Single-beam

User guides

K LAB
Single Beam Spectrophotometer
User Manuals

k lab

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Introduction

Thank you for purchasing KLAB Single Beam UV/Visible Spectrophotometer.

This user guide describes how to install and operate, precautions for use, and details about accessories and options. Please read the user guide before using the instrument, and use the instrument according to its instructions. We also recommend that you keep the user guide for reference when using the instrument.

Important

Please keep this user guide with the product.
To ensure safe and smooth operation, please read the safety instructions in advance. If the product needs to be readjusted or reinstalled, please contact KLAB customer center. If the User Guide is lost or damaged, please contact KLAB Customer Center.

Safety instructions

· To ensure safe operation of the equipment, please read the safety instructions carefully before use.
· Please keep in mind all warnings and cautions described in the user guide.

In this documentation, warnings and cautions are displayed using the following conventions.

Warning	Indicates a potentially hazardous situation that, if not avoided, could result in serious injury or death.
Caution	Indicates a potentially hazardous situation that, if not followed, could result in minor injury or damage to equipment.
Note	Additional information provided to ensure proper use of this product.

Caution

Installation site precautions

Warning

When using flammable and toxic samples, be sure to provide ventilation at the installation site.

Caution

· POP, POP-V, QX weighs approximately 10.5 kg. Please consider the total weight when installing.

· The laboratory table on which the equipment is installed must be able to support the total weight of this equipment. Also, use a stable table with a depth of at least 400 mm, otherwise the equipment may tilt or fall.

· Avoid installation locations exposed to corrosive gases or excessive dust. These unfavorable conditions can be detrimental to maintaining the performance of the equipment and can shorten its lifespan.

Caution

Installation Notes

Warning

- In the event of an earthquake or disaster, please take measures to prevent the equipment from falling.
- Be sure to check and authorize the information on the power supply voltage, power consumption, and frequency of the equipment.
- Grounding is essential to prevent electric shock from sudden accidents or discharges and to ensure stable operation.
- Do not place heavy objects on the power cord. Keep hot objects away.
- Do not modify the power cord in any way.
- Always wear safety gloves when working with hazardous or biologically infectious samples.
- Do not use flammable sprays near the instrument.

Product warranty

We provide warranties for our products as set forth below.

1. Product warranty period
For more information on product warranty period and scope, please contact KLAB's customer center.

2. Product warranty description
During the warranty period, we will replace or repair parts free of charge if the failure is due to an internal defect in the machine (software, hardware). For consumables and various accessories with a limited shelf life, free repair and replacement of the same product may not be available.

3. Product warranty exceptions
Failures due to the following reasons are excluded from the product warranty, even during the warranty period

1) the product has been modified and is being used in an improper manner
2) If the repair or modification is performed by a company or person other than KLAB and the designated company.
3) Damage to data and devices, including basic software, caused by internal computer viruses
4) Internal damage to the equipment caused by power outages and sudden voltage drops
5) Errors caused by reasons other than the equipment itself
6) Failure due to use in harsh environments such as high temperature or humidity, corrosive gases, or strong vibrations.
7) Failure due to external impact, including fire, earthquake, or contamination by harmful substances.

*If the product has a document such as a warranty card or a separate contract with warranty terms, you must comply with the rules set forth in that document. If the product is built differently than the standard specifications for use in special applications, the warranty period for the product is provided separately.

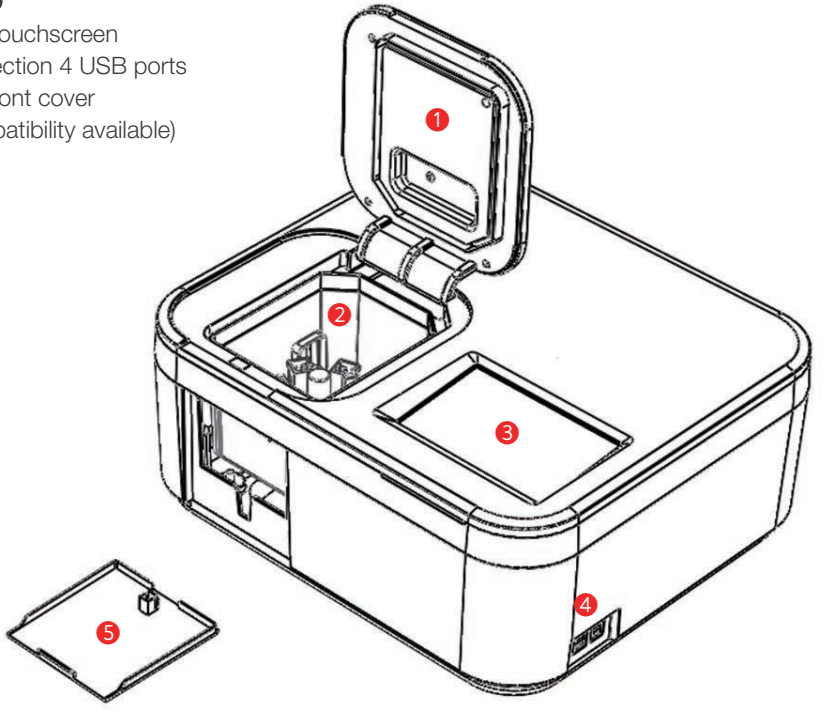
Table of Contents

Chapter 1.

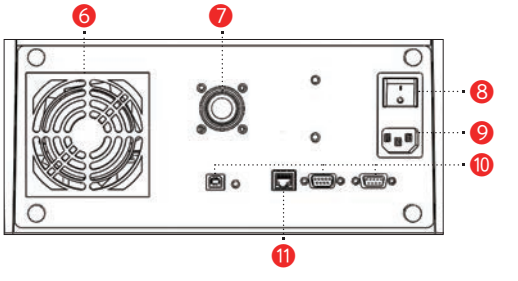
Introduction

1-1 Structure Description

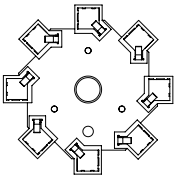
1. Cell holder cover
2. Cell holder ℹ
3. 7-inch color touchscreen
4. max. 4 connection 4 USB ports
5. Detachable front cover
   (various compatibility available)

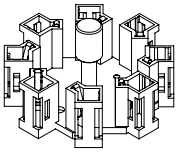


6. Fan
7. Speaker
8. Main Power
9. Power Connection
10. Port for Accessory
11. Ethernet



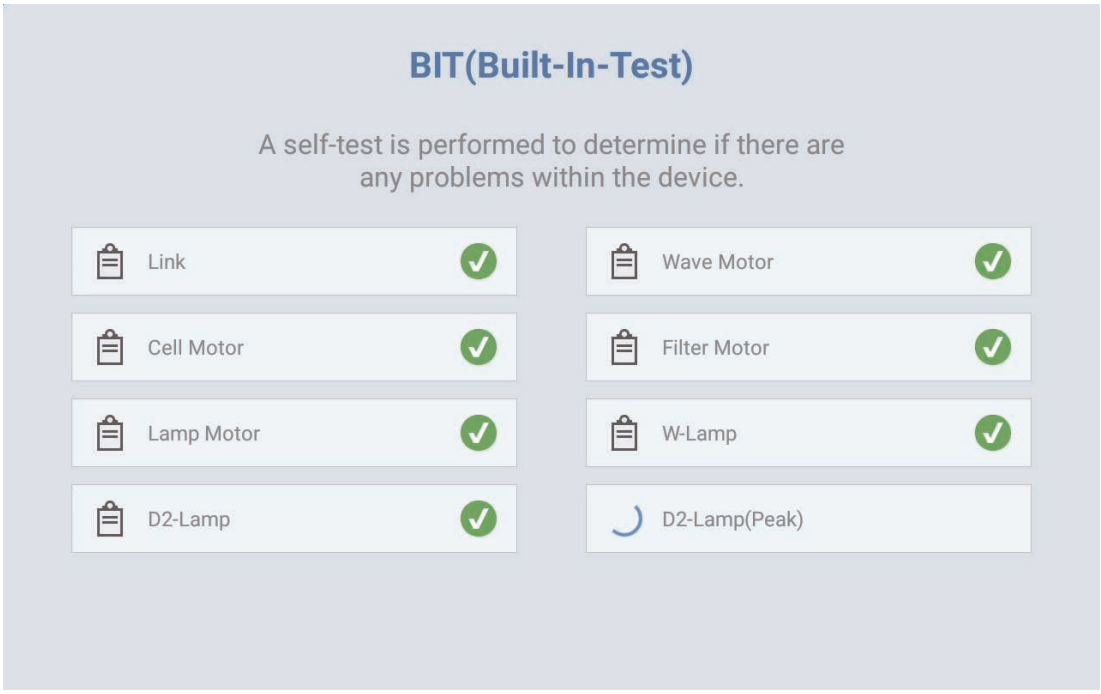
ℹ Note





POP, POP-V: Built-in multi-cell holder
QX: All-in-one cell holder comes standard

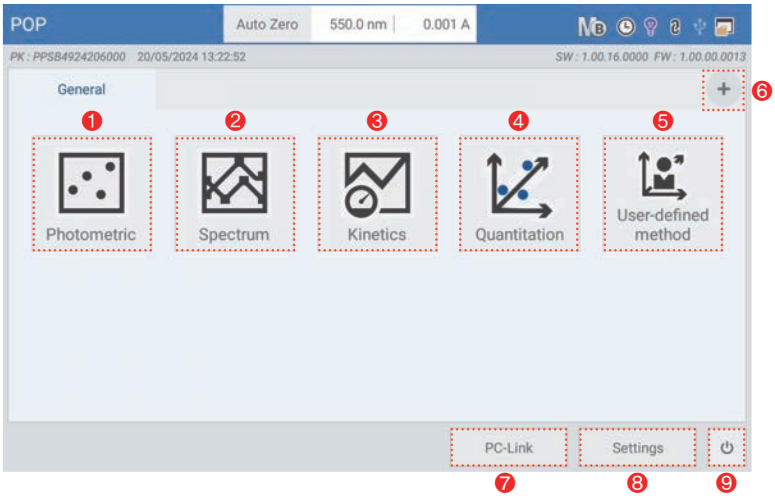
1-2 Self-Diagnostic Features (Built-In-Test, BIT)



When the power is turned on, the device performs a self-test to determine if there are any abnormalities. The initial self-test checks the status of the Link, Wave Motor, Cell Motor, Filter Motor, Lamp Motor, W-Lamp, D2-Lamp, and D2-Lamp (Peak) to determine whether the device is abnormal. Each item is checked and the results are displayed. If there is an abnormality in the device, warning is displayed. At this time, you can use [OK] to proceed to the next step. If everything is in order, you will automatically be taken to the main screen. If a warning occurs, please contact technical support and after-sales service. *POP-V does not check lamp motor, D2 lamp, and D2 lamp (peak) items.

> **Note**
>
> To obtain stable measurements, please allow the lamp to warm up for about 30 minutes after powering on.*The instrument can be measured and operated immediately regardless of preheating.

1-3 Main Screen Mode



❶ Photometric Mode (Absorption Information Measurement Mode)

· You can easily measure absorbance (Abs) (or transmittance (%T)) at a specific wavelength.
· A factor (K) value can be set, and it enables simple quantitative test of samples by just measuring absorbance (Abs).
· Up to 20 wavelengths can be set, and absorbance by wavelength is automatically measured.

❷ Quantitation Mode

· Quantitative analysis of samples can be performed by creating a standard curve and using the standard curve.
· Provides four types of calibration lines: Linear (Zero-crossing), Linear, Quadratic, and Cubic.
· Accurate calibration lines can be created with results from up to 8 repeated measurements.

❸ Spectrum Mode

· You can check the spectrum of the desired wavelength band.
· Absorbance (Abs) and transmittance (%T) data can be switched through shortcut keys.
· Enlarging a certain section and pointing peak/valley spots.

❹ Kinetics Mode (Dynamic Characterization analysis Mode)

· This mode allows you to see the change in absorbance (or transmittance) over time at a specific wavelength.
· Measurements are taken at regular time intervals, and the minimum interval that can be set is 1 second (based on 1 cell).
· Progress is displayed during the measurement, and up to 24 hours of measurement is possible.

*The minimum measurement interval is adjusted according to the measurement range and conditions.

❺ User defined method

· This mode is a collection of measurement setting parameters of Standard Curve (STC), Photometric/ Kinetics/Spectrum mode used in Quantitation mode.
· This mode allows users to define and save their own measurement settings.
· It provides users with flexibility in measurement settings and a personalized experimental environment.

❻ Favorites

· This is a function that allows you to create a new tab on the main screen by selecting the desired menu.

❼ PC connection

· This function is for connecting to the optional PC software (View).

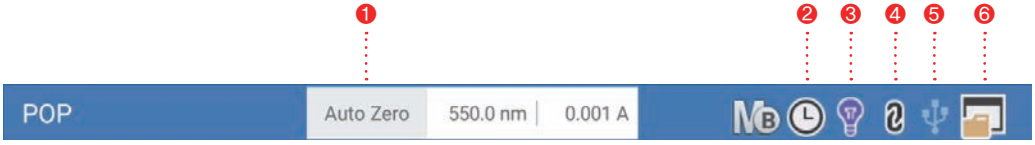
❽ Settings

· You can change various settings of the equipment. (Refer to 8-3 Equipment Settings)

❾ Power off

· This is the button to turn off the power. You must use the power switch on the rear for a complete shutdown and restart.

1-4 Quick Menus and Features



❶ Measured value monitoring function
You can check the current absorbance for one wavelength in the range of 190-1100 nm and adjust the zero point based on the current cell.

❷ Cell type selection
The icon changes according to the status of the cell type, helping you to easily check the status of the cell.
*All-in-one cell holders are labeled with S and multi-cell holders are labeled with M.

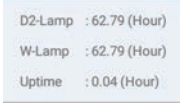
❸ Lamp preheating status check function
You can monitor the equipment's running time, the lamp's preheating status, and the cumulative hours of use in real time to ensure measurements are taken under optimal conditions. The instrument can be used immediately without preheating.

❹ Software connection status check function
You can check the connection status of the PC software View. This is one of the important factors for maintaining the stability and reliability of the software.

❺ USB connection status check function
This function checks the connection status of devices connected to the instrument via USB port.

❻ Explorer
You can copy files from the device's storage space and external storage space and delete files.
* For details, please refer to 8-2 Explorer in Chapter 7.

Note



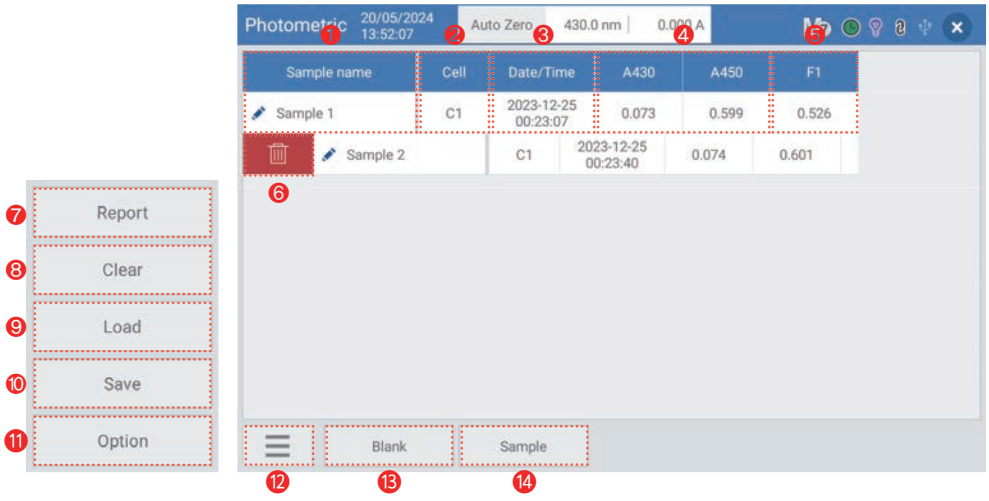
Uptime: Hours of use the device / Lamp usage time: Total cumulative hours of use lamps.
* Before the lamp warms up, the icons in the quick menu are colored gray[]. After the lamp has warmed up (1 hour), the icons are colored green[] .

Chapter 2.

Photometric Mode

2-1 Photometric Mode Descriptions

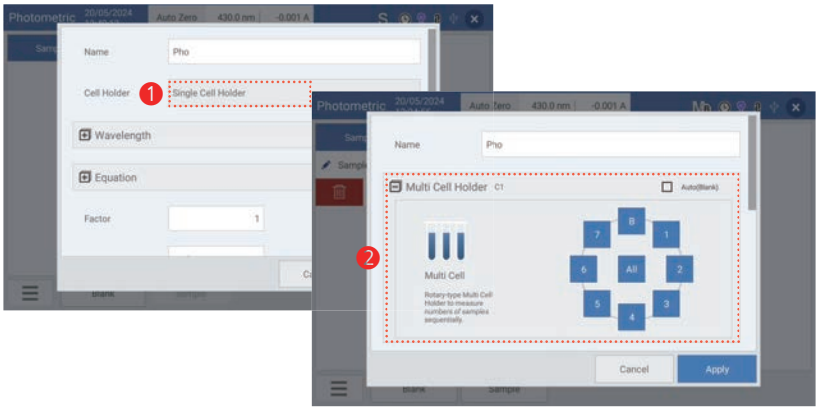
This mode measures a sample at a wavelength entered by the user and it calculates and displays the Absorbance, Transmittance, and Concentration.



❶ Sample name	A sequential sample name is automatically generated, which can be modified later.
❷ Cell	Indicates the cell location for that sample.
❸ Date/Time	Displays the date and time of the measurement.
❹ A-Wavelength	Represents the measured absorbance at that wavelength.
❺ F	Displays the results for the Equation specified in the options.
❻ (Trash)	You can delete the experiment by swiping from left to right on the desired row and tapping the trash can icon that is created.
❼ Report	You can preview and print the result, and save it as a PDF/HTML.
❽ Clear	Initialize all measured data.
❾ Load	Load a saved file or save measured data.
❿ Save	
⓫ Option	You can set the necessary options for the measurement.
⓬ ☰	Selecting a menu creates an expanded menu of non-Experiments.(❼~⓫)
⓭ Baseline/Blank	Zero the blank at the wavelength before the measurement.
⓮ Sample	Measure the sample in the selected cell.

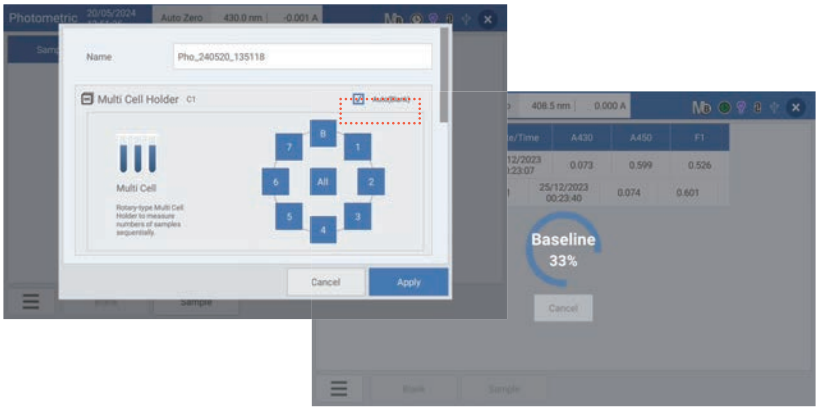
2-2 Measurement Settings

This is the window to make a setting for the measurement.

