).
- "A" in the equations depends on [Photometric Type]. For [Absorbance (Abs)], [Transmittance (%T)], and [Reflectance (%R)], "A", "T", and "R" shall be used, respectively.

7.1 Setting Measurement Parameters

1 Display the measurement mode screen of Photometric 8λ mode.

1 Tap [Photometric].

2 Tap [Photometric 8λ].

The measurement screen is displayed.

2 Set measurement parameters in the [Parameters] tab.

The [Parameters] tab has 3 subtabs. Select the subtab and make necessary settings changes.

Hint Tap [Load Params] to load saved measurement parameters ("4.4 Loading Files" P.37).

[Wavelength Settings] subtab

No.	Name	Description
❶	Tab for Switching Screens	Switches displayed tab. Switch to the [Attachments] tab to set attachments ("19 Setting Attachments" P.449). Switch to the [Photo. Table] to see measurement results.
❷	[Photometric Type]	Switches the format of photometric value. Tap [Absorbance (Abs)], [Transmittance (%T)], or [Reflectance (%R)] to select it. **NOTE** [Reflectance (%R)] is available when using a specular reflectance attachment in combination.
❸	Subtab	Switches setting items in the [Parameters] tab.
❹	[No. of WLs]	Specifies the number of wavelengths from 2 to 8.
❺	Wavelength	Specifies the wavelength for measurement. The number set in [No. of WLs] of input fields will be enabled. Tap the input field to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29). **Hint** The measurement will be carried out in the order of [WL1], [WL2],...[WLn]. When all measurements are completed, the UV-1900i automatically goes to [WL1].

[Equation Settings] subtab

No.	Name	Description
❶	[Equation]	Selects an equation applied to the photometric values. The following items are available. "A" in the equations depends on [Photometric Type]. For [Absorbance (Abs)], [Transmittance (%T)], and [Reflectance (%R)], "A", "T", and "R" shall be used, respectively. • [A1-A2] • [A1/A2] • [dA (A1 to A3)] • [(K1A1+K2A2+K3A3+K4A4) *K5] • [K5* (K1A1+K2A2)/(K3A3+K4A4)] • [None] For details, see "Equation" P.67.
❷	Factor Settings	Specifies Factor K1 to K5. This is enabled when the item using K Factor is selected in [Equation]. Tap the input field to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29). **NOTE** In the methods that calculate the concentration by multiplying measurement data by the factor, such as K Factor method, values are displayed in the range of -9999.9 to 9999.9. If values are out of displayable range, "######" is displayed.

[Edit Sample Name] subtab

No.	Name	Description
❶	[Name] [Start Number]	Displays the sample name of the measurement result. The sample name will be [Name] + [Start Number] such as "SAMPLE1". In [Start Number], enter a number to be used for the first measurement result. The number increases by 1 every measurement. Tap the input field of [Name] to display text input screen ("4.2.1 Text Input Screen (Keyboard)" P.27). Tap the input field of [Start Number] to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29). **NOTE** • Up to 15 characters can be entered in [Name]. The value of [Start Number] (up to 999) is added to this, therefore, the number of characters of sample name is 18 at the maximum. • The value entered in [Start Number] increases to 999 at the maximum. When 999 is exceeded, it returns to 1.

Hint

- To set attachments, see "19 Setting Attachments" P.449.
- Tap [Save Params] to save measurement parameters ("4.3 Saving Files" P.32).

Reference After setting measurement parameters, perform measurement according to "7.2 Measurement" P.68.

■ Equation

The detail of each equation set in the [Equation Settings] subtab is described below. When [dA (A1~A3)] is selected, the following calculation is performed.

> **NOTE** "A" in the equations depends on [Photometric Type]. For [Absorbance (Abs)], [Transmittance (%T)], and [Reflectance (%R)], "A", "T", and "R" shall be used, respectively.

Absorbance: 

Transmittance: 

Reflectance: 

• The symbols in the equations stand for the following:

An (n = 1 to 4): Absorbance at measurement wavelength WLn (n = 1 to 4)

Tn (n = 1 to 4): Transmittance at measurement wavelength WLn (n = 1 to 4)

Rn (n = 1 to 4): Reflectance at measurement wavelength WLn (n = 1 to 4)

Kn (n = 1 to 5): Factor that is specifiable between -9999.9 and 9999.9.

7.2 Measurement

7.2.1 Performing Measurement

Performs measurement using set measurement parameters.

> **NOTE** If the number of measurement wavelengths is less than the number of wavelengths used in the equation set for measurement, the measurement cannot be carried out.

Hint A maximum of 400 measurements can be entered in a single table data file.

1 **Before the first measurement after setting or changing measurement parameters, set a blank sample in the cell and tap [Base Corr.].**

In the cases described above, baseline correction should be performed before measuring unknown samples.

Hint This step can be skipped when the same parameters are used for the measurement.

2 **Tap [Start].**

The [Photo. Table] tab is displayed and measurement starts using set measurement parameters.

Operation other than [Stop] is disabled during measurement.

7.2.2 Checking Measurement Results

After measurement, the results are displayed.

No.	Name	Description
❶	[Results]	Displays measurement results and used equation.
❷	The number of results and selection button	Number in the top line shows the ordinal number of displayed measurement result and total number of measurement results. The four buttons on the right operate as follows: •  Moves to the previous or next page (by 10 pages). •  Moves to the previous or next page (by 1 page).
❸	All Delete button	Deletes all measurement results.
❹	Delete button	Deletes displayed measurement results.
❺	Sample Name Change button	Changes the sample name of displayed measurement results. Tap it to display text input screen ("4.2.1 Text Input Screen (Keyboard)" P.27).

Hint

- Tap [Save Table] to save measured data ("4.3 Saving Files" P.32).
- Tap [Load Table] to load saved table data file ("4.4 Loading Files" P.37).
- Tap [Print] to print measured data ("7.3.2 Manual Print" P.71).

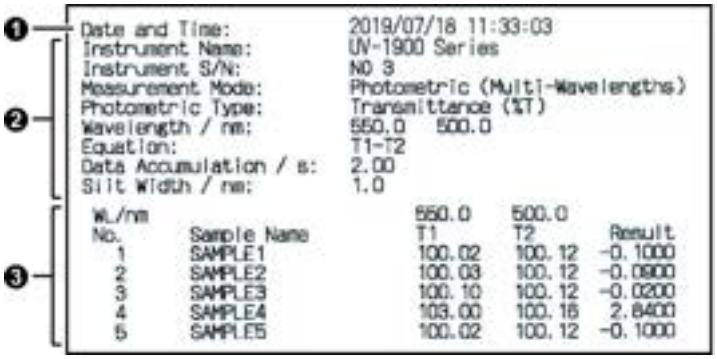
7.3 Printing Measurement Results

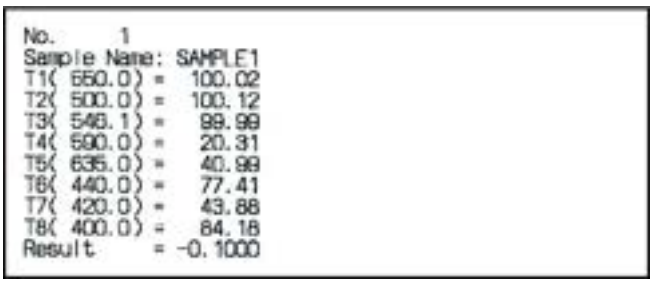
Measurement results can be printed.

7.3.1 Auto Print

If a hard copy printer (optional) is connected, the measurement results will be printed on the printer for every measurement.

After the first measurement, date, time, measurement parameters, and the first measurement results will be printed. After that, the measurement results will be printed for every measurement.



No.	Name	Description
❶	Date and time	The date and time when the first measurement is completed are printed.
❷	Measurement parameters	Measurement parameters are printed.
❸	Results	In order from left, sample number, set sample name, photometric value at each wavelength, and the result of calculation are printed. The above figure is an example when [No. of WLs] is set at [2]. When more than [3] is selected, they will be printed in the following format. 

7.3.2 Manual Print

All measurement results, or all the data within the currently-loaded table data file will be printed as a numeric data table.

1 **Tap [Print].**

2 **Tap [Measured data].**

A numeric data table is printed.
The format is the same as "7.3.1 Auto Print" P.70.

8 Spectrum

The spectrum mode measures the absorbance, transmittance, and reflectance spectra of the sample by performing the wavelength scan. This mode also allows you to measure the energy of a light source using its single beam.

Format of the photometric value can be selected from [Absorbance (Abs)], [Transmittance (%T)], [Reflectance (%R)], and [Energy (E)]. Select [Energy (E)] to measure the energy. The measured spectra may be stored as a single curve data file. Data processing such as peak detection, smoothing, and arithmetic operations may also be applied to those spectra.

8.1 Setting Measurement Parameters

1 **Tap [Spectrum].**

The measurement screen is displayed.

2 **Set measurement parameters in the [Parameters] tab.**

The [Parameters] tab has 2 subtabs. Select the subtab and make necessary settings changes.

Hint Tap [Load Params] to load saved measurement parameters ("4.4 Loading Files" P.37).

[Scan Settings] subtab

No.	Name	Description
❶	Tab for Switching Screens	Switches displayed tab. Switch to the [Attachments] tab to set attachments ("19 Setting Attachments" P.449). Switch to the [Measurement] tab to see measurement results. Switch to the [View] tab to load and display a curve data file ("Loading curve data files" P.81).
❷	[Photometric Type]	Switches the format of photometric value. Tap to select [Absorbance (Abs)], [Transmittance (%T)], [Reflectance (%R)] or [Energy (E)]. **NOTE** [Reflectance (%R)] is available when using a specular reflectance attachment in combination.
❸	[Auto Print]	Prints a graph for every measurement when enabled ("8.3.1 Auto Print" P.84). Each tap of this key toggles between ON and OFF. OFF: ON: **NOTE** For multi-cell measurements and repeated measurements without using the Auto File function, only the latest-acquired data can be printed. Therefore, if you wish to obtain the printouts of these measurement results, enable [Auto Print] function.
❹	Subtab	Switches setting items in the [Parameters] tab.

No.	Name	Description
❺	[Scan Range]	Sets the range of the wavelength scans. Enter the scan starting and ending wavelength in the left and right input fields, respectively. Tap the input field to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29). NOTE • The starting wavelength must be longer than the ending wavelength. • The lower limit (minimum scan range) is determined by the value in [Data Interval]. The equation is shown below: Scan start wavelength ≥ Scan end wavelength + the value in [Data Interval] Up to 2001 measurement points are acceptable. When the measurement points led by the calculation exceeds 2001, the value in [Data Interval] is changed to the minimum value that creates less than 2001 points, after the execution confirmation message is displayed.
❻	[Record Range]	Specifies the range of Y-axis of the graph displayed during the measurement. Tap the input field to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29).
❼	[Scan Speed]	Specifies a wavelength scanning rate. Tap to select [Survey], [Fast], [Medium], [Slow], or [Very Slow]. The accumulation time in each speed is shown below: [Survey]: None [Fast]: 0.05 s [Medium]: 0.2 s [Slow]: 0.5 s [Very Slow]: 2.0 s NOTE [Survey] is used to perform the wavelength scan at super-high speed. The waveform of the measurement result may be deformed.
❽	[Data Interval]	Specifies the interval at which to obtain data during wavelength scan. Tap to select [AUTO], [0.05 nm], [0.1 nm], [0.2 nm], [0.5 nm], [1.0 nm], or [2.0 nm]. If [AUTO] is selected, the data interval is determined by the selected scan range so that the number of measurement points becomes maximum (and still does not exceed 2001). The equation is shown below: the maximum value out of 0.05/0.1/0.2/0.5/1.0/2.0 that meets [2001 > Scan Range/Data Interval] NOTE When [Scan Speed] (❼) is set to [Survey], [1.0 nm] and [2.0 nm] are available.

[Measurement Settings] subtab

No.	Name	Description
❶	[Repetitions]	Sets the number of times a scan will be repeated. Spectrum measurement will be repeated up to the number of times set here. Tap the input field to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29). **NOTE** If this is set to 2 or more times, a multi cell measurement using multi-cell holder cannot be performed. **Hint** To save all curve data obtained in a repeated measurement, use the Auto File function (see "8.2.3 Auto File Function" P.82). The Auto File function is available when a USB memory or expanded memory is connected. When not using the Auto File function, only the latest acquired data can be saved.
❷	[Display Mode]	Selects how to display the curve data. Tap to select [Overlay] or [Sequential]. When [Overlay] is selected, multiple curve data are overlaid in the display. This is used to display multiple curve data for measurement results of repeated measurement. When [Sequential] is selected, only one curve data is displayed. **NOTE** Even if [Overlay] is selected, only the latest acquired data can be saved or processed.

No.	Name	Description
❸	[Light Source]	Sets the light source for the measurement. This is enabled only when [Energy (E)] is selected in [Photometric Type]. Tap to select [WI] (halogen lamp), [D2] (deuterium lamp), or [OFF]. [OFF] is used to introduce the external light source into the spectrometer when measuring the energy change of light sources other than those equipped in the standard UV-1900i. When it is selected, both the WI and D2 lamps are turned OFF and the light source mirror turns to the third light source. **NOTE** This setting takes priority over the setting of [Light Source] in General Settings ("15.2 Setting the Light Source Lamp" P.241).
❹	[Meas. Interval]	Sets the time period from a scan start to the next scan start (including the time required for scanning). This is enabled when [Repetitions] is set to 2 or more times. Tap the input field to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29). **NOTE** • If the time required for scanning is shorter than the set value, the UV-1900i will wait for the next scan start. During this waiting period, the next scanning count and the remaining waiting time are displayed. • If the time required for scanning is longer than the set value, the scan will be continuously carried out without any waiting time.

Hint
- To set attachments, see "19 Setting Attachments" P.449.
- Tap [Save Params] to save measurement parameters ("4.3 Saving Files" P.32).

Reference After setting measurement parameters, perform measurement according to "8.2 Measurement" P.77.

8.2 Measurement

8.2.1 Performing Measurement

Performs measurement using set measurement parameters.

1 **Before the first measurement after setting or changing measurement parameters, set a blank sample in the cell and tap [Base Corr.].**

In the cases described above, baseline correction should be performed before measuring unknown samples.

Hint This step can be skipped when the same parameters are used for the measurement.

2 **Tap [Start].**

The [Measurement] tab is displayed and measurement starts using set measurement parameters.

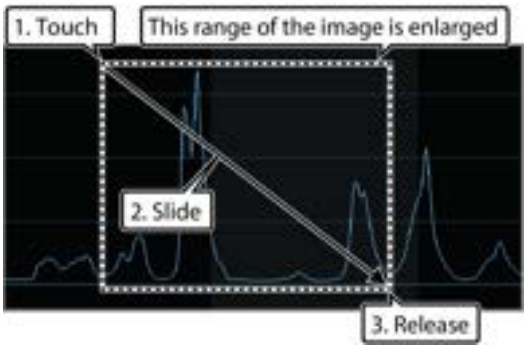
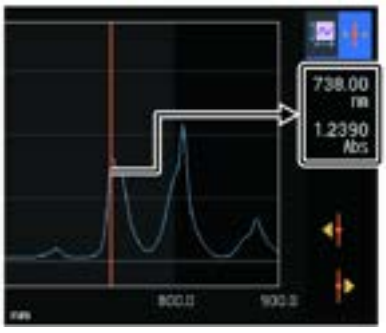
During measurement, a spectral waveform is plotted in real time.

Operation other than [Stop] is disabled during measurement.

8.2.2 Checking Measurement Results

After the measurement has finished (stopped), the graph can be scaled up/down.

No.	Name	Description
❶	Graph	Displays the spectral waveform.

No.	Name	Description
❷	Operation Switching button	Tap it to switch operation applied to the graph. Displayed button changes according to the operation. When  button is displayed, you can change the range of displayed graph using ❸ to ❻ buttons. Touch the start point of the range to be enlarged, slide the touch pen to the end point, and release it to enlarge displayed graph.  When  button is displayed, you can see data of a specified point on the graph using the cursor on the graph (orange vertical line). • The cursor can be moved to the left/right with  button. Hold down the button to move the cursor continuously. • The wavelength and photometric value at intersection of the spectral waveform and the cursor are displayed. 

No.	Name	Description
❸	Changing the Scale button	Opens the screen to set display range of the graph. Enter the upper and lower limits of display range in the input field and tap [Apply] to change display range.  **NOTE** Data is obtained according to the value in [Data Interval]. If a value other than the integral multiple of [Data Interval] is entered for the horizontal axis, the data will be automatically replaced with the wavelength values nearest to the existing data values.
❹	Overall Display button	Enlarges overall spectral waveform to fill the graph. **NOTE** The scale of the horizontal axis will not be changed.
❺	Display Reset button (once)	Cancels the latest change of display range or scale-up/down.
❻	Display Reset button (all)	Cancels all changes of display range or scale-up/down and returns the graph to the state immediately after the measurement.

NOTE When multiple spectral waveforms are overlaid on the graph, the operation is applied to the latest acquired or loaded waveform.

Hint

- Tap [Save Curve] to save measured data ("4.3 Saving Files" P.32).
- Tap [Print] to print measured data ("8.3.2 Manual Print ([Measurement] Tab)" P.85).

■ Loading curve data files

[View] tab displays loaded curve data file.

Tap [Load Curve] to load saved curve data file.

Reference For procedures of loading, see "4.4 Loading Files" P.37.

- Multiple curve data files can be loaded and overlaid, if they have the same measurement parameters.
- When a curve data file of the Spectrum mode is loaded on [Data File] of the Mode Menu screen, this tab appears on the screen.

■ Processing data of measurement results

Tap [Operations] to apply the following operations to obtained spectral waveform. For details, see "14 Data Processing" P.195.

- Arithmetic Operations
- Peak Area
- Derivative
- Point Pick
- Peak Pick
- Data Print

8.2.3 Auto File Function

When a USB memory or expanded memory is connected, you can save all measurement results acquired in a repeated measurement (a measurement of which the [Repetitions] parameter is set to 2 or more), as well as in a sequential measurement with a multi-cell. Results obtained from each measurement are saved in each curve data file.

1 **When the following screen is displayed after tapping [Start], tap [Yes].**

2 **Tap the destination.**

3 **Tap the input field of the File Name and enter the name using the text input screen ("4.2.1 Text Input Screen (Keyboard)" P.27).**

The file name specified here is assigned to the saved file with sequential numbers from "01" attached.

4 **Tap [Start].**

Measurement starts.
Upon completion of the measurement, the file with specified name is saved to the selected destination.

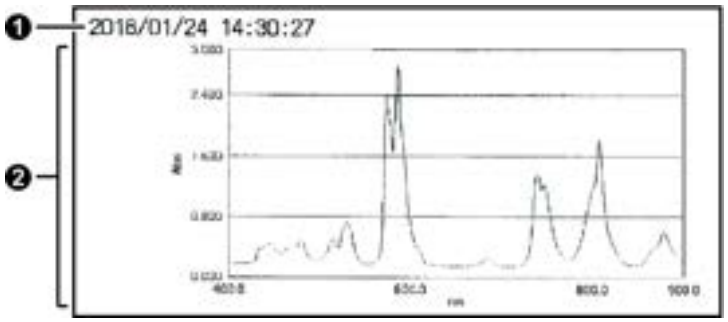
8.3 Printing Measurement Results

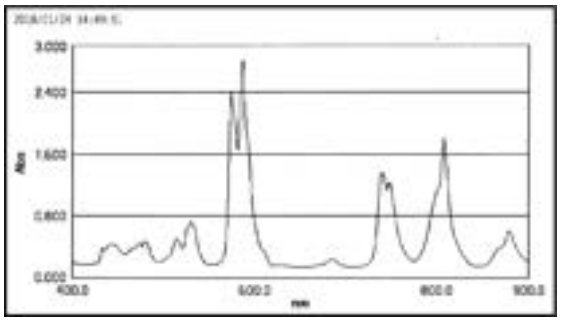
Measurement results can be printed out.

Hint In Spectrum mode, the graph will be printed out. Grid type of the graph is selectable when using a commercially available printer ("15.13 Setting the Printer" P.253).

8.3.1 Auto Print

When the [Auto Print] function is enabled in the [Scan Settings] subtab ("[Scan Settings] subtab" P.73), the date, time, and graph are automatically printed after the measurement.



No.	Name	Description
❶	Date and time	The date and time of the end of the measurement are printed.
❷	Graph	The graph of the measurement results is printed. The above figure shows an example when using a hard copy printer (optional). When using other printers, the graph will be printed in a format shown below, which is different from that displayed on the screen. It includes different axes but the content is equal.  **NOTE** When [Display Mode] ("[Measurement Settings] subtab" P.75) is set to [Overlay] and a hard copy printer is used, multiple curves displayed on the screen are printed as shown on the screen.

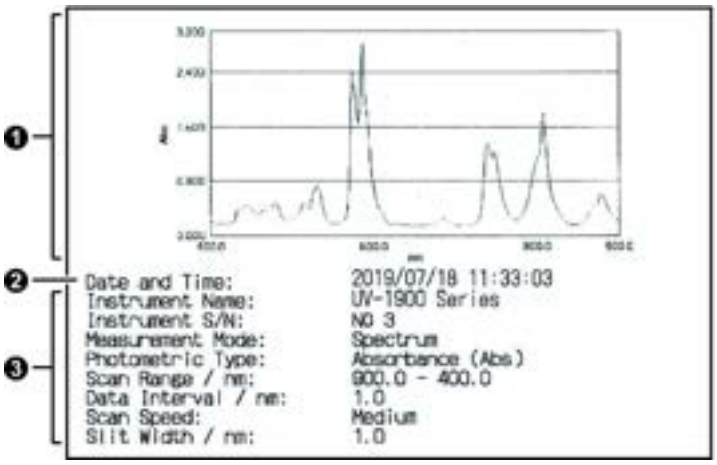
8.3.2 Manual Print ([Measurement] Tab)

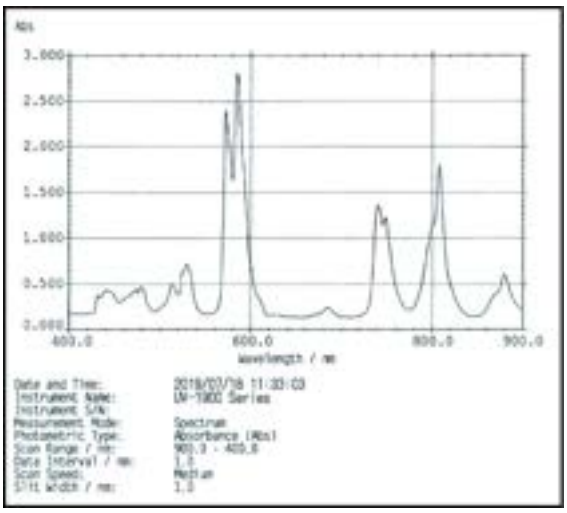
The graph, date, time, and measurement parameters can be printed for the curve data files on the [Measurement] tab.

1 **Tap [Print].**

2 **Tap [Measured data].**

The graph, date, time, and measurement parameters are printed.



No.	Name	Description
❶	Graph	The graph of the measurement results is printed. The above figure shows an example when using a hard copy printer (optional). When using other printers, the graph will be printed in a format shown below, which is different from that displayed on the screen. It includes different axes but the content is equal.  **NOTE** When [Display Mode] ("[Measurement Settings] subtab" P.75) is set to [Overlay] and a hard copy printer is used, multiple curves displayed on the screen are printed as shown on the screen. However, when using a commercially available printer, only the curve obtained in the latest measurement can be saved and printed even if [Display Mode] is set to [Overlay].
❷	Date and time	The date and time of the end of the measurement are printed.
❸	Measurement parameters	Measurement parameters are printed.

Hint

- Data at multiple sampling points can be listed and printed ("14.6 Point Pick" P.219).
- All data values can be printed on the Operations menu ("14.8 Data Print" P.233).

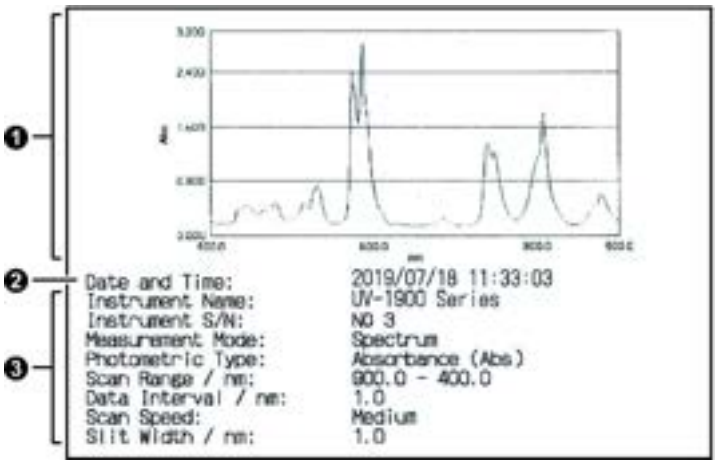
8.3.3 Manual Print ([View] Tab)

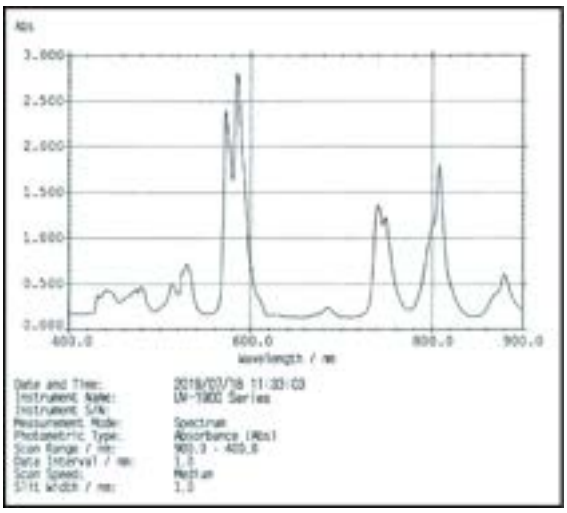
The graph, date, time, and measurement parameters can be printed for the curve data files loaded on the [Display] tab.

1 **Tap [Print].**

2 **Tap [Loaded Data].**

The graph, date, time, and measurement parameters are printed.



No.	Name	Description
❶	Graph	The graph of the measurement results is printed. The above figure shows an example when using a hard copy printer (optional). When using other printers, the graph will be printed in a format shown below, which is different from that displayed on the screen. It includes different axes but the content is equal.  **NOTE** When [Display Mode] ("[Measurement Settings] subtab" P.75) is set to [Overlay] and a hard copy printer is used, multiple curves displayed on the screen are printed as shown on the screen. However, when using a commercially available printer, only the curve obtained in the latest measurement can be saved and printed even if [Display Mode] is set to [Overlay].
❷	Date and time	The date and time of the end of the measurement are printed.
❸	Measurement parameters	Measurement parameters are printed.

Hint

- Data at multiple sampling points can be listed and printed ("14.6 Point Pick" P.219).
- All data values can be printed on the Operations menu ("14.8 Data Print" P.233).

9 Quantitation

The quantitation mode is used to quantify an unknown sample by creating a calibration curve from the standard sample. The following four types of measurement methods are available according to the number of wavelengths used:

- One-wavelength quantitation method: The sample is quantified using its absorbance at a single wavelength.
- Two-wavelength quantitation method: The absorbance at a wavelength other than the quantitation wavelength is used to eliminate the interfering components.

Reference "Two-wavelength quantitation method" P.119

- Three-wavelength quantitation method: The absorbance of two wavelengths is used to eliminate the interfering components.

Reference "Three-wavelength quantitation method" P.120

- Derivative quantitation method: The derivative value (1st through 4th orders) for the spectrum at the quantitation wavelength is used.

Reference "9.8.2 Derivative Quantitation Method" P.121

The calibration curve is created using one of the following three methods:

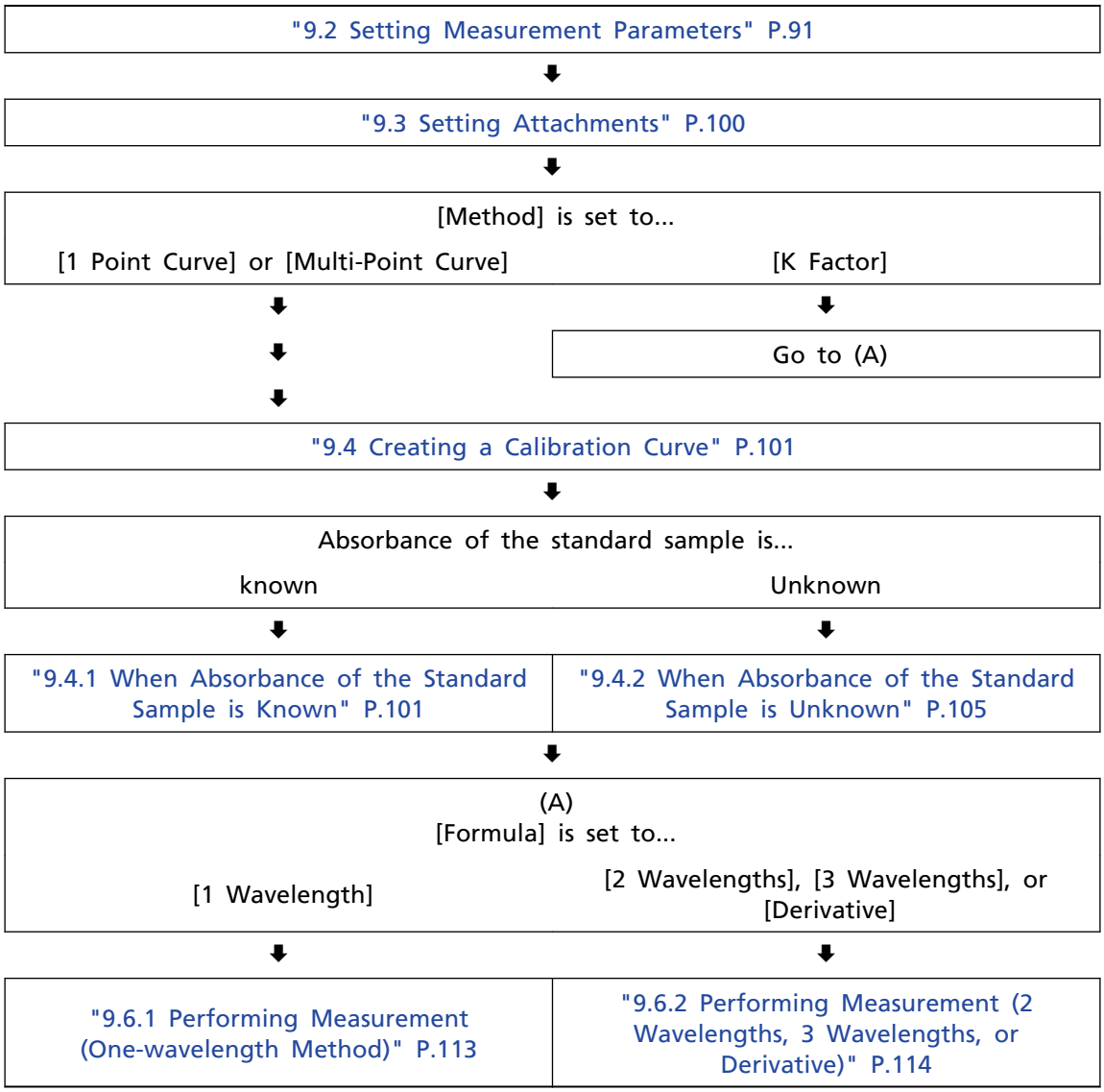
- K-factor method: In the equation, "C = K × Abs + B", K and B are predetermined.
- Single-point calibration curve method: One standard sample is measured to create the calibration curve.
- Multi-point calibration curve method: Multiple standard samples (10 maximum) are measured to create the calibration curve.

The measurement results may be displayed as a list. A single list can include a maximum of 400 measurement results. This data may be saved as a single curve data file.

9.1 Operation Flow

Quantitation mode requires you to perform operations in a certain order starting from measurement parameters settings and ending with performing the measurement.

The following figure shows operation flow.



9.2 Setting Measurement Parameters

1 Tap [Quantitation].

The measurement screen is displayed.

2 Set measurement parameters in the [Parameters] tab.

The [Parameters] tab has four subtabs. Select the subtab and make necessary settings changes.

Hint Tap [Load Params] to load saved measurement parameters ("4.4 Loading Files" P.37).
For procedures to save or load parameters, see "9.5 Saving and Loading Parameters Files in the Quantitation Mode" P.112.

[Formula Settings] subtab

In the [Formula Settings] subtab, formula to be used can be selected. The items on the screen depends on the setting of [Formula].

- When [1 Wavelength], [2 Wavelengths], or [3 Wavelengths] is selected in [Formula]
  The following figure is an example of the screen when [3 Wavelengths] is selected. [Wavelength 1] to [Wavelength 3] is displayed according to the number of wavelengths used for the formula.

No.	Name	Description
❶	Tab for Switching Screens	Switches the displayed tab. The Quantitation mode requires you to change the settings from the [Parameters] tab at the left end, and does not allow you to skip any tab. For example, you cannot proceed to the [Std. Table] tab from the [Parameters] tab skipping the [Attachments] tab. The display can be switched to the tab in which the setting is completed. When [Method] in the [Calib. Curve Settings] subtab ("[Calib. Curve Settings] subtab" P.94) is set to [K Factor] and you proceed to the next screen, [Parameters], [Attachments], and [Unk. Table] tabs will be displayed.
❷	Subtab	Switches the setting items in the [Parameters] tab.
❸	[Formula]	Specifies the formula to be used. Tap to select [1 Wavelength], [2 Wavelengths], [3 Wavelengths], or [Derivative].
❹	[Resettings]	Confirms the resettings. This is enabled when you return to the tab in which the setting is completed.

No.	Name	Description
❺	[Wavelength 1] [Wavelength 2] [Wavelength 3]	Specifies the wavelengths for measurement. • When [1 Wavelength] is selected in [Formula] Enter the quantitation wavelength in [Wavelength 1]. • When [2 Wavelengths] is selected in [Formula] Enter the quantitation wavelength in [Wavelength 1] and the wavelength at which to eliminate the interfering components in [Wavelength 2]. ▶▶ Reference "Two-wavelength quantitation method" P.119 • When [3 Wavelengths] is selected in [Formula] Enter the quantitation wavelength in [Wavelength 2] and the wavelength at which to eliminate the interfering components in [Wavelength 1] and [Wavelength 3]. The entered wavelength values are automatically arranged as Wavelength 1, Wavelength 2, and Wavelength 3 in this order starting with the longer wavelength side. ▶▶ Reference "Three-wavelength quantitation method" P.120 Tap the input field to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29).
❻	Tab Switching button	Switches the tab. The button name varies according to the tab.

• When [Derivative] is selected in [Formula]

▶▶ Reference "9.8.2 Derivative Quantitation Method" P.121

No.	Name	Description
❶	[Wavelength]	Specifies the quantitation wavelength. Tap the input field to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29).
❷	[Order]	Specifies the order of derivative. Tap the input field to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29).

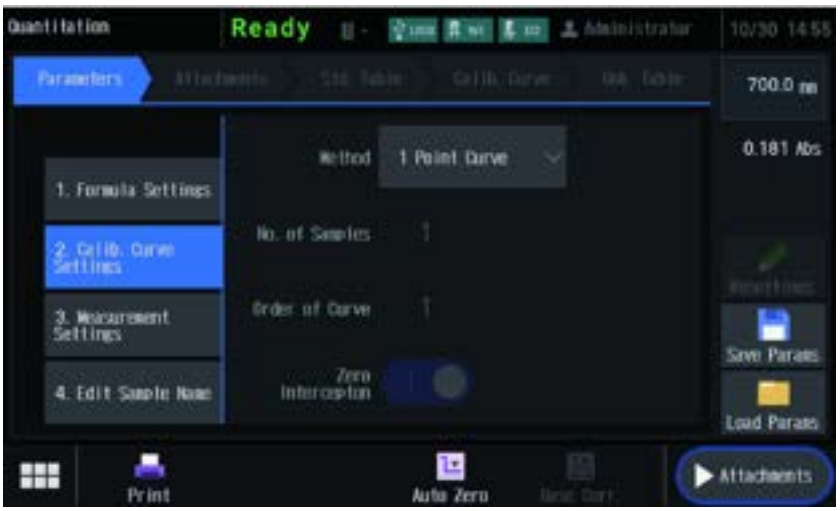
[Calib. Curve Settings] subtab

In the [Calib. Curve Settings] subtab, the calibration method to be used can be selected. The items on the screen depends on the setting of [Method].

- When [K Factor] is selected in [Method]
  In K Factor method, the relationship between sample concentration C and absorbance Abs is shown as "C = K × Abs + B". When K Factor and B are given, enter the values of K and B and create the calibration curve.

No.	Name	Description
❶	[Method]	Specifies the calibration method to be used. Tap to select [K Factor], [1 Point Curve], or [Multi-Point Curve].
❷	[K]	Specifies the constant K. Tap the input field to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29). **NOTE** In the methods that calculate the concentration by multiplying measurement data by the factor, such as K Factor method, values are displayed in the range of -9999.9 to 9999.9. If values are out of displayable range, "######" is displayed.
❸	[B]	Specifies the constant B. Tap the input field to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29).
❹	[Conc.]	Displays the equation to calculate sample concentration.

- When [1 Point Curve] is selected in [Method]
  In 1 Point curve method, the concentration of an unknown sample is determined by finding the value for K in the calibration curve equation "C = K × Abs" or "Abs = K × C" from a single standard sample of known concentration. The calibration curve will be a straight line defined by the origin and the absorbance and concentration of the standard sample.
  When this method is selected, the other items in the [Calib. Curve Settings] subtab do not need to be set.



• When [Multi-Point Curve] is selected in [Method]
In Multi-point calibration curve method, the calibration curve is created by measuring multiple standard samples of known concentration.

No.	Name	Description
❶	[No. of Samples]	Specifies the number of standard samples. The number of required standard samples depends on the setting of [Zero Interception]. The number of required standard sample is the order of the calibration curve or more when the setting is ON, and the order of the calibration curve +1 or more when the setting is OFF. Tap the input field to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29).
❷	[Order of Curve]	Specifies the order of the calibration curve equation. A linear, quadratic, or cubic equation can be used as the calibration curve equation, therefore, the setting range is 1 to 3. Tap the input field to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29).
❸	[Zero Intercepton]	Each tap of this key toggles between ON and OFF of Zero Interception. OFF:  ON: 

[Measurement Settings] subtab

Specifies how many times the same sample is to be measured and the concentration unit for the quantitation result.

No.	Name	Description
❶	[Repetitions]	Specifies how many times the same sample is to be measured. When this is set to 2 or more times, the following operation will be applied: • For standard sample measurement, the average of absorbance obtained by repeated measurements is used. • In unknown sample measurement, measurement results of each measurement in repeated measurements and their average are shown. **NOTE** Repeated measurements using a multi-cell or similar holder (optional) with the multiple cells cannot be carried out. Tap the input field to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29).
❷	[Unit]	Specifies the concentration unit for the measurement result. Tap to select [None], [%], [ppm], [ppb], [g/l], [mg/ml], [ng/ml], [mol/l], [μg/ml], [mg/l], or [Registered Unit [ ]]. To use a unit other than those listed above, select [Registered Unit [ ]] and then enter the desired unit in [Unit (User-defined)].
❸	[Unit (User-defined)]	Specifies the desired concentration unit for the measurement result. Tap the input field to display text input screen ("4.2.1 Text Input Screen (Keyboard)" P.27).

[Edit Sample Name] subtab

No.	Name	Description
❶	[Name] [Start Number]	Displays the sample name of the measurement result. The sample name will be [Name] + [Start Number] such as "SAMPLE1". In [Start Number], enter a number to be used for the first measurement result. The number increases by 1 every measurement. Tap the input field of [Name] to display text input screen ("4.2.1 Text Input Screen (Keyboard)" P.27). Tap the input field of [Start Number] to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29). **NOTE** • Up to 15 characters can be entered in [Name]. The value of [Start Number] (up to 999) is added to this, therefore, the number of characters of sample name is 18 at the maximum. • The value entered in [Start Number] increases to 999 at the maximum. When 999 is exceeded, it returns to 1.

3 When the setting is completed, tap [Attachments].

The [Attachments] tab is displayed.

Reference After setting measurement parameters, set attachments according to "9.3 Setting Attachments" P.100.

Hint Tap [Save Params] to save measurement parameters ("4.3 Saving Files" P.32).
For procedures to save or load parameters, see "9.5 Saving and Loading Parameters Files in the Quantitation Mode" P.112.

9.3 Setting Attachments

Make the settings changes in this section after "9.2 Setting Measurement Parameters" P.91.

1 Change the settings of attachments according to "19 Setting Attachments" P.449.

Hint

- Tap [Save Params] to save measurement parameters ("4.3 Saving Files" P.32).
  For procedures to save or load parameters, see "9.5 Saving and Loading Parameters Files in the Quantitation Mode" P.112.
- To reset each item, return to this screen after the settings. However, tap [Resettings] in advance to change the settings of [Attachments] (to change optional device to be used).

2 When the setting is completed, tap [Std. Table] or [Start].

The button and the following procedures vary according to the settings of [Method] and [Formula]. See below.

Setting	Button	Reference
When [1 Point Curve] or [Multi-Point Curve] is selected in [Method]	[Std. Table]	"9.4 Creating a Calibration Curve" P.101
When [K Factor] is selected in [Method] and [1 Wavelength] is selected in [Formula]	[Start]	"9.6.1 Performing Measurement (One-wavelength Method)" P.113
When [K Factor] is selected in [Method] and [2 Wavelengths], [3 Wavelengths], or [Derivative] is selected in [Formula]	[Start]	"9.6.2 Performing Measurement (2 Wavelengths, 3 Wavelengths, or Derivative)" P.114

9.4 Creating a Calibration Curve

Enter the concentration and absorbance of the standard sample to create the calibration curve. The following 2 methods are available. In both cases, perform "9.3 Setting Attachments" P.100 before the procedures in this section.

Reference
- "9.4.1 When Absorbance of the Standard Sample is Known" P.101
- "9.4.2 When Absorbance of the Standard Sample is Unknown" P.105

9.4.1 When Absorbance of the Standard Sample is Known

Enter the concentration and absorbance of standard samples.

1 **Tap [OK].**

Numeric keypad is displayed ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29).

2 **Enter the concentration of standard samples.**

Tap [OK] to confirm the entry. Tap [Cancel] to cancel the entry and return to the [Parameters] tab.
When [No. of Samples] in the [Calib. Curve Settings] subtab is set to 2 or more, [Go to (Sample Number)] and [Back to (Sample Number)] are displayed. Tap [OK] after entering the concentrations of all the standard samples.

3 Tap [Key-in].

Numeric keypad is displayed ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29).

4 Enter the absorbance of standard samples.

As with the concentrations, tap [OK] after entering the absorbance of all the standard samples.
Tap [Cancel] to cancel the entry and return to the [Parameters] tab.

You can check entered concentrations and absorbance on the screen.

5 Tap [Calib. Curve].

The tab switches to the [Calib. Curve] tab and you can check the calibration curve.

6 To see the setting or make changes, tap [Calib. Curve Statistical Func.].

Hint Tap [Save Params] to save created calibration curve ("4.3.4 Saving Files" P.34). Measurement parameters set in the previous steps are also saved.
For procedures to save or load parameters, see "9.5 Saving and Loading Parameters Files in the Quantitation Mode" P.112.

Reference When you do not see the setting or make changes, the following procedures vary according to the settings of [Formula]. See below.

- [1 Wavelength] is selected:
  "9.6.1 Performing Measurement (One-wavelength Method)" P.113
- Either of [2 Wavelengths], [3 Wavelengths], or [Derivative] is selected:
  "9.6.2 Performing Measurement (2 Wavelengths, 3 Wavelengths, or Derivative)" P.114

7 Check and change them as needed.

No.	Name	Description
❶	[Type]	Tap to switch the type of the calibration curve equation.
❷	[Order]	Specifies the order of the calibration curve equation. A linear, quadratic, or cubic equation can be used as the calibration curve equation, therefore, setting range is 1 to 3. Tap the input field to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29).
❸	[Zero Intercepton]	Each tap of this key toggles between ON and OFF of Zero Interception. OFF:  ON: 
❹	Calibration curve equation	Displays the calibration curve equations.
❺	Square of Correlation Coefficient	Displays square of correlation coefficient, r^2. This is displayed when [Zero Interception] is disabled. r^2 is obtained using the following equation: $$r^2=\frac{\{\Sigma(Ai-A_m)(Ci-C_m)\}^2}{\{\Sigma(Ai-A_m)^2\}\{\Sigma(Ci-C_m)^2\}}$$ The symbols stand for the following: Ai: Absorbance of the standard sample Ci: Concentration of the standard sample A_m: Average of Ai C_m: Average of Ci **Hint** For the quadratic or cubic equation, the value of $K3Ci^3 + K2Ci^2 + K1Ci + K0$ is used for the value Ai.
❻	[Apply]	Confirms changes and closes the window. Displayed calibration curve will be changed.
❼	[Cancel]	Discards changes and closes the window.

Reference The following procedures vary according to the settings of [Formula]. See below.

- [1 Wavelength] is selected:
  "9.6.1 Performing Measurement (One-wavelength Method)" P.113
- Either of [2 Wavelengths], [3 Wavelengths], or [Derivative] is selected:
  "9.6.2 Performing Measurement (2 Wavelengths, 3 Wavelengths, or Derivative)" P.114

9.4.2 When Absorbance of the Standard Sample is Unknown

Enter the concentration of the standard sample and determine the absorbance by measuring the standard sample.

Hint When using a multi-cell holder (optional), the cell will be automatically switched for measurement. For details, see "Measuring Multi-cell Continuously" P.110.

1 Tap [OK].

Numeric keypad is displayed ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29).

2 Enter the concentration of standard samples.

Tap [OK] to confirm the entry and tap [Cancel] to cancel it.
When [No. of Samples] in the [Calib. Curve Settings] subtab is set to 2 or more, [Go to (Sample Number)] and [Back to (Sample Number)] are displayed. Tap [OK] after entering the concentrations of all the standard samples.

3 Tap [Measure Cell 1].

4 Tap [Auto Zero] or [Base Corr.] setting a blank sample in the cell.

5 Measure the standard sample.

For measurements, set the standard samples one by one in the order of having entered their concentrations.

1. Set the standard sample on the cell holder.
   To measure the standard samples one by one using the multi-cell holder (optional), set it on cell 1.
2. Tap [Start].

3. When [Repetitions] in the [Parameters] tab is set to 2 or more, tap [Next Sample].

4. Repeat step 1 to 3 until all the standard samples are measured.

6 Tap [Calib. Curve].

The tab switches to the [Calib. Curve] tab and you can check the calibration curve.

7 To see the setting or make changes, tap [Calib. Curve Statistical Func.].

Hint Tap [Save Params] to save created calibration curve ("4.3.4 Saving Files" P.34). Measurement parameters set in the previous steps are also saved.
For procedures to save or load parameters, see "9.5 Saving and Loading Parameters Files in the Quantitation Mode" P.112.

Reference When you do not see the setting or make changes, the following procedures vary according to the settings of [Formula]. See below.

- [1 Wavelength] is selected:
  "9.6.1 Performing Measurement (One-wavelength Method)" P.113
- Either of [2 Wavelengths], [3 Wavelengths], or [Derivative] is selected:
  "9.6.2 Performing Measurement (2 Wavelengths, 3 Wavelengths, or Derivative)" P.114

8 Check and change them as needed.

No.	Name	Description
❶	[Type]	Tap to switch the type of the calibration curve equation.
❷	[Order]	Specifies the order of the calibration curve equation. A linear, quadratic, or cubic equation can be used as the calibration curve equation, therefore, setting range is 1 to 3. Tap the input field to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29).

No.	Name	Description
❸	[Zero Intercepton]	Each tap of this key toggles between ON and OFF of Zero Interception. OFF:  ON: 
❹	Calibration curve equation	Displays the calibration curve equations.
❺	Square of Correlation Coefficient	Displays square of correlation coefficient, r^2. This is displayed when [Zero Interception] is disabled. r^2 is obtained using the following equation: $$r^2 = \frac{\{\Sigma(Ai-A_m)(Ci-C_m)\}^2}{\{\Sigma(Ai-A_m)^2\}\{\Sigma(Ci-C_m)^2\}}$$ The symbols stand for the following: Ai: Absorbance of the standard sample Ci: Concentration of the standard sample A_m: Average of Ai C_m: Average of Ci **Hint** For the quadratic or cubic equation, the value of $K3Ci^3 + K2Ci^2 + K1Ci + K0$ is used for the value Ai.
❻	[Apply]	Confirms changes and closes the window. Displayed calibration curve will be changed.
❼	[Cancel]	Discards changes and closes the window.

Reference The following procedures vary according to the settings of [Formula]. See below.

- [1 Wavelength] is selected:
  "9.6.1 Performing Measurement (One-wavelength Method)" P.113
- Either of [2 Wavelengths], [3 Wavelengths], or [Derivative] is selected:
  "9.6.2 Performing Measurement (2 Wavelengths, 3 Wavelengths, or Derivative)" P.114

■ Measuring Multi-cell Continuously

When using a multi-cell holder (optional), multiple standard samples can be measured continuously.

1 **Perform step 1 and 2 in "9.4.2 When Absorbance of the Standard Sample is Unknown" P.105.**

2 **Tap [Measure Multi-cell Cont.].**

3 Measure the standard sample.

1 Set the standard samples in the order of having entered their concentrations starting with cell 1.

2 Tap [Start].

The UV-1900i continuously performs the same number of measurements as [Number of Cells] ("19.2 Settings of [Multi-Cell (6 Cells)], [MMC (8 Cells)], [MMC (16 Cells)], and [CPS]" P.451) and then stops. When tapping [Start] after that, the UV-1900i starts sequential measurements and stops again. Repeat it until the same number of measurements as [No. of Samples] ("[Calib. Curve Settings] subtab" P.94) are completed.

Ex: Operation when [Number of Cells] is 3 and [No. of Samples] is 8

1. <UV-1900i> Performs three measurements continuously and then stops
2. <User> Tap [Start].
3. <UV-1900i> Performs three measurements continuously and then stops
4. <User> Tap [Start].
5. <UV-1900i> Performs two measurements continuously and then stops (End)

Reference After the measurement is completed, go to step 5 in "9.4.2 When Absorbance of the Standard Sample is Unknown" P.105.

9.5 Saving and Loading Parameters Files in the Quantitation Mode

■ Saving parameters files

When measurement parameters files are saved in the Quantitation mode, settings in the [Parameters], [Attachments], [Std. Table], and [Calib. Curve] tabs are saved.

When saved as a template file, the [Parameters], [Attachments], and [Std. Table] (concentration table only) are saved.

> NOTE The file of which type is checked in the Save Params window is saved.

The file will be created in checked format.
Tap [Load Params] and select the file format.

Measurement parameters should be set in the order of the [Parameters], [Attachments], [Std. Table], and [Calib. Curve] tabs, however, the parameters can be saved even before the [Calib. Curve] tab is set (cannot be saved in the [Std. Table] tab).

■ Loading parameters files

Tap [Load Params] and select the file type to load measurement parameters files or template files (these files are hereinafter referred to as "parameters file").

When a parameters file is loaded, all of the current settings will be discarded and overwritten by the parameters in the file. Settings in any tab made before loading will be cleared if the parameters in the tab are not set in the loaded file.

The tab on which the file is saved is displayed on the screen.

Ex: When a file with the settings in [Attachments] tab completed is loaded after the settings in the [Calib. Curve] are completed

- The settings in the [Parameters] and [Attachments] tabs will be the settings in the loaded file.
- The settings in the [Std. Table] and [Calib. Curve] tabs are cleared.
- The [Attachments] tab is displayed on the screen.

9.6 Measurement

9.6.1 Performing Measurement (One-wavelength Method)

Measures unknown samples using set measurement parameters.

1 **Before the first measurement after setting or changing measurement parameters, set a blank sample in the cell and tap [Auto Zero].**

In the cases described above, blank correction should be performed before measuring unknown samples.

Hint This step can be skipped when the same parameters are used for the measurement.

The photometric value will be set to 0 Abs (100 % T).

2 **Set an unknown sample in the cell and tap [Start].**

Measurement starts using set measurement parameters.
Operation other than [Stop] is disabled during measurement.

NOTE When [Stop] is tapped, the average value of repeated measurements is not calculated.

Reference After the measurement, see the results according to "9.6.3 Checking Measurement Results" P.115.

9.6.2 Performing Measurement (2 Wavelengths, 3 Wavelengths, or Derivative)

Measures unknown samples using set measurement parameters.

1 **Before the first measurement after setting or changing measurement parameters, set a blank sample in the cell and tap [Base Corr.].**

In the cases described above, baseline correction should be performed before measuring unknown samples.

Hint This step can be skipped when the same parameters are used for the measurement.

2 **Set an unknown sample in the cell and tap [Start].**

Measurement starts using set measurement parameters.
Operation other than [Stop] is disabled during measurement.

NOTE When [Stop] is tapped, the average value of repeated measurements is not calculated.

Reference After the measurement, see the results according to "9.6.3 Checking Measurement Results" P.115.

9.6.3 Checking Measurement Results

After measurement, the results are displayed.

No.	Name	Description
❶	[No.]	Displays the order of measurement. In normal measurement, numbers increasing by 1 are displayed. In repeated measurement, the same number is displayed for the measurements of the same sample and "-x" or "-Ave" is attached to the number. • "x" stands for repetition count. For the 1st to 3rd measurements of the first sample of repeated measurement, [001-01], [001-02], and [001-03] are displayed. • "Ave" stands for the average of the repeated measurement. For the average of the first sample, [001-Ave] is displayed.
❷	[Sample Name]	Displays sample names (up to 18 characters). Sample name will be "Name + Start Number" set in the [Edit Sample Name] subtab.
❸	Abs	Displays absorbance of each sample.
❹	[Conc. (specified unit)]	Displays concentration of each sample.
❺	The number of results and selection/page button	Number in the top line shows the ordinal number of selected measurement result and total number of saved measurement results. The four buttons on the right operate as follows: •  Moves to the previous or next page when the list of measurement results continues for more than one page. •  Selects the previous or next measurement results.

No.	Name	Description
❻	Multiple Selection button	Tap this button to enable the function (highlighted in blue) to select multiple measurement results. Tap a selected measurement result to cancel the selection when multiple results are selected.
❼	Delete button	Deletes selected measurement results.
❽	All Delete button	Deletes all measurement results.
❾	Sample Name Change button	Changes the sample name of selected measurement results. Tap it to display text input screen ("4.2.1 Text Input Screen (Keyboard)" P.27).

Hint

- Tap [Save Table] to save measured data ("4.3 Saving Files" P.32).
- Tap [Load Table] to load saved table data file ("4.4 Loading Files" P.37).
- Tap [Print] to print measured data ("9.7.2 Manual Print" P.118).

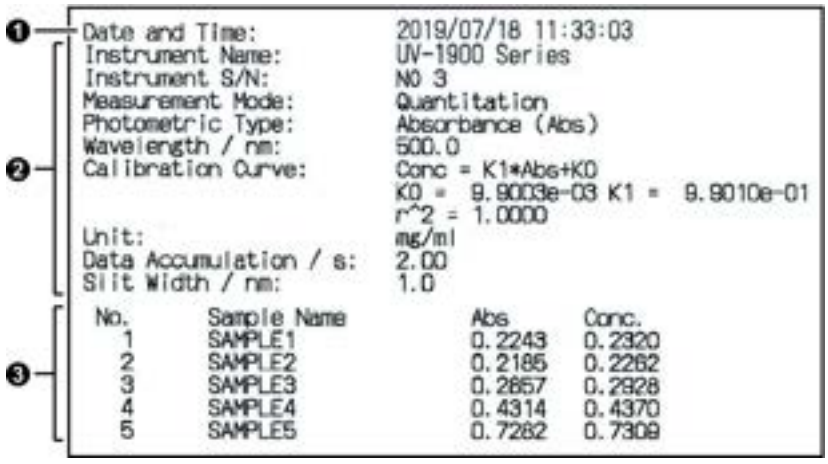
9.7 Printing Measurement Results

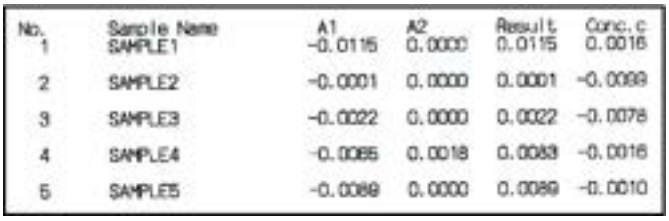
Measurement results can be printed out.

9.7.1 Auto Print

If a hard copy printer (optional) is connected, the measurement results will be printed on the printer for every measurement.

After the first measurement, date, time, measurement parameters, and the first measurement results will be printed. After that, the measurement results will be printed for every measurement.



No.	Name	Description
❶	Date and time	The date and time when the first measurement is completed are printed.
❷	Measurement parameters	Measurement parameters are printed.
❸	Results	In order from left, sample number, set sample name, photometric value, and concentration are printed. The above figure shows an example when [Formula] is set to [1 Wavelength] or [Derivative]. When [2 Wavelengths] or [3 Wavelengths] is selected, the following format is used according to the number of wavelengths (The figure shows an example of [2 Wavelengths]). 

9.7.2 Manual Print

All measurement results, or all the data within the currently-loaded table data file will be printed as a numeric data table.

1 **Tap [Print].**

2 **Select the type of the table to be printed.**

A numeric data table is printed according to the selected table type.

- When selecting [Std. Sample Table], the standard sample table and the calibration curve are printed.
- When selecting [Unknown Sample Table], only the unknown sample table is printed. The printing format is the same as shown in "9.7.1 Auto Print" P.117.
- When selecting [All Tables], the standard sample table, calibration curve, and unknown sample table are printed.

9.8 Quantitation Method

9.8.1 Two/Three-wavelength Quantitation Method

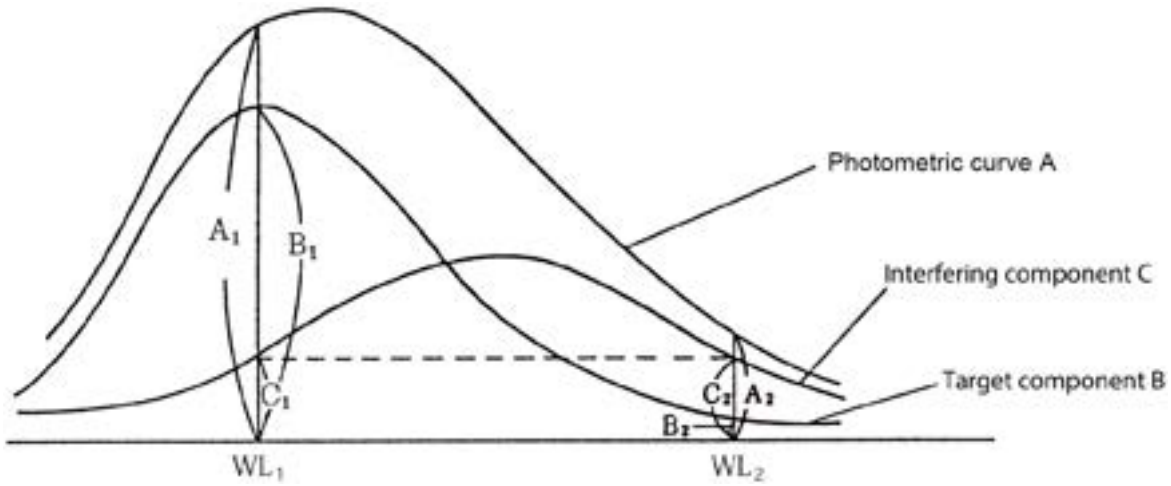
Two/three-wavelength quantitation method is an accurate quantitation method which can be used to eliminate the effects of dispersion due to interfering components and contaminants, and to correct "floating" of the baseline due to bubbles when such conditions exist.

■ Two-wavelength quantitation method

This method quantitates based on the difference between the photometric values at two wavelengths. This allows for the elimination of the effects of interfering components. Assume that the absorbance of the measured sample is A_1 and A_2 at wavelengths WL_1 and WL_2, that the absorbance of the target component B is B_1 and B_2, and that the absorbance of interfering component C is C_1 and C_2 ($A_1 = B_1 + C_1$, $A_2 = B_2 + C_2$). When wavelengths WL_1 and WL_2 are selected so that C_1 is equal to C_2, the following equation holds:

$$A_1 - A_2 = B_1 - B_2$$

Thus, the information on the target component remains on the equation. Normally, the absorbance wavelength for the target component is set for WL_1.
The following figure shows an example of two-wavelength measurement.



Quantitation measurement is then performed using these parameters.

■ Three-wavelength quantitation method

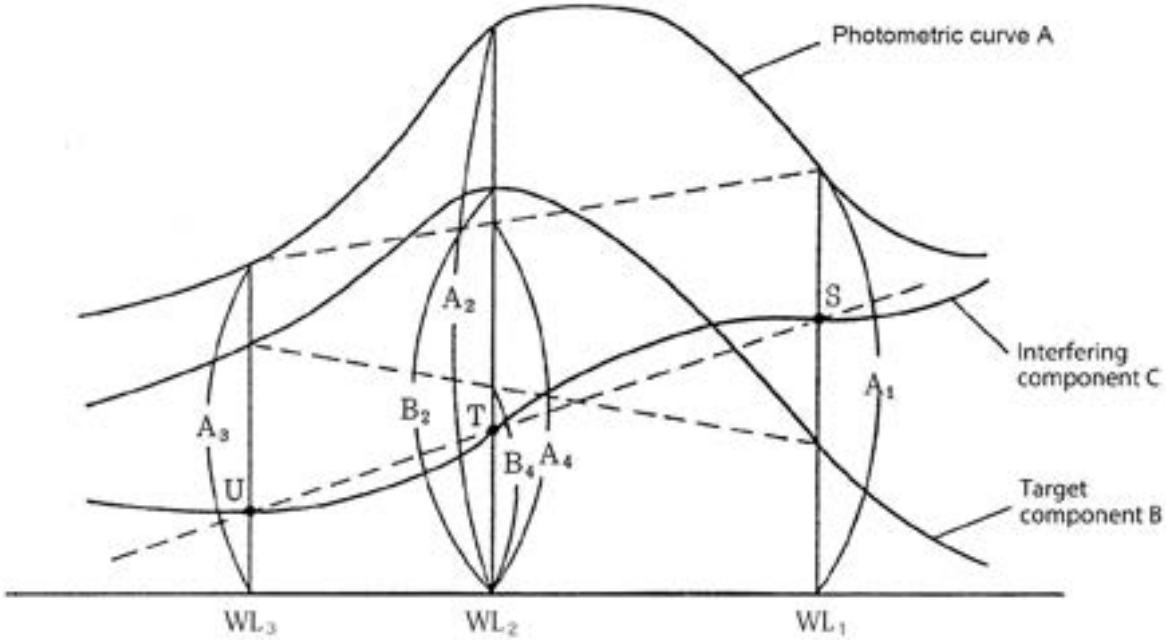
This method quantitates based on the difference between the photometric values at three wavelengths. As in the two-wavelength quantitation method, three-wavelength quantitation also eliminates the effects of interfering components, and is also useful in eliminating "floating" of sloped baselines due to dust, etc.
The following calculation is performed based on the photometric values at three wavelengths.

$A_2 - A_4$ Where, $A_4 = \frac{(WL_1 - WL_2)A_3 + (WL_2 - WL_3)A_1}{WL_1 - WL_3}$

Where A_1, A_2, and A_3 stand for the absorbance of the sample at wavelengths WL_1, WL_2, and WL_3 (see the following figure).
The following figure describes the elimination of the effects of an interfering component. If WL_1, WL_2 and WL_3 are taken so that the points S, T and U of the interfering component are connected by a single straight line, then

$A_2 - A_4 = B_2 - B_4$

leaving only the information for the target component. Normally, the absorbance wavelength for the target component is set for WL_2.
Quantitation measurement is then performed using these parameters.

