206-97926A
Sep. 2015

LabSolutions RF

Instruction Manual

Basic 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 product.

Thank you for purchasing this product.

This manual describes the operation and options for this product. Read this manual thoroughly before using the product and operate the product in accordance with the instructions in this manual.

Keep this manual for future reference.

IMPORTANT

- If the user or usage location changes, ensure that this Instruction Manual is always kept together with the product.
- If this manual is lost or damaged, immediately contact your Shimadzu representative to request a replacement.
- To ensure safe operation, contact your Shimadzu representative if product installation, adjustment, re-installation (after the product is moved), or repair is required.

Notice

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Original version is approved in English.

Indications Used in This Manual

The following symbols are used in this manual:

Indication	Meaning
NOTE	Emphasizes additional information that is provided to ensure the proper use of this product.
Hint	Indicates information provided to improve product performance.
Reference	Indicates the location of related reference information.

Mouse and On-Screen Operations

Indication	Meaning
Click	Indicates placing the mouse pointer over a target and pressing the left button on the mouse once.
Right-click	Indicates placing the mouse pointer over a target and pressing the right button on the mouse once.
Double-click	Indicates placing the mouse pointer over a target and pressing the left button on the mouse twice.
Drag	Indicates placing the mouse pointer over a target and holding down the left button on the mouse while moving the mouse pointer.
Drag and drop	Indicates dragging to the intended location and releasing the left button on the mouse.
Text enclosed in [ ]	Names of buttons and windows displayed on screen are described enclosed in square brackets. E.g.: Click [OK].
Text enclosed in " "	Input values, text, and the keys on the keyboard are described enclosed in double quotation marks. E.g.: Press the "N" key while holding down the "Ctrl" key.

Using This Manual

The instruction manuals for the LabSolutions RF software (hereafter "LabSolutions RF") comprise the following manuals including this manual.

Refer to the corresponding instruction manual for details on the operation of LabSolutions RF.

Document Name	Document No.	Description
LabSolutions RF Setup Procedure	207-90012	This manual explains installation and environment settings for the LabSolutions RF software.
LabSolutions RF Instruction Manual [Basic Operation Manual] (this manual)	206-97926	This manual explains specifically how to perform basic operations using the LabSolutions RF software.

The basic operation manual is aimed at new users of LabSolutions RF and describes the basic functions and operating procedures of the software. For details on each command of LabSolutions RF and execution method, refer to the help file provided with LabSolutions RF.

Explanations in this manual are structured as follows.

Structure	Description
Chapter 1 Basic Software Operation	Provides an outline of LabSolutions RF.
Chapter 2 Starting and Shutting Down the System	Describes the startup procedures from turning on the system to software startup.
Chapter 3 Launcher	Describes how to use the LabSolutions RF launcher.
Chapter 4 Spectrum	Describes how to measure a spectrum.
Chapter 5 3D Spectrum	Describes how to measure a 3D spectrum.
Chapter 6 Quantitation	Describes how to perform quantitative measurement that employs the multi-point calibration curve method.
Chapter 7 Photometric	Describes how to perform photometric measurement.
Chapter 8 Time Course	Describes how to perform time-course measurement.
Chapter 9 Data Processing	Describes how to use the data processing functions.
Chapter 10 Printing	Describes how to use the printing function.
Chapter 11 Quantum Yield	Describes how to perform quantum yield measurement.
Chapter 12 Quantum Efficiency	Describes how to perform quantum efficiency measurement.
Chapter 13 Management Tools	Describes how to operate the management tools used for instrument management, registration, and performance checks.

While this manual describes examples of operation that are considered to be the most frequently performed, these examples may not always match your specific operational requirements. In this case, an understanding of basic methodology and operating procedures can be attained by performing operations based on the actual examples provided in this manual.

Shimadzu recommends performing the examples in this manual in order to become accustomed with software operations.

For explanations on items not covered in the above chapters, refer to the help file provided with LabSolutions RF.

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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.

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   (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) Consumable 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.

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(4) The invalidity or unenforceability of any provision of this Agreement shall not affect the validity or enforceability of any other provision.

Precautions for Use

■ Latest Information

The latest information on LabSolutions RF is described in the "ReleaseNotes" file that is displayed by clicking  (Start) - [All Programs] - [Shimadzu] - [LabSolutions RF] - [Release Notes]. Read this information thoroughly before operating the product.

■ Compatible OS

LabSolutions RF is only compatible with the 32- and 64-bit versions of Windows 7 Professional.

■ Screensaver

If the screensaver activates during time-course measurement, consecutive measurements, or other types of measurements, the software may stop operating. Turn off the Windows screensaver function.

■ Resident Programs Including Anti-Virus Software

Resident programs, such as anti-virus software, running on the PC used for LabSolutions RF may cause the LabSolutions RF software to start up and exit slowly.
Do not allow such software to run when using LabSolutions RF.

■ Text Input

LabSolutions RF does not support environment-dependant characters (Unicode).
Do not enter text using environment-dependant characters (Unicode).

■ Numerical Value Input

Always enter numerical values into LabSolutions RF using one-byte characters.

Contents

3 Launcher

4 Spectrum

5 3D Spectrum

6 Quantitation

7 Photometric

8 Time Course

1 Basic Software Operation

This chapter provides an outline of the LabSolutions RF software (hereafter "LabSolutions RF") and explains basic operation.

Reference For cases not covered in this chapter and detailed descriptions and information on LabSolutions RF functions, refer to the help file provided with LabSolutions RF.

■ Explanations Included in this Chapter

This chapter provides an overview of LabSolutions RF specifications and applications.

1.1 Overview

LabSolutions RF comprises various applications for performing instrument control and data analysis using the Shimadzu Spectrofluorophotometer series as well as software and tools used for instrument management.

- Applications for performing basic measurement and related data analysis (hereafter "Basic Analysis")

Application	Specifications
Spectrum	Scan the fluorescence (excitation) spectrophotometer using any excitation (fluorescence) wavelength to capture a fluorescence (excitation) Spectrum. Synchronized scanning, which captures data by scanning excitation and the spectrofluorophotometer at the same time while keeping the interval between the excitation wavelength and fluorescence wavelength constant, is also supported. Reference "4 Spectrum" P.34
3D Spectrum	Repeatedly measure fluorescence spectra at any excitation wavelength interval and draw the results in 3D. Repeated measurement of fluorescence spectra at any time interval and capturing fluorescence spectra in 3D is also supported. Reference "5 3D Spectrum" P.49
Quantitation	Create a calibration curve from the fluorescence intensity captured from the standard sample to determine the concentration of unknown samples. Quantitation using peak values and areas within a specified wavelength range is also supported. Reference "6 Quantitation" P.63

Application	Specifications
Photometric	Capture fluorescence intensity at any fixed wavelength (multiple wavelengths can be set). Calculation results and pass/fail judgments can be obtained in conjunction with measurement by using captured data to create/register arithmetic expressions with the four basic arithmetic operations and judgment criteria. Reference "7 Photometric" P.83
Time course	Capture changes in fluorescence intensity over time at any fixed wavelength. Calculation of enzyme reaction activity values based on the gradient of the change in fluorescence intensity over time is also supported. Reference "8 Time Course" P.99

• Applications for performing specific analysis (hereafter "Special Analysis")

Application	Specifications
Quantum Yield	Determine the Quantum Yield of an unknown sample by using the fluorescence Spectrum of a standard sample (with a known Quantum Efficiency) and the fluorescence Spectrum of the unknown sample. Reference "11 Quantum Yield" P.157
Quantum Efficiency	Use an integrating sphere to determine the Quantum Eficiency from the fluorescence Spectrum in the blank state and the fluorescence Spectrum of the sample. Reference "12 Quantum Efficiency" P.176

• Tools used in instrument management (hereafter "management tools")

Tool	Specifications
RF Performance Validation Software	Check instrument performance (such as wavelength accuracy and S/N ratios). Reference "13.5 Checking RF-6000 Performance" P.208
Register Device	Register instruments (spectrofluorophotometer and integrating sphere) that connect to LabSolutions RF. Reference "13.1 Registering an Instrument" P.193
Spectrum Correction Function Measurement Tool	Create correction functions used in Spectrum correction when an integrating sphere is installed. Reference "13.2 Registering an Integrating Sphere" P.196

1.1.1 Specifications

Item	Specification
Operating system	Microsoft Windows 7 Professional 32/64-bit version
Required hard disk space	40 GB min.
Required memory	4 GB min.
Controllable devices	• RF-5300PC/5301PC (RF-5300 series) • RF-6000
Basic Analysis	
Spectrum	• Excitation Spectrum, fluorescence Spectrum, synchronous Spectrum
3D Spectrum	• Repeated measurement in a specified time interval (3D excitation Spectrum, 3D fluorescence Spectrum, 3D synchronous Spectrum) • Fluorescence Spectrum measurement at a specified excitation wavelength interval (3D Spectrum) • Excitation/fluorescence Spectrum extraction
Quantitation	• Quantitation using the peak / maximum value / area etc. of single wavelengths, multiple wavelengths (including single, double, and triple wavelength methods), and specified wavelength ranges • K-factor method, single-point calibration curve method, and multi-point calibration curve method (1st, 2nd, and 3rd order function-fitting, zero intercept can be specified) • Photometric processing with user-defined functions (functions that use addition, subtraction, multiplication, and division can be embedded together with factors)
Photometric	• Capturing the fluorescence intensity of single wavelengths and multiple wavelengths as well as peak / maximum value / area in specified wavelength ranges • Photometric processing with user-defined functions (functions that use addition, subtraction, multiplication, and division can be embedded together with factors)
Time course	• Time course recording using up to 4 wavelengths • Calculation of a difference between 2 wavelengths and a ratio • Activity value calculation • Event recording of reagent additions during measurement
Data processing functions (common)	• Processing, data printing, point pick, peak pick, area calculation, constant calculation, data set calculation, 1st to 4th order differentiation, smoothing, common logarithm transformation, natural logarithm transformation, reciprocal transformation, exponentiation, square root, index transformation of waveform data (Spectrum/Time course)

Item		Specification
	Printing functions	• Report template creation • Printing using report templates
	File functions	• Automatic conversion to CSV file and text file (.txt) formats (Only manual text conversion in the Quantitation and Photometric applications)
Special Analysis (note: unavailable on the RF-5300 series)		
	Quantum Yield	• Quantum Yield calculation of unknown samples • Display and printing of results list of multiple samples • Text conversion of Spectrum data
	Quantum Efficiency*1	• Calculation of sample absorption factors, internal Quantum Efficiency, and external Quantum Efficiency • Display and printing of results list of multiple samples • Text conversion of Spectrum data
Management tools		
	RF Performance Validation Software	S/N ratio, Stability, Wavelength Accuracy*2, Wavelength Repeatability*2, resolution (emission side)*2, and results of initialization NOTE The only test item that can be executed on the RF-5300 series is S/N ratio.
	Register Device	Registration of spectrofluorophotometer and integrating spheres
	Spectrum Correction Function Measurement Tool	Creation of correction functions when an integrating sphere is installed (unavailable on the RF-5300 series).

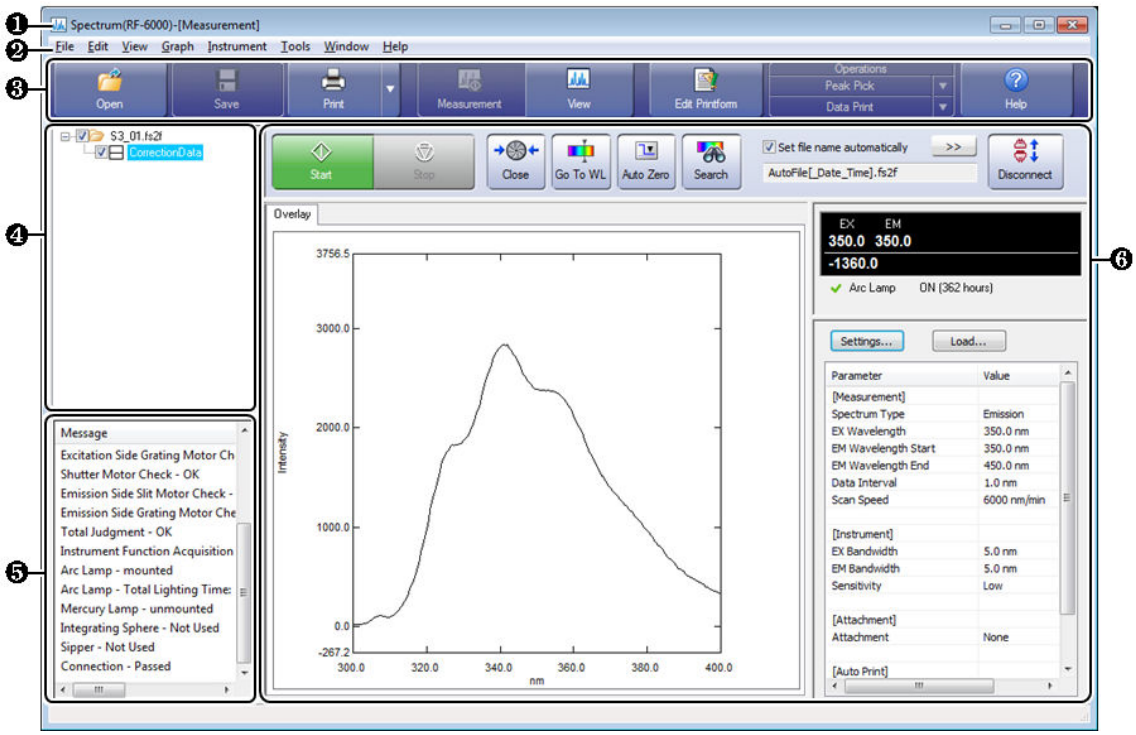
*1 An integrating sphere unit (option) is required.

*2 A mercury lamp unit (option) is required. Unavailable on the RF-5300PC/5301PC models.

1.1.2 Analysis Application Window Layout

The layout of the Basic Analysis application window in LabSolutions RF is shown below.

Reference For details on the parts that comprise the window, refer to the help file provided with LabSolutions RF.
For details on the window layout of the Special Analysis applications, see the chapter that describes each application.



Window Layout

No.	Name	Function
❶	Title bar	Displays information including the application name, registered instrument name, and window mode ([Measurement] or [View]).
❷	Menu bar	Displays the application menus. Selecting a menu along the bar displays multiple command menus. The displayed command menus differ depending on the application type and window mode.
❸	Main toolbar	Displays tool buttons for executing main functions, such as file operations, printing, and data processing.
❹	Tree view	Displays the open data file and data set contained in this file in tree format. Operations including switching the active data set and closing open files can be performed.
❺	Log view	Displays and records logs that indicate the instrument status and operations performed on the system as well as warnings.

No.	Name	Function
❻	Application area	Displays a graph, data processing table, and information on measurement parameters. The type of view displayed in the area and layout differ depending on the application.

1.1.3 Window Mode Selection

Each Basic Analysis application window in LabSolutions RF has a "measurement mode", "view mode", and "edit print form mode".
The window mode can be changed by clicking [Measurement], [View], and [Edit Printform] on the main toolbar.
The functions of each window mode differ depending on the analysis application. For details, see the chapter of the relevant analysis application in this manual or refer to the help file provided with LabSolutions RF.

Name	Function
Measurement mode	This mode is used when controlling an instrument to capture data. The "measurement toolbar" used for instrument control and measurement, "istrument status" that indicates the status of connected instruments, and "parameter view" that allows configuration of measurement parameters and other settings are displayed.
View mode	This mode is used when performing data processing on captured data. The data processing button on the main toolbar becomes active and data processing items become selectable.
Edit printform	This mode is used when creating, editing, and saving report files for printing. The report layout can be edited while graphs and different data processing tables are displayed and the user does not need to change the window to print after editing.

1.1.4 LabSolutions RF Data Formats

LabSolutions RF data files internally store both the original data from measurement as well as any calculation results obtained from the various data processing functions.

A single Basic Analysis application data file generally stores multiple data.

In addition, each data set is appended with auxiliary information.

• Data sets contained in files (for Spectrum and 3D Spectrum data)

Item	Description
Raw data (measurement data)	Data prior to Spectrum correction. On the RF-5300PC, this data is the sample data that is normally used because the RF-5300 series does not have the Spectrum correction function.
Correction data	Data that has undergone Spectrum correction and is normally used as the sample data. On the RF-6000, this data set is used for sample analysis.
Converted data	Data converted or generated in waveform processing. (Only Spectrum.)

• Data sets contained in files (for Quantitative and Photometric data)

Item	Description
Standard table	Table data that includes sample information and concentration.
Unknown sample table	Table data that includes sample information, concentration, and calculation results.

• Data sets contained in files (for Time course data)

Item	Description
Raw data (measurement data)	Sample data that is normally used. This data set is used in sample analysis.
Converted data	Data converted or generated in waveform processing.

• Auxiliary data appended to each data set

Item	Description
History	History of data set generation and modification
Measurement parameters	Parameters used during measurement
Summary	General information on the data set (such as software version, analysis time and date, and instrument information)
Peak pick table	Peak table generated using the "peak" pick function
Point pick table	Point pick table generated using the "point pick" function and "batch point pick" function
Peak area table	peak area table generated using the "area calculation function".

1.1.5 File Formats of the LabSolutions RF Software

The following file formats can be used with LabSolutions RF.

• Data files

Name	Extension	Description
Spectrum file	fs2f	Data file created in the Spectrum application. This file contains Spectrum (waveform) data, measurement parameter information, file information (summary), data history, peak pick data, point pick data, and area calculation data.
3D Spectrum file	fs3f	Data file created in the 3D Spectrum application. This file contains 3D Spectrum data, measurement parameter information, file information (summary), and data history.
Calibration curve file	fqcf	Calibration curve data file created in the Quantitation application. This file contains standard table data, measurement parameters*1, calibration curve parameters, file information (summary), and data history.
Quantitation file	fqqf	Quantitation result data created in the Quantitation application. This file contains standard sample / sample table data, measurement parameters*1, calibration curve parameters, file information (summary), and data history.
Photometric file	fquf	Measurement result data created in the Photometric application. This file contains sample table data, measurement parameters, file information (summary), and data history.
Time course file	fttc	Data of changes in fluorescence intensity over time created in the Time course application. This file contains Time course (waveform) data, measurement parameter information, file information (summary), data history, peak pick data, point pick data, and area calculation data.
Quantum Yield file	fqty	This measurement result data is created in Quantum Yield measurement. This file contains standard/unknown sample Spectrum (waveform) data, analysis results, and file information (such as summary information and measurement conditions).
Quantum Efficiency file	fqte	This measurement result data is created in Quantum Eficiency measurement. This file contains blank/sample Spectrum (waveform) data, analysis results, and file information (summary, measurement conditions, etc.).
Test results file (Validation)	fpvr	This test result data is created by the RF performance validation software. This file contains waveform data, test conditions, test results, and file information (such as summary information) for each test item.

Name	Extension	Description
Text file (Spectrum)	txt	Data file created (output to text file) in the Spectrum application (can be loaded). This text format file contains horizontal axis values (wavelength) and the corresponding vertical axis values (fluorescence intensity) delimited with commas or other characters[*2].
Text file (3D Spectrum)	txt	Data file created (output to text file) in the 3D Spectrum application (cannot be loaded). This text format file contains X-axis values (fluorescence wavelength)[*3], Y-axis values (excitation wavelength or time)[*3], and Z-axis values (such as fluorescence intensity) delimited with commas or other characters[*2].
Text file (Quantitation)	txt	Data file created (output to text file) in the Quantitation application (cannot be loaded). This text format file contains standard sample and sample table items and data delimited with commas or other characters[*2].
Text file (Photometric)	txt	Data file created (output to text file) in the Photometric application (cannot be loaded). This text format file contains sample table items and data delimited with commas or other characters[*2].
Text file (Time course)	txt	Data file created (output to text file) in the Time course application (cannot be loaded). This text format file contains horizontal axis values (time) and the corresponding vertical axis values (such as fluorescence intensity) delimited with commas or other characters[*2].
Text file (Quantum Yield)	txt	Result file created (output to text file) in the Quantum Yield application (cannot be loaded). This text format file contains horizontal axis values (time) and the corresponding vertical axis values (such as fluorescence intensity) delimited with commas or other characters[*2]. When saving, any of the following three types can be selected: standard sample, any unknown sample, or all unknown samples.
Text file (Quantum Efficiency)	txt	Result file created (output to text file) in the Quantum Eficiency application (cannot be loaded). This text format file comprises waveform data of blank spectra and sample spectra and contains horizontal axis values (wavelength) and the corresponding vertical axis values (fluorescence intensity) delimited with commas.
Data Print Table	txt	Data processing result file created in the Spectrum and Time course applications (cannot be loaded). This text format file contains data print table items and data delimited with commas or other characters[*2].
Point Pick Table	txt	Data processing result file created in the Spectrum and Time course applications (cannot be loaded). This text format file contains point pick table items and data delimited with commas or other characters[*2].

Name	Extension	Description
Peak Pick Table	txt	Data processing result file created in the Spectrum and Time course applications (cannot be loaded). This text format file contains peak pick table items and data delimited with commas or other characters*2.
Peak Area Table	txt	Data processing result file created in the Spectrum and Time course applications (cannot be loaded). This text format file contains peak area table items and data delimited with commas or other characters*2.
Main Table	txt	Data processing result file created in the Time course application (cannot be loaded). This text format file contains main table items and data delimited with commas or other characters*2.
Intensity Difference Table	txt	Data processing result file created in the Time course application (cannot be loaded). This text format file contains intensity difference table items and data delimited with commas or other characters*2.
RFPC Spectrum file	spc	This is an RFPC software file format. This file can be loaded into the Spectrum application.
RFPC Time course file	tmc	This is an RFPC software file format. This file can be loaded into the Time course application.

*1 Configured as the application's measurement parameters when the data file is loaded.

*2 Depends on the application setting when saving. Measurement parameters and summary information can be included when saving.

*3 The X axis and Y axis can be selected when performing text conversion from the application.

• Measurement parameter files

Application	Extension	Description
Spectrum	fm2f	This file stores measurement, instrument, and attachment parameters.
3D Spectrum	fm3f	This file stores measurement, instrument, and attachment parameters.
Quantitation	fmqf	This file stores wavelength, calibration curve, measurement (standard sample), measurement (sample), instrument, attachment, calculation, and pass/fail parameters.
Photometric	fmff	This file stores wavelength, measurement (sample), instrument, attachment, calculation, and pass/fail parameters.
Time course	fmtc	This file stores wavelength, measurement, instrument, and attachment parameters.