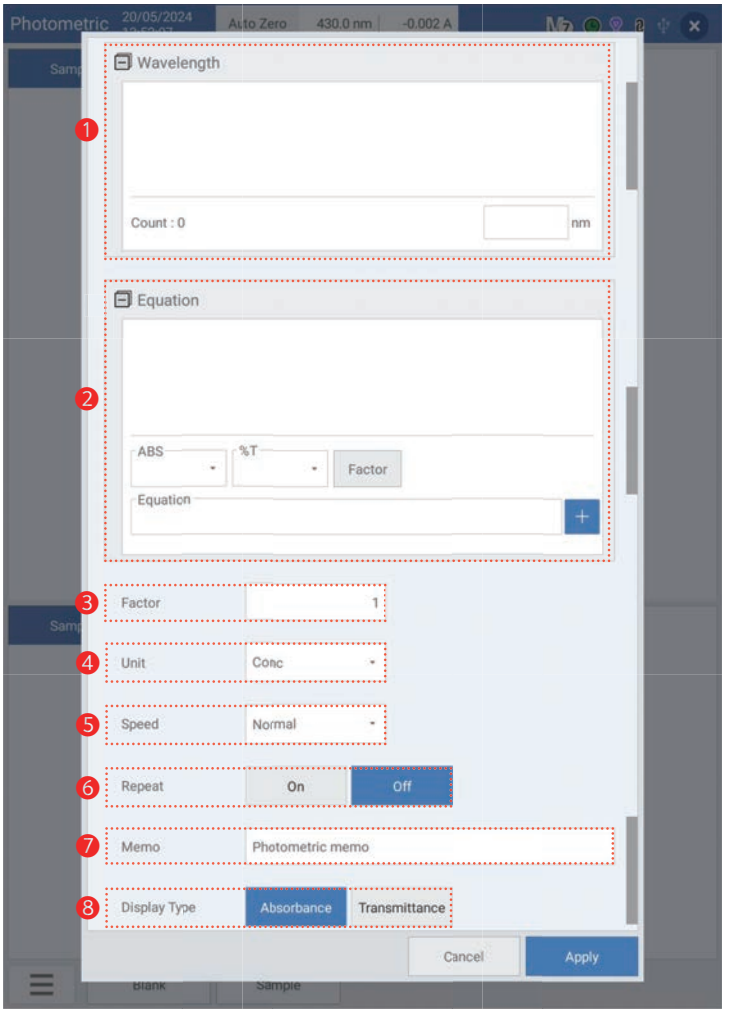


1 Single cell	Select if you want to use Round Cell, Film Cell, Long Path Cell, or All-in-One (QX only).
2 Multi Cell (B ~ 7)	Universal measurement mode using a Multi Cell Holder.

Note

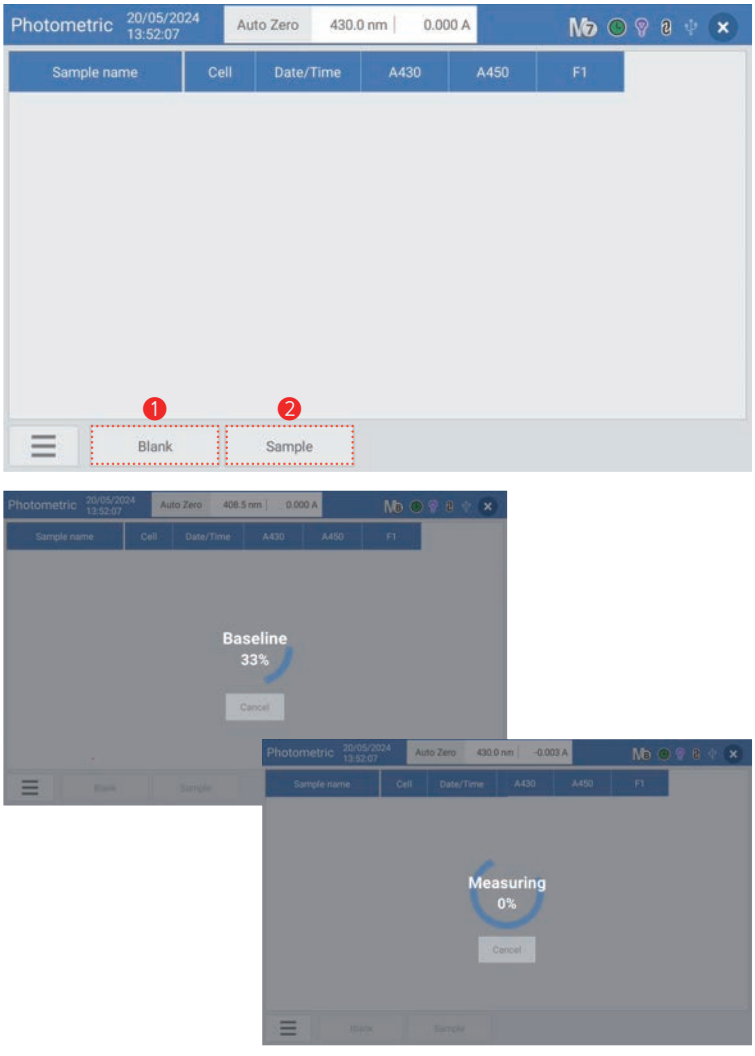


The function of Auto(blank) is to perform blank measurement and sample measurement simultaneously with one click. This help users to conveniently set the blank value and measure the sample at the same time. By using Auto(blank), you can not only save time, but also get accurate measurement results.



❶ Wavelength	rom 190 to 1100 is available. The number can be entered up to the first decimal place.
❷ Equation	You can calculate the measured absorbance (A1 through A8) at the set wavelengths through user-entered formulas (C1 through C3).
❸ Factor	Adjust the measured absorbance or transmittance by multiplying it by the factor value.
❹ Unit	Select the units users want to use.
❺ Speed	Adjust the measurement speed.
❻ Repeat	Set the number of repetitions of measurements. *Up to 8 times.
❼ Memo	Add a memo to the report.
❽ Display Type	Choose whether to measure absorbance or transmittance.

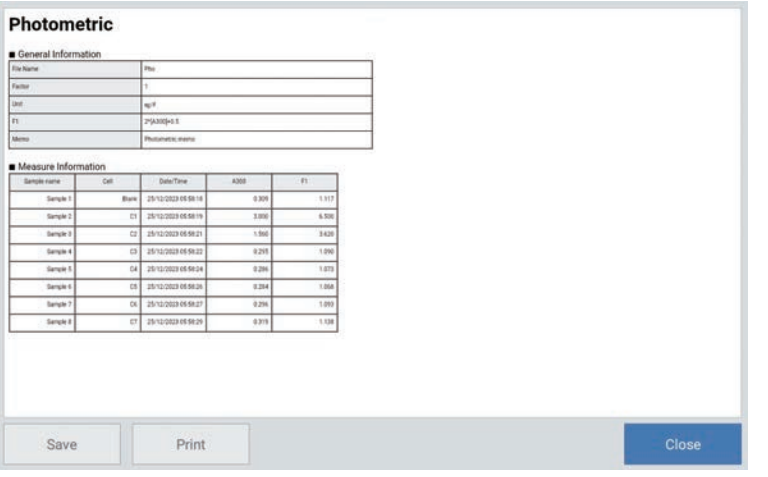
2-3 Measurement Procedure

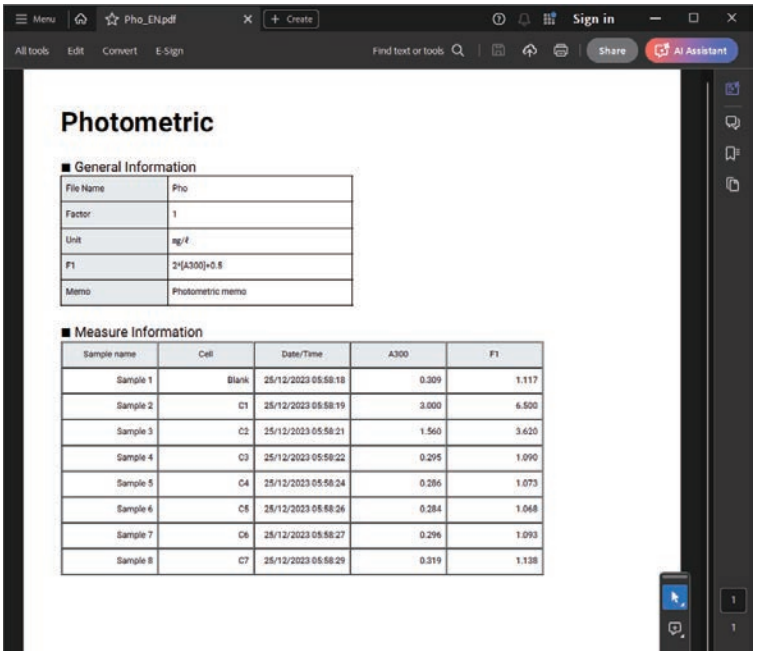


Procedure1. Select ❶[Blank] to set it to zero.
Procedure2. Select ❷[Sample] to measure the absorbance of an unknown sample.
*You can perform analysis in Photometric mode by following the procedure above.

2-4 Reports

The Report visualizes the results of an experiment or analysis, organize them into a report format, and output them. *Selected data can be previewed and printed, and can be saved as PDF or HTML. You can display efficient and professional reports by functions such as data visualization.





Chapter 3.

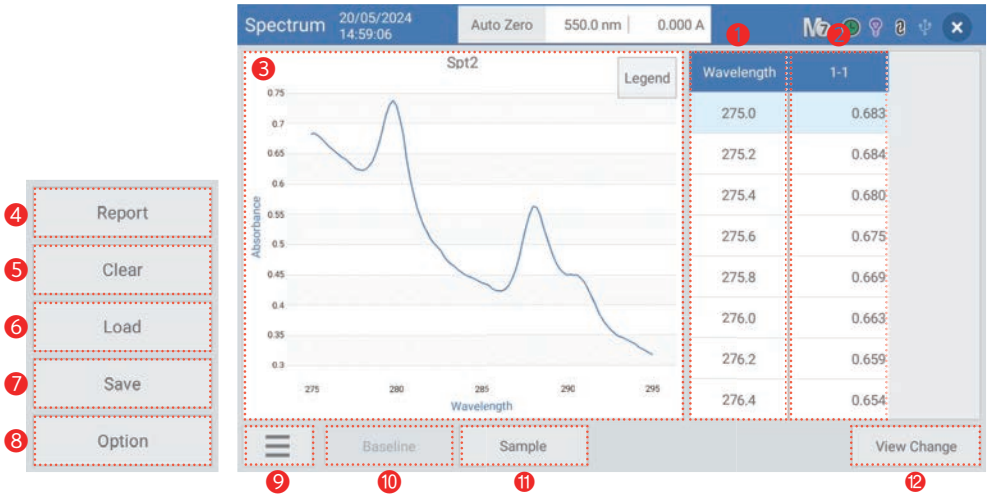
Spectrum Mode

3-1 Spectrum Mode Description

This mode scans the selected cells in the specified wavelength band at the specified step interval and displays them in a chart or table. It is used to measure absorbance and transmittance at each wavelength.

Measurement Screen

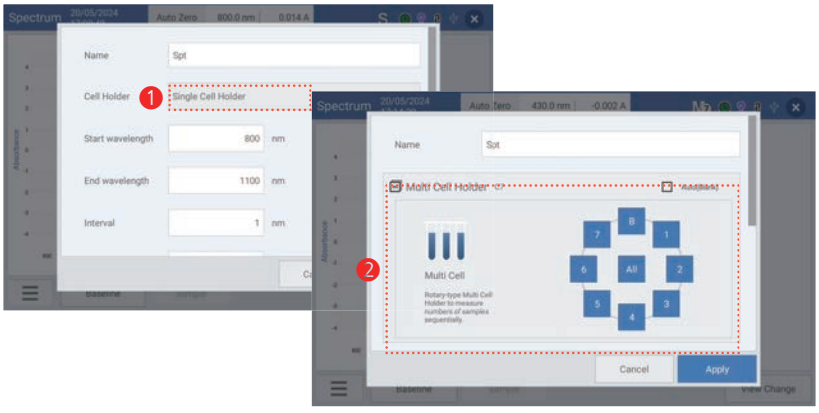
Scan the selected cells in the specified wavelength band at the specified step interval.



❶ Wavelength	A list of measurement wavelengths is automatically generated based on the specified wavelength band and step interval.
❷ ABS / %T	The scan results are recorded. The column names represent the measurements.
❸ Chart	Scan results are displayed in a chart. Pinch zoom and pan functions are supported via touch.
❹ Report	You can preview and print the result, and save it as a PDF.
❺ Clear	Initialize all measured data.
❻ Load	Load a saved file or save measured data.
❼ Save	
❽ Option	You can set the necessary options for the measurement.
❾ ☰	ou can conduct other actions related to the meansurement.
❿ Baseline	Zero the blank at the wavelength before the measurement.
⓫ Sample	Measure the sample in the selected cell.
⓬ View Change	You can check your data in three forms: graph+data, graph, and data view.

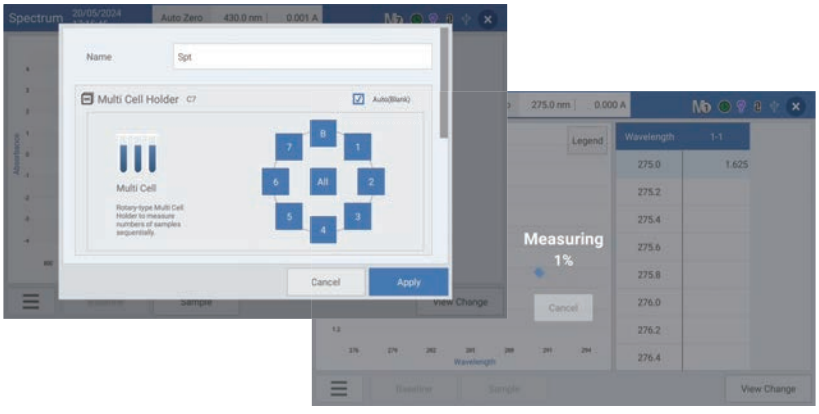
3-2 Measurement settings

This is the window to make a setting for the measurement.



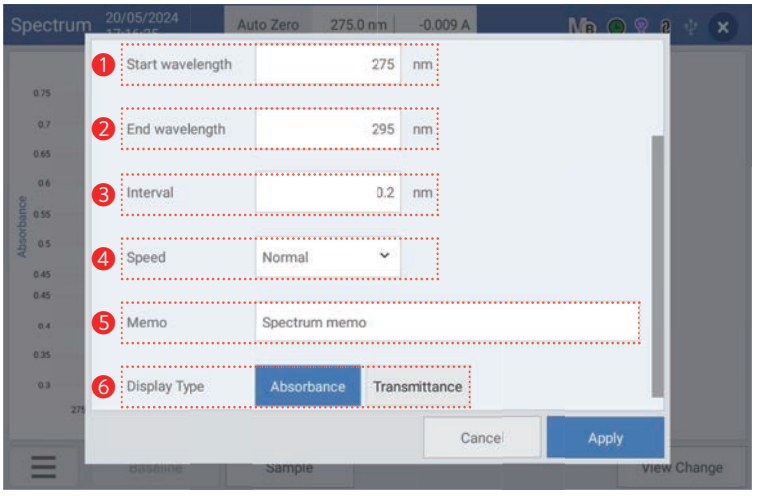
1 Single cell	Select if you want to use Round Cell, Film Cell, Long Path Cell, or All-in-One (QX only).
2 Multi Cell (B ~ 7)	Universal measurement mode using a Multi Cell Holder.

Note



The function of Auto(blank) is to perform blank measurement and sample measurement simultaneously with one click. This help users to conveniently set the blank value and measure the sample at the same time. By using Auto(blank), you can not only save time, but also get accurate measurement results.

Set the details of the measurement. Set start wavelength, end wavelength, interval, measurement speed, notes, and display values.



❶ Start wavelength	Sets the start wavelength. *Range : 190~1100 nm
❷ End wavelength	Sets the end wavelength. *Range : 190~1100 nm
❸ Interval	Set the wavelength interval, the minimum interval is 0.1 nm.
❹ Speed	Specify the measurement speed.
❺ Memo	Add a memo to the report.
❻ Display Type	Choose whether to measure absorbance or transmittance.

3-3 Legend and P/V

In the spectrum mode, this function displays a legend of the measured spectrum and it makes the data interpretation easier. The P/V graph helps you to characterize the spectrum by pointing the peak/valley for the sample.

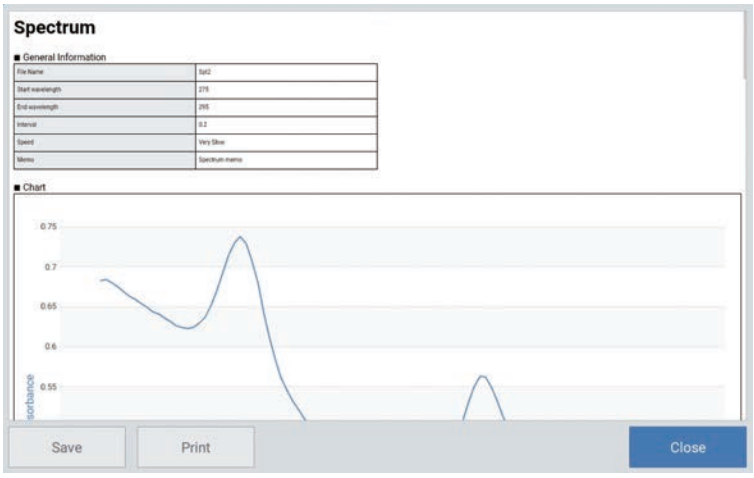
Legend	Select whether to show a legend for the spectrum graph.
P/V	In the graph, you can see the peak/valley for the sample.

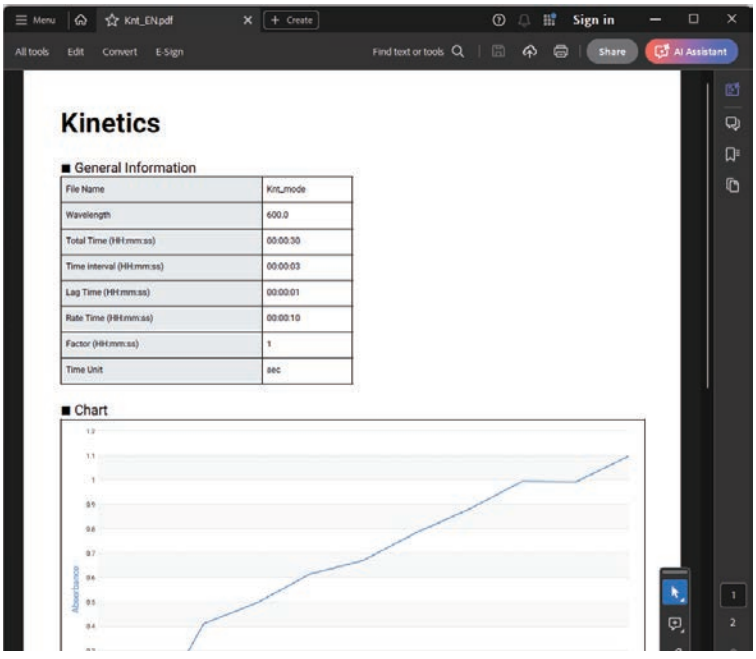
3-4 Measurement Procedure

Procedure1. Select ❶[Baseline] to set it to zero.
Procedure2. Select ❷[Sample] to measure the spectrum of a sample.
You can perform analysis in Spectrum mode by following the procedure above.

3-5 Reports

The Report visualizes the results of an experiment or analysis, organize them into a report format, and output them. *Selected data can be previewed and printed, and can be saved as PDF or HTML. You can display efficient and professional reports by functions such as data visualization.





Chapter 4.

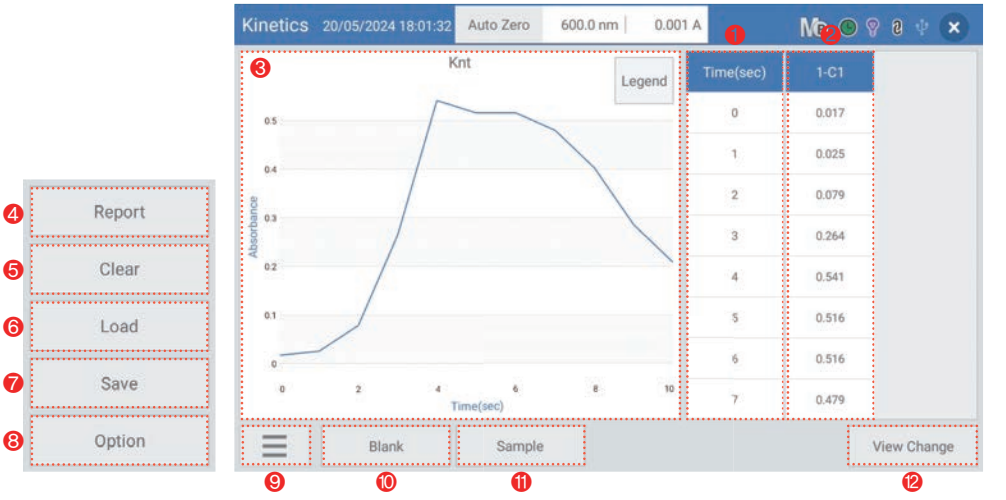
Kinetics Mode

4-1 Kinetics Mode Description

This mode shows the absorbance change of the sample over time. It is convenient for measuring samples that are currently reacting, and the data can be obtained in the form of a chart or table.