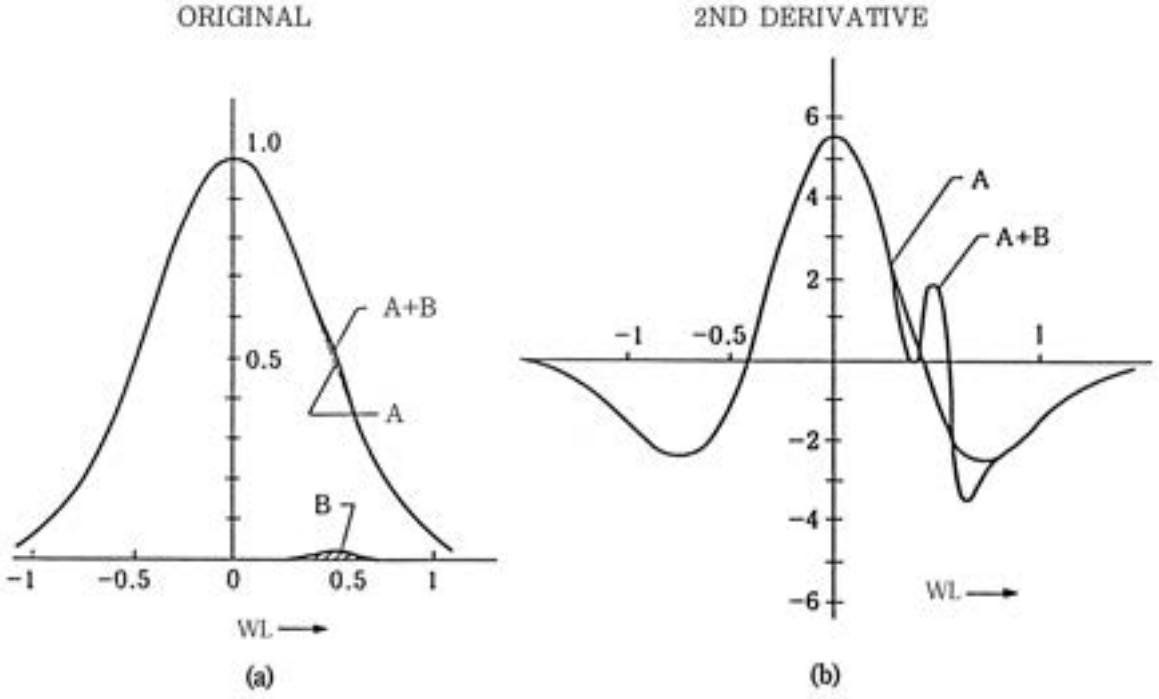


9.8.2 Derivative Quantitation Method

Derivative quantitation method uses the derivative value at a set wavelength(s). This method has the following advantages.

- Absorption bands can be recognized when there are two or more absorption bands overlapping at the same wavelength or at slightly different wavelengths.
- Weak absorption bands which are hidden in portions where the absorbance increases sharply relative to wavelength.
- The single greatest point of absorption can be recognized in broad absorption spectra.
- Since a straight line correlation can be drawn between the derivative value and the concentration, quantitative analysis is easy in the presence of a background.

The 2nd derivative spectrum in a case where two absorption bands overlap at different wavelengths is shown in the following figure. (a) is the normal spectrum, where the absorption band B cannot be discerned in the spectrum A + B in which the absorption bands A and B are overlapped.
The 2nd order derivative of this is shown in (b), where the spectrum A + B is obtained by the combination of the derivatives of absorption bands A and B.
Thus, the absorption band B, which was hidden in the larger absorption band A, can clearly be discerned in the 2nd derivative.
See "14.4 Derivative" P.205 for details on derivative calculations.
Derivative in the quantitation mode is calculated from 17 points of data before and after the center of the set wavelength. The derivative wavelength difference ΔWL is constant at 0.8 nm. In addition, the order of derivative can be set from 1st through 4th.



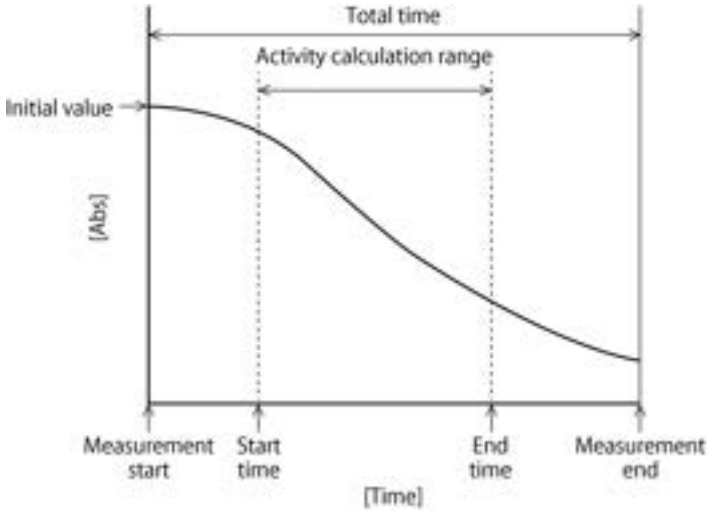
10 Kinetics

The Kinetics mode allows you to measure the activity value of the sample.

Data in the activity calculation range is fitted to a linear expression by the method of least squares to obtain the rate of change (Δ Abs/min) (the unit will be converted when the unit is set to second).

Activity values are obtained by multiplying the range of change by four factor values. The equation is shown below:

(Activity value) = (Factor 1) × (Factor 2) × (Factor 3) × (Factor 4) × (Rate of change)



10.1 Setting Measurement Parameters

1 Display Measurement Mode screen of Kinetics Mode.

1 Tap [Kinetics].

2 Tap [Kinetics].

The measurement screen is displayed.

2 Set measurement parameters in the [Parameters] tab.

The [Parameters] tab has four subtabs. Select the subtab and make necessary settings changes.

Hint Tap [Load Params] to load saved measurement parameters ("4.4 Loading Files" P.37).

[Wavelength Settings] subtab

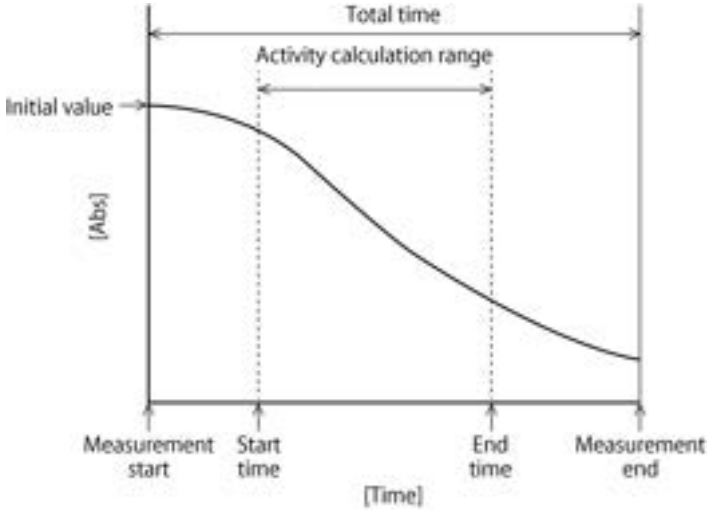
No.	Name	Description
❶	Tab for Switching Screens	Switches displayed tab. Switch to the [Attachments] tab to set attachments ("19 Setting Attachments" P.449). Switch to the [Reaction Curve] tab to see measured reaction curve and switch to the [Activity] tab to see the list of activities calculated from measurement results.
❷	Subtab	Switches setting items in the [Parameters] tab.
❸	[Wavelength]	Specifies the wavelength for measurement. Tap the input field to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29).
❹	[Background Correction]	Each tap of this key toggles between ON and OFF of the background correction function. OFF:  ON:  When it is turned ON, tap the input field and enter the background correction wavelength. Tap the input field to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29). NOTE When this setting is turned ON, measurements using multiple cells are not available.
❺	[Record Range]	Specifies the range of Y-axis of the graph ("[Reaction Curve] tab" P.129). Enter the lower and upper limit in the left and right fields, respectively. Tap the input field to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29).

[Time Settings] subtab

No.	Name	Description
❶	[Time Unit]	Specifies time unit used for the measurements. Tap to select [Second (s)] or [Minute (min)].
❷	[Total Time]	Specifies the time to acquire absorbance data. Tap the input field to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29). **NOTE** When the [Background Correction] is ON or when performing a multi cell measurement with multi-cell holder, the lower limit of the range is determined by the difference of set wavelengths or the number of cells.
❸	[Data Interval]	Specifies the interval to acquire measurement data. Tap to select [Integer Input], [0.1 (s or min)], [0.2 (s or min)], [0.5 (s or min). When [Integer Input] is selected, the [Total Time] range is as given in the following: • When Total Time < 2001: Integers from 1 to 1000 • When Total Time ≥ 2001: Integers from (Total Time/2000) to 1000 When [Integer Input] is selected, specify the interval in [Data Interval (Integer Input)]. **NOTE** • When the [Background Correction] is ON or when performing a multi cell measurement with multi-cell holder, the lower limit of the range is determined by the difference of set wavelengths or the number of cells. • Up to 2001 data points can be obtained. When the measurement points exceed 2001, the setting cannot be accepted.

No.	Name	Description
❹	[Data Interval (Integer Input)]	Specifies the interval to acquire measurement data. This is enabled when [Integer Input] is selected in [Data Interval]. Tap the input field to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29).

[Activity Calc. Settings] subtab

No.	Name	Description
❶	[Activity Calc. Range]	Specifies the start time and end time of the activity calculation range.  Enter the start and end time in the left and right fields, respectively. The input range is as follows: • Start time: 0 to ((Total Time) - (Data Interval)) • End time: (Data Interval) to ((Total Time) - (Start time)) Tap the input field to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29).

No.	Name	Description
❷	[Factor (1 to (4]	Specifies a coefficient for the equation that connects the rate of change of absorbance (reaction speed) in terms of the activity value. The equation is shown below: (Activity value) = (Factor 1) × (Factor 2) × (Factor 3) × (Factor 4) × (Reaction speed) Tap the input field to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29).

[Edit Sample Name] subtab

No.	Name	Description
❶	[Name] [Start Number]	Displays the sample name of the measurement result. The sample name will be [Name] + [Start Number] such as "SAMPLE1". In [Start Number], enter a number to be used for the first measurement result. The number increases by 1 every measurement. Tap the input field of [Name] to display text input screen ("4.2.1 Text Input Screen (Keyboard)" P.27). Tap the input field of [Start Number] to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29). **NOTE** • Up to 15 characters can be entered in [Name]. The value of [Start Number] (up to 999) is added to this, therefore, the number of characters of sample name is 18 at the maximum. • The value entered in [Start Number] increases to 999 at the maximum. When 999 is exceeded, it returns to 1.

Hint

- To set attachments, see "19 Setting Attachments" P.449.
- Tap [Save Params] to save measurement parameters ("4.3 Saving Files" P.32).

Reference After setting measurement parameters, perform measurement according to "10.2 Measurement" P.128.

10.2 Measurement

10.2.1 Performing Measurement

Performs measurement using set measurement parameters.

Hint A maximum of 400 measurements can be entered in a single table data file.

1 **Before the first measurement after setting or changing measurement parameters, set a blank sample in the cell and tap [Auto Zero] or [Base Corr.].**

Tap [Auto Zero] when [Background Correction] is disabled and tap [Base Corr.] when enabled.

Hint This step can be skipped when the same parameters are used for the measurement.

- When [Auto Zero] is tapped, the photometric value will be set to 0 Abs (100 % T).
- When [Base Corr.] is tapped, baseline correction will be carried out.

2 **Tap [Start].**

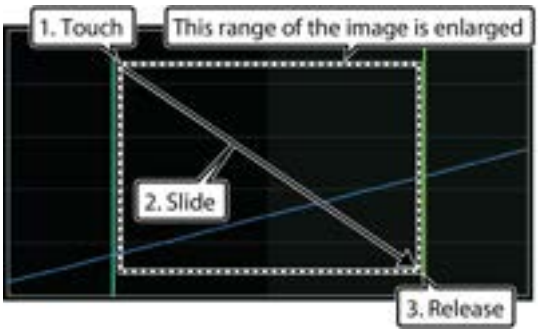
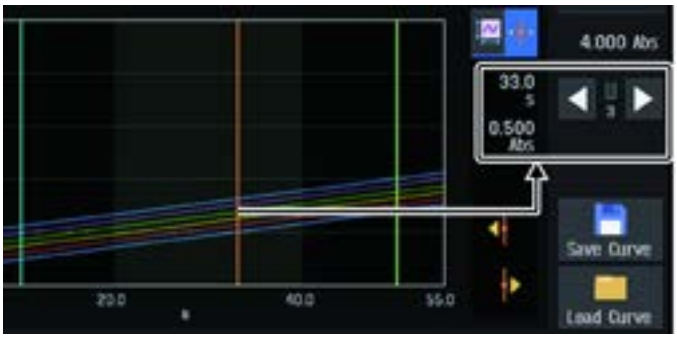
The [Reaction Curve] tab is displayed and measurement starts using set measurement parameters.
During measurement, a reaction curve is plotted in real time.
And, operations other than [Stop] is disabled.

10.2.2 Checking Measurement Results

When the measurement is completed, the screen switches to the [Activity] tab and you can edit measurement results on the [Reaction Curve] and [Activity] tabs.

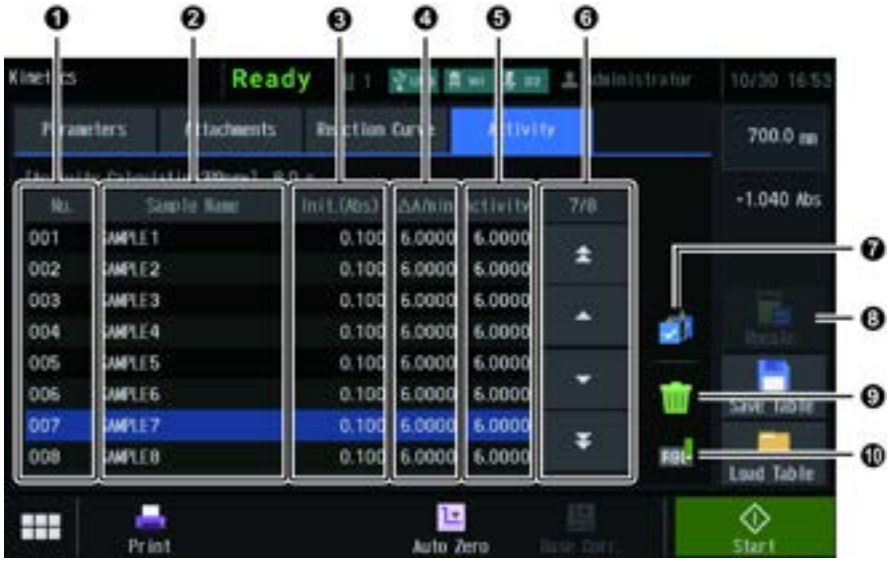
[Reaction Curve] tab

No.	Name	Description
❶	Graph	Displays the reaction curve. Blue and green vertical lines indicate the start and end time of the activity calculation range, respectively.

No.	Name	Description
❷	Operation Switching button	Tap it to switch operation applied to the graph. Displayed button changes according to the operation. When  button is displayed, you can change the range of displayed graph using ❸ to ❻ buttons. Touch the start point of the range to be enlarged, slide the touch pen to the end point, and release it to enlarge displayed graph.  When  button is displayed, you can see data of a specified point on the graph using the cursor on the graph (orange vertical line). • The cursor can be moved to the left/right with  button. Hold down the button to move the cursor continuously. • The wavelength and photometric value at intersection of the reaction curve and the cursor are displayed. • For a multiple cell measurement with multi-cell holder, the Cell Number Selection screen appears for selecting the corresponding to the reaction curve. Tap to select the target reaction curve to display the wavelength and absorbance. 

No.	Name	Description
❸	Changing the Scale button	Opens the screen to set display range of the graph. Enter the upper and lower limits of display range in the input field and tap [Apply] to change display range.  **NOTE** Data is obtained according to the value in [Data Interval]. If a value other than the integral multiple of [Data Interval] is entered for the horizontal axis, the data will be automatically replaced with the time values nearest to the existing data values.
❹	Overall Display button	Enlarges overall reaction curve to fill the graph. **NOTE** The scale of the horizontal axis will not be changed.
❺	Display Reset button (once)	Cancels the latest change of display range or scale-up/down.
❻	Display Reset button (all)	Cancels all changes of display range or scale-up/down and returns the graph to the state immediately after the measurement.

[Activity] tab



No.	Name	Description
❶	[No.]	Displays the order of measurement.
❷	[Sample Name]	Displays sample names. Sample name will be "Name + Start Number" set in the [Edit Sample Name] subtab.
❸	Initial Value	Indicates the absorbance at start time.
❹	Reaction speed	Displays the change of absorbance per minute in the activity calculation range.
❺	[Activity]	Displays the activity value calculated by the following equation: (Activity value) = (Factor 1) × (Factor 2) × (Factor 3) × (Factor 4) × (Rate of change)
❻	The number of results and selection/page button	Number in the top line shows the ordinal number of selected measurement result and total number of saved measurement results. The four buttons on the right operate as follows: •  Moves to the previous or next page when the list of measurement results continues for more than one page. •  Selects the previous or next measurement results.
❼	Multiple Selection button	Tap this button to enable the function (highlighted in blue) to select multiple measurement results. Tap a selected measurement result to cancel the selection when multiple results are selected.
❽	[Recalc.]	Opens the screen to reset the activity calculation range changing the start and end time. For details, see "Resetting the activity calculation range" P.133.
❾	Delete button	Deletes selected measurement results.

No.	Name	Description
⓾	Sample Name Change button	Changes the sample name of selected measurement results. Tap it to display text input screen ("4.2.1 Text Input Screen (Keyboard)" P.27).

Hint

- Tap [Save Curve] in the [Reaction Curve] tab or [Save Table] in the [Activity] tab to save measured data ("4.3 Saving Files" P.32).
- Tap [Load Curve] in the [Reaction Curve] tab or [Load Table] in the [Activity] tab to load saved curve or table data file ("4.4 Loading Files" P.37).
  When a curve data file is loaded, the activity is calculated using the current settings and the results is displayed. However, curve data files which include settings of wavelength, background correction, and total time different from the current settings cannot be loaded.
- Tap [Print] to print measured data ("10.3.3 Manual Print (Curve data)" P.139, "10.3.2 Manual Print (Table Data)" P.137, "10.3.4 Manual Print (Curve Total Plot)" P.141).

■ Resetting the activity calculation range

Tap [Recalc.] in the [Activity] tab to display the screen to recalculate measurement results changing the start and end time of the activity calculation range.

No.	Name	Description
❶	Graph	Displays the reaction curve. Blue and green vertical lines on the graph indicate the start and end time of the activity calculation range, respectively.
❷	Buttons relating to graph display	Function of each button is the same as the [Reaction Curve] tab ("[Reaction Curve] tab" P.129).

No.	Name	Description
❸	Start Time Settings	Resets the start time. Tap the input field to display numeric keypad and enter a value ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29). The cursor can be moved by the set data interval using  buttons. Hold down the button to move the cursor continuously.
❹	End Time Settings	Resets the end time. Tap the input field to display numeric keypad and enter a value ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29). The cursor can be moved by the set data interval using  buttons. Hold down the button to move the cursor continuously.
❺	Abs	Displays the absorbance at intersection of the reaction curve and the cursor. Absorbance at the start and end points is displayed.
❻	[Execute]	Recalculation will be carried out based on changed start and end time. Tapping this button closes this screen and the result of recalculation is displayed on the [Activity] tab.
❼	[Close]	Closes this screen and returns to the [Activity] tab. Changes will be discarded.

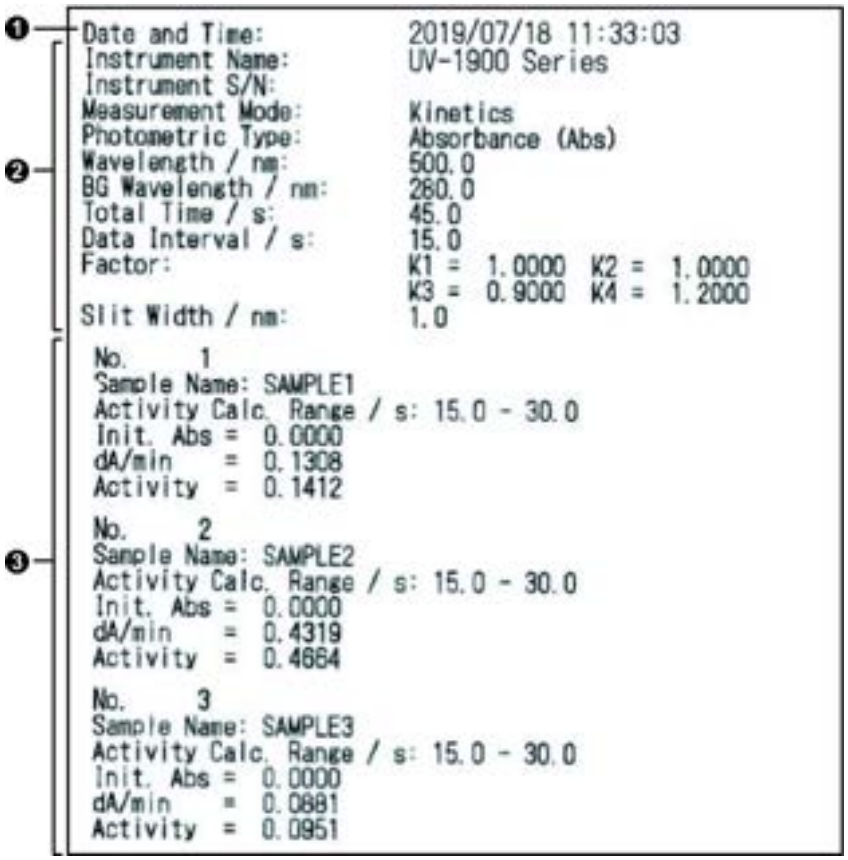
10.3 Printing Measurement Results

In the Kinetics mode, measurement results can be printed out as follows.

Print Type		Description
Auto Print		Prints a numeric data table for every measurement. Reference "10.3.1 Auto Print" P.136
Manual Print	Table data	Prints all measurement results as a numerical data table. Reference "10.3.2 Manual Print (Table Data)" P.137
	Curve data	Prints the graph and measurement parameters displayed on the [Reaction Curve] tab. Reference "10.3.3 Manual Print (Curve data)" P.139
	Curve total plot	Prints time and absorbance at all plots (point where data is obtained) of the graph displayed in the [Reaction Curve] tab as a numerical data table. Reference "10.3.4 Manual Print (Curve Total Plot)" P.141

10.3.1 Auto Print

If a hard copy printer (optional) is connected, the numeric data table displayed on the [Activity] tab will be printed for every measurement.
After the first measurement, date, time, measurement parameters, and the first measurement results will be printed. After that, the measurement results will be printed for every measurement.



No.	Name	Description
❶	Date and time	The date and time when the first measurement is completed are printed.
❷	Measurement parameters	Measurement parameters are printed.
❸	Measurement results	In order from left, sample number, set sample name, photometric value, concentration, and activity value are printed.

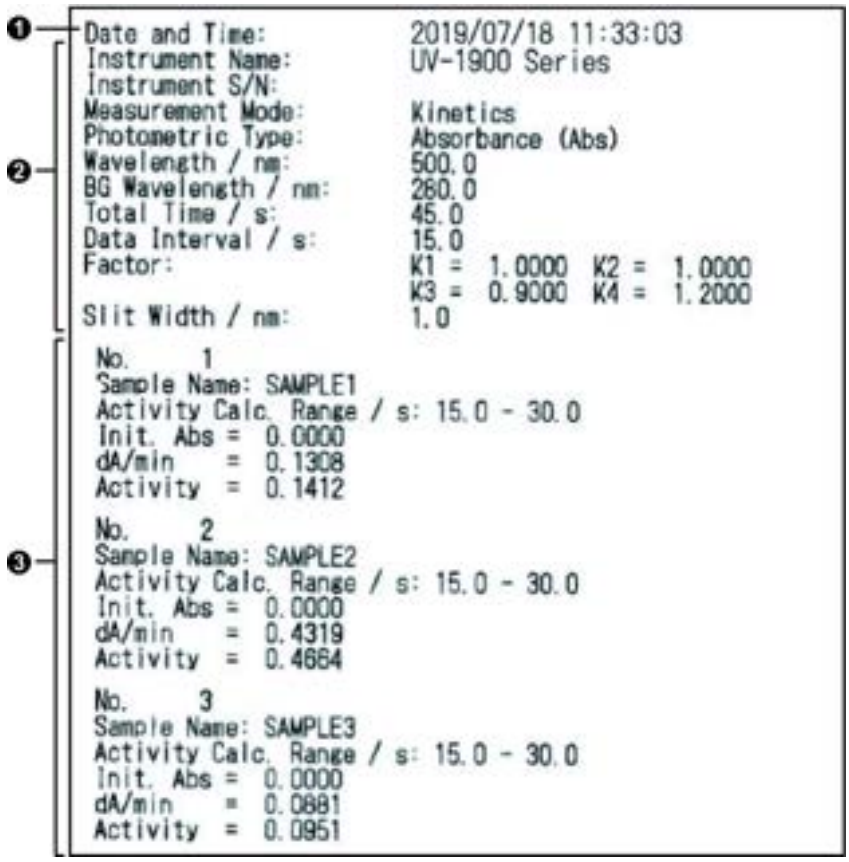
10.3.2 Manual Print (Table Data)

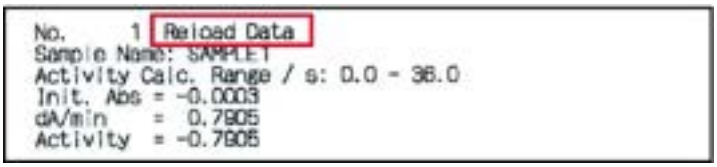
All measurement results, or all the data within the currently-loaded table data file (activity value) will be printed as a numeric data table.

1 **Tap [Print].**

2 **Tap [Table data].**

A numeric data table is printed.



No.	Name	Description
❶	Date and time	The date and time when the first measurement is completed are printed.
❷	Measurement parameters	Measurement parameters are printed.
❸	Measurement results	In order from top, sample name, activity calculation range, photometric value, reaction speed, and activity are printed. For loaded data, "Reload Data" is indicated in the header. 

10.3.3 Manual Print (Curve data)

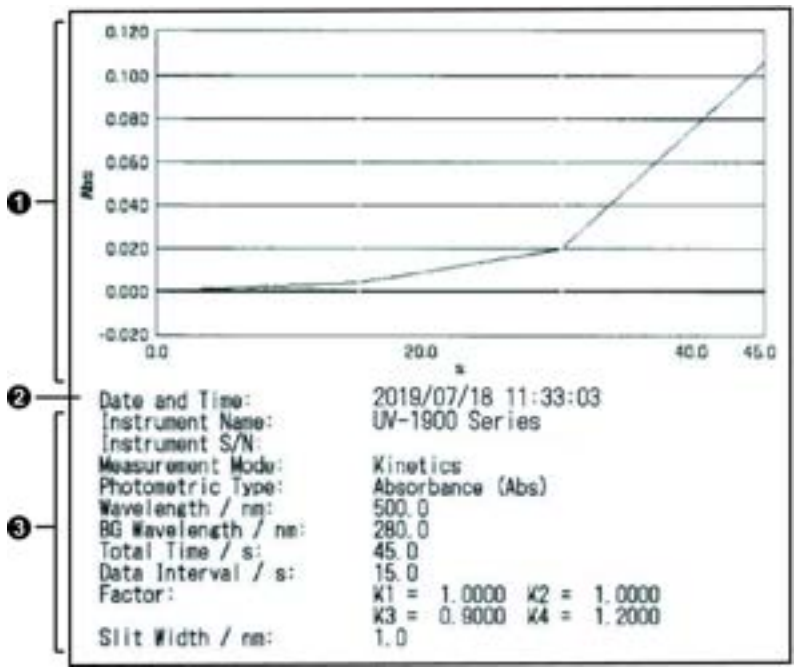
The graph, date, time, and measurement parameters of [Reaction Curve] tab can be printed for all measurement results and all loaded curve data files.

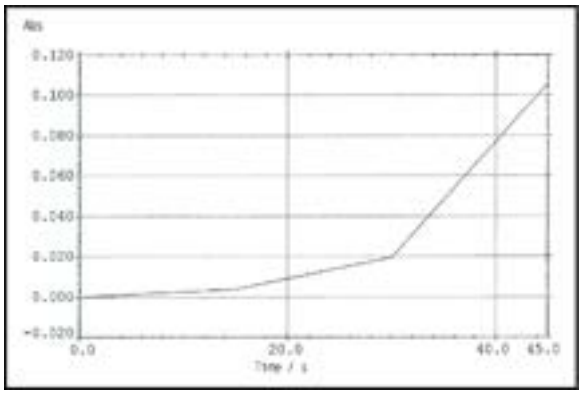
Hint Grid type of the graph is selectable when using a commercially available printer ("15.13 Setting the Printer" P.253).

1 **Tap [Print].**

2 **Tap [Curve data].**

The graph, date, time, and measurement parameters are printed.



No.	Name	Description
❶	Graph	The graph of the measurement results is printed. The above figure shows an example when using a hard copy printer (optional). When using other printers, the graph will be printed in a format shown below, which is different from that displayed on the screen. It includes different axes but the content is equal.  **NOTE** When using a hard copy printer, multiple curves displayed on the screen are printed as shown on the screen. However, when using a commercially available printer, only the curve obtained in the latest measurement can be printed.
❷	Date and time	The date and time of the end of the measurement are printed.
❸	Measurement parameters	Measurement parameters are printed.

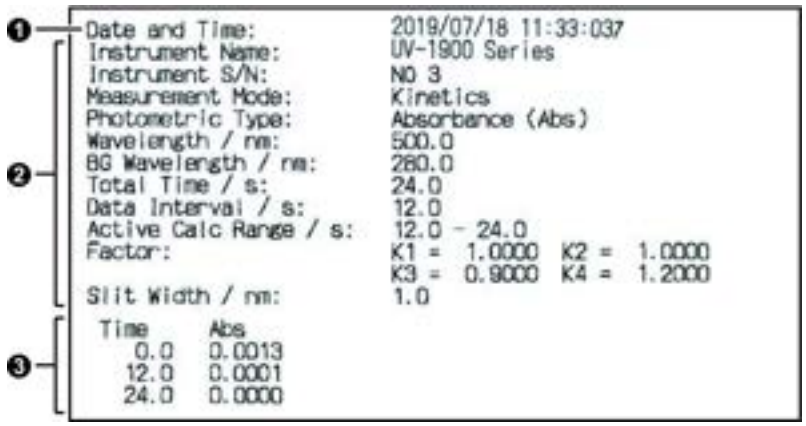
10.3.4 Manual Print (Curve Total Plot)

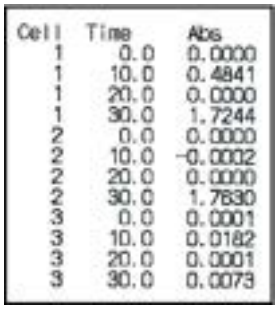
Prints time and absorbance at all plots (point where data is obtained) of the graph displayed in the [Reaction Curve] tab as a numerical data table for all measurement results and all loaded curve data files.

1 **Tap [Print].**

2 **Tap [Curve plot].**

A numeric data table is printed.



No.	Name	Description
❶	Date and time	The date and time of the end of the measurement are printed.
❷	Measurement parameters	Measurement parameters are printed.
❸	Measurement results	In order from left, elapsed time and absorbance at each plot are printed. The above figure shows an example when the measurement is carried out with the standard sample compartment. When using optional multi-cell holder, the format changes according to the number of cells as follows: 

11 Kinetics Rate

The Kinetics Rate mode is used to measure the change in the rate of absorbance for one wavelength and obtain the change in absorbance per specified interval (rate interval).

Whether the absorbance is being changed linearly is determined and [Linear] or [Non-linear] is displayed in the measurement results.

Based on the following equation, linearity is determined by whether the ratio between the absorbance change rate at a certain interval and the absorbance change rate at the previous interval are within the proportion (%) set in the criteria.

|{(change in absorbance at the last rate interval)-(change in absorbance at the rate interval)} / (change in absorbance at the last rate interval)| × 100 < (criteria)

11.1 Setting Measurement Parameters

1 Displays Measurement Mode screen of Kinetics Mode.

1. Tap [Kinetics].
2. Tap [Kinetics Rate].

The measurement screen is displayed.

2 Set measurement parameters in the [Parameters] tab.

The [Parameters] tab has three subtabs. Select the subtab and make necessary settings changes.

Hint Tap [Load Params] to load saved measurement parameters ("4.4 Loading Files" P.37).

[Wavelength Settings] subtab

No.	Name	Description
❶	Tab for Switching Screens	Switches displayed tab. Switch to the [Attachments] tab to set attachments ("19 Setting Attachments" P.449). Switch to the [Reaction Curve] tab to see measured reaction curve and switch to the [Rate] tab to see the list of change in absorbance at each rate interval.
❷	Subtab	Switches setting items in the [Parameters] tab.
❸	[Wavelength]	Specifies the wavelength for measurement. Tap the input field to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29).
❹	[Record Range]	Specifies the range of Y-axis of the graph ("[Reaction Curve] tab" P.149). Enter the lower and upper limit in the left and right fields, respectively. Tap the input field to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29).

[Time Settings] subtab

No.	Name	Description
❶	[Time Unit]	Specifies time unit used for the measurements. Tap to select [Second (s)] or [Minute (min)].
❷	[Total Time]	Specifies the time to acquire absorbance data. Tap the input field to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29).
❸	[Data Interval]	Specifies the interval to acquire measurement data. Tap to select [Integer Input], [0.1 (s or min)], [0.2 (s or min)], or [0.5 (s or min)]. When [Integer Input] is selected, the [Total Time] range is as given in the following: • When Total Time < 2001: Integers from 1 to 1000 • When Total Time ≥ 2001: Integers from (Total Time/2000) to 1000 When [Integer Input] is selected, specify the interval in [Data Interval (Integer Input)]. **NOTE** Up to 2001 data points can be obtained. When the measurement points exceed 2001, the setting cannot be accepted.
❹	[Data Interval (Integer Input)]	Specifies the interval to acquire measurement data. This is enabled when [Integer Input] is selected in [Data Interval]. Tap the input field to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29).

[Rate Settings] subtab

No.	Name	Description
❶	[Rate Interval]	Specifies the interval to obtain the change in absorbance. Tap to select [Integer Input], [0.1 (s or min)], [0.2 (s or min)], or [0.5 (s or min). When [Integer Input] is selected, specify the interval in [Rate Interval (Integer Input)]. **NOTE** Up to 401 data points can be obtained. When the data points exceed 401, the setting cannot be accepted.
❷	[Rate Interval (Integer Input)]	Specifies the interval to obtain the change in absorbance. This is enabled when [Integer Input] is selected in [Rate Interval]. The input range is integers from "(the value in [Total Time]/400) to the value in [Total Time]" (integral multiples of measurement cycle). Tap the input field to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29).
❸	[Discriminator]	Specifies the criteria to determine whether the absorbance is being changed linearly. [Linear] is displayed in the measurement results when the result calculated by the following equation is less than the discriminator, while [Non-linear] is displayed when it exceeds the discriminator. $\lvert\{$(change in absorbance at the last rate interval)-(change in absorbance at the rate interval)$\}$ / (change in absorbance at the last rate interval)$\rvert \times 100 <$ (criteria)

Hint

- To set attachments, see "19 Setting Attachments" P.449.
- Tap [Save Params] to save measurement parameters ("4.3 Saving Files" P.32).

Reference After setting measurement parameters, perform measurement according to "11.2 Measurement" P.148.

11.2 Measurement

11.2.1 Performing Measurement

Performs measurement using set measurement parameters.

1 **Before the first measurement after setting or changing measurement parameters, set a blank sample in the cell and tap [Auto Zero].**

In the cases described above, blank correction should be performed before measuring unknown samples.

Hint This step can be skipped when the same parameters are used for the measurement.

The photometric value will be set to 0 Abs (100 % T).

2 **Tap [Start].**

The [Rate] tab is displayed and measurement starts using set measurement parameters. The measurement results will be displayed in real time.

Operation other than [Stop] is disabled during measurement.

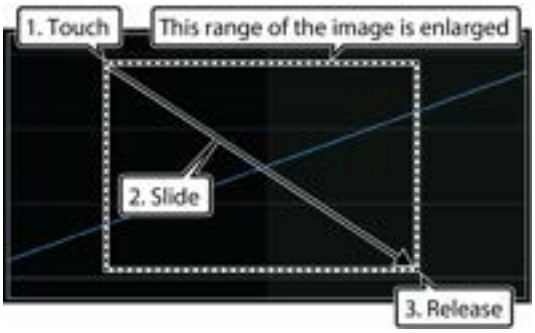
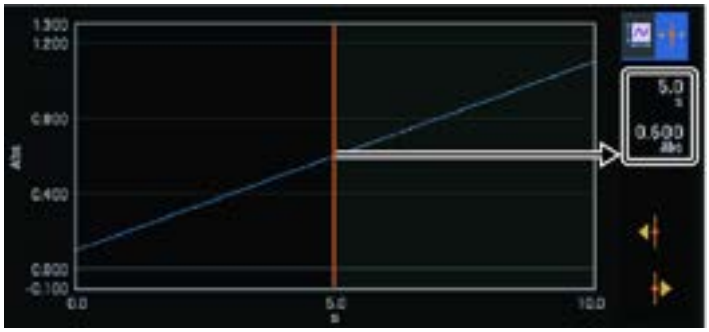
Hint To carry out the measurement while checking the reaction curve, switch the screen to the [Reaction Curve] tab and then tap [Start].

11.2.2 Checking Measurement Results

When the measurement is completed, you can edit measurement results on the [Reaction Curve] and [Rate] tabs.

[Reaction Curve] tab

No.	Name	Description
❶	Graph	Displays the reaction curve.

No.	Name	Description
❷	Operation Switching button	Tap it to switch operation applied to the graph. Displayed button changes according to the operation. When  button is displayed, you can change the range of displayed graph using ❸ to ❻ buttons. Touch the start point of the range to be enlarged, slide the touch pen to the end point, and release it to enlarge displayed graph.  When  button is displayed, you can see data of a specified point on the graph using the cursor on the graph (orange vertical line). • The cursor can be moved to the left/right with  button. Hold down the button to move the cursor continuously. • The wavelength and photometric value at intersection of the reaction curve and the cursor are displayed. 

No.	Name	Description
❸	Changing the Scale button	Opens the screen to set display range of the graph. Enter the upper and lower limits of display range in the input field and tap [Apply] to change display range.  **NOTE** Data is obtained according to the value in [Data Interval]. If a value other than the integral multiple of [Data Interval] is entered for the horizontal axis, the data will be automatically replaced with the time values nearest to the existing data values.
❹	Overall Display button	Enlarges overall reaction curve to fill the graph. **NOTE** The scale of the horizontal axis will not be changed.
❺	Display Reset button (once)	Cancels the latest change of display range or scale-up/down.
❻	Display Reset button (all)	Cancels all changes of display range or scale-up/down and return the reaction curve to the state immediately after the measurement.

[Rate] tab

No.	Name	Description
❶	[Time (s or min)]	Displays the last time the absorbance is obtained at each rate interval.
❷	[Abs]	Displays the absorbance obtained for the first time at each rate interval.
❸	[ΔAbs]	Displays the change in absorbance.
❹	[Discriminator]	Displays the result of the judgment whether the change is [Linear] or [Non-linear].
❺	The number of results and selection/page button	Number in the top line shows the ordinal number of selected measurement result and total number of saved measurement results. The four buttons on the right operate as follows: •  Moves to the previous or next page when the list of measurement results continues for more than one page. •  Selects the previous or next measurement results.

Hint

- Tap [Save Curve] in the [Reaction Curve] tab or [Save Table] in the [Rate] tab to save measured data ("4.3 Saving Files" P.32).
- Tap [Load Table] in the [Rate] tab to load saved table data file ("4.4 Loading Files" P.37).
  In the Kinetics Rate mode, the rate is not calculated after loading saved curve, therefore, curve data files cannot be loaded.
- Tap [Print] to print measured data ("11.3.3 Manual Print (Curve data)" P.155, "11.3.2 Manual Print (Table Data)" P.154, "11.3.4 Manual Print (Curve Total Plot)" P.157).

11.3 Printing Measurement Results

In the Kinetics Rate mode, measurement results can be printed out as follows.

Print Type		Description
Auto Print		Prints a numeric data table for every measurement. Reference "11.3.1 Auto Print" P.153
Manual Print	Table data	Prints all measurement results as a numerical data table. Reference "11.3.2 Manual Print (Table Data)" P.154
	Curve data	Prints the graph and measurement parameters displayed on the [Reaction Curve] tab. Reference "11.3.3 Manual Print (Curve data)" P.155
	Curve total plot	Prints time and absorbance at all plots (point where data is obtained) of the graph displayed in the [Reaction Curve] tab as a numerical data table. Reference "11.3.4 Manual Print (Curve Total Plot)" P.157

11.3.1 Auto Print

If a hard copy printer (optional) is connected, the measurement results will be printed on the printer for every measurement.

After the first measurement, date, time, measurement parameters, and the first measurement results will be printed. After that, the measurement results will be printed for every measurement.

No.	Name	Description
❶	Date and time	The date and time when the first measurement is completed are printed.
❷	Measurement parameters	Measurement parameters are printed.
❸	Measurement results	In order from left, the end time of the measurement (for each specified [Rate Interval]), absorbance, the change in absorbance, and judgment result ([Linear] or [Non-linear]) are printed.

11.3.2 Manual Print (Table Data)

All measurement results, or all the data within the currently-loaded table data file (rate) will be printed as a numeric data table.

1 **Tap [Print].**

2 **Tap [Table data].**

A numeric data table is printed.

The format is the same as "11.3.1 Auto Print" P.153.

11.3.3 Manual Print (Curve data)

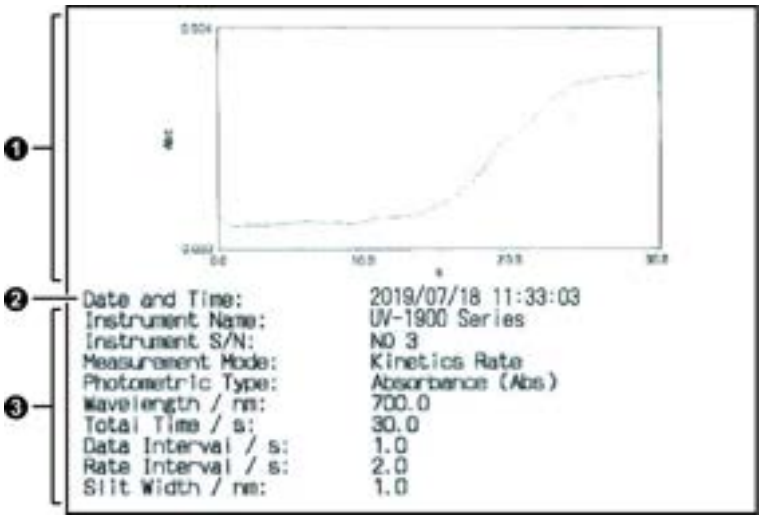
The graph, date, time, and measurement parameters of [Reaction Curve] tab can be printed for all measurement results and all loaded curve data files.

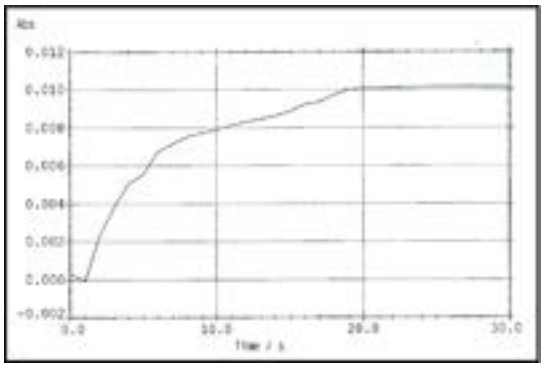
Hint Grid type of the graph is selectable when using a commercially available printer ("15.13 Setting the Printer" P.253).

1 **Tap [Print].**

2 **Tap [Curve data].**

The graph and the measurement parameters are printed.



No.	Name	Description
❶	Graph	The graph of the measurement results is printed. The above figure shows an example when using a hard copy printer (optional). When using other printers, the graph will be printed in a format shown below, which is different from that displayed on the screen. It includes different axes but the content is equal.  **NOTE** When using a hard copy printer, multiple curves displayed on the screen are printed as shown on the screen. However, when using a commercially available printer, only the curve obtained in the latest measurement can be printed.
❷	Date and time	The date and time of the end of the measurement are printed.
❸	Measurement parameters	Measurement parameters are printed.

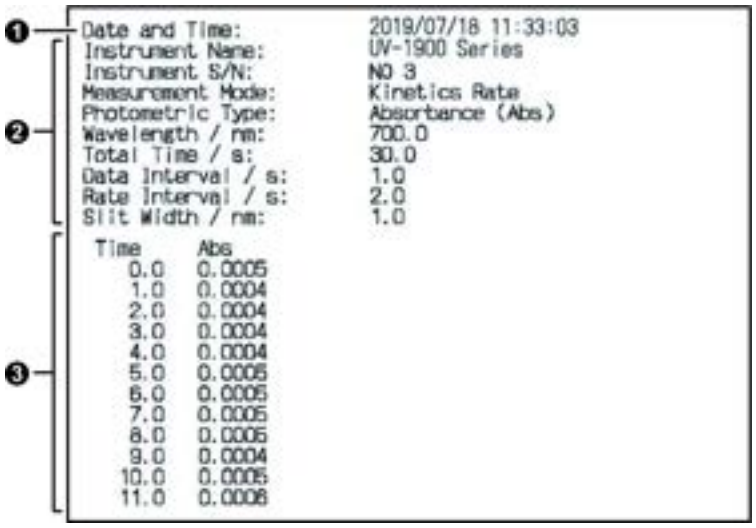
11.3.4 Manual Print (Curve Total Plot)

Prints time and absorbance at all plots (point where data is obtained) of the graph displayed in the [Reaction Curve] tab as a numerical data table for all measurement results and all loaded curve data files.

1 **Tap [Print].**

2 **Tap [Curve plot].**

A numeric data table is printed.



No.	Name	Description
❶	Date and time	The date and time of the end of the measurement are printed.
❷	Measurement parameters	Measurement parameters are printed.
❸	Measurement results	In order from left, elapsed time and absorbance at each plot are printed.

12 Time Course

The Time Course mode is used to measure time course change of photometric values at the specified arbitrary wavelength. Format of the photometric value can be selected from [Absorbance (Abs)], [Transmittance (%T)], [Reflectance (%R)], and [Energy (E)].

12.1 Setting Measurement Parameters

1 **Tap [Time Course].**

The measurement screen is displayed.

2 **Set measurement parameters in the [Parameters] tab.**

The [Parameters] tab has two subtabs. Select the subtab and make necessary settings changes.

Hint Tap [Load Params] to load saved measurement parameters ("4.4 Loading Files" P.37).

[Wavelength Settings] subtab

No.	Name	Description
❶	Tab for Switching Screens	Switches displayed tab. Switch to the [Attachments] tab to set attachments ("19 Setting Attachments" P.449). Switch to the [Measurement] tab to see measurement results. Switch to the [View] tab to load and display a curve data file ("Loading curve data files" P.167).
❷	[Photometric Type]	Switches the format of photometric value. Tap to select [Absorbance (Abs)], [Transmittance (%T)], [Reflectance (%R)] or [Energy (E)]. NOTE [Reflectance (%R)] is available when using a specular reflectance attachment in combination.
❸	[Auto Print]	Prints a graph for every measurement when enabled ("12.3.1 Auto Print" P.169). Each tap of this key toggles between ON and OFF. OFF: ON:
❹	Subtab	Switches setting items in the [Parameters] tab.
❺	[Wavelength]	Specifies the wavelength for measurement. Tap the input field to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29).
❻	[Record Range]	Specifies the range of Y-axis of the graph displayed during the measurement. Tap the input field to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29).

No.	Name	Description
❼	[Light Source]	Sets the light source for the measurement. This is enabled only when [Energy (E)] is selected in [Photometric Type]. Tap to select [WI] (halogen lamp), [D2] (deuterium lamp), or [OFF]. [OFF] is used to introduce the external light source into the spectrometer when measuring the energy change of light sources other than those equipped in the standard UV-1900i. When it is selected, both the WI and D2 lamps are turned OFF and the light source mirror turns to the third light source. **NOTE** This setting takes priority over the setting of [Light Source] in General Settings ("15.2 Setting the Light Source Lamp" P.241).

[Time Settings] subtab

No.	Name	Description
❶	[Time Unit]	Specifies time unit used for the measurements. Tap to select [Second (s)] or [Minute (min)].
❷	[Total Time]	Specifies the time to acquire the photometric value. Tap the input field to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29). **NOTE** When performing multi-cell measurement with multi-cell holder, the lower limit of the range is determined by the number of cells.

No.	Name	Description
❸	[Data Interval]	Specify the interval to acquire measurement data. Tap to select [Integer Input], [0.1 (s or min)], [0.2 (s or min)], or [0.5 (s or min). When [Integer Input] is selected, the [Total Time] range is as given in the following: • When Total Time < 2001: Integers from 1 to 1000 • When Total Time ≥ 2001: Integers from (Total Time/2000) to 1000 When [Integer Input] is selected, specify the interval in [Data Interval (Integer Input)]. NOTE Up to 2001 data points can be obtained. When the measurement points exceed 2001, the setting cannot be accepted.
❹	[Data Interval (Integer Input)]	Specifies the interval to acquire measurement data. This is enabled when [Integer Input] is selected in [Data Interval]. Tap the input field to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29).

Hint

- To set attachments, see "19 Setting Attachments" P.449.
- Tap [Save Params] to save measurement parameters ("4.3 Saving Files" P.32).

Reference After setting measurement parameters, perform measurement according to "12.2 Measurement" P.163.

12.2 Measurement

12.2.1 Performing Measurement

Performs measurement using set measurement parameters.

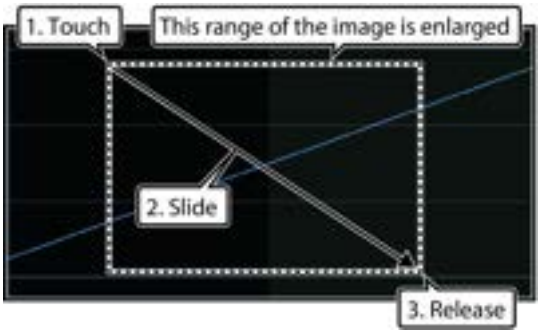
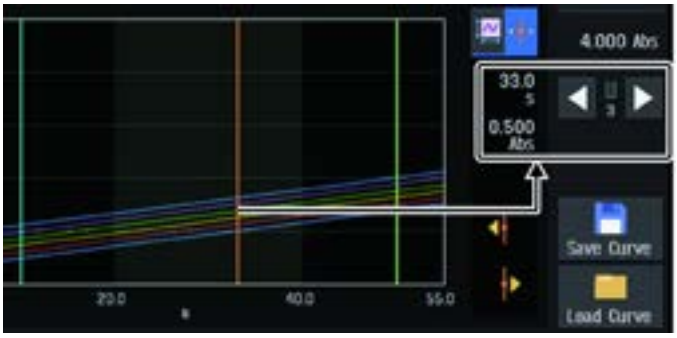
1 **Tap [Start].**

The [Measurement] tab is displayed and measurement starts using set measurement parameters.
During measurement, a time curve is plotted in real time.
Operation other than [Stop] is disabled during measurement.

12.2.2 Checking Measurement Results

After the measurement has finished (stopped), the graph can be scaled up/down.

No.	Name	Description
❶	Graph	Displays the time curve.

No.	Name	Description
❷	Operation Switching button	Tap it to switch operation applied to the graph. Displayed button changes according to the operation. When  button is displayed, you can change the range of displayed graph using ❸ to ❻ buttons. Touch the start point of the range to be enlarged, slide the touch pen to the end point, and release it to enlarge displayed graph.  When  button is displayed, you can see data of a specified point on the graph using the cursor on the graph (orange vertical line). • The cursor can be moved to the left/right with  button. Hold down the button to move the cursor continuously. • The wavelength and photometric value at intersection of the time curve and the cursor are displayed. • For a multiple cell measurement with multi-cell holder, the Cell Number Selection screen appears for selecting the corresponding to the time curve. Tap  to select the target time curve to display the wavelength and absorbance. 

No.	Name	Description
❸	Changing the Scale button	Opens the screen to set display range of the graph. Enter the upper and lower limits of display range in the input field and tap [Apply] to change display range.  NOTE Data is obtained according to the value in [Data Interval]. If a value other than the integral multiple of [Data Interval] is entered for the horizontal axis, the data will be automatically replaced with the wavelength values nearest to the existing data values.
❹	Overall Display button	Enlarges overall time curve to fill the graph. NOTE The scale of the horizontal axis will not be changed.
❺	Display Reset button (once)	Cancels the latest change of display range or scale-up/down.
❻	Display Reset button (all)	Cancels all changes of display range or scale-up/down and returns the graph to the state immediately after the measurement.

NOTE When multiple time curves are overlaid on the graph, the operation is applied to the latest acquired or loaded time curve.

Hint
- Tap [Save Curve] to save measured data ("4.3 Saving Files" P.32).
- Tap [Print] to print measured data ("12.3.2 Manual Print ([Measurement] Tab)" P.171).

■ Loading curve data files

[View] tab displays loaded curve data file.

Tap [Load Curve] to load saved curve data file.

Reference For procedures of loading, see "4.4 Loading Files" P.37.

- Multiple curve data files can be loaded and overlaid, if they have the same measurement parameters.
- When a curve data file of the Time Course mode is loaded on [Data File] of the Mode Menu screen, this tab appears on the screen.

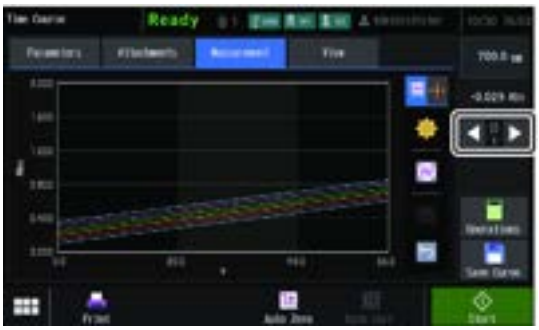
■ Processing data of measurement results

Tap [Operations] to apply the following operations to obtained time curve. For details, see "14 Data Processing" P.195.

- Arithmetic Operations
- Peak Area
- Derivative
- Point Pick
- Peak Pick
- Data Print

Data processing cannot be applied to multiple reaction curves. For a multiple cell measurement with multi-cell holder, the Cell Number Selection screen appears for selecting the corresponding curve.

Tap ◀ ▶ to select the target reaction curve for the data processing.



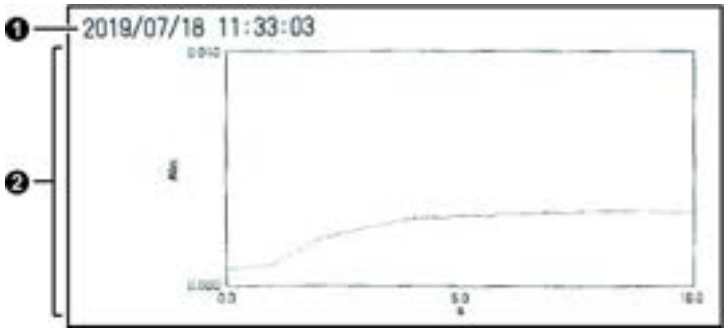
12.3 Printing Measurement Results

Measurement results can be printed out.

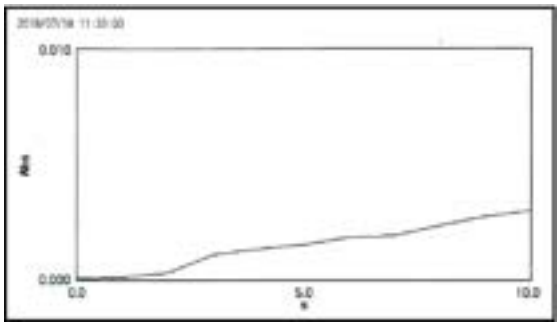
Hint In the Time Course mode, the graph will be printed out. Grid type of the graph is selectable when using a commercially available printer ("15.13 Setting the Printer" P.253).

12.3.1 Auto Print

When the [Auto Print] function is enabled in the [Wavelength Settings] subtab ("[Wavelength Settings] subtab" P.160), the date, time, and graph are automatically printed after the measurement.



No.	Name	Description
❶	Date and time	The date and time of the end of the measurement are printed.

No.	Name	Description
❷	Graph	The graph of the measurement results is printed. The above figure shows an example when using a hard copy printer (optional). When using other printers, the graph will be printed in a format shown below, which is different from that displayed on the screen. It includes different axes but the content is equal.  **NOTE** When using a hard copy printer, multiple curves displayed on the screen are printed as shown on the screen. However, when using a commercially available printer, only the curve obtained in the latest measurement can be printed.

12.3.2 Manual Print ([Measurement] Tab)

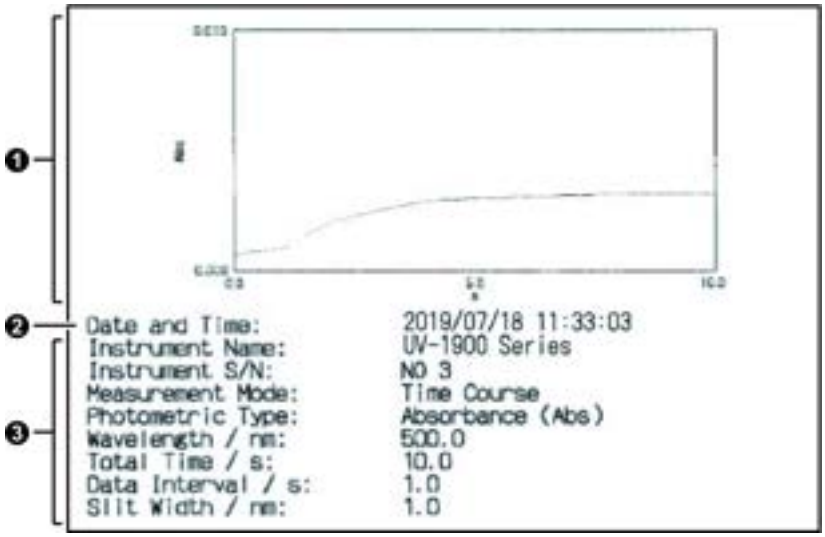
The graph, date, time, and measurement parameters can be printed for the curve data files on the [Measurement] tab.

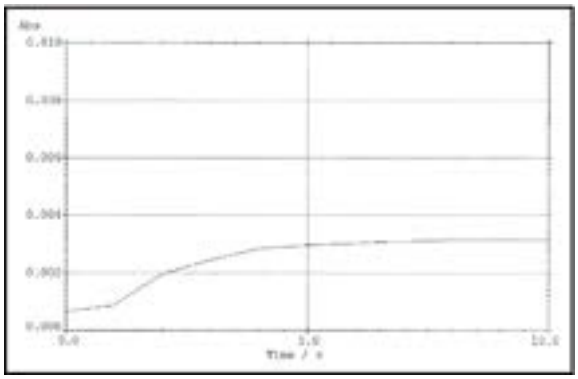
> **NOTE** When multiple time curves are overlaid on the graph, the latest acquired or loaded time curve is printed.

1 **Tap [Print].**

2 **Tap [Measured data].**

The graph, date, time, and measurement parameters are printed.



No.	Name	Description
❶	Graph	The graph of the measurement results is printed. The above figure shows an example when using a hard copy printer (optional). When using other printers, the graph will be printed in a format shown below, which is different from that displayed on the screen. It includes different axes but the content is equal.  **NOTE** When using a hard copy printer, multiple curves displayed on the screen are printed as shown on the screen. However, when using a commercially available printer, only the curve obtained in the latest measurement can be printed.
❷	Date and time	The date and time of the end of the measurement are printed.
❸	Measurement parameters	Measurement parameters are printed.

Hint

- Data at multiple sampling points can be listed and printed ("14.6 Point Pick" P.219).
- All data values can be printed on the Operations menu ("14.8 Data Print" P.233).

12.3.3 Manual Print ([View] Tab)

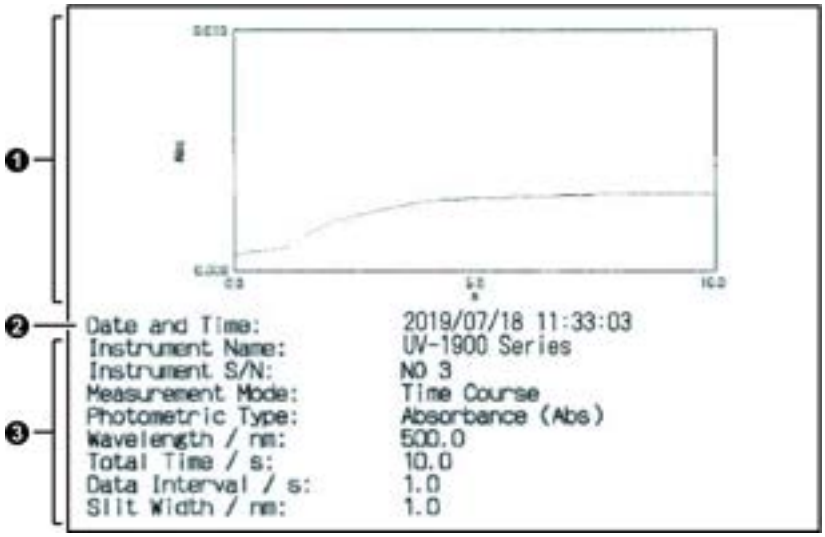
The graph, date, time, and measurement parameters can be printed for the curve data files loaded on the [Display] tab.

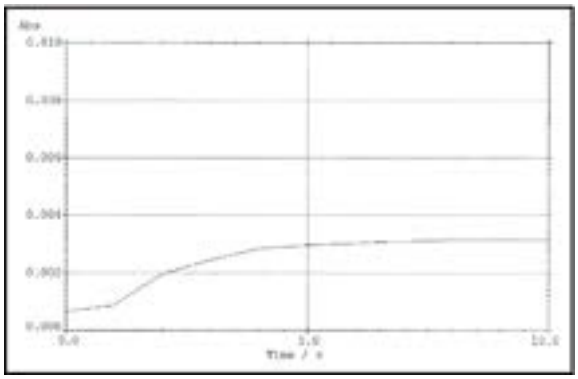
> **NOTE** When multiple time curves are overlaid on the graph, the latest acquired or loaded time curve is printed.

1 **Tap [Print].**

2 **Tap [Loaded Data].**

The graph, date, time, and measurement parameters are printed.



No.	Name	Description
❶	Graph	The graph of the measurement results is printed. The above figure shows an example when using a hard copy printer (optional). When using other printers, the graph will be printed in a format shown below, which is different from that displayed on the screen. It includes different axes but the content is equal.  **NOTE** When using a hard copy printer, multiple curves displayed on the screen are printed as shown on the screen. However, when using a commercially available printer, only the curve obtained in the latest measurement can be printed.
❷	Date and time	The date and time of the end of the measurement are printed.
❸	Measurement parameters	Measurement parameters are printed.

Hint

- Data at multiple sampling points can be listed and printed ("14.6 Point Pick" P.219).
- All data values can be printed on the Operations menu ("14.8 Data Print" P.233).

13 Bio Method

The Bio-method mode allows you to obtain the DNA and protein concentrations with various quantitation methods.

The following quantitation methods are available.

Quantitation Method	Description
DNA Quantitation	This method performs measurement at specified two to three fixed wavelengths and obtains DNA concentration, protein concentration, and absorbance ratio, based on the measured absorbances. You can choose any wavelength for measurements, including the most commonly used wavelengths (260 nm/230 nm or 260 nm/280 nm). You can add measurements at a wavelength of 320 nm for background correction. You can also set the desired parameters for calculating the DNA and protein concentrations in samples. Reference "13.1.1 Setting Measurement Parameters (DNA Quantitation)"
Lowry Method	This quantitation method offers excellent sensitivity and reproducibility. Based on reactions to tyrosine and tryptophan, this method utilizes different absorbance values depending on the type of protein measured, even if the amount of protein is the same. This method measures absorbance at a wavelength of 500 nm. Reference "13.1.2 Setting Measurement Parameters (Lowry Method, BCA Method, CBB Method, Biuret Method)" P.183
BCA Method	This method measures the absorbance at a wavelength of 562 nm using a reagent called Bicinchoninic Acid. You must take into consideration that the absorbance is known to increase with time when this method is used. Reference "13.1.2 Setting Measurement Parameters (Lowry Method, BCA Method, CBB Method, Biuret Method)" P.183
CBB Method	This method measures the absorbance at a wavelength of 595 nm using a reagent called Coomassie Brilliant Blue G-250. Reference "13.1.2 Setting Measurement Parameters (Lowry Method, BCA Method, CBB Method, Biuret Method)" P.183
Biuret Method	This method is based on the unique peptide linkage of protein as well as the Biuret reaction which involves the formation of a colored compound with copper reagent. This method offers a fast and easy determination of protein concentration. The drawback is its low sensitivity. In this method, absorbance is normally measured at a wavelength of 540 to 560 nm. Reference "13.1.2 Setting Measurement Parameters (Lowry Method, BCA Method, CBB Method, Biuret Method)" P.183
UV Method	This method determines protein concentration directly from absorbance value and absorptivity in the ultraviolet region, without using any color reagent. This method normally measures absorbance at a wavelength of 280 nm. Reference "13.1.3 Setting Measurement Parameters (UV Method)" P.184

Hint For details on each quantitation method, refer to the following references.