• Template files

Name	Extension	Description
Spectrum Peak Area template	fsta	Template file for peak area tables that contain the wavelength range and coefficients used in area calculation.
Spectrum Point Pick template	fstp	Template file for point pick tables that contain the wavelengths used in point picking.
Time course Peak Area template	ftta	Template file for peak area tables that contain the time range and factors used in area calculation.
Time course Point Pick template	fttp	Template file for point pick tables that contain the times used in point picking.
Quantitation template	fqtf	Quantitation measurement file that contains standard sample / sample table information without any data, measurement parameters, and calibration curve parameters.
Photometric template	futf	Photometric measurement file that contains sample table information without any data, and measurement parameters.
Report template	frpt	Template file for printing that contains printable items.

• Other

Name	Extension	Description
Log	log	This file contains the history of operations performed using the software. The contents of this file can be checked via [System Log] - [View] on the [Tools] menu.

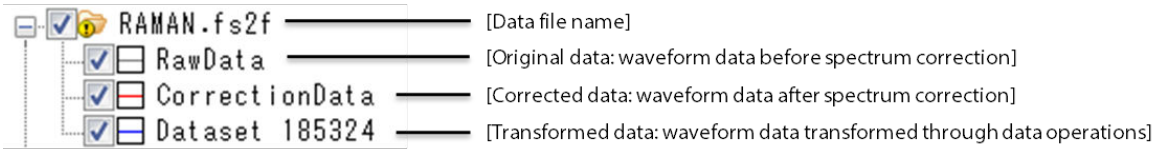
1.2 Window Operation

This section explains window operation in LabSolutions RF.

1.2.1 Tree View Operations

The tree view structure is shown below.

Display or hide the tree view by clicking [Tree View] on the [View] menu.



Example of Spectrum Data

NOTE

- When using the RF-6000, [RawData] in Spectrum measurement and 3D Spectrum measurement is considered internal data and is therefore not shown by default. This data can be set to be shown or hidden in the [User Settings], which are accessible from the [Tools] menu.
- [CorrectionData] does not exist on the RF-5300 series because the Spectrum correction function is not installed on this model.

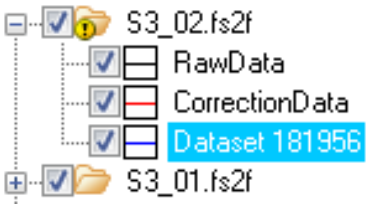
Measure a sample or open data to display data in the tree view and graph view.

At first, data is displayed at the top of the hierarchical structure. When data is processed, new data is added at a lower level.

If other data is added, it is displayed at the top of the hierarchical structure. Close data to remove the data from the tree view and graph view.

Reference For details on the data format of displayed data, see "1.1.4 LabSolutions RF Data Formats" P.7.

The following operations can be performed on data in the tree view of the Spectrum application.



Operation	Description
Clicking [+] and [-]	Display or hide the contents of the data set in the tree view. • Click [+] to display data sets lower in the hierarchy. • Click [-] to hide data sets lower in the hierarchy.

Operation	Description
Clicking checkboxes	Toggles between showing and hiding data (waveforms). • Selected: Displays waveforms on the [Overlay] graph. • Unselected: Hides waveforms on the [Overlay] graph. Deselect the checkbox next to the filename to hide the waveforms of all data sets contained in the file.
Double-clicking data set names	Toggles the active data set. The double-clicked data set becomes the active data set. Reference See "1.2.2 Specifying Data Sets (Activation)".
Right-click (on mouse)	Right-click on a filename or data set name to display a menu specific to the current task or area. The following menu items are displayed in the case of a Spectrum. • Filename - [Show Full Path]: Displays the filename with it's full path. • Filename - [Close]: Closes the file. • Data set name - [Text File Output]: Outputs the selected data set to a text file. Reference The menu items differ depending on the analysis application. For details, refer to the help file provided with LabSolutions RF.
Dragging a data set	Places a 3D graph on the [Tile] tab in the 3D Spectrum application.

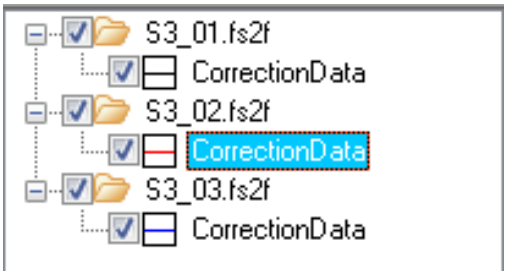
1.2.2 Specifying Data Sets (Activation)

When multiple data files (data sets) are loaded into the Spectrum, 3D Spectrum, and Time course applications, the data set to be targeted for data processing must be specified. In LabSolutions RF, the data set targeted for data processing through specification is referred to as the "active data set".

Hint A data set is automatically selected as the active data set immediately after measurement or loading.

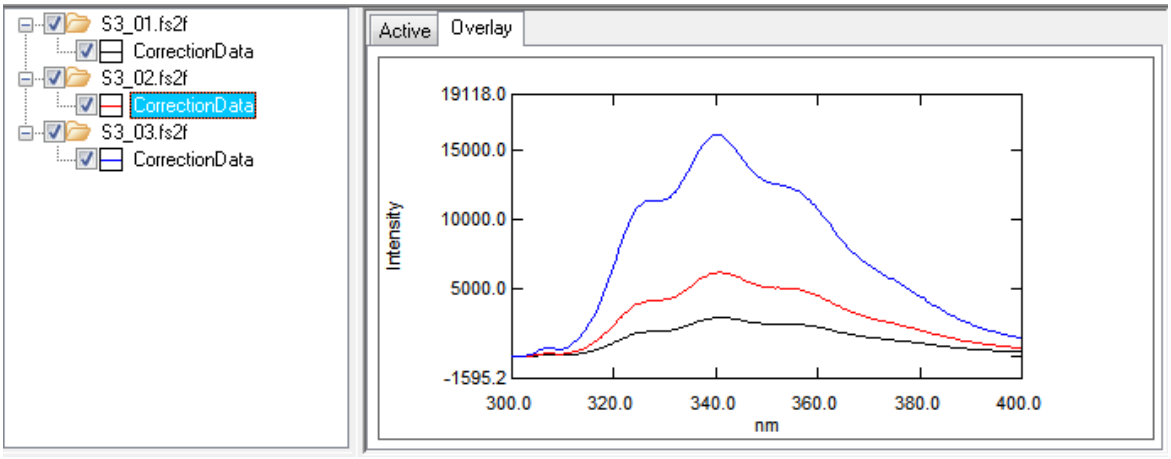
The active data set is specified in the tree view.

1 **Click the [+] that precedes the data filename in the tree view.**
This expands the data file and displays all of the loaded data set names.



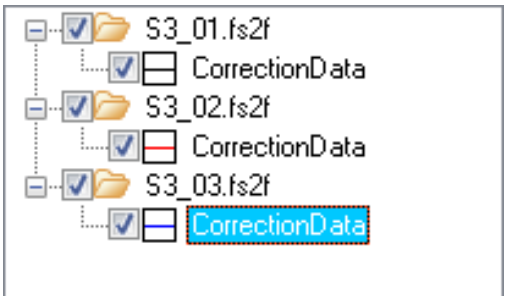
2 **Click the [Overlay] tab in the graph view.**

Search for the data set to specify (set active) among the loaded data set waveforms and check the line type and color.



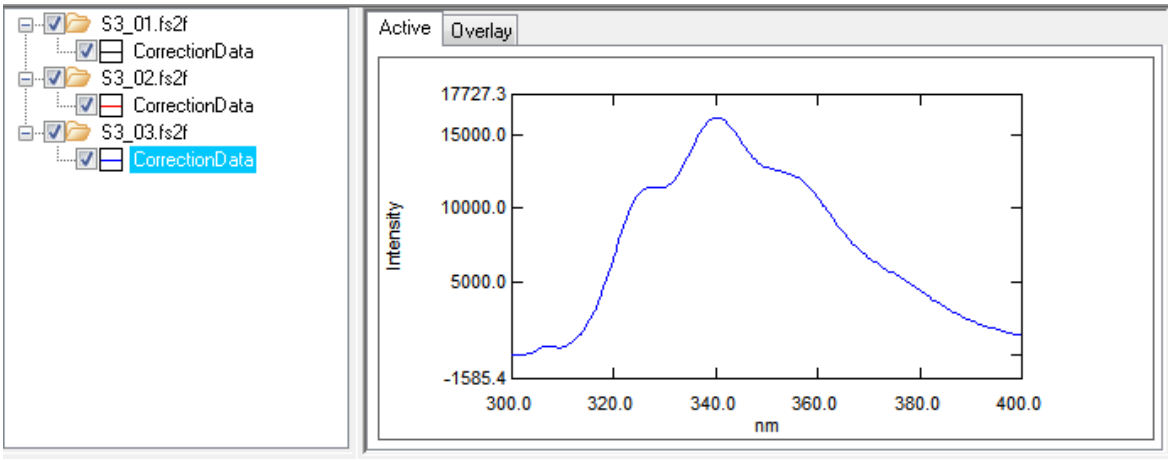
3 **In the tree view, check the line type icon that precedes the data set name and then double-click the name of the target data set.**

This highlights the specified data set name in blue and sets the data set to active.



4 **Click the [Active] tab in the graph view.**

Check that the waveform of the target data set is displayed.



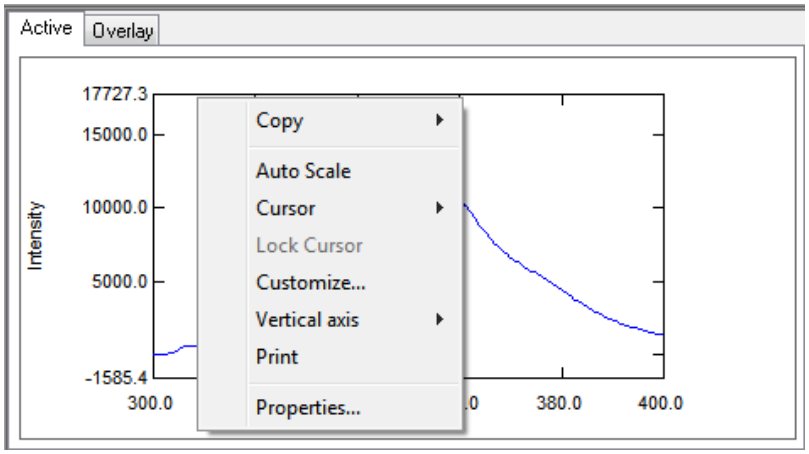
1.2.3 Right-Click Menu

Right-click on the tree view or graph view to display a menu specific to the current task or area. This allows commands to be easily executed without having to perform selection via a menu or toolbar.
The following procedure shows how to display and use menus using the Spectrum graph view as an example.

1 **Click the [Active] tab in the graph view.**

2 **Right-click on the active graph.**
The active graph right-click menu is displayed.

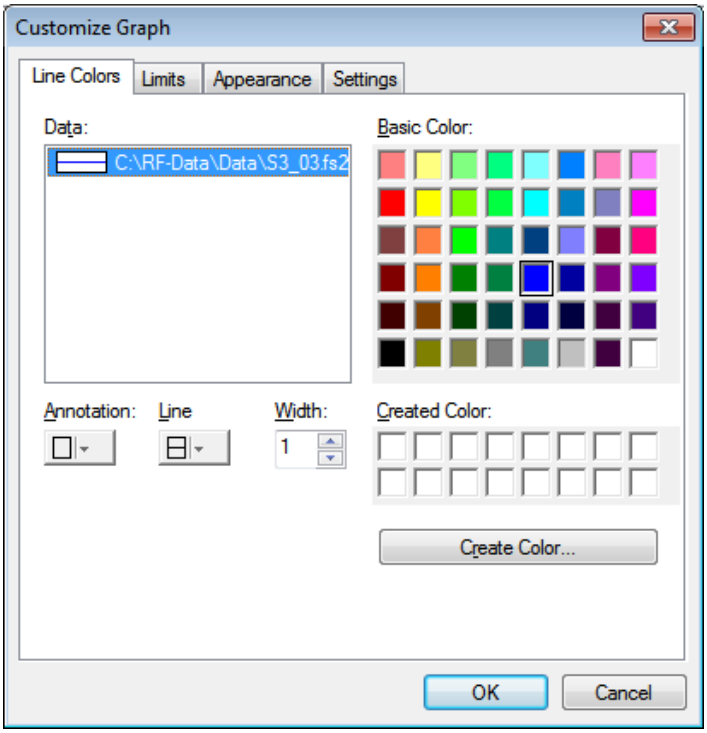
Reference For details on the active graph menu, refer to the help file provided with LabSolutions RF.



3 Click [Customize].

The [Customize Graph] window is displayed.

Reference The [Customize Graph] window can also be displayed by selecting [Customaize] on the [Graph] menu.



2 Starting and Shutting Down the System

This chapter explains how to start and shut down the Shimadzu Spectrofluorophotometer system.

Reference For details on Windows operation, refer to the relevant Windows manual.

■ Explanations Included in this Chapter

This chapter explains the procedure for starting the system, from turning on power to software startup, assuming that the personal computer (hereafter "PC") and instrument are connected using the communication cable and the LabSolutions RF software is installed on the PC.

2.1 Turning the Power ON

2.1.1 For RF-6000

1 **Turn ON the main switch on the RF-6000.**
Initialization of instrument settings starts.

2 **Turn ON power to the PC.**
A system check is performed and then Windows starts up.

2.1.2 For RF-5300 Series

1 **Turn ON the main switch on the RF-5300 series.**

2 **Turn ON power to the PC.**
A system check is performed and then Windows starts up.

2.2 Registering an Instrument

Before starting up any of the analysis applications, information on the connected instrument must be registered in LabSolutions RF.
Instrument registration is performed using the "Register Device" tool in LabSolutions RF.

Reference For information on the registration method, see "13.1 Registering an Instrument" P.193.

2.3 Connecting the Instrument

2.3.1 Starting an Analysis Application

This section explains application startup using the spectrum general analysis application as an example.

1 **Double-click**  **(LabSolutions RF) on the desktop.**

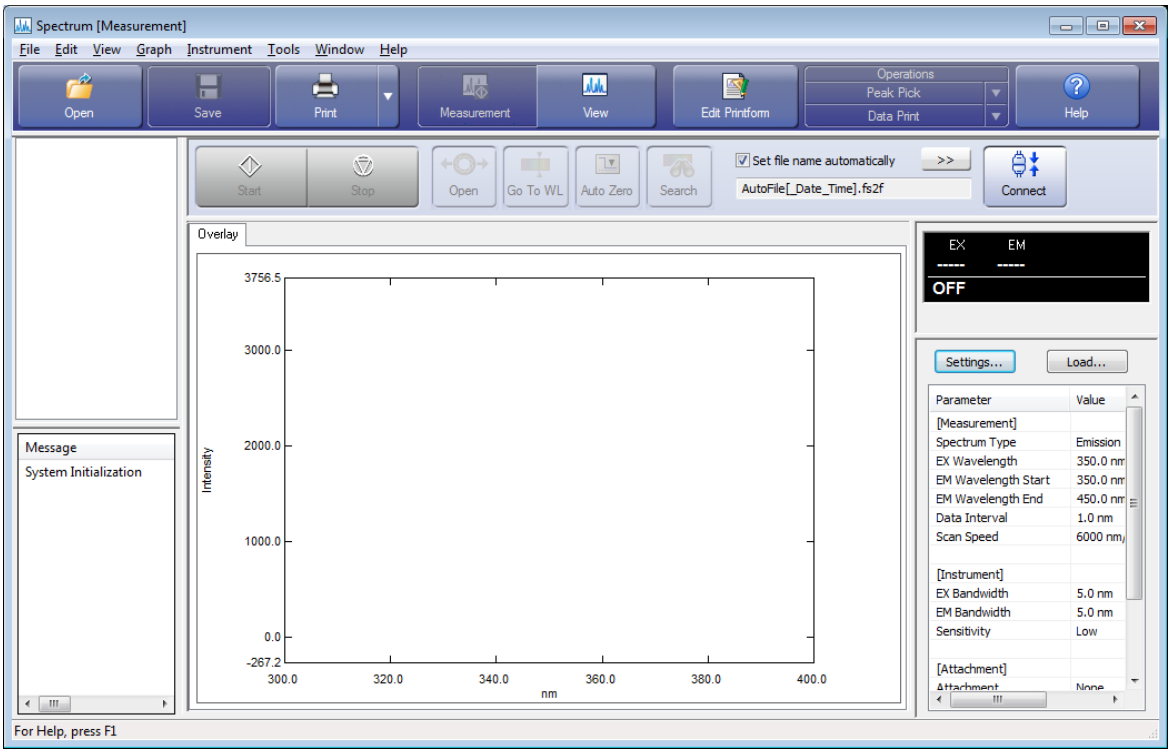
Hint The software can also be started by clicking the [Start] button, navigating to [All Programs] - [Shimadzu] - [LabSolutions RF], and clicking [LabSolutions RF].

The LabSolutions RF launcher starts.

LabSolutions RF Launcher

2 Click [Spectrum] on the [Fluorescence] tab.

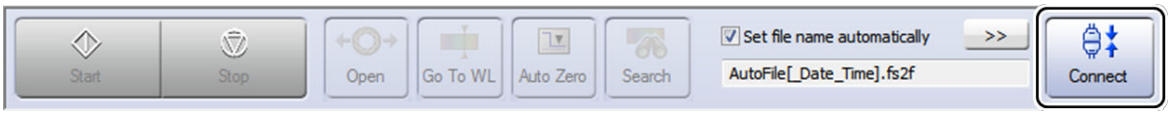
The spectrum general analysis application starts.



2.3.2 Connecting to the Instrument

This section explains instrument connection using the spectrum application window for the RF-5300 series as an example.

1 **Click [Connect] on the measurement toolbar.**

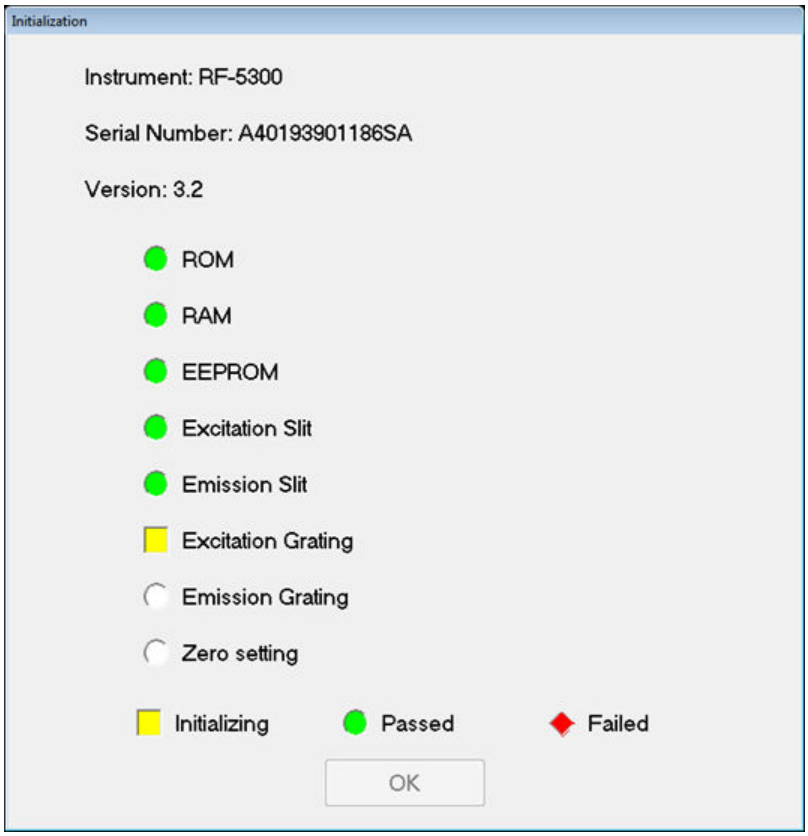


Spectrum Measurement Toolbar (Instrument Disconnected)

The application connects to the instrument and the initialization of settings starts.

Reference For details on the items set during initialization, refer to the instrument instruction manual or the help file provided with LabSolutions RF.

NOTE The RF-6000 automatically performs initialization of settings when the power is turned ON. Because the initialization of settings completes in a short time, if it completes normally before communication is established, the [Initialization] window is not displayed.



[Initialization] Window

2 **Click [OK] after the settings are initialized.**

The instrument control button on the measurement toolbar becomes active and measurement can now be performed.

Spectrum Measurement Toolbar

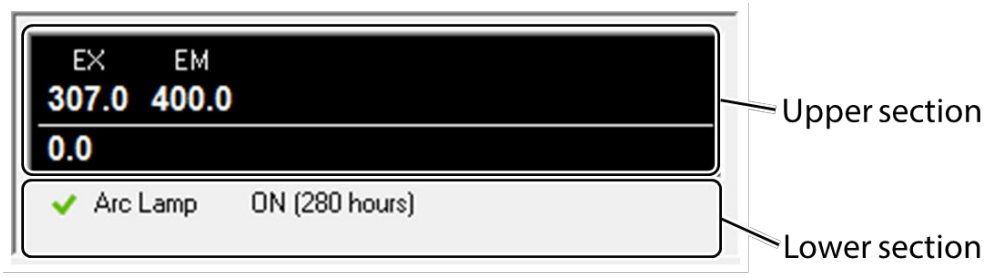
NOTE If an NG occurs for any of the items set during initialization, a connection cannot be established with the instrument.

2.3.3 Instrument Status

When a connection is established with the instrument, the currently set wavelength and fluorescence intensity are displayed in real time on the upper section of the instrument status located on the right of the main window in the analysis application.

The lower section displays the lighting state and cumulative operating time of the light source lamp and the type of any installed attachments. The cumulative operating time of the light source lamp is updated every hour.

The lower section can be shown or hidden from the right-click menu of the instrument status.