Measurement Screen

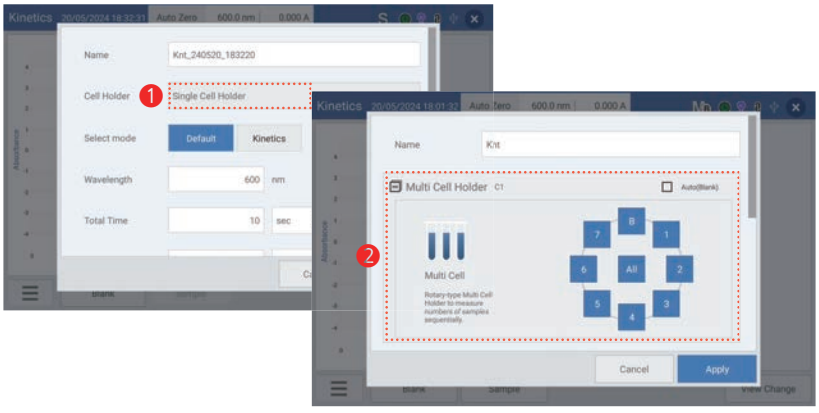
Measure the change in concentration of a sample over time.



❶ Time	A list of measurement times is automatically generated based on the specified total time and time interval.
❷ ABS / %T	The scan results are recorded. The column names represent the measurements.
❸ Chart	Scan results are displayed in a chart. Pinch zoom and pan functions are supported via touch.
❹ Report	You can preview and print the result, and save it as a PDF.
❺ Clear	Initialize all measured data.
❻ Load	Load a saved file or save measured data.
❼ Save	
❽ Option	You can set the necessary options for the measurement.
❾ ☰	You can conduct other actions related to the measurement.
❿ Baseline	Zero the blank at the wavelength before the measurement.
⓫ Sample	Measure the sample in the selected cell.
⓬ View Change	You can check your data in three forms: graph+data, graph, and data view.

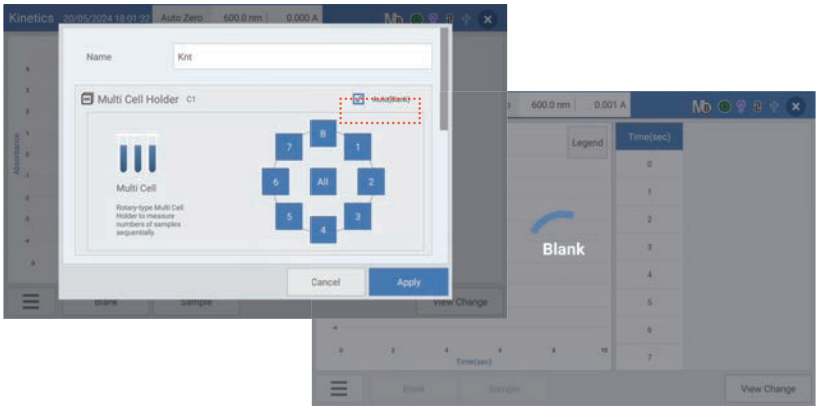
4-2 Measurement settings

This is the window to make a setting for the measurement.



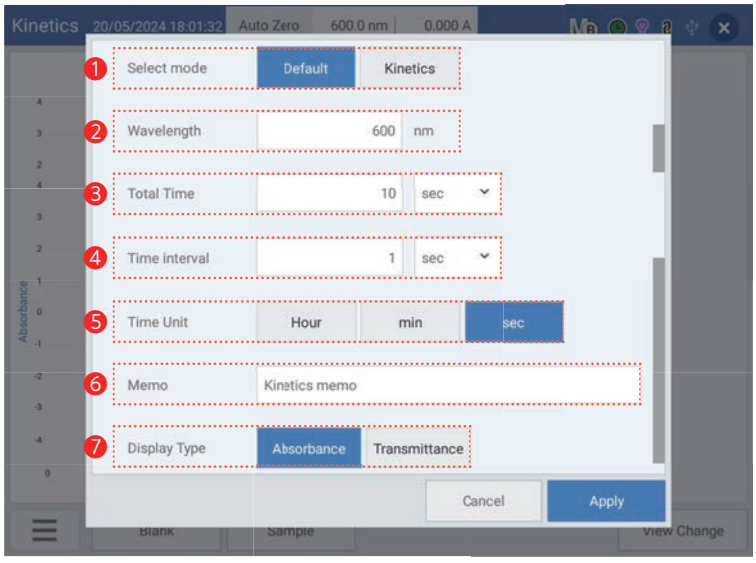
1 Single cell	Select if you want to use Round Cell, Film Cell, Long Path Cell, or All-in-One (QX only).
2 Multi Cell (B ~ 7)	Universal measurement mode using a Multi Cell Holder.

Note



The function of Auto(blank) is to perform blank measurement and sample measurement simultaneously with one click. This help users to conveniently set the blank value and measure the sample at the same time. By using Auto(blank), you can not only save time, but also get accurate measurement results.

[Default] Setting for the measurement

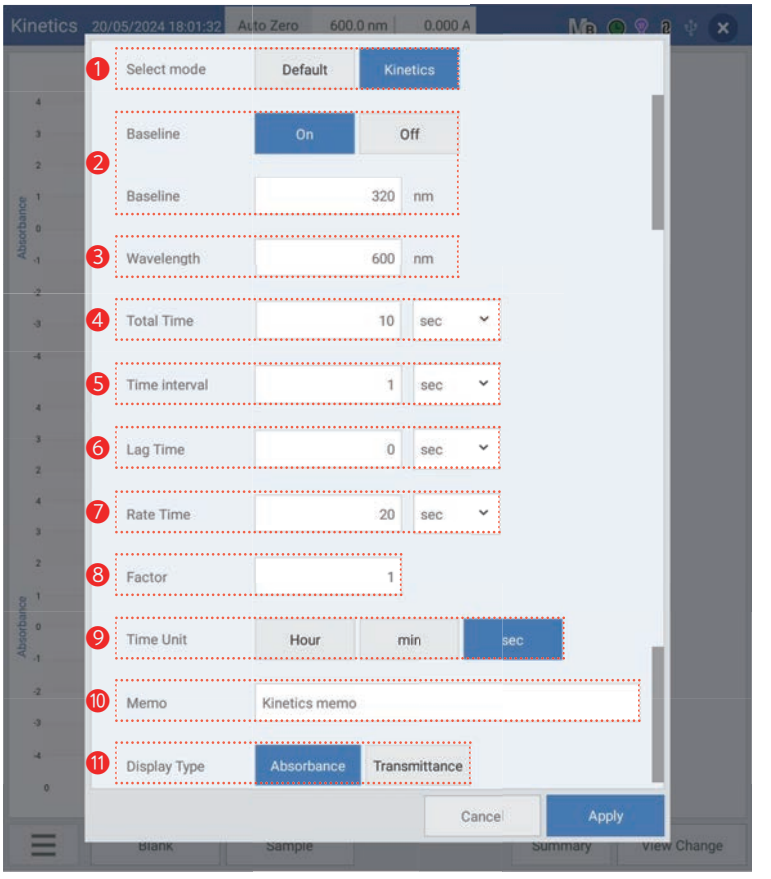


❶ Select mode	Select Default mode or Kinetics mode to measure.
❷ Wavelength	Set the wavelength you want to use. *Range : 190~1100 nm
❸ Total Time	Set the total measurement time. *The maximum is 99:99:99.
❹ Time interval	Set the time interval between measurements. *The minimum per cell is 1 second.
❺ Time Unit	You can set the time unit to hours, minutes, or seconds.
❻ Memo	Add a memo to the report.
❼ Display Type	Choose whether to measure absorbance or transmittance.

Note

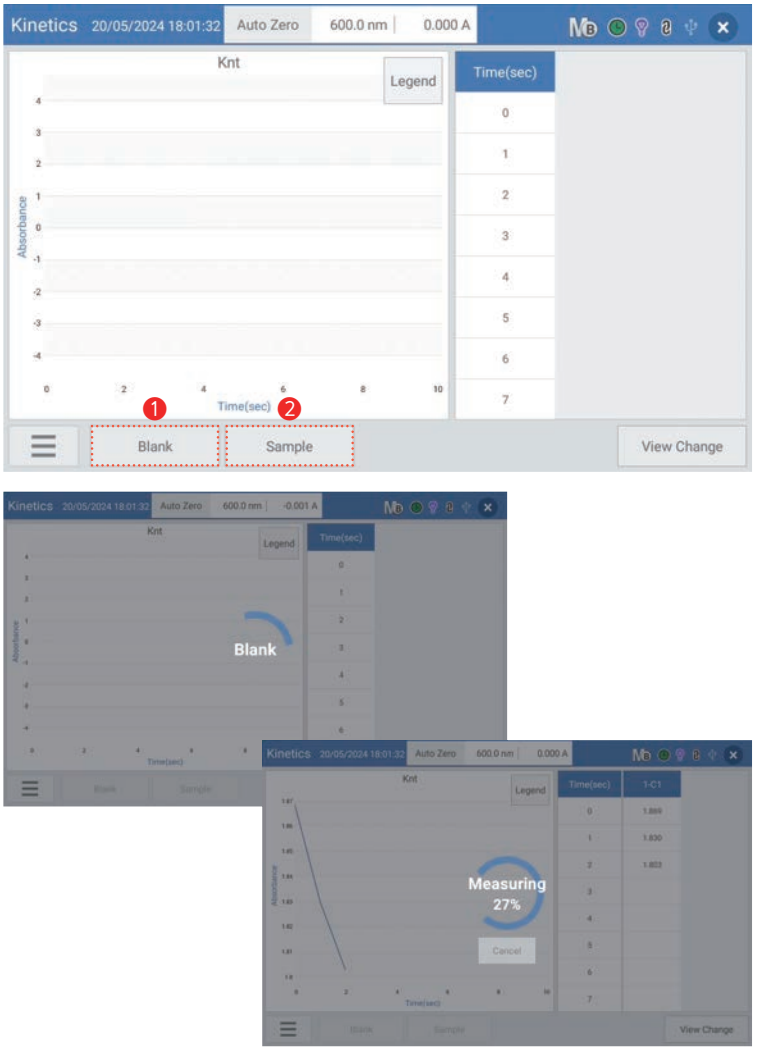
Default shows the absorbance change with reaction time. Kinetics measures the spectrum at regular time intervals to see the absorbance change over time

[Kinetics] Setting for the measurement



❶ Select mode	Select Default mode or Kinetics mode to measure.
❷ Baseline	Zero the blank at the wavelength before the measurement.
❸ Wavelength	Set the wavelength you want to use. *Range : 190~1100 nm
❹ Total Time	Set the total measurement time. *The maximum is 99:99:99.
❺ Time interval	Set time interval between measurements.
❻ Lag Time	Set the delay time.
❼ Rate Time	Set the ratio time.
❽ Factor	A constant to calibrate the analysis results.
❾ Time Unit	Set the time unit to hours, minutes, or seconds.
❿ Memo	Add a memo to the report.
⓫ Display Type	Choose whether to measure absorbance or transmittance.

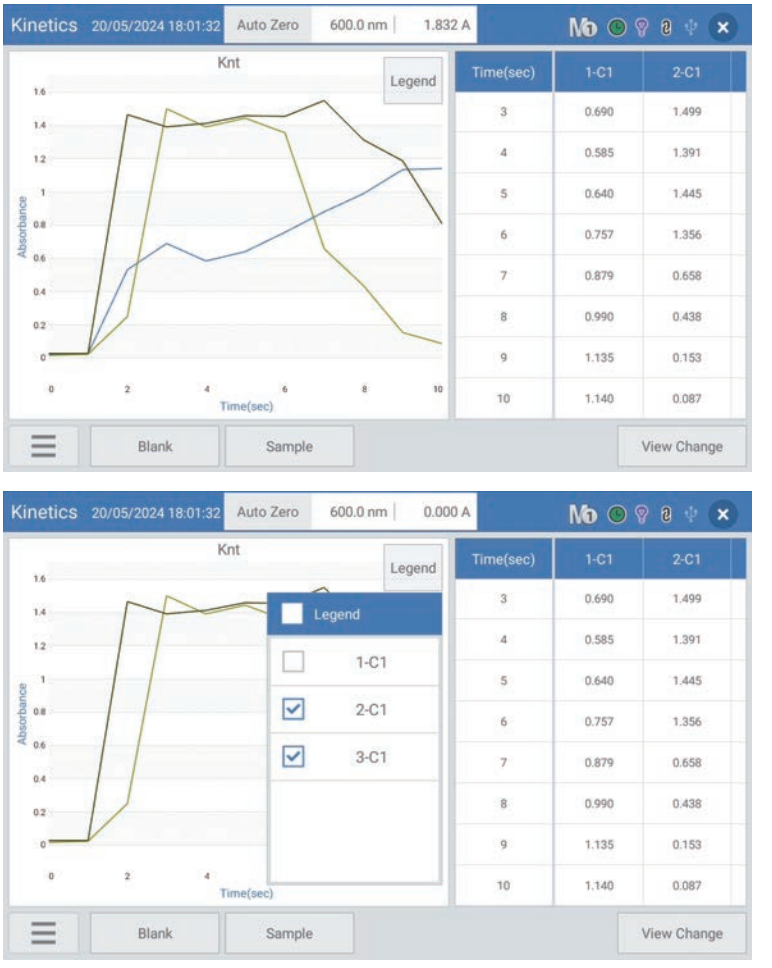
4-3 Measurement Procedure



Procedure1. Select ❶[Blank] to set it to zero.
Procedure2. Select ❷[Sample] to measure a sample.
You can follow the procedure above to perform analysis in Kinetics mode.

4-4 Legend

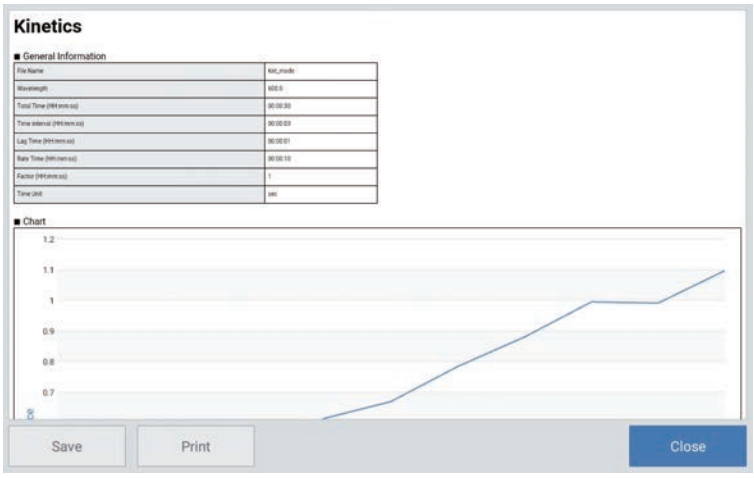
This function Legend feature displays a legend for the measured date to make the data interpretation easier.

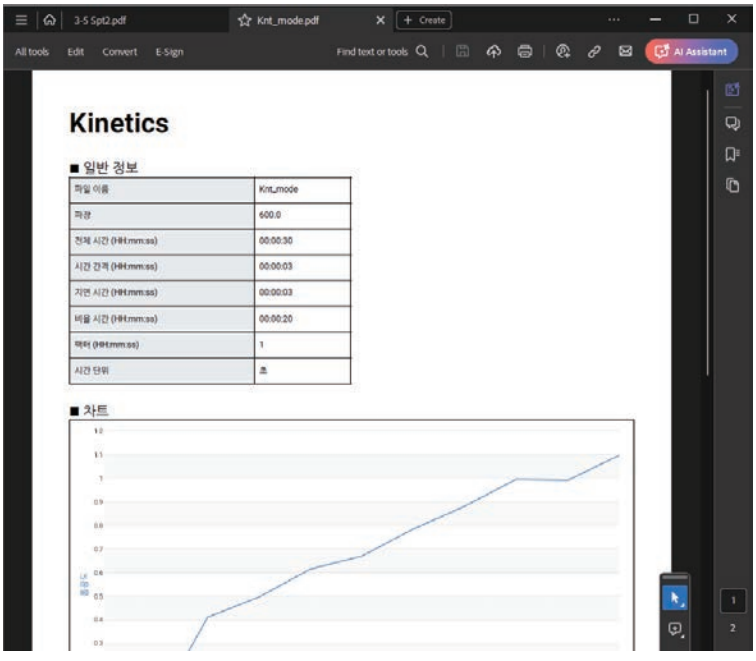


Legend	Select whether to show a legend for the measurement spectrum graph.

4-5 Reports

The Report visualizes the results of an experiment or analysis, organize them into a report format, and output them. *Selected data can be previewed and printed, and can be saved as PDF or HTML. You can display efficient and professional reports by functions such as data visualization.





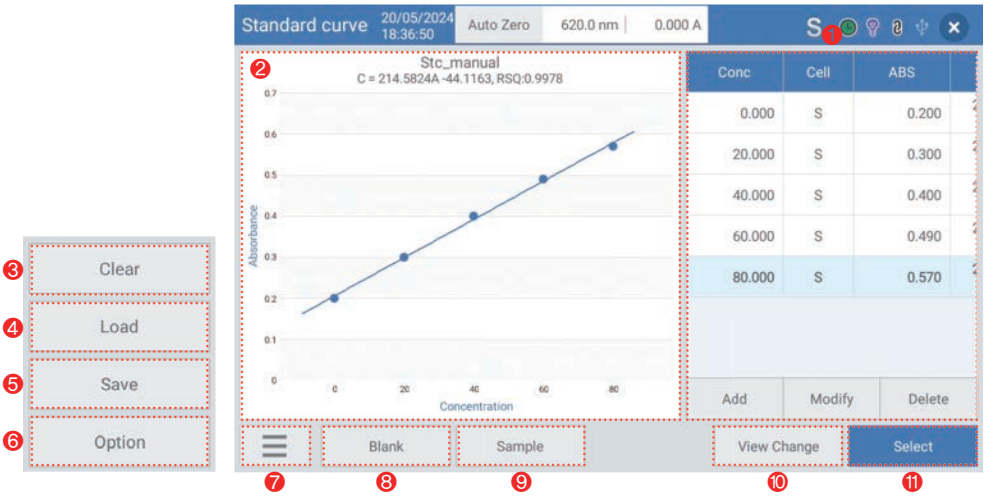
Chapter 5.

Quantitation Mode

5-1 Quantitation Mode Description

You can create a standard curve by measuring the absorbance of a standard sample whose concentration is already known, and then quantitatively measure the concentration of an unknown sample based on the data in the standard curve.

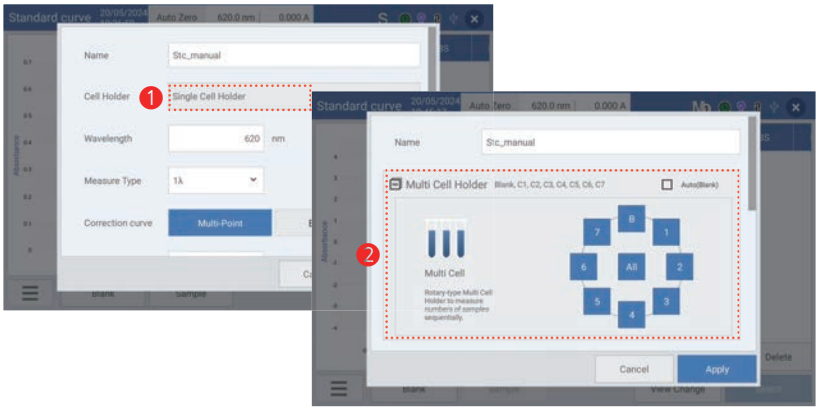
*After creating a new standard curve, press [Select] to switch to the Quantitation measurement screen. Previously saved standard curves can be utilized in User Defined Mode.