- Warberg, O., and Christian, W. (1942) Biochem.Z.310, 384-421.
- Vernon F. Kalb, Jr., and Robert W. Bernlohr (1977) Anal. Biochem. 82, 362-371.
- Gornall, A.G., Bradawill, C. J. & David, M.M. (1949) J. Biol. Chem. 177, 751-766.
- Lowry, O. H., Rosebrough, N. J., Farr, A. I. & Randall, R. J. (951) J. Biol. Chem. 193, 265-275.
- Bradford, M. M. (1976) Anal. Biochem. 72, 248-254.
- Smith, P. K., Krohn, R. I., Hermanson, G. T., Mallia, A. K., Gartner, F. H., Provenzano, M. D., Fujimoto, E. K., Goeke, N. M., Olson, B. J. & Klenk, D. C. (1985) Anal. Biochem. 150, 76-85.

13.1 Setting Measurement Parameters

1 Displays Measurement Mode screen by selecting the quantitation method.

1 Tap [Bio Method].

2 Specifies the quantitation method to be used.

The measurement screen is displayed.

2 Set measurement parameters in the [Parameters] tab.

Hint Tap [Load Params] to load saved measurement parameters ("4.4 Loading Files" P.37). When calibration curve data is included, the calibration curve is also loaded.

Reference Parameters to be specified depend on the quantitation method. See below.

- "13.1.1 Setting Measurement Parameters (DNA Quantitation)" P.178
- "13.1.2 Setting Measurement Parameters (Lowry Method, BCA Method, CBB Method, Biuret Method)" P.183
- "13.1.3 Setting Measurement Parameters (UV Method)" P.184

13.1.1 Setting Measurement Parameters (DNA Quantitation)

The [Parameters] tab has four subtabs. Select the subtab and make necessary settings changes.

[Wavelength Settings] subtab

No.	Name	Description
❶	Tab for Switching Screens	Switches displayed tab. Switch to the [Attachments] tab to set attachments ("19 Setting Attachments" P.449). Switch to the [Unk. Table] tab to see measurement results.
❷	Subtab	Switches setting items in the [Parameters] tab.
❸	[Wavelength Pattern]	Specifies the wavelength for measurement. Tap it to select the preset combination of wavelengths ([Type A] or [Type B]) or the desired wavelength ([Manual Input]). The values set in [Type A] and [Type B] are as follows: • [Type A]: WL1 = 260.0 nm, WL2 = 230.0 nm, BG WL = 320.0 nm • [Type B]: WL1 = 260.0 nm, WL2 = 280.0 nm, BG WL = 320.0 nm **Hint** When [Type A] or [Type B] is selected, [Factor Patterns] in the [Factor Settings] subtab ("[Factor Settings] subtab" P.180) will be set to the corresponding item ([Type A] or [Type B]). The equations used for calculating DNA and protein concentrations are formulated to eliminate mutual interference, which means that the K factor will be automatically determined once WL1 and WL2 are defined.
❹	[Background Correction]	Each tap of this key toggles between ON and OFF of the background correction function. OFF: ON: When it is turned ON, [BG WL] is subtracted from [WL1] and [WL2].

No.	Name	Description
❺	[WL1] [WL2] [BG WL]	Displays or specifies the wavelength for measurement. [BG WL] is the wavelength used for background correction. When [Type A] or [Type B] is selected in [Wavelength Pattern], wavelengths for the measurement are displayed. When [Manual Input] is selected, tap the input field to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29) and enter the desired wavelength.

[Factor Settings] subtab

In [Factor Settings] subtab, K Factors used to calculate absorbance ratio and DNA and protein concentrations is specified.
You can see the equation in "[Equation] subtab" P.181.

No.	Name	Description
❶	[Factor Patterns]	Specifies K Factors used to calculate absorbance ratio and DNA and protein concentrations. Tap it to select the preset combination of factors ([Type A] or [Type B]) or the desired wavelength ([Manual Input]). The values set in [Type A] and [Type B] are as follows: • [Type A]: K1 = 49.1, K2 = 3.48, K3 = 183, K4 = 75.8 • [Type B]: K1 = 62.9, K2 = 36.0, K3 = 1552, K4 = 757.3 [Type A] and [Type B] are values when using the cell with optical path length of 10 mm. When using the cell with different optical path length, tap [Manual Input] and enter corrected factors in [K1] to [K4]. When the optical path length ℓ = 5 mm, 10/ ℓ = 2 Thus, the corrected factors (Kn') can be obtained as follows: K1' = K1 × 2, K2' = K2 × 2, K3' = K3 × 2, K4' = K4 × 2 **Hint** This item is automatically set corresponding to [Wavelength Pattern] in the [Wavelength Settings] subtab ("[Wavelength Settings] subtab" P.178) ([Type A or [Type B]). You can also change the setting.
❷	[K1] to [K4]	Displays or specifies the K Factors. When [Type A] or [Type B] is selected in [Factor Patterns], the values are displayed. When [Manual Input] is selected, tap the input field to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29) and enter the desired value.

[Equation] subtab

In the DNA quantitation, the following equations are used to calculate absorbance ratio and DNA and protein concentrations: In the [Equation] subtab, the following equations are displayed.

- Absorbance ratio = A1/A2
- DNA concentration = K1 × A1 - K2 × A2 [μg/ml]
- Protein concentration = K3 × A2 - K4 × A1 [μg/ml]

The symbols in the equations stand for the following:

- K1 to K4: Factors ("[Factor Settings] subtab" P.180)
- A1: Absorbance at [WL1] (the value obtained by subtracting the absorbance of [BG WL] when the background correction function is enabled)
- A2: Absorbance at [WL2] (the value obtained by subtracting the absorbance of [BG WL] when the background correction function is enabled)

No.	Name	Description
❶	[Absorbance Ratio]	Displays the equation to calculate absorbance ratio.
❷	[DNA Concentration]	Displays the equation to calculate DNA concentration.
❸	[Protein Concentration]	Displays the equation to calculate protein concentration.

[Edit Sample Name] subtab

No.	Name	Description
❶	[Name] [Start Number]	Displays the sample name of the measurement result. The sample name will be [Name] + [Start Number] such as "SAMPLE1". In [Start Number], enter a number to be used for the first measurement result. The number increases by 1 every measurement. Tap the input field of [Name] to display text input screen ("4.2.1 Text Input Screen (Keyboard)" P.27). Tap the input field of [Start Number] to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29). **NOTE** • Up to 15 characters can be entered in [Name]. The value of [Start Number] (up to 999) is added to this, therefore, the number of characters of sample name is 18 at the maximum. • The value entered in [Start Number] increases to 999 at the maximum. When 999 is exceeded, it returns to 1.

Hint

- To set attachments, see "19 Setting Attachments" P.449.
- Tap [Save Params] to save measurement parameters ("4.3 Saving Files" P.32).

Reference After setting measurement parameters, perform measurement according to "13.2.1 Performing Measurement (DNA Quantitation)" P.187.

13.1.2 Setting Measurement Parameters (Lowry Method, BCA Method, CBB Method, Biuret Method)

The [Parameters] tabs for Lowry Method, BCA Method, CBB Method, and Biuret Method are almost the same as that for the Quantitation mode.

However, this mode offers a unique function to set parameters to values defined for each quantitation method by tapping [Define] (the default values are the defined values).

The defined values are shown below. The values can be changed as desired.

Item	Setting in Lowry Method	Setting in BCA Method	Setting in CBB Method	Setting in Biuret Method
[Formula]	1 Wavelength	1 Wavelength	1 Wavelength	1 Wavelength
[Wavelength 1]	500.0 nm	562.0 nm	595.0 nm	540.0 nm
[Method]	Multi-Point Curve	Multi-Point Curve	Multi-Point Curve	Multi-Point Curve
[No. of Samples]	5	5	5	5
[Order]	2	2	2	1
[Zero Intercepton]	OFF	OFF	OFF	OFF
[Repetitions]	1	1	1	1
[Unit]	μg/ml	μg/ml	μg/ml	mg/ml

Other operations are the same as the Quantitation mode. For setting measurement parameters, performing measurement, and checking and printing measurement results, see below.

Reference
- "9.1 Operation Flow" P.90
- "9.2 Setting Measurement Parameters" P.91
- "9.6 Measurement" P.113
- "9.7 Printing Measurement Results" P.117

13.1.3 Setting Measurement Parameters (UV Method)

The [Parameters] tab has three subtabs. Select the subtab and make necessary settings changes.

[WL / Coefficient Settings] subtab

No.	Name	Description
❶	Tab for Switching Screens	Switches displayed tab. Switch to the [Attachments] tab to set attachments ("19 Setting Attachments" P.449). Switch to the [Unk. Table] tab to see measurement results.
❷	Subtab	Switches setting items in the [Parameters] tab.
❸	[Wavelength]	Specifies the wavelength for measurement. Tap the input field to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29) and enter the desired wavelength. Normally, do not change the default value (280 nm).
❹	[Absorption Coefficient]	Specifies the desired absorptivity for the protein to be measured. The frequently used absorptivity BSA (bovine serum albumin) has been specified as the default value.
❺	[Concentration]	Displays the equation to calculate protein concentration.
❻	[Define]	Returns the settings to the defined values. The defined values are shown below. • [Absorption Coefficient]: 0.667 • [Wavelength]: 280.0 nm • [Repetitions]: 1 • [Unit]: mg/ml

[Measurement Settings] subtab

Specifies how many times the same sample is to be measured and the concentration unit for the measurement result.

No.	Name	Description
❶	[Repetitions]	Specifies how many times the same sample is to be measured. When this is set to 2 or more times, the following operation will be applied: • For standard sample measurement, the average of absorbance obtained by repeated measurements is used. • In unknown sample measurement, measurement results of each measurement in repeated measurements and their average are shown. **NOTE** If a multi-cell or similar holder is used with the number of cells set to more than one, the repeating measurement function takes priority. The interlocked measurement of multiple cells cannot be carried out. Tap the input field to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29).
❷	[Unit]	Specifies the concentration unit for the measurement result. Tap to select [None], [%], [ppm], [ppb], [g/l], [mg/ml], [ng/ml], [mol/l], [μg/ml], [mg/l], or [Registered Unit [ ]]. To use a unit other than those listed above, select [Registered Unit [ ]] and then enter the desired unit in [Unit (User-defined)].
❸	[Unit (User-defined)]	Specifies the desired concentration unit for the measurement result. Tap the input field to display text input screen ("4.2.1 Text Input Screen (Keyboard)" P.27).

[Edit Sample Name] subtab

No.	Name	Description
❶	[Name] [Start Number]	Displays the sample name of the measurement result. The sample name will be [Name] + [Start Number] such as "SAMPLE1". In [Start Number], enter a number to be used for the first measurement result. The number increases by 1 every measurement. Tap the input field of [Name] to display text input screen ("4.2.1 Text Input Screen (Keyboard)" P.27). Tap the input field of [Start Number] to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29). **NOTE** • Up to 15 characters can be entered in [Name]. The value of [Start Number] (up to 999) is added to this, therefore, the number of characters of sample name is 18 at the maximum. • The value entered in [Start Number] increases to 999 at the maximum. When 999 is exceeded, it returns to 1.

Hint
- To set attachments, see "19 Setting Attachments" P.449.
- Tap [Save Params] to save measurement parameters ("4.3 Saving Files" P.32).

Reference After setting measurement parameters, perform measurement according to "13.2.3 Performing Measurement (UV Method)" P.189.

13.2 Measurement

13.2.1 Performing Measurement (DNA Quantitation)

Performs measurement using set measurement parameters.

Hint A maximum of 400 measurements can be entered in a single table data file.

1 **Before the first measurement after setting or changing measurement parameters, set a blank sample in the cell and tap [Base Corr.].**

In the cases described above, baseline correction should be performed before measuring unknown samples.

Hint This step can be skipped when the same parameters are used for the measurement.

2 **Tap [Start].**

The [Unk. Table] tab is displayed and measurement starts using set measurement parameters.

Operation other than [Stop] is disabled during measurement.

Reference After the measurement, see the results according to "13.2.2 Checking Measurement Results (DNA Quantitation)" P.188.

13.2.2 Checking Measurement Results (DNA Quantitation)

After measurement, the results are displayed.

No.	Name	Description
❶	[Results]	Displays measurement results.
❷	The number of results and selection/page button	Number in the top line shows the ordinal number of displayed measurement result and total number of measurement results. The four buttons on the right operate as follows: •  Moves to the previous or next page (by 10 pages). •  Moves to the previous or next page (by 1 page).
❸	All Delete button	Deletes all measurement results.
❹	Delete button	Deletes displayed measurement results.
❺	Sample Name Change button	Changes the sample name of displayed measurement results. Tap it to display text input screen ("4.2.1 Text Input Screen (Keyboard)" P.27).

Hint

- Tap [Save Table] to save measured data ("4.3 Saving Files" P.32).
- Tap [Load Table] to load saved table data file ("4.4 Loading Files" P.37).
- Tap [Print] to print measured data ("13.3.2 Manual Print" P.193).

13.2.3 Performing Measurement (UV Method)

Performs measurement using set measurement parameters.

> **NOTE** Repeated measurements using a multi-cell or similar holder (optional) with the multiple cells cannot be carried out.

Hint A maximum of 400 measurements can be entered in a single table data file.

1 Before the first measurement after setting or changing measurement parameters, set a blank sample in the cell and tap [Auto Zero].

In the cases described above, blank correction should be performed before measuring unknown samples.

Hint This step can be skipped when the same parameters are used for the measurement.

The photometric value will be set to 0 Abs (100 % T).

2 Tap [Start].

The [Unk. Table] tab is displayed and measurement starts using set measurement parameters.
Operation other than [Stop] is disabled during measurement.

Reference After the measurement, see the results according to "13.2.4 Checking Measurement Results (UV Method)" P.190.

13.2.4 Checking Measurement Results (UV Method)

After measurement, the results are displayed.

No.	Name	Description
❶	[No.]	Displays the order of measurement. In normal measurement, numbers increasing by 1 are displayed. In repeated measurement, the same number is displayed for the measurements of the same sample and "-x" or "-Ave" is attached to the number. • "x" stands for repetition count. For the 1st to 3rd measurements of the first sample of repeated measurement, [1-1], [1-2], and [1-3] are displayed. • "Ave" stands for the average of the repeated measurement. For the average of the first sample, [1-Ave] is displayed.
❷	[Sample Name]	Displays sample names (up to 18 characters). Sample name will be "Name + Start Number" set in the [Edit Sample Name] subtab.
❸	Photometric value	Displays photometric value of each sample.
❹	[Conc. (specified unit)]	Displays concentration of each sample. The displayed unit is the unit specified in the [Measurement Settings] subtab.
❺	The number of results and selection/page button	Number in the top line shows the ordinal number of selected measurement result and total number of saved measurement results. The four buttons on the right operate as follows: •  Moves to the previous or next page when the list of measurement results continues for more than one page. •  Selects the previous or next measurement results.

No.	Name	Description
❻	Multiple Selection button	Tap this button to enable the function (highlighted in blue) to select multiple measurement results. Tap a selected measurement result to cancel the selection when multiple results are selected.
❼	Delete button	Deletes selected measurement results.
❽	All Delete button	Deletes all measurement results.
❾	Sample Name Change button	Changes the sample name of displayed measurement results. Tap it to display text input screen ("4.2.1 Text Input Screen (Keyboard)" P.27).

Hint

- Tap [Save Table] to save measured data ("4.3 Saving Files" P.32).
- Tap [Load Table] to load saved table data file ("4.4 Loading Files" P.37).
- Tap [Print] to print measured data ("13.3.2 Manual Print" P.193).

13.3 Printing Measurement Results

Measurement results can be printed out.

13.3.1 Auto Print

If a hard copy printer (optional) is connected, the measurement results will be printed on the printer for every measurement.

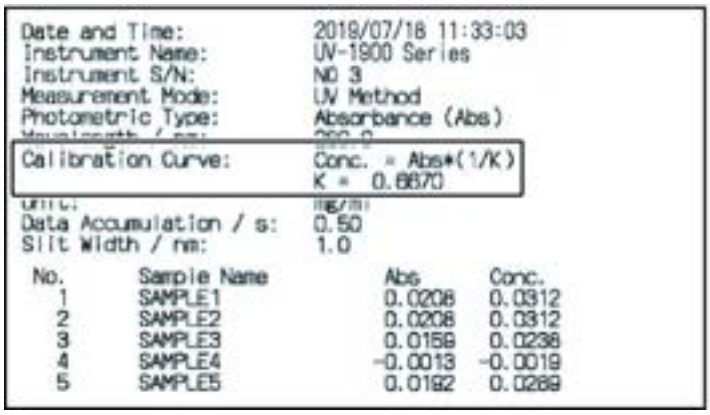
After the first measurement, date, time, measurement parameters, and the first measurement results will be printed. After that, the measurement results will be printed for every measurement.

The following figure is an example of printing for DNA Quantitation.

No.	Name	Description
❶	Date and time	The date and time when the first measurement is completed are printed.
❷	Measurement parameters	Measurement parameters are printed.
❸	Measurement results	The measurement results are printed.

The printing format in the other quantitation methods is the same as the Quantitation mode ("9.7.1 Auto Print" P.117).

In UV Method, only the part of the calibration curve equations are different.



Date and Time:	2019/07/18 11:33:03
Instrument Name:	UV-1900 Series
Instrument S/N:	NO 3
Measurement Mode:	UV Method
Photometric Type:	Absorbance (Abs)
Calibration Curve:	Conc. = Abs*(1/K) K = 0.8670
Data Accumulation / s:	0.50
Slit Width / nm:	1.0

No.	Sample Name	Abs	Conc.
1	SAMPLE1	0.0208	0.0312
2	SAMPLE2	0.0208	0.0312
3	SAMPLE3	0.0158	0.0238
4	SAMPLE4	-0.0013	-0.0019
5	SAMPLE5	0.0192	0.0289

13.3.2 Manual Print

All measurement results, or all the data within the currently-loaded table data file will be printed as a numeric data table.

■ For DNA Quantitation/UV Method

1 **Tap [Print].**

2 **Tap [Measured data].**

A numeric data table is printed.

The format is the same as "13.3.1 Auto Print" P.192.

■ For Other Quantitation Methods

The printing procedures are the same as the Quantitation mode.

Reference "9.7.2 Manual Print" P.118

14 Data Processing

This function allows you to apply the following processing options to the curve data measured in the Spectrum and Time Course modes:

Reference
- "14.3 Arithmetic Operations" P.199
- "14.4 Derivative" P.205
- "14.5 Peak Pick" P.213
- "14.6 Point Pick" P.219
- "14.7 Peak Area" P.227
- "14.8 Data Print" P.233

NOTE
- The horizontal axis of the graph of the curve data is wavelength ([nm]) for the Spectrum mode and time ([min] or [s]) for the Time Course mode.
- During data processing, multiple curves cannot be overlaid.

14.1 Selecting Processing

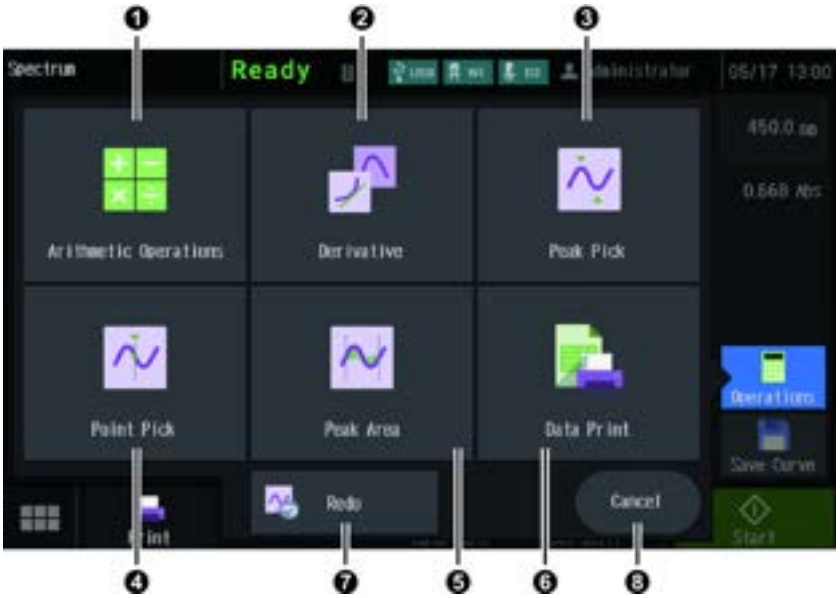
1

Display the curve data and tap [Operations].

To display the curve data:

- Carry out measurement in the Spectrum or Time Course mode.
- Load a curve data file in the Spectrum or Time Course mode ("4.4 Loading Files" P.37).

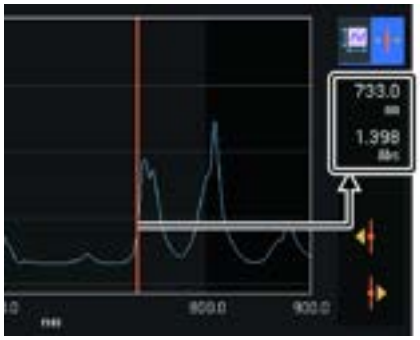
2 Tap the operation to be applied.



No.	Name	Description
❶	[Arithmetic Operations]	Performs arithmetic operations between curve data and values or between curve data. Reference "14.3 Arithmetic Operations" P.199
❷	[Derivative]	Applies the 1st to 4th order differential operation or smoothing to the curve data. Reference "14.4 Derivative" P.205
❸	[Peak Pick]	Detects the peaks or valleys of the curve data and then displays them as a list of the horizontal values (wavelength or time) and photometric values. Reference "14.5 Peak Pick" P.213
❹	[Point Pick]	Displays, as a list, photometric values against the horizontal axis (wavelength or time) at arbitrary or constant intervals of the curve data. Tap [Point Pick] and then select [Even Intervals] or [Arbitrary]. Reference "14.6 Point Pick" P.219
❺	[Peak Area]	Calculates the area enclosed by the curve data and the horizontal axis. Reference "14.7 Peak Area" P.227
❻	[Data Print]	Prints measurement parameters and data at each sampling point of curve data. Reference "14.8 Data Print" P.233
❼	[Redo]	Restores the original data before data processing.
❽	[Cancel]	Returns to the Operations screen.

14.2 Operation of Common Buttons

This section explains buttons common to all data processing screens (except for Data Print).

No.	Name	Description
❶	Operation Switching button	Tap it to switch operation applied to the graph. Displayed button changes according to the operation. When  button is displayed, you can change the range of displayed graph using ❷ to ❺ buttons. Touch the start point of the range to be enlarged, slide the touch pen to the end point, and release it to enlarge displayed graph. When  button is displayed, you can see data of a specified point on the graph using the cursor on the graph (orange vertical line). • The cursor can be moved to the left/right with  button. Hold down the button to move the cursor continuously. • The horizontal values (wavelength or time) and photometric value at intersection of the curve and the cursor are displayed.  **NOTE** This button is not displayed on the Peak Area and Point Pick screens.

No.	Name	Description
❷	Changing the Scale button	Opens the screen to set display range of the graph. Enter the upper and lower limits of display range in the input field and tap [Apply] to change display range.  **NOTE** Data is obtained according to [Data Interval] set in measurement parameters settings. If a value other than the integral multiple of [Data Interval] is entered for the horizontal axis, the data will be automatically replaced with the values nearest to the existing data values.
❸	Overall Display button	Enlarges overall curve to fill the graph. **NOTE** The scale of the horizontal axis will not be changed.
❹	Display Reset button (once)	Cancels the latest change of display range or scale-up/down.
❺	Display Reset button (all)	Cancels all changes of display range or scale-up/down and returns the graph to the state immediately after the measurement.

14.3 Arithmetic Operations

Performs arithmetic operations between curve data and values or between curve data.

14.3.1 Performing Arithmetic Operations

1 **Tap [Arithmetic Operations].**

2 Specify parameters for the operations.

No.	Name	Description
❶	Graph	Displays the curve data.
❷	Operation parameters	Displays the method of arithmetic operations, values used for the operations, and file name (only when the curve data file is loaded).
❸	Operation selection field	Specifies the operation method. Tap to select [+] (addition), [-] (subtraction), [*] (multiplication), or [/] (division).
❹	Numeric entry field	Specifies the values used for the operations. Tap it to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29).
❺	Load Files button	Loads a saved curve data file. Tap it to display the file selection field. For procedures of loading, see "4.4 Loading Files" P.37. **NOTE** When measurement parameters are different between displayed curve data and loaded curve data, there are the following limitations: • No data can be calculated if unit inconsistencies exist between the vertical and horizontal axes. • For data with different horizontal axis range or sampling intervals, calculation is performed for consistent range ("Operation for curve data with different horizontal axis range or sampling intervals" P.202).
❻	[Execute]	Performs operation using set parameters.
❼	[Cancel]	Returns to the Operations screen.

3 **Tap [Execute].**

The operation is performed and the graph is updated.

4 **Check the result of operation.**

No.	Name	Description
❶	[Save]	Saves the data displayed on the screen. For procedures, see Step 2 and after in "4.3.4 Saving Files" P.34.
❷	[Recalculate]	Returns to the screen to set operation parameters. Tap this button to perform recalculation after changing the parameters.
❸	[Close]	Returns to the Operations screen. Tap this button to exit the screen.
❹	Buttons relating to graph display	For details, see "14.2 Operation of Common Buttons" P.197.

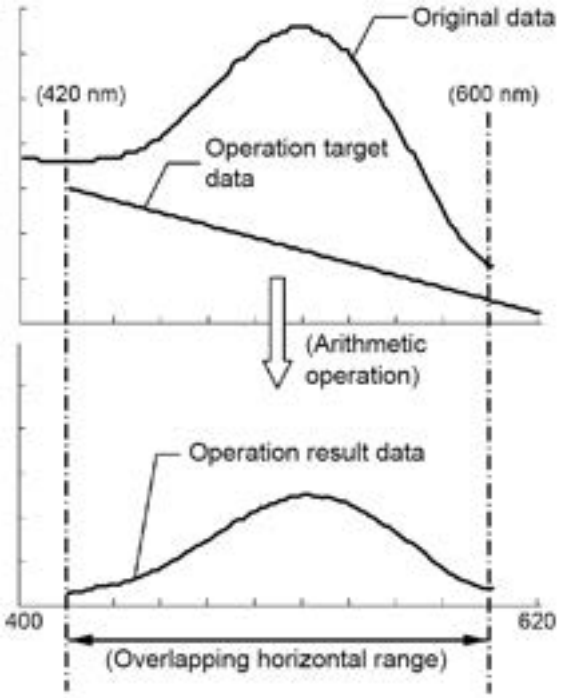
■ Operation for curve data with different horizontal axis range or sampling intervals

When performing an arithmetic operation between two curve data sets with different horizontal axis ranges and sampling intervals, the operation will be performed as follows:

When the horizontal axis range is different

The arithmetic operation will be performed on the overlapping part of the two data ranges.

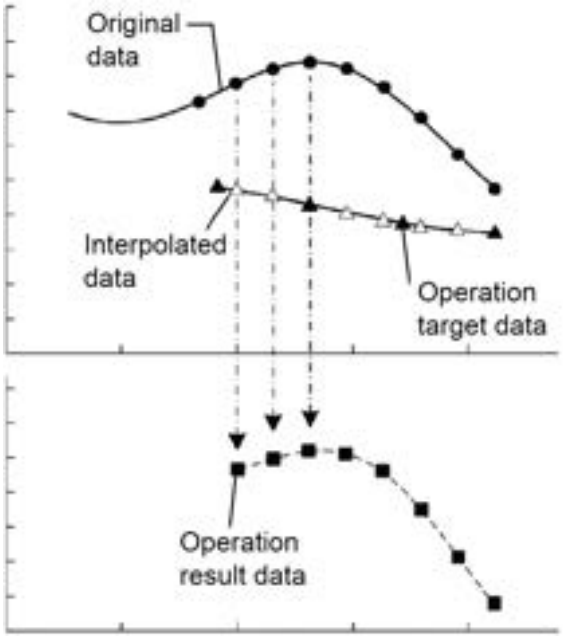
For example, wavelength range is 400 nm to 600 nm for the original data and 420 nm to 620 nm for the operation target data. In this case, wavelength range of the operation result data is 420 nm to 600 nm.



When the sampling interval is different

The arithmetic operation is performed by interpolating the operation target data in compliance with the sampling interval (wavelength) of the original data.

For example, sampling interval is 0.2 nm for the original data and 0.5 nm for the operation target data. In this case, sampling interval of the operation result data is 0.2 nm.



14.3.2 Printing the Results (Arithmetic Operations)

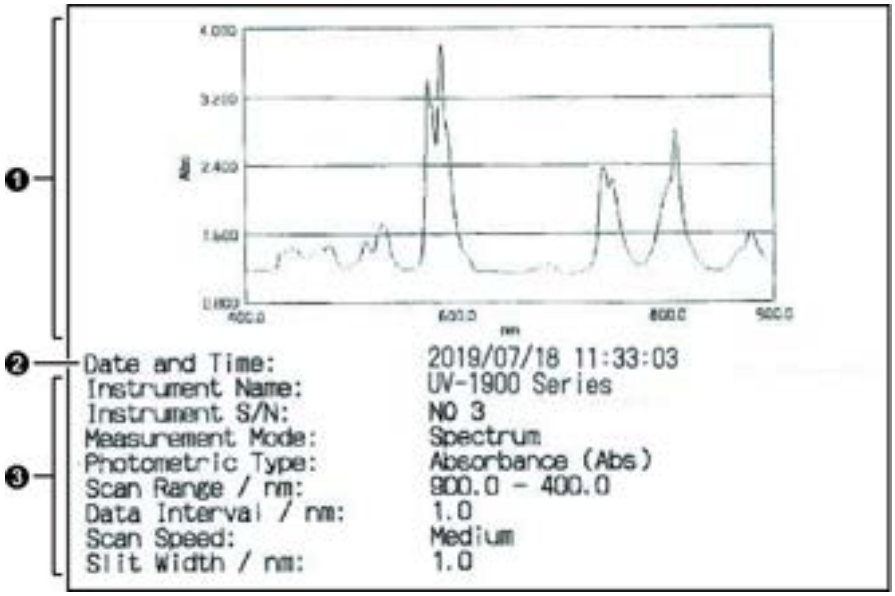
The results of arithmetic operations can be printed out.

Hint Grid type of the graph is selectable when using a commercially available printer ("15.13 Setting the Printer" P.253).

1 **Tap [Print].**

2 Tap [Calculation data].

The results are printed on the printer.



No.	Name	Description
❶	Graph	The graph after calculation is printed.
❷	Date and time	The date and time when measurement of the original data is finished are printed.
❸	Measurement parameters	Measurement parameters of the original data are printed.

14.4 Derivative

Applies the 1st to 4th order differential operation or smoothing to the curve data.

14.4.1 Data Processing Method

For derivative processing, the convolution method digital derivative operation using 17 data pieces consisting of former and latter data (Savitzky-Golay method *) has been adopted.

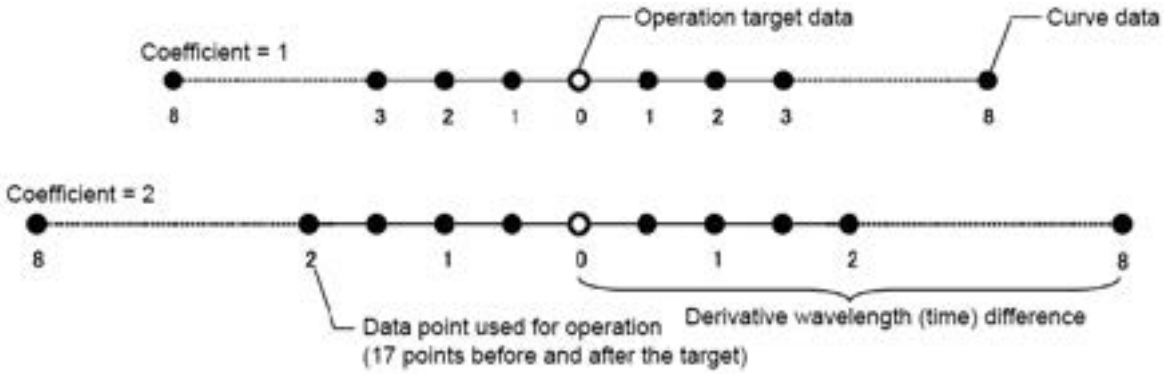
* A. Savitzky, M.J.E. Golay,"Smoothing and Differentiation of Data by Simplified Least Squares Procedures," Analytical Chemistry, vol. 36, no. 8, pp.1627-1639, 1964

To perform derivative processing, the order of derivative and derivative wavelength (time) difference must be determined.

The derivative wavelength (time) difference is defined by the sampling interval of operated curve data and the coefficient $\Delta\lambda$ (N) (or ΔT(N), ΔR(N)) specified to perform the operation.

(Derivative wavelength (time) difference) = { (Sampling interval) × (Coefficient) × 16) ÷ 2

This coefficient defines the interval of data points on the curve used for the operation. When the coefficients are defined as "1" and "2", one sampling interval and two sampling intervals are the respective intervals of the data points picked up for the operation.



The greater the coefficient, the greater the derivative wavelength (time) difference, and the less the noise. However, specifying a coefficient larger than appropriate deteriorates the resolution of the derivative spectrum. The two elements of noise and resolution should be considered when determining the coefficient value.

14.4.2 Performing Derivative Processing

1 **Tap [Derivative].**

2 Specify parameters for the operations.

No.	Name	Description
❶	Graph	Displays the curve data.
❷	Operation parameters	Displays settings of the order and coefficient.
❸	[Order]	Specifies the order of derivative. Tap it to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29). When 0 is specified, smoothing is performed. For the result of smoothing, see "Example of smoothing processing" P.209. When 1 to 4 is specified, 1st to 4th order derivative processing is performed. For the results, see "Examples of 1st to 4th order derivative" P.210.
❹	[Δλ (N)] or [ΔT (N)]	Specifies the coefficient. Tap it to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29).
❺	[Execute]	Performs operation using set parameters.
❻	[Cancel]	Returns to the Operations screen.

3 Tap [Execute].

The operation is performed and the graph is updated.

4 Check the result of operation.

No.	Name	Description
❶	[Save]	Saves the data displayed on the screen. For procedures, see Step 2 and after in "4.3.4 Saving Files" P.34.
❷	[Recalculate]	Returns to the screen to set operation parameters. Tap this button to perform recalculation after changing the parameters.
❸	[Close]	Returns to the Operations screen. Tap this button to exit the screen.
❹	Buttons relating to graph display	For details, see "14.2 Operation of Common Buttons" P.197.

■ Example of smoothing processing

Raw data

Δλ(N): 1

Δλ(N): 5

Δλ(N): 9

■ Examples of 1st to 4th order derivative

Raw data

Order: 1

Order: 2

Order: 3

Order: 4

NOTE In order to calculate the derivative values for each data set, 17 data points consisting of former and latter data are required. Therefore, when calculating the data set around both ends of the curve data, the edging data is repeatedly used for the calculation, since no other data is available.
For example, when performing derivative processing on the spectrum data at the wavelength range of 400 nm to 500 nm, it is assumed for the calculation that all data sets at wavelengths shorter than 400 nm are 0.1 Abs, and those at wavelengths longer than 500 nm are 0.2 Abs.

14.4.3 Printing the Results (Derivative)

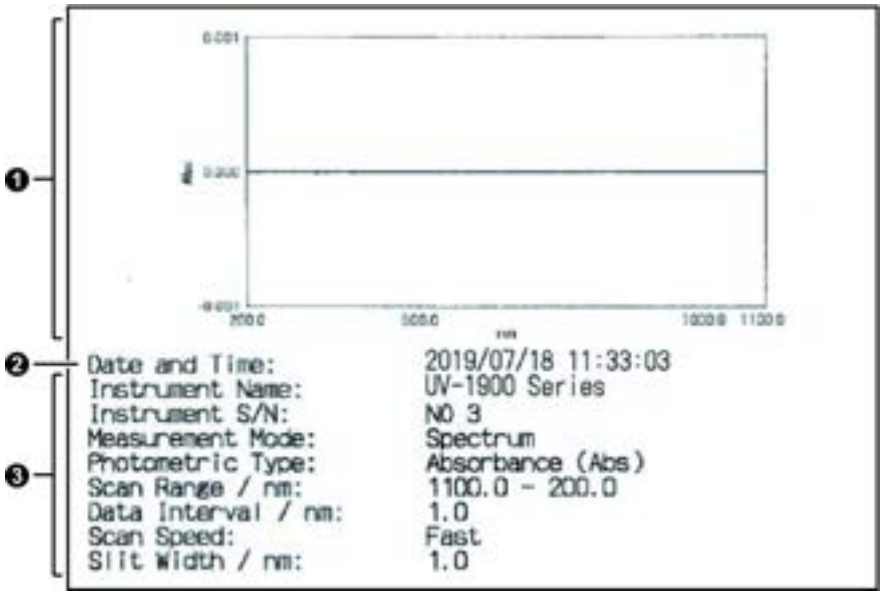
The results of derivative operations can be printed out.

Hint Grid type of the graph is selectable when using a commercially available printer ("15.13 Setting the Printer" P.253).

1 **Tap [Print].**

2 Tap [Calculation data].

The results are printed on the printer.



No.	Name	Description
❶	Graph	The graph after calculation is printed.
❷	Date and time	The date and time when measurement of the original data is finished are printed.
❸	Measurement parameters	Measurement parameters of the original data are printed.

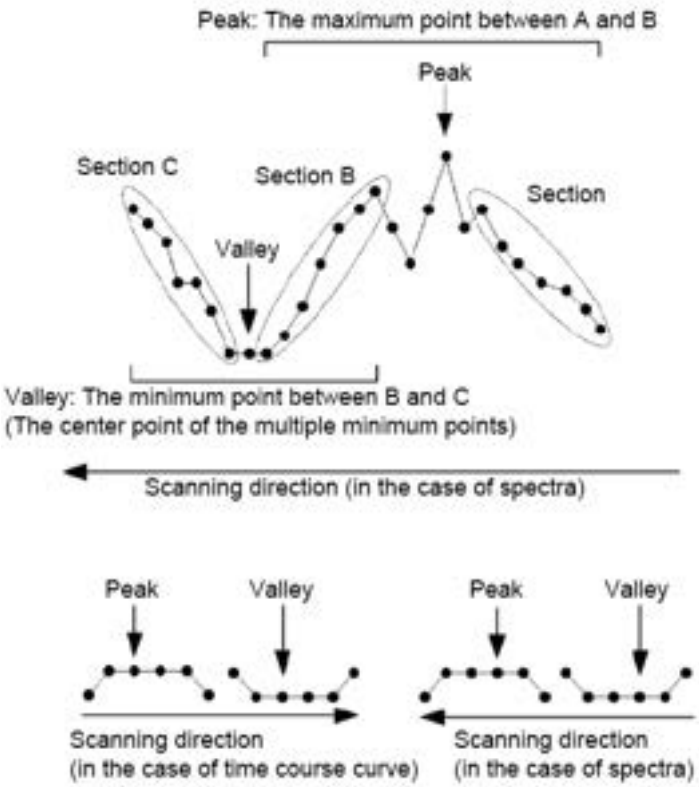
14.5 Peak Pick

This function detects the peaks or valleys of the curve data and then displays them as a list of the horizontal values (wavelength or time) and photometric values for up to 20 points.

14.5.1 Data Processing Method

When Peak Pick is executed, the UV-1900i operates as follows:

1. The program searches a section consisting of six continuously increasing data points (Section A) and a section consisting of six continuously decreasing data points (Section B), appearing after Section A.
   In Spectrum mode, peaks are searched from the longer wavelength side (right side). In Time Course mode, peaks are searched from the side of time "zero" (left side).
2. The maximum data point detected between Sections A and B is defined as a peak.
3. The program starts searching the next section consisting of six continuously increasing data points (Section C).
4. The minimum point between Sections B and C is defined as a valley.



Searching of peaks and valleys is repeated until a maximum of 20 peaks are detected.

14.5.2 Performing Peak Pick

1 **Tap [Peak Pick].**

Peaks and valleys in the curve data are automatically detected.

2 Check the results.

Switch to the following tab to check the results.

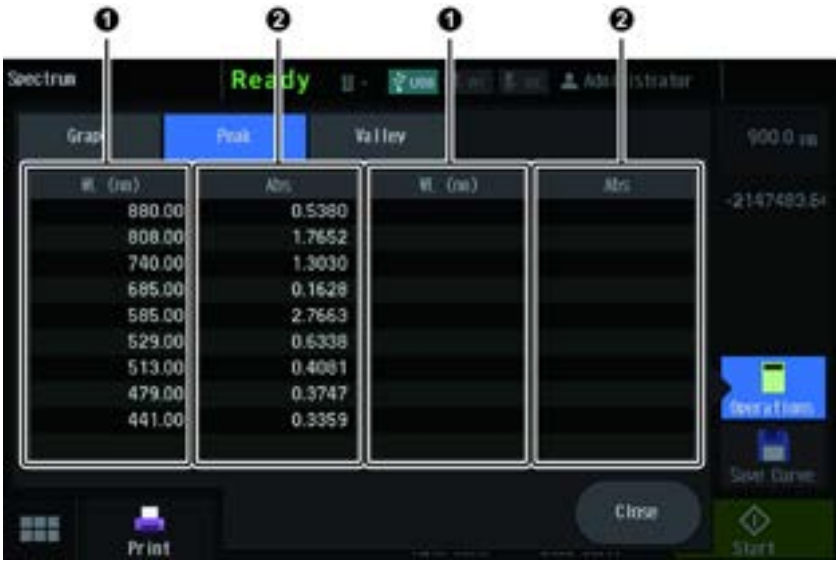
[Graph] tab

No.	Name	Description
❶	Tab for Switching Screens	Switches displayed screen. Switch to the [Graph] tab to see the curve data and switch to the [Peak] or [Valley] tab to see information about peaks or valleys.
❷	Buttons relating to graph display	For details, see "14.2 Operation of Common Buttons" P.197.
❸	Graph	Displays the curve. Peaks or valleys in the curve are indicated by white cursors.
❹	[Close]	Returns to the Operations screen. Tap this button to exit the screen.

[Peak] or [Valley] tab

Displays the horizontal values (wavelength or time) and photometric values for up to 20 points.

The following figure shows the [Peak] tab. Screen layout of the [Valley] tab is the same as the [Peak] tab.



No.	Name	Description
❶	Horizontal value	Displays the horizontal values (wavelength or time) of peaks or valleys. The unit is [WL (nm)], [Time (min)], or [Time (s)].
❷	Photometric value	Displays the photometric values of peaks or valleys. The unit is [Abs], [%T], [%R], or [E].

14.5.3 Printing the Results (Peak Pick)

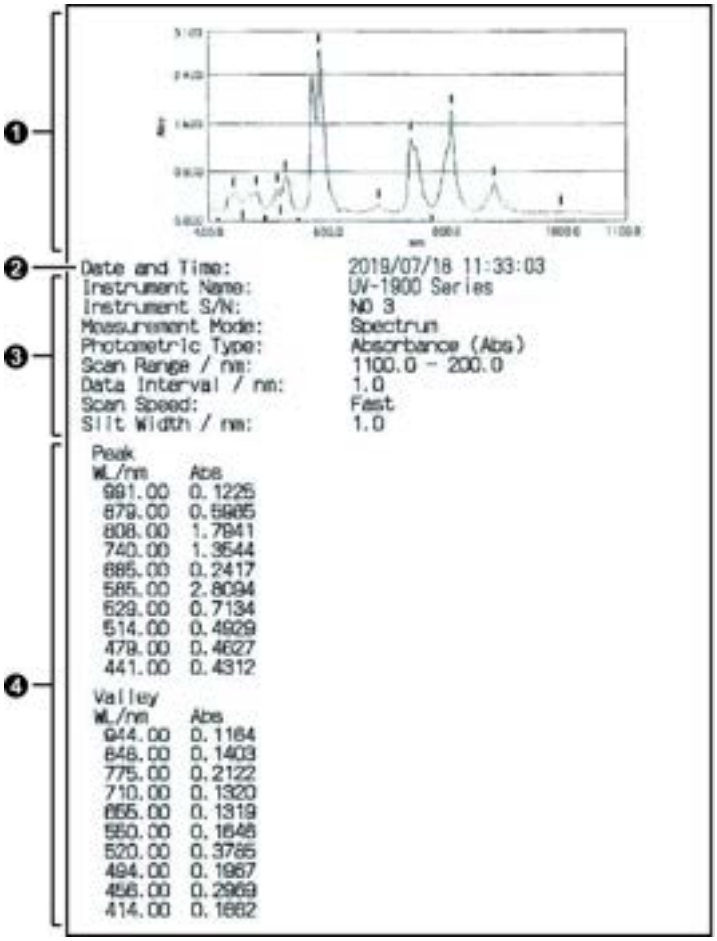
The results of Peak Pick can be printed out.

Hint Grid type of the graph is selectable when using a commercially available printer ("15.13 Setting the Printer" P.253).

1 Tap [Print].

2 Tap [Calculation data].

The results are printed on the printer.



No.	Name	Description
❶	Graph	The graph of the original data is printed.
❷	Date and time	The date and time when measurement of the original data is finished are printed.
❸	Measurement parameters	Measurement parameters of the original data are printed.
❹	Results of Peak Pick	Information about detected peaks and valleys is printed.

14.6 Point Pick

Displays, as a list, photometric values against the horizontal axis (wavelength or time) at arbitrary or constant intervals of the curve data.

The procedures vary according to the pick method.

Reference
- "14.6.1 Point Pick (Even Interval)" P.219
- "14.6.2 Performing Point Pick (Arbitrary)" P.222

14.6.1 Point Pick (Even Interval)

Displays a list of photometric values for up to 20 points at a specified interval from a specified abscissa (wavelength or time).

1 Open the setting screen for Point Pick (Even Interval).

1. Tap [Point Pick].
2. Tap [Even Intervals].

2 Specify parameters for picking.

No.	Name	Description
❶	Graph	Displays the curve. Blue vertical line on the graph indicates the start point.
❷	Buttons relating to graph display	For details, see "14.2 Operation of Common Buttons" P.197.
❸	Start Point Setting	Specifies the start time for picking photometric values. Tap the input field to display numeric keypad and enter a value ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29). The cursor can be moved by the set data interval using buttons. Hold down the button to move the cursor continuously.
❹	[Pick Interval]	Specifies the interval to pick photometric values. Tap the input field to display numeric keypad and enter a value ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29).
❺	[Execute]	Executes Pick using set parameters.
❻	[Cancel]	Returns to the Operations screen.

NOTE Data is obtained according to [Data Interval] set in measurement parameters settings. For the start time and Interval, set an integer multiple of [Data Interval].

3 **Tap [Execute].**

4 **Check the results of picking.**

No.	Name	Description
❶	Horizontal value	Displays the horizontal values (wavelength or time) of the points where photometric values are picked. The unit is [WL (nm)], [Time (min)], or [Time (s)].
❷	Photometric value	Displays photometric values at picked points. The unit is [Abs], [%T], [%R], or [E].
❸	[Recalculate]	Returns to the pick method selection screen. Tap this button to perform recalculation after changing the parameters.
❹	[Close]	Returns to the Operations screen. Tap this button to exit the screen.

14.6.2 Performing Point Pick (Arbitrary)

Displays a list of photometric values for up to 20 points at arbitrary horizontal values (wavelength or time).

1 Open the setting screen for Point Pick (Arbitrary).

1 Tap [Point Pick].

2 Tap [Arbitrary].

2 Specify parameters for picking.

Hint Only the setting of [Number of Picks] is required.

No.	Name	Description
❶	Graph	Displays the curve.
❷	Buttons relating to graph display	For details, see "14.2 Operation of Common Buttons" P.197.
❸	[Number of Picks]	Specifies number of picks of photometric values. Tap the input field to display numeric keypad and enter a value ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29).
❹	[Execute]	Tap it to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29). Specify data (wavelengths or time) of the points to be picked. The number of points is the number set in [Number of Picks].
❺	[Cancel]	Returns to the Operations screen.

3 Tap [Execute].

4 Specify data (wavelengths or time) of the points to be picked. The number of points is the number set in [Number of Picks].

Reference "4.2.2 Numeric Input Screen (10-button Keypad)" P.29

5 Check the results of picking.

No.	Name	Description
❶	Horizontal value	Displays the horizontal values (wavelength or time) of the points where photometric values are picked. The unit is [WL (nm)], [Time (min)], or [Time (s)].
❷	Photometric value	Displays photometric values at picked points. The unit is [Abs], [%T], [%R], or [E].
❸	[Recalculate]	Returns to the pick method selection screen. Tap this button to perform recalculation after changing the parameters.
❹	[Close]	Returns to the Operations screen. Tap this button to exit the screen.

14.6.3 Printing the Results (Point Pick)

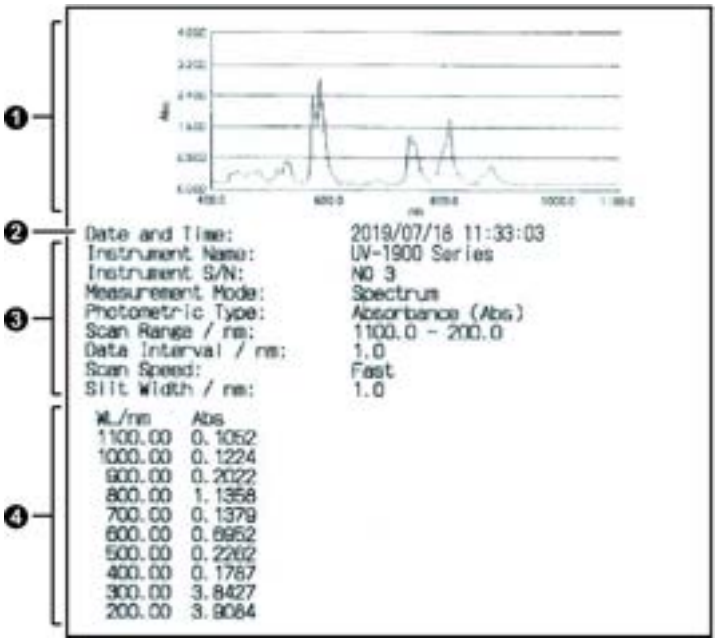
The results of Point Pick can be printed out.

Hint Grid type of the graph is selectable when using a commercially available printer ("15.13 Setting the Printer" P.253).

1 **Tap [Print].**

2 Tap [Calculation data].

The results are printed on the printer.



No.	Name	Description
❶	Graph	The graph of the original data is printed.
❷	Date and time	The date and time when measurement of the original data is finished are printed.
❸	Measurement parameters	Measurement parameters of the original data are printed.
❹	Results of Point Pick	Information about picked points is printed.

14.7 Peak Area

Calculates the area enclosed by the curve data and the horizontal axis.

14.7.1 Data Processing Method

The calculation results are expressed as the values α, β, and α + β. However, the calculation method varies according to the data type of the photometric value (vertical axis).

When the type of photometric value is absorbance (Abs) or energy (E)

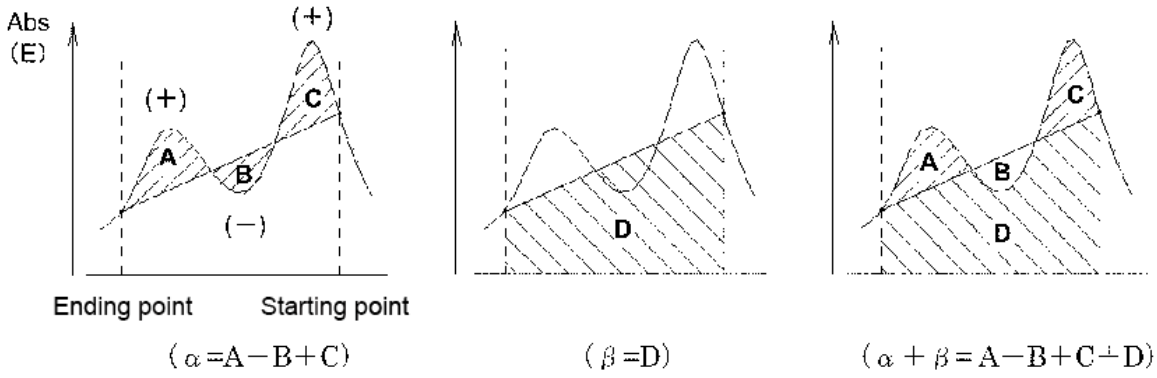
α is the area of the portion bounded by the curve data and a straight line connecting the starting and ending points on the data.

The sign of α for the area protruding upwards is (+), and (-) for that protruding downwards.

β is the area of the portion bounded by a straight line connecting the starting and ending points on the curve data and the horizontal axis.

The sign of β is always (+).

Example)



(α=A−B+C) (β=D) (α + β=A−B+C+D)

When the type of photometric value is transmittance (%T or Reflectance (%R))

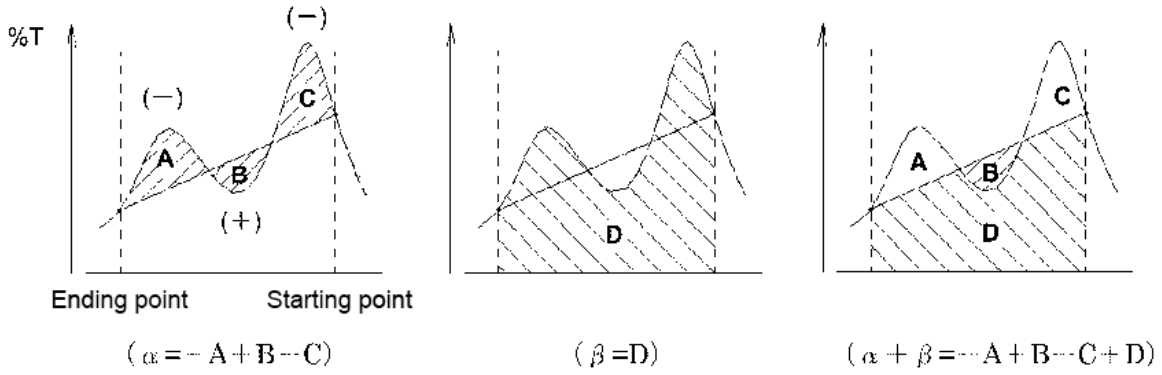
α is the area of the portion bounded by the curve data and a straight line connecting the starting and ending points on the data.

The sign of α for the area protruding upwards is (-), and (+) for that protruding downwards.

β is the area of the portion bounded by the curve data and horizontal axis (the starting and ending points)

The sign of β is always (+).

Example)



$(\alpha = -A + B - C)$ $(\beta = D)$ $(\alpha + \beta = -A + B - C + D)$

14.7.2 Performing Area Calculation

1 **Tap [Peak Area].**

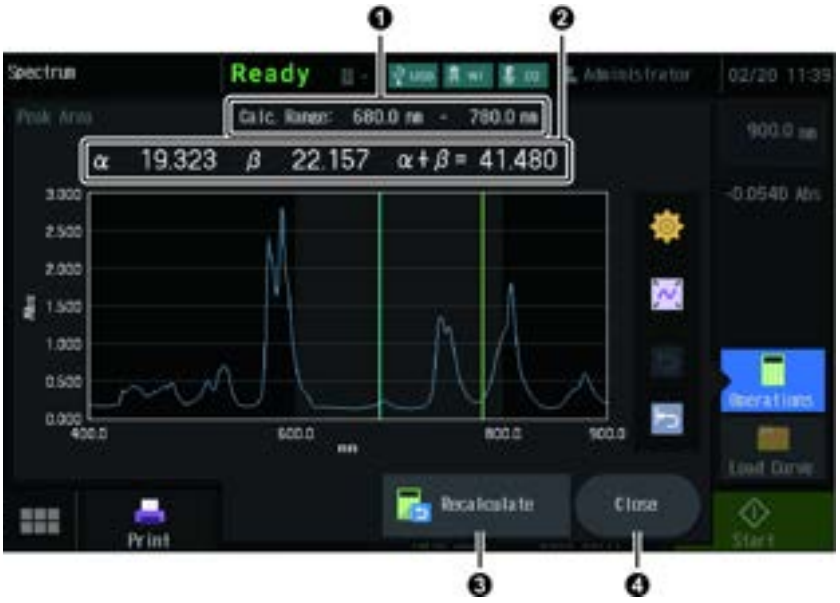
2 Specify parameters for the calculation.

No.	Name	Description
❶	Graph	Displays the curve. Blue and green vertical lines on the graph indicate the start and end points of the area calculation, respectively.
❷	Buttons relating to graph display	For details, see "14.2 Operation of Common Buttons" P.197.
❸	Start Point Setting	Specifies start point for area calculation. Tap the input field to display numeric keypad and enter a value ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29). The cursor can be moved by the set data interval using buttons. Hold down the button to move the cursor continuously.
❹	End Point Setting	Specifies end point for area calculation. Tap the input field to display numeric keypad and enter a value ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29). The cursor can be moved by the set data interval using buttons. Hold down the button to move the cursor continuously.
❺	Photometric value	Displays the photometric value at intersection of the curve and the cursor. Absorbance at the start and end points is displayed.
❻	[Execute]	Executes area calculation according to the settings of start and end points.
❼	[Cancel]	Returns to the Operations screen.

3 Tap [Execute].

The calculation is performed and the graph is updated.

4 Check the results of calculation.



No.	Name	Description
❶	Set values	Displays the settings of start and end points.
❷	Calculation results	Displays the results of calculation (values of α, β, and α + β).
❸	[Recalculate]	Returns to the screen to set calculation parameters. Tap this button to perform recalculation after changing the parameters.
❹	[Close]	Returns to the Operations screen. Tap this button to exit the screen.

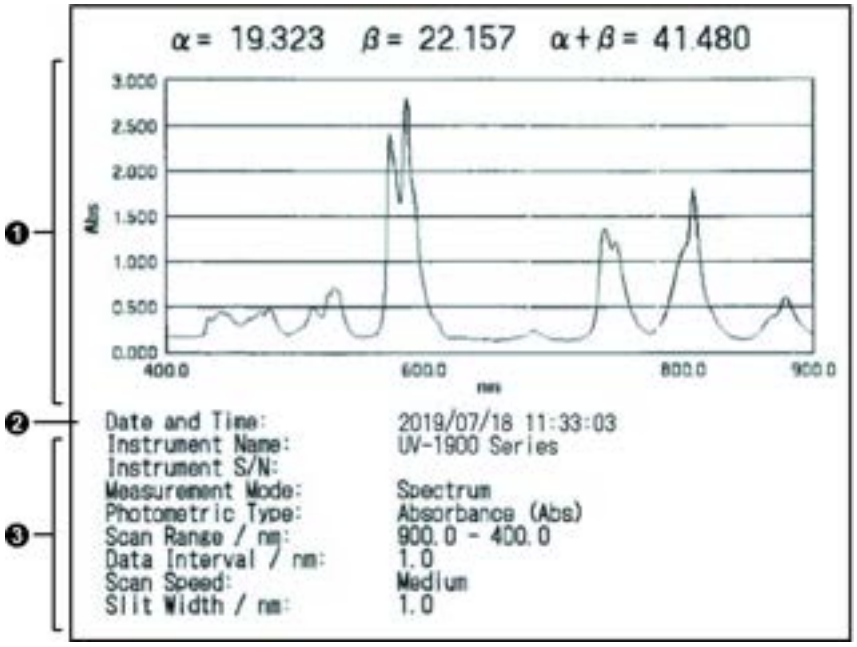
14.7.3 Printing the Results (Peak Area)

The results of peak area calculation can be printed out.

1 **Tap [Print].**

2 **Tap [Calculation data].**

The results are printed on the printer.



No.	Name	Description
❶	Graph	The graph of the original data is printed.
❷	Date and time	The date and time when measurement of the original data is finished are printed.
❸	Measurement parameters	Measurement parameters of the original data are printed.

14.8 Data Print

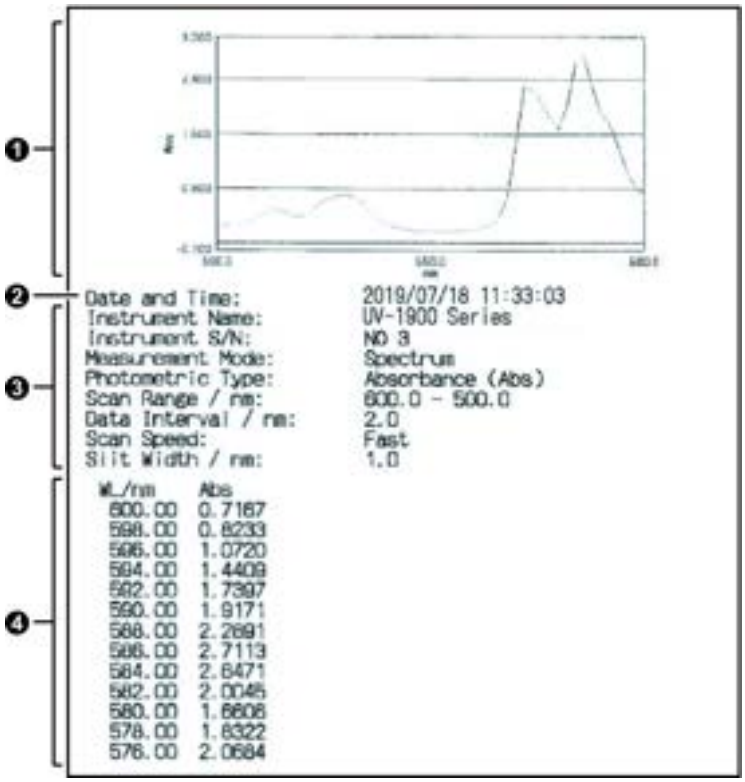
Prints measurement parameters and data at each sampling point of curve data.

NOTE
- Printing cannot be terminated on the UV-1900i. To stop printing urgently, disconnect the USB cable connected between the UV-1900i and the printer.
- The number of digits of printed data is in accordance with "15.11 Setting the Number of Decimals" P.251.

Hint Grid type of the graph is selectable when using a commercially available printer ("15.13 Setting the Printer" P.253).

1 Tap [Data Print].

The data is printed on the printer.



No.	Name	Description
❶	Graph	The graph is printed.
❷	Date and time	The date and time of the end of the measurement are printed.
❸	Measurement parameters	Measurement parameters of the data are printed.
❹	Sampling point information	Information about each sampling point is printed.

15 General Settings

This is the menu for setting the instrument's operating parameters, such as settings of the light source or printer, or number of decimals.

NOTE
- The parameters set in this menu are common to all measurement modes.
- The parameters set in this menu are stored internally, even if the power is turned OFF.

15.1 Displaying the General Settings Menu

1 **Tap [General Settings].**

The General Settings screen is displayed.

The General Settings menu has five tabs.