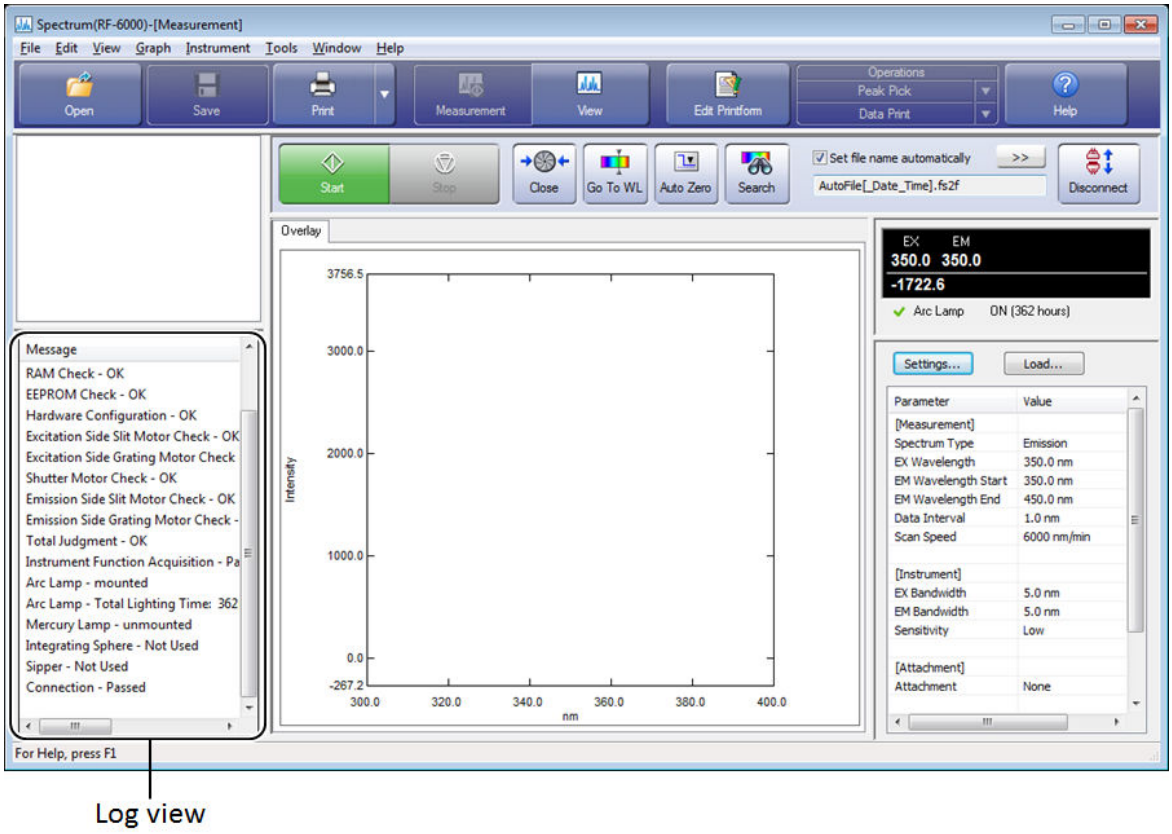
Instrument Status

The following table describes the meaning of each icon.

Icon	Description
	(Xenon) Xenon arc lamp Indicates that the cumulative operating time is within the service life range. The service life of the xenon arc lamp used by the RF-5300 series is 500 hours and the service life of the xenon arc lamp used by the RF-6000 is 2000 hours. Attachments (sipper, integrating sphere) Indicates that a sipper or integrating sphere (RF-6000-only option) is installed in the sample compartment.
	(Xenon) Xenon arc lamp Indicates that the cumulative operating time of the xenon arc lamp has exceeded the service life range. The lamp must be replaced.
	(Xenon) Xenon arc lamp A problem is occurring with the xenon arc lamp or lighting circuit. Contact your Shimadzu representative.

2.3.4 Log View

The general analysis applications display instrument log information in the log view located at the lower left of the window when a connection is established with the instrument.



Log View

NOTE Although exiting the application clears the log view, log information is saved. To reference previous log information, click [System Log] - [View] on the [Tools] menu and check the required log in the displayed [System Log] window. For details, refer to the help file provided with LabSolutions RF.

2.4 Shutting Down the System

NOTE Do not turn off the power or press the reset switch on the PC while Windows is running.

2.4.1 Disconnecting From the Instrument

The spectrum application screen is used as an example to explain this operation.

1 **Click [Disconnect] on the measurement toolbar.**

Communication with the instrument stops and "OFF" is displayed on the instrument status.

2.4.2 Exiting the Analysis Application

1 **Click [End] in the [File] menu.**

The analysis application closes. If an unsaved data file exists, a confirmation message asking whether to save the data file is displayed.

2 **Click [X] at the upper right of the LabSolutions RF launcher.**

The LabSolutions RF launcher closes

2.4.3 Turning the Power OFF

1 **Turn OFF the main switch on the instrument.**

2 **Shut down Windows.**

3 **Turn OFF power to the monitor.**

3 Launcher

This chapter explains how to use the LabSolutions RF launcher (hereafter "launcher").

Reference For cases not covered in this chapter and detailed descriptions on LabSolutions RF functions, refer to the help file provided with LabSolutions RF.

■ Explanations Included in this Chapter

This chapter explains the procedure for starting analysis applications and tools from the launcher as well as registering external applications to the launcher.

■ Functions Used in this Chapter

- Starting analysis applications and tools from the launcher
- Registering external applications to the launcher

3.1 Starting the Launcher

Double-click  (LabSolutions RF) on the desktop to start the LabSolutions RF launcher.

LabSolutions RF Launcher

Launcher functions are divided into the following three types.

Name	Function
[Fluorescence] tab	Start LabSolutions RF analysis applications for fluorescence measurement and any registered external applications or files from this tab.
[Manage] tab	Start the RF performance validation software, instrument registration, spectrum correction function measurement tool, and any registered external applications or files.
[Settings]	Perform operations including configuring the startup method of analysis applications and registering external applications to the launcher.

Hint The launcher can be exited independently even if any analysis applications that were started using the launcher are still displayed. The launcher can also be restarted when applications are running.

3.2 [Fluorescence] Tab

Analysis applications for fluorescence measurement that uses the xenon arc lamp can be started from this tab.

In addition, frequently used external applications can be started directly from the [Fluorescence] tab by registering them.

[Fluorescence] Tab

3.2.1 Analysis Applications

General analysis and special analysis applications can be started from this tab.

While multiple applications can be started at the same time, only one application can communicate with the instrument.

Note that when using (or performing instrument registration of) the RF-5300 series, the special analysis applications ([Quantum yield] and [Quantum efficiency]) cannot connect to these instruments.

> **NOTE** Multiple instances of the same application cannot be started.

3.2.2 External Applications

Frequently used external applications can be started from this tab by registering them. In addition, folders on the PC that contain related data and information can be opened directly from the launcher by registering them.

Reference For details on the registration method, see "3.4.2 Registering External Applications" P.32.

3.3 [Manage] Tab

Tools for instrument management and creating and saving correction functions for integrating spheres can be started from this tab.

In addition, frequently used external applications can be started directly from the [Manage] tab by registering them.

[Manage] Tab

3.3.1 Management Tools

Tools for instrument management and creating and saving correction functions for integrating spheres can be started from the [Manage] tab.

While the [Validation] and [Correction] tools can be started when other applications are running, multiple instances of the same tool cannot be started.

3.3.2 External Applications

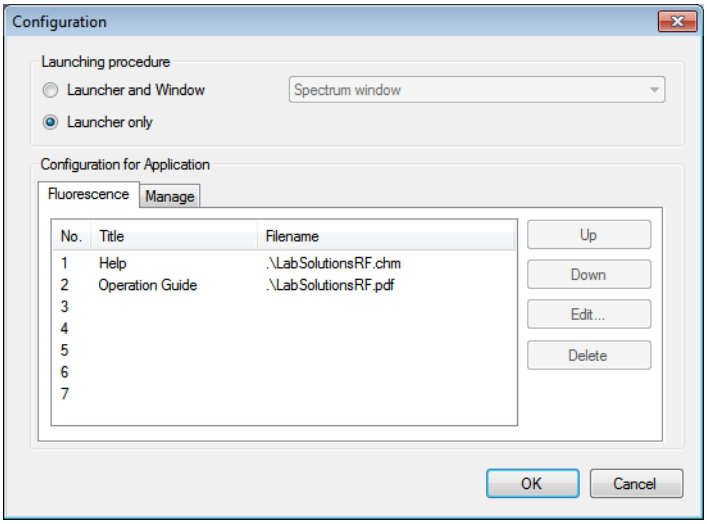
Frequently used external applications can be started from this tab by registering them. In addition, folders on the PC that contain related data and information can be opened directly from the launcher by registering them.

Reference For details on the registration method, see "3.4.2 Registering External Applications" P.32.

3.4 Configuration

Click [Settings] in the launcher to display the [Configuration] window.

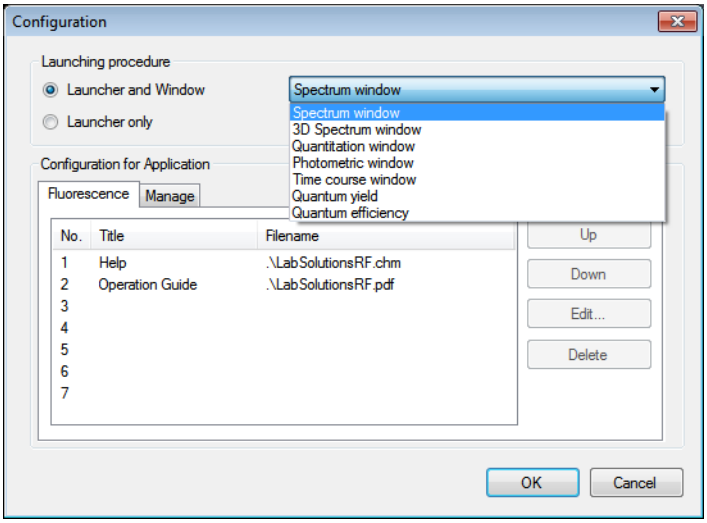
External applications for starting from the launcher can be registered in the [Configuration] window. Applications to be started together with the launcher when starting LabSolutions RF can also be selected.



[Configuration] Window

3.4.1 Startup Settings

Set the applications to be started together with the launcher.



Item	Description
[Launcher and Window]	Start the LabSolutions RF analysis application selected in the list together with the launcher.
[Launcher only]	Start only the launcher.

3.4.2 Registering External Applications

Register frequently used applications and PC folders to the launcher.

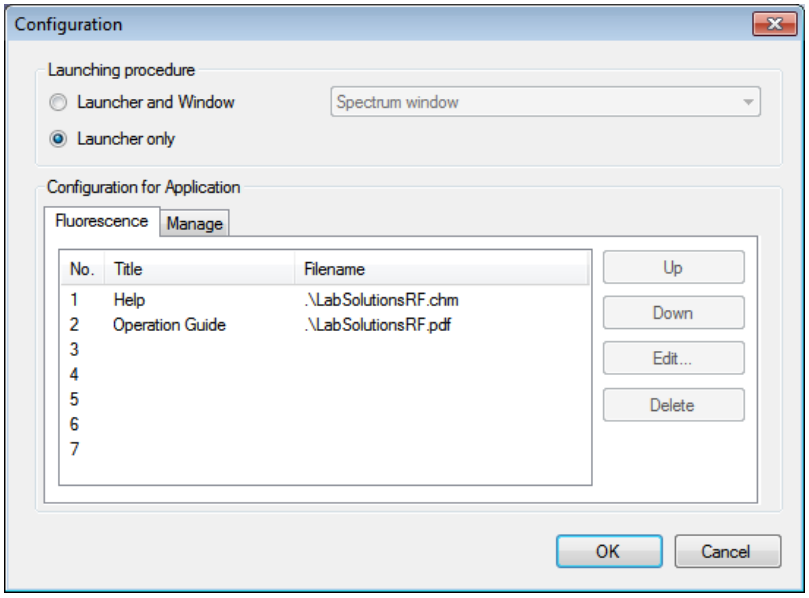
■ Registering external applications

Up to a combined total of 14 external applications and folders can be registered (seven each for the [Fluorescence] tab and [Manage] tab).

1 **Click [Settings] in the launcher.**

2 **Click the tab ([Fluorescence] tab or [Manage] tab) for registering an external application.**

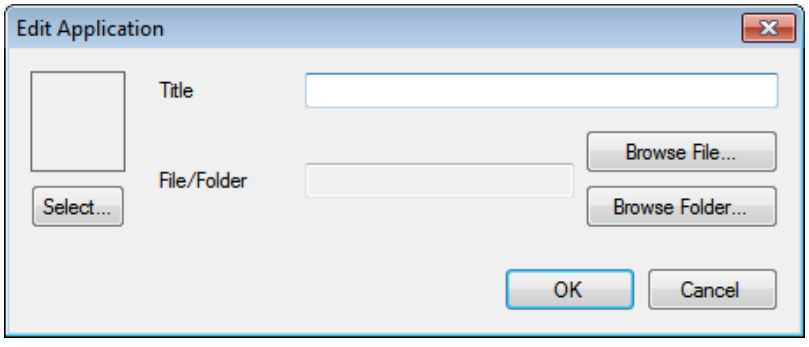
A list of registered external applications and folders is displayed.



[Configuration] Window

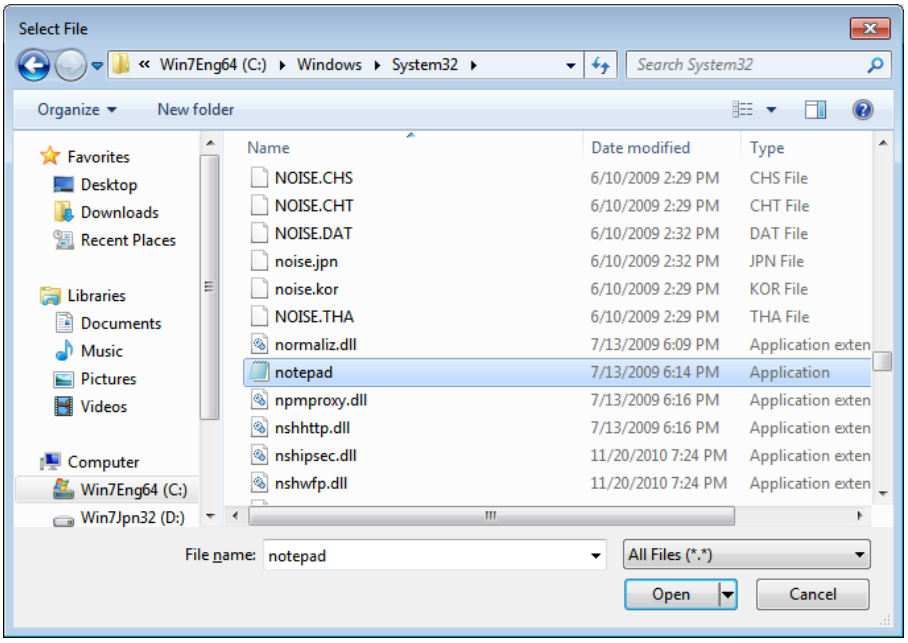
3 **Click an empty number in the list to highlight the row and then click [Edit].**

An [Edit Application] window is displayed.



[Edit Application] Window

4 Click [Browse File], select the application to be registered in the [Select File] window, and then click [Open].



[Select File] Window

NOTE A folder can be registered by clicking [Browse Folder] instead of [Browse File].

Hint The application icon is set automatically. Click [Select] to change the icon.

5 Enter a title in the [Title] field and click [OK].

The user is returned to the [Configuration] window.

NOTE The order of registered applications can be changed using the [Up] and [Down] buttons.

4 Spectrum

This chapter explains how to operate the spectrum general analysis application.

Reference For cases and functions not covered in this chapter, refer to the help file provided with LabSolutions RF.

■ Explanations Included in this Chapter

This chapter explains the procedures for measuring fluorescence spectra using distilled water, changing the scale on graphs, and printing using the quick print function.

NOTE Measurement parameter configuration is explained assuming that a connection is established between an RF-6000 and LabSolutions RF.

■ Functions Used in this Chapter

The following functions are used in spectrum measurement mode.

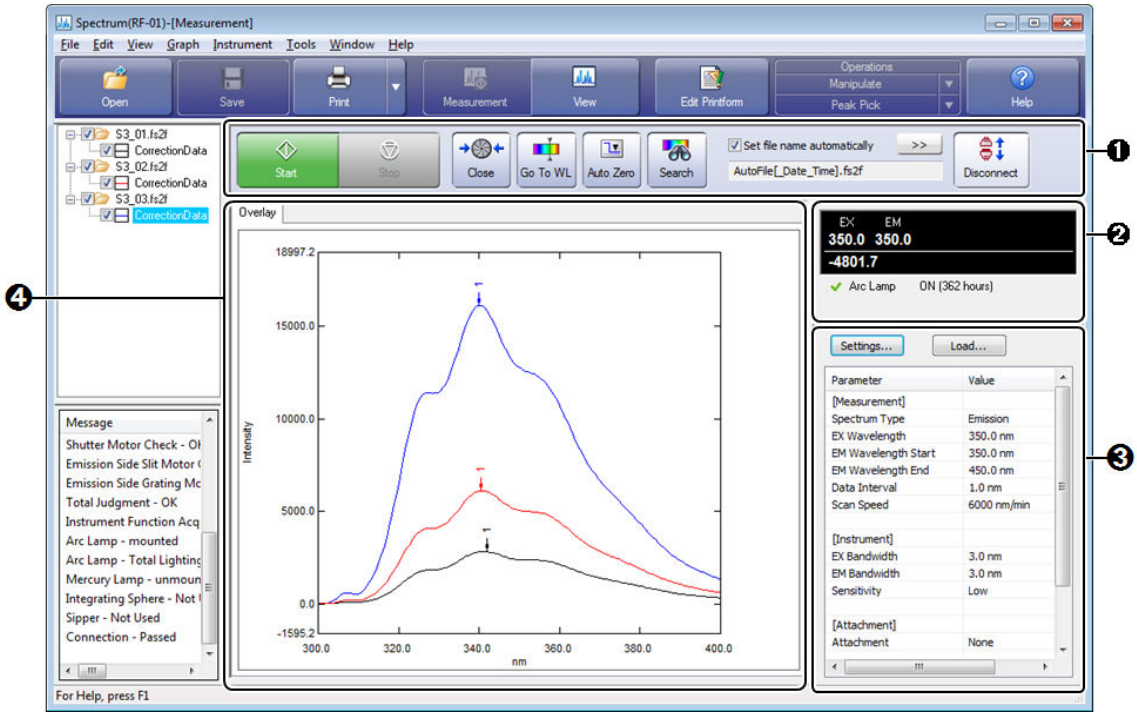
- Configuring measurement parameters, saving measurement parameter files
- Auto file function (setting filenames automatically)
- Fluorescence spectrum measurement
- Changing graph scales
- Printing (quick print)

4.1 Startup

Click [Spectrum] on the [Fluorescence] tab in the LabSolutions RF launcher to start the spectrum general analysis application.
The [Spectrum] window features a "measurement mode", "view mode", and "edit print form mode" and the mode can be changed by clicking the relevant button on the main toolbar.

Reference For details and operation method of the "edit print form mode" window, see "10 Printing" P.135.

4.1.1 [Spectrum - [Measurement]] Window Layout



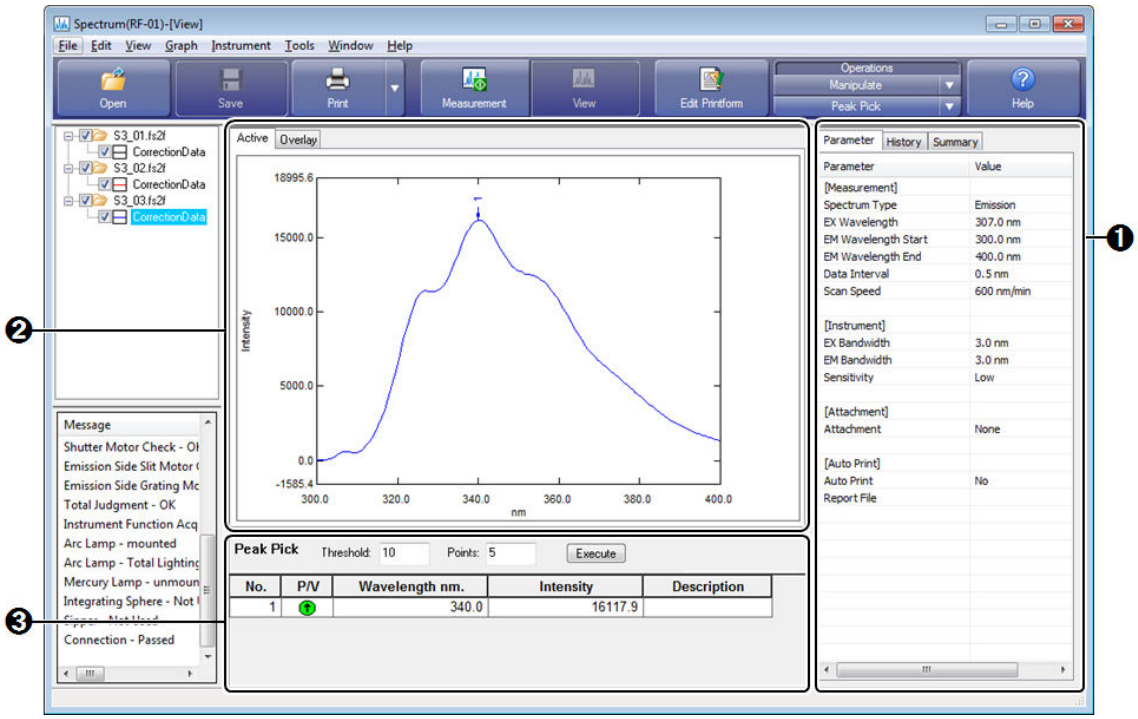
[Spectrum - [Measurement]] Window

The measurement mode is used when controlling an instrument to perform measurement.

No.	Name	Function
❶	Spectrum measurement toolbar	The buttons used for starting and stopping measurement and performing instrument control are located on this toolbar. Buttons such as [Start] become active after clicking [Connect] and establishing a connection with the instrument.
❷	Instrument Status	The upper section displays the current wavelength and fluorescence intensity and the lower section displays the status of the spectrofluorophotometer. Reference For details on the instrument status, see "2.3.3 Instrument Status" P.23.

No.	Name	Function
❸	Parameter view	Displays the settings of the currently configured measurement parameters (settings such as parameters related to measurement and whether to perform automatic printing). This view is used to configure, save, and load measurement parameters.
❹	Spectrum graph view	Displays a spectrum graph in real time during measurement. Only [Overlay] is available as the graph display method. **Hint** Displaying and hiding of the spectrum graph is performed in the tree view. Reference For details on the operating procedure, see "1.2.1 Tree View Operations" P.13.

4.1.2 Spectrum - [View] Window Layout



[Spectrum - [View]] Window

The view mode is used to perform operations such as data processing with respect to captured or saved data.

No.	Name	Function
❶	Parameter view	Displays measurement parameter information, data history, and summary information (such as sample information and instrument information) of the active data.
❷	Spectrum graph view	Displays a spectrum graph of the loaded data. [Active] and [Overlay] are available as graph display methods. **Hint** Displaying and hiding of the spectrum graph is performed in the tree view. **Reference** For details on the operating procedure, see "1.2.1 Tree View Operations" P.13.
❸	Data processing view	Displays the parameter setting window for the Peak Pick table, Point Pick table, and Manipulate. **Reference** For details on data processing, see "9 Data Processing" P.118.

4.2 Configuring and Saving Measurement Parameters

Create (configure) measurement parameters for measuring the fluorescence spectrum of distilled water and save them to a file.