❶ Table	Concentration-absorbance information obtained through direct input or measurement results is displayed.
❷ Chart	Scan results are displayed in a chart. Pinch zoom and pan functions are supported via touch.
❸ Clear	Initialize all data for the created standard curve.
❹ Load	Load a saved file or save measured data.
❺ Save	
❻ Option	You can set the options needed to build a standard curve.
❼ ☰	You can conduct other actions related to the meansurement.
❽ Baseline	Zero the blank at the wavelength before building the standard curve.
❾ Sample	Measure the sample in the selected cell.
❿ View Change	You can check your data in three forms: graph+data, graph, and data view.
⓫ Select	After building the standard curve, switch to measurement screen.

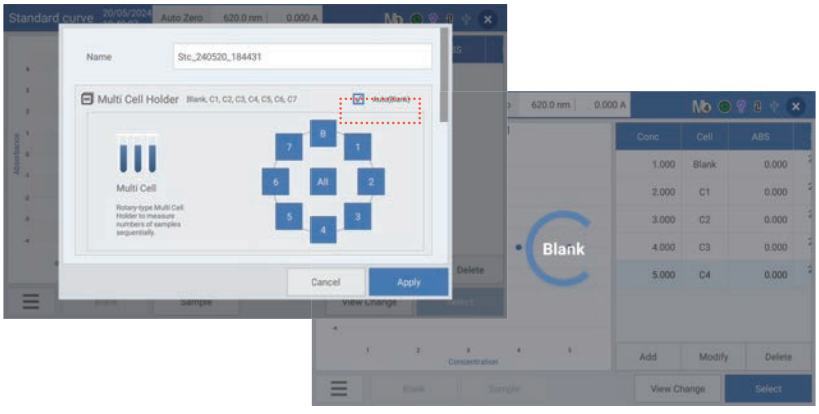
5-2 Measurement settings

This is the window to make a setting for the measurement.



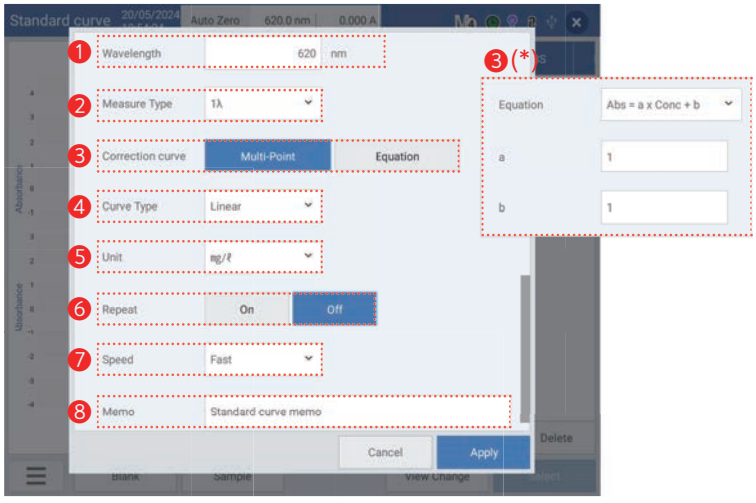
1 Single cell	Select if you want to use Round Cell, Film Cell, Long Path Cell, or All-in-One (QX only).
2 Multi Cell (B ~ 7)	Universal measurement mode using a Multi Cell Holder.

Note



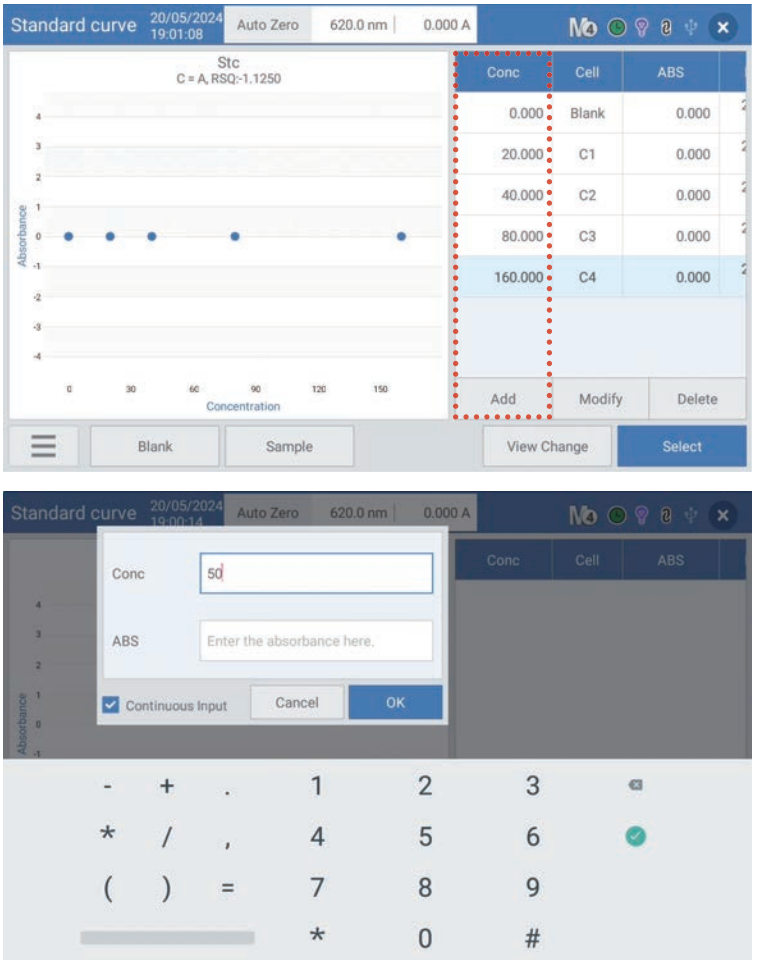
The function of Auto(blank) is to perform blank measurement and sample measurement simultaneously with one click. This help users to conveniently set the blank value and measure the sample at the same time. By using Auto(blank), you can not only save time, but also get accurate measurement results.

Setting for creating a standard curve



❶ Wavelength	Set the wavelength you want to use. *Range : 190~1100 nm
❷ Measure Type	Select the measurement method: 1λ (single wavelength), 2λ (two wavelengths), 3λ (three wavelengths), Derivative (absorbance change with wavelength change).
❸ Correction curve	Select Multi-Point or Equation. *Multi-Point: Enter a concentration and measure absorbance to draw a standard curve. *❸(*) Equation: Enter a formula to calculate the concentration using the y-axis and x-axis.
❹ Curve Type	Choose a standard curve type(a first-order straight line through the origin, a first-order straight line, a second-order curve, or a third-order curve).
❺ Unit	Select a unit you want to use.
❻ Repeat	Set the number of repetitions of measurements. *Up to 8 times.
❼ Speed	Adjust the measurement speed.
❽ Memo	Add a memo to the report.

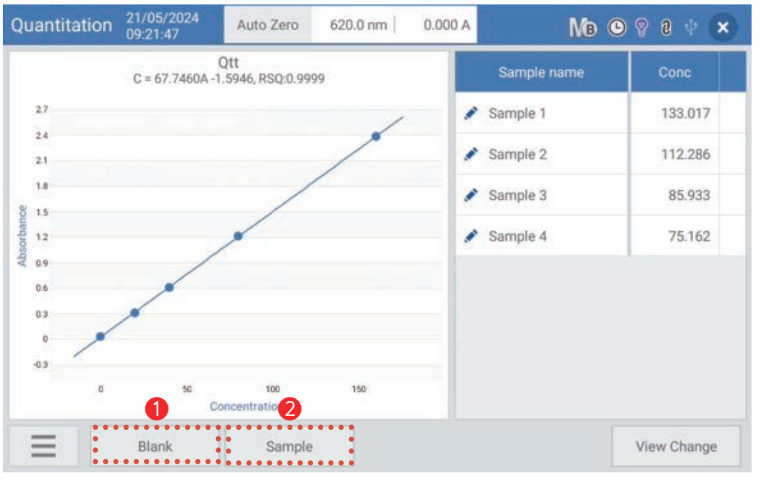
5-3 Standard Curve and Quantitative Analysis Procedures



Procedure1. Select [Plus] to enter the concentrations of known standards one after another.

> **Note**
>
> Enter the concentration: When you select the Conc cell in the corresponding chart (table), a keyboard is automatically generated and you can use it to enter the concentration.

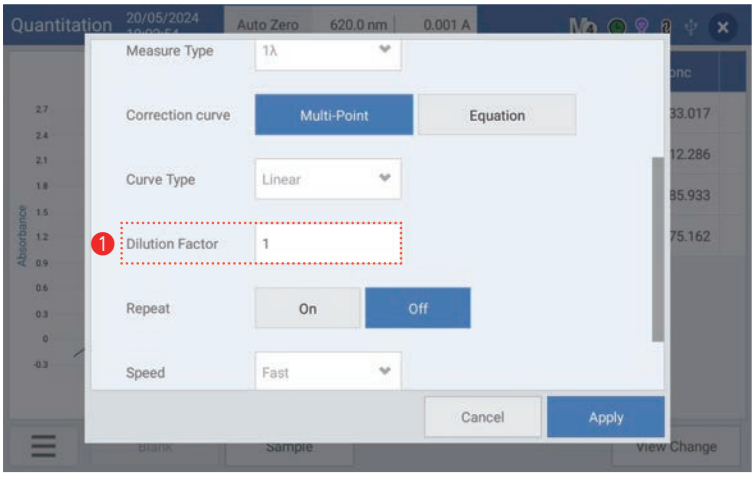
Procedure2. Select ❶[Blank] to set it to zero.
Procedure3. Select ❷[Sample] to measure the absorbance of the standard.
Procedure4. After checking the created standard curve, press ❸[Select] to switch to the measurement screen.



Procedure5. Select ❶[Blank] to set it to zero.
Procedure6. Select ❷[Sample] to measure the concentration of an unknown sample.
You can follow the procedure above to build a standard curve and perform concentration analysis.

5-4 Set up quantitative analysis measurements

In Quantitation, the values entered when creating the Standard Curve are automatically applied, and the dilution factor is enabled to compensate for diluted samples. Users can adjust the dilution factor to make the necessary corrections. This makes it easy to manage measurement settings and perform calibration tasks efficiently.

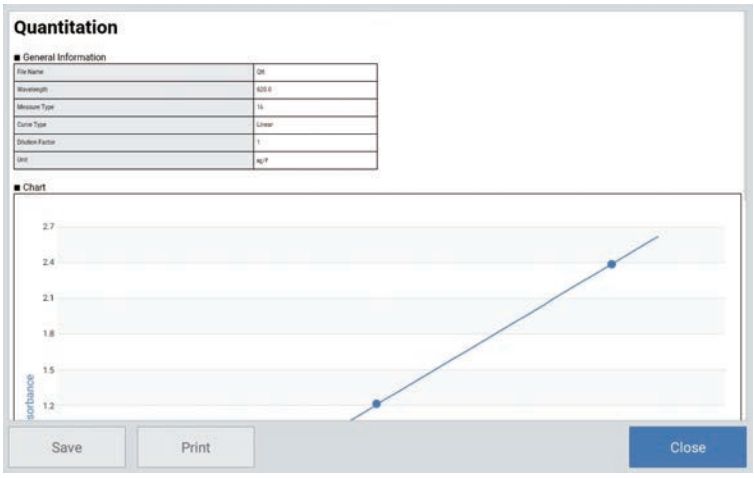


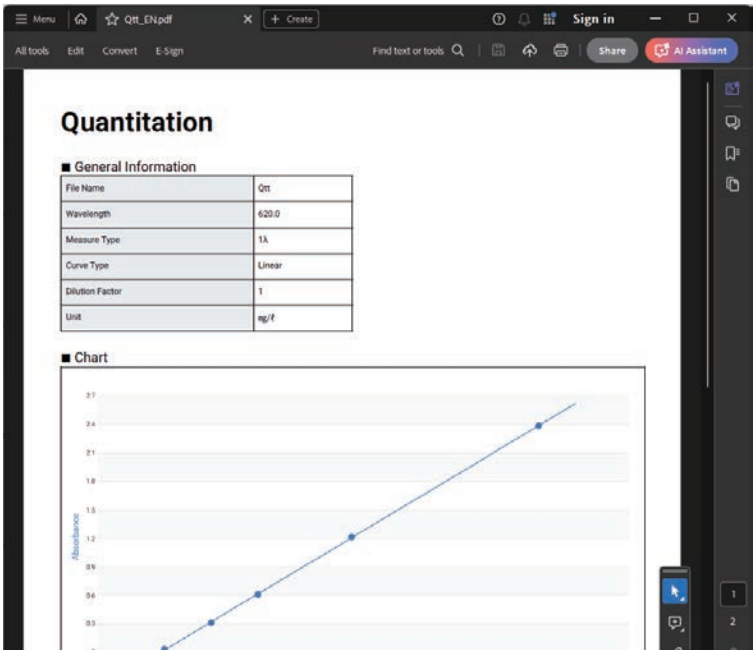
Wavelength	Set the wavelength you want to use. *Range : 190~1100 nm
Measure Type	Select the measurement method: 1λ (single wavelength), 2λ (two wavelengths), 3λ (three wavelengths), Derivative (absorbance change with wavelength change).
Correction curve	Select Multi-Point or Equation.
Curve Type	Choose a standard curve shape. (a first-order straight line through the origin, a second-order curve, or a third-order curve).
1 Dilution Factor	Correct the dilution factor for your sample.
Repeat	Set the number of repetitions of measurements. *Up to 8 times.
Speed	Adjust the measurement speed.
Memo	Add a memo to the report.

*Only dilution multiples can be set in the Quantitation settings.

5-5 Reports

The Report visualizes the results of an experiment or analysis, organize them into a report format, and output them. *Selected data can be previewed and printed, and can be saved as PDF or HTML. You can display efficient and professional reports by functions such as data visualization.



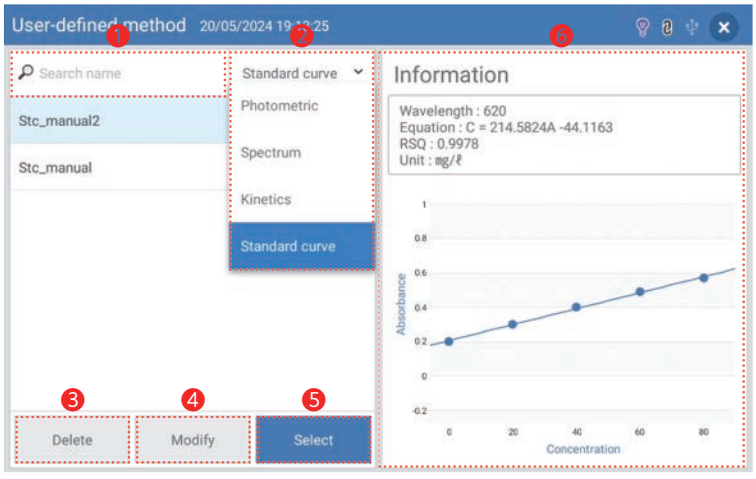


Chapter 6.

User-defined method

6-1 User-defined method Description

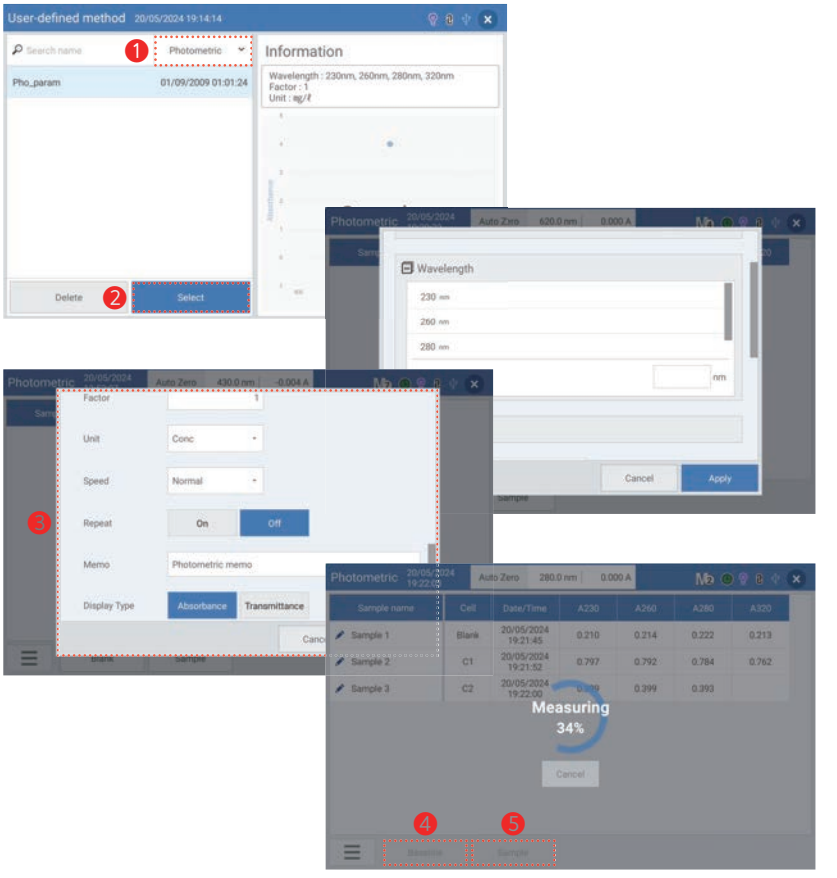
User defined method is a collection of measurement parameters for Standard Curve (STC), Photometric/ Kinetics/Spectrum modes and Standard Curves (STC) used in Quantitation mode. This mode helps users to define and save their own measurement settings. User defined method serves to increase the reproducibility and efficiency of experiments by providing users with flexibility in measurement settings and a personalized experimental environment.



❶ Search name	Search for the name of a saved standard curve (STC) or parameters.
❷ Mode	Select Photometric, Spectrum, Quantitation, or Kinetics mode.
❸ Delete	Delete the selected standard curve (STC) or parameters.
❹ Modify	Modify information in the selected standard curve (STC). For *parameters, the Modify button is disabled.
❺ Select	Bring up the selected standard curve (STC) or parameters.
❻ Information	Display information for the selected standard curve (STC) or parameters.

6-2 Importing parameters

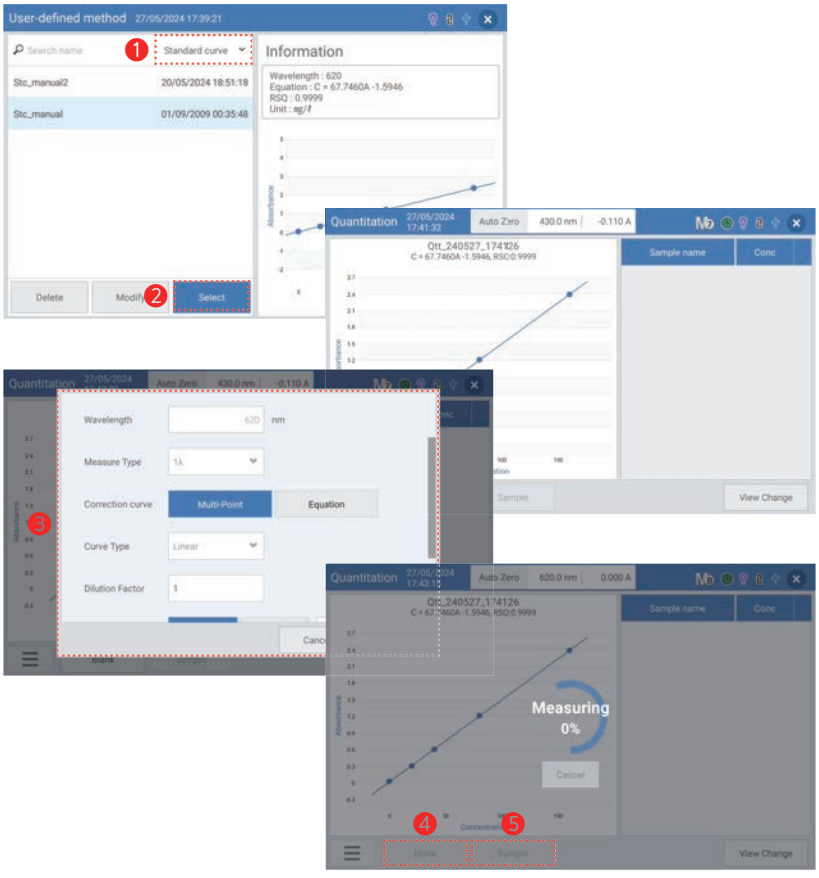
A parameter is a set of instructions, including preset procedures and conditions, for conducting a specific test or analysis. Importing a parameter file can save users time by automatically applying the set options and conditions. (Available modes Photometric, Spectrum, Kinetics)



Procedure1. Select a mode from ❶[Photometric], [Spectrum], or [Kinetics].
Procedure2. After entering the selected mode, ❷[Select] a parameter.
Procedure3. ❸Check that the parameter you set are inserted properly.
Procedure4. After pressing ❹[Blank/Baseline] to zero, select ❺[Sample] to start a sample measurement.