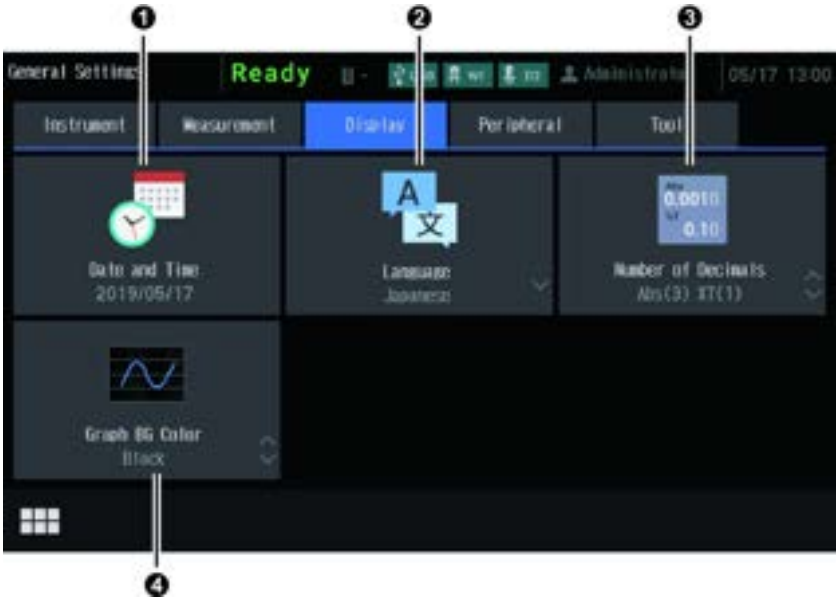
[Instrument] tab

No.	Name	Description
❶	Tab for Switching Screens	Switches displayed tab.
❷	[Light Source]	Sets the light source. ▶▶ Reference "15.2 Setting the Light Source Lamp" P.241
❸	[LCD Brightness]	Sets the brightness of the LCD backlight. ▶▶ Reference "15.3 Setting LCD Brightness" P.242
❹	[Display Off Time]	Sets the function to automatically turn off the LCD backlight when no operation is performed for a certain period of time. ▶▶ Reference "15.4 Setting Display Off Time" P.243
❺	[Buzzer]	Sets the buzzer. ▶▶ Reference "15.5 Setting the Buzzer" P.244
❻	[Network]	Sets the network. ▶▶ Reference "15.6 Network Settings" P.245

[Measurement] tab

No.	Name	Description
❶	[Accumulation Time]	Specifies the accumulation time to read data in the Photometric, Photometric 8λ, Quantitation, and Bio-method modes. ▶▶ Reference "15.7 Setting the Accumulation Time" P.246
❷	[S/R Exchange]	Exchanges the light flux on the sample side and reference (subject) side. ▶▶ Reference "15.8 Setting S/R Exchange" P.248 NOTE This function is used when a specular reflectance attachment (incidence angle 5°) is installed. Normally, do not change this setting.

[View] tab



No.	Name	Description
❶	[Date and Time]	Specifies the current date and time. Also specifies the date print format. Reference "15.9 Setting Date and Time" P.249
❷	[Language]	Specifies the language. Reference "15.10 Setting the Language" P.250
❸	[Number of Decimals]	Specifies the number of decimals of the photometric values to be displayed. Reference "15.11 Setting the Number of Decimals" P.251
❹	[Graph BG Color]	Specifies the background color to display the curve data. Reference "15.12 Setting Graph Background Color" P.252

[Peripheral] tab

No.	Name	Description
❶	[Printer]	Sets the printer to be used and the format of a hard copy. ▶▶ Reference "15.13 Setting the Printer" P.253
❷	[Keyboard layout]	Sets the keyboard layout. ▶▶ Reference "15.14 Setting the Keyboard Layout" P.260
❸	[Format Expanded Memory]	Formats the expanded memory. ▶▶ Reference "15.15 Setting the Expanded Memory" P.261

[Tool] tab

No.	Name	Description
❶	[Start Program]	Sets the mode in which the instrument will enter when the power is turned ON. ▶▶ Reference "15.16 Setting the Start Program" P.262
❷	[Save CSV During Auto File]	Sets whether the instrument saves curve data files (*.spc) as well as CSV files (*.csv) including the same content when the Auto File function is enabled in the Spectrum mode. ▶▶ Reference "15.17 Setting of Save CSV During Auto File" P.266
❸	[Wakeup]	Sets the automatic startup function of the instrument. ▶▶ Reference "15.18 Setting the Wakeup Function" P.267

15.2 Setting the Light Source Lamp

The UV-1900i uses a deuterium lamp (D2 lamp) in the ultra-violet region and a halogen lamp (WI lamp) in the visible/near-infrared region. Select whether to automatically switch between the two light sources according to measurement wavelengths, or to fix them regardless of the wavelengths.

1 **Tap [Light Source].**

2 **Tap the item to be set.**

[Auto], [WI], and [D2] are available.

When tapping [Auto], enter the wavelength for light source switching with numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29).

The factory default is [Auto] and the wavelength for light source switching is 340.0 nm.

15.3 Setting LCD Brightness

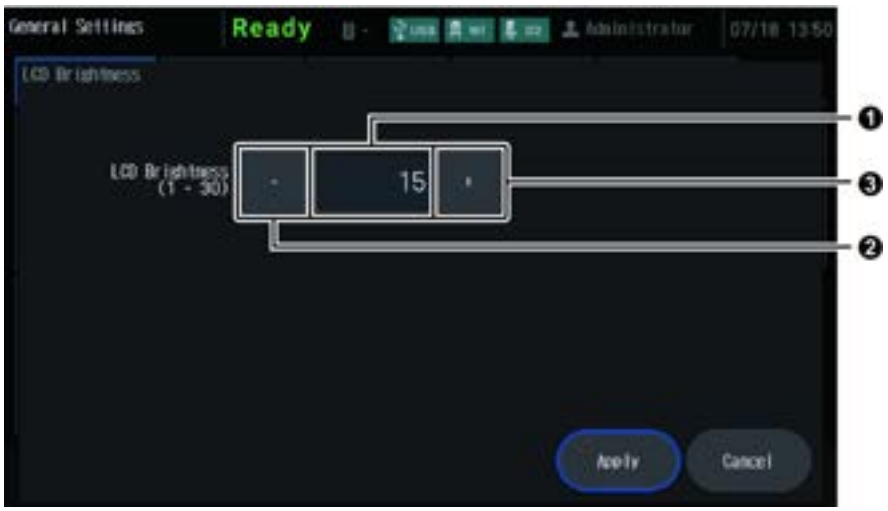
Sets the brightness of the LCD backlight.

1 **Tap [LCD Brightness].**

2 **Specifies the brightness by entering a value from 1 to 30.**

The greater the value, the brighter the LCD.

Set the brightness as desired.



No.	Name	Description
❶	Brightness Display/Set button	Displays the brightness currently set. Tap the input field to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29).
❷	Brightness Decrease button	Decreases the current brightness by one increment.
❸	Brightness Increase button	Increases the current brightness by one increment.

15.4 Setting Display Off Time

Sets the function to automatically turn off the LCD backlight when no operation is performed for a certain period of time.

1 Tap [Display Off Time].

2 Tap the item to be set.

[10 min], [30 min], [60 min], and [∞] are available.

When selecting [10 min], [30 min], or [60 min], the LCD backlight is automatically turned OFF if nothing is executed for the set time.

When selecting [∞], the LCD backlight is not automatically turned OFF.

Tap the screen to illuminate the backlight again.

15.5 Setting the Buzzer

Sets the buzzer.

1 Tap [Buzzer].

2 Specifies the items as desired.

No.	Name	Description
❶	[Mode]	Specifies the type of buzzer sound. Tap to select [ON], [Error sound only], or [OFF]. • [ON] is the setting to sound a buzzer for notifications and an alarm indicating failures, etc. • [Error sound only] is the setting to sound only an alarm indicating failures, etc. • [OFF] is the setting not to sound a buzzer nor alarm. When an error occurs, the error message appears on the touch panel and the LED light at the bottom right of the touch panel illuminates in red even if the alarm is turned off.
❷	[Volume]	Specifies the volume of the buzzer. Tap to select [High], [Middle] or [Low].
❸	[Apply]	Confirms changes and closes the window.

No.	Name	Description
❹	[Cancel]	Discards changes and closes the window.

15.6 Network Settings

Set the network. Also, the MAC address of the instrument is displayed.

> **NOTE** Any change made in the network settings will be reflected after instrument restart.

1 Tap [Network].

2 Specifies the items as desired.

No.	Name	Description
❶	[IP Address]	Sets the IP address of the instrument. Tap the input field to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29). The default value is [192.168.200.100].

No.	Name	Description
❷	[Subnet Mask]	Sets the subnet mask for the instrument. Tap the input field to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29). The default value is [255.255.255.0].
❸	[Default Gateway]	Sets the default gateway for the instrument. Tap the input field to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29). The default value is [0.0.0.0].
❹	[Apply]	Confirms changes and closes the window.
❺	[Cancel]	Discards changes and closes the window.

15.7 Setting the Accumulation Time

Specifies the accumulation time to read data in the Photometric, Photometric 8λ, Quantitation, and Bio-method modes.

Hint In the Spectrum mode, the accumulation time is determined by the setting of [Scan Speed] in the [Scan Settings] subtab ("[Scan Settings] subtab" P.73).

1 Tap [Accumulation Time].

2 **Tap the item to be set.**

[0.05 s], [0.2 s], [0.5 s], and [2.0 s] are available. The default value is [0.2 s].
The longer the time become, the less the dispersion of the obtained data, but the number of data outputs per unit time becomes less.
The number of outputs per second is almost the reciprocal of the accumulation time.

15.8 Setting S/R Exchange

Exchanges the light flux on the sample side and reference (subject) side.

> NOTE This function is used when a specular reflectance attachment (incidence angle 5°) is installed. Normally, do not change this setting.

1 Tap [S/R Exchange].

[Normal] and [Inverse] are available. Each tap of this key toggles the item.

When [Normal] is selected, the front of the sample compartment will be the sample light flux, and the back will be the reference light flux.

When [Inverse] is selected, the front of the sample compartment will be the reference light flux, and the back will be the sample light flux.

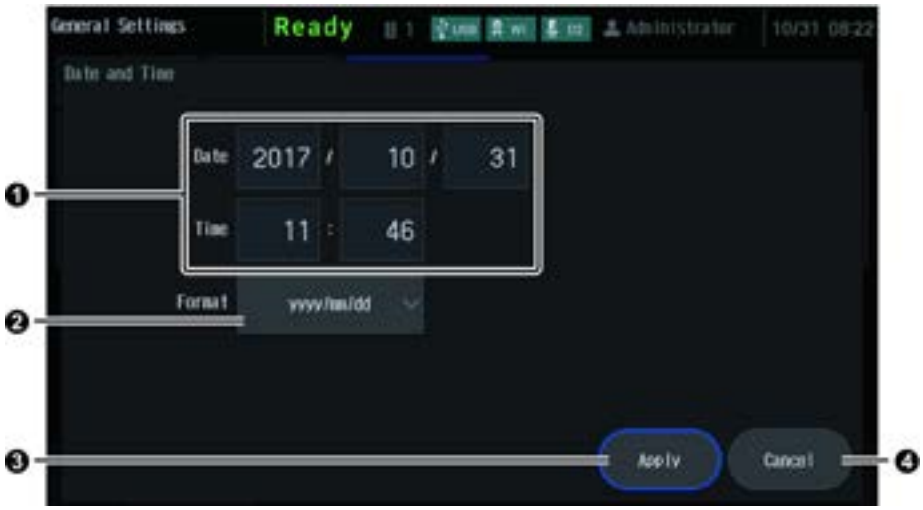
15.9 Setting Date and Time

Specifies the current date and time. Also specifies the date print format.

> **NOTE** The setting of date and time is backed up by the battery, therefore, you do not need to set them for each startup.

1 Tap [Date and Time].

2 Specifies the items as desired.



No.	Name	Description
❶	[Date] [Time]	Specifies the current date and time. Tap the input field to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29).
❷	[Format]	Specifies the date print format. Tap to select [yyyy/mm/dd], [mm/dd/yyyy], or [dd/mm/yyyy]. The year, month, and day are printed in "yyyy", "mm", and "dd", respectively.
❸	[Apply]	Confirms changes and closes the window.
❹	[Cancel]	Discards changes and closes the window.

15.10 Setting the Language

Sets the language to be displayed.

1 **Tap [Language].**

2 **Tap the item to be set.**

[日本語](Japanese), [English], [■■](Chinese), [Español (México)](Spanish (Mexico)), [Português (Brasil)](Portuguese (Brazil)), [Русский](Russian), [Deutsch](Germany), and [Français](French) are available.

15.11 Setting the Number of Decimals

Specifies the number of decimals of the photometric values to be displayed.

NOTE
- The value at the minimum digit is rounded off when displayed or printed out.
- When the photometric values are saved in a CSV file, the values have the digits set here.

1 Tap [Number of Decimals].

[Abs (3) %T (1)] and [Abs (4) %T (2)] are available. Each tap of this key toggles the item.

When selecting [Abs (3) %T (1)]

- Abs (Absorbance): Rounded to three decimal places (i.e. the fourth decimal place is rounded off).
- %T (Transmittance) or %R (Reflectance): Rounded to one decimal place (i.e. the second decimal place is rounded off).
- E (Energy): Rounded to one decimal place (i.e. the second decimal place is rounded off).

When selecting [Abs (4) %T (2)]

- Abs (Absorbance): Rounded to four decimal place (i.e. the fifth decimal place is rounded off).
- %T (Transmittance) or %R (Reflectance): Rounded to two decimal places (i.e. the third decimal place is rounded off).
- E (Energy): Rounded to two decimal places (i.e. the third decimal place is rounded off).

15.12 Setting Graph Background Color

Specifies the background color to display the curve data.

1 **Tap [Graph BG Color].**

[Black] and [White] are available. Each tap of this key toggles the item.

15.13 Setting the Printer

Sets the printer to be used and the format of a hard copy.

1 Tap [Printer].

2 Specifies the items as desired.

No.	Name	Description
❶	[Printer Type]	Specifies the printer type. For details, see "15.13.1 Selecting the Printer" P.255.
❷	[Date Printing]	Each tap of this key toggles between ON and OFF of Date Printing. ON:  OFF:  NOTE When [Printer Type] (❶) is set to [PictBridge], this setting is disabled.

No.	Name	Description
❸	[Left Margin]	Specifies left margin (space) of the page. The setting range is from 0 to 9. The unit is a single-byte character. Tap the input field to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29). NOTE When [Printer Type] (❶) is set to [DPU], [MPU], or [PictBridge], this setting is disabled.
❹	[Paper Size]	Sets the paper size used for printing. Tap to select [A4] or [Letter]. NOTE When [Printer Type] (❶) is set to [DPU] or [MPU], this setting is disabled. Reference For [PictBridge], see "15.13.4 Changing the Paper Size (Only When Selecting PictBridge)" P.259.
❺	[Printer Driver] [Printer Name]	Changes the printer driver to be used when [Printer Type] (❶) is set to [ESC/P-R]. Reference For details, see "15.13.2 Changing Printer Driver (Only When ESC/P-R is Selected)" P.256. When [Printer Type] (❶) is set to [PictBridge], select the printer name to be used. Reference For the details, see "15.13.3 Setting the Printer Name (Only When Selecting PictBridge)" P.258. NOTE When [Printer Type] (❶) is not set to [ESC/P-R] or [PictBridge], this setting is disabled.
❻	[Page number]	Each tapping of this key toggles between showing and hiding of the number of pages for printing. • Showing:  • Hiding:  NOTE When [Printer Type] (❶) is not set to [PictBridge], this setting is disabled.
❼	[Grid Style]	Specifies the grid type of the graph to be printed. This setting is applied to the following printing with a printer which supports control code ESC/P-24, ESC/P Raster (ESC/P-R), or PCL. • Printing in the Spectrum mode ("8.3 Printing Measurement Results" P.84) • Printing in the Time Course mode ("12.3 Printing Measurement Results" P.169) • Printing of curve data in the Kinetics mode ("10.3.3 Manual Print (Curve data)" P.139) • Printing of curve data in the Kinetics Rate mode ("11.3.3 Manual Print (Curve data)" P.155)
❽	[Apply]	Confirms changes and closes the window.
❾	[Cancel]	Discards changes and closes the window.

15.13.1 Selecting the Printer

Item	Description
[DPU]	Select this when using the hard copy printer DPU (optional).
[MPU]	Select this when using the hard copy printer MPU (optional).
[ESC/P-24]	Select this when using a printer that supports the ESC/P control code for EPSON. This is also applied for 24-pin printers and laser printers.
[ESC/P-R]	Select this when using a printer that supports the ESC/P Raster (ESC/P-R) control code for EPSON. Note that driver software must be changed according to the printer used. Be sure to preselect a driver specific to the printer. Reference "15.13.2 Changing Printer Driver (Only When ESC/P-R is Selected)" P.256
[PCL]	Select this when using a printer that supports the PCL control code for Hewlett Packard.
[PictBridge]	Select this when using PictBridge printer. Reference • "15.13.3 Setting the Printer Name (Only When Selecting PictBridge)" P.258 • "15.13.4 Changing the Paper Size (Only When Selecting PictBridge)" P.259

CAUTION

Instruction

To plug the USB printer cable to another port or computer after (or while) using ESC/P Raster (ESC/P-R) printer, be sure to turn OFF the printer power beforehand.

If the USB cable is unplugged before the printer head returns to its home position, printing cannot be accepted.

15.13.2 Changing Printer Driver (Only When ESC/P-R is Selected)

When using a printer that supports the ESC/P Raster (ESC/P-R) control code, proper printer driver must be selected.

Connect a USB memory and tap [Printer Driver] in the [Printer] screen ("15.13 Setting the Printer" P.253 Step 2) to display available printer drivers.

Check whether the printer driver compatible with the printer (the name is the same as the printer model name) is included in the list or not and proceed to either of the following procedure.

- When there is not a compatible printer driver, proceed to "Preparing the printer driver" P.256.
- When there is a compatible printer driver, proceed to "Changing printer driver" P.257.

■ Preparing the printer driver

> **NOTE** To learn about ESC/P-R printers compatible with UV-1900i, and how to obtain drivers specific to the printers, contact your Shimadzu Representative where you purchased the product.

1 **Prepare a USB memory, and create "(USB memory drive)\UV1900\Devinfo".**

2 **Save the printer driver file (printer.drv) to the created folder (\Devinfo).**

Proceed to "Changing printer driver" P.257.

■ Changing printer driver

1 **Connect a USB memory to the instrument.**

2 **Open the setting screen for printer driver.**

1 Set [Printer Type] to [ESC/P-R].

2 Tap [Printer Driver].

3 **Tap printer driver to be used.**

4 **Tap [OK].**

5 **Tap [Apply].**

The printer driver is changed.

15.13.3 Setting the Printer Name (Only When Selecting PictBridge)

Set the printer name to be used when [Printer Type] is set to [PictBridge].
Printers compatible with PictBridge are commercially available.

1 **Open the setting screen for the printer name.**

1 Set [Printer Type] to [PictBridge].

2 Tap [Printer name].

2 **Tap the printer name to be used.**
Available printers are displayed in a list.

3 **Tap [Apply].**

The printer to be used is changed.

15.13.4 Changing the Paper Size (Only When Selecting PictBridge)

1 **Tap [Paper Size].**

2 **Tap the item to be set.**

NOTE The paper sizes unavailable for the printer are not displayed.

15.14 Setting the Keyboard Layout

Set the keyboard layout.

1 **Tap [keyboard layout].**

2 **Tap the item to be set.**

[Japanese], [English (U.S.)], [Chinese], [Spanish (Mexico)], [Portuguese (Brazil)], [Russian], [Germany], and [French] are available.

15.15 Setting the Expanded Memory

Format the expanded memory.

> NOTE If you perform formatting, all saved files will be deleted.

1 **Tap [Format Expanded Memory].**

2 **Tap [Yes].**

Formatting of the expanded memory starts.

3 **Tap [OK].**

The General Settings menu screen appears.

15.16 Setting the Start Program

Sets the mode in which the instrument will enter when the power is turned ON.

1 **Tap [Start Program].**

2 **Tap the item to be set.**

The selectable items are shown below.

There are 3 pages of items. Tap ▲ ▼ to switch the pages.

Start Program	Description
[Standard Menu]	The Mode Menu screen ("3.1 Mode Menu Screen" P.18) will be displayed when the instrument starts up. This mode has been set as a factory default.

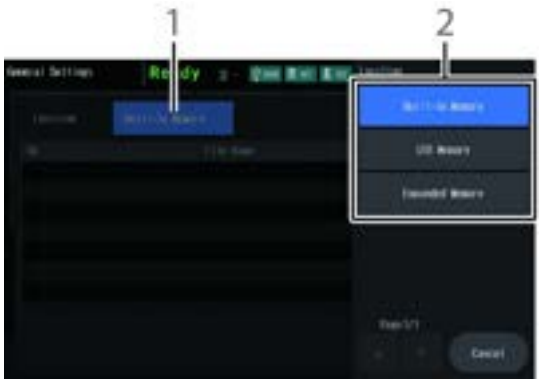
Start Program	Description
[Photometric]	The instrument will start in the selected measurement mode.
[Photometric 8 λ]	
[Spectrum]	
[Quantitation]	
[Kinetics]	
[Kinetics Rate]	
[Time Course]	
[DNA Quantitation]	
[Lowry Method]	
[BCA Method]	
[CBB Method]	
[Biuret Method]	
[UV Method]	
[Saved Params File]	The selected parameters file is loaded and the instrument will start up in the measurement mode for the file contents. You can specify parameters files stored in the built-in memory, USB memory, or expanded memory. Reference "Operations when selecting [Saved Params File]" P.263

■ Operations when selecting [Saved Params File]

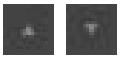
When selecting [Saved Params File], perform the following procedures to specify the file to be loaded at startup.

1 Specifies the location of the file to be loaded.

1. Tap the [Location] selection field.
2. Tap [Built-in Memory], [USB Memory] or [Expanded Memory].



2 Specify the file to be loaded at startup.

No.	Name	Description
❶	File List	Saved files are listed. Selected file is highlighted in blue. Number at the upper right shows the ordinal number of selected file and total number of saved files. Four buttons at the right operates as follows: •  Moves to the previous or next page when the list continues for more than 2 pages. •  Selects the previous or next file.
❷	Graph Display button	This button is not available because it is not used for this procedure.
❸	Preview button	Displays the details of the selected file. Displayed items depend on the file type.  • When the items continue for more than 2 pages, switch pages using  at the right of the screen. • Tap [Close] to close the screen.
❹	[Close]	Cancels file selection and returns to the General Settings menu.
❺	[Open]	Specifies selected file as the file to be loaded at startup.

Hint When a file is selected and [Open] is tapped, the name of selected file is displayed under the item name.
The item icon varies depending on the type of selected file. When a parameters file in the built-in memory is selected,  is displayed. For a parameters file in the USB memory,  and for a measurement parameters file in the expanded memory,  .

15.17 Setting of Save CSV During Auto File

Sets whether the instrument saves curve data files (*.spc) as well as CSV files (*.csv) including the same content when the Auto File function is enabled in the Spectrum mode.

Hint The names of CSV files saved by this function are the same as the original curve data files (ex. the name of the CSV file saved with 001.spc is 001.csv).

1 Tap [Save CSV During Auto File].

[ON] and [OFF] are available. Each tap of this key toggles the item.

When [ON] is selected, CSV file saving is enabled. When [OFF] is selected, it is disabled.

15.18 Setting the Wakeup Function

Set the automatic startup of the instrument.

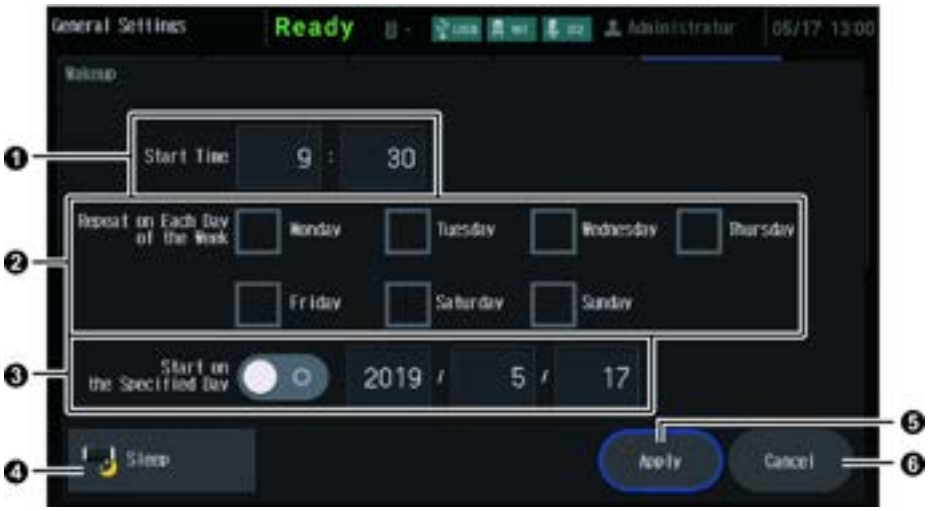
By setting the start time of the instrument and then setting it to the Sleep state, the instrument initialization can be started automatically from the Sleep state when the start time comes.

The automatic start date can be set on the specified day every week or on the specified date.

> **NOTE** You cannot set both [Repeat on Each Day of the Week] and [Start on the Specified Day] at the same time.

1 Tap [Wakeup].

2 Tap the item to be set.



No.	Name	Description
❶	[Start Time]	Sets the time at which the instrument starts up automatically. Tap the input field to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29). The hour of the startup time can be set in the range of 0 to 23. The minutes can be set in the range of 0 to 59.

No.	Name	Description
❷	[Repeat on Each Day of the Week]	Tap the checkbox of the day of the week to turn on/off  . At the start time of the checked  day of the week, the instrument gets out of the sleep state and initialization starts. Multiple days of the week can be selected at the same time. **NOTE** When setting [Repeat on Each Day of the Week], check that the [Start on the Specified Day] button is disabled.
❸	[Start on the Specified Day]	Enable the [Start on the Specified Day] button to automatically start up the instrument on the specified date. While the button is enabled, tap the input field to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29). **NOTE** When setting [Start on the Specified Day], check that all checkboxes of [Repeat on Each Day of the Week] are turned off  .
❹	[Sleep]	Set the instrument to the sleep state. **NOTE** If all days of the week are turned off in [Repeat on Each Day of the Week] and [Start on the Specified Day] is turned off, you cannot set the instrument to the sleep state. Also, if the date set in [Start on the Specified Day] is earlier than the current date, you cannot set the instrument to the sleep state.
❺	[Apply]	Saves changes and closes the window.
❻	[Cancel]	Discards changes and closes the window.

16 Maintenance

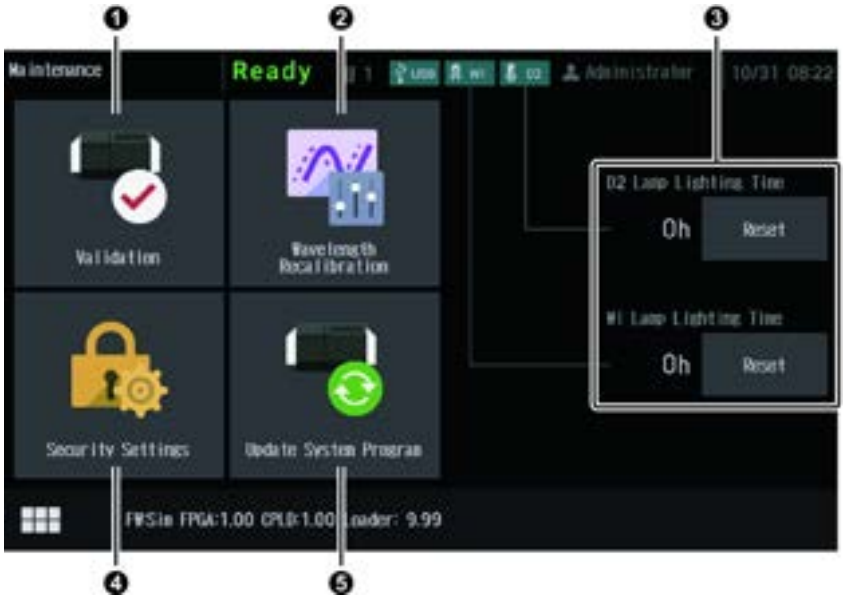
This section explains the functions used for maintenance and inspection of UV-1900i.
This section explains the following functions.
For the validation function, see "17 Validation Function" P.288.

Reference
- "16.2 Wavelength Recalibration" P.271
- "16.3 Resetting Lamp Lighting Time" P.273
- "16.4 Security Mode" P.274
- "16.5 Update System Program" P.286

16.1 Displaying the Maintenance Menu

1 **Tap [Maintenance].**

The Maintenance menu is displayed.



No.	Name	Description
❶	[Validation]	Validates the performance of the instrument. Reference "17 Validation Function"
❷	[Wavelength Recalibration]	Calibrates the wavelength origin by referencing the emission line of the D2 (deuterium) lamp (656.1 nm). Reference "16.2 Wavelength Recalibration" P.271
❸	Lamp Lighting Time	Displays the current lighting time of WI (halogen) lamp or D2 (deuterium) lamp. Tap [Reset] to reset the time to zero. Reference "16.3 Resetting Lamp Lighting Time" P.273
❹	[Security Settings]	Sets security functions. You can switch ON/OFF each security function, change passwords, and set limitations for each function. Reference "16.4 Security Mode" P.274
❺	[Update System Program]	Updates system software of the UV-1900i. Reference "16.5 Update System Program" P.286

16.2 Wavelength Recalibration

Calibrates the wavelength origin by referencing the emission line of the D2 (deuterium) lamp (656.1 nm). Perform the wavelength recalibration in the following cases:

- To recalibrate the original wavelength accuracy of the UV-1900i after an extended period without powering on the instrument or to check instrument function.
- In the case of significant environment temperature change after the power is turned ON.

NOTE

- Use the standard sample compartment, and verify that nothing is placed in the cell holder.
- Do NOT open the sample compartment cover during the calibration.
- The wavelength recalibration is automatically performed during the initialization process at the instrument startup. Though the slight shift due to the influence of environment temperature fluctuations can be corrected by restarting the UV-1900i, this function can correct the shift when the instrument and light source lamp are at stable temperature.

1 **Tap [Wavelength Recalibration].**

2 **Tap [Yes].**

Wavelength recalibration starts.

When the wavelength recalibration is completed, the Maintenance menu is displayed.

16.3 Resetting Lamp Lighting Time

When halogen lamp (WI lamp) or deuterium lamp (D2 lamp) is replaced ("3.4 Replacing the Lamp" in "UV-1900i Instruction Manual (Installation and Maintenance Guide)", reset lamp lighting time as follows:

1 **Tap [Reset] for replaced lamp.**

The upper and lower buttons are for D2 and WI lamps, respectively.

2 **Tap [Yes].**

Lighting time is set to [0h].

16.4 Security Mode

The UV-1900i has a security function that limits function availability according to user level.

To use security function, enable the function, set the password for each user level, and set limitation on function availability. See the following sections.

Reference
- "16.4.1 Enabling Security Mode" P.274
- "16.4.2 Setting the Password" P.276
- "16.4.3 Setting Function Availability" P.279

Security functions includes the setting to start the UV-1900i in the PC Control mode ("18 PC Control Mode" P.427).

Reference "16.4.4 Setting for Startup in PC Control Mode" P.284

16.4.1 Enabling Security Mode

1 **Tap [Security Settings].**

2 **Tap the entry field.**

3 Enter Administrator Password.

Reference • "16.4.2 Setting the Password" P.276
• "4.2.1 Text Input Screen (Keyboard)" P.27

NOTE If you forget the Administrator password, contact your Shimadzu representative.

Hint The default password is "Shimadzu".

4 Tap [OK].

5 Tap [Security Mode] to turn it ON ( ).

16.4.2 Setting the Password

Sets the password for each user.

Three types of user level are available: "Administrator" for the administrative manager, "Developer" for the inspection manager, and "Operator" for the operator of the UV-1900i.

Enter the set password to log in to the UV-1900i ("2.2.1 Changing User Level and Login" P.9). The administrative manager should protect Administrator password by him/herself and inform the inspection manager about Developer password and the operator about Operator password.

NOTE

- Set passwords cannot be checked on the instrument. Manage them by yourself.
- If you forget the Administrator password, contact your Shimadzu representative.

1 **Tap [Security Settings].**

2 **Tap the entry field.**

3 **Enter Administrator Password.**

Reference "4.2.1 Text Input Screen (Keyboard)" P.27

NOTE If you forget the Administrator password, contact your Shimadzu representative.

Hint The default password is "Shimadzu".

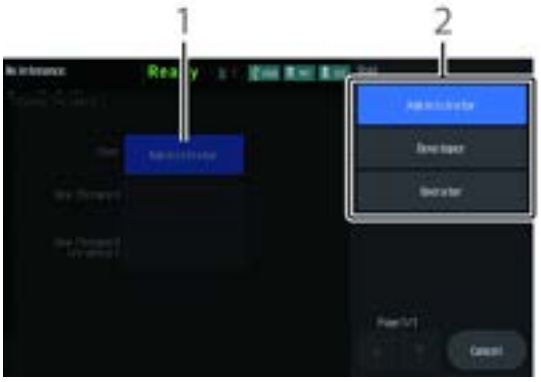
4 **Tap [OK].**

5 **Tap [Change Password].**

6 **Select the user level.**

1 Tap the [User] selection field.

2 Tap the user level whose password is to be set.



7 Set the password.

1 Tap the [New Password] entry field and enter the password as desired.
Tap the input field to display text input screen ("4.2.1 Text Input Screen (Keyboard)" P.27).

2 Tap the [New Password (re-enter)] entry field and enter the same password as previously entered.

3 Tap [Apply].

The [Security Settings] screen is displayed.

16.4.3 Setting Function Availability

Specify the user level required to use the function for each function, such as setting of measurement parameters and changing utilities.

1 **Tap [Security Settings].**

2 **Tap the entry field.**

3 **Enter Administrator Password.**

Reference
- "16.4.2 Setting the Password" P.276
- "4.2.1 Text Input Screen (Keyboard)" P.27

NOTE If you forget the Administrator password, contact your Shimadzu representative.

Hint The default password is "Shimadzu".

4 Tap [OK].

5 Tap [Security Items Settings].

6 Specify the user level required to use the function for each function.

Hint Sixteen (16) types of functions can be set ("List of functions that can be set by the Security mode" P.282). When the target function is not displayed on the screen, tap ▲ ▼.

1 Tap selection field at the right of function name.
The following items are displayed. Each item indicates the user level required to use the function.

- [Administrator]
- [Administrator + Developer]
- [Administrator + Operator]
- [Administrator + Developer + Operator]

2 Tap the user level.

Perform this procedure for each function.

7 After setting, tap [Apply].

The [Security Settings] screen is displayed.
If you tap [Cancel], the setting is not saved and the [Security Settings] screen appears.

■ List of functions that can be set by the Security mode

A list of functions whose availability can be limited by the Security mode and default settings (authority) for each user level are shown in the following table.

The default settings are as follows:

- Administrator can use all functions of the instrument.
- Developer can used all functions except for Update System Program, Reset Lamp Lighting Time, and PC Control Mode functions.
- Operator can perform measurements and save the results.

Item	Description	Default *1		
		A	D	O
[Change Parameters]	The right to change parameters on the Parameters screen for each measurement mode.	✓	✓	
[Change Calibration Curve]	In the Quantitation mode and Bio-method mode, • The right to change, add, and delete the standard sample data in the Concentration Table screen. • The right to change the order of calibration curve and to create a new calibration curve in the Calibration Curve screen.	✓	✓	
[Load Parameter Files]	The right to load stored parameters files. Reference "4.4 Loading Files" P.37	✓	✓	✓
[Save Parameter Files]	The right to save the currently set parameters as a file. Reference "4.3.4 Saving Files" P.34	✓	✓	
[Change Utilities]	The right to change settings in the General Settings screen. Reference "15 General Settings" P.235	✓	✓	
[Change Validation Settings]	The right to change parameters of each item to be validated for the Validation function. Reference "17 Validation Function" P.288	✓	✓	
[Load Data Files]	The right to load stored table data files or curve data files. Reference "4.4 Loading Files" P.37	✓	✓	✓
[Save Data Files]	The right to save the measurement results as a file. Reference "4.3 Saving Files" P.32	✓	✓	✓
[Operate Data]	The right to perform the data processing in the Spectrum and Time Course modes. Reference "14 Data Processing" P.195	✓	✓	
[Update System Program]	The right to update the system program of the UV-1900i. Reference "16.5 Update System Program" P.286	✓		

Item	Description	Default *1		
		A	D	O
[Reset Lamp Lighting Time]	The right to reset lamp lighting time. Reference "16.3 Resetting Lamp Lighting Time" P.273	✓		
[PC Control Mode]	The right to switch to or exit from the PC Control mode*2. Reference "18 PC Control Mode" P.427	✓		
[Copy Files]	The right to copy the files stored in the built-in memory, USB memory, or expanded memory. Reference "5 Managing Files (Copy, Delete, Save in a CSV Format)" P.48	✓	✓	
[Delete Files]	The right to delete files. • The right to delete the files stored in the built-in memory, USB memory, or expanded memory. • The right to overwrite and save data files in each measurement mode. • The right to delete unnecessary files when a file cannot be saved because capacity of the destination location is insufficient. Reference "5 Managing Files (Copy, Delete, Save in a CSV Format)" P.48	✓	✓	
[CSV Conversion]	The right to convert files in the built-in memory, USB memory, or expanded memory to data files in CSV format. Reference "5 Managing Files (Copy, Delete, Save in a CSV Format)" P.48	✓	✓	

*1 The default authorities are shown. "A", "D", and "O" stand for Administrator, Developer, and Operator, respectively. The tick mark (✓) means that corresponding user(s) can use the particular function.

*2 Use this function to protect the status where LabSolutions UV-Vis software (standard accessory) controls the instrument history.

16.4.4 Setting for Startup in PC Control Mode

Make the setting to start the UV-1900i in the PC Control mode ("18 PC Control Mode" P.427).

1 **Tap [Security Settings].**

2 **Tap the entry field.**

3 Enter Administrator Password.

Reference
- "16.4.2 Setting the Password" P.276
- "4.2.1 Text Input Screen (Keyboard)" P.27

NOTE If you forget the Administrator password, contact your Shimadzu representative.

Hint The default password is "Shimadzu".

4 Tap [OK].

5 Tap [Start-up in PC Control].

Each tap of this key toggles between OFF ( ) and ON ( ).

16.5 Update System Program

The system program used for the UV-1900i should be manually updated.

When system program update is required due to modifications or bug fix, update the program as follows:

⚠ CAUTION

Instruction

Do NOT turn "OFF" the power during update of the system programs.

If the power is turned "OFF" before completion of all update operation, the instrument will become unable to start properly.

1 **Download the system program from the following Shimadzu website.**

http://www.an.shimadzu.co.jp/uv/support/download/index.htm

2 **Save the system program directly under the USB memory drive (the 1st level).**

NOTE

- Ensure that the program is saved at the 1st level. If it is saved in other directory (ex. In a folder), the instrument cannot update the program.
- Do NOT change the file name of the system program. It prevents the update.

3 **Connect a USB memory to the instrument.**

4 **Tap [Update System Program].**

5 **Tap [Yes].**

System program update starts.

6 **When a message saying the update is completed, tap [OK].**

The UV-1900i restarts and the system program is updated.

17 Validation Function

The Validation function inspects measurement performance of the instrument, such as wavelength accuracy and repeatability.

17.1 Operation Flow

The Validation function offers various test items. Select tests to be conducted, set parameters, and start the tests. Once the tests started, all of selected tests are continuously conducted.

The following shows operation flow. For details on each procedure, see reference for each procedure.

1 Display the Validation menu.

Reference "17.2 Displaying the Validation Menu" P.295

1 Tap [Maintenance].

2 Tap [Validation].

The Validation menu is displayed.

2 Select tests to be conducted.

Reference "17.3 Selecting Tests to be Conducted" P.297

1 Tap [Parameters Settings].

The Test Item List (Parameters Settings) screen is displayed.

2 Tap the checkbox on the left of the test to be conducted to place ☑.

3 Specify parameters for the tests to be conducted.

Reference "17.4 Setting Validation Parameters" P.306

1 Tap  of the test to be conducted.

2 Specify parameters such as filter name to be used and the criteria.

3 When the setting is completed, tap .

The screen returns to the Test Item List (Parameters Settings) screen.

4 Repeat steps 1 to 3 to specify parameters for the tests to be conducted.

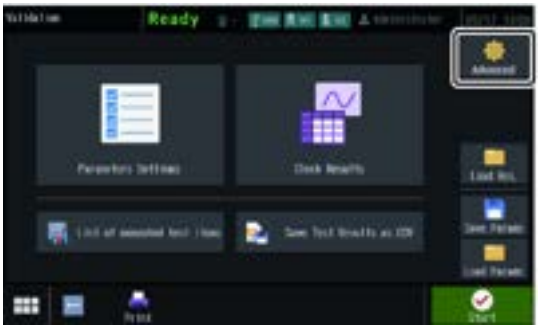
5 When setting of all parameters is completed, tap on the Test Item List (Parameters Settings) screen.

The screen returns to the Validation menu.

4 Set whether the Auto Print function and optional devices are used or not, etc. as needed.

Reference "17.5 Advanced Settings" P.353

1 Tap [Advanced].



2 Make necessary settings.

3 When the setting is completed, tap [Apply].

The screen returns to the Validation menu.

5 Start the test.

> **NOTE** Up to three files of test results can be saved in the built-in memory. To save more files, use a USB memory or expanded memory.

Reference "17.6 Starting the Test" P.355

1 Tap [Start].

2 Make the setting for saving test results.
Test results will be automatically saved according to this setting after the tests are completed.

3 Tap [Go].

Selected tests are continuously conducted.

6 Prompts may appear during the measurement, follow the directions.

During tests, the results of completed tests are displayed, and a message appears when procedures are required.

Reference "17.7 Operation During the Test" P.357

7 When the tests are completed, check the results.

Reference "17.8 Checking Test Results" P.378

1 Tap [Check Results].

The Test Item List (Check Results) screen is displayed.

Hint The Summary screen allows you to check the overview of the results of each test. If there is any failed item, the test item name will be displayed in red.

2 Move to the tab including the test item to check, and tap .

3 Check the test results.

4 When the check is completed, tap .

The screen returns to the Test Item List (Check Results).

5 Repeat steps 2 to 4 to check results of conducted tests.

8 Save the results in a file or print them as needed.

Reference
- "17.9.1 Saving Test Parameters File" P.396
- "17.9.4 Save Test Results as CSV" P.402
- "17.10 Printing Test Results" P.404

The above procedures are the operation flow in the Validation function.

17.2 Displaying the Validation Menu

The Validation function can be activated on the Validation menu under the Maintenance menu.

1 **Tap [Maintenance].**

The Maintenance menu is displayed.

2 **Tap [Validation].**

The Validation menu is displayed.

No.	Name	Description
❶	[Parameters Settings]	Specifies tests to be conducted. Reference "17.3 Selecting Tests to be Conducted" P.297
❷	[Check Results]	Checks the results of conducted tests. Reference "17.8 Checking Test Results" P.378
❸	[Advanced]	Sets operation during tests and presence / absence of attachments. Reference "17.5 Advanced Settings" P.353
❹	[Load Res.]	Loads saved test results. Reference "17.9.3 Loading Test Results File" P.400
❺	[Print]	Print test results. Reference "17.10.2 Test Data Print (All Data)" P.405
❻	[List of executed test items]	Displays a list of the test results. Reference "17.9.5 Executed Test List" P.403
❼	[Save Test Results as CSV]	Converts the test results to a text file in a CSV format and saves it in a USB memory or expanded memory. Reference "17.9.4 Save Test Results as CSV" P.402
❽	[Start]	Executes tests using set parameters. Reference "17.6 Starting the Test" P.355
❾	[Load Params]	Loads saved test parameters. Reference "17.9.2 Loading Test Parameters File" P.398
❿	[Save Params]	Saves set test parameters. Reference "17.9.1 Saving Test Parameters File" P.396

17.3 Selecting Tests to be Conducted

Selects tests to be conducted on the Test Item List (Parameters Settings) screen.

1 **Tap [Parameters Settings] on the Validation menu.**

The Test Item List (Parameters Settings) screen is displayed.

2 Select tests to be conducted and set parameters for each test.

No.	Name	Description
❶	Tab for switching items	There are two tabs: [Semi-Automatic] and [Full-Automatic]. Tap the tab to switch the display. Reference • "17.3.1 Semi-Automatic Validation Items" P.300 • "17.3.2 Full-Automatic Validation Items" P.304
❷	Test items	Select tests to be conducted. Tap the checkbox on the left of each item to turn on/off ☑. Place ☑ for tests to be conducted. Tap ☰ of each item to set test parameters. Reference "17.4 Setting Validation Parameters" P.306

No.	Name	Description
❸	[Select Cat.]	Selects tests in the same category in bulk. There are four categories: [JP], [EP], [USP], and [Others]. The category is displayed in front of the test item name. • [JP], [EP], and [USP] They are tests according to the Japanese Pharmacopoeia (JP), European Pharmacopoeia (EP), and United States Pharmacopoei (USP), respectively. • [Others] ([JP], [EP], or [USP] is not displayed) They are not tests defined in the Pharmacopoeia, but tests conducted by Shimadzu sales/service representative in periodical inspection. When the button is tapped, the following screen is displayed. Tap the checkbox on the left of each item to turn on/off ☑. Place ☑ to select the category. After selecting necessary categories, tap [Apply]. 
❹	[Clear Cat.]	Cancels all tests in the same category. Operation procedures are the same as [Select Cat.] (❸). When ☑ is turned on the following screen, selection of tests of the category is canceled on the Test Item List (Parameters Settings) screen. 
❺	Page up/down button	Switches the page displaying test items.

17.3.1 Semi-Automatic Validation Items

The semi-automatic validation requires validation products such as optical filters.

The semi-automatic items are shown below:

Test items	Description
[JP] Wavelength Accuracy	The filter for wavelength calibration* is measured, and then the deviation from the reference wavelength indicated on the filter is used to evaluate the validation result. Up to 2 types of filters can be used for the validation. When defining the criteria (pass/fail judgment value), add the calibration filter accuracy (inaccuracy) described in the certificate. Reference For setting of test parameters, see "17.4.1 Setting - [JP] Wavelength Accuracy" P.306.
[JP] Wavelength Repeatability	The filter for wavelength calibration* is used to measure the absorbance peak at an arbitrarily specified wavelength several times. The mean value is obtained, and then the deviation of the measured values from that mean value is used to evaluate the results. Up to 2 types of filters can be used for the validation. Same as the Wavelength Accuracy, when defining the criteria (pass/fail judgment value), add the calibration filter accuracy (inaccuracy) described in the certificate. Reference For setting of test parameters, see "17.4.2 Setting - [JP] Wavelength Repeatability" P.309.
[JP] Photometric Accuracy	The optical filter for transmittance calibration* is measured (absorbance or transmittance), and then the deviation of the photometric values from the standard values for calibration (standard values) indicated on the filter is used for the evaluation. Up to 4 types of filters can be used for the validation. To produce a more accurate validation, perform the validation at or near the reagent (filter) temperature specified in the certificate of the calibration filter. In addition, when defining the criteria (pass/fail judgment value), add the calibration filter accuracy described in the validation certificate. Reference For setting of test parameters, see "17.4.3 Setting - [JP] Photometric Accuracy" P.312.
[JP] Photometric Repeatability	The optical filter for transmittance calibration* is used to measure the photometric value (absorbance or transmittance) at an arbitrarily specified wavelength three times. The mean value is obtained, and then the deviation of the measured values from that mean value is used to evaluate the results. Up to 4 types of filters can be used for the validation. Reference For setting of test parameters, see "17.4.4 Setting - [JP] Photometric Repeatability" P.316.

Test items	Description
Stray Light	Measures the stray light. The stray light can be represented by the following equation: {(The sum of light intensity at wavelengths other than the specified one) / (The intensity of light coming from the spectroscope at the specified wavelength)} × 100 It is possible to evaluate the stray light value at the following wavelengths: • 200 nm: A solution of potassium chloride (12 g/l) is used. • 220 nm: A solution of sodium iodine (10 g/l) is used. • 340 nm/370 nm: A solution of sodium nitrite (50 g/l) is used. Up to 4 types of filters can be used for the validation. Absorbance errors due to the stray light is described in the following reference. Refer to it when defining the criteria (pass/fail judgment value). Reference • "6.3.7 Calibration Curve Curvature" in "UV-1900i Instruction Manual (Installation and Maintenance Guide)" • For setting of test parameters, see "17.4.5 Setting - Stray Light" P.320.
[EP] Control of Wavelengths	The filter for wavelength calibration* is measured, and then the deviation from the reference wavelength indicated on the filter is used to evaluate the validation result. Up to 2 types of filters can be used for the validation. Reference For setting of test parameters, see "17.4.6 Setting - [EP] Control of Wavelengths" P.322.
[USP] Control of Wavelengths	The filter for wavelength calibration* is measured 6 times, and then the deviation of the mean value of peak wavelengths from the reference wavelength indicated on the filter is used to evaluate the validation result. Variation of detected peak wavelengths is also evaluated on a pass/fail basis. Up to 2 types of filters can be used for the validation. Reference For setting of test parameters, see "17.4.7 Setting - [USP] Control of Wavelengths" P.326.
[EP] Control of Absorbance	The absorbance of the optical filter for transmittance calibration* is measured, and then the deviation of the measured value from the standard value for calibration (standard values) indicated on the filter is used for the evaluation. Up to 4 types of filters can be used for the validation. To produce a more accurate validation, perform the validation at or near the reagent (filter) temperature specified in the certificate of the calibration filter. Reference For setting of test parameters, see "17.4.8 Setting - [EP] Control of Absorbance" P.330.

Test items	Description
[USP] Control of Absorbance	The absorbance of the optical filter for transmittance calibration* is measured 6 times, and then the deviation of the measured values from the standard values for calibration (standard values) indicated on the filter is used for the evaluation. Variation of absorbance is also evaluated on a pass/fail basis. Up to 4 types of filters can be used for the validation. To produce a more accurate validation, perform the validation at or near the reagent (filter) temperature specified in the certificate of the calibration filter. ▶▶ Reference For setting of test parameters, see "17.4.9 Setting - [USP] Control of Absorbance" P.334.
[EP] Limit of Stray Light	The absorbance spectrum of a solution of potassium chloride (12 g/l) is measured. The photometric value near 198 nm is obtained, and this value is evaluated. ▶▶ Reference For setting of test parameters, see "17.4.10 Setting - [EP] Limit of Stray Light" P.338.
[USP] Limit of Stray Light	The absorbance spectrum of the filter (such as a solution of sodium iodine (10 g/l)) is measured. The photometric value at peak wavelength is obtained, and this value is evaluated. Up to 4 types of filters can be used for the validation. For measurement, install the 10-mm light path filter on the measurement side, and the 5-mm light path filter on the reference side. ▶▶ Reference For setting of test parameters, see "17.4.11 Setting - [USP] Limit of Stray Light" P.340.
[EP] Resolution [USP] Resolution	The absorbance spectrum of a toluene solution in hexane (0.02 %V/V) (hereinafter referred to as "toluene/hexane solution") is measured. The absorbance ratio between the maximum (peak) value near 269 nm and the minimum (valley) value near 266 nm is obtained, and these values are evaluated. ▶▶ Reference For setting of test parameters, see the following sections. • "17.4.12 Setting - [EP] Resolution" P.342 • "17.4.13 Setting - [USP] Resolution" P.343

* The National Institute of Standard and Technology (NIST), the Japan Quality Assurance Organization (JQA), and other organizations evaluate and supply glass-optical filters and solution filters for calibrators of spectrometer transmittance (absorbance) and wavelength indication values. Various types of the filter are available depending on the wavelength and the type of vertical axis ranges to be calibrated.

A list of products (jigs) used for semi-automatic validation is shown below:

Test items	Product name	Cell used		Source or Shimadzu P/N
		10 mm cell*3	5 mm cell*4	
[JP] Wavelength Accuracy	Filter for wavelength calibration*1	-	-	Obtain from the NIST or the Japan Quality Assurance Organization (JQA).
[JP] Photometric Accuracy [JP] Photometric Repeatability	Optical filter for transmittance calibration*1	-	-	
Stray Light*2	Sodium iodine solution (10 g/L)	✓	-	Obtain from a reagent dealer.
	Sodium nitrite solution (50 g/L)	✓	-	
	Potassium chloride solution (12 g/L)	✓	-	
	Shutter block	-	-	P/N 202-30338
[EP] Control of Wavelengths [USP] Control of Wavelengths	Holmium solution filter*1	-	-	Obtain from a reagent dealer.
[EP] Control of Absorbance	Potassium dichromate solution (60 mg/L, 600 mg/L)	✓	-	
[USP] Control of Absorbance	Potassium dichromate solution (0 to 200 mg/L)	✓	-	
[EP] Limit of Stray Light	Potassium chloride solution (12 g/l)	✓	-	
[USP] Limit of Stray Light*2	Potassium chloride solution (12 g/l)	✓	✓	
	Sodium iodine solution (10 g/l)	✓	✓	
	Acetone	✓	✓	
	Sodium nitrite solution (50 g/l)	✓	✓	
[EP] Resolution [USP] Resolution	Toluene/hexane solution (0.02 %)	✓	-	

*1 Use the filter calibrated at 1 nm band path (Spectrum Bandwidth).

*2 Prepare cells as many as the number of tested reagents.

*3 Purchase P/N 200-34442 (10 mm square quartz cell).

*4 Purchase P/N 200-34449 (5 mm path length quartz cell) and P/N 204-21473-02 (spacer for short path length cells: 1 pc).

17.3.2 Full-Automatic Validation Items

In full-automatic validation, validation products (jigs) are not used, therefore, operation is not required after the validation starts.

The full-automatic validation items are shown below:

Test items	Description
[JP] Wavelength Accuracy (D2)	Emission line radiated from the D2 (deuterium) lamp is measured, and then the deviation from the emission line wavelength is used to evaluate the validation result. Reference For setting of test parameters, see "17.4.14 Setting - [JP] Wavelength Accuracy (D2)" P.344.
[JP] Wavelength Repeatability (D2)	Emission line radiated from the D2 (deuterium) lamp is measured three times. The mean value is obtained, and then the deviation of the measured values from that mean value is used to evaluate the results. Reference For setting of test parameters, see "17.4.15 Setting - [JP] Wavelength Repeatability (D2)" P.345.
Resolution (Spectral Bandwidth)	The emission line radiated from the D2 (deuterium) lamp is measured. The half-value width (spectrum bandwidth) of the obtained spectral waveform for the emission line is defined as the resolution, and this value is evaluated. Reference For setting of test parameters, see "17.4.16 Setting - Resolution (Spectral Bandwidth)" P.346.
Noise Level	The time changes around the absorbance of 0 Abs at an arbitrary wavelength are measured for 1 minute, and the deflection of the absorbance is defined as "noise level (P-P)". The RMS value* is obtained from the measurement for 1 minute and then both of these values are evaluated. Up to 4 types of wavelength can be used for the validation. Reference For setting of test parameters, see "17.4.17 Setting - Noise Level" P.347.
Baseline Flatness	The baseline is corrected without a sample. Immediately after the correction, the wavelengths are scanned and the curvature of the spectrum is obtained. The obtained curvature is defined as "baseline flatness", and this value is evaluated. This validation should be performed when the temperature inside the instrument is stable. If 1 hour has not elapsed after the startup initialization is completed when the validation starts, the Waiting screen is displayed. Reference For setting of test parameters, see "17.4.18 Setting - Baseline Flatness" P.349.

Test items	Description
Drift (Baseline Stability)	The time changes around absorbance of 0 Abs are measured and then the measured change per hour is defined as "baseline stability". The value for baseline stability is evaluated. Up to 2 types of wavelength can be used for the validation. Since this validation is sensitive to temperature change in the environment, it should be performed under the environment where temperature change is within 2 °C/H when the temperature inside the instrument is stable. If 1 hour has not elapsed after the startup initialization is completed when the validation starts, the Waiting screen is displayed. Reference For setting of test parameters, see "17.4.19 Setting - Drift (Baseline Stability)" P.350.
[EP] Control of Wavelengths (D2)	Emission line radiated from the D2 (deuterium) lamp is measured, and then the deviation from the emission line wavelength is used to evaluate the validation result. Reference For setting of test parameters, see "17.4.20 Setting - [EP] Control of Wavelengths (D2)" P.351.
[USP] Control of Wavelengths (D2)	Emission line radiated from the D2 (deuterium) lamp is measured repeatedly, and then the deviation from that mean value is used to evaluate the results. The variation of measurement is also evaluated. Reference For setting of test parameters, see "17.4.21 Setting - [USP] Control of Wavelengths (D2)" P.352.

* The RMS value is obtained using the following equation:

$$RMS=\sqrt{\frac{\Sigma(Ai-A_m)^2}{N}}$$

Ai: Absorbance, Am: Mean value of absorbance, N: Number of data points

17.4 Setting Validation Parameters

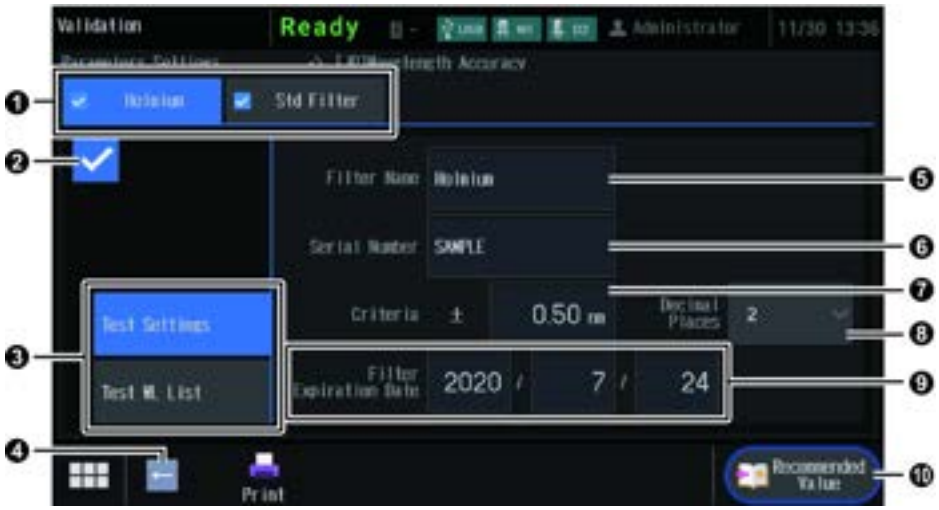
Specify parameters for each validation.

Hint Set validation parameters can be saved and loaded.

- "17.9.1 Saving Test Parameters File" P.396
- "17.9.2 Loading Test Parameters File" P.398

17.4.1 Setting - [JP] Wavelength Accuracy

[Test Settings] subtab



No.	Name	Description
❶	Tab for Switching Screens	Switches displayed tab. Two tabs are prepared to individually set parameters for two types of filter. The contents of both tabs are the same. • The checkbox on the left of filter name is turned on/off in conjunction with the validation execution checkbox (❷). • Default tab names are [Holmium] and [Std Filter]. The name can be changed to a desired name in [Filter Name] (❺). • Default values in the [Holmium] tab are set assuming that the tab is used for the holmium solution filter. The [Std Filter] is prepared assuming that other filters are used.
❷	Validation execution checkbox	Tap it to turn on/off ☑. Place ☑ to use the current tab setting for the validation.
❸	Subtab	Switches setting items in the same tab.
❹	Back button	Saves the setting and returns to the Test Item List (Parameters Settings) screen.

No.	Name	Description
❺	[Filter Name]	Sets a desired name for the filter. Set filter name is displayed on the tab for switching screens. Tap the input field to display text input screen ("4.2.1 Text Input Screen (Keyboard)" P.27).
❻	[Serial Number]	Sets a certain serial number for the filter. Set serial number is printed as well as pass/fail results. Tap the input field to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29).
❼	[Criteria]	Specifies the criteria used to evaluate the validation result. Tap the input field to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29). **NOTE** • To set the value in [Criteria], consider the calibration accuracy (inaccuracy) of the standard filter. For example, when filter accuracy is ± 0.3 nm and when checking whether the instrument wavelength accuracy falls within ± 0.3 nm, define the value in [Criteria] as within ± 0.6 nm. • The value of [Criteria] cannot be specified for each wavelength. When using a different accuracy filter for each wavelength, add the largest accuracy value among the filters.
❽	[Decimal Places]	Specifies the number of decimals of the values to be used for the validation. Tap it and select [1] or [2]. **Hint** The last digit of the value is rounded off.
❾	[Filter Expiration Date]	Sets the expiration date of the standard value of the filter. The UV-1900i automatically checks whether the filter has passed its expiration date when starting the validation, and if it is expired, the validation is cancelled. **Hint** The format of the date can be changed in [Format] described in "15.9 Setting Date and Time" P.249.
❿	[Recommended Value]	Set [Criteria] to ±0.5 nm. This is the criteria required in the Japanese Pharmacopoeia.

[Test WL List] subtab

No.	Name	Description
❶	WL List	Displays a list of wavelengths. Fourteen items are preset. Whether it is measured or not and the wavelength value can be changed for each item. • Items with ☑ are measured. Turn on/off ☑ using the check / clear button (❸ to ❺). • The wavelength value can be set using the editing button (❻).
❷	The number of results and selection/page button	Number in the top line shows the ordinal number of selected item and total number of items. The four buttons on the right operate as follows: • ⏫ ⏬ Moves to the previous or next page. • 🔼 🔽 Selects the previous or next item.
❸	Check all button	Checks (☑) all items.
❹	Clear all button	Clears check marks (☑) of all items.
❺	Check/Clear button	Turn on/off the check mark (☑) of selected item.
❻	Editing button	Changes the wavelength value of selected item. Tap it to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29).

17.4.2 Setting - [JP] Wavelength Repeatability

[Test Settings] subtab

No.	Name	Description
❶	Tab for Switching Screens	Switches displayed tab. Two tabs are prepared to individually set parameters for two types of filter. The contents of both tabs are the same. • The checkbox on the left of filter name is turned on/off in conjunction with the validation execution checkbox (❷). • Default tab names are [Holmium] and [Std Filter]. The name can be changed to a desired name in [Filter Name] (❺). • Default values in the [Holmium] tab are set assuming that the tab is used for the holmium solution filter. The [Std Filter] is prepared assuming that other filters are used.
❷	Validation execution checkbox	Tap it to turn on/off ☑. Place ☑ to use the current tab setting for the validation.
❸	Subtab	Switches setting items in the same tab.
❹	Back button	Saves the setting and returns to the Test Item List (Parameters Settings) screen.
❺	[Filter Name]	Sets a desired name for the filter. Set filter name is displayed on the tab for switching screens. Tap the input field to display text input screen ("4.2.1 Text Input Screen (Keyboard)" P.27).
❻	[Serial number]	Sets a certain serial number for the filter. Set serial number is printed as well as pass/fail results. Tap the input field to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29).
❼	[Criteria]	Specifies the criteria used to evaluate the validation result. Tap the input field to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29).

No.	Name	Description
❽	[Decimal Places]	Specifies the number of decimals of the values to be used for the validation. Tap it and select [1] or [2]. **Hint** The last digit of the value is rounded off.
❾	[Filter Expiration Date]	Sets the expiration date of the standard value of the filter. The UV-1900i automatically checks whether the filter has passed its expiration date when starting the validation, and if it is expired, the validation is cancelled. **Hint** The format of the date can be changed in [Format] described in "15.9 Setting Date and Time" P.249.
❿	[Recommended Value]	Set [Criteria] to ±0.2 nm. This is the criteria required in the Japanese Pharmacopoeia.

[Test WL List] subtab

No.	Name	Description
❶	WL List	Displays a list of wavelengths. Fourteen items are preset. Whether it is measured or not and the wavelength value can be changed for each item. • Items with ☑ are measured. Turn on/off ☑ using the check/clear button (❸ to ❺). • The wavelength value can be set using the editing button (❻).
❷	The number of results and selection/page button	Number in the top line shows the ordinal number of selected item and total number of items. The four buttons on the right operate as follows: • ⏫ ⏬ Moves to the previous or next page. • 🔼 🔽 Selects the previous or next item.
❸	Check all button	Checks (☑) all items.
❹	Clear all button	Clears check marks (☑) of all items.
❺	Check/Clear button	Turn on/off the check mark (☑) of selected item.
❻	Editing button	Changes the wavelength value of selected item. Tap it to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29).

17.4.3 Setting - [JP] Photometric Accuracy

[Test Settings] subtab

No.	Name	Description
❶	Tab for Switching Screens	Switches displayed tab. Four tabs are prepared to individually set parameters for four types of filter. The contents of all tabs are the same. • The checkbox on the left of filter name is turned on/off in conjunction with the validation execution checkbox (❷). • Default tab names are [ND Filter-30%], [ND Filter-10%], [Std Filter 1], and [Std Filter 2]. The name can be changed to a desired name in [Filter Name] (❻). • Default values of items in the [ND Filter-30%] tab and [ND Filter-10%] tab are set assuming that optical filters with transmittance 30%T and 10%T are used, respectively. The [Std Filter 1] and [Std Filter 2] tabs are prepared assuming that other filters are used.
❷	Validation execution checkbox	Tap it to turn on/off ☑. Place ☑ to use the current tab setting for the validation.
❸	[Photometric Type]	Specifies the display format of the photometric values to be used for the validation. Tap it to select [Absorbance (Abs)] or [Transmittance (%T)]. NOTE The settings of [Std (Abs/%T)] and [Criteria (Abs/%T)] ("[Std Value List] subtab" P.314) are saved for each of Abs and %T. If the photometric type is changed after the value is entered, the set value is not converted, therefore, set the value again.
❹	Subtab	Switches setting items in the same tab.
❺	Back button	Saves the setting and returns to the Test Item List (Parameters Settings) screen.