Measurement parameters can be set by loading a saved measurement parameter file.

Spectrum measurement parameters comprise "measurement (parameters)", "instrument (parameters)", and "attachments" and are configured in the parameter view.

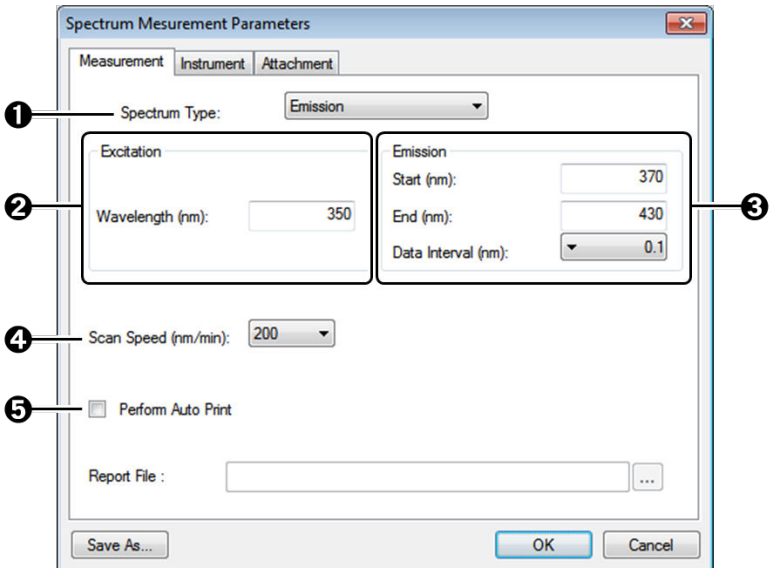
4.2.1 Configuring Measurement Parameters

Reference For details on each measurement parameter item, refer to the help file provided with LabSolutions RF.

1 **Display the measurement mode window and click [Settings] in the parameter view.**

The [Spectrum Measurement Parameters] window is displayed.

2 **Configure the measurement conditions (parameters) on the [Measurement] tab.**

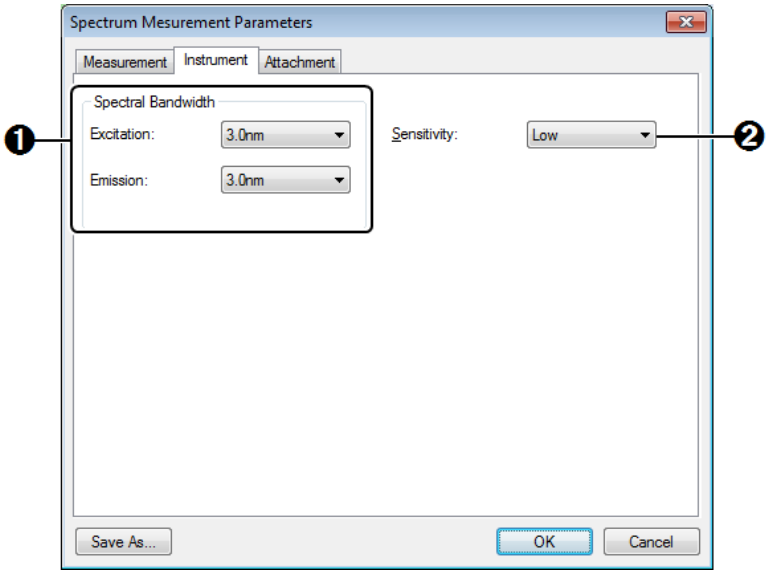


[Spectrum Measurement Parameters] Window ([Measurement] Tab)

No.	Measurement Condition (Parameter)	Setting
❶	[Spectrum Type]	Emission
❷	[Excitation]	350 nm
❸	[Emission]	• [Start]: 370 nm • [End]: 430 nm • [Data Interval]: 0.1 nm
❹	[Scan Speed]	200 (nm/min)

No.	Measurement Condition (Parameter)	Setting
❺	[Perform Auto Print]	No (unselected)

3 Configure the instrument conditions (parameters) on the [Instrument] tab.



[Spectrum Measurement Parameters] Window ([Instrument] Tab)

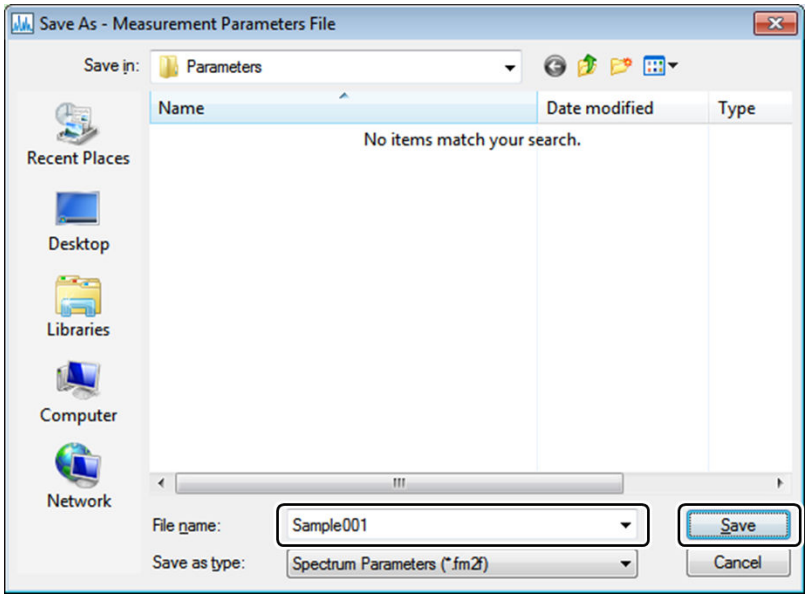
No.	Instrument Condition (Parameter)	Setting
❶	[Spectral Bandwidth]	• [Excitation]: 5.0 nm • [Emission]: 5.0 nm
❷	[Sensitivity]	High

4.2.2 Saving Measurement Parameters

1 **Click [Save As] in the [Spectrum Measurement Parameters] window.**

2 **Enter a filename and click [Save].**

The file is saved and the configured measurement parameters are accepted for use.



[Save As - Measurement Parameters File] Window

4.3 Configuring the Auto File Function (Setting Filenames Automatically)

Filenames with the measurement start date and time or serial number appended to an arbitrary character string can be created automatically.

Hint While file information such as the sample name, ID, and comments can be entered in the [New Data Set] window displayed for each measurement, measurement can be performed without displaying this window.

Reference For details on this function and setting items, refer to the help file provided with LabSolutions RF.

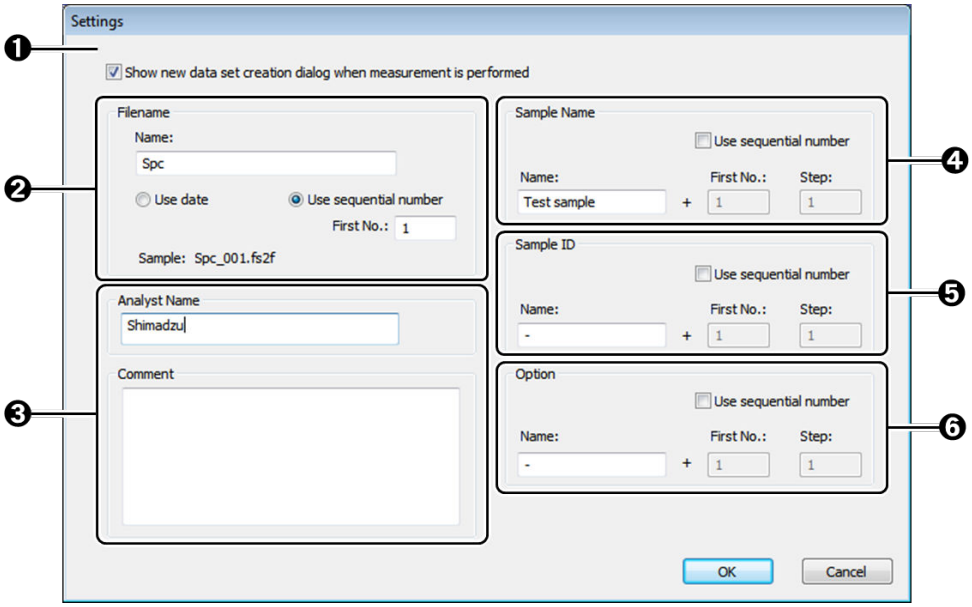
1 Select the [Set file name automatically] checkbox on the spectrum measurement toolbar.

The [Settings] window of the auto file function is displayed.

NOTE If the checkbox is already selected, click >> next to the checkbox.

Spectrum Measurement Toolbar

2 Set the auto file function conditions (parameters).



[Settings] Window

No.	Condition (Parameter)	Setting
❶	[Show new data set creation dialog when measurement is performed]	Yes (selected)
❷	[Filename]	• [Name]: Spc • [Use date]/[Use sequential number]: [Use sequential number] • [First No.]: 1
❸	[Analyst Name]	Enter a name.
❹	[Sample Name]	• [Name]: Test sample (example) • [Use sequential number]: No (unselected)
❺	[Sample ID]	• [Name]: - • [Use sequential number]: No (unselected)
❻	[Option]	• [Name]: - • [Use sequential number]: No (unselected)

3 Click [OK].

The [Settings] window closes and the filename is displayed on the spectrum measurement toolbar.

Spectrum Measurement Toolbar

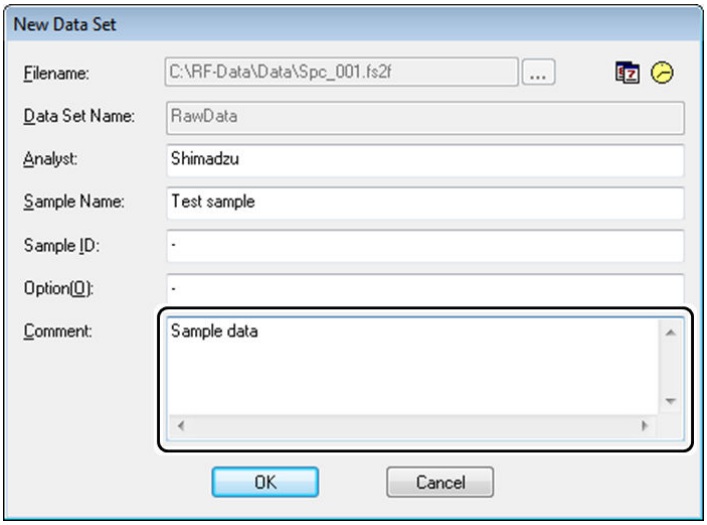
4.4 Spectrum Measurement

1 **Check that the shutter is closed (Open) and then click [Auto Zero] on the spectrum measurement toolbar.**

2 **Place the sample in the instrument's sample compartment and close the lid.**

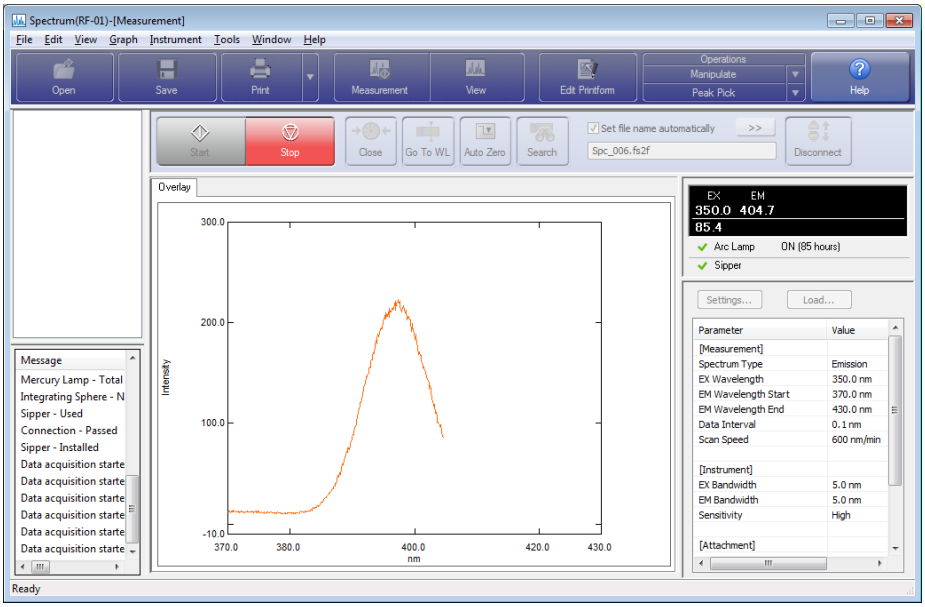
3 **Click [Start] on the spectrum measurement toolbar.**
The [New Data Set] window is displayed.

4 **Enter a comment and click [OK].**



[New Data Set] Window

Measurement starts and the captured data is graphed in real time.



[Spectrum - [Measurement]] Window

4.5 Changing the Graph Scale

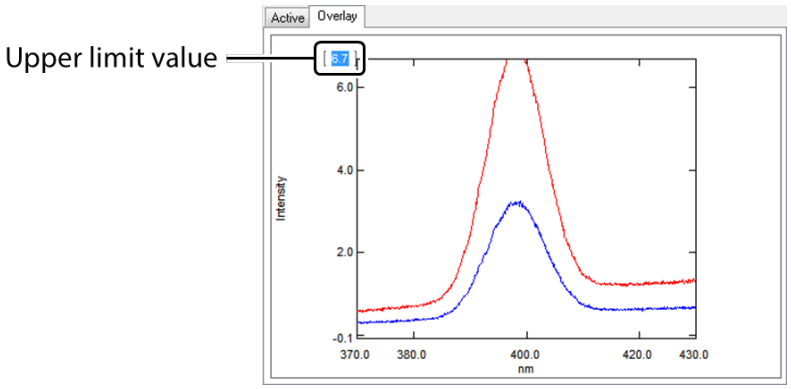
The following methods are available for changing the scale on spectrum graphs.

- Directly Edit the Upper and Lower Limits of the Scale
- Perform automatic scaling
- Configure the scale in the [Customize Graph] window

■ Directly edit the upper and lower limit values of the scale

1 **Click the upper limit value (on the intensity axis in this example) of the graph scale.**

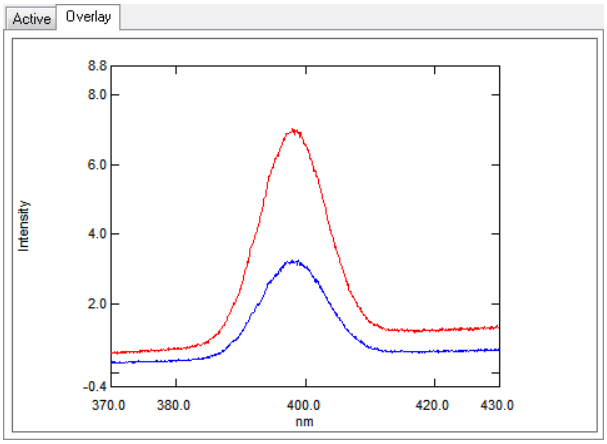
The value changes to the editable state (value becomes highlighted).



Changing the Upper Limit Value

2 **Directly enter a new value and press the "Enter" key.**

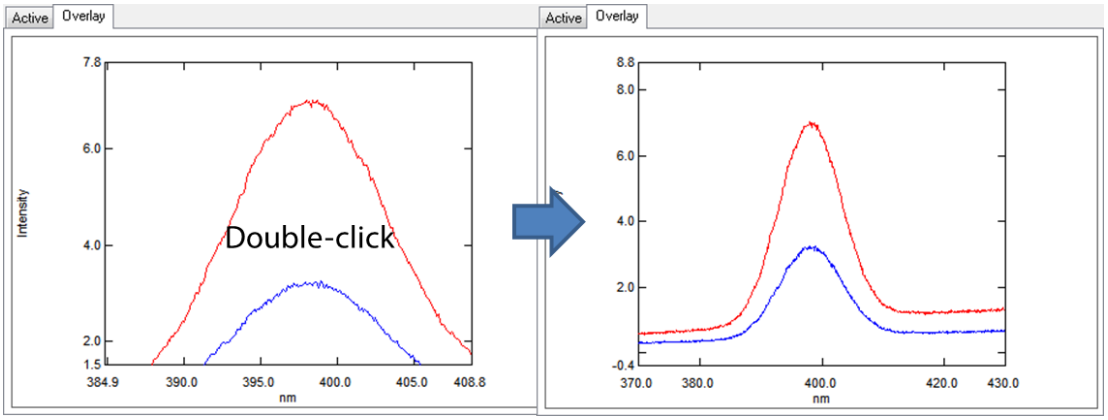
The graph is redrawn using the entered value as the upper limit.



■ Perform Automatic Scaling

1 **Double-click on the graph.**

Automatic scaling is performed according to the current state of the graph.



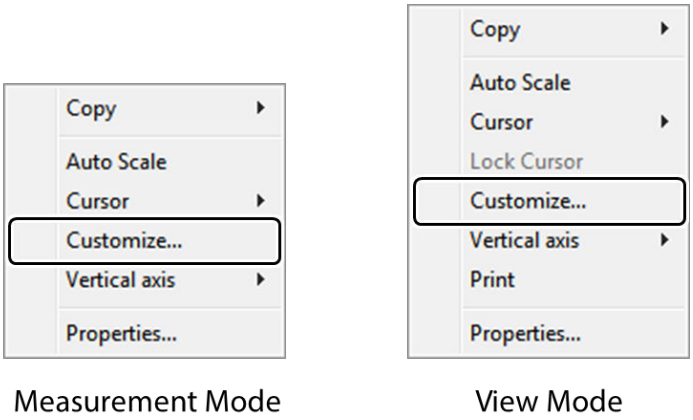
Performing Automatic Scaling

■ Configure the scale in the [Customize Graph] window

1 **Open the right-click menu on the graph and click [Customize].**

The [Customize Graph] window is displayed.

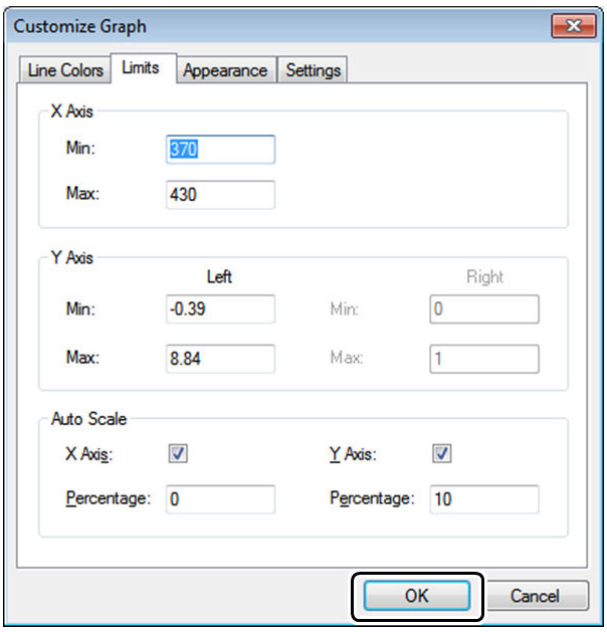
Hint The right-click menus in the graph view differ depending on the window mode and graph tab type.



Right-Click Menus (Overlay Graph)

2 Change the scale on the [Limits] tab and then click [OK].

Hint Set the margin ratio for automatic scaling here.



[Customize Graph] Window ([Limits] Tab)

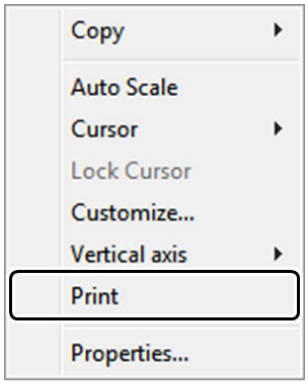
4.6 Printing (Quick Print)

Print using the report file (report template) linked to the overlay graph in the view mode window.

Reference For details on the quick print function (such as creating report files and setting links), see "10 Printing" P.135.

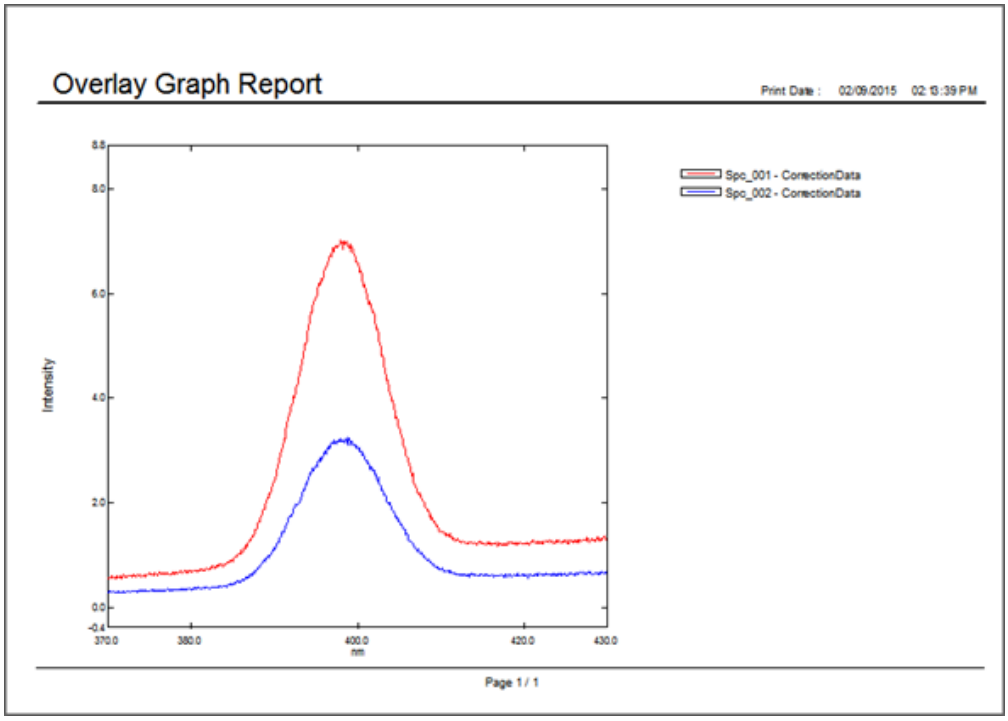
1 **Change to the view mode window, open the right-click menu on the overlay graph, and click [Print].**

Printing is performed using the overlay graph and the linked report file.



View Mode

Right-Click Menu (Overlay Graph)



Example of Printout

5 3D Spectrum

This chapter explains how to operate the 3D spectrum general analysis application.

Reference For cases and functions not covered in this chapter, refer to the help file provided with LabSolutions RF.

■ Explanations Included in this Chapter

This chapter explains the procedures for measuring a 3D spectrum using a fluorescence sample and extracting a fluorescence spectrum from the captured 3D data.