6-3 Importing Standard Curves

STC import is the process of importing standard curves created by the instrument and utilizing them for analysis. This help users to save time by utilizing preset options and conditions and standard curves to reduce repetitive work. (Available Mode Quantitation)



Procedure1. Select the ❶[Standard curve] mode.
Procedure2. After entering the selected mode, ❷[Select] a standard curve.
Procedure3. ❸Check that the standard curve you set are inserted properly.
Procedure4. After oressing ❹[Blank/Baseline] to zero, select ❺[Sample] to start a sample measurement.

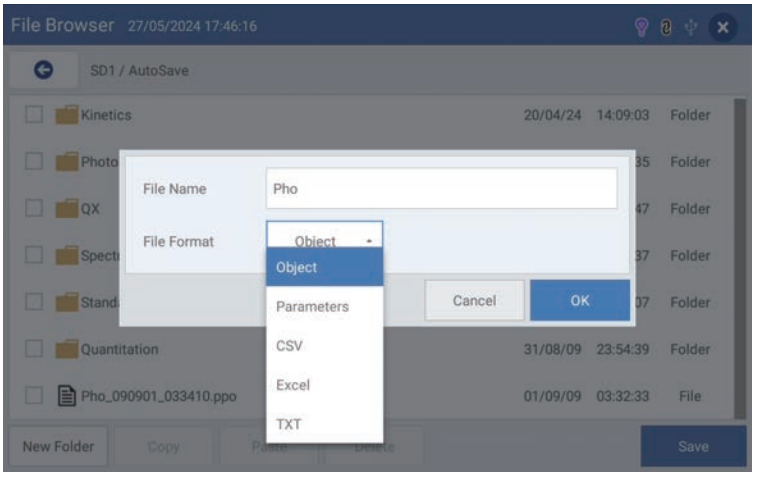
Chapter 7.

Common

7-1 Saving data

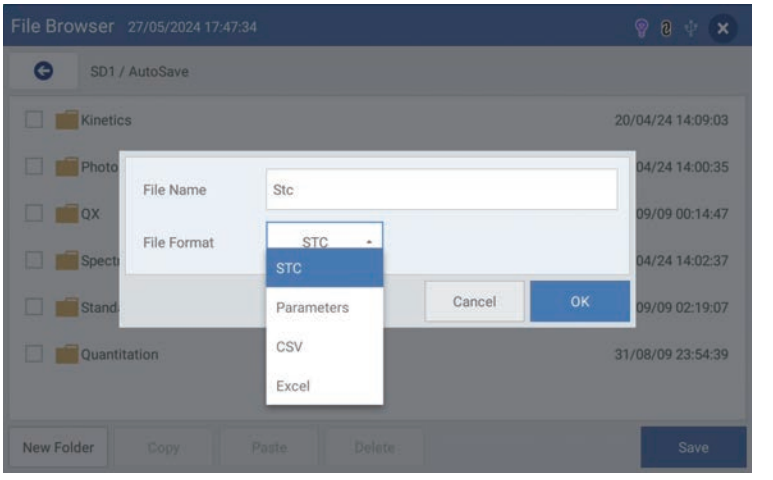
7-1-1 Saving data (Photometric, Spectrum, and Kinetics modes)

The following extension files can be saved: Object, Parameters, SCV, Excel, and TXT.



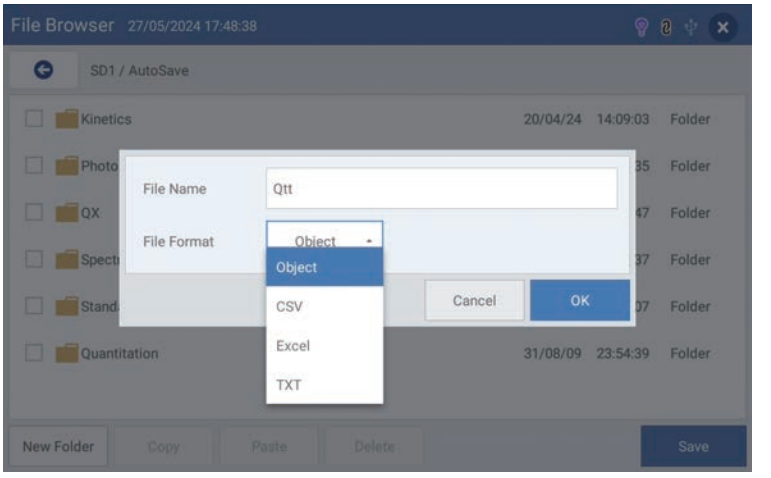
7-1-2 Saving Data (Standard Curve (STC) Mode)

The file extension that can be saved is STC, Parameters.



7-1-3 Saving data (Quantitaion mode)

You can save files with the following extensions: Object, SCV, Excel, and TXT.



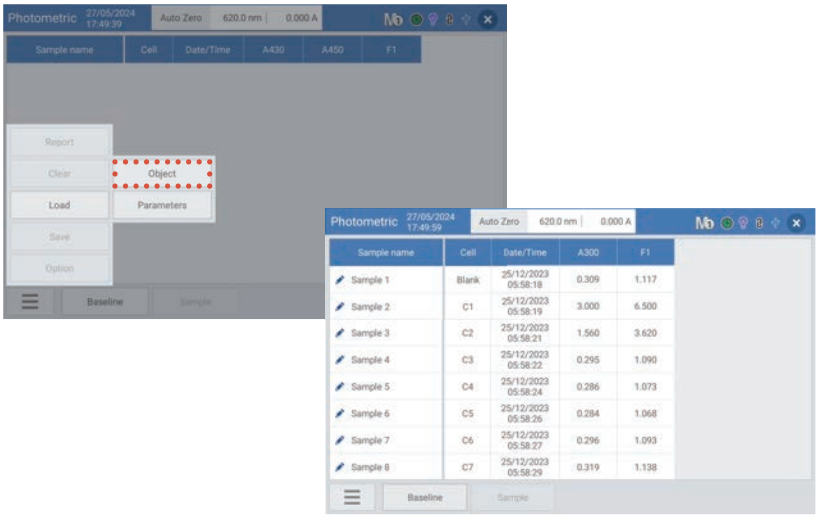
Note

- Object: Parameter file and its corresponding measurements, a format that stores the measurements used in the analysis along with the actual measured data.
- Parameters: Files containing measurement procedures, conditions used in the analysis.
- STC: A file used in Standard curve mode that contains standard curve data created with set values and standard materials and its graphs.

7-2 Importing

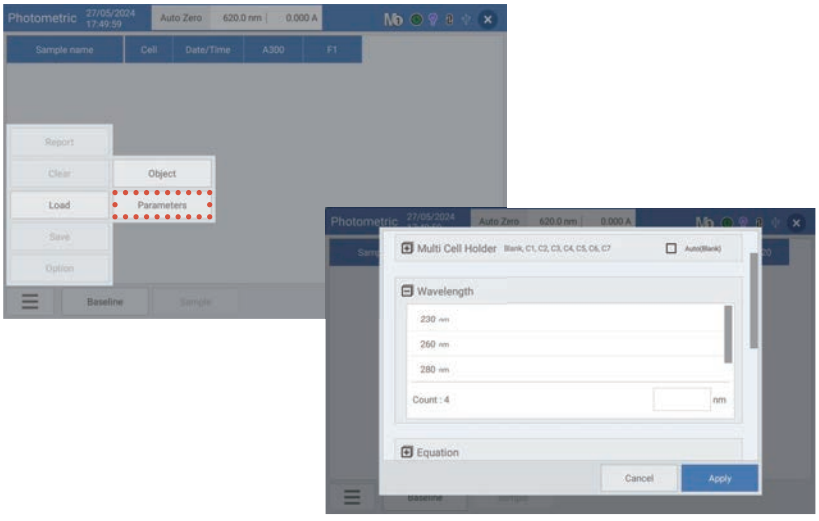
7-2-1 Importing an Object file

An Object file is a parameter and its measurements, a format that stores the measurements used in the analysis along with the actual measured data.



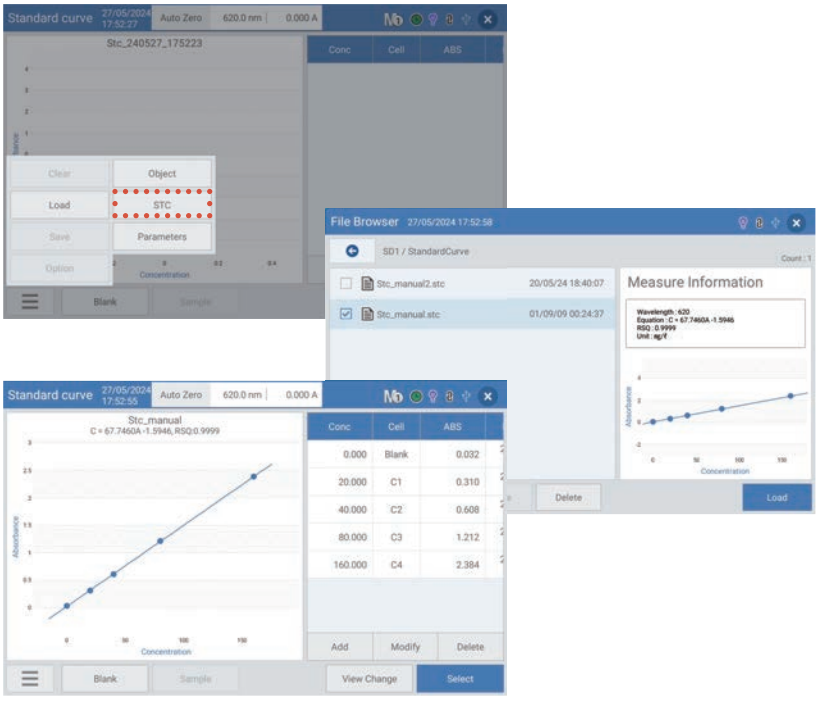
7-2-2 Importing the Parameters file

A parameter file is measurement procedures, conditions, etc. used in the analysis.



7-2-3 Importing a standard curve (STC) file

STC files are used in Standard curve mode and contain standard curve data created with settings and standard materials and its graphs.



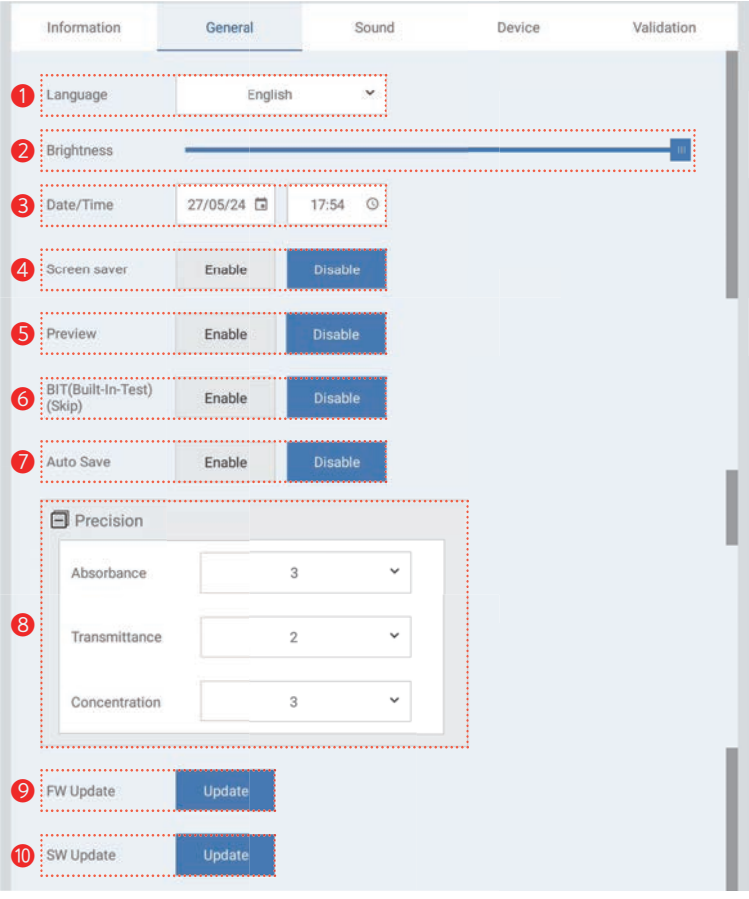
7-3 Equipment settings

7-3-1 Information settings

You can check the app, software, firmware, OS version, and serial number.

❶ App Version	Indicate the software version of the device.
❷ FW Version	Indicate the firmware version of the device.
❸ OS Version	Indicate the OS version of the device.
❹ MAC Address	Indicate the MAC version of the device.
❺ Serial Key	Indicate the serial number of the device.

7-3-2 General Setup



❶ Language	Select the language you want to use.
❷ Brightness	Adjust the brightness of the screen.
❸ Data/Time	Select the date and time of the device.
❹ Screen saver	Set the amount of time the screensaver will run automatically.
❺ Preview	Setting window pops up first when you enter any mode.
❻ BIT(bulit-In-Test)	Skip the self-diagnostic feature.
❼ Auto Save	Enables/disables the auto-save feature. When enabled, data for each measurement is saved to the sdcard1\AutoSave\MeasurementMode\ MeasurementDate folder.
❽ Precision	Displays the number of digits in the measure.
❾, ❿ FW/SW Update	Proceed with the firmware/software update. This will be activated when you connect the USB drive containing the firmware/software files.

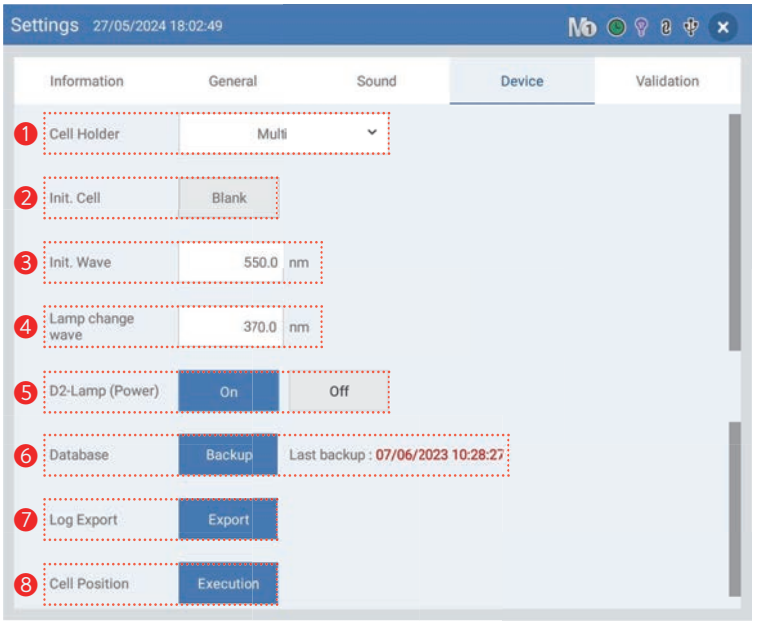
7-3-3 Sound Setup

You can set up different sound systems, such as volume, voice support, touch sound and notifying sound.

❶ Sound	Enable or disable the Sound feature. Selecting [Enable] will enable the Details button below.
❷ Volume	Adjust the loudness of the sound.
❸ Voice	Select whether to enable voice assistant.
❹ Touch(Keypad)	Turn the sound on or off for keyboard input.
❺ Notify	Choose whether or not to make a notification sound.

7-3-4 Setup Device

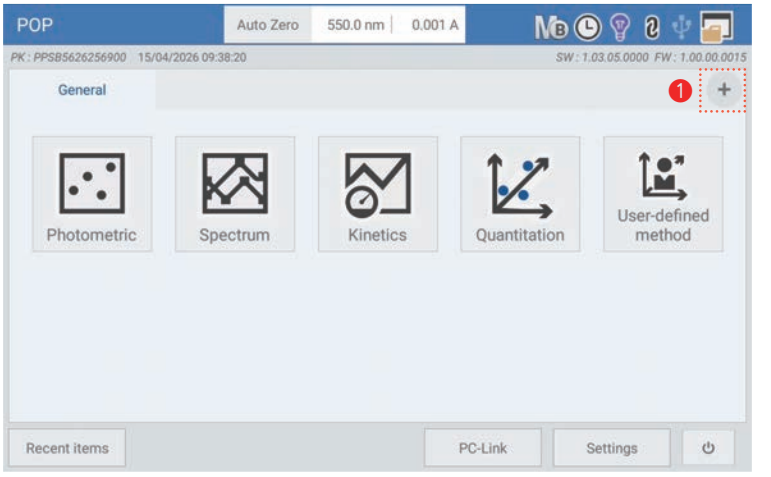
You can check the Cell holder, Init. Cell, Init. Wave, Lamp change wave, Lamp change wave, Database, and Log Export.



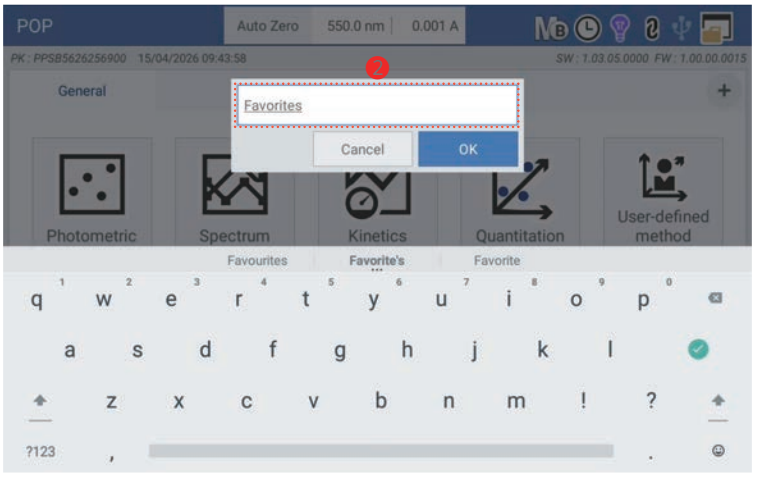
❶ Cell holder	Set the cell holder to use.
❷ Init. Cell	Move the holder to the initial position when the device is turned on. (Multicell holder only)
❸ Init. Wave	The wavelength set when turning on.
❹ Lamp change wave	The wavelength at which the lamp is switched.
❺ D2-Lamp (Power)	Turn on or off D2 lamp. It controls the power state of the D2 lamp.
❻ Database	Back up the device's database. Displaythe latest backup date on the screen and it is colored red after 30 days. *Shown when a USB is inserted
❼ Log Export	Used for troubleshooting. *Shown when a USB is inserted
❽ Cell Position	Execute cell position correction.

7-4 Favorites feature

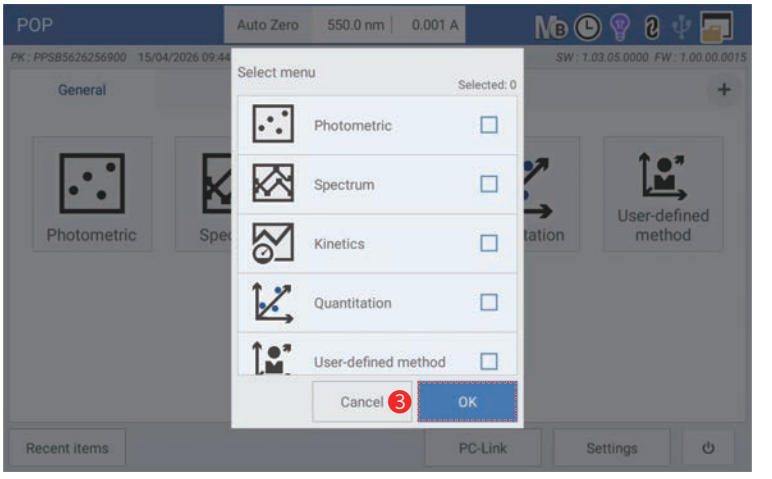
You can add a user menu to combine the modes users frequently conduct.