No.	Name	Description
❻	[Filter Name]	Sets a desired name for the filter. Set filter name is displayed on the tab for switching screens. Tap the input field to display text input screen ("4.2.1 Text Input Screen (Keyboard)" P.27).
❼	[Serial number]	Sets a certain serial number for the filter. Set serial number is printed as well as pass/fail results. Tap the input field to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29).
❽	[Decimal Places]	Specifies the number of decimals of the values to be used for the validation. Tap it to select the number of decimals as follows: • When [Photometric Type] is [Absorbance (Abs)]: [3] or [4] • When [Photometric Type] is [Transmittance (%T)]: [1] or [2] **Hint** The last digit of the value is rounded off.
❾	[Filter Expiration Date]	Sets the expiration date of the standard value of the filter. The UV-1900i automatically checks whether the filter has passed its expiration date when starting the validation, and if it is expired, the validation is cancelled. **Hint** The format of the date can be changed in [Format] described in "15.9 Setting Date and Time" P.249.
❿	[Recommended Value]	Set [Criteria] in the [Std Value List] subtab to the following value: • When [Photometric Type] is [Absorbance (Abs)]: ±0.008 Abs • When [Photometric Type] is [Transmittance (%T)]: ±2.0 %T This is the criteria required in the Japanese Pharmacopoeia when using a standard filter with a tolerance of 1 %. **NOTE** To set the value in [Criteria], consider the calibration accuracy of the standard filter. For example, if the filter accuracy (relative accuracy to transmittance) is ±1 %, the value converted to absorbance will be approx. ±0.0043 Abs. Therefore, when checking whether the instrument photometric accuracy falls within ±0.004 Abs by using a 10 % transmittance filter, set the value in [Criteria] within ±0.008 Abs (the fourth decimal place is rounded off).

[Std Value List] subtab

No.	Name	Description
❶	Std Value List	Displays a list of standard values. Five items are preset. Whether it is measured or not, and the values in [WL (nm)], [Std (Abs/%T)], and [Criteria (Abs/%T)] can be changed for each item. • Items with ☑ are measured. Turn on/off ☑ using the check/clear button (❸ to ❺). • Enter the values in [WL (nm)], [Std (Abs/%T)], and [Criteria (Abs/%T)] on the screen displayed when tapping the Editing button (❻).
❷	The number of results and selection/page button	Number in the top line shows the ordinal number of selected item and total number of items. The four buttons on the right operate as follows: • ⏫ ⏬ Moves to the top/last line of the list. • 🔼 🔽 Selects the previous or next item.
❸	Check all button	Checks (☑) all items.
❹	Clear all button	Clears check marks (☑) of all items.
❺	Check/Clear button	Turn on/off the check mark (☑) of selected item.

No.	Name	Description
❻	Editing button	Changes each value of selected item. When the button is tapped, the following screen is displayed.  Tap the input field of [Wavelength], [Std Value], or [Criteria] to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29). Enter a value for each item. • [Wavelength]: Enter the measurement wavelength. • [Std Value]: Enter the standard value indicated on the filter. Enter a value corresponding to the value entered in [Wavelength]. • [Criteria]: Enter the criteria used to evaluate the validation result. After entering a value on the numeric keypad, tap [Apply] on this screen. The entered value is reflected to the items in the WL List. **NOTE** To set the value in [Criteria], consider the calibration accuracy of the standard filter. For example, if the filter accuracy (relative accuracy to transmittance) is ±1 %, the value converted to absorbance will be approx. ±0.0043 Abs. Therefore, when checking whether the instrument photometric accuracy falls within ±0.004 Abs by using a 10 % transmittance filter, set the value in [Criteria] within ±0.008 Abs (the fourth decimal place is rounded off).

17.4.4 Setting - [JP] Photometric Repeatability

[Test Settings] subtab

No.	Name	Description
❶	Tab for Switching Screens	Switches displayed tab. Four tabs are prepared to individually set parameters for four types of filter. The contents of all tabs are the same. • The checkbox on the left of filter name is turned on/off in conjunction with the validation execution checkbox (❷). • Default tab names are [ND Filter-30%], [ND Filter-10%], [Std Filter 1], and [Std Filter 2]. The name can be changed to a desired name in [Filter Name] (❻). • Default values of items in the [ND Filter-30%] tab and [ND Filter-10%] tab are set assuming that optical filters with transmittance 30%T and 10%T are used, respectively. The [Std Filter 1] and [Std Filter 2] tabs are prepared assuming that other filters are used.
❷	Validation execution checkbox	Tap it to turn on/off ☑. Place ☑ to use the current tab setting for the validation.
❸	[Photometric Type]	Specifies the display format of the photometric values to be used for the validation. Tap it to select [Absorbance (Abs)] or [Transmittance (%T)]. NOTE The setting of [Criteria (Abs/%T)] ("[WL List] subtab" P.318) is saved for each of Abs and %T. If the photometric type is changed after the value is entered, the set value is not converted, therefore, set the value again.
❹	Subtab	Switches setting items in the same tab.
❺	Back button	Saves the setting and returns to the Test Item List (Parameters Settings) screen.

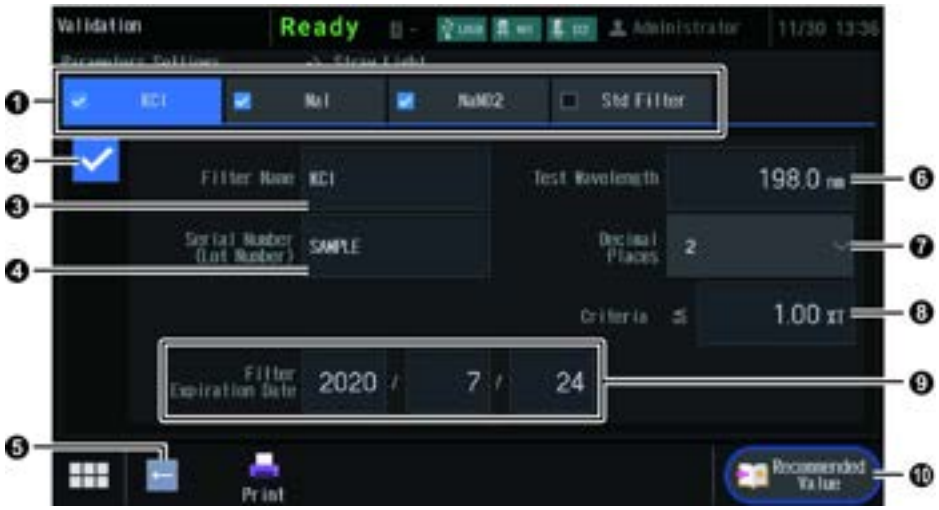
No.	Name	Description
❻	[Filter Name]	Sets a desired name for the filter. Set filter name is displayed on the tab for switching screens. Tap the input field to display text input screen ("4.2.1 Text Input Screen (Keyboard)" P.27).
❼	[Serial number]	Sets a certain serial number for the filter. Set serial number is printed as well as pass/fail results. Tap the input field to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29).
❽	[Decimal Places]	Specifies the number of decimals of the values to be used for the validation. Tap it to select the number of decimals as follows: • When [Photometric Type] is [Absorbance (Abs)]: [3] or [4] • When [Photometric Type] is [Transmittance (%T)]: [1] or [2] **Hint** The last digit of the value is rounded off.
❾	[Filter Expiration Date]	Sets the expiration date of the standard value of the filter. The UV-1900i automatically checks whether the filter has passed its expiration date when starting the validation, and if it is expired, the validation is cancelled. **Hint** The format of the date can be changed in [Format] described in "15.9 Setting Date and Time" P.249.
❿	[Recommended Value]	Set [Criteria] in the [WL List] subtab to the following value: • When [Photometric Type] is [Absorbance (Abs)]: ±0.004 Abs • When [Photometric Type] is [Transmittance (%T)]: ±1.0 %T **NOTE** The Japanese Pharmacopoeia defines that the photometric repeatability should fall within ±0.002 Abs when the absorbance is 0.500 or less, and within ±0.004 Abs when the absorbance is more than 0.500 Abs.

[WL List] subtab

No.	Name	Description
❶	WL List	Displays a list of wavelengths. Five items are preset. Whether it is measured or not, and the values in [WL (nm)] and [Criteria (Abs/%T)] can be changed for each item. • Items with ☑ are measured. Turn on/off ☑ using the check/clear button (❸ to ❺). • Enter the values in [WL (nm)] and [Criteria (Abs/%T)] on the screen displayed when tapping the Editing button (❻).
❷	The number of results and selection/page button	Number in the top line shows the ordinal number of selected item and total number of items. The four buttons on the right operate as follows: • ⏫ ⏬ Moves to the top/last line of the list. • 🔼 🔽 Selects the previous or next item.
❸	Check all button	Checks (☑) all items.
❹	Clear all button	Clears check marks (☑) of all items.
❺	Check/Clear button	Turn on/off the check mark (☑) of selected item.

No.	Name	Description
❻	Editing button	Changes each value of selected item. When the button is tapped, the following screen is displayed.  Tap the input field of [Wavelength] or [Criteria] to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29). Enter a value for each item. • [Wavelength]: Enter the measurement wavelength. • [Criteria]: Enter the criteria used to evaluate the validation result. After entering a value on the numeric keypad, tap [Apply] on this screen. The entered value is reflected to the items in the WL List.

17.4.5 Setting - Stray Light



No.	Name	Description
❶	Tab for Switching Screens	Switches displayed tab. Four tabs are prepared to individually set parameters for four types of filter. The contents of all tabs are the same. • The checkbox on the left of filter name is turned on/off in conjunction with the validation execution checkbox (❷). • Default tab names are [KCl], [NaI], [NaNO2], and [Std Filter]. The name can be changed to a desired name in [Filter Name] (❸). • Default values of items on the [KCl], [NaI], and [NaNO2] tabs are set assuming that the following reagent is used: [KCl] tab: Potassium chloride solution [NaI] tab: Sodium iodine solution [NaNO2]tab: Sodium nitrite solution The [Std Filter] is prepared assuming that other filters are used.
❷	Validation execution checkbox	Tap it to turn on/off ☑. Place ☑ to use the current tab setting for the validation.
❸	[Filter Name]	Sets a desired name for the filter. Set filter name is displayed on the tab for switching screens. Tap the input field to display text input screen ("4.2.1 Text Input Screen (Keyboard)" P.27).
❹	[Serial Number (Lot Number)]	Sets a certain serial number (or lot number) for the filter. Set serial number (or lot number) is printed as well as pass/fail results. Tap the input field to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29).
❺	Back button	Saves the setting and returns to the Test Item List (Parameters Settings) screen.
❻	[Test Wavelength]	Specifies the wavelength to measure the stray light.

No.	Name	Description
❼	[Decimal Places]	Specifies the number of decimals of the values to be used for the validation. Tap it and select [2] or [3]. **Hint** The last digit of the value is rounded off.
❽	[Criteria]	Specifies the criteria used to evaluate the validation result. Tap the input field to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29).
❾	[Filter Expiration Date]	Sets the expiration date of the standard value of the filter. The UV-1900i automatically checks whether the filter has passed its expiration date when starting the validation, and if it is expired, the validation is cancelled. **Hint** The format of the date can be changed in [Format] described in "15.9 Setting Date and Time" P.249.
❿	[Recommended Value]	Set the values of [Test Wavelength] and [Criteria]. For recommended values, see the following table.

Details of [Recommended Value] are shown below. Each value is set assuming that the test filter shown in the table is used.

Tab name	Test Filter	[Test Wavelength]	[Criteria]
KCl	Potassium chloride solution (12 g/l)	198.0 nm	≤ 1.00 %T
NaI	Sodium iodine solution (10 g/l)	220.0 nm	≤ 0.05 %T
NaNO2	Sodium nitrite solution (50 g/l)	340.0 nm	
Std Filter	Other filter	370.0 nm	

These values are defined for the tests conducted by Shimadzu sales/service representative in periodical inspection.

17.4.6 Setting - [EP] Control of Wavelengths

[Test Settings] subtab

No.	Name	Description
❶	Tab for Switching Screens	Switches displayed tab. Two tabs are prepared to individually set parameters for two types of filter. The contents of both tabs are the same. • The checkbox on the left of filter name is turned on/off in conjunction with the validation execution checkbox (❷). • Default tab names are [Holmium] and [Std Filter]. The name can be changed to a desired name in [Filter Name] (❺). • Default values in the [Holmium] tab are set assuming that the tab is used for the holmium solution filter. The [Std Filter] is prepared assuming that other filters are used.
❷	Validation execution checkbox	Tap it to turn on/off ☑. Place ☑ to use the current tab setting for the validation.
❸	Subtab	Switches setting items in the same tab.
❹	Back button	Saves the setting and returns to the Test Item List (Parameters Settings) screen.
❺	[Filter Name]	Sets a desired name for the filter. Set filter name is displayed on the tab for switching screens. Tap the input field to display text input screen ("4.2.1 Text Input Screen (Keyboard)" P.27).
❻	[Serial number]	Sets a certain serial number for the filter. Set serial number is printed as well as pass/fail results. Tap the input field to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29).
❼	[Decimal Places]	Specifies the number of decimals of the values to be used for the validation. Tap it and select [1] or [2]. **Hint** The last digit of the value is rounded off.

No.	Name	Description
❽	[Filter Expiration Date]	Sets the expiration date of the standard value of the filter. The UV-1900i automatically checks whether the filter has passed its expiration date when starting the validation, and if it is expired, the validation is cancelled. **Hint** The format of the date can be changed in [Format] described in "15.9 Setting Date and Time" P.249.
❾	[Recommended Value]	Set [Criteria] in the [Test WL List] subtab to the following value: • When [Test WL (nm)] is 190 nm ≤ λ < 400 nm: ±1.00 nm • When [Test WL (nm)] is 400 nm ≤ λ ≤ 1100 nm: ±3.00 nm This is the criteria required in the European Pharmacopoeia.

[Test WL List] subtab

No.	Name	Description
❶	WL List	Displays a list of wavelengths. Fourteen items are preset. Whether it is measured or not, and the values in [Test WL (nm)] and [Criteria (nm)] can be changed for each item. • Items with ☑ are measured. Turn on/off ☑ using the check/clear button (❸ to ❺). • Enter the values in [Test WL (nm)] and [Criteria (nm)] on the screen displayed when tapping the Editing button (❻).
❷	The number of results and selection/page button	Number in the top line shows the ordinal number of selected item and total number of items. The four buttons on the right operate as follows: • ⏫ ⏬ Moves to the previous or next page. • 🔼 🔽 Selects the previous or next item.
❸	Check all button	Checks (☑) all items.
❹	Clear all button	Clears check marks (☑) of all items.
❺	Check/Clear button	Turn on/off the check mark (☑) of selected item.

No.	Name	Description
❻	Editing button	Changes each value of selected item. When the button is tapped, the following screen is displayed.  Tap the input field of [Test WL] or [Criteria] to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29). Enter a value for each item. • [Test WL]: Enter the measurement wavelength. • [Criteria]: Enter the tolerance used to evaluate the validation result. After entering a value on the numeric keypad, tap [Apply] on this screen. The entered value is reflected to the items in the WL List.

17.4.7 Setting - [USP] Control of Wavelengths

[Test Settings] subtab

No.	Name	Description
❶	Tab for Switching Screens	Switches displayed tab. Two tabs are prepared to individually set parameters for two types of filter. The contents of both tabs are the same. • The checkbox on the left of filter name is turned on/off in conjunction with the validation execution checkbox (❷). • Default tab names are [Holmium] and [Std Filter]. The name can be changed to a desired name in [Filter Name] (❺). • Default values in the [Holmium] tab are set assuming that the tab is used for the holmium solution filter. The [Std Filter] is prepared assuming that other filters are used.
❷	Validation execution checkbox	Tap it to turn on/off ☑. Place ☑ to use the current tab setting for the validation.
❸	Subtab	Switches setting items in the same tab.
❹	Back button	Saves the setting and returns to the Test Item List (Parameters Settings) screen.
❺	[Filter Name]	Sets a desired name for the filter. Set filter name is displayed on the tab for switching screens. Tap the input field to display text input screen ("4.2.1 Text Input Screen (Keyboard)" P.27).
❻	[Serial number]	Sets a certain serial number for the filter. Set serial number is printed as well as pass/fail results. Tap the input field to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29).
❼	[Decimal Places]	Specifies the number of decimals of the values to be used for the validation. Tap it and select [1] or [2]. **Hint** The last digit of the value is rounded off.

<table>
<tr><th>No.</th><th>Name</th><th>Description</th></tr>
<tr><td>❽</td><td>[Filter Expiration Date]</td><td>Sets the expiration date of the standard value of the filter. The UV-1900i automatically checks whether the filter has passed its expiration date when starting the validation, and if it is expired, the validation is cancelled.

Hint The format of the date can be changed in [Format] described in "15.9 Setting Date and Time" P.249.</td></tr>
<tr><td>❾</td><td>[Recommended Value]</td><td>Set [Accuracy (nm)] and [Precision (nm)] in the [Test WL List] subtab to the following values:

<table>
<tr><th>[Test WL (nm)]</th><th>[Accuracy (nm)]</th><th>[Precision (nm)]</th></tr>
<tr><td>190 nm ≤ λ < 400 nm</td><td>±1.0 nm</td><td rowspan="2">≤ 0.5 nm</td></tr>
<tr><td>400 nm ≤ λ ≤ 1100 nm</td><td>±2.0 nm</td></tr>
</table>
This is the criteria required in the United States Pharmacopoeia.</td></tr>
</table>

[Test WL List] subtab

No.	Name	Description
❶	WL List	Displays a list of wavelengths. Fourteen items are preset. Whether it is measured or not, and the values in [Test WL (nm)], [Accuracy (nm)], and [Precision (nm)] can be changed for each item. • Items with ☑ are measured. Turn on/off ☑ using the check/clear button (❸ to ❺). • Enter the values in [Test WL (nm)], [Accuracy (nm)], and [Precision (nm)] on the screen displayed when tapping the Editing button (❻). The values entered in [WL Accuracy Criteria] and [WL Precision Criteria] on the setting screen are displayed in [Accuracy (nm)] and [Precision (nm)], respectively.
❷	The number of results and selection/page button	Number in the top line shows the ordinal number of selected item and total number of items. The four buttons on the right operate as follows: • ⏫ ⏬ Moves to the previous or next page. • 🔼 🔽 Selects the previous or next item.
❸	Check all button	Checks (☑) all items.
❹	Clear all button	Clears check marks (☑) of all items.
❺	Check/Clear button	Turn on/off the check mark (☑) of selected item.

No.	Name	Description
❻	Editing button	Changes each value of selected item. When the button is tapped, the following screen is displayed.  Tap the input field of [Test WL], [WL Accuracy Criteria], or [WL Precision Criteria] to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29). Enter a value for each item. • [Test WL]: Enter the measurement wavelength. • [WL Accuracy Criteria]: Enter the pass/fail judgment criteria for the deviation of the mean value of peak wavelengths from the reference wavelength indicated on the filter. • [WL Precision Criteria]: Enter the pass/fail judgment criteria for variation of detected peak wavelengths. After entering a value on the numeric keypad, tap [Apply] on this screen. The entered value is reflected to the items in the WL List.

17.4.8 Setting - [EP] Control of Absorbance

[Test Settings] subtab

No.	Name	Description
❶	Tab for Switching Screens	Switches displayed tab. Four tabs are prepared to individually set parameters for four types of filter. The contents of all tabs are the same. • The checkbox on the left of filter name is turned on/off in conjunction with the validation execution checkbox (❷). • Default tab names are [K_2CrO_7-60mg/l], [K_2CrO_7-600mg/l], [Std Filter 1], and [Std Filter 2]. The name can be changed to a desired name in [Filter Name] (❺). • Default values of items on the [K_2CrO_7-60mg/l] and [K_2CrO_7-600mg/l] tabs are set assuming that 60 mg/l potassium dichromate solution and 600 mg/l potassium dichromate solution are used, respectively. The [Std Filter 1] and [Std Filter 2] tabs are prepared assuming that other filters are used.
❷	Validation execution checkbox	Tap it to turn on/off ☑. Place ☑ to use the current tab setting for the validation.
❸	Subtab	Switches setting items in the same tab.
❹	Back button	Saves the setting and returns to the Test Item List (Parameters Settings) screen.
❺	[Filter Name]	Sets a desired name for the filter. Set filter name is displayed on the tab for switching screens. Tap the input field to display text input screen ("4.2.1 Text Input Screen (Keyboard)" P.27).
❻	[Serial number]	Sets a certain serial number for the filter. Set serial number is printed as well as pass/fail results. Tap the input field to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29).

No.	Name	Description
❼	[Decimal Places]	Specifies the number of decimals of the values to be used for the validation. Tap it and select [2] or [3]. **Hint** The last digit of the value is rounded off.
❽	[Filter Expiration Date]	Sets the expiration date of the standard value of the filter. The UV-1900i automatically checks whether the filter has passed its expiration date when starting the validation, and if it is expired, the validation is cancelled. **Hint** The format of the date can be changed in [Format] described in "15.9 Setting Date and Time" P.249.
❾	[Recommended Value]	Set [Criteria (Abs)] in the [Std Value List] subtab to ±0.01 Abs. This is the criteria required in the European Pharmacopoeia.

[Std Value List] subtab

No.	Name	Description
❶	Std Value List	Displays a list of standard values. Five items are preset. Whether it is measured or not, and the values in [WL (nm)], [Std (Abs)], and [Criteria (Abs)] can be changed for each item. • Items with ☑ are measured. Turn on/off ☑ using the check/clear button (❸ to ❺). • Enter the values in [WL (nm)], [Std (Abs)], and [Criteria (Abs)] on the screen displayed when tapping the Editing button (❻).
❷	The number of results and selection/page button	Number in the top line shows the ordinal number of selected item and total number of items. The four buttons on the right operate as follows: • ⏫ ⏬ Moves to the top/last line of the list. • 🔼 🔽 Selects the previous or next item.
❸	Check all button	Checks (☑) all items.
❹	Clear all button	Clears check marks (☑) of all items.
❺	Check/Clear button	Turn on/off the check mark (☑) of selected item.

No.	Name	Description
❻	Editing button	Changes each value of selected item. When the button is tapped, the following screen is displayed.  Tap the input field of [Wavelength], [Std Value], or [Criteria] to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29). Enter a value for each item. • [Wavelength]: Enter the measurement wavelength. • [Std Value]: Enter the standard value indicated on the filter. Enter a value corresponding to the value entered in [Wavelength]. • [Criteria]: Enter the criteria used to evaluate the validation result. After entering a value on the numeric keypad, tap [Apply] on this screen. The entered value is reflected to the items in the WL List.

17.4.9 Setting - [USP] Control of Absorbance

[Test Settings] subtab

No.	Name	Description
❶	Tab for Switching Screens	Switches displayed tab. Four tabs are prepared to individually set parameters for four types of filter. The contents of all tabs are the same. • The checkbox on the left of filter name is turned on/off in conjunction with the validation execution checkbox (❷). • Default tab names are [K_2CrO_7-60mg/l], [K_2CrO_7-200mg/l], [ND Filter-30%], and [ND Filter-10%]. The name can be changed to a desired name in [Filter Name] (❺). • Default values of items on each tab are set assuming that the following reagent or filter is used: [K_2CrO_7-60mg/l] tab: 60 mg/l potassium dichromate solution [K_2CrO_7-200mg/l] tab: 200 mg/l potassium dichromate solution [ND Filter-30%] tab: optical filter with 30%T transmittance [ND Filter-10%] tab: optical filter with 10%T transmittance
❷	Validation execution checkbox	Tap it to turn on/off ☑. Place ☑ to use the current tab setting for the validation.
❸	Subtab	Switches setting items in the same tab.
❹	Back button	Saves the setting and returns to the Test Item List (Parameters Settings) screen.
❺	[Filter Name]	Sets a desired name for the filter. Set filter name is displayed on the tab for switching screens. Tap the input field to display text input screen ("4.2.1 Text Input Screen (Keyboard)" P.27).
❻	[Serial number]	Sets a certain serial number for the filter. Set serial number is printed as well as pass/fail results. Tap the input field to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29).

No.	Name	Description
❼	[Decimal Places]	Specifies the number of decimals of the values to be used for the validation. Tap it and select [3] or [4]. **Hint** The last digit of the value is rounded off.
❽	[Filter Expiration Date]	Sets the expiration date of the standard value of the filter. The UV-1900i automatically checks whether the filter has passed its expiration date when starting the validation, and if it is expired, the validation is cancelled. **Hint** The format of the date can be changed in [Format] described in "15.9 Setting Date and Time" P.249.
❾	[Recommended Value]	Sets the values of [Accu. (Abs)] and [Prec. (Abs)] in the [Std Value List] subtab. In this test, potassium dichromate and ND filter are assumed to be used. Therefore, two tabs are assigned to each of potassium dichromate and ND filter and different recommended values are set. For recommended values, see the following table.

• Recommended values for the [K_2CrO_7-60mg/l] and [K_2CrO_7-200mg/l] tabs

Std Value (Abs)	[Accu. (Abs)]	[Prec. (Abs)]
0.000 ≤ Abs < 1.000	±0.010 Abs	≤ 0.005 Abs
1.000 ≤ Abs ≤ 4.000	± (Std value) × 0.010 Abs	≤ (Std value) × 0.005 Abs

• Recommended values for the [ND Filter-30%] and [ND Filter-10%] tabs

Std Value (Abs)	[Accu. (Abs)]	[Prec. (Abs)]
0.000 ≤ Abs < 1.000	±0.008 Abs	≤ 0.005 Abs
1.000 ≤ Abs ≤ 4.000	± (Std value) × 0.008 Abs	≤ (Std value) × 0.005 Abs

This is the criteria required in the United States Pharmacopoeia.

[Std Value List] subtab

No.	Name	Description
❶	Std Value List	Displays a list of standard values. Five items are preset. Whether it is measured or not, and the values in [WL (nm)], [Std (Abs)], [Accu. (Abs)], and [Prec. (Abs)] can be changed. • Items with ☑ are measured. Turn on/off ☑ using the check/clear button (❸ to ❺). • Enter the values in [WL (nm)], [Std (Abs)], [Accu. (Abs)], and [Prec. (Abs)] on the screen displayed when tapping the Editing button (❻). The values entered in [Abs Accuracy Criteria] and [Abs Precision Criteria] on the setting screen are displayed in [Accu. (Abs)] and [Prec. (Abs)], respectively.
❷	The number of results and selection/page button	Number in the top line shows the ordinal number of selected item and total number of items. The four buttons on the right operate as follows: • ⏫ ⏬ Moves to the top/last line of the list. • 🔼 🔽 Selects the previous or next item.
❸	Check all button	Checks (☑) all items.
❹	Clear all button	Clears check marks (☑) of all items.
❺	Check/Clear button	Turn on/off the check mark (☑) of selected item.

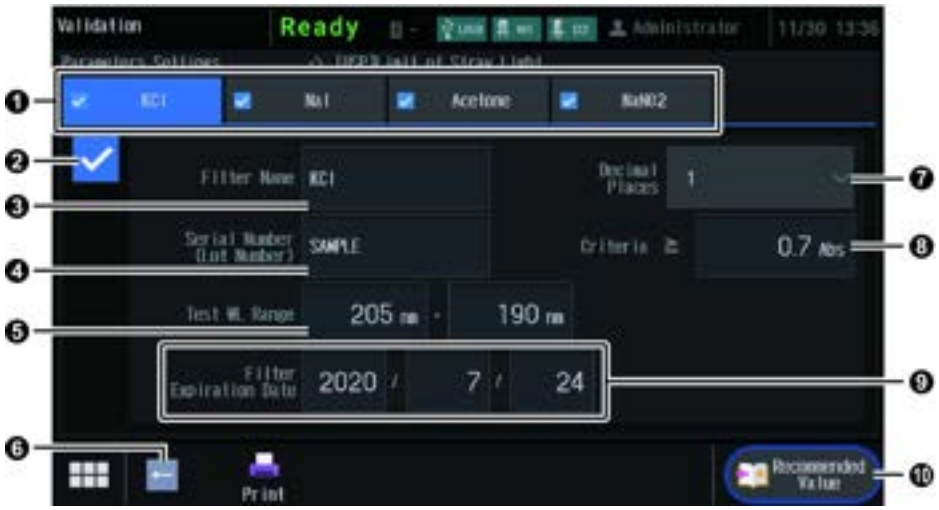
No.	Name	Description
❻	Editing button	Changes each value of selected item. When the button is tapped, the following screen is displayed.  Tap the input field of [Wavelength], [Std Value], [Abs Accuracy Criteria], or [Abs Precision Criteria] to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29). Enter a value for each item. • [Wavelength]: Enter the measurement wavelength. • [Std Value]: Enter the standard value indicated on the filter. Enter a value corresponding to the value entered in [Wavelength]. • [Abs Accuracy Criteria]: Enter the pass/fail judgment criteria for the deviation of the measured values from the standard values indicated on the filter. • [Abs Precision Criteria]: Enter the pass/fail judgment criteria for variation of measured values. After entering a value on the numeric keypad, tap [Apply] on this screen. The entered value is reflected to the items in the WL List.

17.4.10 Setting - [EP] Limit of Stray Light

No.	Name	Description
❶	Validation execution checkbox	Tap it to turn on/off ☑.
❷	[Filter Name]	Sets a desired name for the filter. Set filter name is displayed on the tab for switching screens. Tap the input field to display text input screen ("4.2.1 Text Input Screen (Keyboard)" P.27).
❸	[Serial Number (Lot Number)]	Sets a certain serial number for the filter. Set serial number is printed as well as pass/fail results. Tap the input field to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29).
❹	[Test WL Range]	Sets the range of test wavelength. Enter the starting and ending wavelength in the left and right input fields, respectively. Tap the input field to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29).
❺	Back button	Saves the setting and returns to the Test Item List (Parameters Settings) screen.
❻	[Decimal Places]	Specifies the number of decimals of the values to be used for the validation. Tap it and select [1] or [2]. **Hint** The last digit of the value is rounded off.
❼	[Criteria]	Specifies the criteria used to evaluate the validation result. Tap the input field to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29).

No.	Name	Description
❽	[Filter Expiration Date]	Sets the expiration date of the standard value of the filter. The UV-1900i automatically checks whether the filter has passed its expiration date when starting the validation, and if it is expired, the validation is cancelled. **Hint** The format of the date can be changed in [Format] described in "15.9 Setting Date and Time" P.249.
❾	[Recommended Value]	Set the values of [Test WL Range] and [Criteria] as follows. • [Test WL Range] starting wavelength: 230 nm • [Test WL Range] ending wavelength: 190 nm • [Criteria]: > 2.0 Abs This is the criteria required in the European Pharmacopoeia.

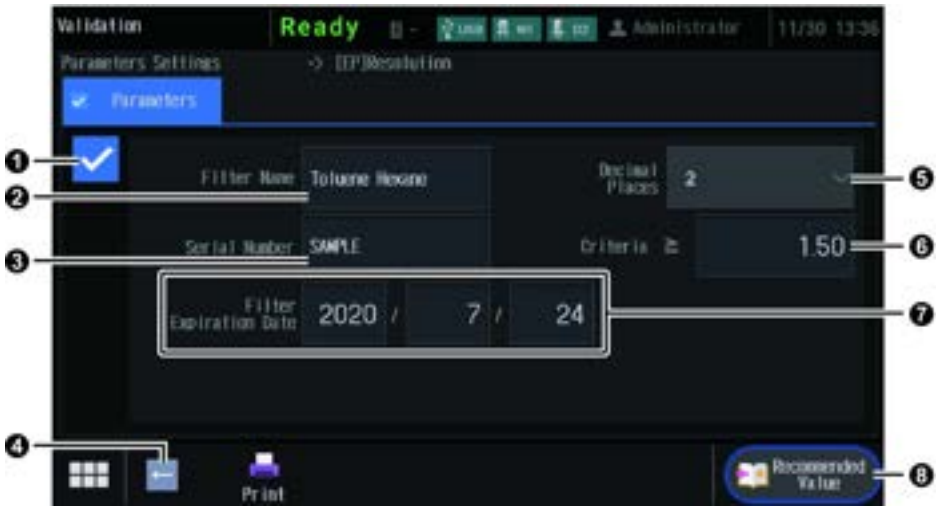
17.4.11 Setting - [USP] Limit of Stray Light



No.	Name	Description
❶	Tab for Switching Screens	Switches displayed tab. Four tabs are prepared to individually set parameters for four types of filter. The contents of all tabs are the same. • The checkbox on the left of filter name is turned on/off in conjunction with the validation execution checkbox (❷). • Default tab names are [KCl], [NaI], [Acetone], and [NaNO2]. The name can be changed to a desired name in [Filter Name] (❸). • Default values of items on each tab are set assuming that the following reagent is used: [KCl] tab: Potassium chloride solution [NaI] tab: Sodium iodine solution [Acetone] tab: Acetone [NaNO2] tab: Sodium nitrite solution
❷	Validation execution checkbox	Tap it to turn on/off ☑. Place ☑ to use the current tab setting for the validation.
❸	[Filter Name]	Sets a desired name for the filter. Set filter name is displayed on the tab for switching screens. Tap the input field to display text input screen ("4.2.1 Text Input Screen (Keyboard)" P.27).
❹	[Serial Number (Lot Number)]	Sets a certain serial number for the filter. Set serial number is printed as well as pass/fail results. Tap the input field to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29).
❺	[Test WL Range]	Sets the range of test wavelength. Enter the starting and ending wavelength in the left and right input fields, respectively. Tap the input field to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29).
❻	Back button	Saves the setting and returns to the Test Item List (Parameters Settings) screen.

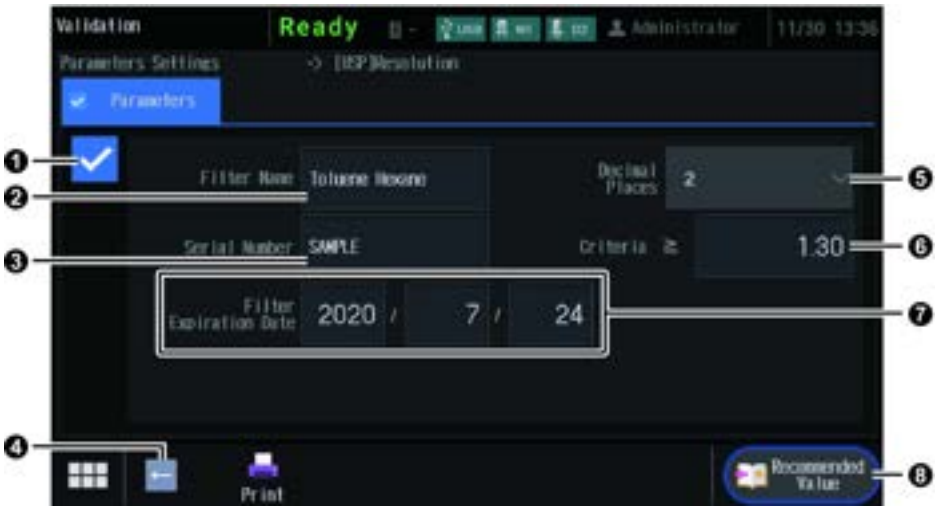
<table>
<tr><th>No.</th><th>Name</th><th>Description</th></tr>
<tr><td>❼</td><td>[Decimal Places]</td><td>Specifies the number of decimals of the values to be used for the validation. Tap it and select [1] or [2].
Hint The last digit of the value is rounded off.</td></tr>
<tr><td>❽</td><td>[Criteria]</td><td>Specifies the criteria used to evaluate the validation result.
Tap the input field to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29).</td></tr>
<tr><td>❾</td><td>[Filter Expiration Date]</td><td>Sets the expiration date of the standard value of the filter. The UV-1900i automatically checks whether the filter has passed its expiration date when starting the validation, and if it is expired, the validation is cancelled.
Hint The format of the date can be changed in [Format] described in "15.9 Setting Date and Time" P.249.</td></tr>
<tr><td>❿</td><td>[Recommended Value]</td><td>Set the values of [Test WL Range] and [Criteria] as follows.
Recommended value differs according to the tab.
<table>
<tr><th>Tab name</th><th>[Test WL Range] starting wavelength</th><th>[Test WL Range] ending wavelength</th><th>[Criteria]</th></tr>
<tr><td>KCl</td><td>210 nm</td><td>190 nm</td><td rowspan="4">≥ 0.7 Abs</td></tr>
<tr><td>NaI</td><td>270 nm</td><td>250 nm</td></tr>
<tr><td>Acetone</td><td>370 nm</td><td>280 nm</td></tr>
<tr><td>NaNO2</td><td>410 nm</td><td>370 nm</td></tr>
</table>
This is the criteria required in the United States Pharmacopoeia.</td></tr>
</table>

17.4.12 Setting - [EP] Resolution



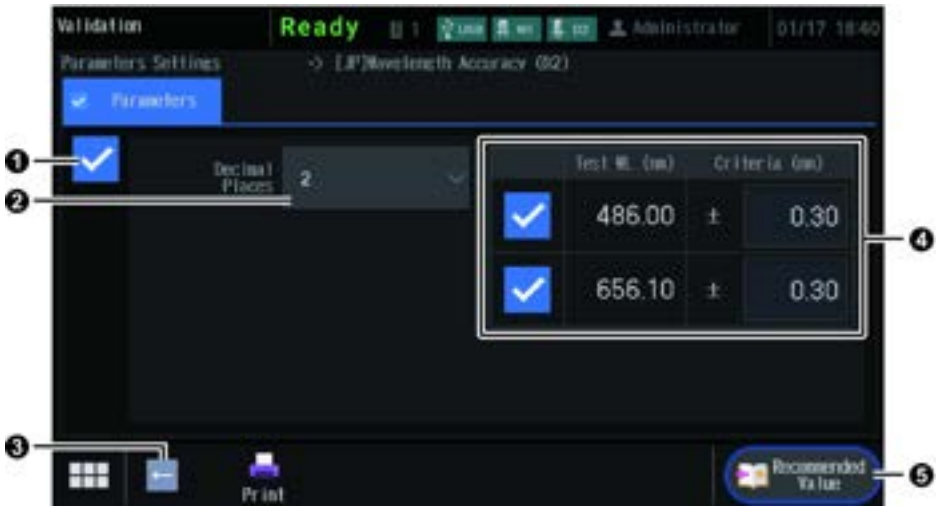
No.	Name	Description
❶	Validation execution checkbox	Tap it to turn on/off ☑.
❷	[Filter Name]	Sets a desired name for the filter. Set filter name is displayed on the tab for switching screens. Tap the input field to display text input screen ("4.2.1 Text Input Screen (Keyboard)" P.27).
❸	[Serial number]	Sets a certain serial number for the filter. Set serial number is printed as well as pass/fail results. Tap the input field to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29).
❹	Back button	Saves the setting and returns to the Test Item List (Parameters Settings) screen.
❺	[Decimal Places]	Specifies the number of decimals of the values to be used for the validation. Tap it and select [1] or [2]. **Hint** The last digit of the value is rounded off.
❻	[Criteria]	Specifies the criteria used to evaluate the validation result. Tap the input field to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29).
❼	[Filter Expiration Date]	Set the expiration date of the standard value of the filter. The UV-1900i automatically checks whether the filter has passed its expiration date when starting the validation, and if it is expired, the validation is cancelled. **Hint** The format of the date can be changed in [Format] described in "15.9 Setting Date and Time" P.249.
❽	[Recommended Value]	Sets [Criteria] to ≥1.5 Abs.

17.4.13 Setting - [USP] Resolution



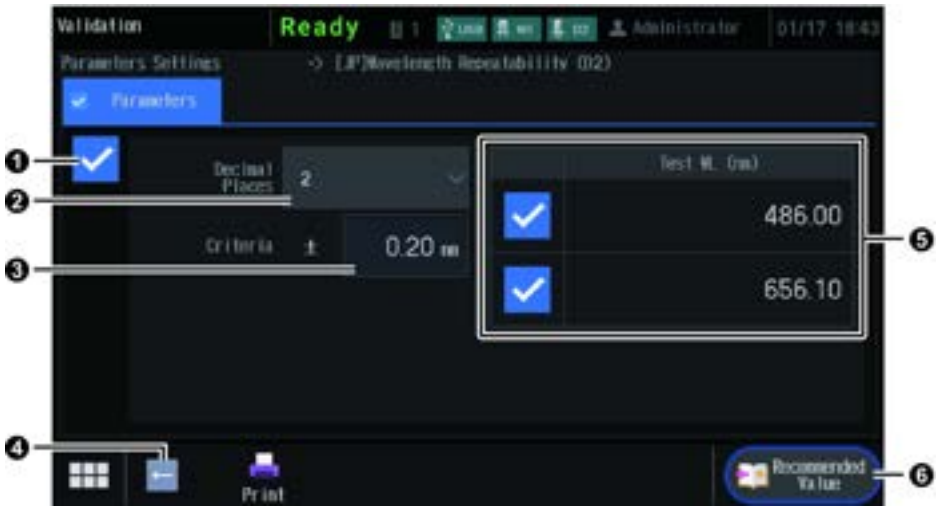
No.	Name	Description
❶	Validation execution checkbox	Tap it to turn on/off ☑.
❷	[Filter Name]	Sets a desired name for the filter. Set filter name is displayed on the tab for switching screens. Tap the input field to display text input screen ("4.2.1 Text Input Screen (Keyboard)" P.27).
❸	[Serial number]	Sets a certain serial number for the filter. Set serial number is printed as well as pass/fail results. Tap the input field to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29).
❹	Back button	Saves the setting and returns to the Test Item List (Parameters Settings) screen.
❺	[Decimal Places]	Specifies the number of decimals of the values to be used for the validation. Tap it and select [1] or [2]. **Hint** The last digit of the value is rounded off.
❻	[Criteria]	Specifies the criteria used to evaluate the validation result. Tap the input field to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29).
❼	[Filter Expiration Date]	Sets the expiration date of the standard value of the filter. The UV-1900i automatically checks whether the filter has passed its expiration date when starting the validation, and if it is expired, the validation is cancelled. **Hint** The format of the date can be changed in [Format] described in "15.9 Setting Date and Time" P.249.
❽	[Recommended Value]	Set [Criteria] to ≥1.3 Abs. This is the criteria required in the United States Pharmacopoeia.

17.4.14 Setting - [JP] Wavelength Accuracy (D2)



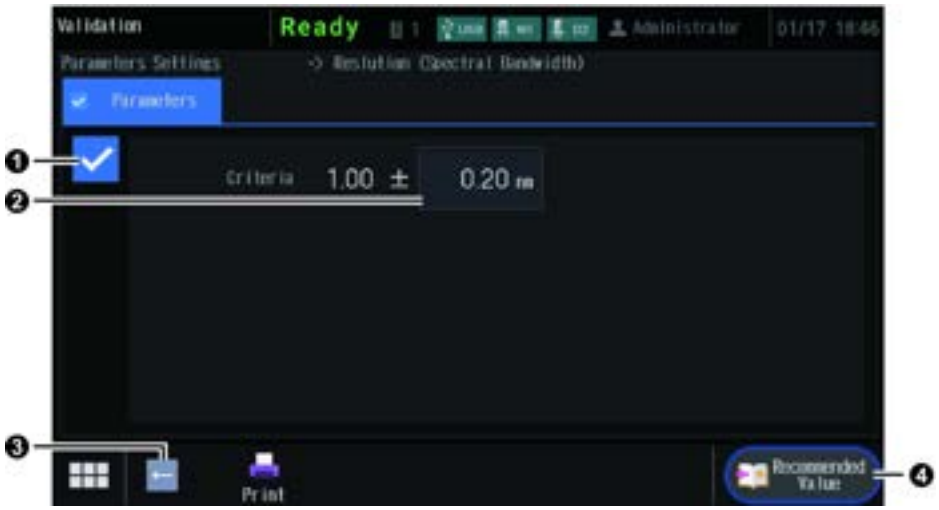
No.	Name	Description
❶	Validation execution checkbox	Tap it to turn on/off ☑.
❷	[Decimal Places]	Specifies the number of decimals of the values to be used for the validation. Tap it and select [1] or [2]. **Hint** The last digit of the value is rounded off.
❸	Back button	Saves the setting and returns to the Test Item List (Parameters Settings) screen.
❹	Wavelength selection/criteria setting	Selects the wavelength and sets the criteria. The wavelength available for this validation is 486.0 nm or 656.1 nm, which is the emission line wavelength of the D2 lamp. • Tap the checkbox on the left of each line to turn on/off ☑. Place ☑ to use the wavelength of the line for the validation. • Specifies the criteria used to evaluate the validation result in [Criteria (nm)]. Tap the input field to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29).
❺	[Recommended Value]	Set [Criteria (nm)] to ±0.3 nm. This is the criteria required in the Japanese Pharmacopoeia.

17.4.15 Setting - [JP] Wavelength Repeatability (D2)



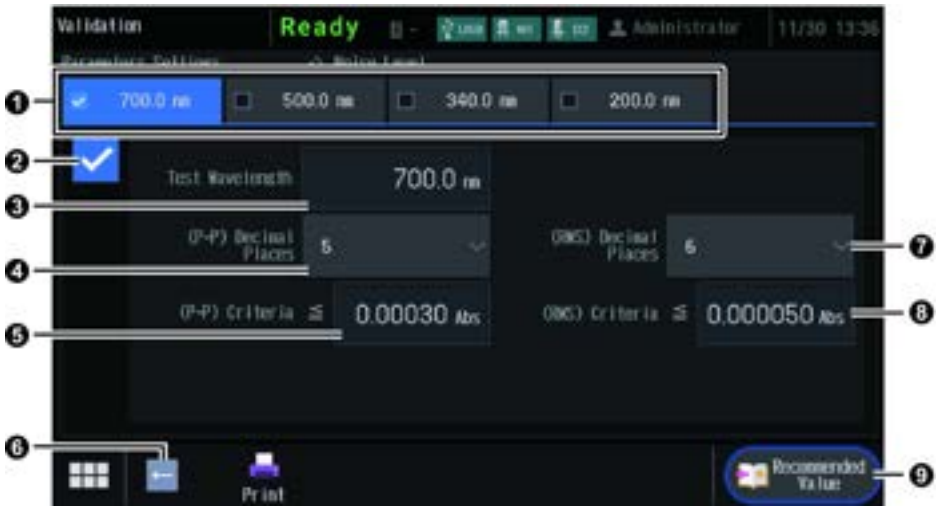
No.	Name	Description
❶	Validation execution checkbox	Tap it to turn on/off ☑.
❷	[Decimal Places]	Specifies the number of decimals of the values to be used for the validation. Tap it and select [1] or [2]. **Hint** The last digit of the value is rounded off.
❸	[Criteria]	Specifies the criteria used to evaluate the validation result. Tap the input field to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29).
❹	Back button	Saves the setting and returns to the Test Item List (Parameters Settings) screen.
❺	Wavelength selection	Selects the wavelength. The wavelength available for this validation is 486.0 nm or 656.1 nm, which is the emission line wavelength of the D2 lamp. Tap the checkbox on the left of each line to turn on/off ☑. Place ☑ to use the wavelength of the line for the validation.
❻	[Recommended Value]	Set [Criteria] to ±0.2 nm. This is the criteria required in the Japanese Pharmacopoeia.

17.4.16 Setting - Resolution (Spectral Bandwidth)



No.	Name	Description
❶	Validation execution checkbox	Tap it to turn on/off ☑.
❷	[Criteria]	Specifies the criteria used to evaluate the validation result. Tap the input field to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29).
❸	Back button	Saves the setting and returns to the Test Item List (Parameters Settings) screen.
❹	[Recommended Value]	Set [Criteria] to ≤ 1.00 ± 0.20 nm. These values are defined for the tests conducted by Shimadzu sales/service representative in periodical inspection.

17.4.17 Setting - Noise Level

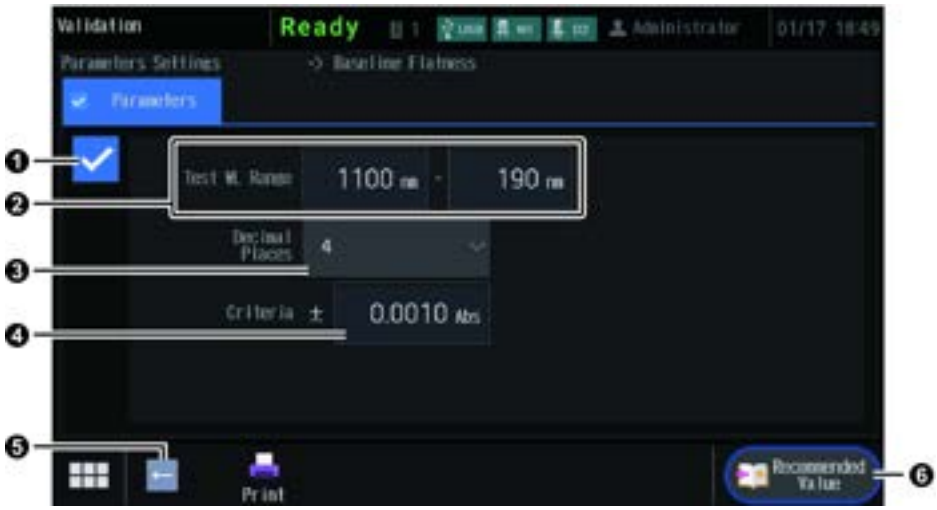


No.	Name	Description
❶	Tab for Switching Screens	Switches displayed tab. Four tabs are prepared to individually set parameters for four wavelengths. The contents of all tabs are the same. In this validation, the wavelength values are displayed as tab names. • The checkbox on the left of the wavelength is turned on/off in conjunction with the validation execution checkbox (❷). • Default tab names are [700.0 nm], [500.0 nm], [340.0 nm], and [200.0 nm]. The values set in [Test Wavelength] (❸) are displayed in the tabs. • Default values of items in each tab is set assuming that the wavelength same as the default tab name (700.0 nm, 500.0 nm, 340.0 nm, or 200.0 nm) is used for the validation.
❷	Validation execution checkbox	Tap it to turn on/off ☑. Place ☑ to use the current tab setting for the validation.
❸	[Test Wavelength]	Sets a wavelength at which to measure noise level. Set value is also displayed on the tab for switching screens. Tap the input field to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29).
❹	[(P-P) Decimal Places]	Specifies the number of decimals of the P-P value to be displayed. Tap it and select [4] or [5]. **Hint** The last digit of the value is rounded off.
❺	[(P-P) Criteria]	Specifies the pass/fail judgment criteria used to evaluate the P-P value. Tap the input field to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29).
❻	Back button	Saves the setting and returns to the Test Item List (Parameters Settings) screen.

<table>
<tr><th>No.</th><th>Name</th><th>Description</th></tr>
<tr><td>❼</td><td>[(RMS) Decimal Places]</td><td>Specifies the number of decimals of the RMS value to be displayed. Tap it and select [5] or [6].

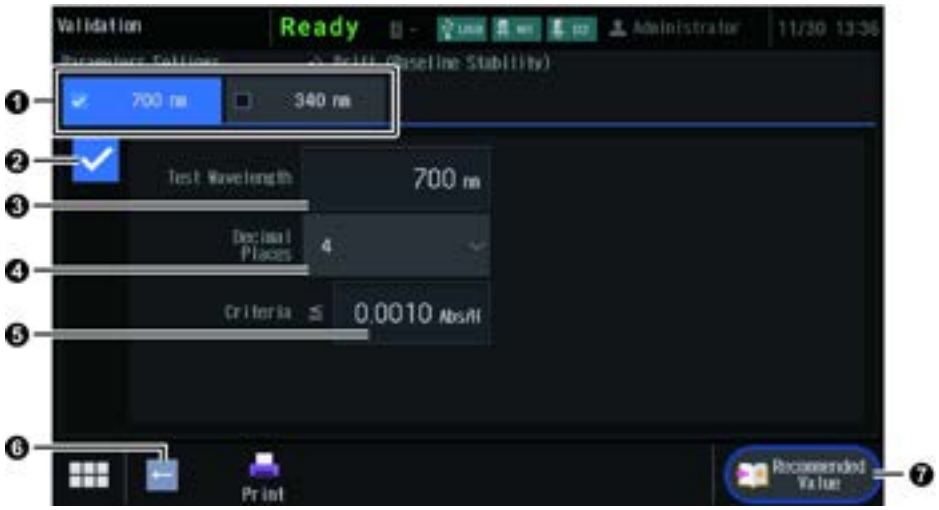
Hint The last digit of the value is rounded off.</td></tr>
<tr><td>❽</td><td>[(RMS) Criteria]</td><td>Specifies the pass/fail judgment criteria used to evaluate the RMS value.
Tap the input field to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29).</td></tr>
<tr><td>❾</td><td>[Recommended Value]</td><td>Set the values of [Test Wavelength], [(P-P) Criteria], and [(RMS) Criteria] as follows.
Recommended value differs according to the tab.
<table>
<tr><th>Tab name</th><th>[Test Wavelength]</th><th>[(P-P) Criteria]</th><th>[(RMS) Criteria]</th></tr>
<tr><td>700.0 nm</td><td>700.0 nm</td><td>≤ 0.0003</td><td>≤ 0.00005</td></tr>
<tr><td>500.0 nm</td><td>500.0 nm</td><td>≤ 0.0006</td><td>≤ 0.00010</td></tr>
<tr><td>340.0 nm</td><td>340.0 nm</td><td rowspan="2">≤ 0.0024</td><td rowspan="2">≤ 0.00040</td></tr>
<tr><td>200.0 nm</td><td>200.0 nm</td></tr>
</table>
These values are defined for the tests conducted by Shimadzu sales/service representative in periodical inspection.</td></tr>
</table>

17.4.18 Setting - Baseline Flatness



No.	Name	Description
❶	Validation execution checkbox	Tap it to turn on/off ☑.
❷	[Test WL Range]	Specifies the wavelength range to measure the baseline flatness. Enter the starting and ending wavelength in the left and right input fields, respectively. Tap the input field to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29).
❸	[Decimal Places]	Specifies the number of decimals of the values to be used for the validation. Tap it and select [3] or [4]. **Hint** The last digit of the value is rounded off.
❹	[Criteria]	Specifies the criteria used to evaluate the validation result. Tap the input field to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29).
❺	Back button	Saves the setting and returns to the Test Item List (Parameters Settings) screen.
❻	[Recommended Value]	Set the values of [Test WL Range] and [Criteria] as follows. • [Test WL Range] starting wavelength: 1100 nm • [Test WL Range] ending wavelength: 190 nm • [Criteria]: ±0.001 Abs These values are defined for the tests conducted by Shimadzu sales/service representative in periodical inspection.

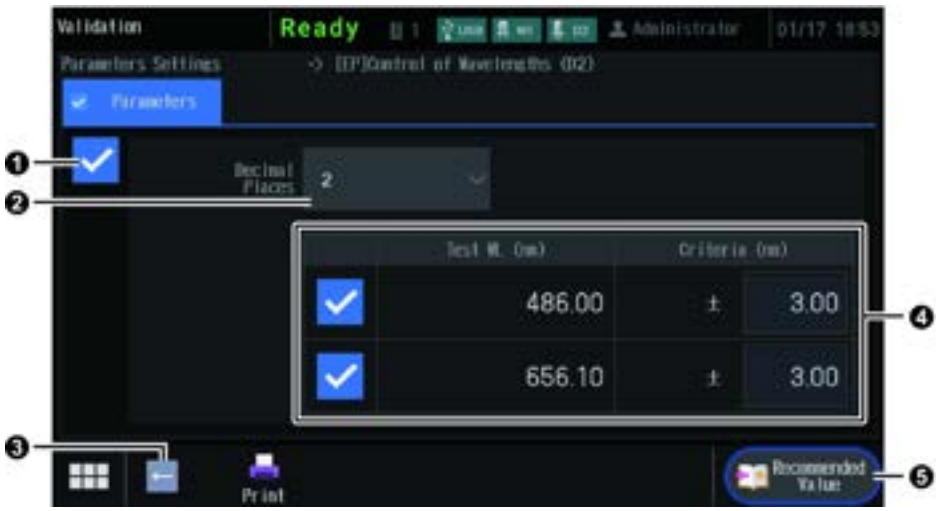
17.4.19 Setting - Drift (Baseline Stability)



No.	Name	Description
❶	Tab for Switching Screens	Switches displayed tab. Two tabs are prepared to individually set parameters for two wavelengths. The contents of both tabs are the same. In this validation, the wavelength values are displayed as tab names. • The checkbox on the left of the wavelength is turned on/off in conjunction with the validation execution checkbox (❷). • Default tab names are [700 nm] and [340 nm]. The values set in [Test Wavelength] (❸) are displayed in the tabs. • Default values of items in each tab is set assuming that the wavelength same as the default tab name (700 nm or 340 nm) is used for the validation.
❷	Validation execution checkbox	Tap it to turn on/off ☑. Place ☑ to use the current tab setting for the validation.
❸	[Test Wavelength]	Specifies the wavelength to measure the drift (baseline stability). Tap the input field to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29).
❹	[Decimal Places]	Specifies the number of decimals of the values to be used for the validation. Tap it and select [3] or [4]. **Hint** The last digit of the value is rounded off.
❺	[Criteria]	Specifies the criteria used to evaluate the validation result. Tap the input field to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29).
❻	Back button	Saves the setting and returns to the Test Item List (Parameters Settings) screen.

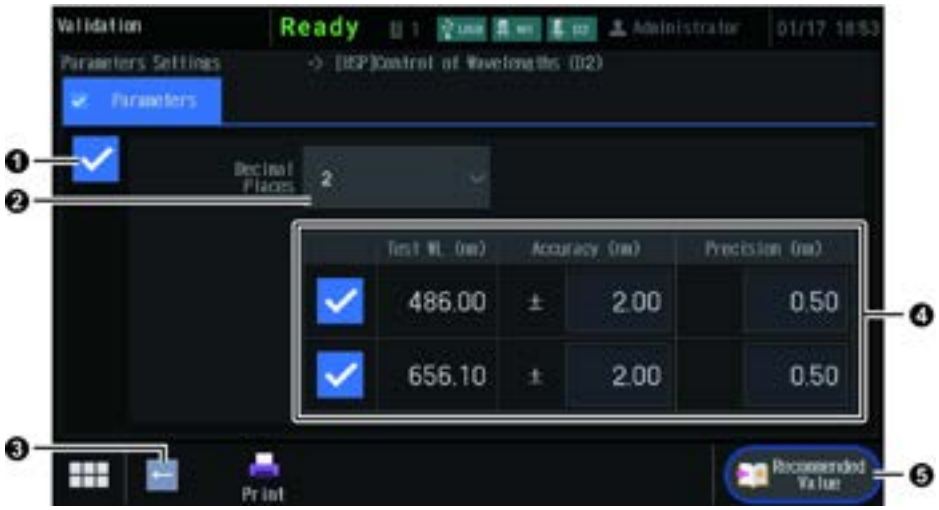
No.	Name	Description
❼	[Recommended Value]	Set the values of [Test Wavelength] and [Criteria] as follows. Recommended value differs according to the tab. • [Test Wavelength] in the [700 nm] tab: 700 nm • [Test Wavelength] in the [340 nm] tab: 340 nm • [Criteria]: ≤ 0.001 Abs/H These values are defined for the tests conducted by Shimadzu sales/service representative in periodical inspection.

17.4.20 Setting - [EP] Control of Wavelengths (D2)



No.	Name	Description
❶	Validation execution checkbox	Tap it to turn on/off ☑.
❷	[Decimal Places]	Specifies the number of decimals of the values to be used for the validation. Tap it and select [1] or [2]. **Hint** The last digit of the value is rounded off.
❸	Back button	Saves the setting and returns to the Test Item List (Parameters Settings) screen.
❹	Wavelength selection/criteria setting	Selects the wavelength and sets the criteria. The wavelength available for this validation is 486.0 nm or 656.1 nm. • Tap the checkbox on the left of each line to turn on/off ☑. Place ☑ to use the wavelength of the line for the validation. • Specifies the criteria used to evaluate the validation result in [Criteria (nm)]. Tap the input field to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29).
❺	[Recommended Value]	Set [Criteria (nm)] to ±3.0 nm. This is the criteria required in the European Pharmacopoeia.

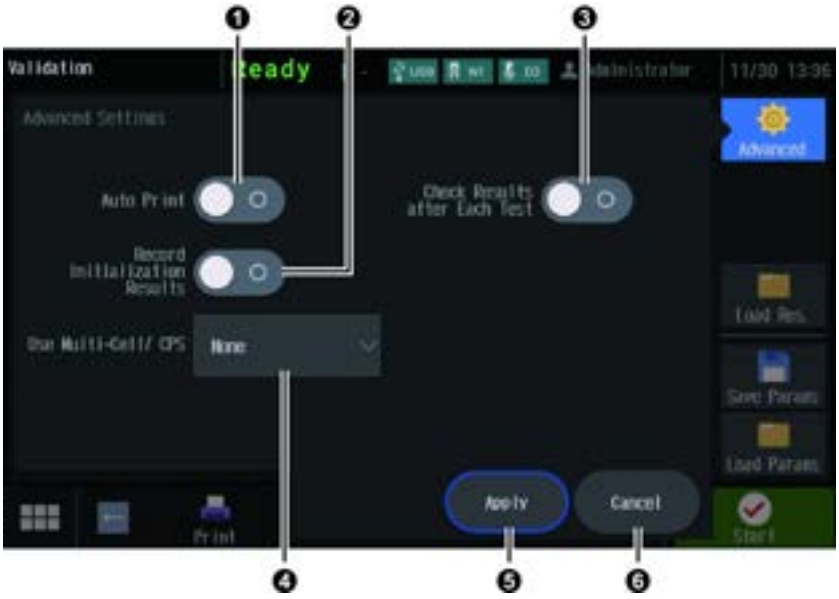
17.4.21 Setting - [USP] Control of Wavelengths (D2)

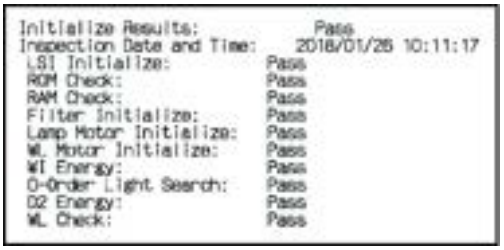


No.	Name	Description
❶	Validation execution checkbox	Tap it to turn on/off ☑.
❷	[Decimal Places]	Specifies the number of decimals of the values to be used for the validation. Tap it and select [1] or [2]. **Hint** The last digit of the value is rounded off.
❸	Back button	Saves the setting and returns to the Test Item List (Parameters Settings) screen.
❹	Wavelength selection/criteria setting	Selects the wavelength and sets the criteria. The wavelength available for this validation is 486.0 nm or 656.1 nm. • Tap the checkbox on the left of each line to turn on/off ☑. Place ☑ to use the wavelength of the line for the validation. • Specifies the criteria used to evaluate the validation result in [Accuracy (nm)] and [Precision (nm)]. Tap the input field to display numeric keypad ("4.2.2 Numeric Input Screen (10-button Keypad)" P.29).
❺	[Recommended Value]	Set [Accuracy (nm)] to ±2.0 nm, and [Precision (nm)] to ±0.5 nm. This is the criteria required in the United States Pharmacopoeia.

17.5 Advanced Settings

Tap [Advanced] on the Validation menu to display the following Advanced Settings screen. On this screen, operation during the validation and whether optional devices are used or not can be set.



No.	Name	Description
❶	[Auto Print]	Tap and enable it to print the result for every validation. Each tap of this key toggles between ON and OFF. OFF:  ON: 
❷	[Record Initialization Results]	Tap and enable it to print the result of initialization, which is automatically performed when the power is turned on, after all test results ("17.10 Printing Test Results" P.404) are printed. Each tap of this key toggles between ON and OFF. OFF:  ON:   ▶▶ Reference For details on the initialization, refer to “2.5.2 Initialization Operation” in "UV-1900i Instruction Manual (Installation and Maintenance Guide)".

No.	Name	Description
❸	[Check Results after Each Test]	Tap and enable it to display the result for every validation. Each tap of this key toggles between ON and OFF. OFF:  ON:  **NOTE** When this function is enabled, the next test is suspended after a test is completed until [To Next Test] on the bottom right of the screen is tapped.
❹	[Use Multi-Cell/ CPS]	Set it when using optional 6-position Multi-Cell or CPS series. Tap it and select [None], [Multi-Cell (6 Cells)] or [CPS].
❺	[Apply]	Confirms changes and closes the window.
❻	[Cancel]	Discards changes and closes the window.

Hint Settings can be saved or loaded as a part of test parameters.