NOTE Measurement parameter configuration is explained assuming that a connection is established between an RF-6000 and LabSolutions RF.

■ Functions Used in this Chapter

The following functions are used in 3D spectrum measurement mode.

- Configuring measurement parameters, saving measurement parameter files
- 3D spectrum measurement
- Switching to view mode

The operation explanation uses a sample that emits fluorescent light at around 340 nm for an applied excitation light of 307 nm as an example.

The following functions are used in 3D spectrum view mode.

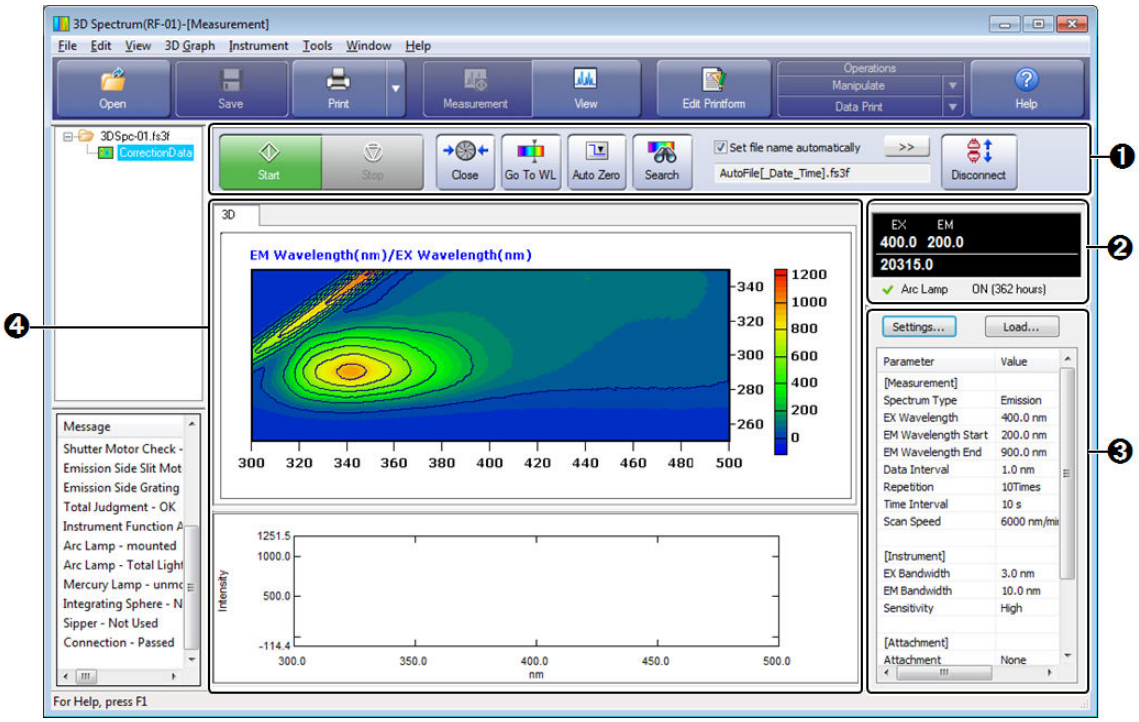
- Graph enlargement
- Cursor position setting
- Fluorescence spectrum extraction (file saving)

5.1 Startup

Click [3D Spectrum] on the [Fluorescence] tab in the LabSolutions RF launcher to start the 3D spectrum general analysis application for capturing 3D data (excitation/fluorescence wavelength - time - fluorescence intensity or fluorescence wavelength - excitation wavelength - fluorescence intensity).
The [3D Spectrum] window features a "measurement mode", "view mode", and "edit print form mode" and the mode can be changed by clicking the relevant button on the main toolbar. The "measurement mode" window is displayed when the 3D spectrum application starts up.

Reference
- For details on the "view mode" window, see "5.5.1 3D Spectrum - [View] Window Layout" P.57.
- For details and operation method of the "edit print form mode" window, see "10 Printing" P.135.

5.1.1 [3D Spectrum - [Measurement]] Window Layout



[3D Spectrum - [Measurement]] Window

The [3D Spectrum - [Measurement]] window is divided into the following four parts.

No.	Name	Function
❶	3D spectrum measurement toolbar	The buttons used for starting and stopping measurement and performing instrument control are located on this toolbar. Buttons such as [Start] become active after clicking [Connect] and establishing a connection with the instrument.
❷	Instrument status	The upper section displays the current wavelength and fluorescence intensity and the lower section displays the status of the spectrofluorophotometer. Reference For details on the instrument status, see "2.3.3 Instrument Status" P.23.
❸	Parameter view	Displays the settings of the currently configured measurement parameters (settings such as parameters related to measurement and whether to perform automatic printing). This view is used to configure, save, and load measurement parameters.
❹	3D spectrum graph view	The lower section displays a spectrum graph and the upper section displays a 3D spectrum graph in real time during measurement.

5.2 Configuring Measurement Parameters

Create (configure) measurement parameters for measuring the fluorescence spectrum (3D spectrum) at a certain excitation wavelength interval.

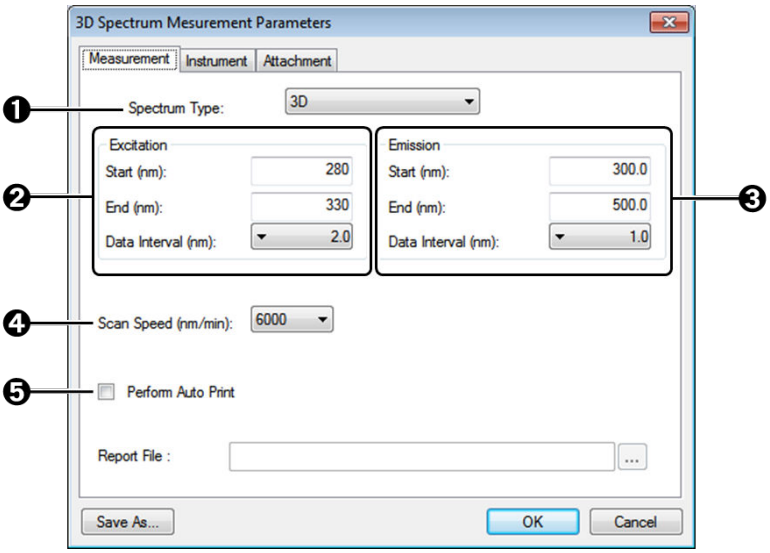
Reference For details on the procedure for saving measurement parameters to a file, see "4.2 Configuring and Saving Measurement Parameters" P.38.

3D spectrum measurement parameters comprise "measurement (parameters)", "instrument (parameters)", and "attachments" and are configured in the parameter view.

1 Click [Settings] in the parameter view.

The [3D Spectrum Mesurement Parameters] window is displayed.

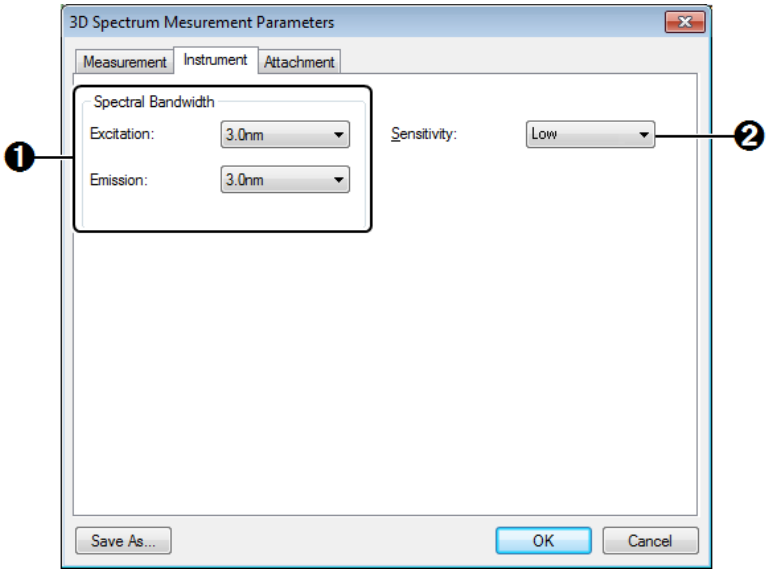
2 Configure the measurement conditions (parameters) on the [Measurement] tab.



[3D Spectrum Mesurement Parameters] Window ([Measurement] Tab)

No.	Measurement Condition (Parameter)	Setting
❶	[Spectrum Type]	3D
❷	Excitation	• [Start]: 280 nm • [End]: 330 nm • [Data Interval]: 2.0 nm
❸	Emission	• [Start]: 300 nm • [End]: 500 nm • [Data Interval]: 1.0 nm
❹	[Scan Speed]	6000 (nm/min)
❺	[Perform Auto Print]	No (unselected)

3 Configure the instrument conditions (parameters) on the [Instrument] tab.



[3D Spectrum Method] Window ([Instrument] Tab)

No.	Instrument Condition (Parameter)	Setting
❶	[Spectral Bandwidth]	• [Excitation]: 3.0 nm • [Emission]: 3.0 nm
❷	[Sensitivity]	Low

4 Click [OK] to close the window.

The measurement parameter settings are accepted for use.

5.3 Disabling the Auto File Function

An arbitrary filename and sample information (sample name and comments) can be set when starting measurement.

Reference For details on the procedure for enabling automatic filename creation (auto file function), see "4.3 Configuring the Auto File Function (Setting Filenames Automatically)" P.41.

1 **Check that the [Set file name automatically] checkbox on the 3D spectrum measurement toolbar is not selected.**

If this checkbox is selected, deselect it.

3D Spectrum Measurement Toolbar

5.4 3D Spectrum Measurement

1 **Check that the shutter is closed (** 

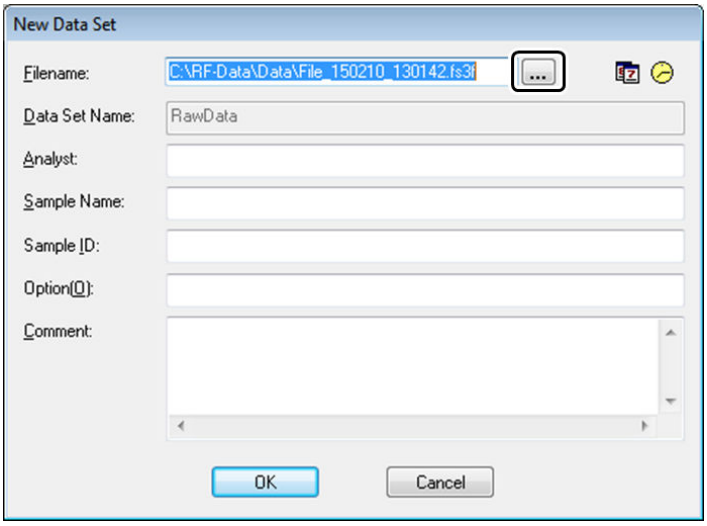
) and then click [Auto Zero] on the 3D spectrum measurement toolbar.

2 **Place the sample in the instrument's sample compartment and close the lid.**

3 **Click [Start] on the 3D spectrum measurement toolbar.**

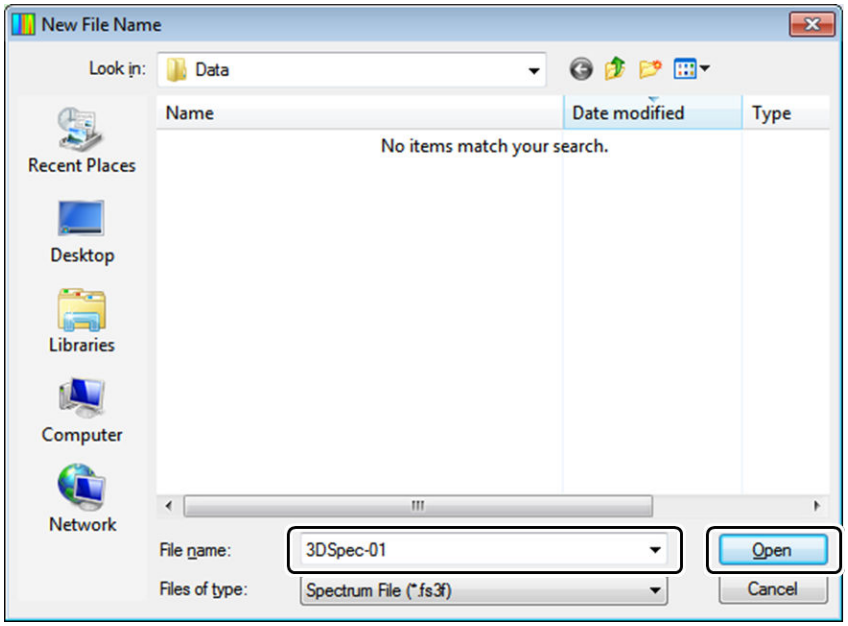
The [New Data Set] window is displayed.

4 Click [...].



[New Data Set] Window

5 Enter a filename and click [Open].

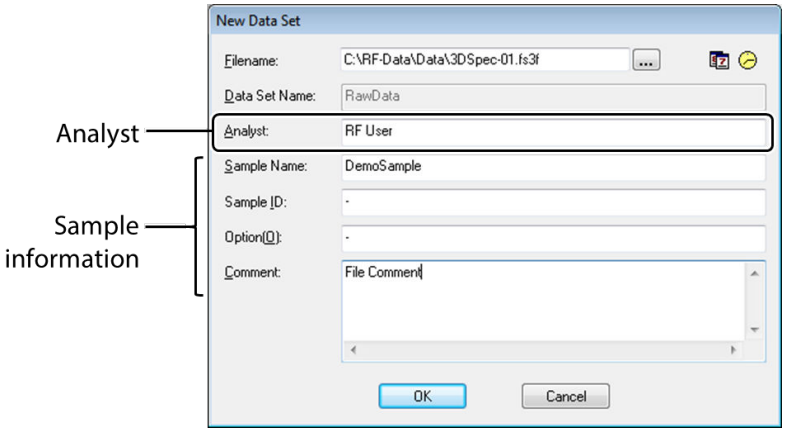


[New Filename] Window

Hint The save destination of data files can be changed from [Destination Folder] on the [Tools] menu.

Reference For details, refer to the help file provided with LabSolutions RF.

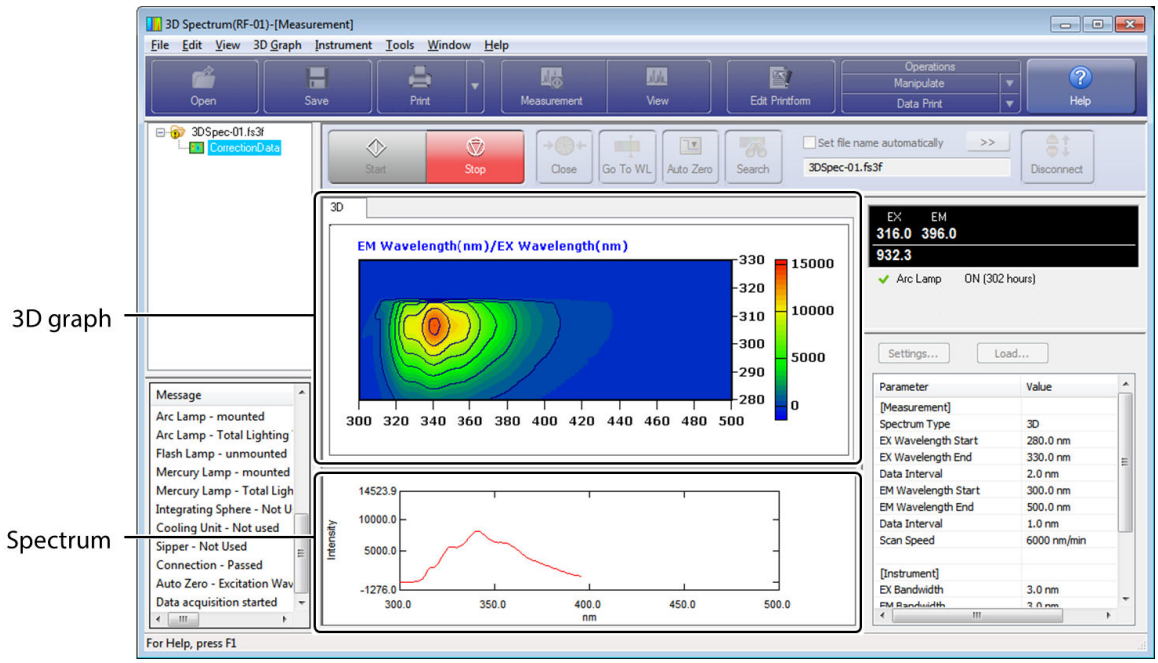
6 Enter the name of the analyst and sample information (such as sample name and comments).



[New Data Set] Window

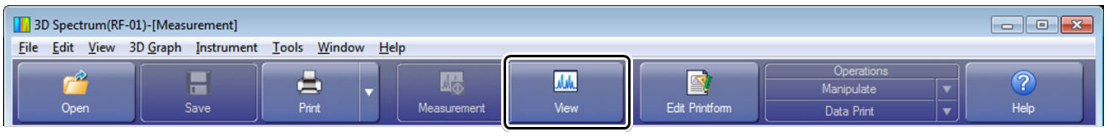
7 Click [OK] to start measurement.

During measurement, the upper section of the 3D spectrum graph view draws a 3D graph (intensity distribution diagram) and the lower section draws the fluorescence spectrum being captured in real time.



During Measurement

8 **After measurement is complete, click [View] on the main toolbar.**

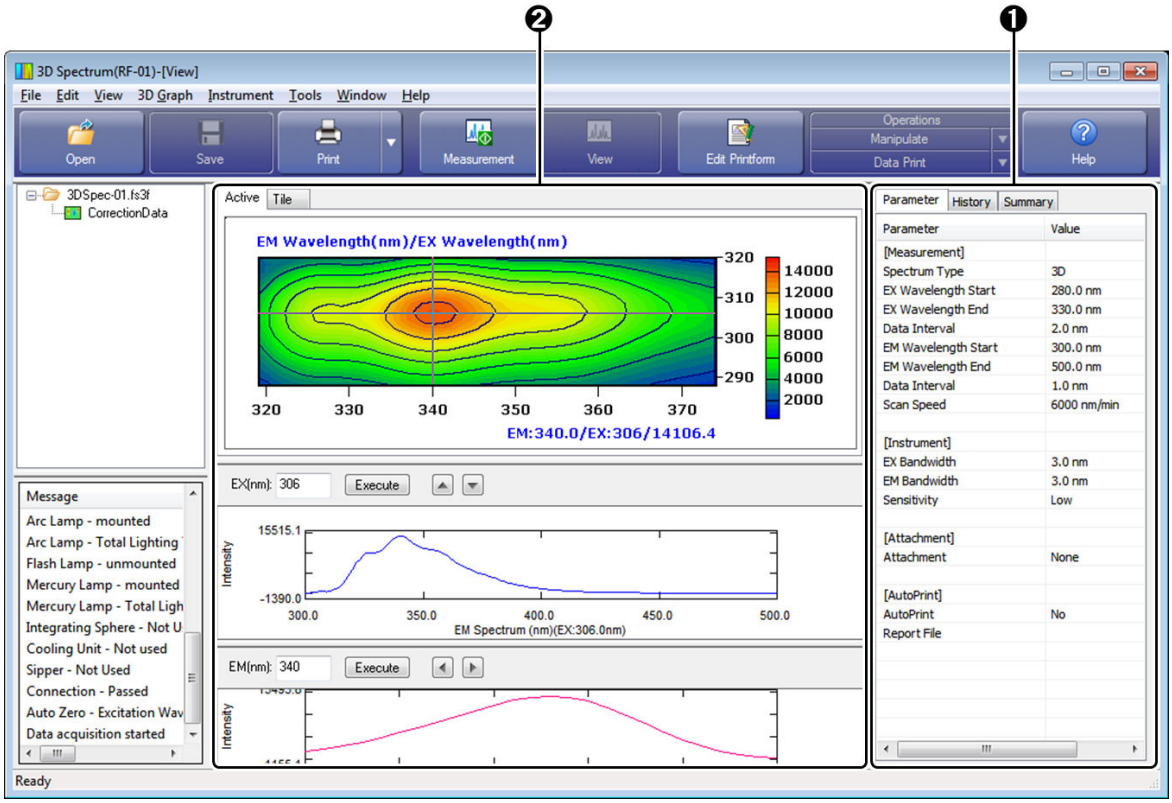


Main Toolbar

The window changes to view mode.

5.5 View Mode

5.5.1 3D Spectrum - [View] Window Layout



[3D Spectrum - [View]] Window (View Mode)

No.	Name	Function
❶	Parameter view	Displays the measurement parameter information, data history, and summary information of data shown on the [Active] tab.
❷	3D spectrum graph view	Displays graphs of the loaded 3D data. Moving the mouse cursor into the 3D graph area changes the cursor to a crosshair, and moving the mouse moves the crosshair. • The [Active] tab displays graphs of the currently active data set. An "intensity distribution diagram" or "3D spectrum graph" can be shown in the graph display. • The [Tile] tab can display up to six 3D graphs of any data set in tiled form. Dragging a filename from the tree view into the tiled graph area displays a 3D graph corresponding to the file. ▶▶ Reference For details on the operating procedure of the [Tile] tab, refer to the help file provided with LabSolutions RF.

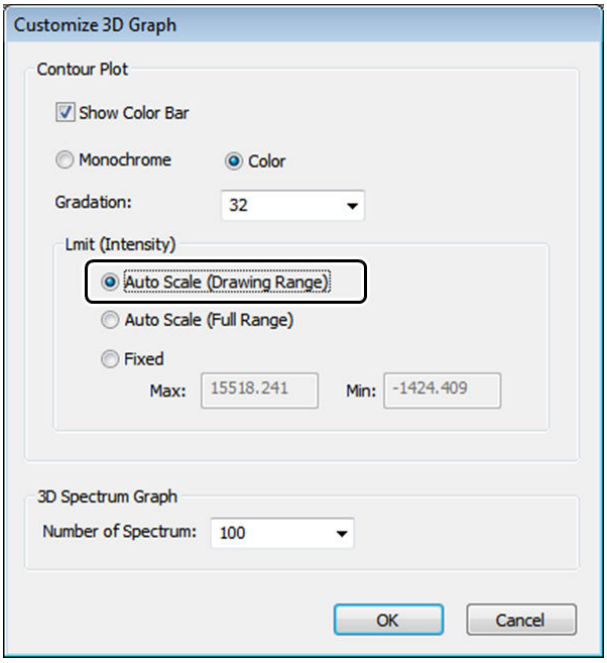
5.5.2 Enlarging 3D Graphs

> **NOTE** When the "3D spectrum graph" display is enabled, click [Contour Plot] on the [3D Graph] menu.