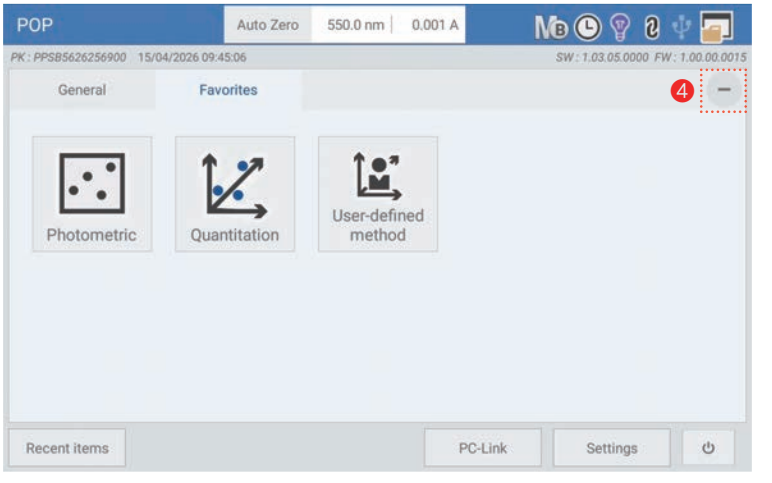
Procedure1. On the menu screen, click the ❶[+] icon.



Procedure2. In the user input box, enter the name of the ❷menu you want to create.



Procedure3. Select the modes you want to include in the new menu and click the ❸[OK] button.

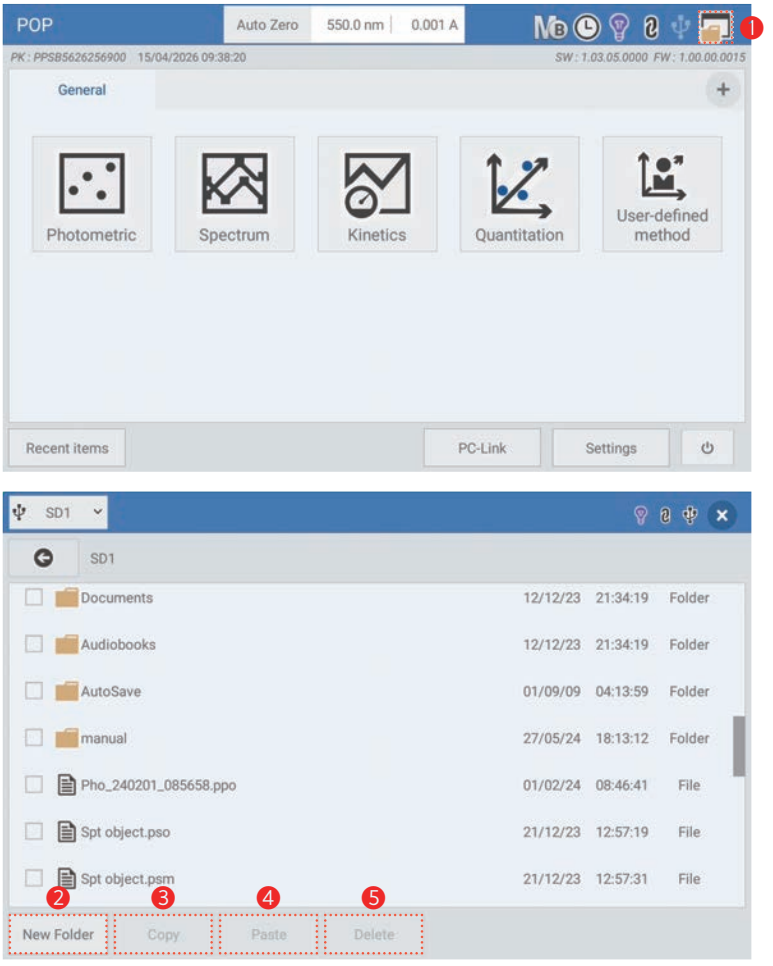


Procedure4. If you want to remove a user menu, click the ❹[-] icon on the menu screen.

7-5 File Browser

7-5-1 File Browser Feature Descriptions

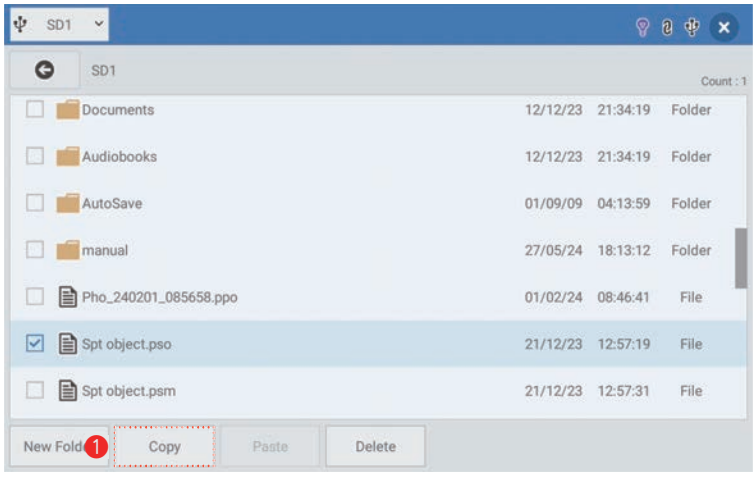
A file management program helps you to browse and navigate files and folders on your device.



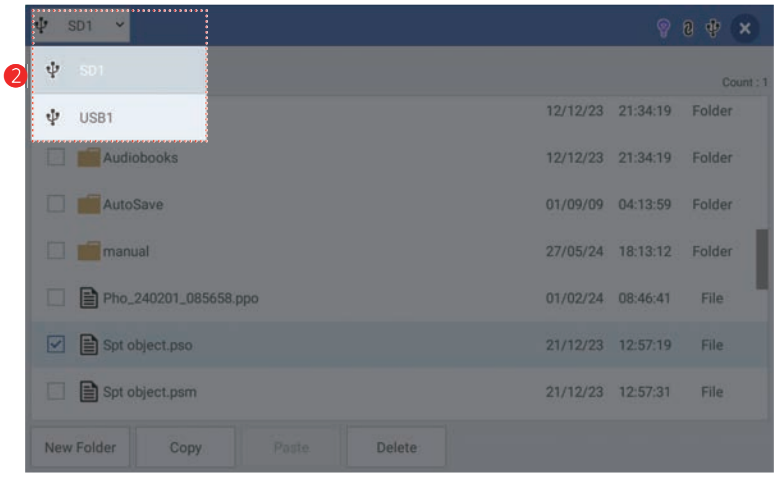
Click the ❶[File Browser] icon in the upper right corner of the main screen to create a file browser window. In the file browser window, you can search for previously saved data files and use the new folder, copy, paste, and delete functions.

❷ New Folder	Create a new folder.
❸ Copy	Copy the selected file to the clipboard.
❹ Paste	Paste the copied file.
❺ Delete	Delete the selected file from the file browser.

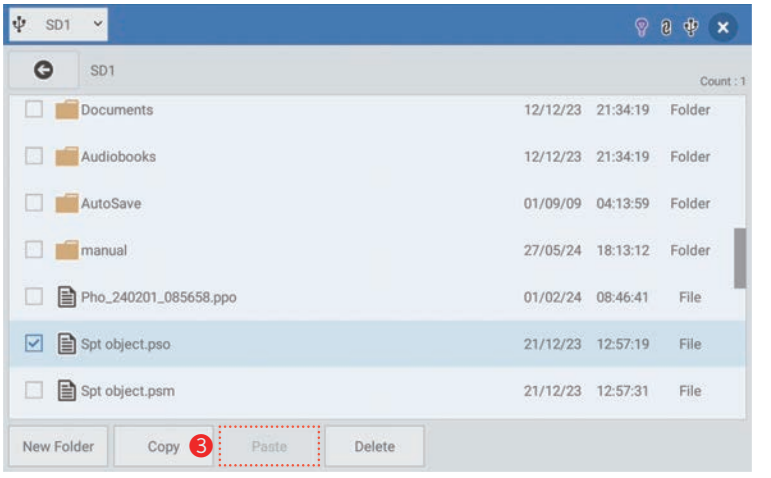
7-5-2 Procedure for moving files from a file browser to USB



Procedure1. Select the saved files with the checkboxes and touch ❶[Copy] to copy the selected files to the clipboard.



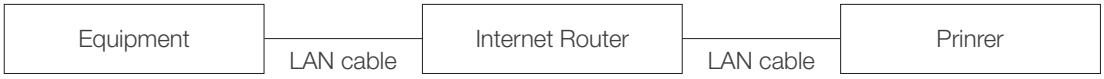
Procedure2. In the upper left corner of the file browser screen, select Connected ❷[USB]. You can check the connection status of your device and USB.



Procedure3. Select a folder on the USB and select ❸[Paste] to paste the files from the clipboard. This completes the process of moving or copying the selected files to the USB.

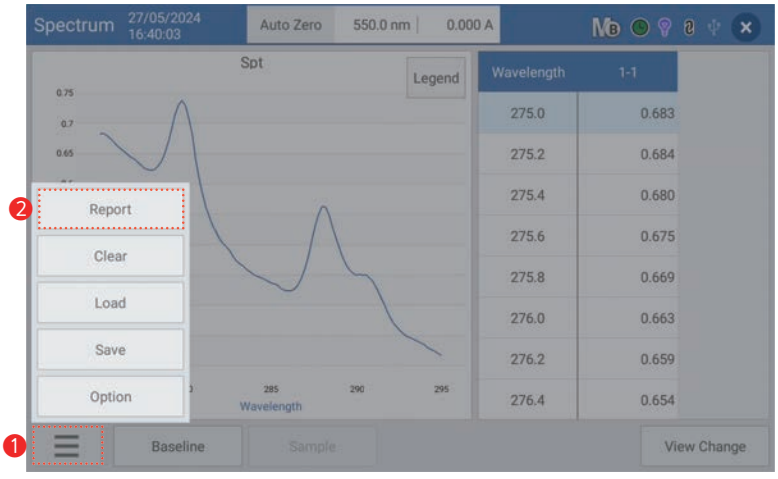
7-6 Connecting a printer

POP/QX can be connected directly to a printer using a LAN cable, bypassing the Internet router, for direct printing capabilities.

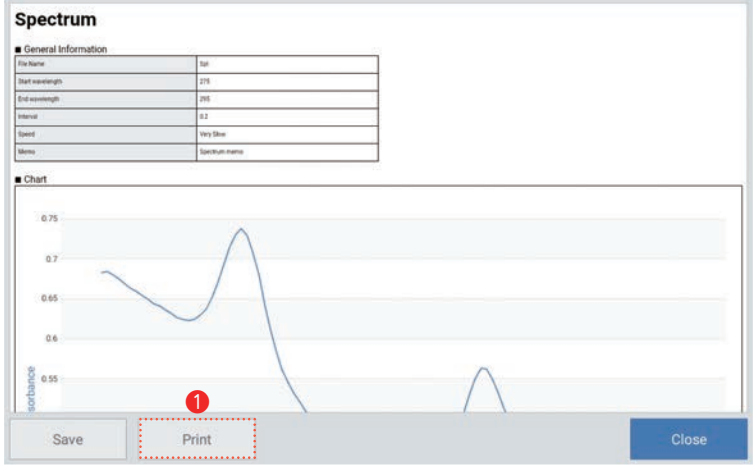


The printer you use must be capable of network printing and IPP.

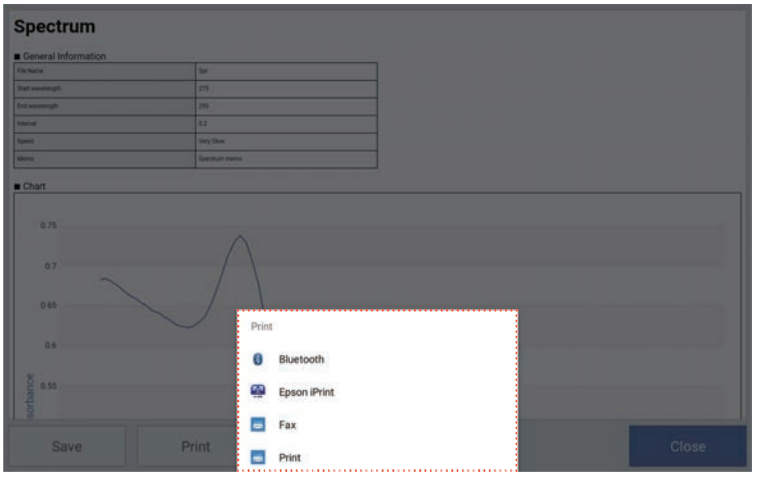
7-6-1 How to auto-register a printer



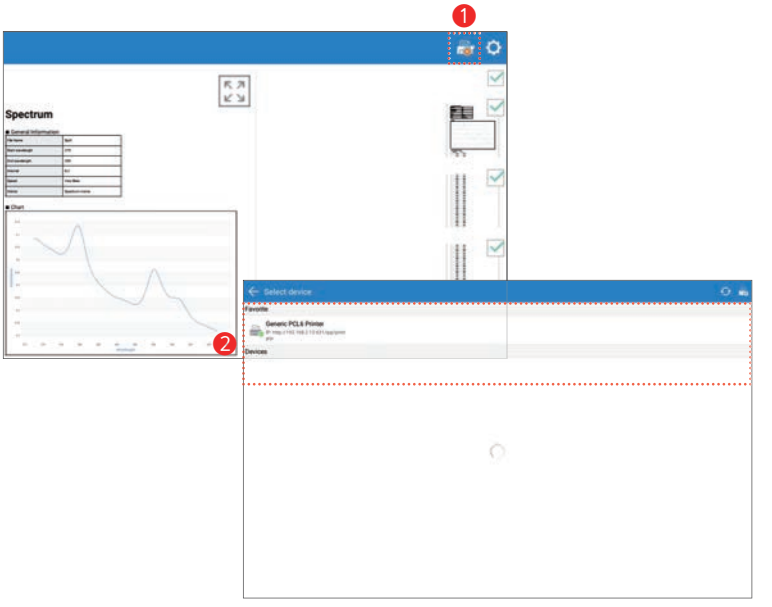
Procedure1. After checking the measurement results, select ❶[Hamburger menu] and select ❷[Report].



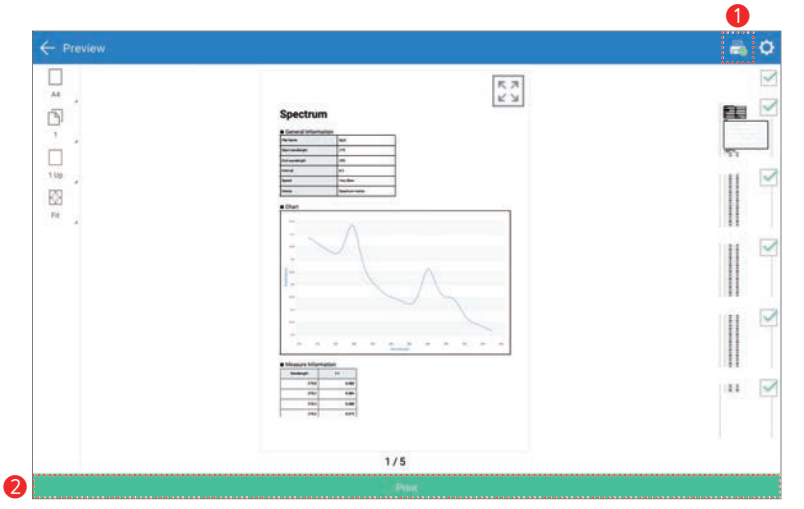
Procedure2. When the measurement result report is generated, select ❶[Print].



Procedure3. The Add Print window is created at the bottom of the screen.
Select the appropriate option for your printer model.
Print : Samsung, HP …
Epson iPrint : Epson



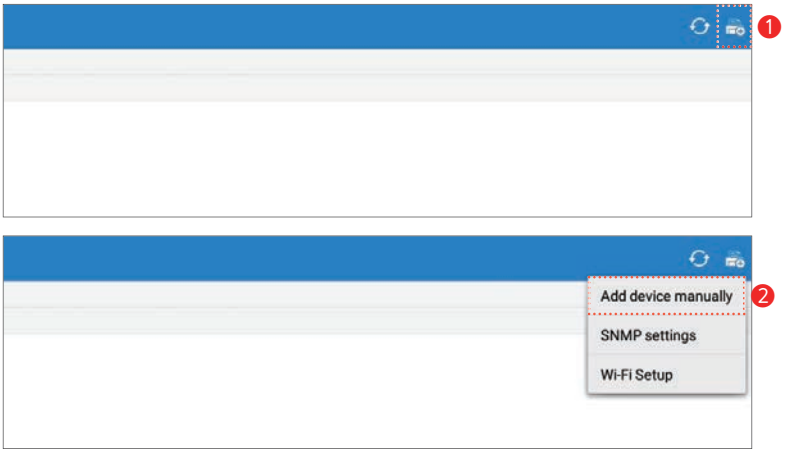
Procedure4. Select the ❶[Print] icon in the top right corner of the screen. Select the connected printer from the ❷[Devices] list.



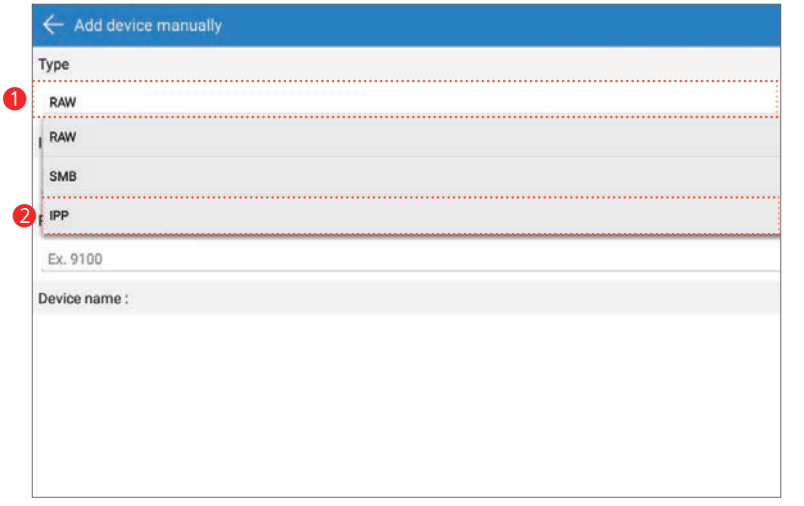
Procedure5. ❶When you see the icon indicating that the printer is connected, you can select ❷[Print] to proceed with printing out.

7-6-2 How to manually enroll a printer

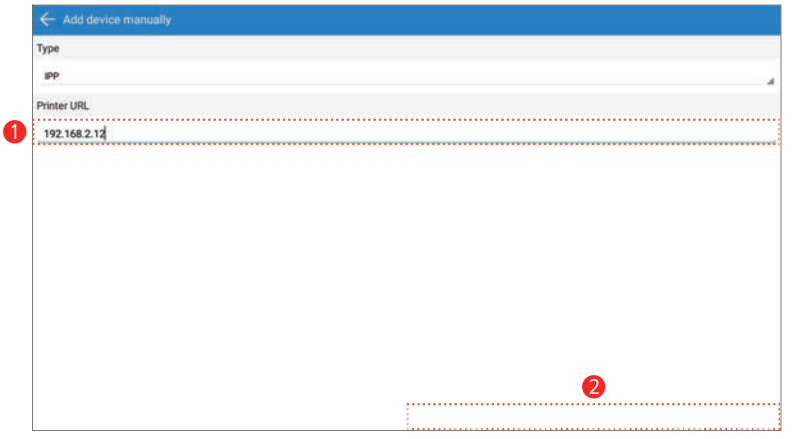
Procedure1. Find the IP address in IPv4 assigned to the printer by referring to the manual of the printer you want to connect.