- "17.9.1 Saving Test Parameters File" P.396
- "17.9.2 Loading Test Parameters File" P.398

17.6 Starting the Test

After selecting and setting the tests, start the tests as follows:

1 Tap [Start] on the Validation menu.

2 Make the settings for saving test results.

No.	Name	Description
❶	[File Name]	Specify the name of the file to be saved. Tap the input field to display text input screen ("4.2.1 Text Input Screen (Keyboard)" P.27).
❷	[Tester Name]	Sets the name of the tester. Tap the input field to display text input screen ("4.2.1 Text Input Screen (Keyboard)" P.27).
❸	[Location]	Specifies the destination location of the file. Tap it to select [Built-in Memory], [USB Memory], or [Expanded Memory].
❹	[Go]	Confirms the setting and starts the test.
❺	[Cancel]	Cancels the setting and closes the window.

After that, the following operations are automatically performed.

- For tests using a filter, the setting of [Filter Expiration Date] is checked. When the filter has passed its expiration date, a message appears, and the test is cancelled. Replace the filter with a new one (not expired), and set [Filter Expiration Date].
  The test item is displayed in red on the [Parameters Settings] screen if the tool expires.

- When optional multi-cell is set to be used, the multi-cell is initialized.
- When optional CPS series device is set to be used, the connection status of the CPS series device is checked.
- When [Auto Print] is enabled, the status of the printer is checked.

When no error is detected, the tests start.

The tests are executed in the following order. Tests which are not selected are skipped and the next test is executed.

Execution order	Test name	Execution order	Test name
1	[JP] Wavelength Accuracy	12	[EP] Resolution
2	[JP] Wavelength Repeatability	13	[USP] Resolution
3	[JP] Photometric Accuracy	14	[JP] Wavelength Accuracy (D2)
4	[JP] Photometric Repeatability	15	[JP] Wavelength Repeatability (D2)
5	Stray Light	16	Resolution (Spectral Bandwidth)
6	[EP] Control of Wavelengths	17	Noise Level
7	[USP] Control of Wavelengths	18	Baseline Flatness
8	[EP] Control of Absorbance	19	Drift (Baseline Stability)
9	[USP] Control of Absorbance	20	[EP] Control of Wavelengths (D2)
10	[EP] Limit of Stray Light	21	[USP] Control of Wavelengths (D2)
11	[USP] Limit of Stray Light		

For operation during the tests, see the following section. The semi-automatic validation requires operation (such as replacement of the filter) during the test.

Reference "17.7 Operation During the Test" P.357

When all scheduled test items are completed, you will return to the Validation menu. Check and print the results.

Reference • "17.8 Checking Test Results" P.378
• "17.10 Printing Test Results" P.404

17.7 Operation During the Test

Operation during the tests and screens displayed during the tests are described below:

Reference
- Operation common among multiple tests:
"17.7.1 Common Operations" P.357
- Operation during the tests and screens displayed during the tests:
"17.7.3 Operation During the Test - [JP] Wavelength Repeatability" P.361 to
"17.7.22 Operation During the Test - [USP] Control of Wavelengths (D2)" P.377

17.7.1 Common Operations

■ Termination of the test

To terminate the test, perform the following procedures. This is common among all tests.

1 **Tap [Stop].**

2 **Specifies the method of termination.**

- When [Stop the current test and start the next test.] is tapped, the current test is stopped and the next test starts.
- When [Stop all remaining tests.] is tapped, all tests are canceled and you will return to the Validation menu.

Hint The results of tests completed before termination are saved, therefore, you can check or print them.

■ Installation of the Filter

When [Use Multi-Cell/ CPS] ("17.5 Advanced Settings" P.353) is enabled for the test using a filter, the following screen appears when the test starts.

This screen shows installation location of the filters for optional 6-position Multi-Cell or CPS series.

Install the filters on the optional device according to the screen.

No.	Name	Description
❶	Cell number/filter name	Displays cell number and the name of the filter to be set.
❷	[OK]	Closes the window.

■ Resuming the test (after checking results)

When [Check Results after Each Test] ("17.5 Advanced Settings" P.353) is enabled, the test is suspended to enable you to check results after each test.

To resume the test, tap [To Next Test] on the bottom right of the screen.

■ Cancellation of Baseline Correction

For tests including baseline correction, the following operation can be applied:

1 Tap [Cancel].

2 Select the operation to be conducted.

- Tap [Perform baseline correction again.] to perform baseline correction again.
- When [Stop the current test and start the next test.] is tapped, the current test is stopped and the next test starts.
- When [Stop all remaining tests.] is tapped, all tests are canceled and you will return to the Validation menu.

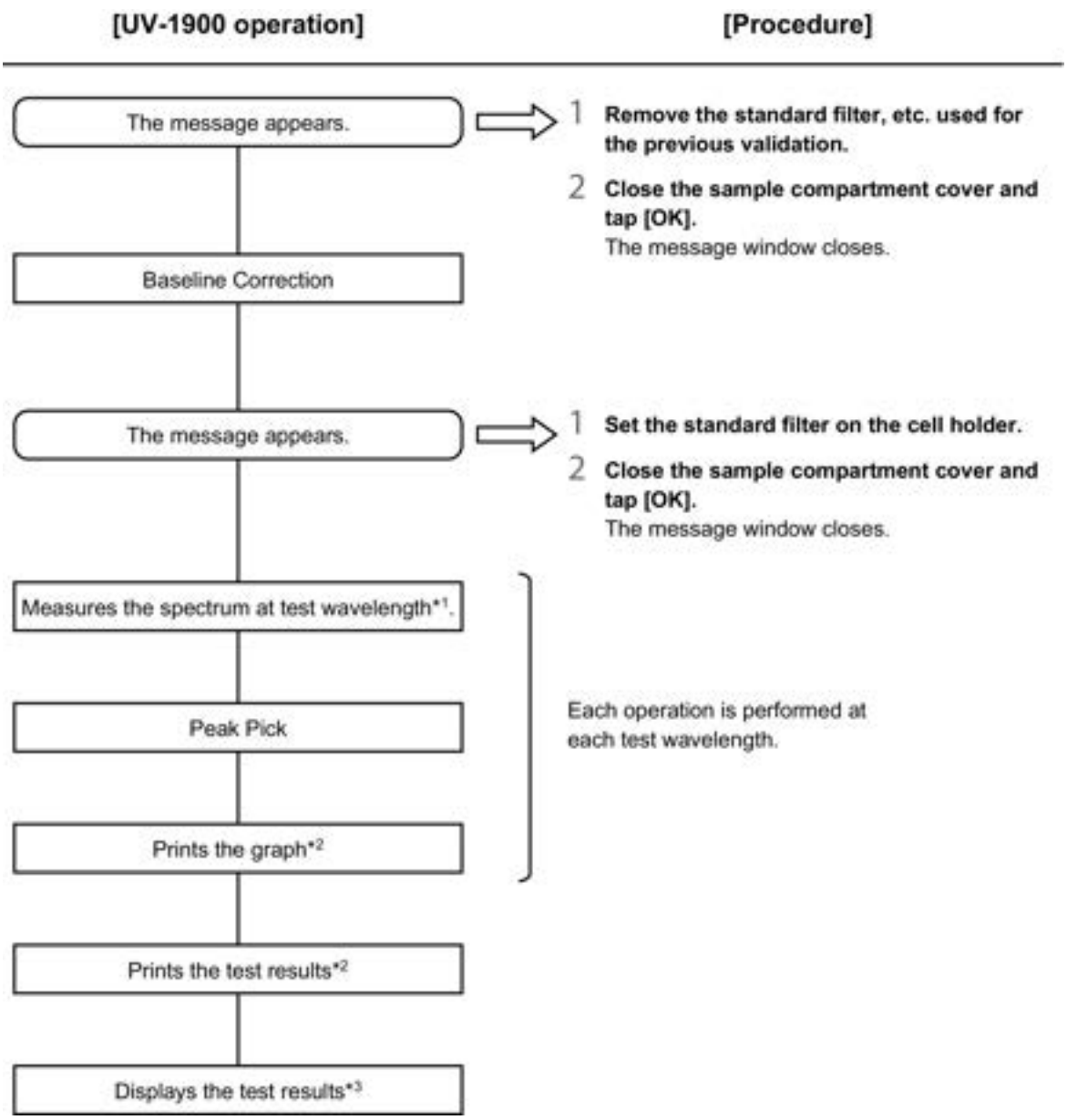
Hint The results of tests completed before termination are saved, therefore, you can check or print them.

17.7.2 Operation During the Test - [JP] Wavelength Accuracy

■ Operation During the Test

Hint

- To perform tests using multiple filters, perform the following procedures for each filter.
- When optional 6-position Multi-Cell or CPS series device is set to be used, the screen showing installation location of the filters appears when the test starts ("Installation of the Filter" P.358).



*1 Spectrum measurement is performed within the range of ±10 nm of the specified test wavelength.

*2 Executed when [Auto Print] is enabled ("17.5 Advanced Settings" P.353).

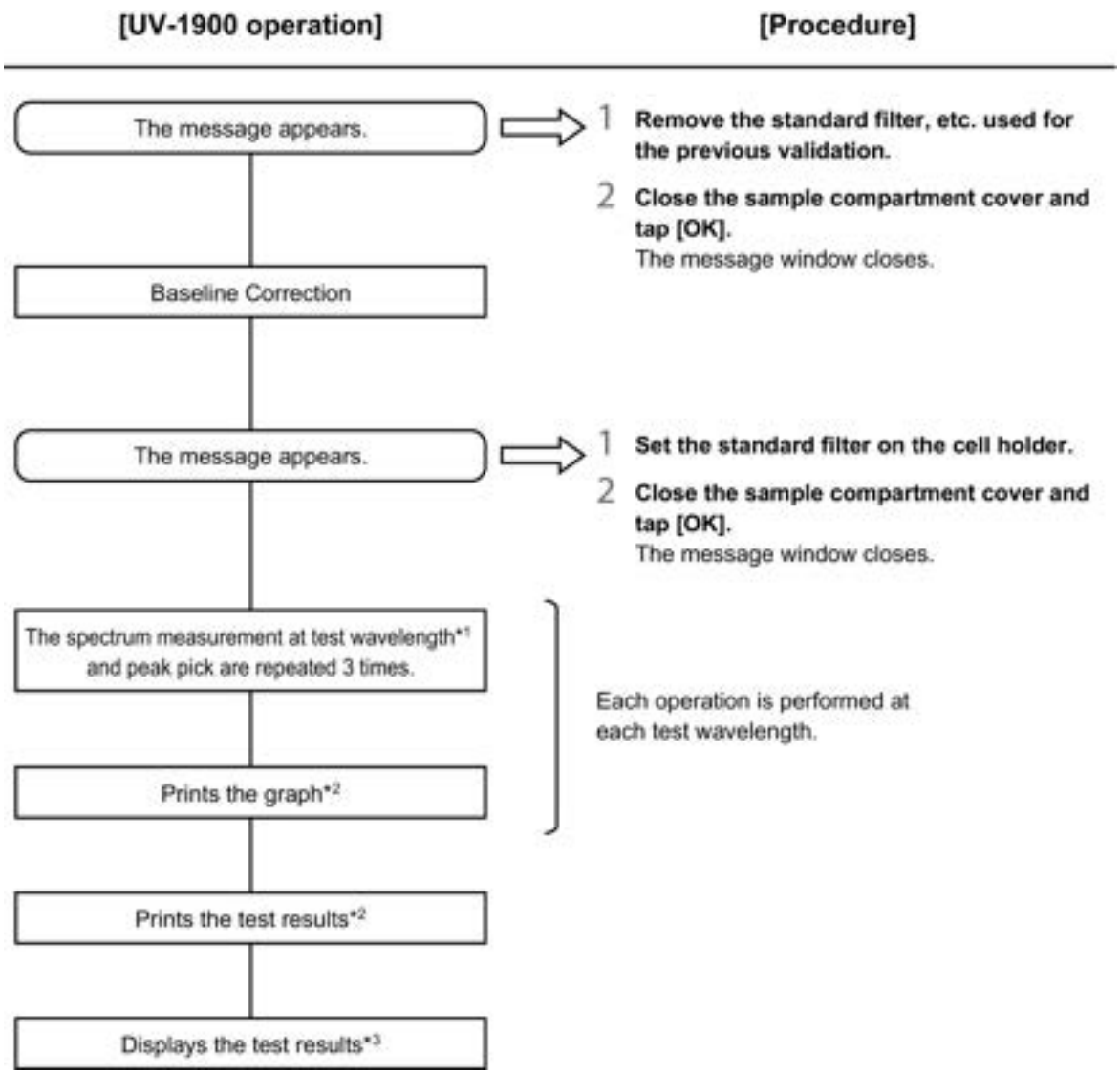
*3 Executed when [Check Results after Each Test] is enabled ("17.5 Advanced Settings" P.353).

17.7.3 Operation During the Test - [JP] Wavelength Repeatability

■ Operation During the Test

Hint

- To perform tests using multiple filters, perform the following procedures for each filter.
- When optional 6-position Multi-Cell or CPS series device is set to be used, the screen showing installation location of the filters appears when the test starts ("Installation of the Filter" P.358).



*1 Spectrum measurement is performed within the range of ±10 nm of the specified test wavelength.

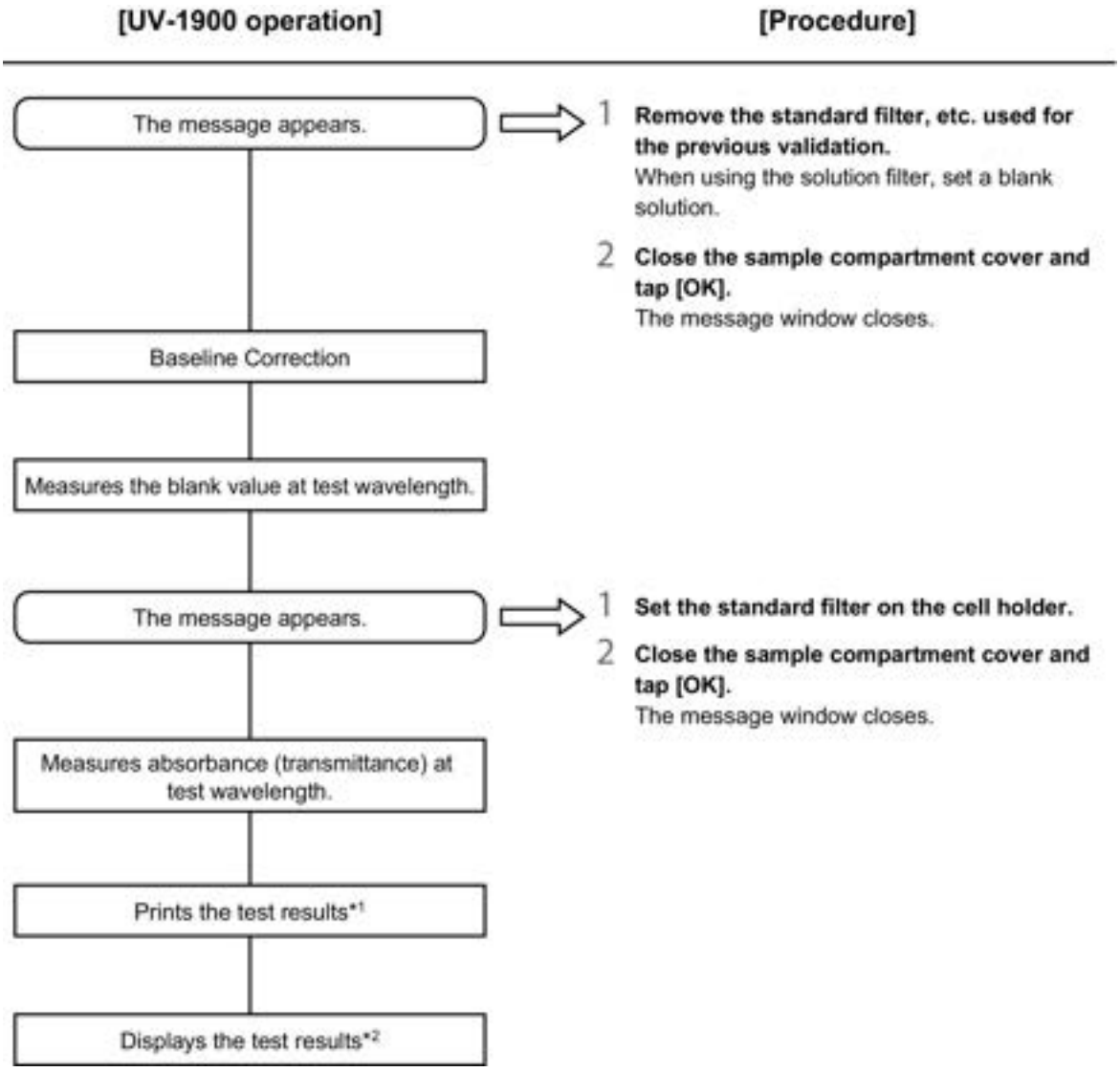
*2 Executed when [Auto Print] is enabled ("17.5 Advanced Settings" P.353).

*3 Executed when [Check Results after Each Test] is enabled ("17.5 Advanced Settings" P.353).

17.7.4 Operation During the Test - [JP] Photometric Accuracy

Hint

- To perform tests using multiple filters, perform the following procedures for each filter.
- When optional 6-position Multi-Cell or CPS series device is set to be used, the screen showing installation location of the filters appears when the test starts ("Installation of the Filter" P.358).



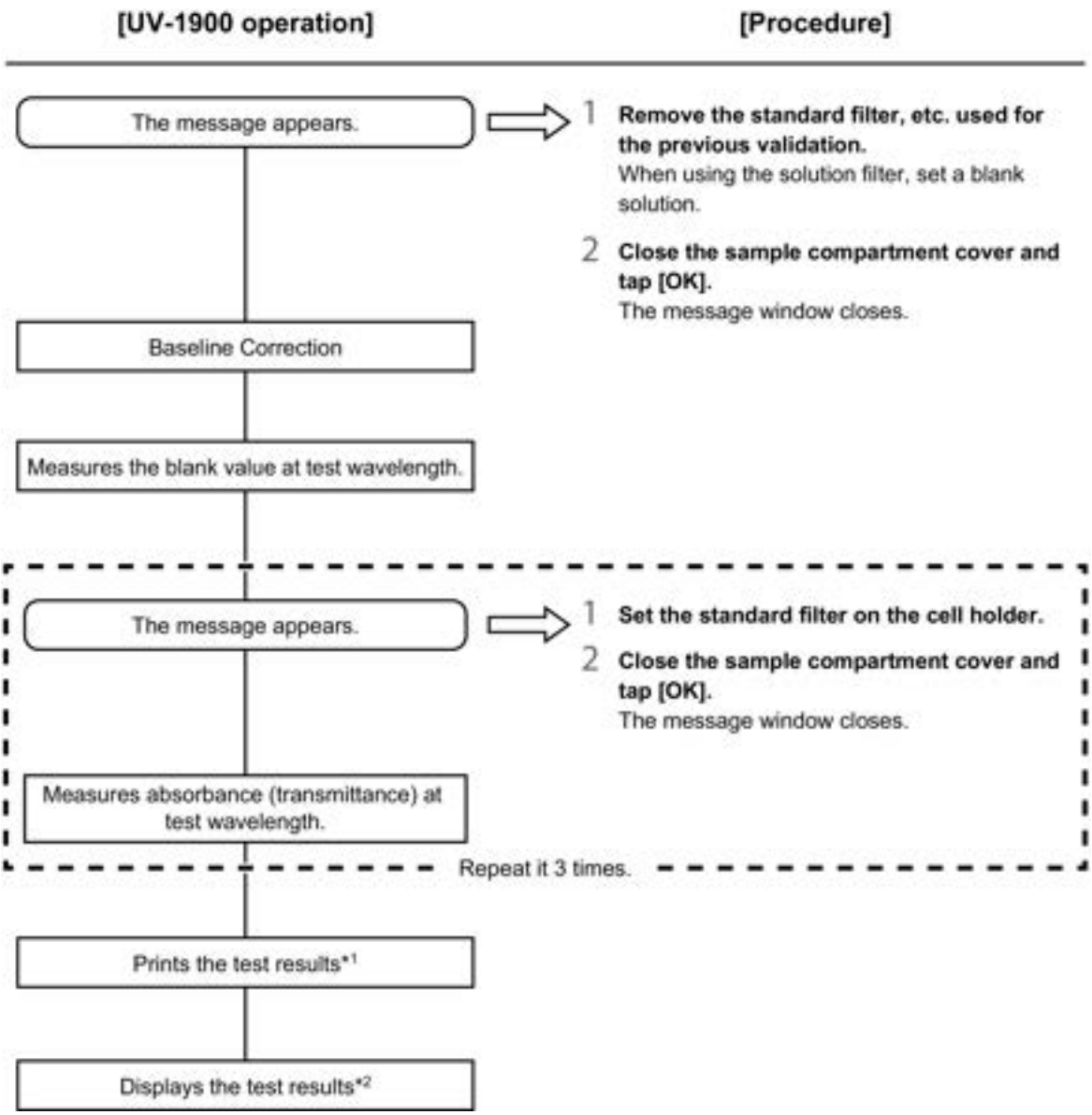
*1 Executed when [Auto Print] is enabled ("17.5 Advanced Settings" P.353).

*2 Executed when [Check Results after Each Test] is enabled ("17.5 Advanced Settings" P.353).

17.7.5 Operation During the Test - [JP] Photometric Repeatability

Hint

- To perform tests using multiple filters, perform the following procedures for each filter.
- When optional 6-position Multi-Cell or CPS series device is set to be used, the screen showing installation location of the filters appears when the test starts ("Installation of the Filter" P.358).
  When using the 6-position Multi-Cell or CPS series device, the filter cannot be removed nor inserted.



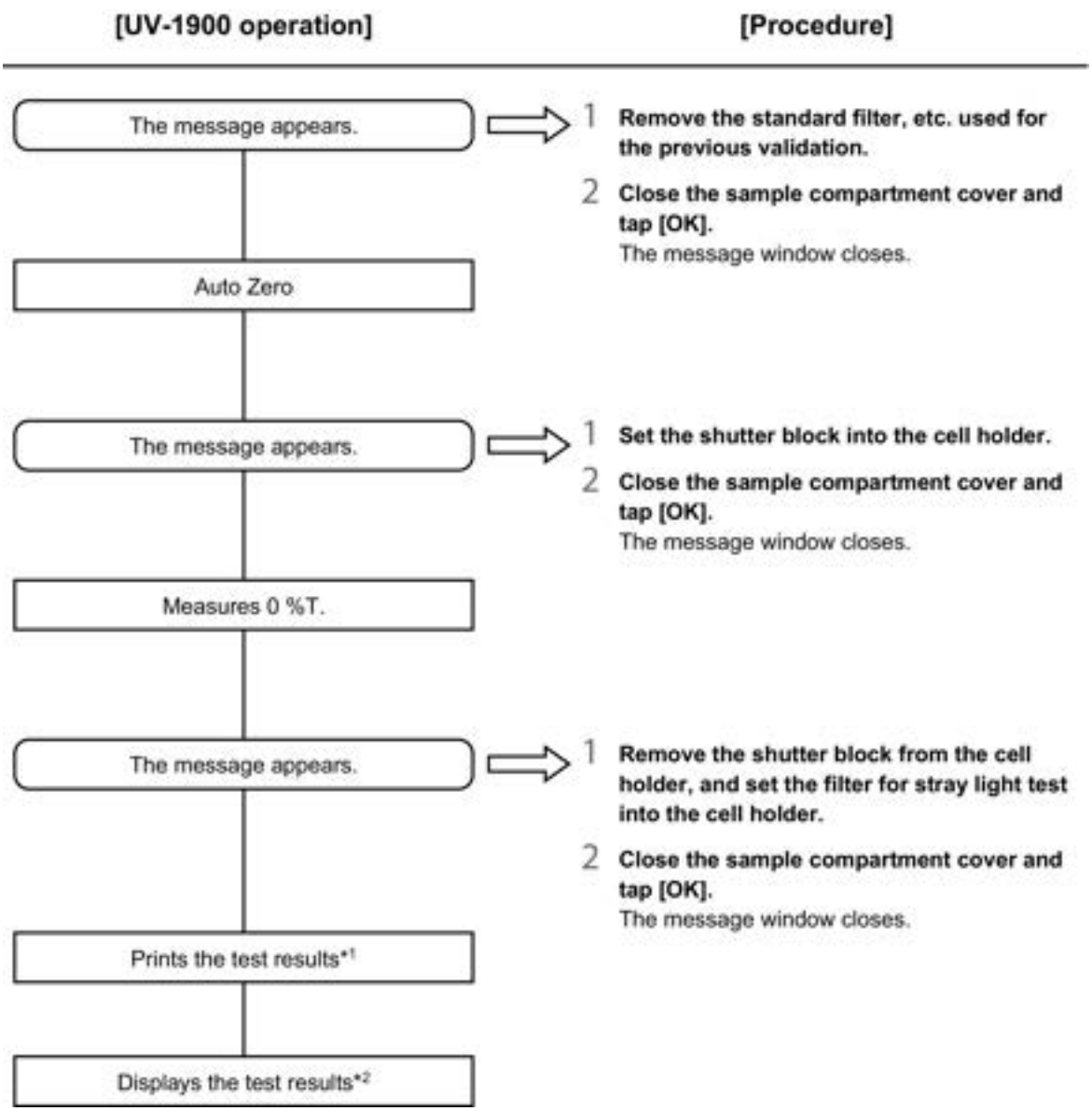
*1 Executed when [Auto Print] is enabled ("17.5 Advanced Settings" P.353).

*2 Executed when [Check Results after Each Test] is enabled ("17.5 Advanced Settings" P.353).

17.7.6 Operation During the Test - Stray Light

Hint

- To perform tests using multiple filters, perform the following procedures for each filter.
- When optional 6-position Multi-Cell or CPS series device is set to be used, the screen showing installation location of the filters appears when the test starts ("Installation of the Filter" P.358).



*1 Executed when [Auto Print] is enabled ("17.5 Advanced Settings" P.353).

*2 Executed when [Check Results after Each Test] is enabled ("17.5 Advanced Settings" P.353).

17.7.7 Operation During the Test - [EP] Control of Wavelengths

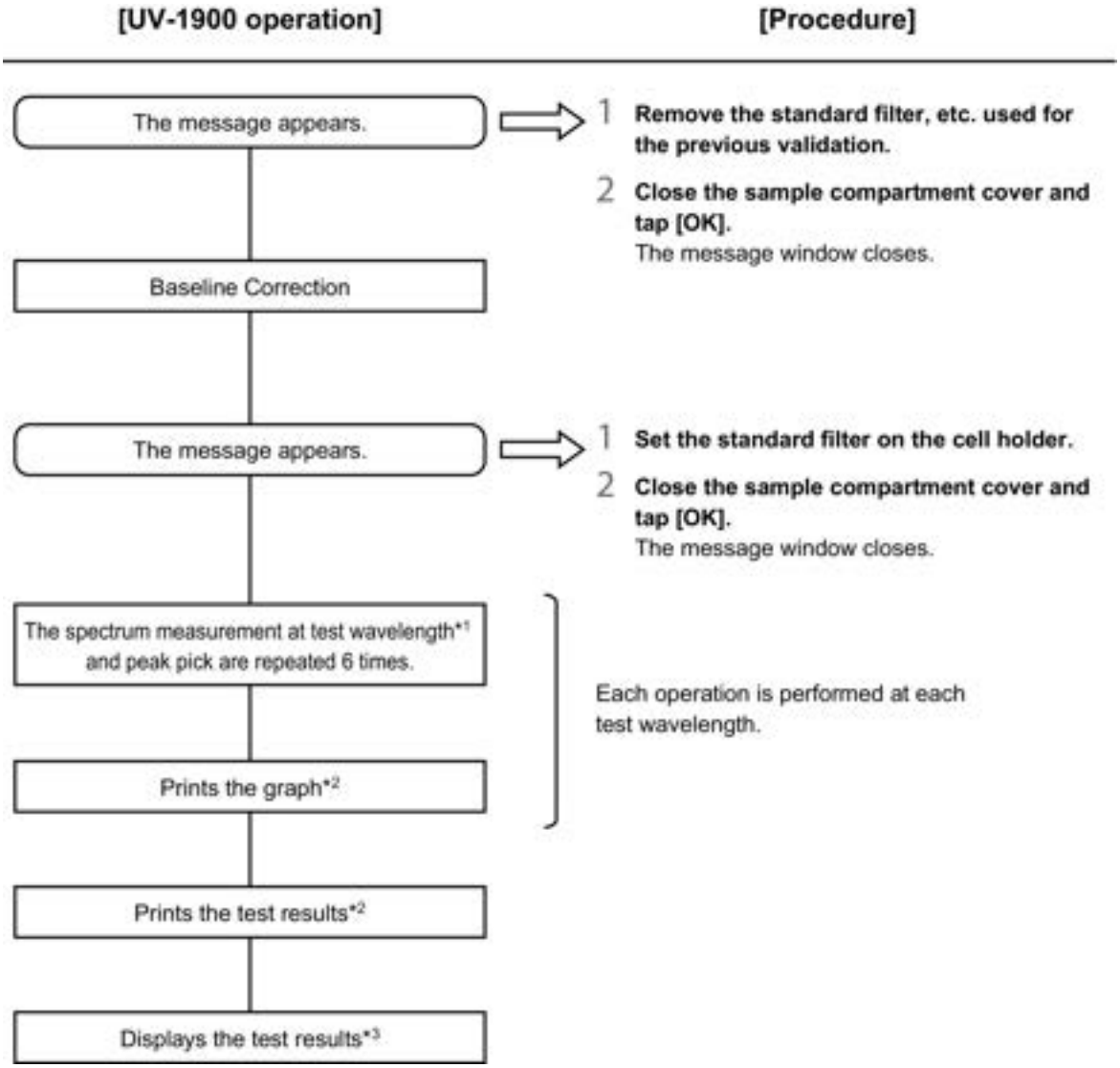
Operation of the instrument and procedures performed by the operator during the test are the same as those during the test of [JP] Wavelength Accuracy.

Reference "17.7.2 Operation During the Test - [JP] Wavelength Accuracy" P.360

17.7.8 Operation During the Test - [USP] Control of Wavelengths

Hint

- To perform tests using multiple filters, perform the following procedures for each filter.
- When optional 6-position Multi-Cell or CPS series device is set to be used, the screen showing installation location of the filters appears when the test starts ("Installation of the Filter" P.358).



*1 Spectrum measurement is performed within the range of ±10 nm of the specified test wavelength.

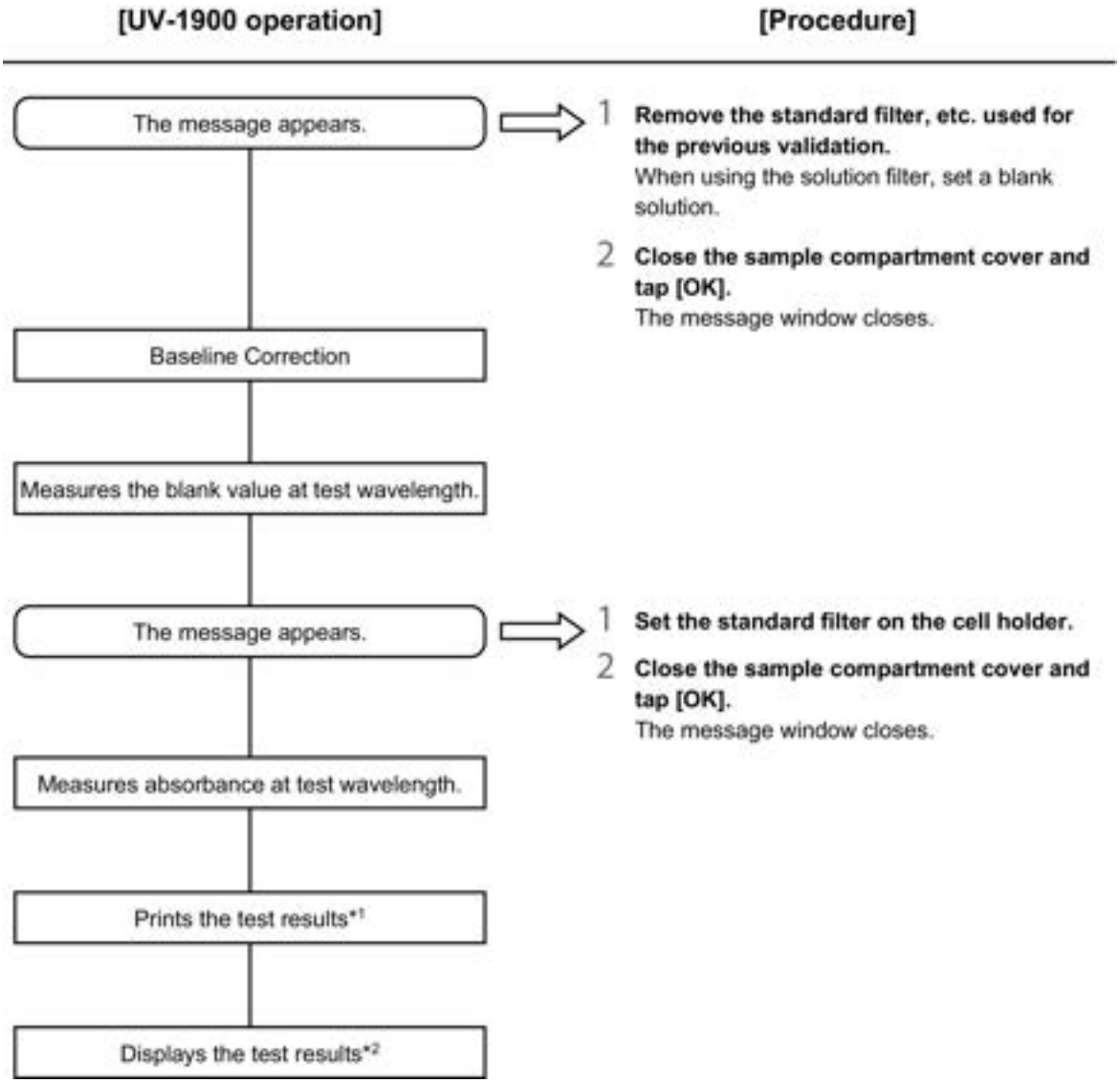
*2 Executed when [Auto Print] is enabled ("17.5 Advanced Settings" P.353).

*3 Executed when [Check Results after Each Test] is enabled ("17.5 Advanced Settings" P.353).

17.7.9 Operation During the Test - [EP] Control of Absorbance

Hint

- To perform tests using multiple filters, perform the following procedures for each filter.
- When optional 6-position Multi-Cell or CPS series device is set to be used, the screen showing installation location of the filters appears when the test starts ("Installation of the Filter" P.358).



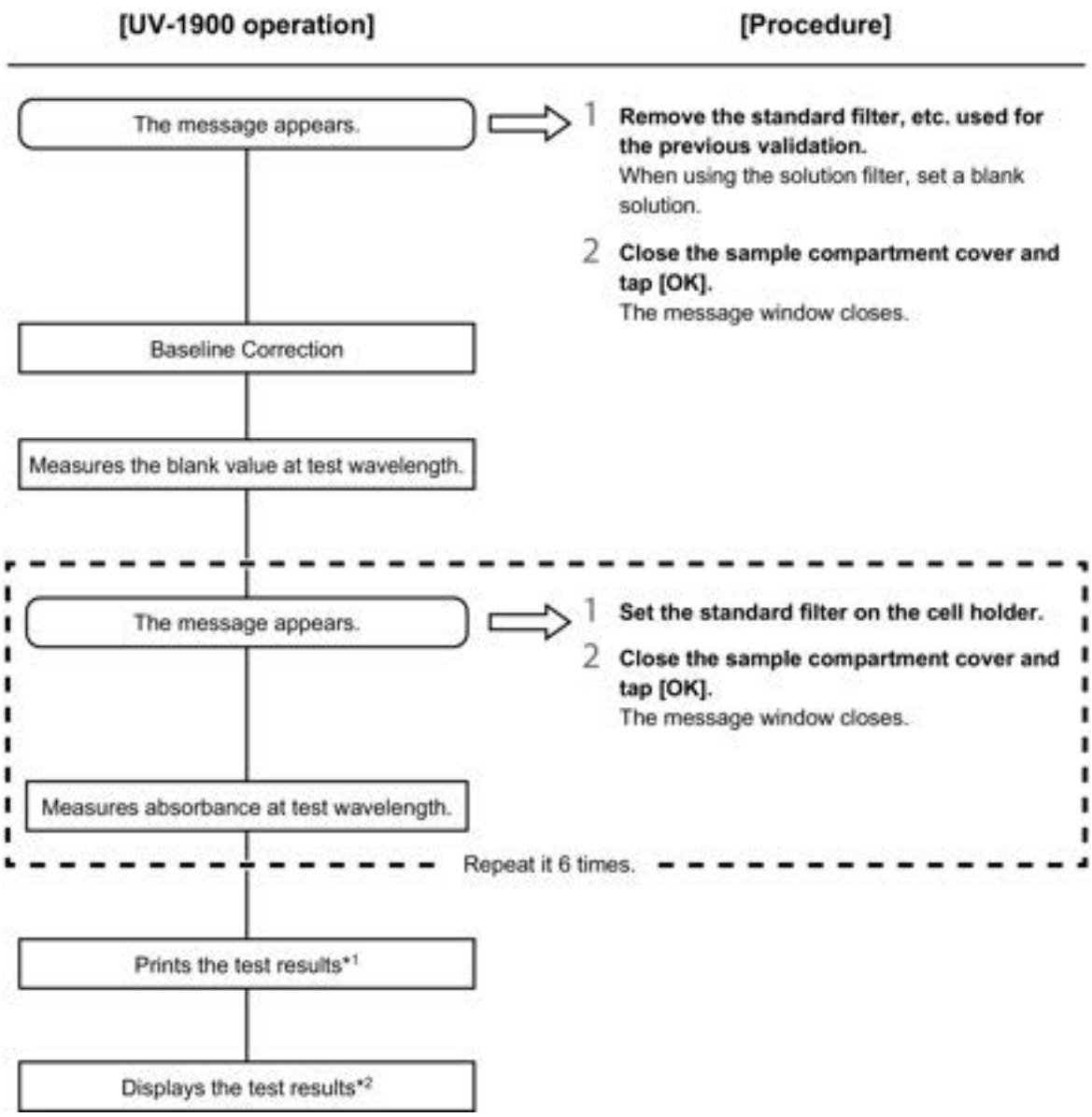
*1 Executed when [Auto Print] is enabled ("17.5 Advanced Settings" P.353).

*2 Executed when [Check Results after Each Test] is enabled ("17.5 Advanced Settings" P.353).

17.7.10 Operation During the Test - [USP] Control of Absorbance

Hint

- To perform tests using multiple filters, perform the following procedures for each filter.
- When optional 6-position Multi-Cell or CPS series device is set to be used, the screen showing installation location of the filters appears when the test starts ("Installation of the Filter" P.358).
  When using the 6-position Multi-Cell or CPS series device, the filter cannot be removed nor inserted.



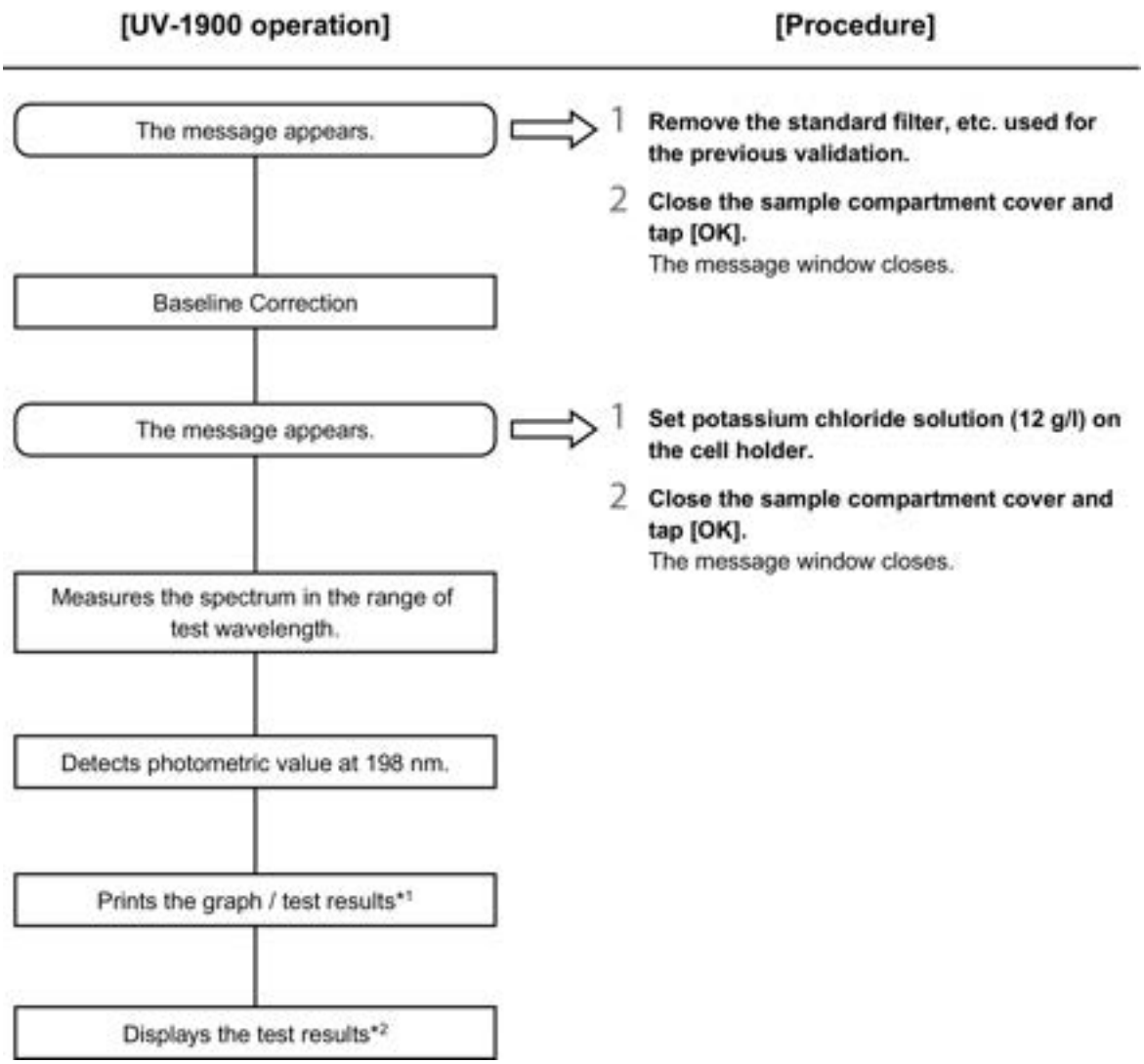
*1 Executed when [Auto Print] is enabled ("17.5 Advanced Settings" P.353).

*2 Executed when [Check Results after Each Test] is enabled ("17.5 Advanced Settings" P.353).

17.7.11 Operation During the Test - [EP] Limit of Stray Light

Hint

- To perform tests using multiple filters, perform the following procedures for each filter.
- When optional 6-position Multi-Cell or CPS series device is set to be used, the screen showing installation location of the filters appears when the test starts ("Installation of the Filter" P.358).



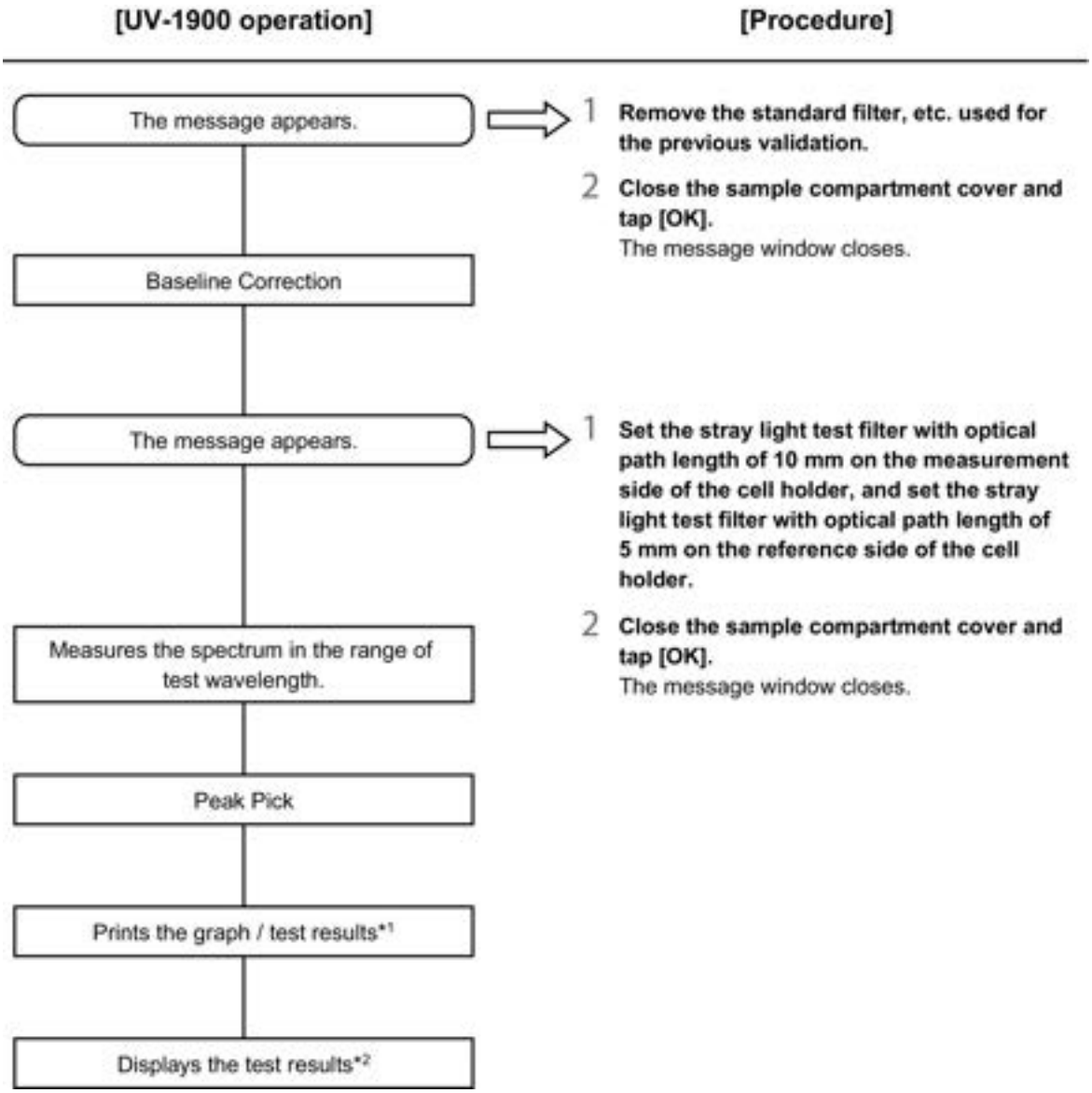
*1 Executed when [Auto Print] is enabled ("17.5 Advanced Settings" P.353).

*2 Executed when [Check Results after Each Test] is enabled ("17.5 Advanced Settings" P.353).

17.7.12 Operation During the Test - [USP] Limit of Stray Light

Hint

- To perform tests using multiple filters, perform the following procedures for each filter.
- When optional 6-position Multi-Cell or CPS series device is set to be used, the screen showing installation location of the filters appears when the test starts ("Installation of the Filter" P.358).



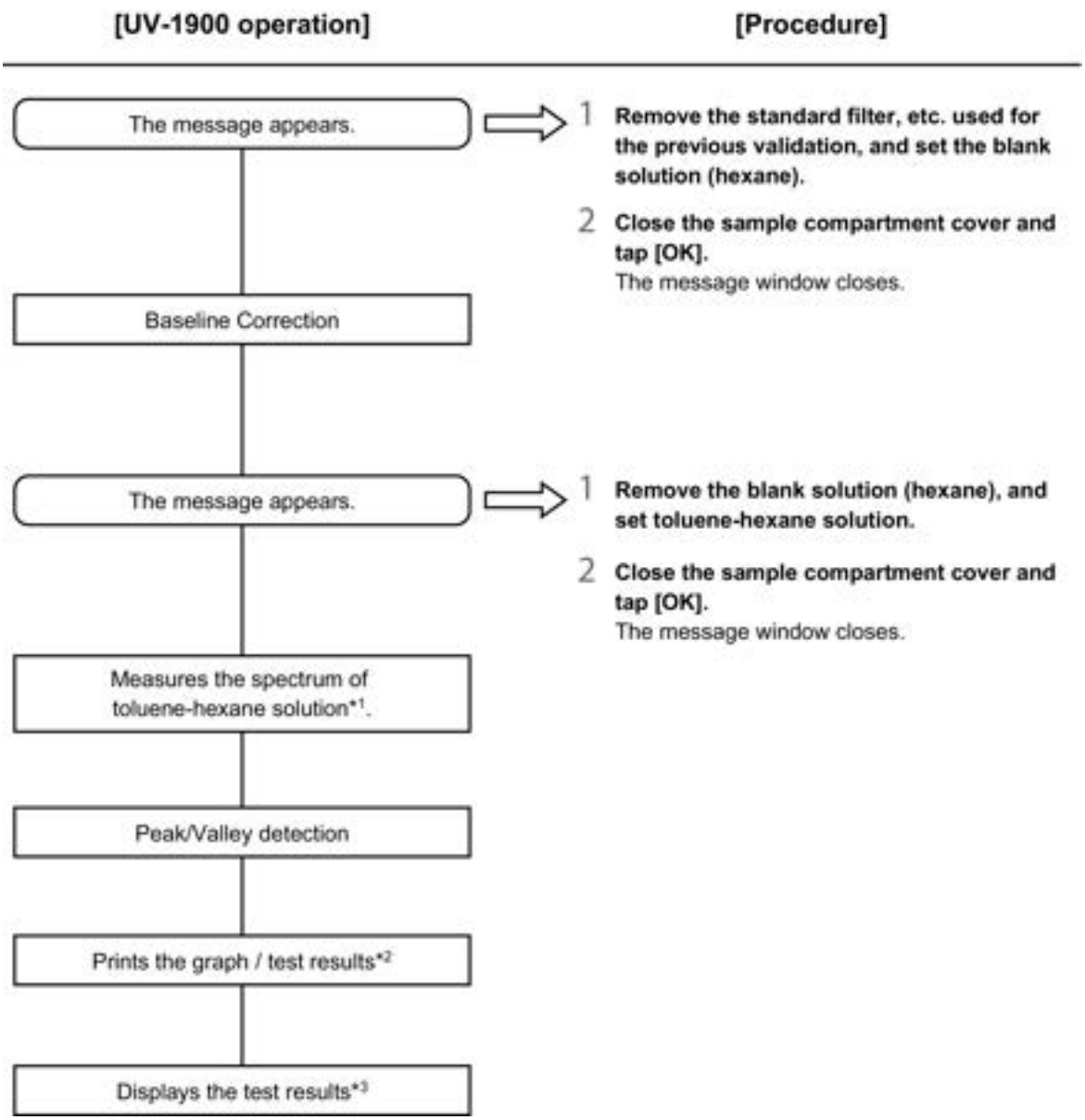
*1 Executed when [Auto Print] is enabled ("17.5 Advanced Settings" P.353).

*2 Executed when [Check Results after Each Test] is enabled ("17.5 Advanced Settings" P.353).

17.7.13 Operation During the Test - [EP] Resolution

Hint

- To perform tests using multiple filters, perform the following procedures for each filter.
- When optional 6-position Multi-Cell or CPS series device is set to be used, the screen showing installation location of the filters appears when the test starts ("Installation of the Filter" P.358).



*1 The range of test wavelength is from 275.0 nm to 265.0 nm.

*2 Executed when [Auto Print] is enabled ("17.5 Advanced Settings" P.353).

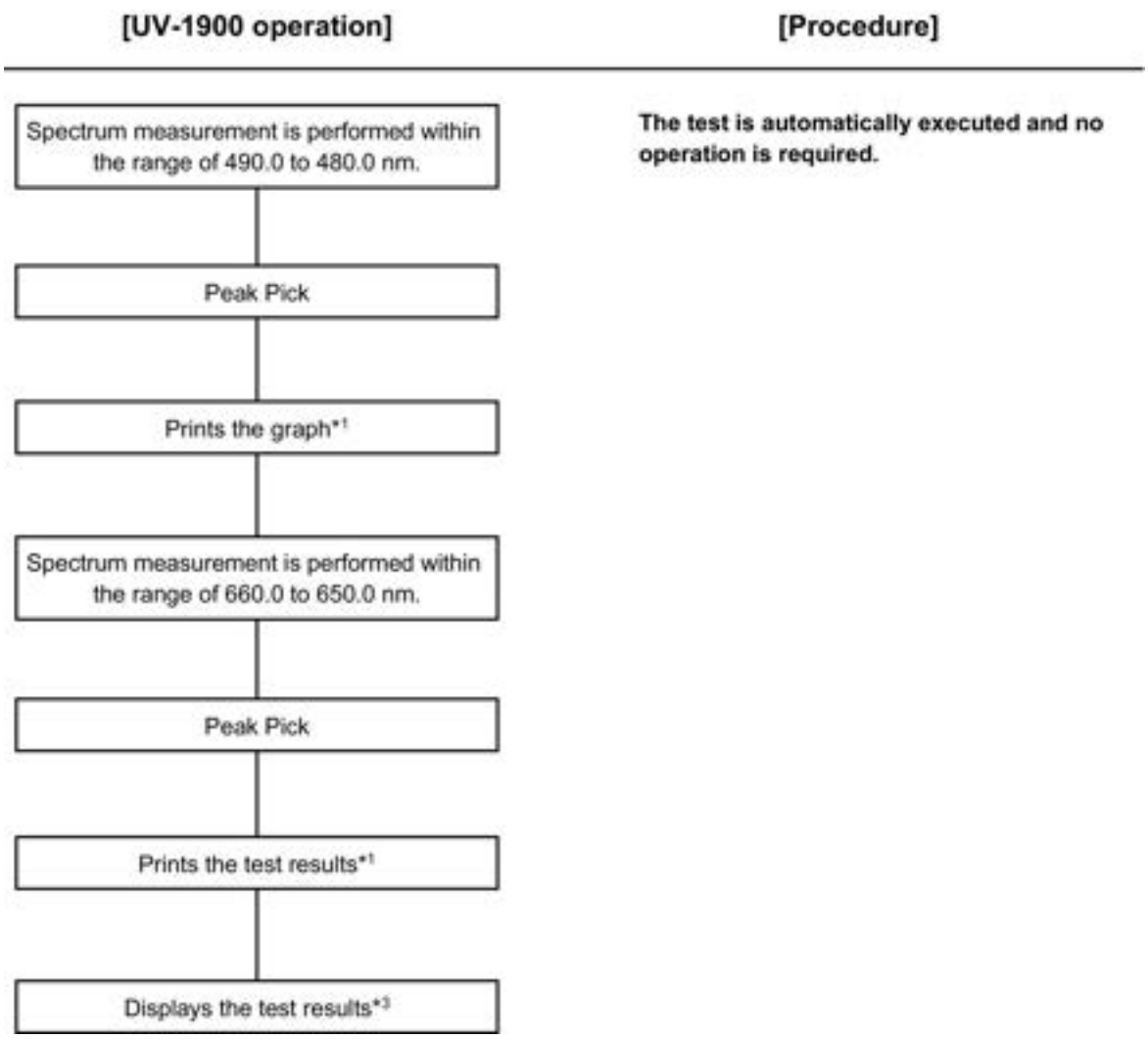
*3 Executed when [Check Results after Each Test] is enabled ("17.5 Advanced Settings" P.353).

17.7.14 Operation During the Test - [USP] Resolution

Operation of the instrument and procedures performed by the operator during the test are the same as those during the test of [EP] Resolution.

Reference "17.7.13 Operation During the Test - [EP] Resolution" P.370

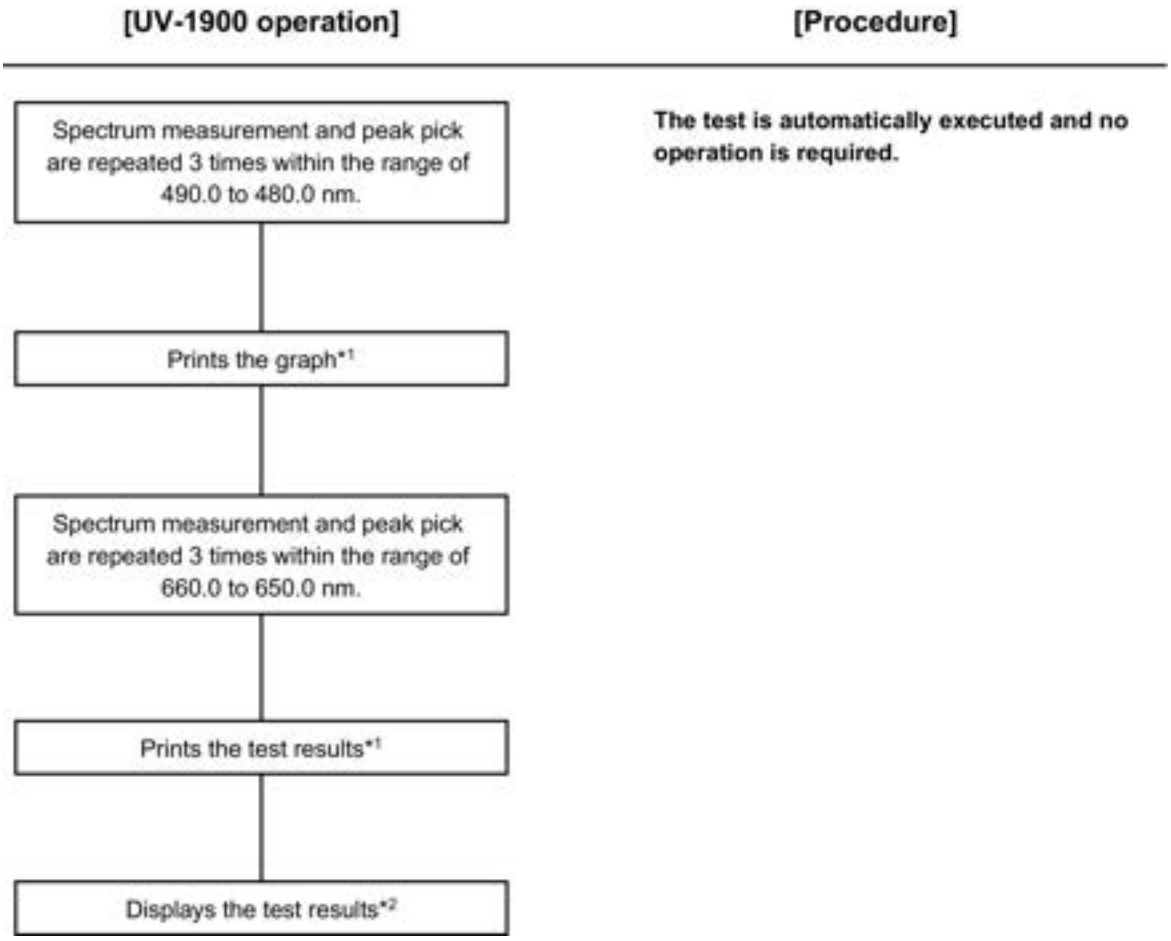
17.7.15 Operation During the Test - [JP] Wavelength Accuracy (D2)



*1 Executed when [Auto Print] is enabled ("17.5 Advanced Settings" P.353).

*2 Executed when [Check Results after Each Test] is enabled ("17.5 Advanced Settings" P.353).

17.7.16 Operation During the Test - [JP] Wavelength Repeatability (D2)

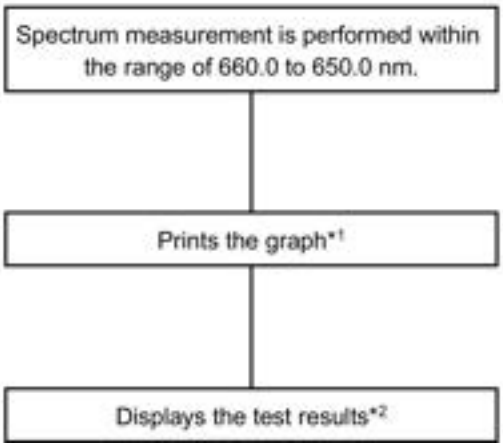


*1 Executed when [Auto Print] is enabled ("17.5 Advanced Settings" P.353).

*2 Executed when [Check Results after Each Test] is enabled ("17.5 Advanced Settings" P.353).

17.7.17 Operation During the Test - Resolution (Spectral Bandwidth)

[UV-1900 operation]



[Procedure]

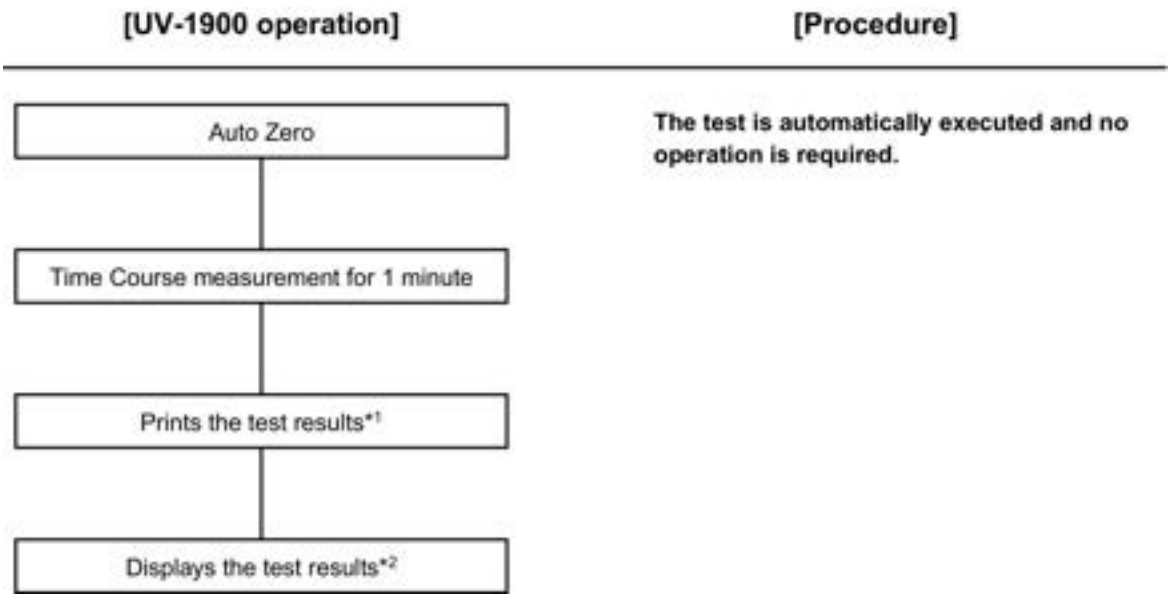
The test is automatically executed and no operation is required.

*1 Executed when [Auto Print] is enabled ("17.5 Advanced Settings" P.353).

*2 Executed when [Check Results after Each Test] is enabled ("17.5 Advanced Settings" P.353).

17.7.18 Operation During the Test - Noise Level

Hint To perform tests using multiple test wavelengths, perform the following procedures for each test wavelength.



*1 Executed when [Auto Print] is enabled ("17.5 Advanced Settings" P.353).

*2 Executed when [Check Results after Each Test] is enabled ("17.5 Advanced Settings" P.353).

17.7.19 Operation During the Test - Baseline Flatness

The test is automatically executed.

However, this test should be performed when the instrument operation is stable, therefore, if 1 hour has not elapsed after the startup initialization is completed, the Waiting screen is displayed when the test is started.

After the displayed time elapsed, the test automatically starts.

To start the test immediately, tap [Continue].

The tests are executed according to the following flow.

[UV-1900 operation]	[Procedure]
Baseline Correction	The test is automatically executed and no operation is required.
Measures the spectrum in the range of test wavelength.	
Prints the test results*1	
Displays the test results*2	

*1 Executed when [Auto Print] is enabled ("17.5 Advanced Settings" P.353).

*2 Executed when [Check Results after Each Test] is enabled ("17.5 Advanced Settings" P.353).