Enlarge 3D graphs on the [Active] tab.

3D graphs can be enlarged either by specifying a range using the mouse or by directly entering a range in [3D Graph Range] from the right-click menu.
The method of using the mouse is explained in this example.

> **Hint** The intensity distribution of an enlarged area can be viewed more clearly by configuring automatic scaling to be performed on fluorescence intensity according to the drawing range. Configure the settings in the window displayed by clicking [Customize] on the [3D Graph] menu.

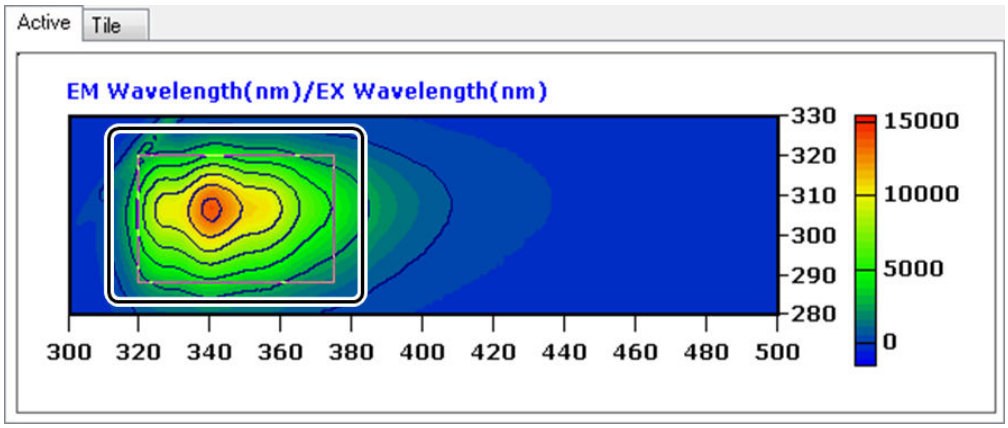


[Customize 3D Graph] Window

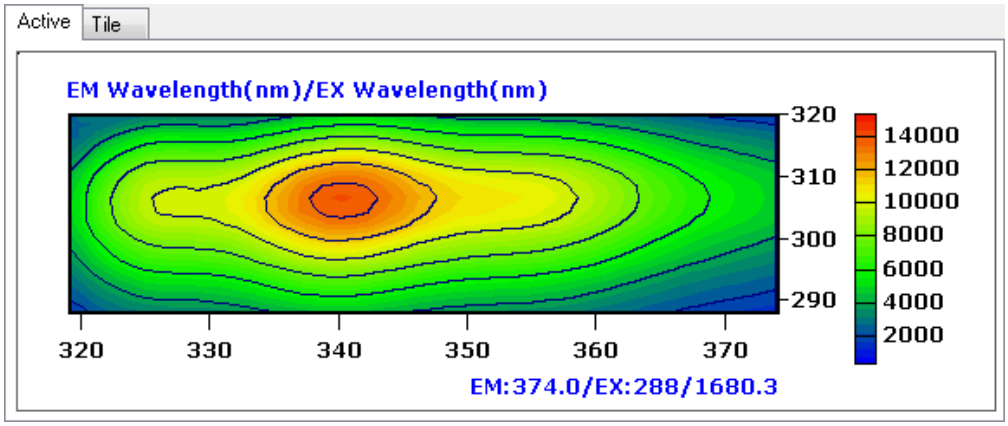
1 **Drag the mouse on the 3D graph to create a quadrilateral and then click on the position to enlarge.**

Hint After creating a quadrilateral, the created quadrilateral can be moved within the 3D graph using the mouse.

The enclosed area is displayed enlarged.



3D Graph (Before Enlarging)



3D Graph (After Enlarging)

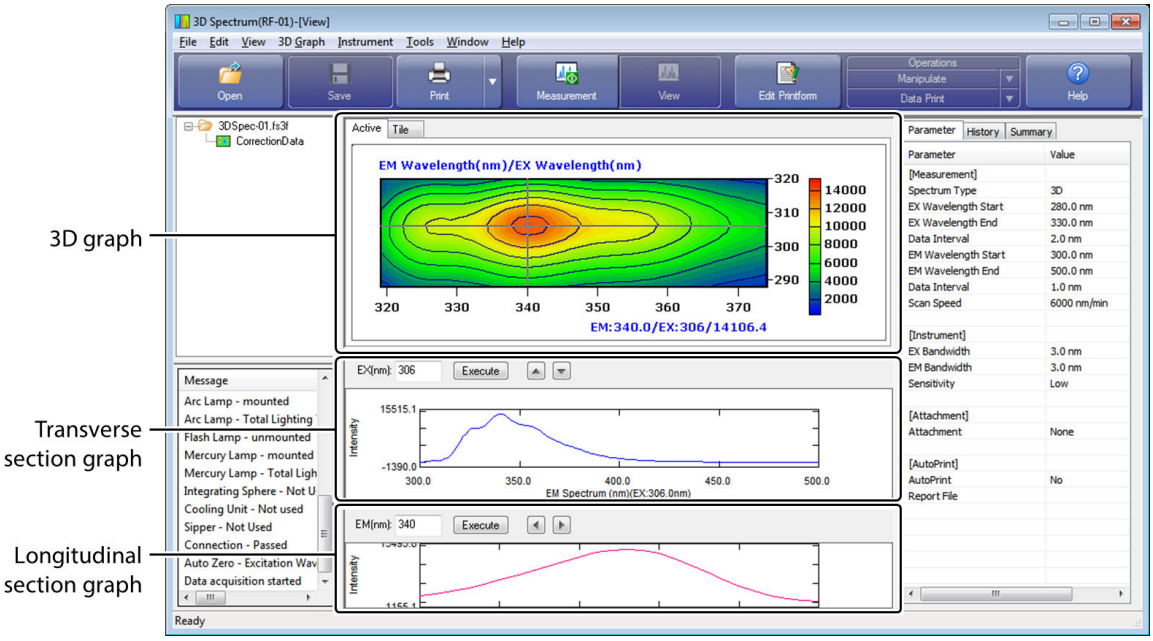
5

5.6 Extracting Spectrum Data

Extract a fluorescence spectrum from captured 3D spectrum data and save it to a spectrum data file.

1 Move the mouse cursor onto the 3D graph (upper section of the graph view).

A transverse section graph (middle section) and longitudinal section graph (lower section) of the cursor line position are displayed.

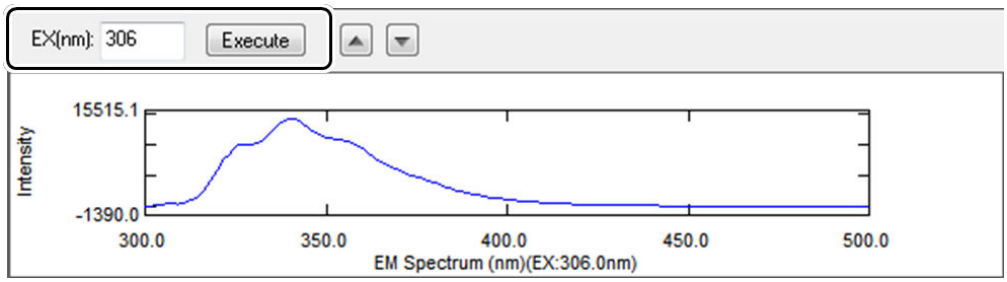


[3D Spectrum - [View]] Window (Example of 3D Spectrum Data Display)

2 Move the cursor to the position for extraction on the fluorescence spectrum on the 3D graph and click to lock the cursor position.

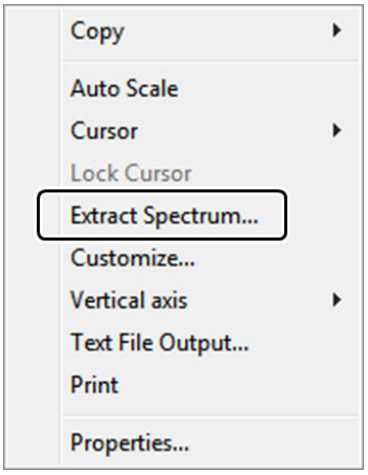
The fluorescence spectrum graph can also be updated by clicking / located above the transverse section graph in the middle section to move the extraction position (the excitation wavelength in this example) by the amount set for the data interval.

Hint To display the fluorescence spectrum for any excitation wavelength, directly enter the wavelength into the [EX] field and click [Execute].



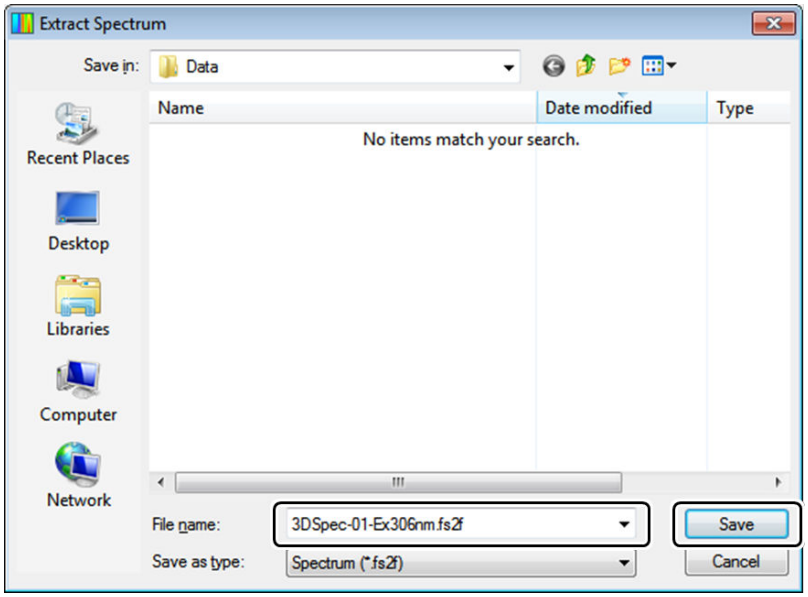
Transverse Section Graph (Fluorescence Spectrum)

3 **Open the right-click menu on the middle section graph area and click [Extract Spectrum].**



Right-Click Menu

4 **Enter a filename for the created spectrum data and click [Save].**



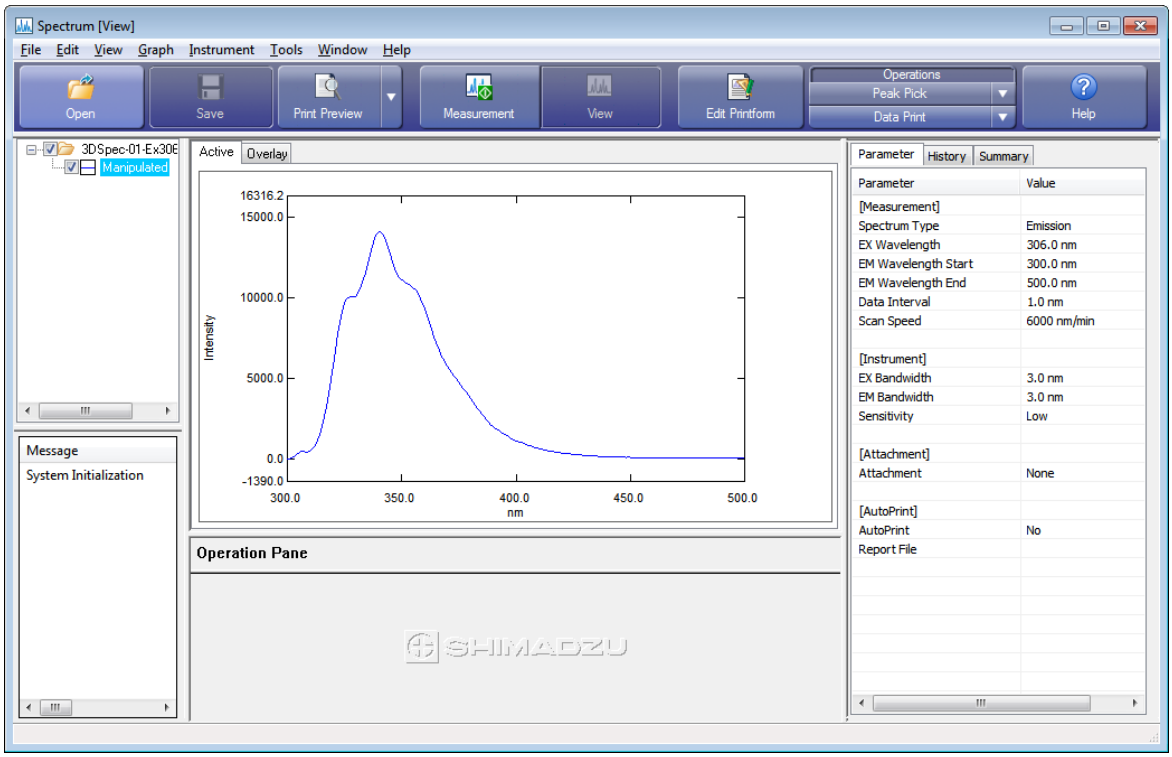
Saving a Spectrum Data File

5 **Start [Spectrum] from the LabSolutions RF launcher.**

6 Open the spectrum data file saved in step 4.

The extracted spectrum data can be loaded into the spectrum general analysis application.

Reference To proceed to data processing, see "9 Data Processing" P.118.



[Spectrum - [View]] Window

6 Quantitation

This chapter explains how to operate the quantitation general analysis application.

Reference For cases and functions not covered in this chapter, refer to the help file provided with LabSolutions RF.

■ Explanations Included in this Chapter

This chapter explains the procedures for performing quantitation measurement with the multi-point calibration curve method using three types of standard samples of varying concentrations and creating and saving calibration curve files and (quantitation) template files.

The following table shows the files that can be created by the quantitation application and the settings and data contained in these files (indicated with a check mark).

NOTE Measurement parameter configuration is explained assuming that a connection is established between an RF-6000 and LabSolutions RF.

File Type	Configuring Measurement Parameters (Including Calibration Curve Parameters)	Data and Information in the Standard Table	Data and Information in the Sample Table
Measurement parameter file	✓	-	-
Calibration curve file	✓	✓	-
Quantitation file	✓	✓	✓
Template file	✓	✓ (excluding measurement data*1)	✓ (excluding measurement data*1)

*1 This refers to information and values that can be directly entered into tables, such as sample information (sample name and ID) and standard sample concentration.

■ Functions Used in this Chapter

The following functions are used in quantitation.

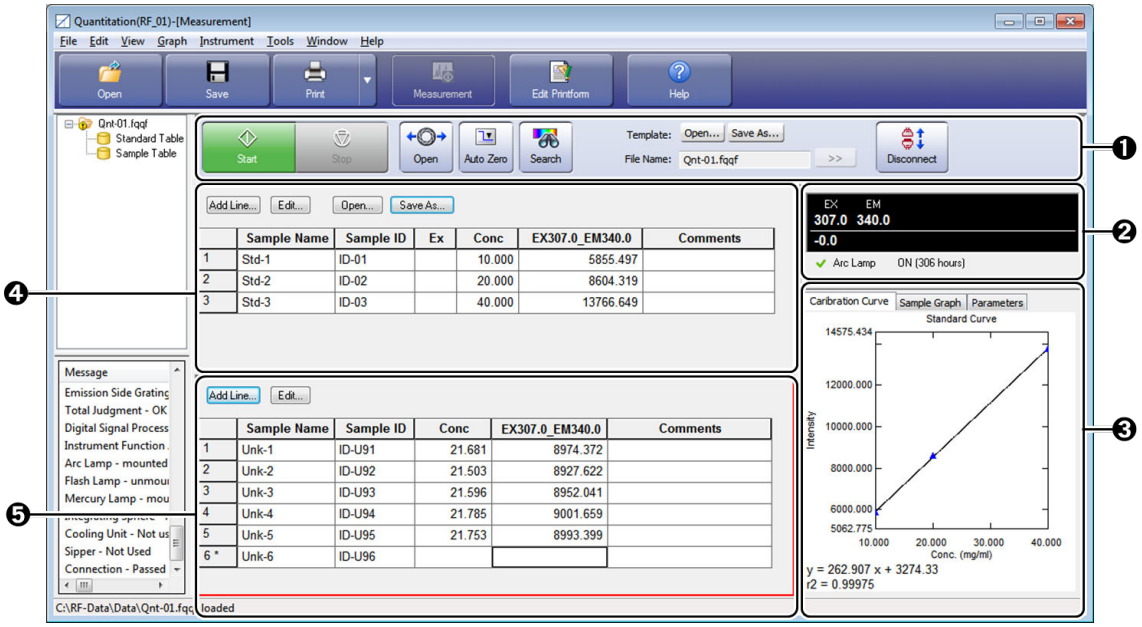
- Configuring measurement parameters
- Creating standard tables
- Creating and saving calibration curve files (multi-point calibration curve method)
- Quantitation measurement
- Creating, saving, and loading template files

The operation explanation uses a sample that emits fluorescent light at around 340 nm for an applied excitation light of 307 nm as an example.

6.1 Startup

Click [Quantitation] on the [Fluorescence] tab in the LabSolutions RF launcher to start the quantitation general analysis application that allows quantitation using the calibration curve method.

6.1.1 [Quantitation - [Measurement]] Window Layout



[Quantitation - [Measurement]] Window

NOTE The quantitation application has only the measurement mode.

No.	Name	Function
❶	Quantitation measurement toolbar	The buttons used for starting and stopping measurement and performing instrument control are located on this toolbar. Buttons such as [Start] become active after clicking [Connect] and establishing a connection with the instrument.
❷	Instrument status	The upper section displays the current wavelength and fluorescence intensity and the lower section displays the status of the spectrofluorophotometer. Reference For details on the instrument status, see "2.3.3 Instrument Status" P.23.
❸	Graph/Parameter view	Displays information including the settings of the currently configured measurement parameters and information and graph of the calibration curve. Clicking [Settings] on the [Parameters] tab displays the window for creating (configuring) the quantitation measurement parameters. When loading an existing measurement parameter file, click [Load].

No.	Name	Function
❹	Standard table	Displays information on the standard sample (such as sample information, concentration, and fluorescence intensity) used to create calibration curves.
❺	Sample table	Displays information on unknown samples (such as sample information and fluorescence intensity) and quantitation results (concentration).

6.2 Creating and Saving Calibration Curve Files

6.2.1 Configuring Measurement Parameters

Set parameters related to measurement, such as measurement wavelength and instrument conditions, and the calibration curve information used in quantitation.

> **NOTE** When connecting to the instrument in the quantitation general analysis application, measurement parameters must be configured in advance.

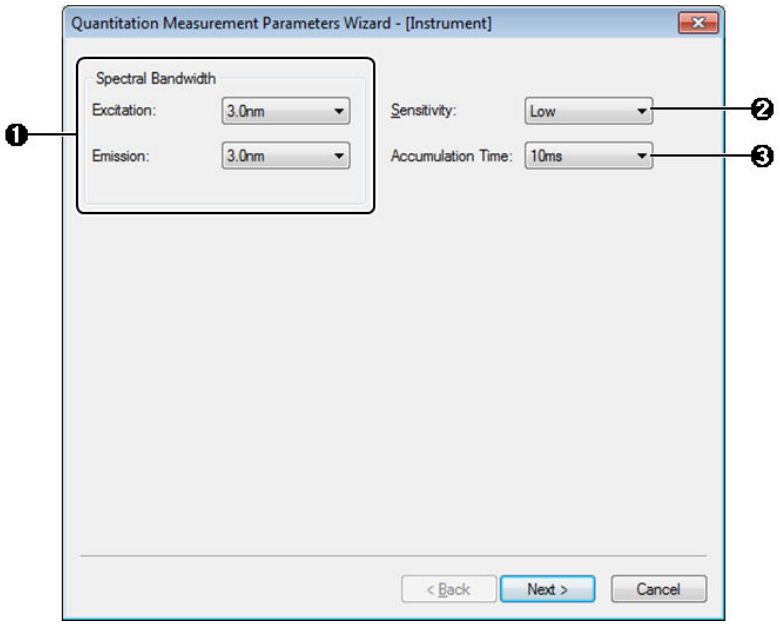
1 **Click [Settings] on the [Parameters] tab in the graph/parameter view.**

The [Quantitation Measurement Parameters Wizard] window is displayed.

> **Hint** If measurement parameter configuration is already complete, the [Quantitation Measurement Parameters Wizard] window is displayed.

2 **Set the [Instrument], [Wavelength], [Calibration], [Measurement (Standard)], and [Measurement(Sample)] according to the wizard and click [Finish] when finished.**

- [Instrument]

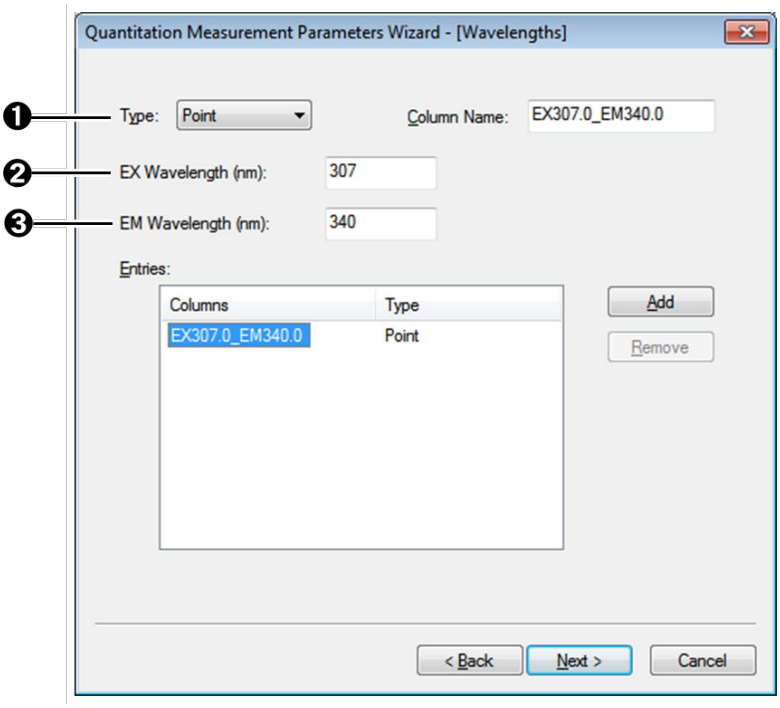


[Quantitation Measurement Parameters Wizard - [Instrument]] Window

No.	Instrument Condition (Parameter)	Setting
❶	[Spectral Bandwidth]	• [Excitation]: 3.0 nm • [Emission]: 3.0 nm
❷	[Sensitivity]	Low

No.	Instrument Condition (Parameter)	Setting
❸	[Accumulation Time]	10 ms

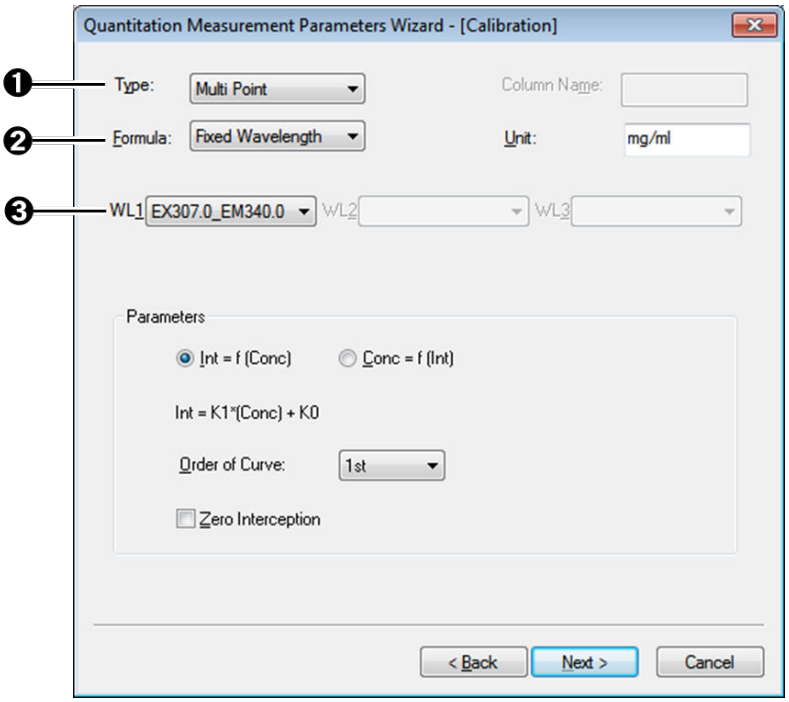
• [Wavelengths]
Click [Add] after setting the following parameters to register the wavelength and automatically create a (modifiable) column name.