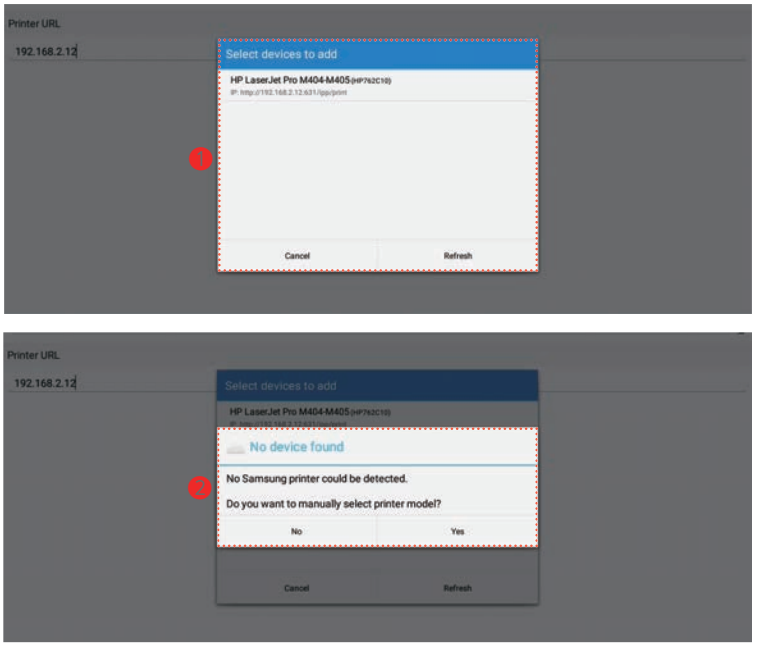
Procedure2. Select 1[Add printer icon] and then 2[Add device manually].



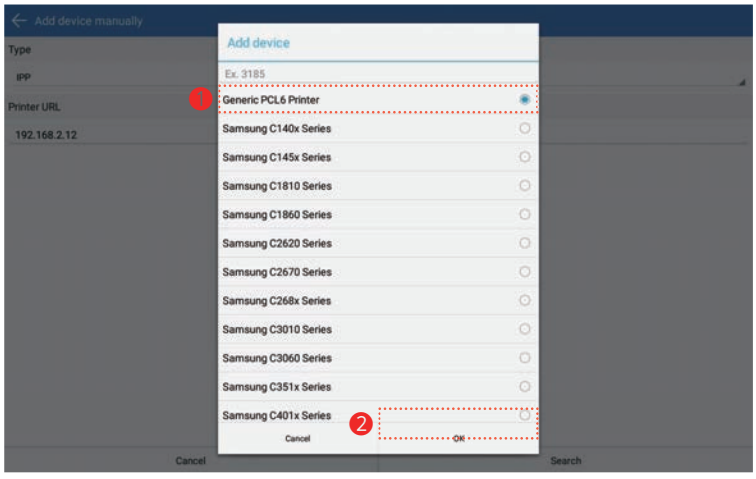
Procedure3. In the Type list, select the 1[RAW] term and change it to 2[IPP].



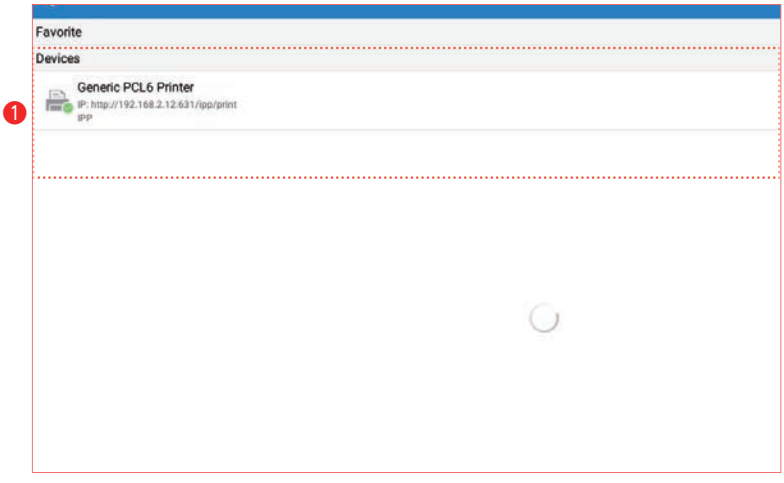
Procedure4. Enter the IP of the confirmed print IPv4 in ❶[Printer URL] and select ❷[Search].



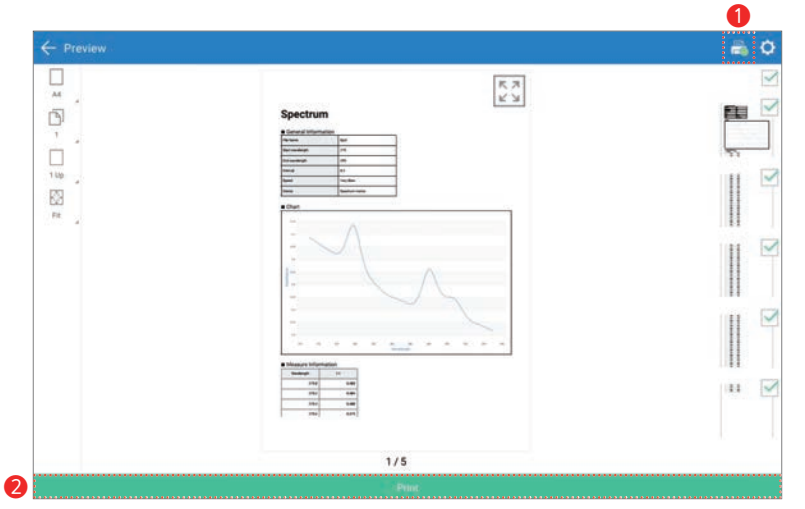
Procedure5. You can check ❶[Connected printers] with the specified IP. If ❷[Warning message] is generated, select [Yes].



Procedure6. Select ❶[Generic PCL6 Printer] from the printer list and select ❷[OK].



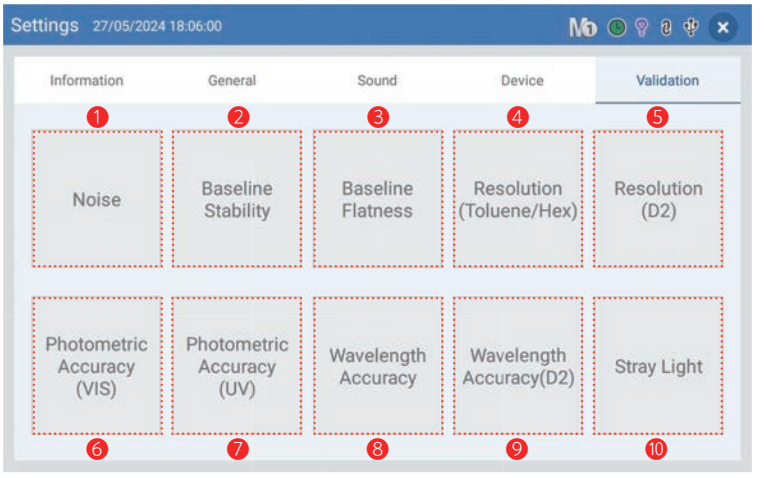
Procedure7. In the printer list, you can see the ❶[Generic PCL6 Printer] that you manually specified.



Procedure8. ❶When you see the icon indicating that the printer is connected, you can select ❷[Print] to proceed with printing.

7-7 Validation mode descriptions

The process of evaluating and improving the performance of an instrument in Validation mode can be conducted iteratively.



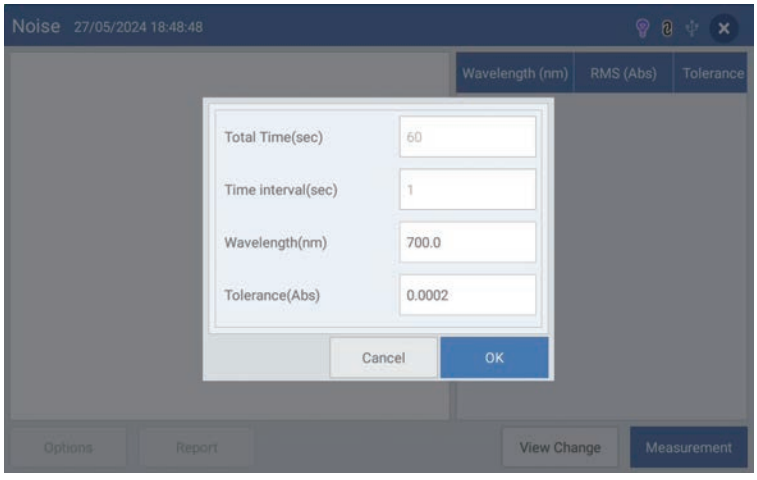
❶ Noise	You can validate the RMS noise by measuring the change in absorbance at a specific wavelength over a set period of time (60 seconds).
❷ Baseline Stability	You can validate the baseline stability by measuring the change in absorbance at a specific wavelength over a long period of time (60 minutes).
❸ Baseline Flatness	You can validate the baseline flatness measuring the deviation of the baseline in a specific spectral range (200-1100 nm).
❹ Resolution (Toluene/ Hexane)	You can validate the resolution (Spectral bandwidth, SBW) by measuring the ratio of the maximum/minimum absorbance of the toluene-hexane filter between 265 nm and 270 nm. *A standard toluene-hexane filter must be used for accurate measurements.
❺ Resolution(D2)	You can validate the resolution of the instrument by measuring the full width half maximum (FWHM) of the deuterium lamp peak (656.1 nm).
❻ Photometric Accuracy (Vis)	You can validate the photometric accuracy and repeatability in the visible range using standard neutral-density glass (ND) filters. * An ND filter equivalent to SRM 930 should be used for accurate measurements.
❼ Photometric Accuracy (UV)	You can validate the photometric accuracy and repeatability in the ultraviolet range using standard potassium dichromate filters. * A potassium dichromate filters equivalent to SRM 935 should be used for accurate measurements.

❽ Wavelength Accuracy	You can validate the wavelength accuracy and repeatability by measuring the peak positions of the spectrum of a standard Holmium Oxide glass filter. * A certified Holmium Oxide glass filter should be used for accurate measurements.
❾ Wavelength Accuracy (D2)	You can validate the wavelength accuracy by measuring the peak positions of the deuterium lamp (486.0 nm, 656.1 nm).
❿ Stray Light	You can validate the stray light characteristics of the instrument by measuring the transmittance with reference cut-off filters in place. * A reference cut-off filters should be used for accurate measurements.

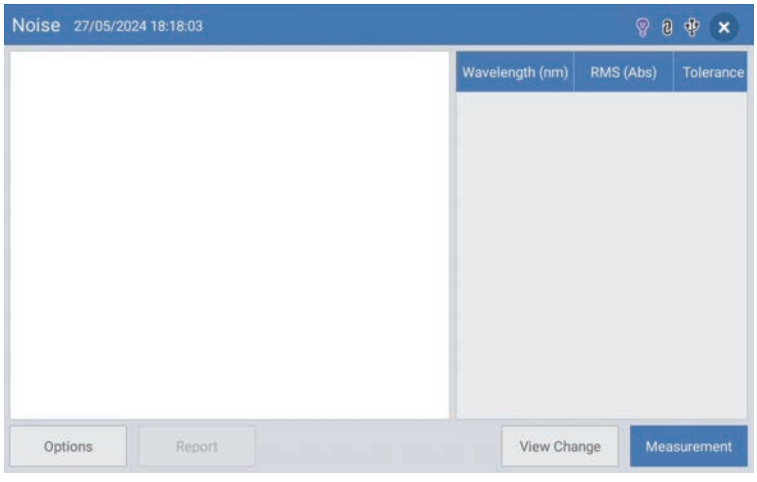
*The POP-V model does not provide the functions for Resolution (Toluene/Hexane), Resolution (D2), Photometric Accuracy (UV), or Wavelength Accuracy (D2).

7-7-1 Noise

This mode measures the change in absorbance at a specific wavelength over 60 seconds to determine the root mean square (RMS) of the fluctuation. POP, POP-V, and QX guarantee an RMS noise of 0.0002 Abs or less at 700 nm. It is recommended to warm up the lamp for at least 30 minutes prior to this test.



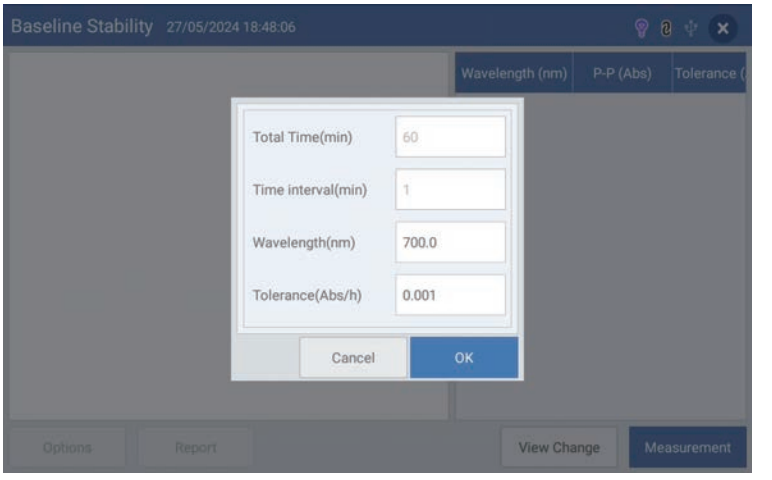
Step 1. Select [Options] to set the wavelength and tolerance.



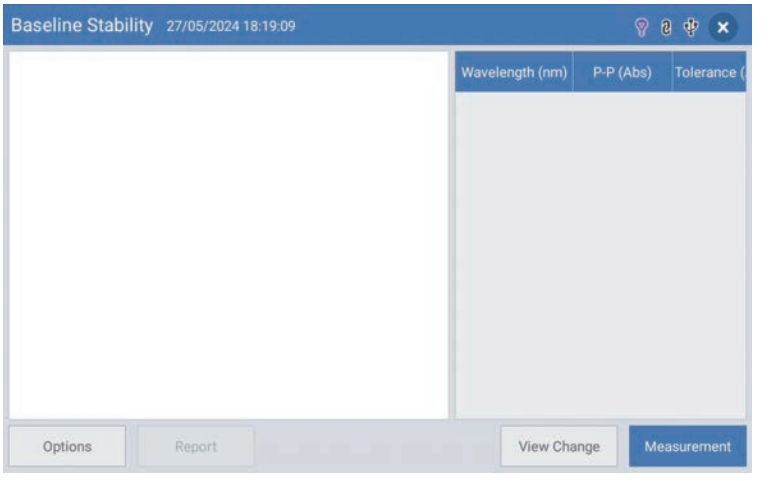
Step 2. Remove samples from the cell holder and select [Measurement] to start the noise validation.

7-7-2 Baseline Stability

This mode measures the change in absorbance at a specific wavelength over 60 minutes to determine the drift characteristics. POP, QX guarantees a baseline stability of 0.001 Abs/h or less at 700 nm, and POP-V guarantees a baseline stability of 0.002 Abs/h or less at 700 nm. It is recommended to warm up the lamp for at least 30 minutes prior to this test.



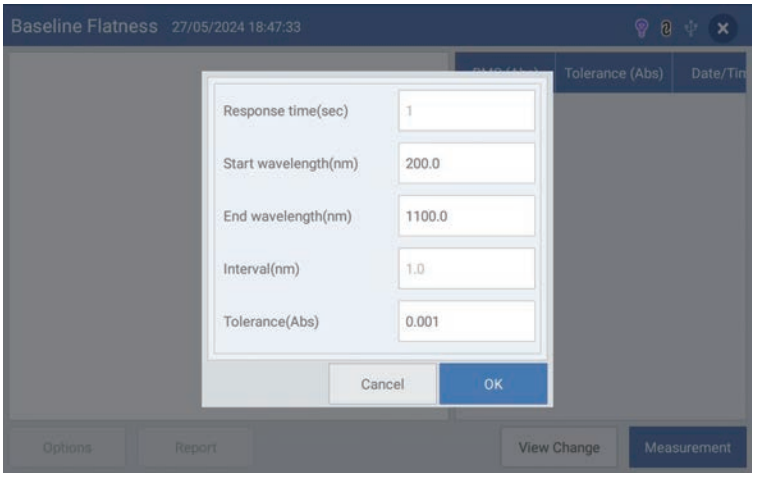
Step 1. Select [Options] to set the wavelength and tolerance.



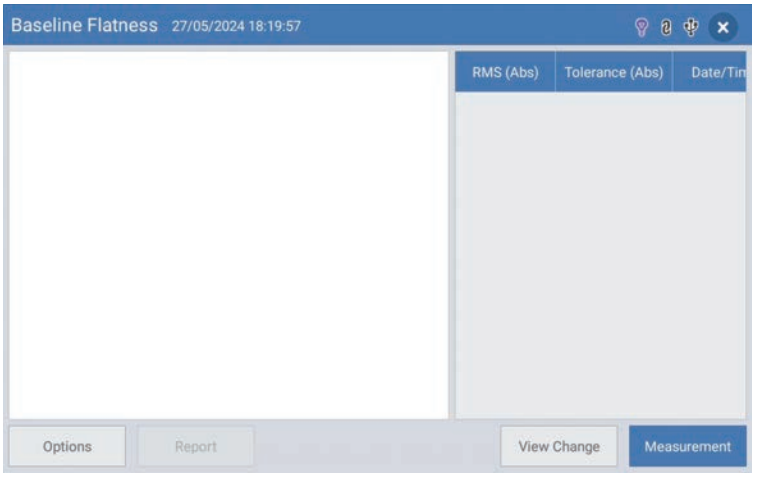
Step 2. Remove samples from the cell holder and select [Measurement] to start the baseline stability validation

7-7-3 Baseline Flatness

This mode measures the RMS of the absorbance deviation over a specific wavelength range. POP, QX guarantees baseline flatness of 0.001 Abs or less from 200 to 1100 nm, and POP-V guarantees baseline flatness of 0.003 Abs or less from 340 to 1100 nm. It is recommended to warm up the lamp for at least 30 minutes prior to this test.



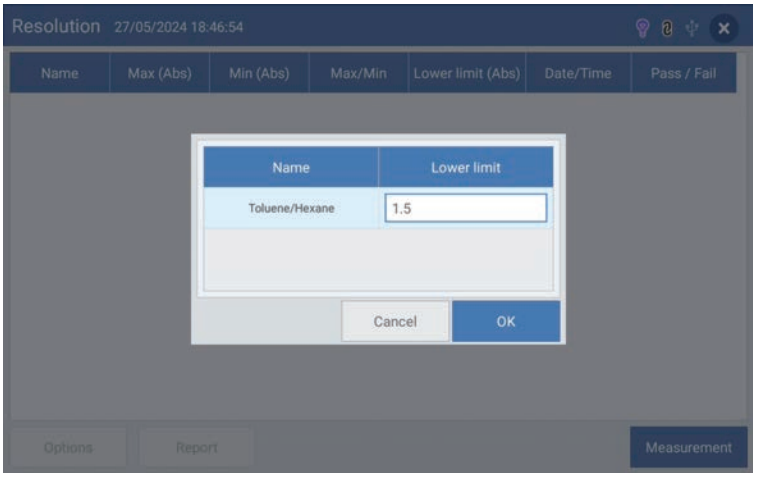
Step 1. Select [Options] to set the wavelength range and tolerance.



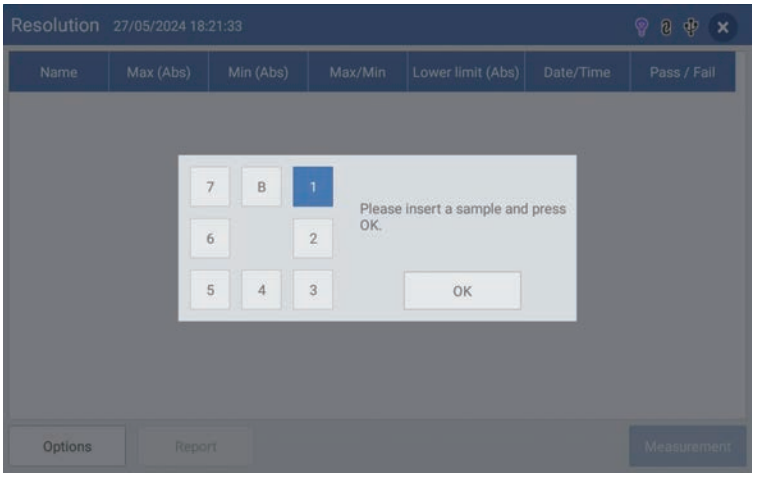
Step 2. Remove samples from the cell holder and select [Measurement] to start the baseline flatness validation

7-7-4 Resolution(Toluene/Hexane)

This mode measures the resolution (Spectral bandwidth, SBW) of the instrument using a Toluene/Hexane standard filter. POP, QX guarantees an SBW of less than 1.8 nm.
*POP-V does not provide this feature.