17.7.20 Operation During the Test - Drift (Baseline Stability)

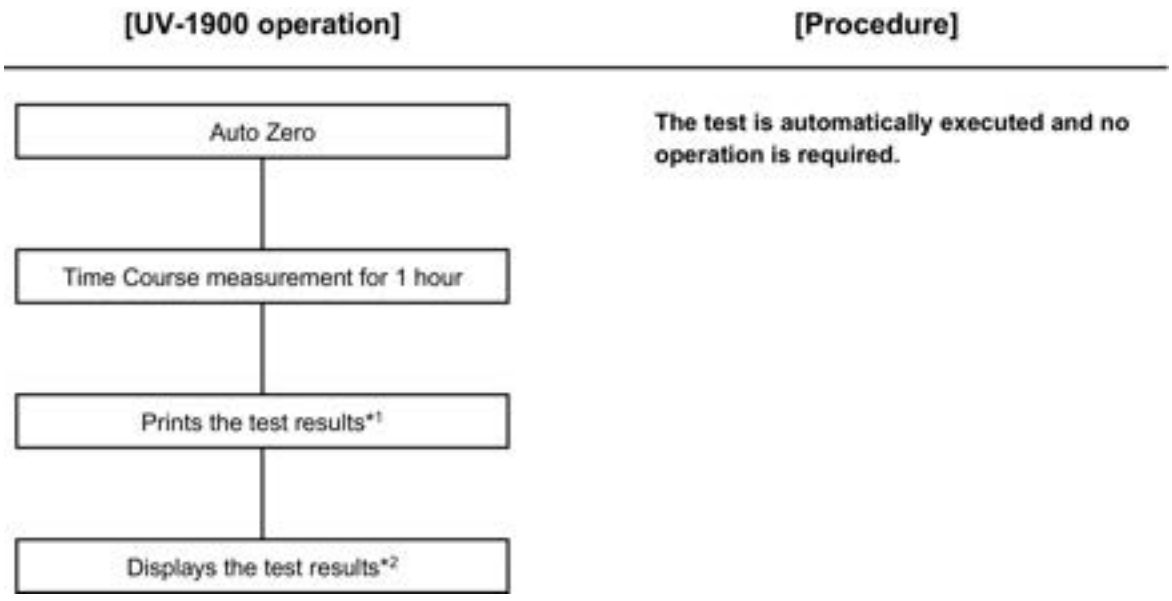
The test is automatically executed.

However, this test should be performed when the instrument operation is stable, therefore, if 1 hour has not elapsed after the startup initialization is completed, the Waiting screen is displayed when the test is started.

After the displayed time elapsed, the test automatically starts.

To start the test immediately, tap [Continue].

The tests are executed according to the following flow.



*1 Executed when [Auto Print] is enabled ("17.5 Advanced Settings" P.353).

*2 Executed when [Check Results after Each Test] is enabled ("17.5 Advanced Settings" P.353).

17.7.21 Operation During the Test - [EP] Control of Wavelengths (D2)

Operation of the instrument during the test are the same as those during the test of [JP] Wavelength Accuracy (D2).

Reference "17.7.15 Operation During the Test - [JP] Wavelength Accuracy (D2)" P.371

17.7.22 Operation During the Test - [USP] Control of Wavelengths (D2)

[UV-1900 operation]	[Procedure]
Spectrum measurement and peak pick are repeated 6 times within the range of 490.0 to 480.0 nm. ↓ Prints the graph*1 ↓ Spectrum measurement and peak pick are repeated 6 times within the range of 660.0 to 650.0 nm. ↓ Prints the test results*1 ↓ Displays the test results*2	**The test is automatically executed and no operation is required.**

*1 Executed when [Auto Print] is enabled ("17.5 Advanced Settings" P.353).

*2 Executed when [Check Results after Each Test] is enabled ("17.5 Advanced Settings" P.353).

17.8 Checking Test Results

You can check the results of completed tests by loading them on the Test Item List (Check Results) screen.

When [Check Results after Each Test] ("17.5 Advanced Settings" P.353) is enabled, the test result is automatically displayed after each test.

In both cases, the same screen is displayed.

This section explains how to display the Test Item List (Check Results) screen and operation procedures.

Hint

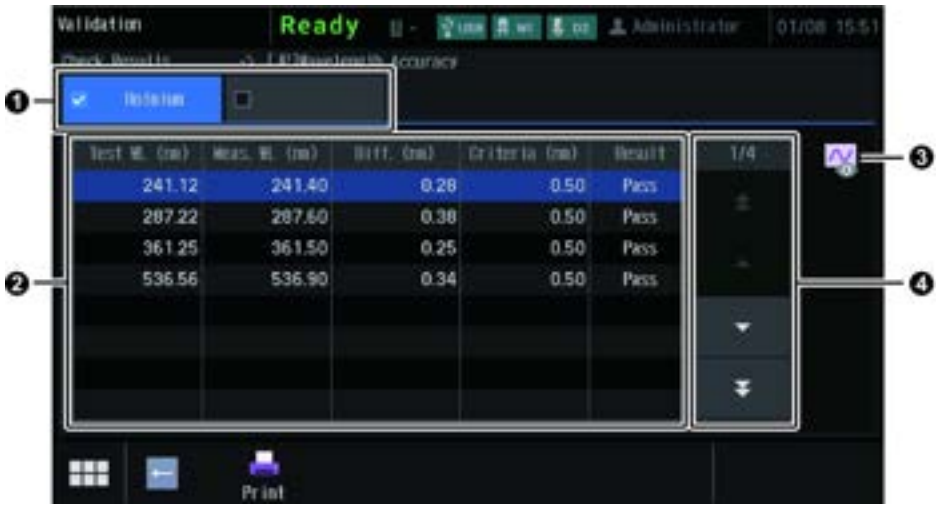
- You also can load and check the results of past tests ("17.9 Saving/Loading Test Files" P.396) by the procedures described below.
- Test results are automatically saved, however, you also can save them as a CSV format file as needed ("17.9.4 Save Test Results as CSV" P.402).

1 Tap [Check Results] on the Validation menu.

2 Select test results.

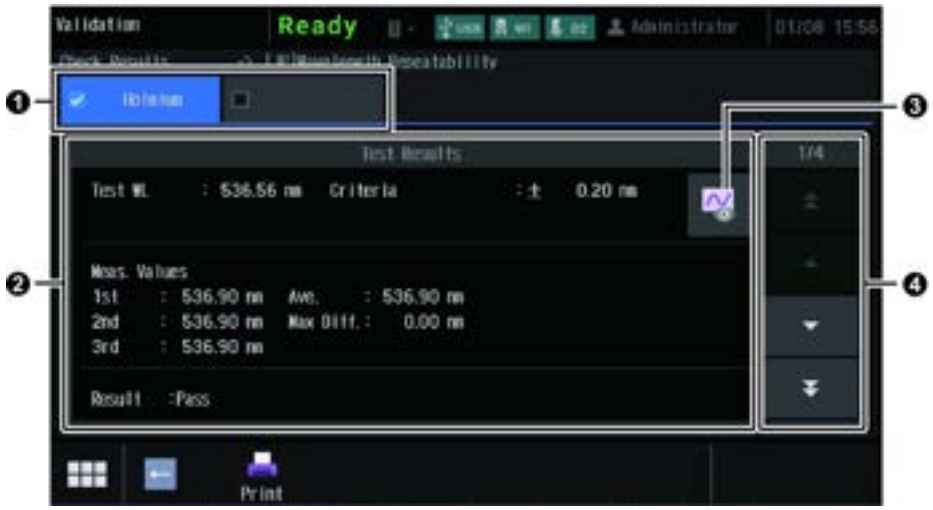
No.	Name	Description
❶	Tab for switching items	The tabs for summary, semi-automatic validation items, and automatic validation items are available. Tap the tab to switch it.
❷	Test items	Tap  to display the results of the test. ▶▶ Reference "17.8.1 Check Results - [JP] Wavelength Accuracy" P.380 to "17.8.21 Check Results - [USP] Control of Wavelengths (D2)" P.395
❸	Page up/down button	Switches the page displaying test items.

17.8.1 Check Results - [JP] Wavelength Accuracy



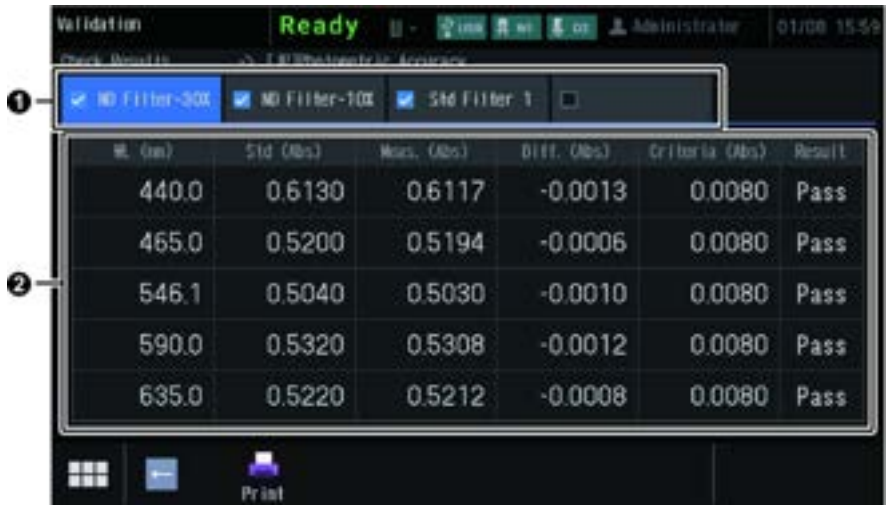
No.	Name	Description
❶	Tab for Switching Screens	The tabs for summary, semi-automatic validation items, and automatic validation items are available. Switches displayed tab.
❷	Test result list	Displays a list of test results. Test result at one wavelength is displayed in one line of the table. The meaning of each item is as follows: • [Test WL (nm)]: The value of set wavelength. • [Meas. WL (nm)]: The value of the wavelength actually detected. • [Diff. (nm)]: The value obtained by subtracting [Test WL (nm)] from [Meas. WL (nm)]. • [Criteria (nm)]: The value of set criteria. • [Result]: When [Diff. (nm)] is within [Criteria (nm)], [Pass] is displayed. If not, [Fail] is displayed.
❸	Graph Display button	Displays the graph of selected test results. Tap [Close] on the Graph screen to return to this screen.
❹	The number of results and page up/down button	Number in the top line shows the ordinal number of selected item and total number of items. The four buttons on the right operate as follows: •  Moves to the previous or next page. •  Selects the previous or next item.

17.8.2 Check Results - [JP] Wavelength Repeatability



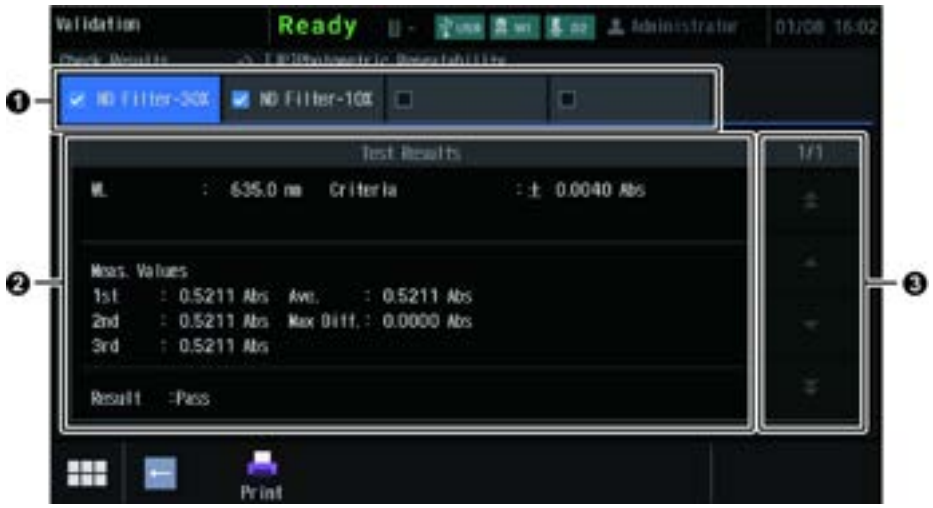
No.	Name	Description
❶	Tab for Switching Screens	Switches displayed tab. In the tab with the same name as the tab on the Test Parameters Setting screen, the results of the test performed under the parameters are displayed.
❷	Test Results	Displays test results. The meaning of each item is as follows: • [Test WL]: The value of set wavelength. • [Criteria]: The value of set criteria. • [Meas. Values]: The value of the wavelength actually detected. Three measurement results are displayed. • [Ave.]: The mean value of three [Meas. Values]. • [Max Diff.]: The maximum deviation. The maximum deviation is defined as the value with the largest absolute value obtained by subtracting [Ave.] from [Meas. Values]. • [Result]: When [Max Diff.] is within [Criteria], [Pass] is displayed. If not, [Fail] is displayed.
❸	Graph Display button	Displays the graph of displayed test results. Tap [Close] on the Graph screen to return to this screen.
❹	The number of results and page up/down button	Number in the top line shows the ordinal number of selected page and total number of pages. The four buttons on the right operate as follows: •  Moves to the previous or next page (by 10 page). •  Moves to the previous or next page (by 1 page).

17.8.3 Check Results - [JP] Photometric Accuracy



No.	Name	Description
❶	Tab for Switching Screens	Switches displayed tab. In the tab with the same name as the tab on the Test Parameters Setting screen, the results of the test performed under the parameters are displayed.
❷	Test result list	Displays a list of test results. Test result at one wavelength is displayed in one line of the table. The meaning of each item is as follows: • [WL (nm)]: The value of set wavelength. • [Std (Abs/%T)]: The standard value indicated on the filter. • [Meas. (Abs/%T)]: The photometric value actually measured. • [Diff. (Abs/%T)]: The value obtained by subtracting [Std (Abs/%T)] from [Meas. (Abs/%T)]. • [Criteria (Abs/%T)]: The value of set criteria. • [Result]: When [Diff. (Abs/%T)] is within [Criteria (Abs/%T)], [Pass] is displayed. If not, [Fail] is displayed.

17.8.4 Check Results - [JP] Photometric Repeatability



No.	Name	Description
❶	Tab for Switching Screens	Switches displayed tab. In the tab with the same name as the tab on the Test Parameters Setting screen, the results of the test performed under the parameters are displayed.
❷	Test Results	Displays test results. The meaning of each item is as follows: • [Wavelength]: The value of set wavelength. • [Criteria]: The value of set criteria. • [Meas. Values]: The value of the photometric value actually detected. Three measurement results are displayed. • [Ave.]: The mean value of three [Meas. Values]. • [Max Diff.]: The maximum deviation. The maximum deviation is defined as the value with the largest absolute value obtained by subtracting [Ave.] from [Meas. Values]. • [Result]: When [Max Diff.] is within [Criteria], [Pass] is displayed. If not, [Fail] is displayed.
❸	The number of results and page up/down button	Number in the top line shows the ordinal number of selected page and total number of pages. The four buttons on the right operate as follows: •  Moves to the first or last page. •  Moves to the previous or next page.

17.8.5 Checking Results - Stray Light

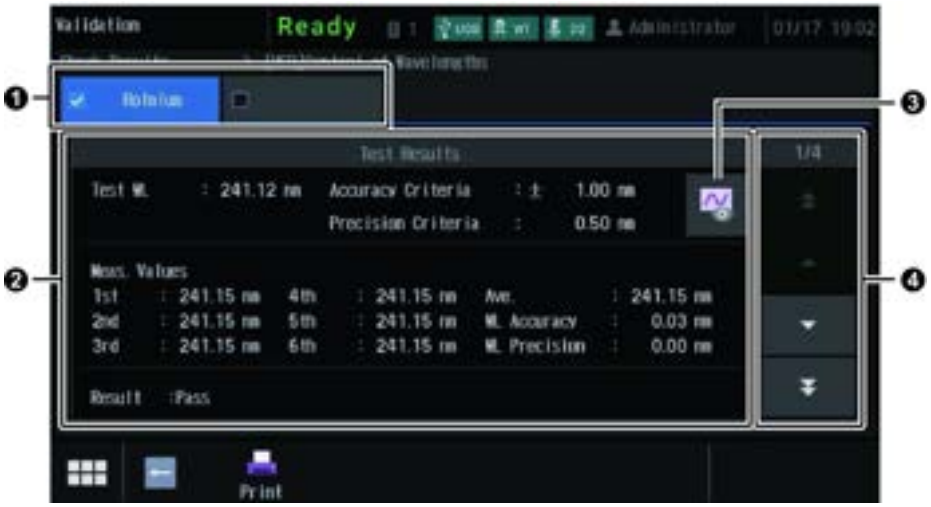
No.	Name	Description
❶	Tab for Switching Screens	Switches displayed tab. In the tab with the same name as the tab on the Test Parameters Setting screen, the results of the test performed under the parameters are displayed.
❷	Test Results	Displays test results. The meaning of each item is as follows: • [Test WL (nm)]: The value of set wavelength. • [Shutter (%T)]: The measurement value of the shutter block. • [Meas. (%T)]: The measurement value of the filter. • [Stray Light (%T)]: The value obtained by subtracting [Meas. (%T)] from [Shutter (%T)]. • [Criteria (%T)]: The value of set criteria. • [Result]: When [Stray Light (%T)] is not greater than [Criteria (%T)], [Pass] is displayed. If not, [Fail] is displayed.

17.8.6 Check Results - [EP] Control of Wavelengths

Test results are displayed in the same way as [JP] Wavelength Accuracy.

Reference "17.8.1 Check Results - [JP] Wavelength Accuracy" P.380

17.8.7 Check Results - [USP] Control of Wavelengths



No.	Name	Description
❶	Tab for Switching Screens	Switches displayed tab. In the tab with the same name as the tab on the Test Parameters Setting screen, the results of the test performed under the parameters are displayed.
❷	Test Results	Displays test results. The meaning of each item is as follows: • [Test WL]: The value of set wavelength. • [WL Accuracy Criteria]: The value of set WL Accuracy criteria. • [WL Precision Criteria]: The value of set WL Precision criteria. • [Meas. Values]: The value of the wavelength actually detected. • [Ave.]: The average of detected wavelengths. • [WL Accuracy]: The value obtained by subtracting [Test WL] from [Ave.]. • [WL Precision]: The standard deviation of [Ave.]. • [Result]: When [WL Accuracy] is within [WL Accuracy Criteria] and [WL Precision] is within [WL Precision Criteria], [Pass] is displayed. If not, [Fail] is displayed.
❸	Graph Display button	Displays the graph of displayed test results. Tap [Close] on the Graph screen to return to this screen.
❹	The number of results and page up/down button	Number in the top line shows the ordinal number of selected page and total number of pages. The four buttons on the right operate as follows: •  Moves to the previous or next page (by 10 page). •  Moves to the previous or next page (by 1 page).

17.8.8 Check Results - [EP] Control of Absorbance

Test results are displayed in the same way as [JP] Photometric Accuracy.

Reference "17.8.3 Check Results - [JP] Photometric Accuracy" P.382

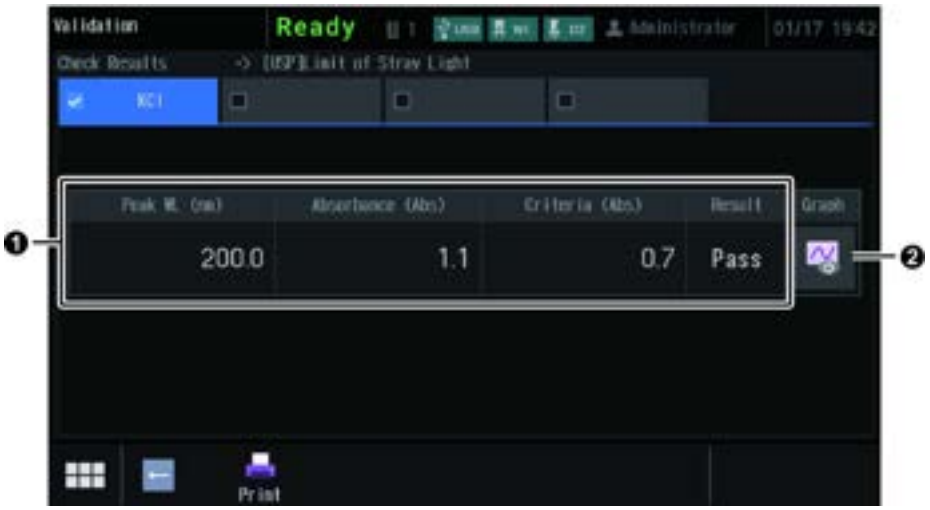
17.8.9 Check Results - [USP] Control of Absorbance

No.	Name	Description
❶	Tab for Switching Screens	Switches displayed tab. In the tab with the same name as the tab on the Test Parameters Setting screen, the results of the test performed under the parameters are displayed.
❷	Test Results	Displays test results. The meaning of each item is as follows: • [Wavelength]: The value of set wavelength. • [Std]: The set standard value. • [Abs Accuracy Criteria]: The value of set Abs Accuracy criteria. • [Abs Precision Criteria]: The value of set Abs Precision criteria. • [Meas. Values]: The value of the wavelength actually detected. • [Abs Accuracy]: The value obtained by subtracting the standard value from the first measurement value. • [Abs Precision]: The standard deviation of the 6th measurement value. • [Result]: When [Abs Accuracy] is within [Abs Accuracy Criteria] and [Abs Precision] is within [Abs Precision Criteria], [Pass] is displayed. If not, [Fail] is displayed.
❸	The number of results and page up/down button	Number in the top line shows the ordinal number of selected page and total number of pages. The four buttons on the right operate as follows: •  Moves to the first or last page. •  Moves to the previous or next page.

17.8.10 Check Results - [EP] Limit of Stray Light

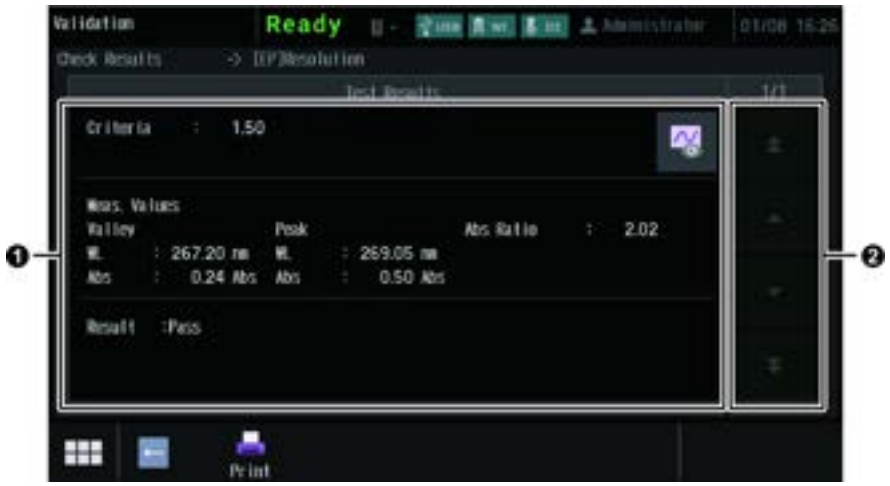
No.	Name	Description
❶	Test Results	Displays test results. The meaning of each item is as follows: • [Test WL (nm)]: The value of set wavelength. It is fixed at 198.0 nm. • [Absorbance (Abs)]: The absorbance at 198.0 nm. • [Criteria (Abs)]: The value of set criteria. • [Result]: When [Absorbance (Abs)] is more than [Criteria (Abs)], [Pass] is displayed. If not, [Fail] is displayed.
❷	Graph Display button	Displays the graph of test results. Tap [Close] on the Graph screen to return to this screen.

17.8.11 Check Results - [USP] Limit of Stray Light



No.	Name	Description
❶	Test Results	Displays test results. The meaning of each item is as follows: • [Peak WL (nm)]: The value of peak wavelength of obtained spectrum. • [Absorbance (Abs)]: The value of peak absorbance of obtained spectrum. • [Criteria (Abs)]: The value of set criteria. • [Result]: When [Absorbance (Abs)] is not less than [Criteria (Abs)], [Pass] is displayed. If not, [Fail] is displayed.
❷	Graph Display button	Displays the graph of test results. Tap [Close] on the Graph screen to return to this screen.

17.8.12 Check Results - [EP] Resolution



No.	Name	Description
❶	Test Results	Displays test results. The meaning of each item is as follows: • [Criteria]: The value of set criteria. • [Meas. Values]: The value of the wavelength and absorbance actually detected. • [Valley]: The value of the wavelength and absorbance at the valley. • [Peak]: The value of the wavelength and absorbance at the peak. • [Abs Ratio]: The value of absorbance ratio. • [Result]: When [Abs Ratio] is not less than [Criteria], [Pass] is displayed. If not, [Fail] is displayed.
❷	The number of results and page up/down button	Number in the top line shows the ordinal number of selected page and total number of pages. The four buttons at the right operate as follows: •  Moves to the first or last page. •  Moves to the previous or next page.

17.8.13 Check Results - [USP] Resolution

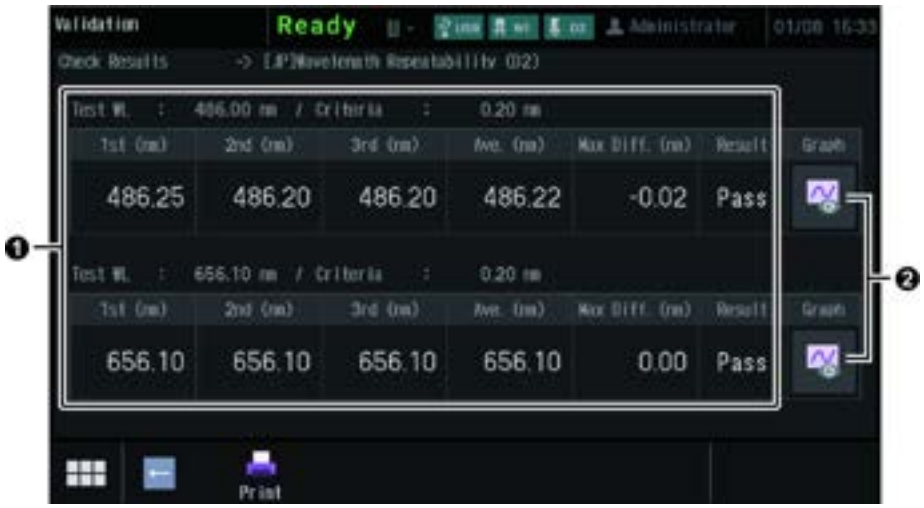
Test results are displayed in the same way as [EP] Resolution.

Reference "17.8.12 Check Results - [EP] Resolution" P.389

17.8.14 Check Results - [JP] Wavelength Accuracy (D2)

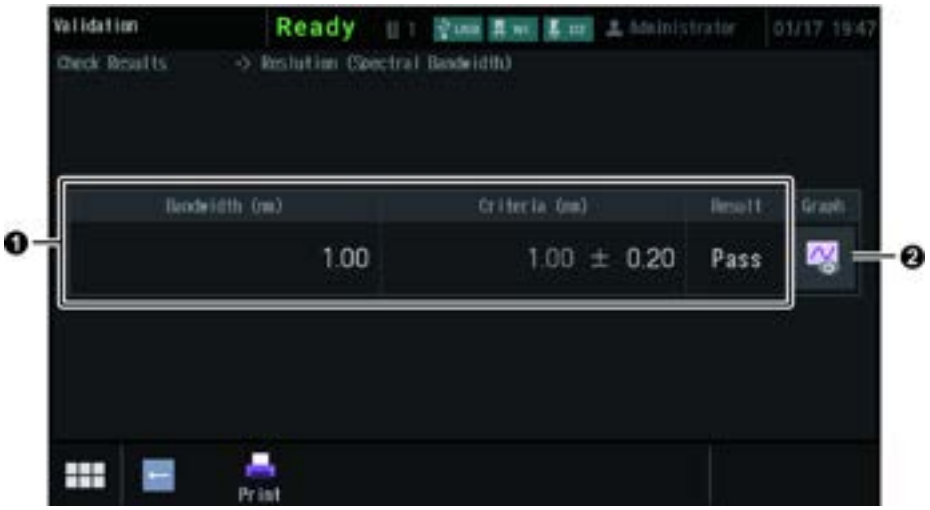
No.	Name	Description
❶	Test Results	Displays test results. Test result at one wavelength is displayed in one line of the table. The meaning of each item is as follows: • [Test WL (nm)]: The value of set wavelength. It is fixed at 486.0 nm or 656.1 nm. • [Meas. WL (nm)]: The value of the wavelength actually detected. • [Diff. (nm)]: The value obtained by subtracting [Test WL (nm)] from [Meas. WL (nm)]. • [Criteria (nm)]: The value of set criteria. • [Result]: When [Diff. (nm)] is within [Criteria (nm)], [Pass] is displayed. If not, [Fail] is displayed.
❷	Graph Display button	Displays the graph of test results. Tap [Close] on the Graph screen to return to this screen.

17.8.15 Check Results - [JP] Wavelength Repeatability (D2)



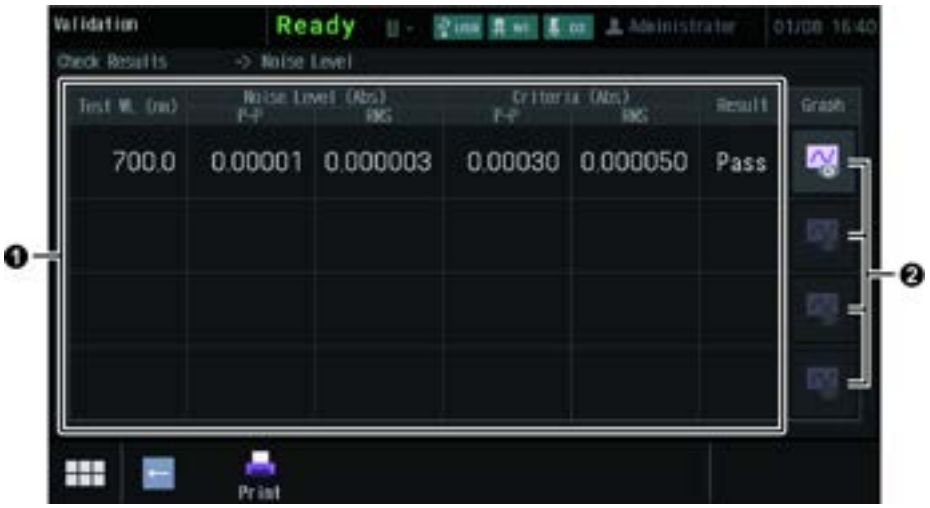
No.	Name	Description
❶	Test Results	Displays test results. The upper and lower tables include test results at 486.0 nm and 656.1 nm, respectively. The meaning of each item is as follows: • [Test WL: / Criteria:]: The values of the test wavelength and criteria. • [1st (to 3rd) (nm)]: The value obtained by subtracting test wavelength from the wavelength detected in each measurement. • [Ave. (nm)]: The average of wavelengths detected in measurements. • [Max Diff. (nm)]: The maximum deviation. The maximum deviation is defined as the value with the largest absolute value obtained by subtracting [Ave.] from the wavelength detected in measurements. • [Result]: When [Max Diff.] is within [Criteria], [Pass] is displayed. If not, [Fail] is displayed.
❷	Graph Display button	Displays the graph of test results. Tap [Close] on the Graph screen to return to this screen.

17.8.16 Check Results - Resolution (Spectral Bandwidth)



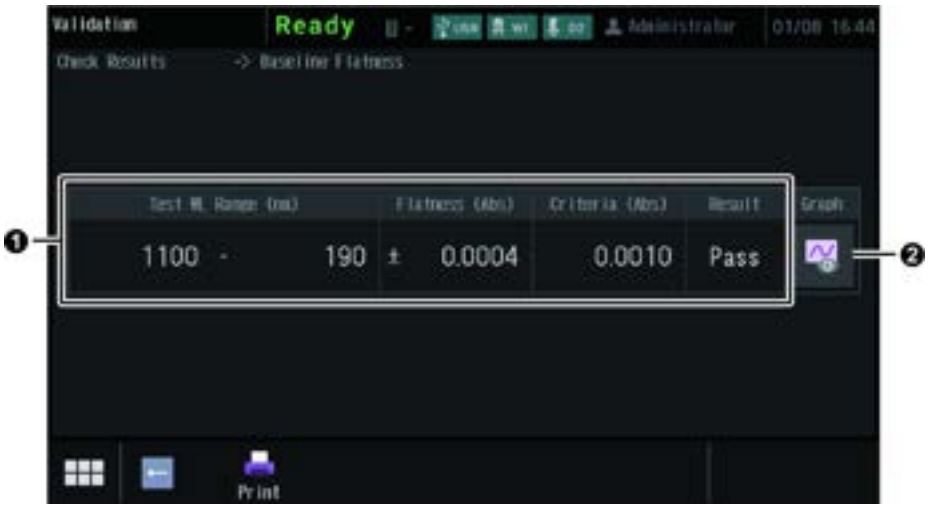
No.	Name	Description
❶	Test Results	Displays test results. The meaning of each item is as follows: • [Bandwidth (nm)]: The value of measured half bandwidth. • [Criteria (nm)]: The value of set criteria. • [Result]: When [Bandwidth (nm)] is within [Criteria (nm)], [Pass] is displayed. If not, [Fail] is displayed.
❷	Graph Display button	Displays the graph of test results. Tap [Close] on the Graph screen to return to this screen.

17.8.17 Check Results - Noise Level



No.	Name	Description
❶	Test Results	Displays test results. Test result at one wavelength is displayed in one line of the table. The meaning of each item is as follows: • [Test WL (nm)]: The value of set wavelength. • [Noise Level (Abs)]: The P-P value and RMS value calculated from measurement results. • [Criteria (Abs)]: The values of set [(P-P) Criteria] and [(RMS) Criteria]. • [Result]: When the P-P value and RMS value in [Noise level (Abs)] are not greater than the corresponding [Criteria (Abs)], [Pass] is displayed. If not, [Fail] is displayed.
❷	Graph Display button	Displays the graph of test results. Tap [Close] on the Graph screen to return to this screen.

17.8.18 Check Results - Baseline Flatness



No.	Name	Description
❶	Test Results	Displays test results. The meaning of each item is as follows: • [Test WL Range (nm)]: The value of set starting and ending wavelengths. • [Flatness (Abs)]: The measured flatness. • [Criteria (Abs)]: The value of set criteria. • [Result]: When [Flatness (Abs)] is within [Criteria (Abs)], [Pass] is displayed. If not, [Fail] is displayed.
❷	Graph Display button	Displays the graph of test results. Tap [Close] on the Graph screen to return to this screen.

17.8.19 Check Results - Drift (Baseline Stability)

No.	Name	Description
❶	Test Results	Displays test results. Test result at one wavelength is displayed in one line of the table. The meaning of each item is as follows: • [Test WL (nm)]: The value of set wavelength. • [Drift (Abs/H)]: The drift value calculated from measurement results. • [Criteria (Abs/H)]: The value of set criteria. • [Result]: When [Drift (Abs/H)] is not greater than [Criteria (Abs)], [Pass] is displayed. If not, [Fail] is displayed.
❷	Graph Display button	Displays the graph of test results. Tap [Close] on the Graph screen to return to this screen.

17.8.20 Check Results - [EP] Control of Wavelengths (D2)

Test results are displayed in the same way as [JP] Wavelength Accuracy (D2).

Reference "17.8.14 Check Results - [JP] Wavelength Accuracy (D2)" P.390

17.8.21 Check Results - [USP] Control of Wavelengths (D2)

Test results are displayed in the same way as [USP] Control of Wavelengths. However, data only at 486.0 nm and 656.1 nm is displayed.

Reference "17.8.7 Check Results - [USP] Control of Wavelengths" P.385

17.9 Saving/Loading Test Files

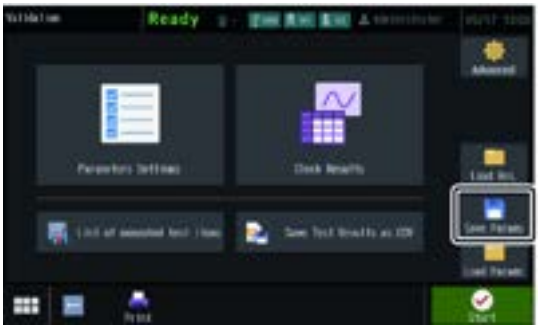
Two types of files are used for the Validation function: "Test Parameters File", which stores the settings of test parameters and advanced settings, and "Test Results File", which stores test results.

- Test Parameters File is manually saved by tapping [Save Params].
- Test Results File is automatically saved after the test, and you also can save it as a CSV format file as needed.
- To load saved files, tap [Load Params] or [Load Res.].

17.9.1 Saving Test Parameters File

Test Parameters File includes which test is set to be executed, the setting of each test, and advanced settings.

1 **Tap [Save Params] on the Validation menu.**



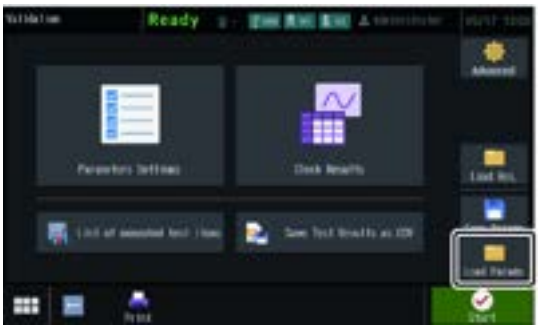
2 Specify the name and destination of the file to be saved.

No.	Name	Description
❶	[Location]	Specifies the destination location of the file. Tap it to select [Built-in Memory], [USB Memory], or [Expanded Memory]. When [USB Memory] or [Expanded Memory] is selected, the file is saved in the following directory. • Test parameters file: \UV1900\ValMethod • Test results file: \UV1900\ValResult
❷	[File Name]	Specify the name of the file to be saved. Tap the input field to display text input screen ("4.2.1 Text Input Screen (Keyboard)" P.27).
❸	[Save]	Saves the file and closes the window.
❹	[Close]	Stops saving the file and closes the window.

17.9.2 Loading Test Parameters File

You can load saved test parameters.
The current test parameters will be overwritten by loaded parameters.

1 **Tap [Load Params] on the Validation menu.**



2 **Select and load a file.**

No.	Name	Description
❶	[Location]	Specify the location of the file to be loaded. You can select [Built-in Memory], [USB Memory], or [Expanded Memory].
❷	File List	Saved files are listed. Selected file is highlighted in blue.
❸	The number of results and selection/page button	Number in the top line shows the ordinal number of selected file and total number of files. The four buttons on the right operate as follows: •  Moves to the previous or next page when the list continues for more than one page. •  Selects the previous or next file.

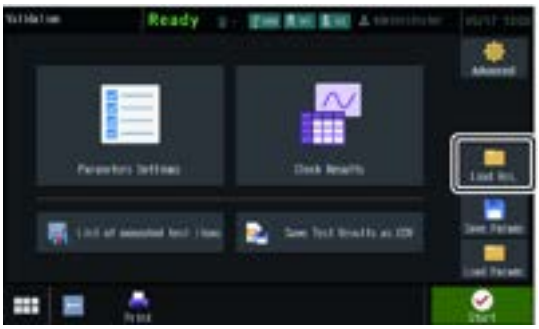
No.	Name	Description
❹	Graph Display button	Displays the graph. This button is enabled when curve data file is selected.
❺	Preview button	Displays the details of the selected file.
❻	Multiple Selection button	Tap this button to enable the function (highlighted in blue) to select multiple files. Tap a selected file to cancel the selection when multiple files are selected.
❼	Copy (File) button	Copy selected file to the other location. • When not using the expanded memory Files in the built-in memory are copied to a USB memory and files in a USB memory are copied to the built-in memory. • When using the expanded memory Specify the destination. You can select [Built-in Memory], [USB Memory], or [Expanded Memory]. Tap the destination to copy selected file to the destination. NOTE Copied file cannot be saved in the same directory as the original file.
❽	Delete button	Deletes the selected file.
❾	[Close]	Closes the window.
❿	[Open]	Loads the file selected in the File List and returns to the Validation menu.

The test parameters are overwritten by loaded file.

17.9.3 Loading Test Results File

You can load saved test results.
The current test results will be overwritten by loaded file.

1 **Tap [Load Res.] on the Validation menu.**



2 **Select and load a file.**

No.	Name	Description
❶	[Location]	Specify the location of the file to be loaded. You can select [Built-in Memory], [USB Memory], or [Expanded Memory].
❷	File List	Saved files are listed. Selected file is highlighted in blue.
❸	The number of results and selection/page button	Number in the top line shows the ordinal number of selected file and total number of files. The four buttons on the right operate as follows: •  Moves to the previous or next page when the list continues for more than one page. •  Selects the previous or next file.

No.	Name	Description
❹	Graph Display button	Displays the graph. This button is enabled when curve data file is selected.
❺	Preview button	Displays the details of the selected file.
❻	Multiple Selection button	Tap this button to enable the function (highlighted in blue) to select multiple files. Tap a selected file to cancel the selection when multiple files are selected.
❼	Copy (File) button	Copy selected file to the other location. • When not using the expanded memory Files in the built-in memory are copied to a USB memory and files in a USB memory are copied to the built-in memory. • When using the expanded memory Specify the destination. You can select [Built-in Memory], [USB Memory], or [Expanded Memory]. Tap the destination to copy selected file to the destination. NOTE Copied file cannot be saved in the same directory as the original file.
❽	Delete button	Deletes the selected file.
❾	[Close]	Closes the window.
❿	[Open]	Loads the file selected in the File List and returns to the Validation menu.

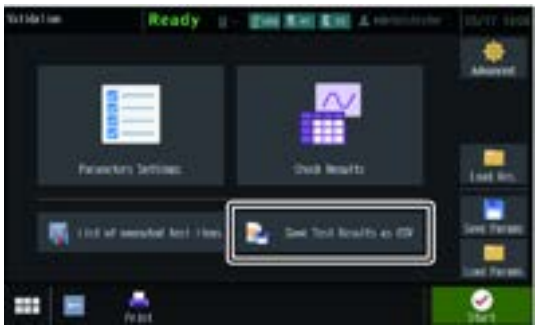
The test results are overwritten by loaded file.

17.9.4 Save Test Results as CSV

Converts the test results to a text file in a CSV format and saves it in a USB memory or expanded memory.

CSV format files can be copied to the PC and used on any commercially available software that supports CSV format.

1 **Tap [Save Test Results as CSV] on the Validation menu.**



2 **(Only when the expanded memory is used) Tap the destination.**

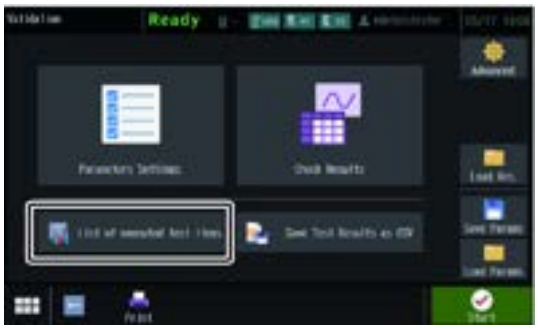
A CSV format file is saved in the following directory in the USB memory or expanded memory.

\UV1900\ValResult

17.9.5 Executed Test List

Displays a list of the executed tests.

The items checked on the Test Item List (Parameters Settings) screen are displayed in a list.



17.10 Printing Test Results

The following three methods are available to print test results.

- Enable [Auto Print] ("17.5 Advanced Settings" P.353) to automatically print test results after each test.
- Manually print test results while the test results are displayed ("17.10.1 Test Data Print (Each Test)" P.404).
- Manually print all test results on the Validation menu ("17.10.2 Test Data Print (All Data)" P.405).

Reference For examples of print format, see "17.10.3 Examples of Test Result Printing" P.406.

17.10.1 Test Data Print (Each Test)

You can print test results while the test results are displayed.

1 **Tap [Print].**

2 **Tap [Test data].**

The test results are printed.

17.10.2 Test Data Print (All Data)

You can print all test results on the Validation menu.

The latest results of each test are printed. When the test file is loaded after the latest test ("17.9.2 Loading Test Parameters File" P.398), the loaded test results are printed.

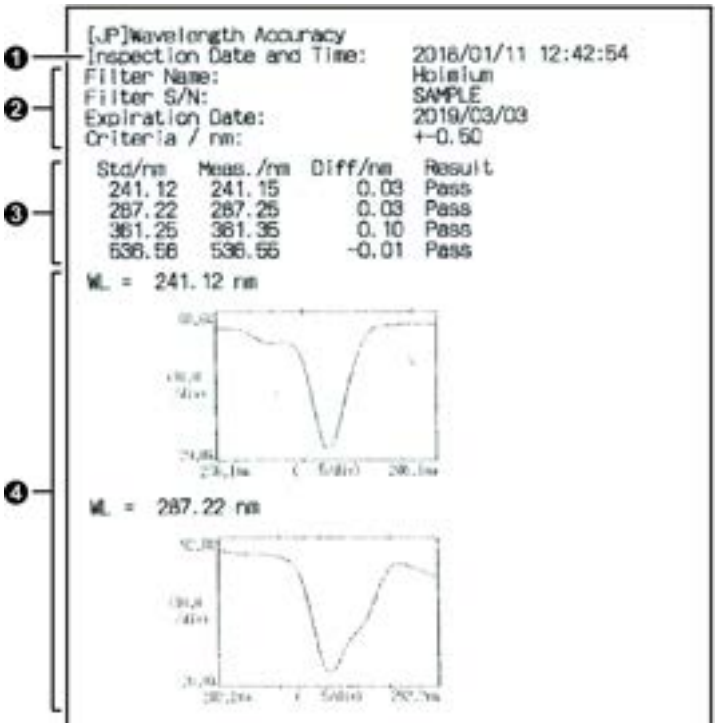
1 **Tap [Print].**

2 **Tap [All test data].**

All test results are printed.

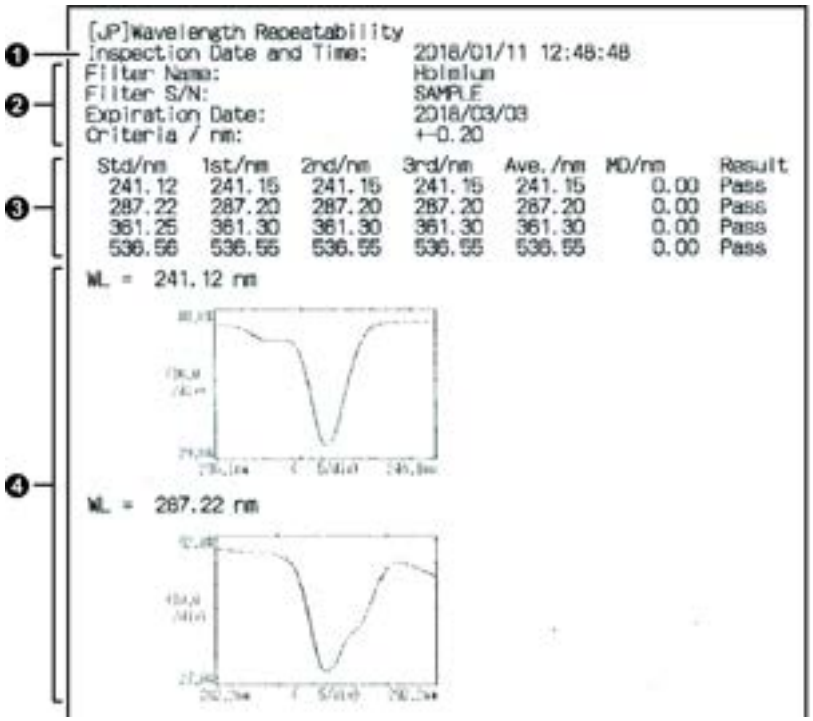
17.10.3 Examples of Test Result Printing

■ Printing example - [JP] Wavelength Accuracy



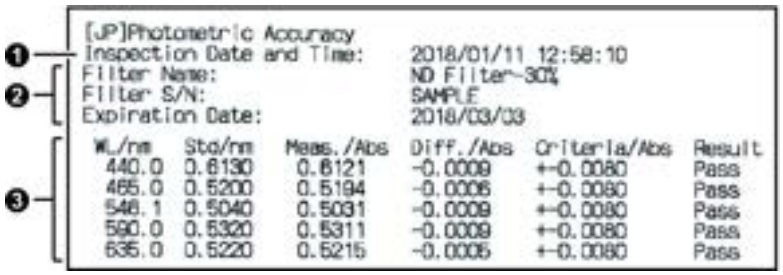
No.	Name	Description
❶	Date and time	The date and time when the test is executed are printed.
❷	Test parameters	Set test parameters are printed.
❸	Test Results	The test results are printed. When "Diff/nm" is within the range of "Criteria/nm", "Pass" is printed. If not, ">>Fail<<" is printed.
❹	Graph	The graph of the test results is printed.

■ Printing example - [JP] Wavelength Repeatability



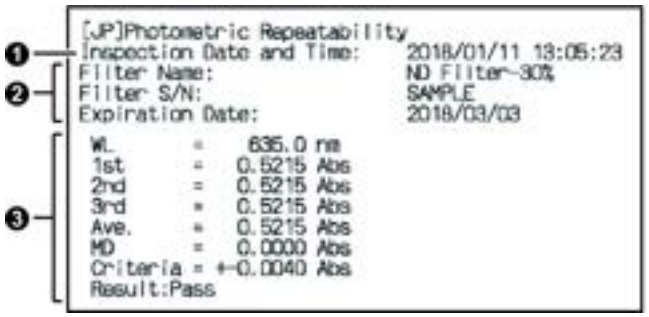
No.	Name	Description
❶	Date and time	The date and time when the test is executed are printed.
❷	Test parameters	Set test parameters are printed.
❸	Test Results	The test results are printed. When "MD/nm" is within the range of "Criteria/nm", "Pass" is printed. If not, ">>Fail<<" is printed.
❹	Graph	The graph of the test results is printed.

■ Printing example- [JP] Photometric Accuracy



No.	Name	Description
❶	Date and time	The date and time when the test is executed are printed.
❷	Test parameters	Set test parameters are printed.
❸	Test Results	The test results are printed. When "Diff./XX" is within the range of "Criteria/XX", "Pass" is printed. If not, ">>Fail<<" is printed.

■ Printing example - [JP] Photometric Repeatability

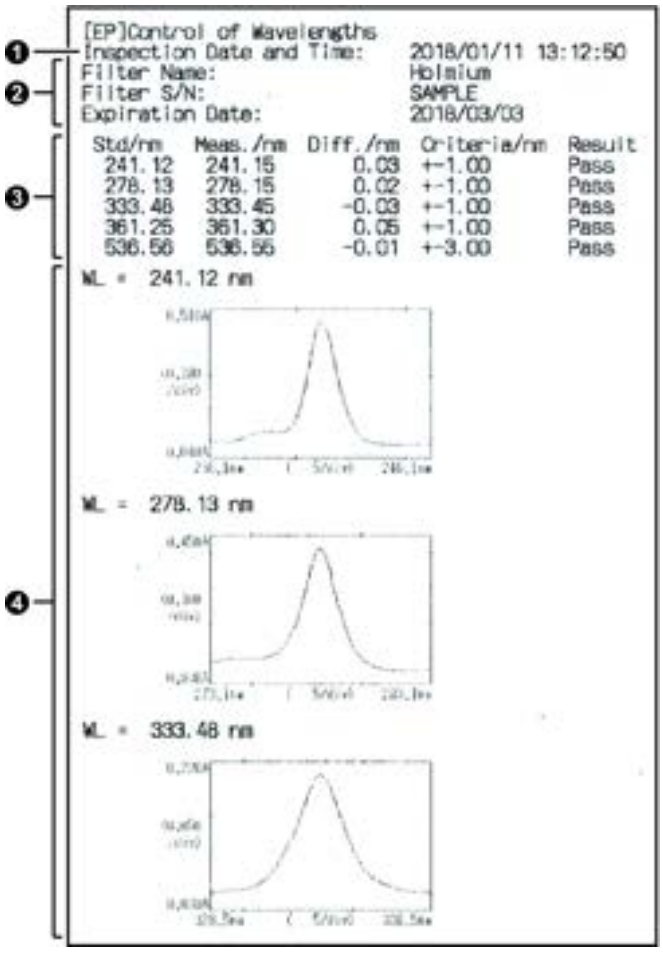


No.	Name	Description
❶	Date and time	The date and time when the test is executed are printed.
❷	Test parameters	Set test parameters are printed.
❸	Test Results	The test results are printed. When "MD" is within the range of "Criteria", "Pass" is printed. If not, ">>Fail<<" is printed.

■ Printing example - Stray Light

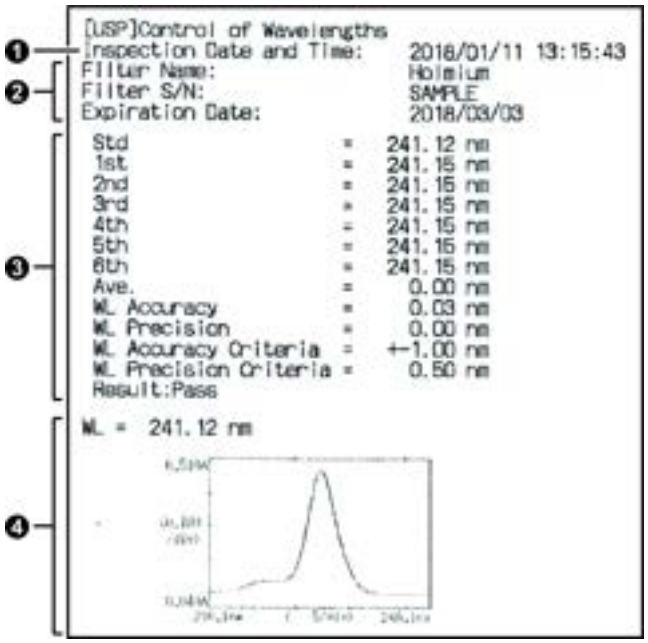
No.	Name	Description
❶	Date and time	The date and time when the test is executed are printed.
❷	Test parameters	Set test parameters are printed.
❸	Test Results	The test results are printed. When "Stray/%T" is not greater than "Criteria/%T", "Pass" is printed. If not, ">>Fail<<" is printed.

■ Printing example - [EP] Control of Wavelengths



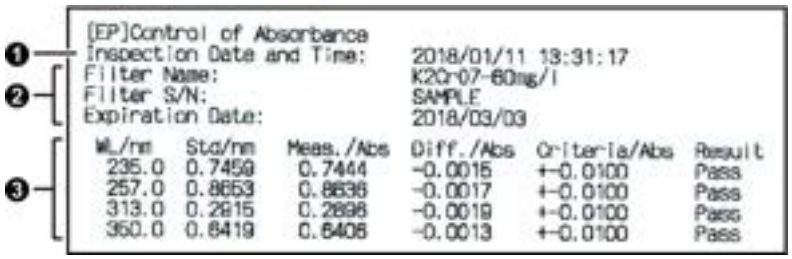
No.	Name	Description
❶	Date and time	The date and time when the test is executed are printed.
❷	Test parameters	Set test parameters are printed.
❸	Test Results	The test results are printed. When "Diff./nm" is within the range of "Criteria/nm", "Pass" is printed. If not, ">>Fail<<" is printed.
❹	Graph	The graph of the test results is printed.

■ Printing example - [USP] Control of Wavelengths



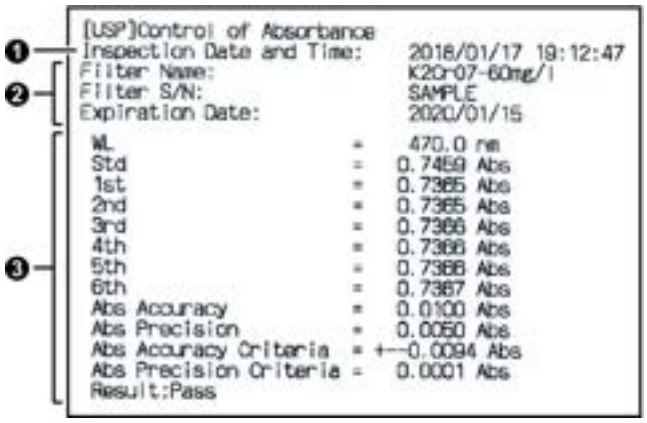
No.	Name	Description
❶	Date and time	The date and time when the test is executed are printed.
❷	Test parameters	Set test parameters are printed.
❸	Test Results	The test results are printed. When "WL Accuracy" is within the range of "WL Accuracy Criteria" and "WL Precision" is within the range of "WL Precision Criteria", "Pass" is displayed. If not, ">>Fail<<" is displayed.
❹	Graph	The graph of the test results is printed.

■ Printing example - [EP] Control of Absorbance



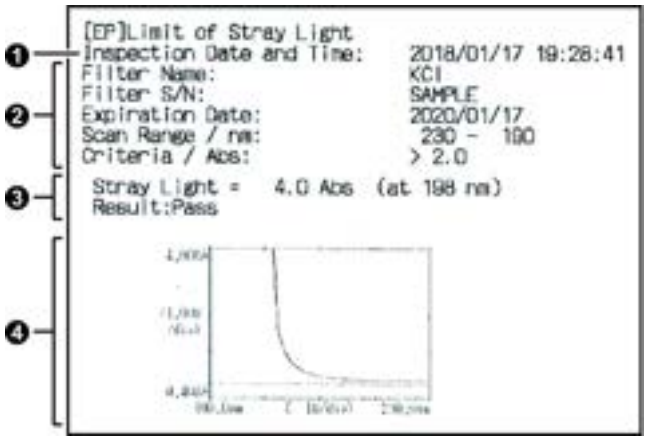
No.	Name	Description
❶	Date and time	The date and time when the test is executed are printed.
❷	Test parameters	Set test parameters are printed.
❸	Test Results	The test results are printed. When "Diff./nm" is within the range of "Criteria/nm", "Pass" is printed. If not, ">>Fail<<" is printed.

■ Printing example - [USP] Control of Absorbance



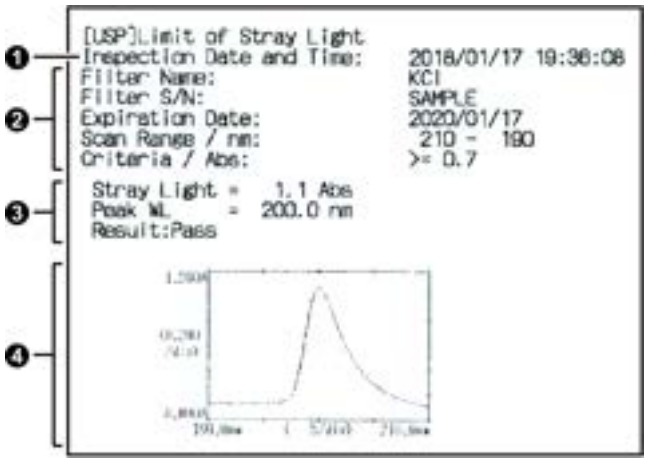
No.	Name	Description
❶	Date and time	The date and time when the test is executed are printed.
❷	Test parameters	Set test parameters are printed.
❸	Test Results	The test results are printed. When "Abs Accuracy" is within the range of "Abs Accuracy Criteria" and "Abs Precision" is within the range of "Abs Precision Criteria", "Pass" is displayed. If not, ">>Fail<<" is displayed.

■ Printing example - [EP] Limit of Stray Light



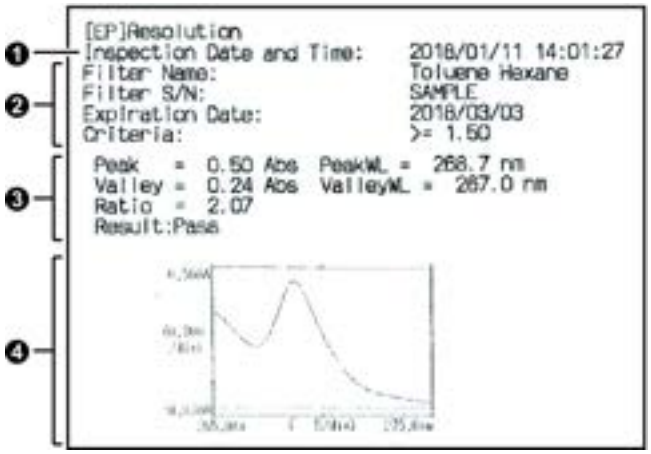
No.	Name	Description
❶	Date and time	The date and time when the test is executed are printed.
❷	Test parameters	Set test parameters are printed.
❸	Test Results	The test results are printed. When "Stray Light = XX Abs (at 198 nm)" is larger than "Criteria / Abs", "Pass" is printed. If not, ">>Fail<<" is printed.
❹	Graph	The graph of the test results is printed.

■ Printing example - [USP] Limit of Stray Light



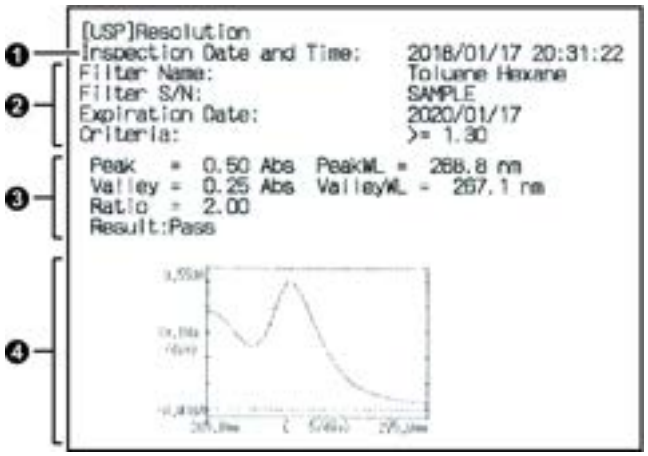
No.	Name	Description
❶	Date and time	The date and time when the test is executed are printed.
❷	Test parameters	Set test parameters are printed.
❸	Test Results	The test results are printed. When "Stray Light = XX Abs" is larger than "Criteria / Abs", "Pass" is printed. If not, ">>Fail<<" is printed.
❹	Graph	The graph of the test results is printed.

■ Printing example - [EP] Resolution



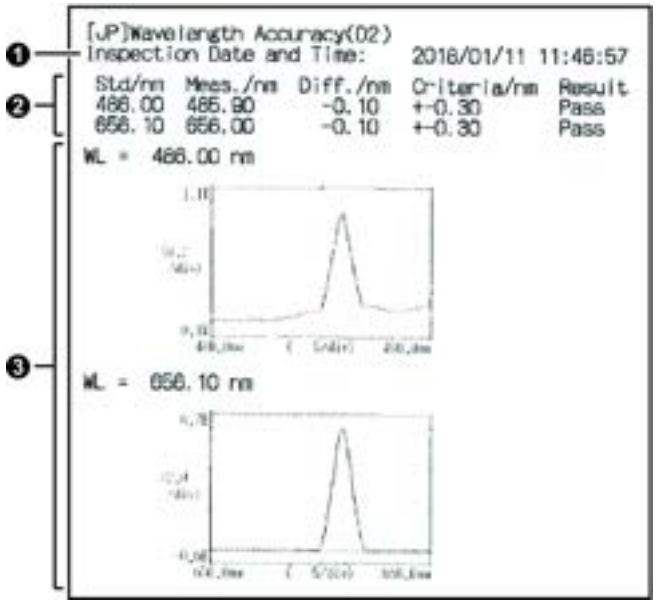
No.	Name	Description
❶	Date and time	The date and time when the test is executed are printed.
❷	Test parameters	Set test parameters are printed.
❸	Test Results	The test results are printed. When "Ratio" is not less than "Criteria", "Pass" is printed. If not, ">>Fail<<" is printed.
❹	Graph	The graph of the test results is printed.

■ Printing example - [USP] Resolution



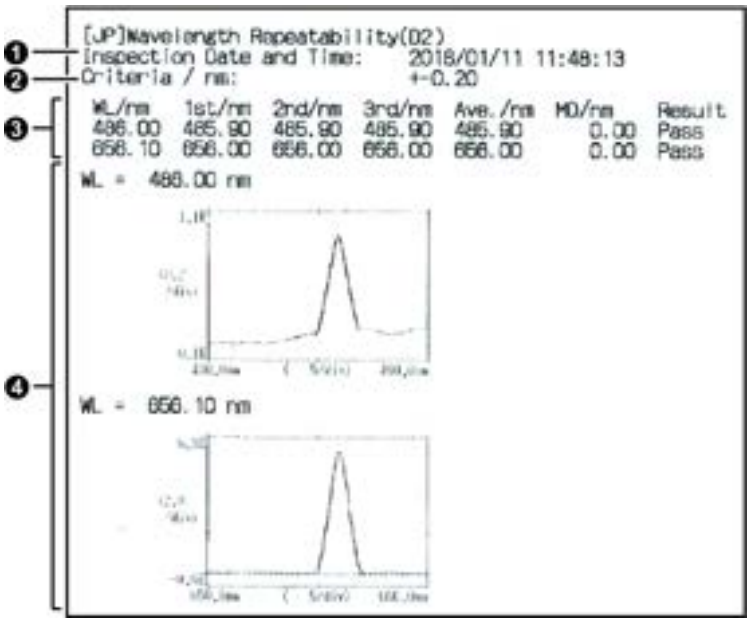
No.	Name	Description
❶	Date and time	The date and time when the test is executed are printed.
❷	Test parameters	Set test parameters are printed.
❸	Test Results	The test results are printed. When "Ratio" is not less than "Criteria", "Pass" is printed. If not, ">>Fail<<" is printed.
❹	Graph	The graph of the test results is printed.