[Quantitation Measurement Parameters Wizard - [Wavelengths]] Window

No.	Wavelength Condition (Parameter)	Setting
❶	[Type]	Point
❷	[EX Wavelength (nm)]	307
❸	[EM Wavelength (nm)]	340

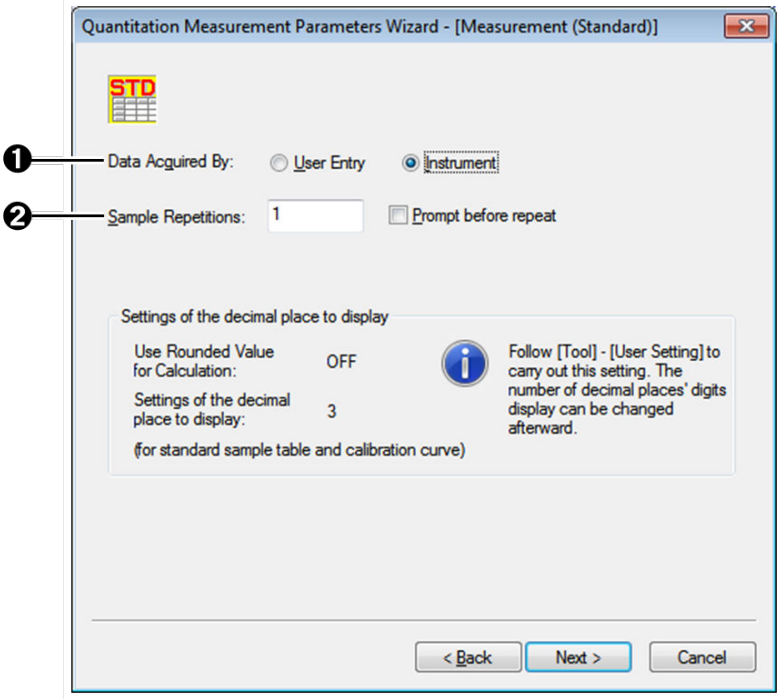
• [Calibration]



[Quantitation Measurement Parameters Wizard - [Calibration]] Window

No.	Calibration Curve Condition (Parameter)	Setting
❶	[Type]	Multi Point
❷	[Formula]	Fixed Wavelength
❸	[WL1]	(Select the column name of the wavelength registered on the previous screen (wavelengths).)

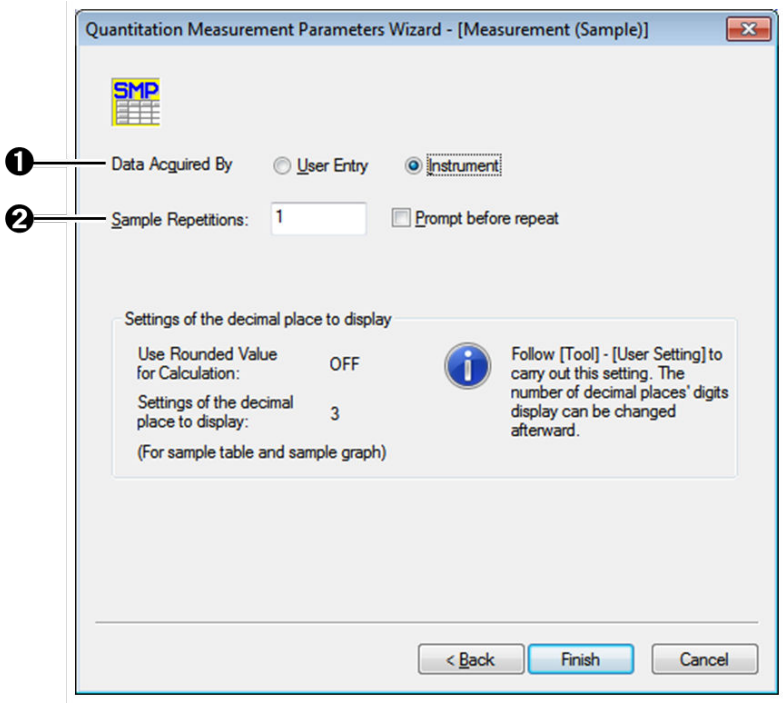
• [Measurement (Standard)]



[Quantitation Measurement Parameters Wizard - [Measurement (Standard)]] Window

No.	Measurement Condition (Parameter)	Setting
❶	[Data Acquired By]	[Instrument]
❷	[Sample Repetitions]	1

• [Measurement (Sample)]

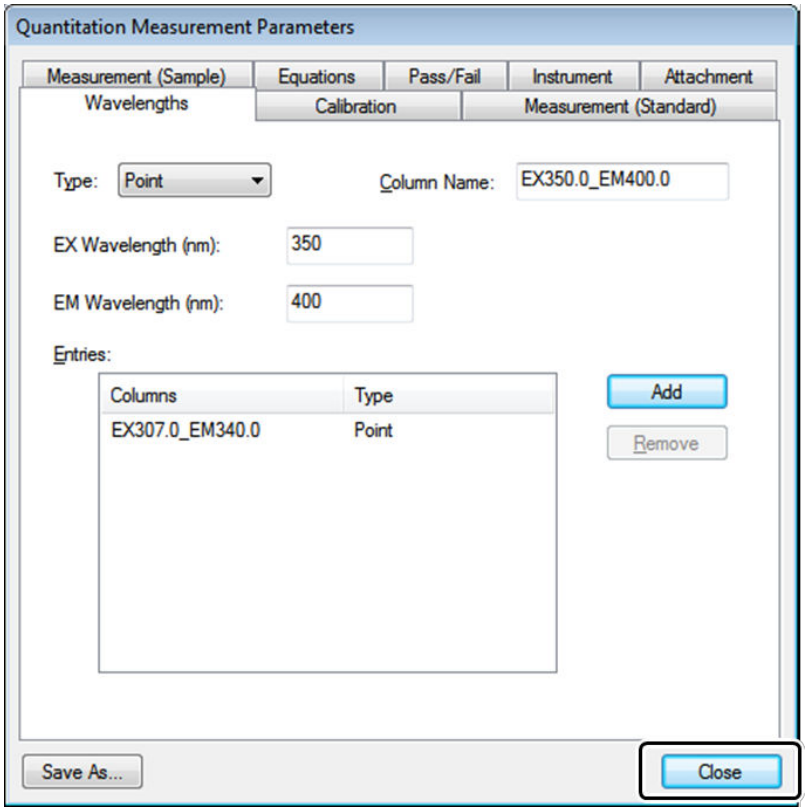


[Quantitation Measurement Parameters Wizard - [Measurement (Sample)]] Window

No.	Measurement Condition (Parameter)	Setting
❶	[Data Acquired By]	[Instrument]
❷	[Sample Repetitions]	1

3 **Click [Close].**

The [Quantitation Measurement Parameters] window closes.

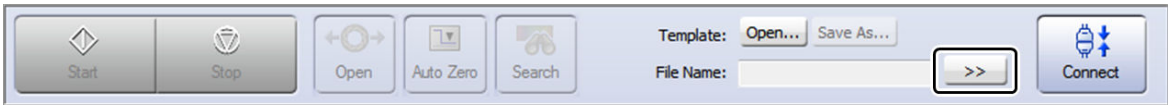


[Quantitation Measurement Parameters] Window

Reference For details on the setting procedure of other parameters (such as for the calculation function and attachments), refer to the help file provided with LabSolutions RF.

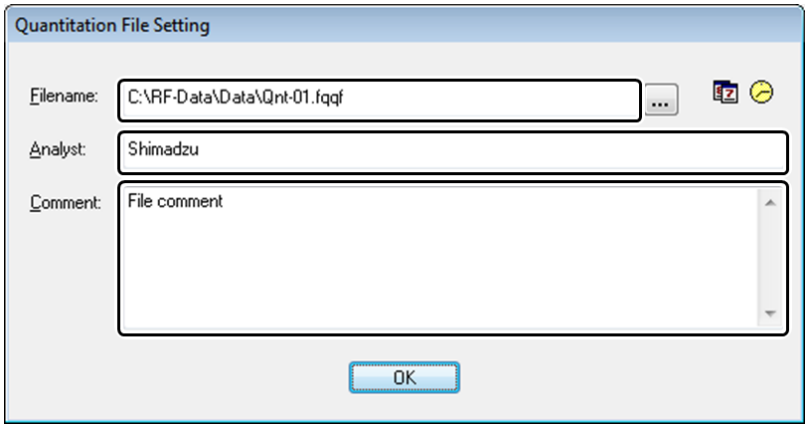
6.2.2 Specifying Filenames

1 **Click [>>] on the quantitation measurement toolbar.**



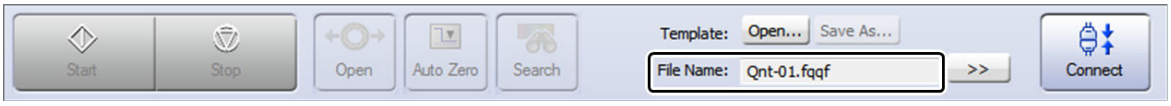
Quantitation Measurement Toolbar

2 **Enter the details for [Filename], [Analyst], and [Comment] and click [OK].**



[Quantitation File Setting] Window

The name of the quantitation file is displayed on the quantitation measurement toolbar.



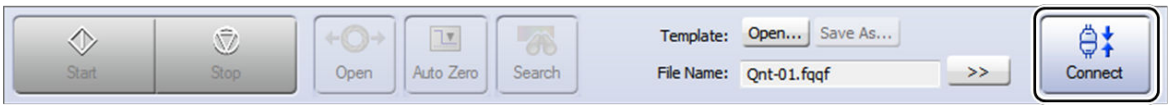
Quantitation Measurement Toolbar

6.2.3 Connecting to the Instrument

In the quantitation general analysis application, a connection with the instrument cannot be established unless the measurement parameters have been configured in advance.

> **NOTE** Closing a quantitation file by clicking [Close] on the [File] menu will clear the configured measurement parameters thereby automatically disconnecting from the instrument.

1 **Click [Connect] on the measurement toolbar.**



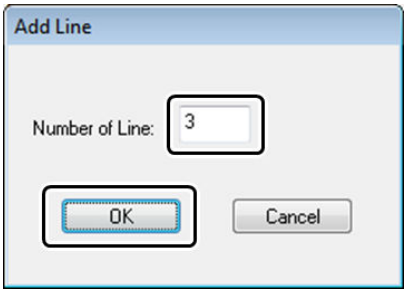
Quantitation Measurement Toolbar

6.2.4 Creating a Standard Table

1 **Click [Add Line] above the standard table.**

[Add Line] Above the Standard Table

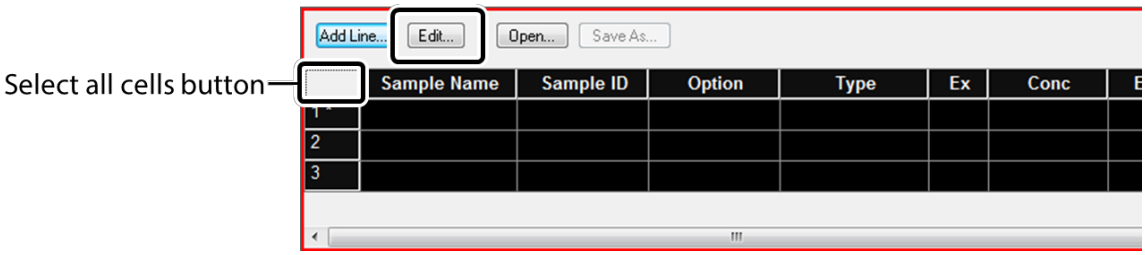
2 **Enter the number of lines to add and click [OK].**



[Add Line] Window

3 Click the select all cells button and then click [Edit].

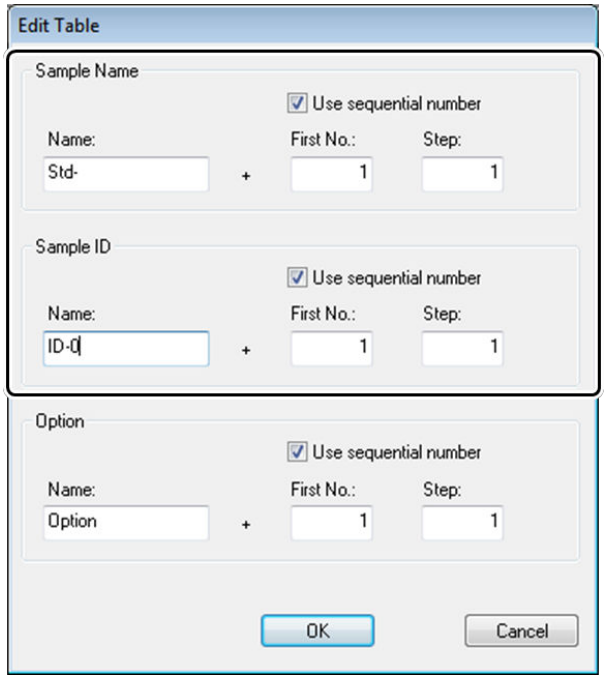
Hint Separate rows can be selected by clicking the corresponding number button on the left edge of the table (multiple rows can be selected in the same manner by holding down the "Shift" key).



Editing the Standard Table

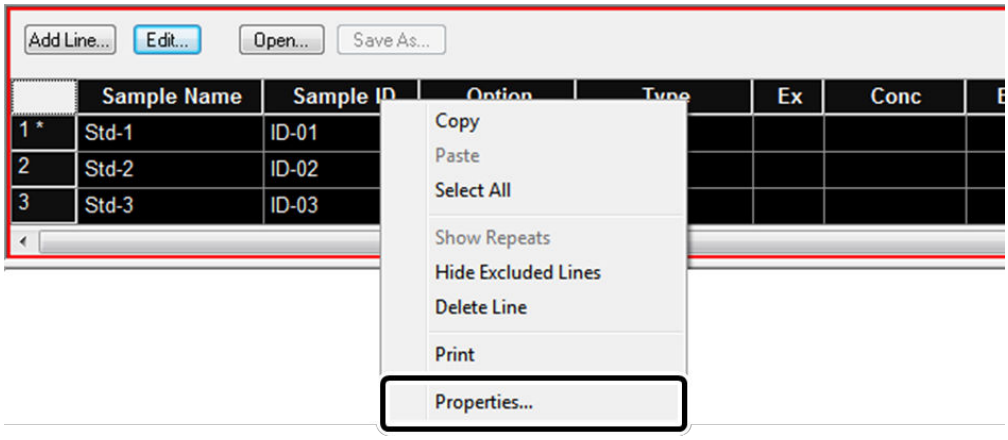
4 Set the sample information in the [Edit Table] window and click [OK].

Hint Sample information (such as sample name and sample ID) can be directly entered into the table or copied and pasted from other application software.



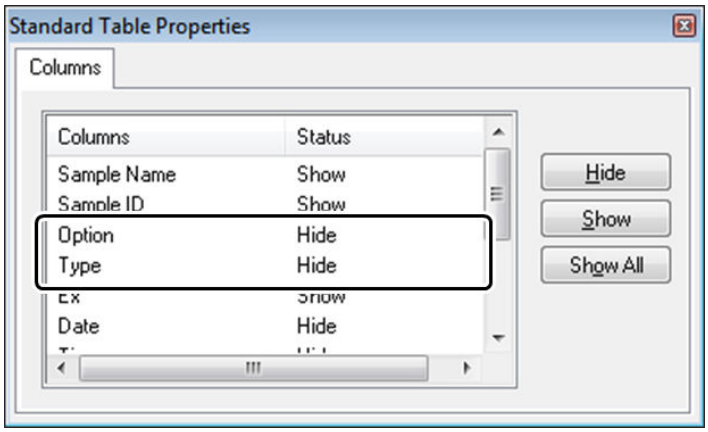
[Edit Table] Window

5 **Open the right-click menu on the standard table and click [Properties].**



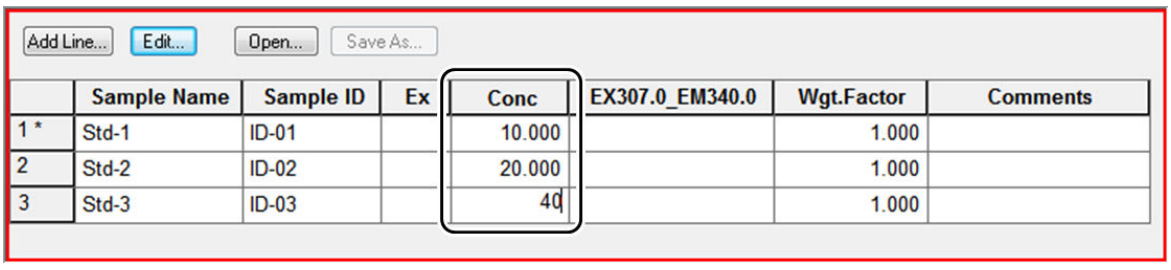
Right-Click Menu of the Standard Table

6 **Hide the columns that are unnecessary in this example ([Option], [Type], [Wgt. Factor]).**



[Standard Table Properties] Window

7 **Enter the concentration of each standard sample into the standard table.**



Entering Concentrations into the Standard Table

6.2.5 Measuring Standard Samples (Creating Calibration Curves) and Saving Calibration Curve Files

1 **Click on the standard table to activate it (the standard table becomes enclosed in a red frame).**

2 **Check that the shutter is closed (Open) and then click [Auto Zero] on the quantitation measurement toolbar.**

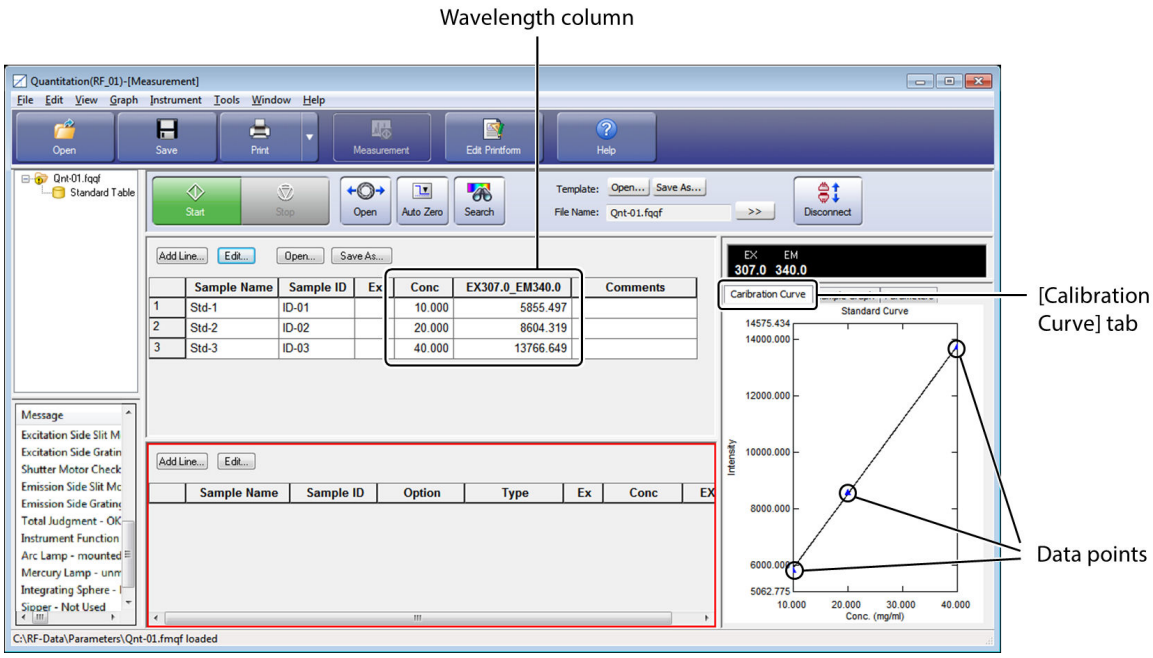
3 **Place a standard sample in the instrument's sample compartment and close the lid.**

4 **Click [Start] on the quantitation measurement toolbar.**

The measurement value is displayed in the wavelength column. Clicking the [Calibration] tab in the graph/parameter view displays the data point plotted on a calibration curve graph.

Hint To display the calibration curve function or the squared correlation coefficient on the [Calibration Curve] tab, select [Calibration Curve Statistics] on the [Graph] menu.

Repeat the same operations with respect to the other prepared standard samples.



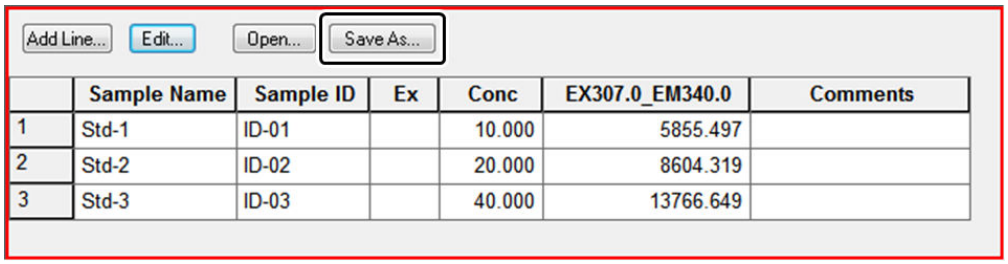
Quantitation Measurement of Standard Samples

5 **Once measurement of all standard samples is complete, click [Save] on the main toolbar.**

Save the quantitation file before creating a calibration curve file.