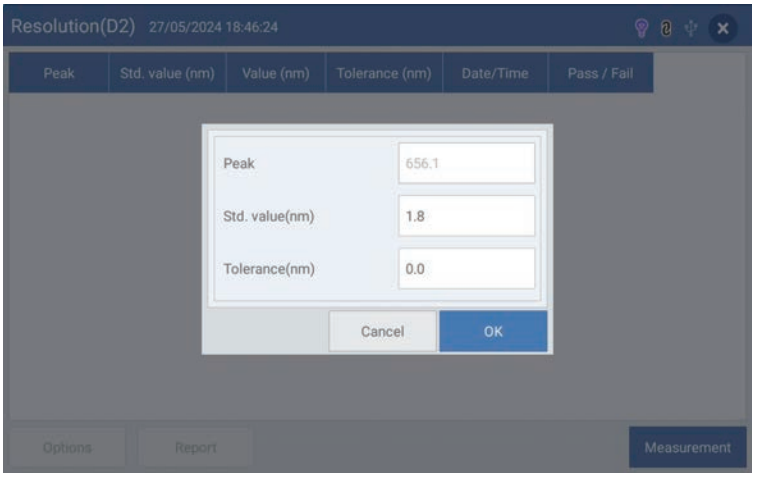
Step 1. Select [Options] to adjust the validation criteria. Referring to the calibration certificate for the standard toluene/hexane filter to be measured, set the lower limit to a ratio value corresponding to an SBW of 1.8 nm.



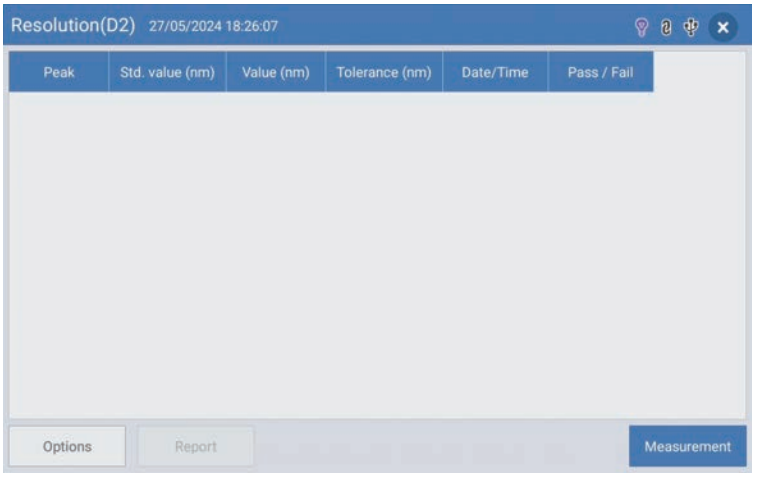
Step 2. Select [Measurement] and follow the instructions to proceed with the resolution validation. If a multi-cell holder is equipped, place a blank sample into the [B] cell and the Toluene/Hexane filter in the highlighted cell (default: 1).

7-7-5 Resolution(D2)

This mode measures the SBW of the instrument using the Full Width Half Maximum (FWHM) of the peak of the deuterium lamp (656.1 nm). POP, QX guarantees an SBW of less than 1.8 nm.
*POP-V does not provide this feature.



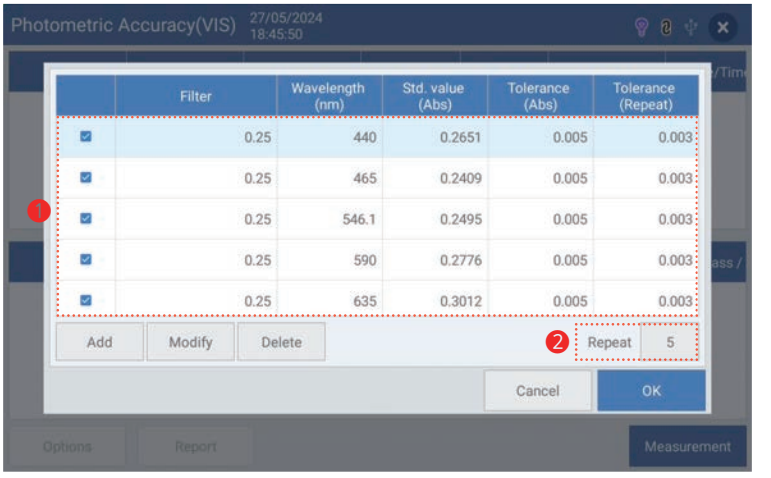
Step 1. Select [Options] to set the validation criteria. If the measured SBW is less than the threshold value + tolerance, it passes.



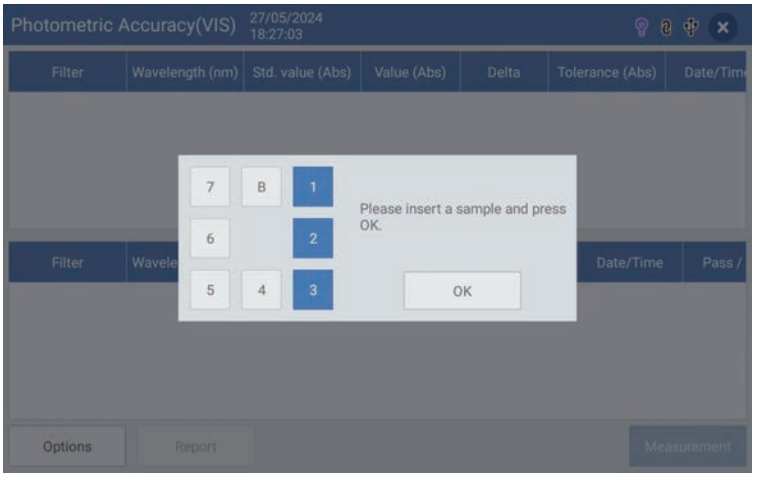
Step 2. Remove samples from the cell holder and select [Measurement] to start the resolution validation.

7-7-6 Photometric Accuracy(Vis)

In this mode, photometric accuracy and repeatability in the visible range are validated using standard neutral-density glass (ND) filters. POP, QX guarantees an error of ± 0.003 Abs at 0.5 Abs or less and ± 0.005 Abs at 1.0 Abs or less, with a standard deviation of less than 0.003 Abs. POP-V guarantees an error within 0.005 Abs at 0.5 Abs and 1% at 2.0 Abs, with a standard deviation of less than 0.003 Abs. For accurate measurement, an ND filter equivalent to SRM 930 should be used.



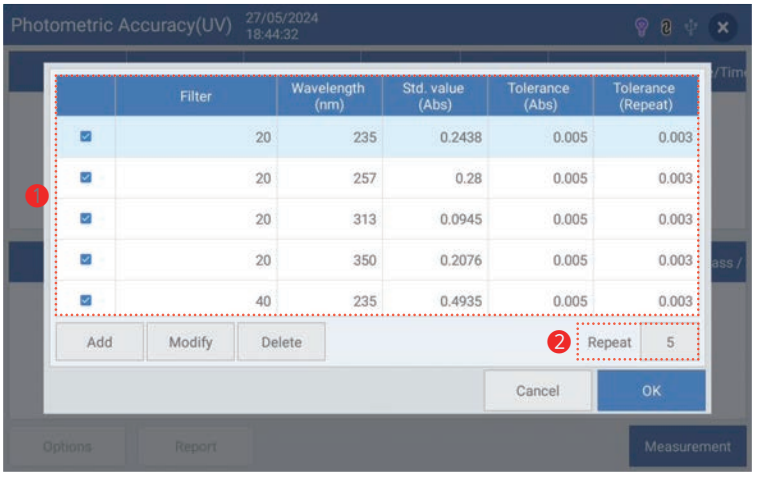
Step 1. Select [Options] to set the validation criteria. Referring to the calibration certificate of the standard filters to be measured, enter the appropriate value in ❶. The uncertainty of the standard filters should be added to the tolerance for accurate judgment. Repeatability can be validated by specifying the number of iterations in ❷.



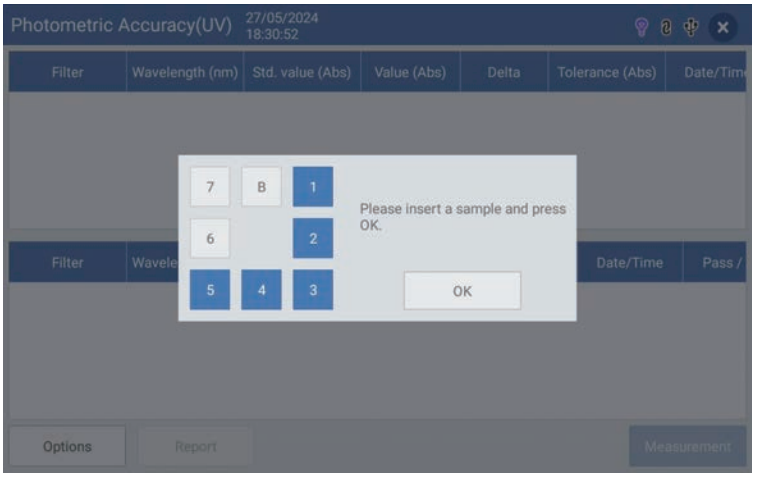
Step 2. Select [Measurement] and follow the instructions to proceed with the photometric accuracy validation. If a multi-cell holder is equipped, place a blank sample in the [B] cell and the standard ND filters in the highlighted cells (default: 1~3).

7-7-7 Photometric Accuracy(UV)

In this mode, photometric accuracy and repeatability in the ultraviolet range are validated using standard potassium dichromate filters. POP, QX guarantees an error of ± 0.003 Abs at 0.5 Abs or less and ± 0.005 Abs at 1.0 Abs or less, with a standard deviation of less than 0.003 Abs. For accurate measurement, potassium dichromate filters equivalent to SRM 935 should be used. *POP-V does not provide this feature.



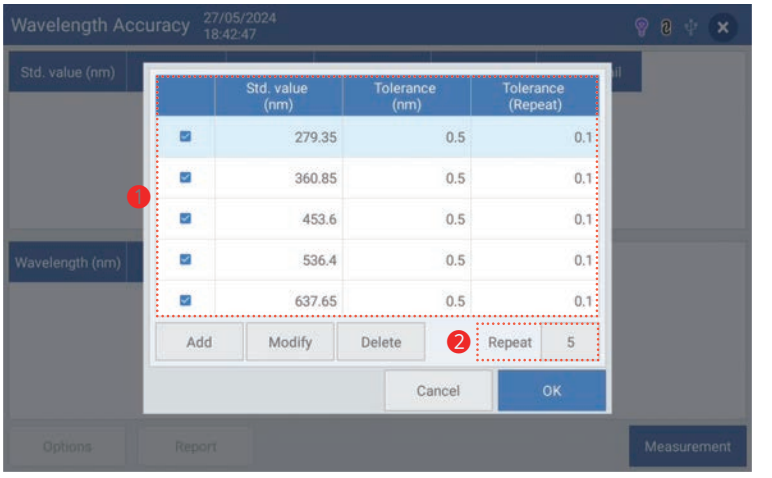
Step 1. Select [Options] to set the validation criteria. Referring to the calibration certificate of the standard filters to be measured, enter the appropriate value in ❶. The uncertainty of the standard filters should be added to the tolerance for accurate judgment. Repeatability can be validated by specifying the number of iterations in ❷.



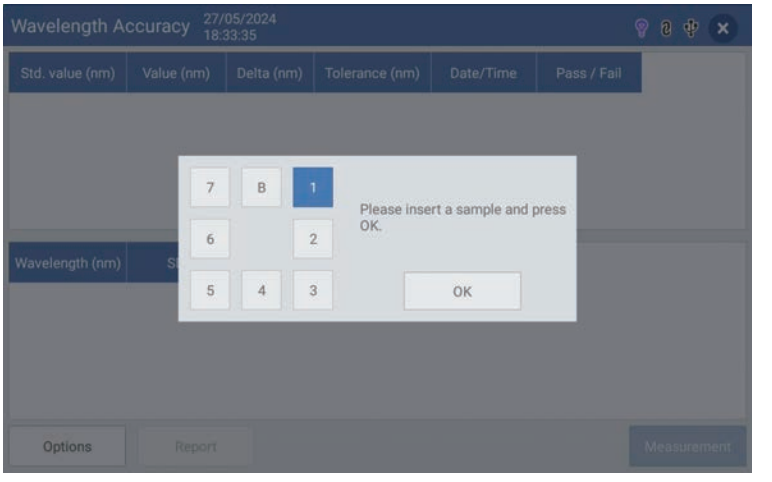
Step 2. Select [Measurement] and follow the instructions to proceed with the photometric accuracy validation. If a multi-cell holder is equipped, place a blank sample in the [B] cell and the standard potassium dichromate filters in the highlighted cells (default: 1~5).

7-7-8 Wavelength Accuracy

This mode validates wavelength accuracy and repeatability by measuring the peak positions of the spectrum of a standard Holmium Oxide glass filter. The POP, POP-V, and QX guarantee an error of ±0.5 nm or less and a standard deviation of ±0.1 nm or less. For accurate measurements, a standard Holmium Oxide glass filter should be used.



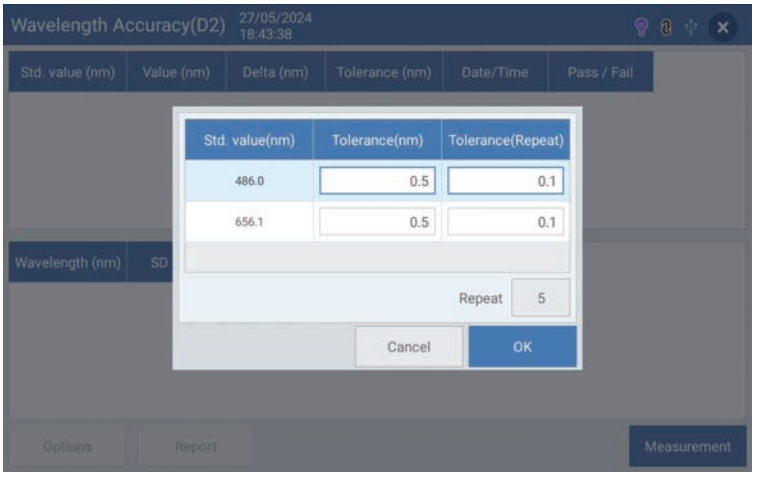
Step 1. Select [Options] to set the validation criteria. Referring to the calibration certificate of the standard filters to be measured, enter the appropriate value in ❶. The uncertainty of the standard filters should be added to the tolerance for accurate judgment. Repeatability can be validated by specifying the number of iterations in ❷.



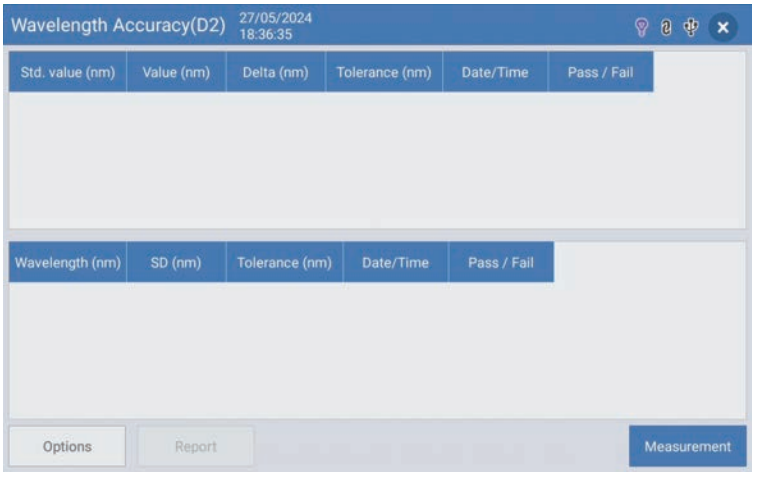
Step 2. Select [Measurement] and follow the instructions to proceed with the wavelength accuracy validation. If a multi-cell holder is equipped, place a blank sample in the [B] cell and the standard Holmium Oxide filter in the highlighted cell (default: 1).

7-7-9 Wavelength Accuracy(D2)

This mode validates wavelength accuracy by measuring the peak positions of the deuterium lamp (486.0 nm, 656.1 nm). *POP-V does not provide this feature.



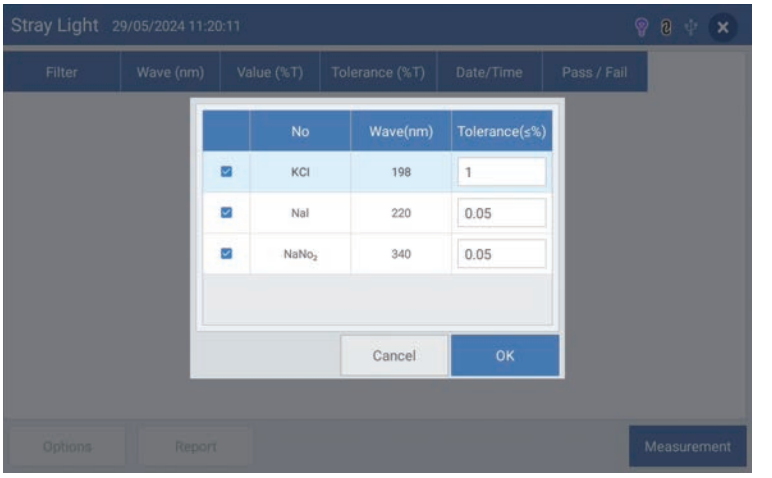
Step 1. Select [Options] to set the error tolerance and repeatability tolerance. The number of measurements can also be changed.



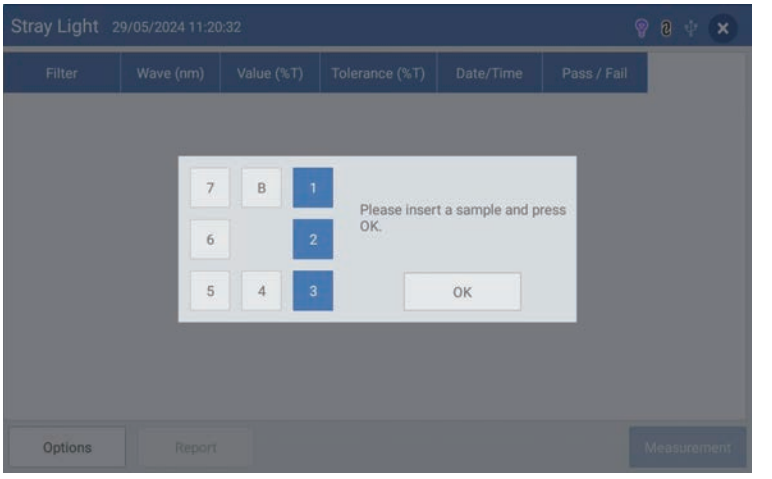
Step 2. Remove samples from the cell holder and select [Measurement] to start the wavelength accuracy validation.

7-7-10 Stray Light

This mode validates the stray light characteristics of the instrument by measuring the transmittance with cut-off filters in place. POP, QX guarantees a transmittance of 0.05% or less at 220 nm with a 0.1% NaI filter, and 0.05% or less at 340 nm with a 0.5% NaNO2 filter. POP-V guarantees a transmittance of 0.05% or less at 340 nm with a 0.5% NaNO2 filter. For accurate measurements, reference cut-off filters should be used.



Step 1. Select [Options] to set the filters to be used and the allowable transmittance.



Step 2. Select [Measurement] and follow the instructions to proceed with the stray light validation. If a multi-cell holder is equipped, place a blank sample in the [B] cell and the selected cut-off filters in the highlighted cells (default: 1~3).

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