■ Printing example - [JP] Wavelength Accuracy (D2)



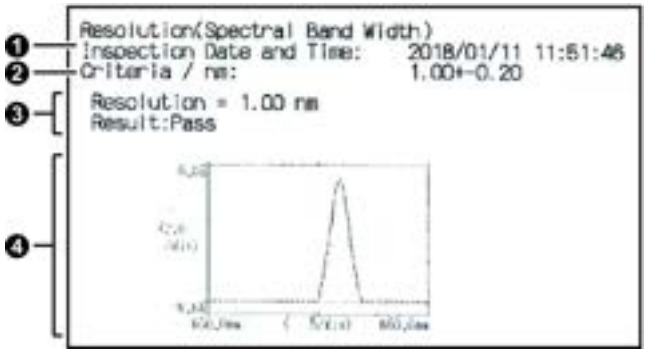
No.	Name	Description
❶	Date and time	The date and time when the test is executed are printed.
❷	Test Results	The test results are printed. When "Diff./nm" is within the range of "Criteria/nm", "Pass" is printed. If not, ">>Fail<<" is printed.
❸	Graph	The graph of the test results is printed.

■ Printing example - [JP] Wavelength Repeatability (D2)



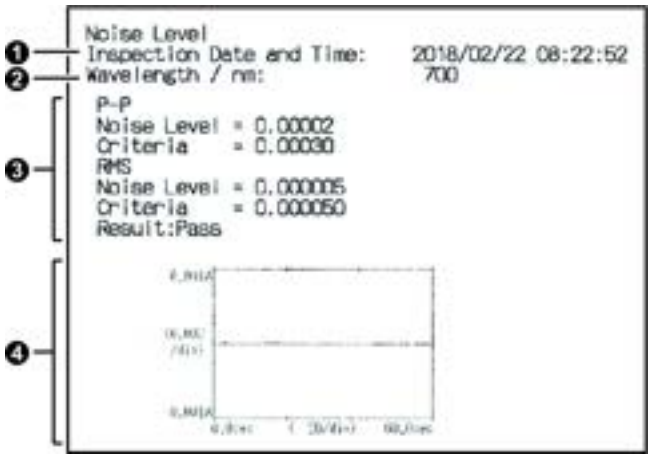
No.	Name	Description
❶	Date and time	The date and time when the test is executed are printed.
❷	Criteria	Set criteria are printed.
❸	Test Results	The test results are printed. When "MD/nm" is within the range of "Criteria/nm", "Pass" is printed. If not, ">>Fail<<" is printed.
❹	Graph	The graph of the test results is printed.

■ Printing example - Resolution (Spectral Bandwidth)



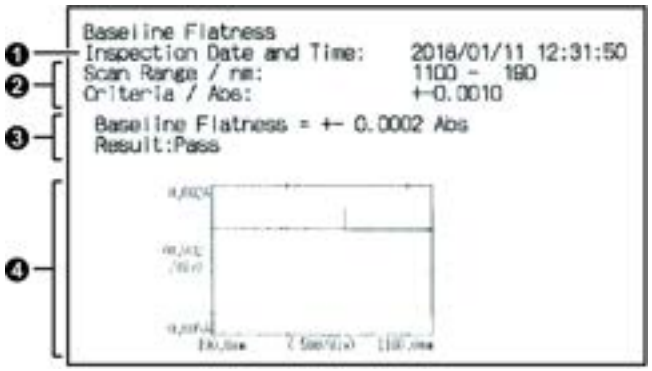
No.	Name	Description
❶	Date and time	The date and time when the test is executed are printed.
❷	Criteria	Set criteria are printed.
❸	Test Results	The test results are printed. When "Resolution" is within the range of "Criteria / nm", "Pass" is printed. If not, ">>Fail<<" is printed.
❹	Graph	The graph of the test results is printed.

■ Printing example - Noise Level



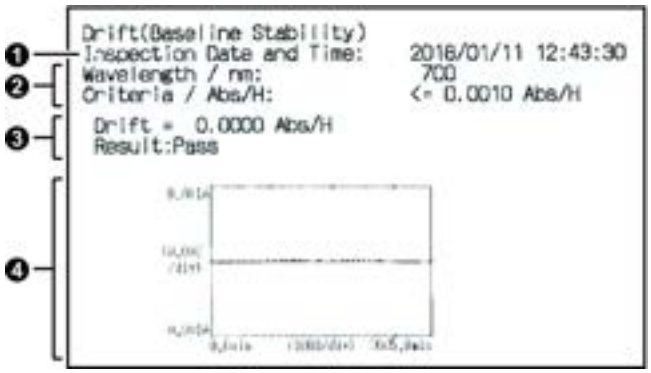
No.	Name	Description
❶	Date and time	The date and time when the test is executed are printed.
❷	Test wavelength	Set wavelength is printed.
❸	Test Results	The test results are printed. When values of two "Noise Level" are not greater than the corresponding values of "Criteria", "Pass" is printed. If not, ">>Fail<<" is printed.
❹	Graph	The graph of the test results is printed.

■ Printing example - Baseline Flatness



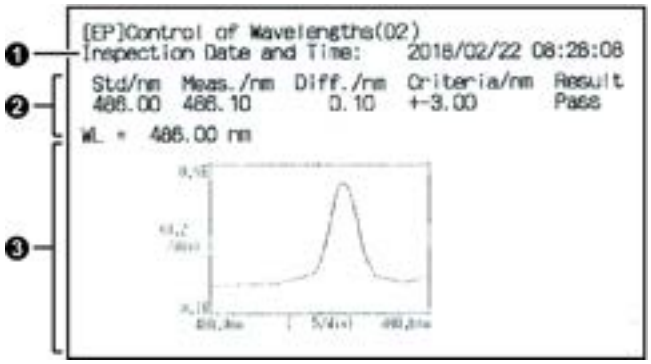
No.	Name	Description
❶	Date and time	The date and time when the test is executed are printed.
❷	Test parameters	Set test parameters are printed.
❸	Test Results	The test results are printed. When "Baseline Flatness" is within the range of "Criteria / Abs", "Pass" is printed. If not, ">>Fail<<" is printed.
❹	Graph	The graph of the test results is printed.

■ Printing example - Drift (Baseline Stability)



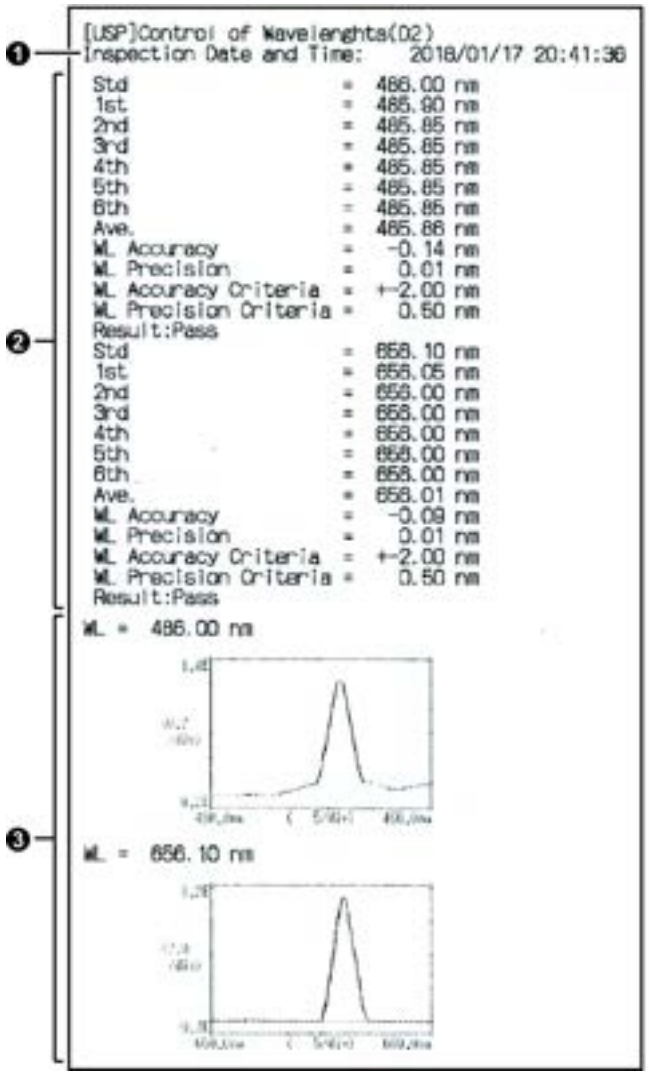
No.	Name	Description
❶	Date and time	The date and time when the test is executed are printed.
❷	Test parameters	Set test parameters are printed.
❸	Test Results	The test results are printed. When "Drift" is not greater than "Criteria / Abs/H", "Pass" is printed. If not, ">>Fail<<" is printed.
❹	Graph	The graph of the test results is printed.

■ Printing example - [EP] Control of Wavelengths (D2)



No.	Name	Description
❶	Date and time	The date and time when the test is executed are printed.
❷	Test Results	The test results are printed. When "Diff./nm" is within the range of "Criteria/nm", "Pass" is printed. If not, ">>Fail<<" is printed.
❸	Graph	The graph of the test results is printed.

■ Printing example - [USP] Control of Wavelengths (D2)



No.	Name	Description
❶	Date and time	The date and time when the test is executed are printed.
❷	Test Results	The test results are printed. When "WL Accuracy" is within the range of "WL Accuracy Criteria" and "WL Precision" is within the range of "WL Precision Criteria", "Pass" is displayed. If not, ">>Fail<<" is displayed.
❸	Graph	The graph of the test results is printed.

18 PC Control Mode

PC Control Mode is the mode in which the UV-1900i is controlled by an external personal computer (PC).

When this mode is selected, you can control the UV-1900i from the computer using the provided software "LabSolutions UV-Vis", optional software or a created control program.

18.1 Preparation for Using PC Control Mode

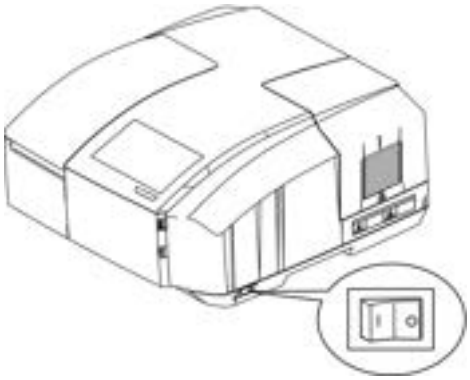
To control the UV-1900i from the computer, install "USB Driver for UV-1900 Series" for host communication control on the computer, and connect the instrument with the computer using a USB cable.

If the USB Driver for UV-1900 Series is installed, the computer recognizes the UV-1900i as a COM port device. To control the UV-1900i, you need to refer to the COM port number. Check it on the computer.

The procedures for installing the USB Driver for UV-1900 Series and verifying the COM port number are described below.

Hint The USB Driver for UV-1900 Series is included in the provided USB Driver for UV-1900 Series installation CD.

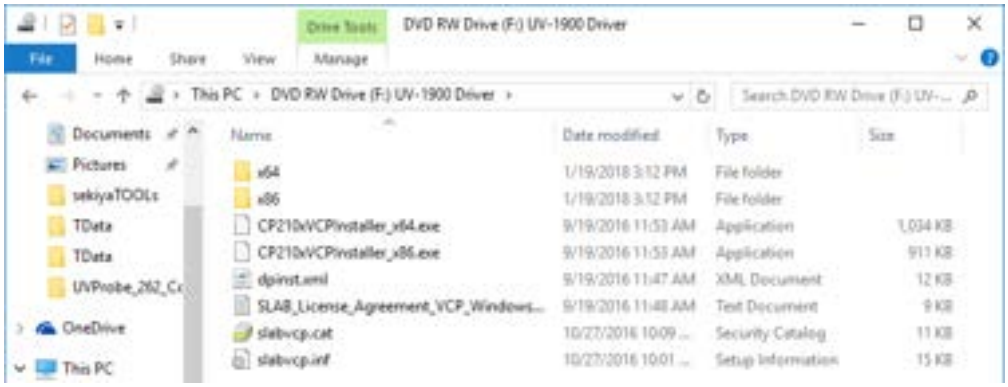
1 **Turn "OFF" the power of the instrument.**



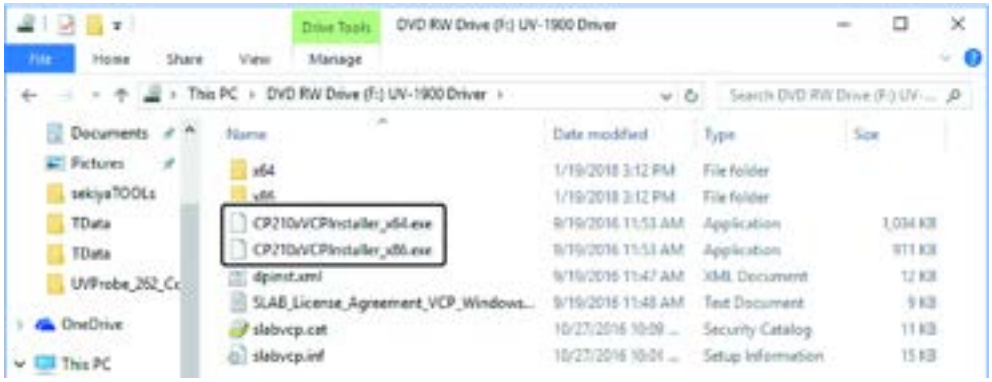
2 **Insert the installation CD of USB Driver for UV-1900 Series into the disk drive of the PC.**

3 **Display the directory of the disk drive on the Explorer.**

> **NOTE** The following image is an example when the disk drive is E drive. The directory of the disk drive differs depending on the setting of the computer.



4 **Double-click [CP210xVCPInstaller_x64.exe] when the OS of the PC is 64-bit Windows, and [CP210xVCPInstaller_x86.exe] when the OS is 32-bit Windows.**



5 **Click [Yes].**

6 **Click [Next].**

7 Agree to the license agreement of the USB Driver for UV-1900 Series.

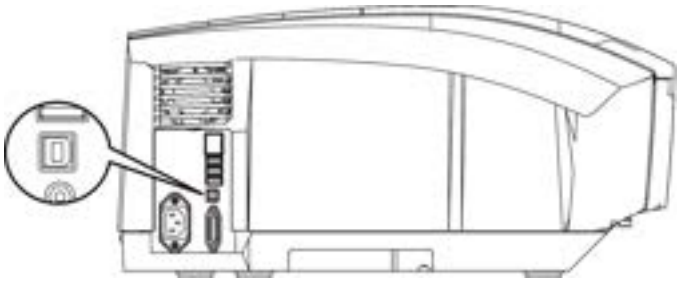
1 Click [I accept this agreement] to select it.

2 Click [Next].

Installation of the USB Driver for UV-1900 Series starts.

8 After installation is completed, click [Finish].

9 Connect the USB connector on the left side of the instrument and the USB connector of the PC using a USB cable.



10 **Turn "ON" the power of the instrument.**

11 **When the Security Mode is enabled, log in to the instrument ("2.2.1 Changing User Level and Login" P.9).**

Log in as a user with Administrator privileges.
When the Security Mode is enabled, only the user with Administrator privileges can enable/disable the PC Control Mode.

12 **Tap [PC Control].**

The instrument enters the PC Control Mode.

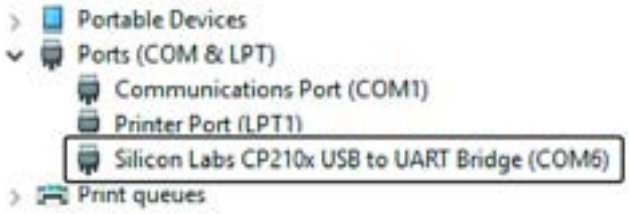
13 **Right-click**  **on the Desktop.**

14 Click [Device Manager].

15 Make a note of the USB connected COM port number.

1 Click [Ports (COM & LPT)] to expand it.

2 Make a note of the last number (n part) of "Silicon Labs CP210x USB to UART Bridge (COMn)".



Preparation for using PC Control Mode is completed.
Depending on the control method to be used, see below.

Reference • "18.2 Controlling with LabSolutions UV-Vis" P.432
• "18.3 Controlling with External Commands" P.432

18.2 Controlling with LabSolutions UV-Vis

You can control the UV-1900i by using the "LabSolutions UV-Vis" software that is provided with the instrument. For installation, refer to the supplied "LabSolutions UV-Vis Setup Procedure".
For the details on how to operate the LabSolutions UV-Vis, refer to "LabSolutions UV-Vis Instruction Manual Basic Operation Guide" saved in the supplied LabSolutions UV-Vis installation disk.

18.3 Controlling with External Commands

You can also control the UV-1900i from the computer using a control program besides the LabSolutions UV-Vis software.

18.3.1 Switching to the PC Control Mode

To control the instrument with external commands, switch the instrument into the PC Control mode.

1 **Display the Mode Menu screen and Tap [PC Control].**

The instrument enters the PC Control Mode.

18.3.2 Control Codes (Commercially Available Printers) and Commands

■ Control codes

The exchange of signals (communication) between the instrument and the PC must be performed with one being the "speaker" and the other the "listener". In this case, the speaker will be referred to as the master and the listener as the slave.

The exchange of signals is performed under a set procedure (protocol). These signals comprise not only commands and data, but also codes to control the protocol. Control codes to be used are shown below.

Control Code (Hexadecimal)	Direction	Function
ENQ ($05) (Enquiry)	Master to Slave	Enquiry code sent when you wish to send commands or data. The first ENQ of a series of transactions also indicates the start of communication.
EOT ($04) (End of Transmission)	Master to Slave	Code for announcing the end of communication. Use this when there are no more data to be sent.
ESC ($1B) (Escape)	Bi-directional	Code sent when you wish to interrupt communication.
ACK ($06) (Acknowledge)	Slave to Master	Code returned from receiving side in affirmative response to a command, data, or code which has been sent.
NAK ($15) (Negative Acknowledge)	Slave to Master	Code returned from receiving side in negative response to a command, data, or code which has been sent.
NUL ($00) (Null)	Master to Slave	Code for recognizing the end of a variable-length signal, such as a command or data, etc. This is also called the terminator.

■ COM port transmission settings

- Transfer rate: 128000 bps
- Data bit: 7 bits
- Stop bit: 1 bit
- Parity bit: Odd

■ Commands

The types of commands sent from the PC to the UV-1900i can be generally classified as the following according to the direction of the data flow.

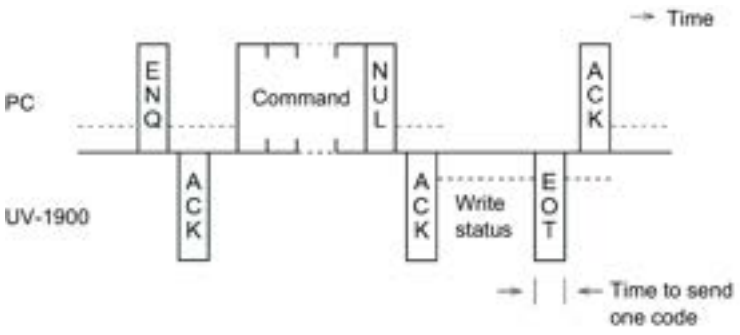
- Write command: Sets the status of the UV-1900i.
- Read command: Recognizes the status of the UV-1900i.

The procedures for these commands have several types.

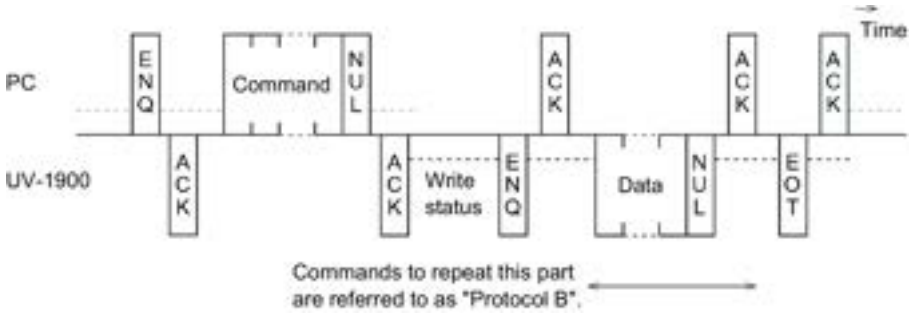
Hint

- In the figure, the "....." mark indicates the master. Please note that the master and slave roles alternate in the communication process.
- The write command is referred to as "Protocol A"; the type in which data are received only once from the external computer and the read command is referred to as "Protocol B"; and when there are multiple data received it is called "Protocol B'".

Time chart for write commands (Protocol A)



Time chart for read commands (Protocol B or Protocol B')



18.3.3 Example of Programming

This section explains the three transmission procedures, protocol types A, B, and B' described in the previous section for reference of your programming.

Hint N in the text stands for repetition count and is assumed to be 5 in this example.

■ Protocol type A

Establishment of communication link: ❶ in flowchart 1

Before transmitting a command, the master (PC in this example) issues the ENQ code to the slave (the UV-1900i in this example) to prompt it to receive the command data.

The slave returns ACK to notify the master that it is ready to receive the command data.

<Error handling>

- If NAK is returned in response to the transmission of ENQ, ENQ is retransmitted. If NAK is still returned after this retry has been made N times, the master determines that there is an error at the slave and ends the retries.
- If any code other than ACK and NAK is returned, the master ignores it and waits for the next reply.
- If there is no reply for a given time, the master retransmits ENQ. If no reply is received after the Nth retransmission, the master determines that there is an error at the slave and ends the retransmission.

Transmission of command data: ❷ in flowchart 1

If the communication link is established successfully, the master (PC in this example) transmits the command data.

When the slave (the UV-1900i in this example) receives the command data successfully, it returns ACK to the master. At this point, the master and the slave change over to each other.

<Error handling>

- If NAK is returned in response to the transmission of the command data, the previously transmitted data is retransmitted. If NAK is still returned after the Nth retransmission, the master determines that an error has occurred at the slave, and ends the retransmission.
- If any code other than ACK and NAK is returned, the master ignores it and waits for the next reply.
- If there is no reply for a given time, the master retransmits ENQ. If no reply is received after the Nth retransmission, the master determines that there is an error at the slave and ends the retransmission.

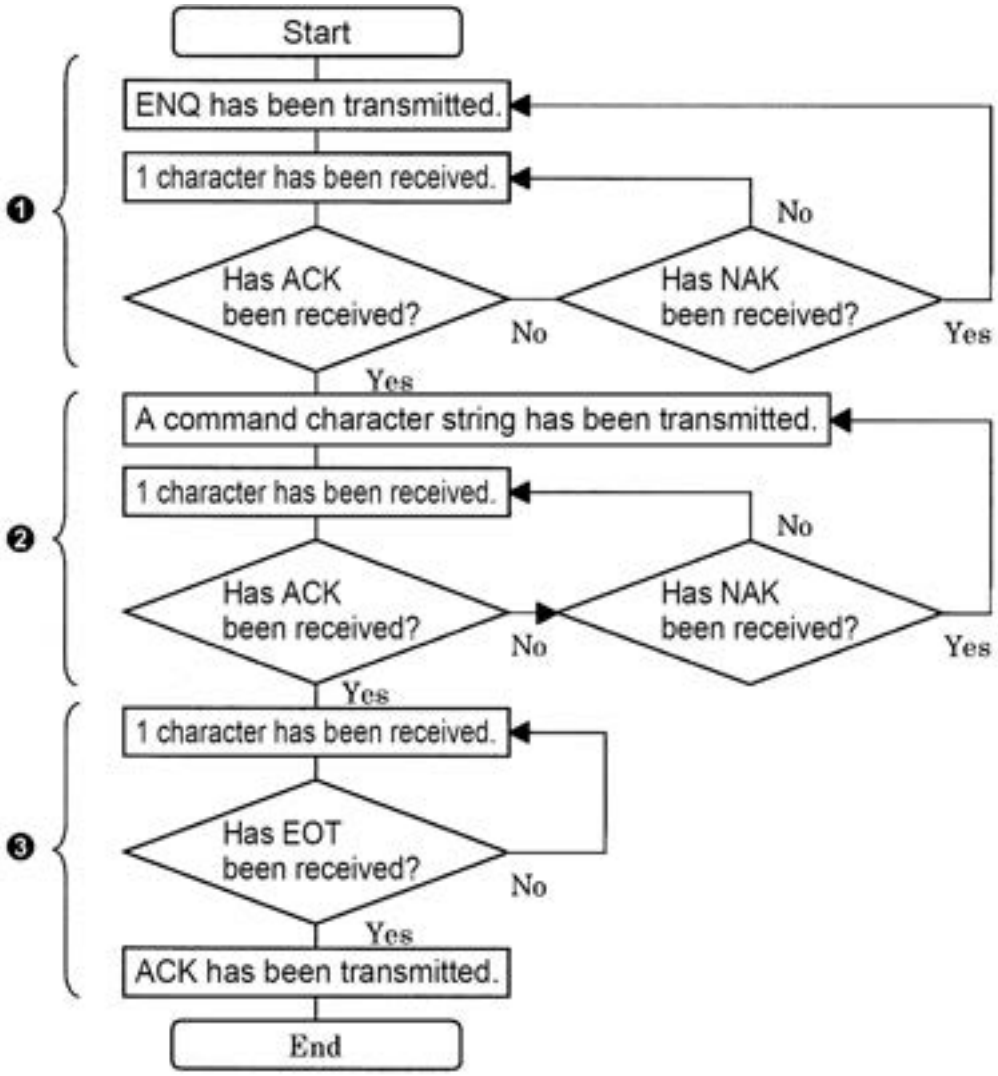
Ending: ❸ in flowchart 1

When the master (the UV-1900i in this example) finishes processing the command data, it transmits EOT to the slave (PC in this example).

The slave waits until EOT is transmitted, and then returns ACK to end the communication.

Flowchart 1

Hint Check of the number of repetitions and time out is omitted.



■ Protocol types B and B'

Establishment of communication link

This is the same as in protocol type A.

Transmission of command data

This is the same as in protocol type A.

Reception of answered-back data: ❶ in flowchart 2

The master (the UV-1900i in this example) processes the command data. When the master finishes this processing, it issues the ENQ code before sending data to prompt the slave (PC in this example) to receive the data.

The slave waits until ENQ is received, and then returns ACK to notify the master that it is ready to receive the data. Receiving this ACK, the master starts sending the data.

In the case of protocol B', there are multiple data sets involved. Therefore, each time the slave receives data, it transmits ACK to notify the master that it has received the data.

<Error handling>

- If no answered-back data is transmitted for a given time, ENQ is retransmitted. If no data is returned after the Nth retransmission, the master determines that an error has occurred at the master and ends the retransmission.
- If the next character is not received for a given time when character string data is being received on a character basis, NAK is immediately returned.

Abortion of data reception: ❷ in flowchart 2

When the slave (PC in this example) is receiving multiple data sets using protocol type B', it transmits ESC rather than ACK if it aborts the data reception.

The master (the UV-1900i in this example) aborts the data transmission and closes the communication link.

If the master becomes unable to transmit data due to any error that has occurred during the data transmission, it transmits ESC rather than the data to close the communication link.

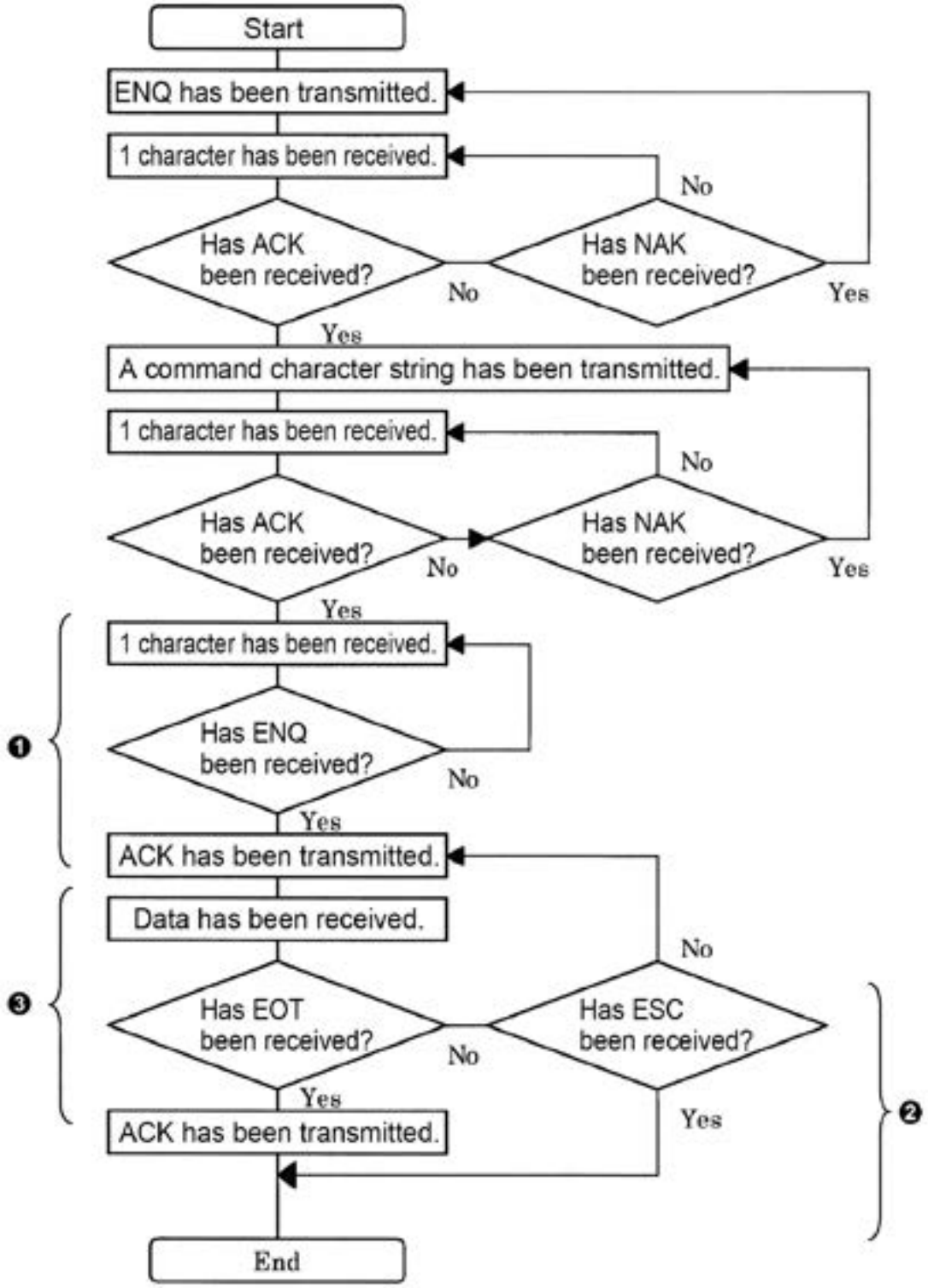
Ending: ❸ in flowchart 2

When the master (the UV-1900i in this example) finishes transmitting all the data, it sends EOT.

Receiving EOT, the slave (PC in this example) determines that the data reception has been finished, and then sends ACK to end the communication.

Flowchart 2

Hint Check of the number of repetitions and time out is omitted.



18.3.4 Explanation of Commands and Data

■ Commands

The commands which can be sent from the PC are comprised of the following elements: "command code", "parameter", and "terminator".

- A command code consists of a single lower-case alphabetic character.
- The number of parameters depends on the command code. Commands can be divided into those with no parameter, those with only one parameter, and those with multiple parameters.
- When there are multiple parameters, it is necessary to separate the parameters with a symbol (delimiter). The symbol "," (comma) is used as the delimiter.
- Since all parameters are sent as ASCII text, if you wish to set the number 15, this will be expressed in hexadecimal as "$31$35".
- "NUL" is used as the terminator.

> **NOTE** Do NOT externally control the UV-1900i using software other than LabSolutions UV-Vis or optional software during the initialization. If communication commands are sent from software other than LabSolutions UV-Vis or optional software, the initialization may not finish correctly.
> When you wish to externally control the UV-1900i using software other than LabSolutions UV-Vis or optional software, make sure to send commands only after the initialization is completed.

■ Data

The data sent from the UV-1900i is comprised of the following elements: "data code", "parameter", and "terminator".

- A data code consists of a single lower-case alphabetic character. The code is the same as the command code.
- The parameter is always sent as a single text string. If the parameter is 10.36, it will be expressed in hexadecimal as "$31$30$2E$33$36".
- "NUL" is used as the terminator.

18.3.5 Programming with Visual Basic 2015

This section explains the programming method using Visual Basic 2015.

You will define the Windows API functions on Visual Basic 2015, and by calling up the functions, you can control the UV-1900i from the external computer.

NOTE
- This chapter assumes readers have basic knowledge of Visual Basic 2015, and use Visual Basic 2015 as their development environment.
- Note that the UV-1900i cannot be controlled from the SerialPort class of .Net Framework.

1 Define the API functions.

Define the four Windows API functions (CreateFile, WriteFile, ReadFile, and CloseHandle) required for the UV-1900i external control as described below.

```
'Start Communication: Define CreateFile
Public Declare Auto Function CreateFile Lib "kernel32.dll"( _
            ByVal lpFileName As String, _
            ByVal dwDesiredAccess As Int32, _
                    ByVal dwShareMode As Int32, _
            ByVal lpSecurityAttributes As IntPtr, _
                    ByVal dwCreationDisposition As Int32, _
            ByVal dwFlagsAndAttributes As Int32, _
                    ByVal hTemplateFile As IntPtr _
) As IntPtr

'Send command: Define WriteFile
Public Declare Auto Function WriteFile Lib "kernel32.dll"( _
            ByVal hFile As IntPtr, _
                    ByVal lpBuffer As Byte(), _
            ByVal nNumberOfBytesToWrite As Int32, _
                    ByRef lpNumberOfBytesWritten As Int32, _
            ByVal lpOverlapped As IntPtr _)
) As Boolean

'Receive data: Define ReadFile
Public Declare Auto Function ReadFile Lib "kernel32.dll"( _
            ByVal hFile As IntPtr, _
                    ByVal lpBuffer As Byte(), _
            ByVal nNumberOfBytesToRead As Int32, _
                    ByRef lpNumberOfBytesRead As Int32, _
            ByVal lpOverlapped As IntPtr _
) As Boolean

'End communication: Define CloseHandle
Public Declare Auto Function CloseHandle Lib "kernel32.dll"( _
            ByVal hObject As IntPtr _
) As Boolean
```

2 **Use the API functions.**

You can externally control the UV-1900i using the defined API functions as follows:

1 Starting communication

Start communication using the CreateFile function.

Example) Start communication through the COM1 port.

```
Dim hCom As IntPtr
Dim strComPort As String
strComPort = "COM1"

'Start communication:
hCom = CreateFile( strComPort, _
                   GENERIC_READ Or GENERIC_WRITE, _
                   0, IntPtr.Zero, OPEN_EXISTING, _
                   FILE_ATTRIBUTE_NORMAL, IntPtr.Zero )
```

2 Sending command

Send a command to the UV-1900i using the WriteFile function.

Example) Send ENQ($05).

```
'Define the object that converts Unicode strings to ASCII strings:
Dim oEnc As System.Text.Encoding _
= System.Text.Encoding.GetEncoding("windows-1252")

Dim bRet As Boolean
Dim byBuffer()As Byte
Dim nBytesWritten As Int32

'Obtain the ASCII string:
byBuffer = oEnc.GetBytes(Chr(&H5))

'Send command:
bRet = WriteFile( hCom, byBuffer, byBuffer.Length, nBytesWritten,
IntPtr.Zero )
```

3 Receiving data
Receive data from the UV-1900i using the ReadFile function.
Example) Receive 1 character.

```
Dim bRet As Boolean
Dim byBuffer()As Byte
Dim nBytesRead As Int32

'Receive data:
bRet = ReadFile( hCom, byBuffer, 1, nBytesRead, IntPtr.Zero )
```

4 Ending communication
End the communication using the CloseHandle function.
Example) End the existing communication.

```
'End communication:
CloseHandle(hCom)
```

18.3.6 Command List

This section shows a list of commands to be used.

> **NOTE** The terminator symbol has been omitted from the "command format" columns in the table. When sending to the UV-1900i, send a terminator code (NUL) appearing right after the content shown in the table as the actual command.

Hint

- The second and subsequent symbols in the command format columns indicate parameters.
- Protocol A, B, and B' are available ("COM port transmission settings" P.433).

Command format	Protocol type	Name	Processing content and usage notes
a	A	Measurement	Performs wavelength scan. The measured data are stored in the continuous data memory area in the UV-1900i. Use the f command when retrieving data.
c	A	Baseline correction	Performs baseline correction. The corrected wavelength range is set by the h command.
d	B	Data output trigger	Outputs the current data. When this command is sent, the UV-1900i performs one measurement and outputs the data as "dk". The parameter k is the current data and is formatted as shown below, according to the measurement mode. • Abs: ±x.xxxy • Not Abs: ±xxx.xy The sign of the parameter is output only if the parameter is negative, while a space is output if the parameter is positive. In addition, y is output if the decimal display in the General Settings is set to 5.

<table>
<tr><th>Command format</th><th>Protocol type</th><th>Name</th><th>Processing content and usage notes</th></tr>
<tr><td>hn,m
or
hn,m,p</td><td>A</td><td>Scan Range</td><td>Sets the scanning range when two parameters are given.
The scan pitch is also set along with the range when three parameters are given.
The parameters n and m correspond with the start wavelength and end wavelength. Set a value ten times the desired wavelength.
The parameter p corresponds with the scan pitch. Use the symbol "," (comma) as the delimiter between the parameters.
The parameters n and m must meet the following conditions:
• 1900 ≤ n, m ≤ 11000
• (n-m) / (scan pitch × 10) ≥ 10
To set the scan pitch, select from the parameters below:
• p = 0 : AUTO
• p = 1 : 0.05 nm
• p = 2 : 0.1 nm
• p = 3 : 0.2 nm
• p = 4 : 0.5 nm
• p = 5 : 1.0 nm
• p = 6 : 2.0 nm (default value)
AUTO automatically sets the pitch according to the measurement wavelength range (n-m).
<table>
<tr><th>Measurement wavelength range</th><th>Scan pitch</th></tr>
<tr><td>200.0 nm or shorter</td><td>0.1 nm</td></tr>
<tr><td>200.1 nm to 400.0 nm</td><td>0.2 nm</td></tr>
<tr><td>400.1 nm or longer</td><td>0.5 nm</td></tr>
</table>
* Note, however, that the pitch is always set to 1.0 nm when the scan speed is "Survey".
When the scan pitch parameter is omitted, the previously set value applies.</td></tr>
<tr><td>jn</td><td>A</td><td>Scan Speed</td><td>Sets the scanning speed. The parameter n corresponds with the speed number as shown below.
• n = 0: Survey
• n = 1: Fast (default value)
• n = 2: Medium
• n = 3: Slow
• n = 4: Very Slow</td></tr>
</table>

Command format	Protocol type	Name	Processing content and usage notes
ln	A	Light source switching	Switches the light source position. The parameter n corresponds with the light source position as shown below. • n = 0: WI lamp • n = 1: D2 lamp • n = 2: Optional lamp This command is valid only if the Photometric Type (vn) is Energy (v2).
vn	A	Photometric Type	Sets the photometric type. The parameter n corresponds with the type number as shown below. • n = 0: Transmittance (%T) • n = 1: Absorbance (Abs) • n = 2: Energy (E)
wn	A	Wavelength setting (goto.l)	Sets the wavelength. The parameter n uses the value which is 10 times the wavelength being set. To set a wavelength of 500.0 nm, set 5000. The parameter n must meet "1900 ≤ n ≤ 11000".
x	A	Auto Zero	Performs Auto Zero (sets the absorbance under the current conditions at 0 Abs, or the current transmittance at 100 %T).
y	A	WI lamp ON/OFF	Controls the ON/OFF of the WI light source lamp. The parameter n corresponds with the lamp illumination status as shown below. • n = 0: OFF • n = 1: ON
z	A	D2 lamp ON/OFF	Controls the ON/OFF of the D2 light source lamp. The parameter n corresponds with the lamp illumination status as shown below. • n = 0: OFF • n = 1: ON

Command format	Protocol type	Name	Processing content and usage notes
fn	B'	Transfer file data	Retrieves data which have been stored in the memory of the UV-1900i by the measurement command a. The parameter n is the number of data points to be retrieved, and allows you to retrieve n pieces of data from the start of the file (in the case of a spectrum, from the long wavelength end). If you set the parameter to a number which is greater than the number of data points saved in memory, processing will end at the point where you run out of data. The parameter n must meet "1 ≤ n ≤ 2001". The data will be output as "k". "k" is the parameter, and data outputted by this command does not include data code f (such as "fk"). For the data which is sent, it is necessary to send an ACK response for each piece of data. The parameter k is a pairing of the wavelength at the time of measurement and the data. The format is as follows, depending on the photometric type at the time. • Abs (v1): zzzz.z DD±x.xxxy • Not Abs (v0, v2): zzzz.z DD±xxx.xy z is the wavelength, x and y are the measurement data and D represents "space" data. The sign of the measurement data is output only if the parameter is negative, while a space is output if the data is positive. In addition, y is output if the decimal display in the General Settings is set to 5.

Command format	Protocol type	Name	Processing content and usage notes

nx,y,z	A	Syringe sipper control	Controls the syringe sipper. This command is valid only if the syringe sipper is connected to the UV-1900i sample compartment.
			The parameters x, y, and z correspond with the suction speed, operation mode, and capacity, respectively. Use the symbol "," (comma) as the delimiter between the parameters.
			Correspondence of each parameter is shown below.
			• Suction speed (ml/sec)
			  • x = 1: 1.2
			  • x = 2: 0.6
			  • x = 3: 0.3
			  • x = 4: 0.2
			  • x = 5: 0.1
			• Operation mode
			  • y = 0: Initialization
			  • y = 1: Suction
			  • y = 2: Discharge (discard)
			  • y = 3: Discharge (return)
			  • y = 4: Cancel initialization
			• Capacity (ml)
			  $0 \leq z \leq 1000$ (× 0.01 ml)

sn	A	Syringe sipper lamp ON/OFF	Controls the ON/OFF of the syringe sipper indication lamp. This command is valid only if the syringe sipper is connected to the UV-1900i sample compartment. The parameter n corresponds with the lamp illumination status as shown below. • n = 0: OFF • n = 1: ON
o	A	Sipper suction	Executes the sipper suction operation. This command is valid only if a sipper is connected to the UV-1900i sample compartment. The settings made on the UV-1900i are used for the sipper parameters, such as pump speed and suction time, etc.
p	A	Sipper purge	Executes the sipper purge operation. This command is valid only if a sipper is connected to the UV-1900i sample compartment. The settings made on the UV-1900i are used for the sipper parameters, such as pump speed and purge time, etc.

Command format	Protocol type	Name	Processing content and usage notes
qn	A	Move cell position	Moves the cell position of the Multi-Cell, Micro Multi-Cell or CPS series cell. This command is valid only if a Multi-Cell, Micro Multi-Cell or CPS series cell is connected to the UV-1900i sample compartment. The parameter n corresponds with the direction of cell movement as shown below. • n = 1: Move 1 cell forward • n = 2: Move to the cell 1 (Multi-Cell) Move 1 cell backward (CPS series)
q	B	Check cell position	Checks the cell position in the Multi-Cell, Micro Multi-Cell or CPS series cell. This command is valid only if a Multi-Cell, Micro Multi-Cell or CPS series cell is connected to the UV-1900i. When this command is executed, data are returned from the UV-1900i as "k". k is the parameter indicating the cell position number. The parameter k must meet "1 ≤ k ≤ 16".
r	B	Check ASC nozzle	Checks the nozzle condition in the auto-sample changer ASC-3 or ASC-5. This command is valid only if the ASC-3 or ASC-5 is connected to the UV-1900i sample compartment. When this command is executed, data are returned from the UV-1900i as "k". The parameter k corresponds with the nozzle status number as follows. • 0 = nozzle is raised • 1 = nozzle is lowered If this shows that the nozzle is lowered, the sample suction operation can begin.
mn	A	Option initialization	Executes the initialization of attachments connected to the sample compartment. • n = 0: initialization (standard cell) • n = B: 6-position Multi-Cell • n = C: CPS series • n = D: 8-position Micro Multi-Cell • n = D: 16-position Micro Multi-Cell

19 Setting Attachments

In the [Attachments] tab of each measurement mode, you can make settings to use optional devices (such as multi-cell holder and sipper) as sample compartment.

Reference Refer to "4 Replacing the Sample Compartment Parts" in "UV-1900i Instruction Manual (Installation and Maintenance Guide)" for installation/removal of optional devices.

19.1 Selecting the Attachment

1 **Tap the [Attachments] selection field.**

2 Select the attachment to be used.

You can select [None], [Multi-Cell (6 Cells)], [MMC (8 Cells)], [MMC (16 Cells)], [CPS], [Sipper 160], or [Syringe Sipper].

Select the device to be used and proceed to the reference shown in the table.

Device to be used	Item to be selected	Description
Standard sample compartment	[None]	The setting to use the standard sample compartment that is initially installed on the UV-1900i.
6-Position multi-cell	[Multi-Cell (6 Cells)]	The setting to use the cell holder that can hold up to six 10 mm square cells. Reference "19.2 Settings of [Multi-Cell (6 Cells)], [MMC (8 Cells)], [MMC (16 Cells)], and [CPS]" P.451
MMC-1600/C	[MMC (8 Cells)] [MMC (16 Cells)]	The setting to use a micro multi-cell holder that capable of handling 8 or 16 position micro multi-cell holder. Reference "19.2 Settings of [Multi-Cell (6 Cells)], [MMC (8 Cells)], [MMC (16 Cells)], and [CPS]" P.451
CPS series	[CPS]	The setting to use a 6-position multi-cell holder equipped with temperature control function. Reference "19.2 Settings of [Multi-Cell (6 Cells)], [MMC (8 Cells)], [MMC (16 Cells)], and [CPS]" P.451
Sipper 160L/C/U/T	[Sipper 160]	The setting to use the Sipper 160 that performs measurements while drawing sample into a flow cell using a peristaltic pump. Reference "19.3 [Sipper 160] Settings" P.457
Syringe Sipper N/CN	[Syringe Sipper]	The setting to use the Syringe Sipper that performs measurements while drawing sample into a flow cell using a syringe pump. Reference "19.4 [Syringe Sipper] Settings" P.459

19.2 Settings of [Multi-Cell (6 Cells)], [MMC (8 Cells)], [MMC (16 Cells)], and [CPS]

This section explains the settings to use a multi-cell holder (6-position multi-cell, MMC-1600, or CPS series) that enables sequential measurement.

Reference For the availability of sequential measurement and limitation, see "19.2.1 Sequential Measurement and Limitation" P.454.

1 Make necessary settings changes.

No.	Name	Description
❶	[Initialize]	Detects the origin of the cell position. To use the 6-position multi-cell holder and MMC-1600, install them on the UV-1900i, and then tap this button to initialize them. When initialization is not executed, [Not Initialized] is displayed on the right of the button. When initialize is executed, [Initialized] is displayed. **NOTE** • Before initialization, verify that the setting of [Attachments] is consistent with installed device ("19.1 Selecting the Attachment" P.449 table in Step 2). • When the MMC-1600 is installed, be sure to perform the initialization with the micro multi-cells mounted to the cell holder. • When [CPS] is selected in [Attachments], this button is not displayed. To detect the origin for the CPS series, turn ON the designated controller power. The CPS series performs initialization by itself. This button is not displayed, however, [Connected] or [Disconnected] is displayed according to the status of connection with the CPS series.
❷	[Number of Cells]	Sets the number of cells being used. When it is set to [2] or more, you can set [Reagent Blank Corr. (Cell 1)], [Cell Blank Corr.], and [Blank Corr.].

No.	Name	Description
❸	[Reagent Blank Corr.(Cell 1)]	Tap and enable it to perform reagent blank correction on the measurement results. When enabling this setting, place the blank sample in the cell position 1 before measurement. Each tap of this key toggles between ON and OFF. OFF:  ON:  NOTE This function is not available in the Spectrum mode. Reference For details on reagent blank correction, see "Reagent blank correction" P.455.
❹	[Cell Blank Corr.]	Tap and enable it to perform cell blank correction on the measurement results. Each tap of this key toggles between ON and OFF. OFF:  ON:  To perform cell blank correction, tap [Blank Corr.] before measurement and acquire the correction value. NOTE This function is not available in the Spectrum mode. Reference For details on cell blank correction, see "Cell blank correction" P.456.
❺	[Blank Corr.]	Acquires and saves absorbance (transmittance) at each cell (cell position) as the correction value. To perform the correction, place a blank cell at each cell position and tap this button.
❻	Cell position display and cell move button	Displays the number of cells and the current cell position. The number of the current cell position is highlighted in blue background. •  button moves cell 1 (the cell inserted into the front-most cell holder) into the measurement light path. •  button moves the cell to the next cell position.
❼	Blank correction preview button	Displays a list of values obtained in blank correction. Reference "Blank correction preview screen" P.453
❽	[Start]	Starts measurement using the settings in this [Attachments] tab and other tabs.

After the setting is completed, set other measurement conditions and start measurement.

■ Blank correction preview screen

When the blank correction preview button is tapped after blank correction is performed, the following screen appears and you can check obtained values.

- Switches displayed contents using the buttons on the right. Tap   buttons to page up/down and   buttons to move one line up/down.
- Tap [Close] to return to the previous screen.

19.2.1 Sequential Measurement and Limitation

When using the 6-position multi-cell, MMC-1600, and CPS series, multiple samples can be measured sequentially.

However, whether the sequential measurement is available or not, the limitation on the functions depend on the measurement mode as shown below.

> **NOTE** To connect the CPS series to the UV-1900i, a USB adaptor for CPS (P/N 206-25234-91) is separately required.

Measurement Mode	Sequential Measurement	Remarks
Photometric (One-Wavelength) Reference Chapter 6	Available	-
Photometric 8λ (Multi-Wavelength) Reference Chapter 7	Available	-
Spectrum Reference Chapter 8	Available	• The reagent blank correction and cell blank correction are not available. Reference "19.2.2 Reagent Blank Correction and Cell Blank Correction" P.455 • Only the data for the last cell can be saved or printed after measurement. However, if the [Auto Print] setting is enabled, the measurement result can be printed for each cell. Reference "[Scan Settings] subtab" P.73
Quantitation Reference Chapter 9	Available	When performing a repeated measurement, the sequential measurement of multiple cells is not available.
Kinetics Reference Chapter 10	Available	When the [Background Correction] setting is enabled, the sequential measurement of multiple cells is not available. Reference "[Wavelength Settings] subtab" P.124
Kinetics Rate Reference Chapter 11	Not available	-
Time Course Reference Chapter 12	Available	-
Bio Method Reference Chapter 13	Available	When performing a repeated measurement, the sequential measurement of multiple cells is not available.

19.2.2 Reagent Blank Correction and Cell Blank Correction

When connecting 6-position Micro Multi-cell, MMC-1600, or CPS series, and using the reagent blank correction and cell blank correction functions, corrected values are displayed as measurement results.

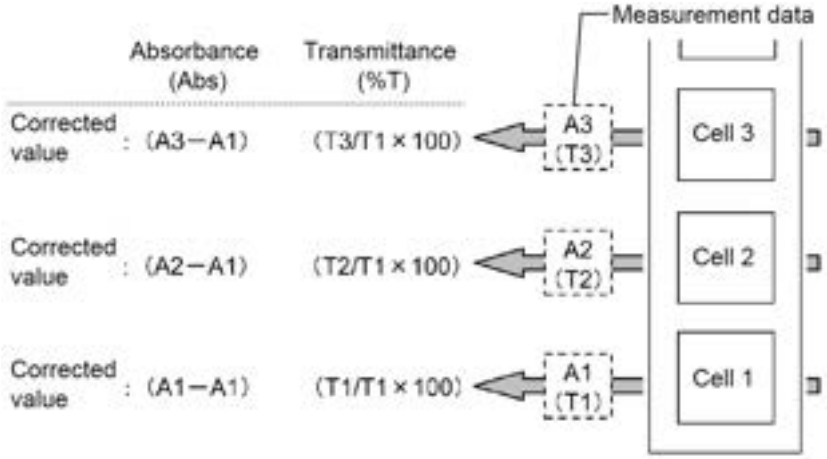
Details on each correction are described below.

> **NOTE** These functions are not available in the Spectrum mode.

■ Reagent blank correction

In this correction method, the cells in the other positions (2 to max. 16) are measured using the sample placed in cell position 1 as a blank. Then, the measured value for the sample in cell position 1 is canceled (subtraction or division) from each measured value.

Because of this, even if time changes occur in the blank sample or drift develops due to the increasing temperature of the instrument, accurate data can be acquired by canceling these fluctuating factors.

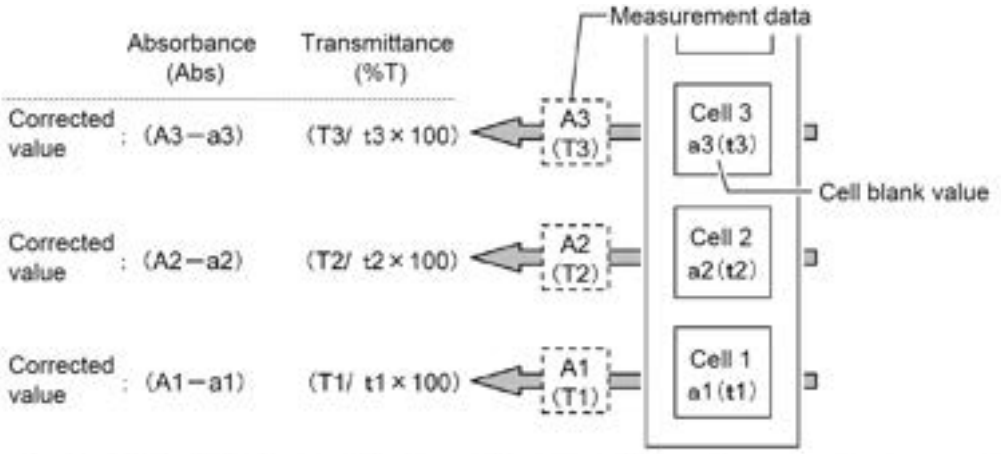


- For Abs: The measured value at Cell 1 (blank) is subtracted from the absorbance at each cell.
- For %T: The transmittance at each cell is divided by the measured value at Cell 1 (blank).

■ Cell blank correction

Even though cells are constructed in the same manner, there are naturally going to be slight optical differences. In cell blank correction, at first, blank sample is placed in each cell and the measured values (cell blank values) in that condition are recorded. Then, the recorded cell blank value is canceled (subtraction or division) from measurement result of unknown sample.

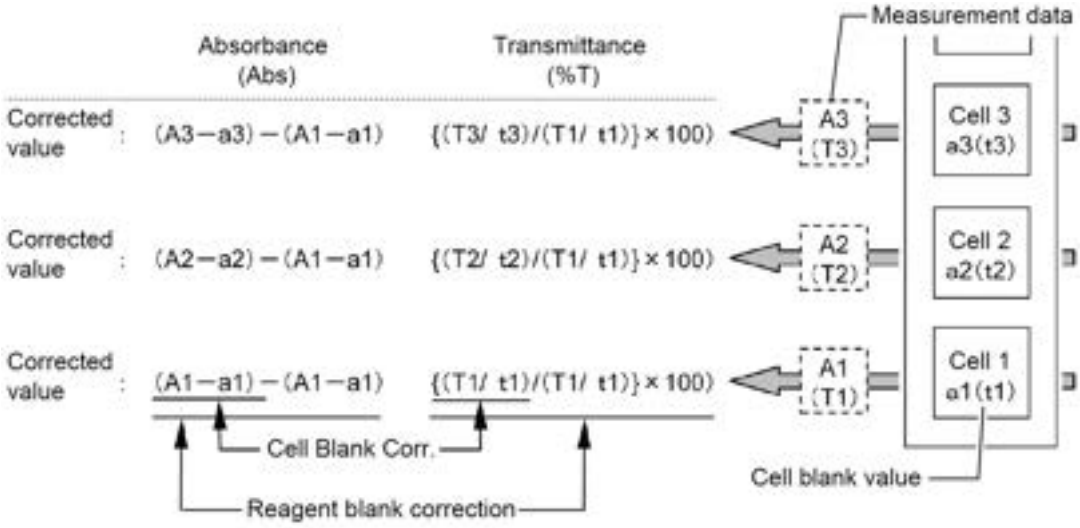
Thus, the measured value of only the sample is obtained.



• For Abs: Each cell blank value (absorbance) is subtracted from the measured value at each cell.
• For %T: The measured value at each cell is divided by each cell blank value (transmittance).

■ Reagent blank correction + Cell blank correction

If both blank correction methods are enabled, the cell blank correction is executed for each cell, and the reagent blank correction is executed using the Cell 1 sample value as a reagent blank on the measured values of the other cell positions.



• The cell blank correction and reagent blank correction are performed on each cell.

19.3 [Sipper 160] Settings

The settings to use the Sipper 160.

> **NOTE** When using the auto sample changer ASC-5 (optional) for link measurement, refer to the manual for ASC-5.
> To connect the ASC-5 to the UV-1900i, a USB adaptor for ASC (P/N 206-25235-91) is separately required.

1 Make necessary settings changes.

No.	Name	Description
❶	[Sip time]	Sets the time that the sample will be aspirated. Tap on the right to rotate the pump for the specified time.
❷	[Dwell time]	Sets the time interval between aspiration of a sample and measurement.
❸	[Purge time]	Sets the time that the sample will be purged (air purge) after measurement is completed. Tap on the right to rotate the pump for the specified time. When [Sample Recovery] (❼) is enabled, the pump rotates in the reverse direction.
❹	[Manual Sip]	Tap this button to enable the function, the sample is drawn while the sipper lever remains pressed regardless of the setting of [Sip Time]. The sample is only aspirated, no measurement will be performed. Each tap of this key toggles between ON and OFF. OFF: ON:
❺	[Pump Speed]	Sets the pump rotation speed. Tap to select [Fast], [Medium], [Slow], or [Stop]. Select [Stop] when using the solenoid valve.

No.	Name	Description
❻	[Rinses]	Sets the number of times that the inside of the flow cell will be rinsed before measurement. The rinse operation includes sipping and purging. Measurement is not included.
❼	[Sample Recovery]	Tap this button to enable the function, the pump rotates in the reverse direction during purging operation to suction and retrieve the measured sample. Enable it to retrieve the sample. Each tap of this key toggles between ON and OFF. OFF:  ON: 
❽	[Auto Meas.] or [Rinse]	This is a button to rinse the cell and then perform measurement. Display and operation change depending on the remaining number of rinses. For details, see "19.5.1 Operation of [Auto Meas.] or [Rinse]" P.461.
❾	[Start]	Performs measurement without Sipper 160. To perform measurement in conjunction with Sipper 160, tap [Auto Meas.] or [Rinse] (❽) or press the lever of Sipper 160.

After the setting is completed, set other measurement conditions and start measurement.

19.4 [Syringe Sipper] Settings

The settings to use the Syringe Sipper.

1 **Make necessary settings changes.**

No.	Name	Description
❶	[Initialize]	Starts initializing the syringe pump. When the Syringe Sipper is installed after the power of the main unit is turned ON, be sure to tap this button to initialize it. If it has not been initialized, the set capacity of sample may not be drawn or drained. When initialization is not executed, [Not Initialized] is displayed on the right of the button. When initialize is executed, [Initialized] is displayed.
❷	[Sip Volume]	Sets the sample sipping volume. Tap on the right to introduce specified volume of the sample and perform automatic purging.
❸	[Dwell time]	Sets the time interval between aspiration of a sample and measurement.
❹	[Purge Volume]	Sets the sample purge volume (air purge) after measurement. Tap on the right to introduce specified volume of the sample and perform automatic purging.
❺	[Auto Meas.] or [Rinse]	This is a button to rinse the cell and then perform measurement. Display and operation change depending on the remaining number of rinses. For details, see "19.5.1 Operation of [Auto Meas.] or [Rinse]" P.461.
❻	[Pump Speed]	Sets the pump rotation speed. Tap to select [0.1 ml/s], [0.2 ml/s], [0.3 ml/s], [0.6 ml/s], or [12 ml/s].

No.	Name	Description
❼	[Rinses]	Sets the number of times that the inside of the flow cell will be rinsed before measurement. The rinse operation includes sipping and purging. Measurement is not included.
❽	[Sample Recovery]	Tap this button to enable the function, the direction in which the sample is purged when the syringe rises is set to the sipping nozzle side and the sample is retrieved. Enable it to retrieve the sample. Each tap of this key toggles between ON and OFF. OFF:  ON: 
❾	[Start]	Performs measurement without the Syringe Sipper. To perform measurement in conjunction with the Syringe Sipper, tap [Auto Meas.] or [Rinse] (❺) or press the lever of the Syringe Sipper.

After the setting is completed, set other measurement conditions and start measurement.

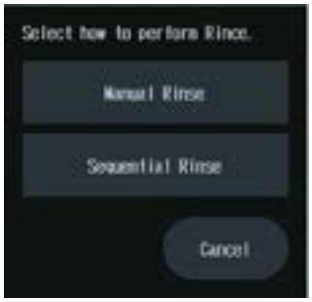
19.5 Supplementary Explanation on Operation (Common to the Sipper 160 and Syringe Sipper)

19.5.1 Operation of [Auto Meas.] or [Rinse]

This is a button to rinse the cell and then perform measurement. Display and operation change depending on the remaining number of rinses.

- When [Rinses] is set to 0 (zero) or set number of rinses are completed,  is displayed.
  In this state, the instrument performs rinse (sipping and purging) and measurement sequentially. When the button is tapped, sipping, waiting for stability, measurement, and purging are executed sequentially.

- When [Rinses] is set to 1 or more,  is displayed. The numbers displayed on the button indicate "the number of executed rinses / set number".
  If the number is set to 1, rinse is executed when tapping the button.
  If the number is set to 2 or more, the following screen appears when tapping the button.



  When [Manual Rinse] is tapped, you need to tap  to execute rinse each time until set number of rinses are completed.
  When [Sequential Rinse] is tapped, rinses are automatically executed until set number of rinses are completed.

- Display of [Auto Meas.] or [Rinse] corresponds to operation by the lever of the Sipper.
  When [Auto Meas.] is displayed, automatic measurement (sipping, waiting for stability, measurement, and purging) is performed when the lever is pressed.
  When [Rinse] is displayed, rinse (sipping and purging) is performed when the lever is pressed. "The number of executed rinses" displayed on the button is also updated.
  If the lever is pressed when [Rinses] is set to 2 or more, the screen to select [Manual Rinse] or [Sequential Rinse] does not appear and [Manual Rinse] is automatically selected.

19.5.2 Operation of [Auto Zero] and [Base Corr.]

Tap [Auto Zero] or [Base Corr.] to select standard operation or operation with prior sipping and subsequent purging.

> **NOTE** When this operation is executed, the number of executed rinses ("19.5.1 Operation of [Auto Meas.] or [Rinse]" P.461) is reset. After Auto Zero or Baseline Correction, perform necessary number of rinses.

- When [Auto Zero] is tapped

Tap [Auto Zero Without Sipping] to execute normal Auto Zero.
Tap [Auto Zero With Sipping] to execute sipping, Auto Zero, and purging sequentially.

- When [Base Corr.] is tapped

Tap [Base Corr. Without Sipping] to execute normal Baseline Correction.
Tap [Base Corr. With Sipping] to execute sipping, Baseline Correction, and purging sequentially.

19.5.3 Notes for Interlocking ASC-5 in Quantitation Mode

When interlocking the ASC-5 autosampler with the Sipper 160 or Syringe Sipper in the Quantitation mode, unknown sample measurement automatically starts after calibration curve creation, if the number of samples on the ASC-5 is greater than that of standard samples.
To check the calibration curve in the settings, perform the following procedures.

1 **Complete the ASC-5 operation by making the number of samples on the ASC-5 and that of the standard samples equal.**

2 **When purge is completed for the number of standard samples, press "STOP" button on the ASC-5.**
The ASC-5 operation stops temporarily.

3 **While [Start] is displayed, press "Start" button on the ASC-5.**
Unknown sample measurement starts.

4 **Tap [Calib. Curve].**

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