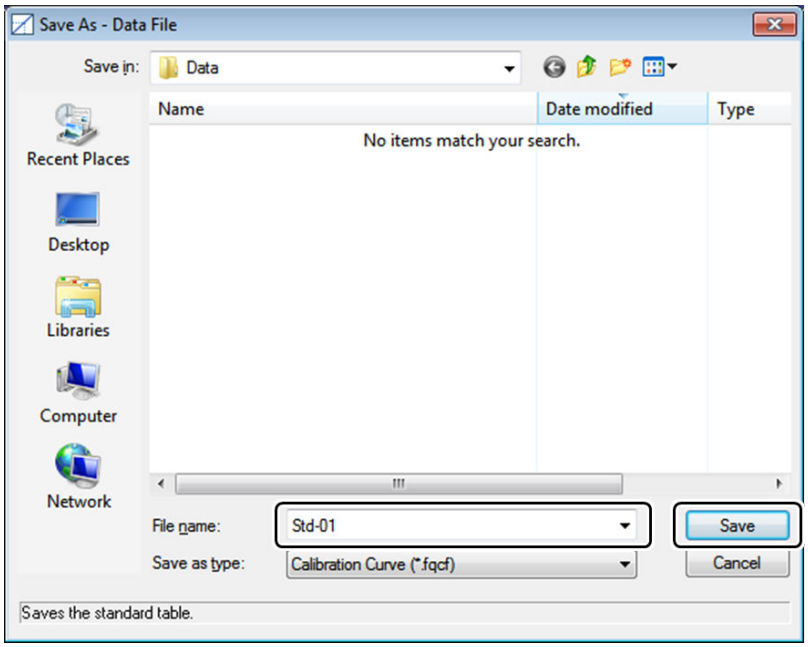
Main Toolbar

6 **Click [Save As] above the standard table.**



Saving a Calibration Curve File

7 **Enter a name for the calibration curve file and click [Save].**



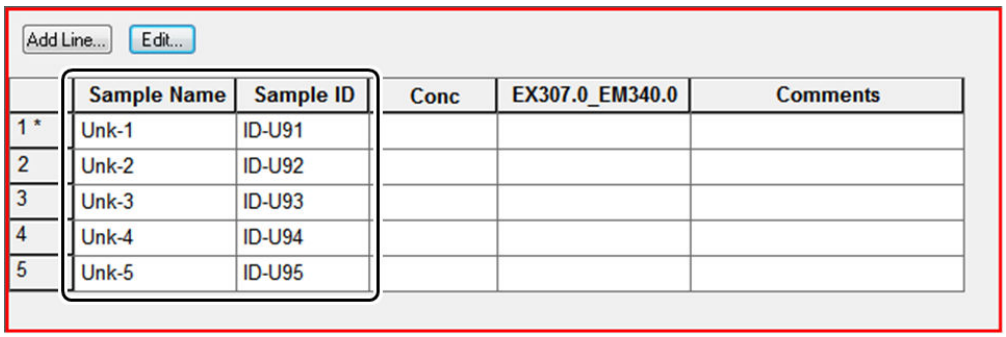
[Save - Data File] Window

6.3 Quantitation

1 **Click on the sample table to activate it (the sample table becomes enclosed in a red frame).**

2 **Use [Add Line] above the sample table to create a number of lines equal to the number of samples for measurement and enter the sample information.**

Reference For details on the procedure for adding rows and editing the table, see "6.2.4 Creating a Standard Table".



[Add Line] Above the Standard Table

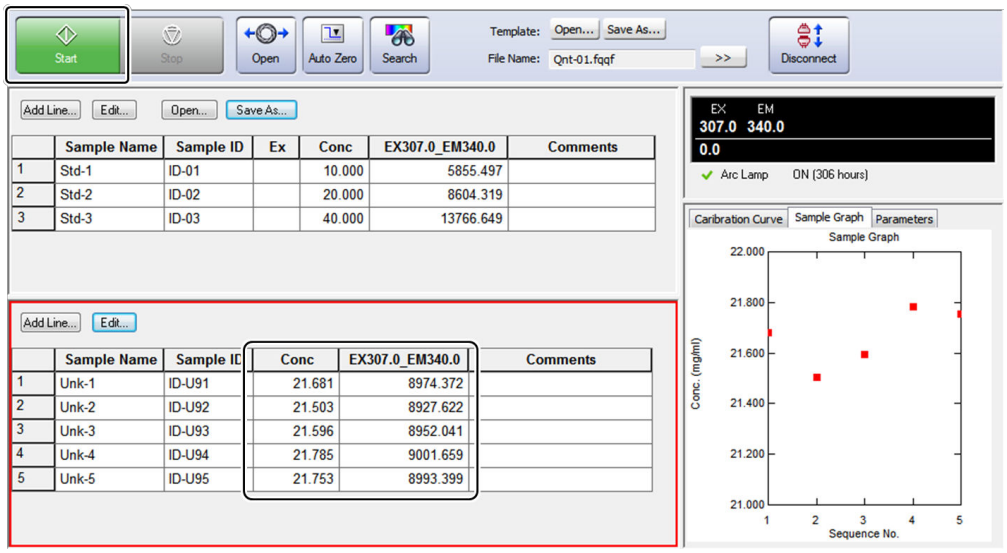
3 **Check that the shutter is closed and then click [Auto Zero] on the quantitation measurement toolbar.**

4 **Place the sample in the instrument's sample compartment and close the lid.**

5 Click [Start] on the quantitation measurement toolbar.

A measurement value is displayed in the wavelength column and the concentration calculated using the calibration curve is displayed in the concentration column. Clicking the [Sample Graph] tab in the graph/parameter view displays the data point plotted on a sample graph.

Repeat the same operations with respect to the other prepared samples.



Quantitation Measurement Results

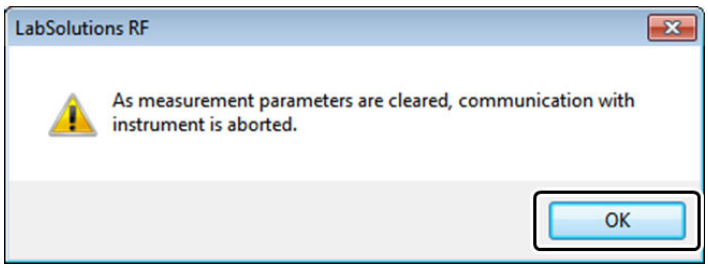
6 Once measurement of all samples is complete, click [Save As] on the main menu bar.

A quantitation file is saved using the filename displayed on the quantitation measurement toolbar.

Quantitation Measurement Toolbar

7 Close the quantitation file by clicking [Close] on the [File] menu.

A message window indicating that communication with the instrument will end. Click [OK].

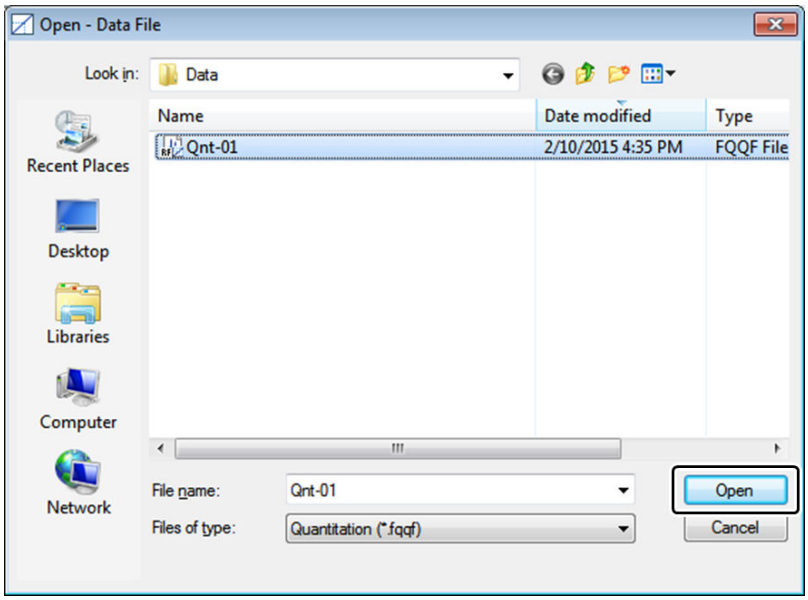


6.4 Saving and Loading Template Files

Quantitation template files are convenient when performing repeated quantitation measurements using the same standard samples because they include measurement parameter information, standard table information, and sample table information (excluding measurement data).
Template files can be created from existing data files. This section explains the procedure for saving and loading template files.

1 Click [Open] on the main toolbar.

Select the source quantitation data file in the [Open Data File] window and click [Open] to open the file.



[Open - Data File] Window (Quantitation)

2 Click [Save As] - [Template] on the [File] menu.

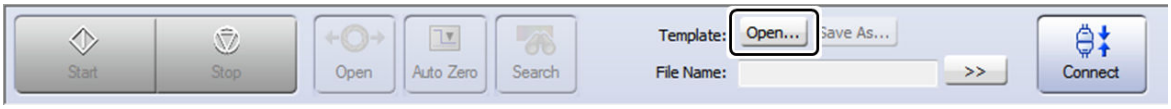
Enter the template filename and click [OK] to save the quantitation data file as a template file.

Hint The folder specified for [Template Folder] in [Destination Folder] on the [Tools] menu is displayed as the default save location.

3 Click [Close] in the [File] menu.

This clears the loaded data, table information, and measurement parameter settings (returns to the startup state).

4 **Click [Open] next to [Template] on the quantitation measurement toolbar.**

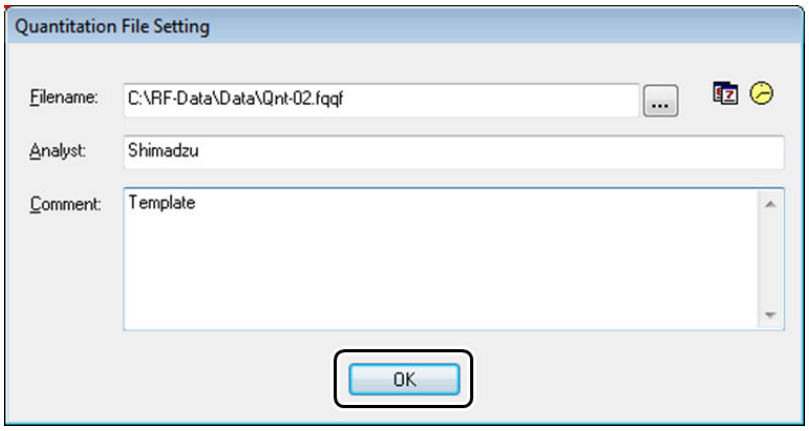


Quantitation Measurement Toolbar

5 **In the [Open - Template File] window, select the template file saved in step 2 and click [OK].**

The [Quantitation File Setting] window is displayed.

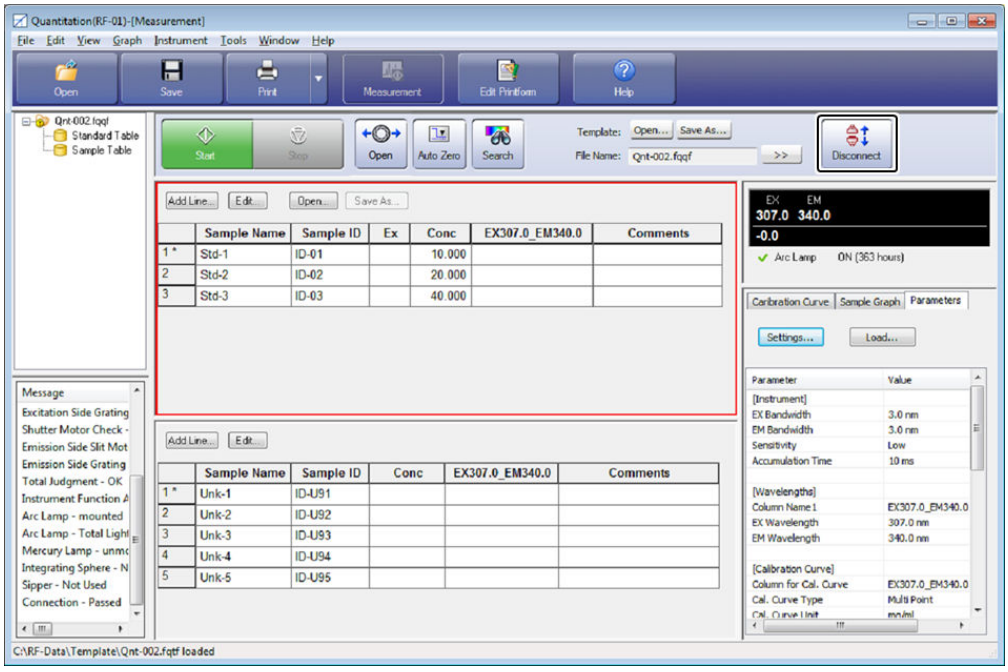
6 **Enter the details for [Filename], [Analyst], and [Comment] and click [OK].**



[Quantitation File Setting] Window

7 **This sets the measurement parameters and loads the standard sample and sample table information.**

Click [Connect] on the quantitation measurement toolbar to establish communication with the instrument and then perform quantitation measurement.



Main Window After Loading a Template File

7 Photometric

This chapter explains how to operate the photometric general analysis application.

Reference For cases and functions not covered in this chapter, refer to the help file provided with LabSolutions RF.

■ Explanations Included in this Chapter

This chapter explains the procedures for measuring using a user-defined calculation function and the pass/fail judgment function as well as saving the results of these functions.

The following table shows the files that can be created by the photometric application and the settings and data contained in these files (indicated with a check mark).

NOTE Measurement parameter configuration is explained assuming that a connection is established between an RF-6000 and LabSolutions RF.

File Type	Measurement Parameter Settings (Including Calculation Formula Parameters)	Data and Information in the Sample Table
Measurement parameter file	✓	-
Photometric file	✓	✓
Template file	✓	✓ (excluding measurement data*1)

*1 This refers to information and values that can be directly entered into tables, such as sample information (sample name and ID) and factors.

■ Functions Used in this Chapter

The following functions are used in photometric measurement.

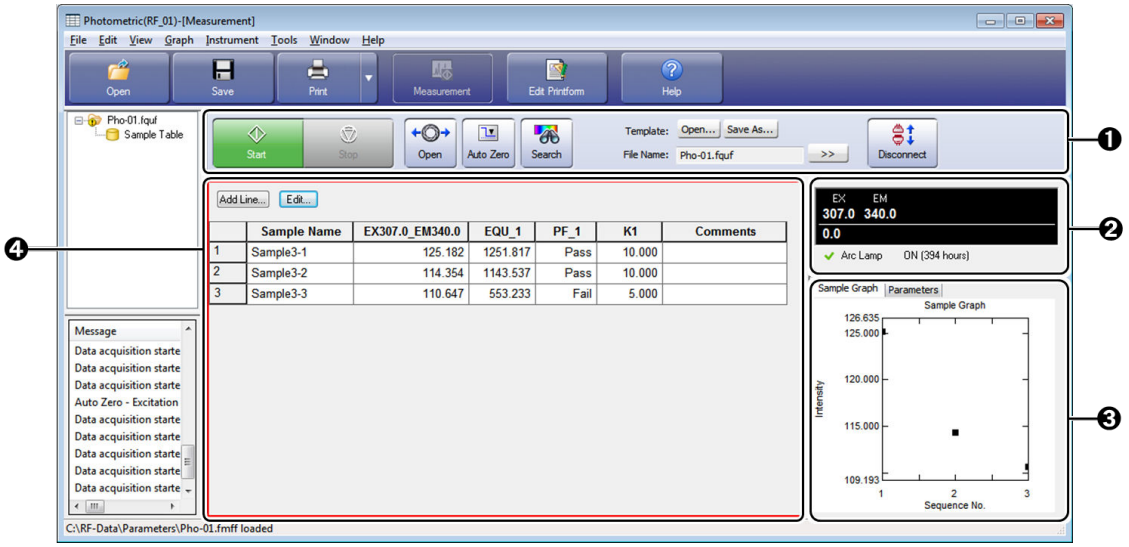
- Creating measurement parameters (including creation of calculation formulas and judgment equations)
- Creating a sample table
- Creating and saving a sample file

The operation explanation uses a sample that emits fluorescent light at around 340 nm for an applied excitation light of 307 nm as an example.

7.1 Startup

Click [Photometric] on the [Fluorescence] tab in the LabSolutions RF launcher to start the photometric general analysis application that allows obtaining of fluorescence intensity at any wavelength, or a calculation result using that fluorescence intensity.

7.1.1 [Photometric - [Measurement]] Window Layout



[Photometric - [Measurement]] Window Layout

NOTE The photometric application only has the measurement mode.

No.	Name	Function
❶	Photometric measurement toolbar	The buttons used for starting and stopping measurement and performing instrument control are located on this toolbar. Buttons such as [Start] become active after clicking [Connect] and establishing a connection with the instrument.
❷	Instrument status	The upper section displays the current wavelength and fluorescence intensity and the lower section displays the status of the spectrofluorophotometer. Reference For details on the instrument status, see "2.3.3 Instrument Status" P.23.
❸	Graph/Parameter view	Displays information including the settings of the currently configured measurement parameters as well as information and a graph of the calibration curve. Clicking [Settings] on the [Parameters] tab displays the window for creating (configuring) the photometric measurement parameters. When loading an existing measurement parameter file, click [Load].
❹	Sample table	Displays sample information and measurement results.

7.2 Configuring Measurement Parameters

Configure measurement parameters as well as calculation and judgment equations that use captured data.

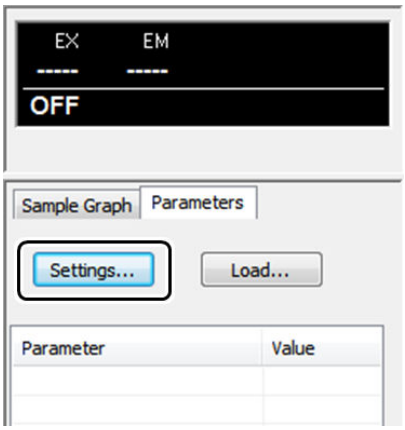
Photometric measurement parameters comprise measurement related parameters of "wavelength", "measurement (sample)", "instrument", and "attachments" as well as user-definable parameters of "calculation formulas" and "pass/fail" judgment. These settings are configured in the graph/parameter view.

7.2.1 Configuring Measurement Parameters (Related to Measurement)

Set the parameters related to measurement, such as measurement wavelength and instrument conditions.

> **NOTE** When connecting to the instrument in the photometric general analysis application, measurement parameters must be configured in advance.

1 **Click [Settings] on the [Parameters] tab in the graph/parameter view.**



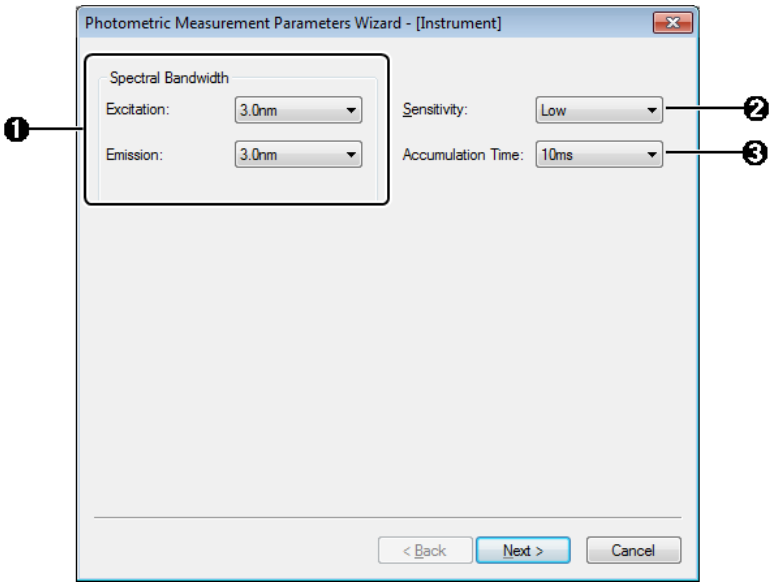
Parameter View

The [Photometric Measurement Parameters Wizard] window is displayed.

> **Hint** If measurement parameter configuration is already complete, the [Photometric Measurement Parameters Wizard] window is displayed.

2 Set the [Instrument], [Wavelength], and [Measurement(Sample)] according to the wizard and click [Finish] when finished.

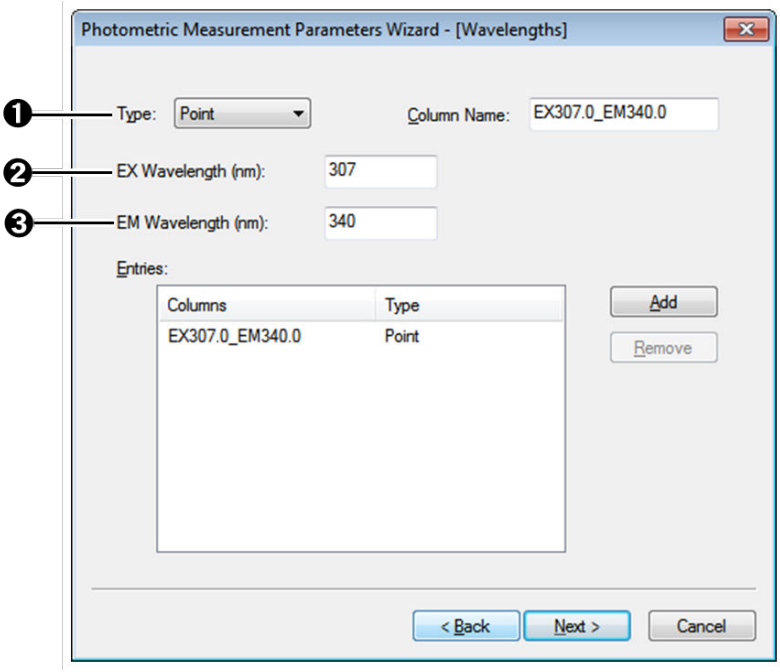
• [Instrument]



[Photometric Measurement Parameters Wizard - [Instrument]] Window

No.	Instrument Condition (Parameter)	Setting
❶	[Spectral Bandwidth]	• [Excitation]: 3.0 nm • [Emission]: 3.0 nm
❷	[Sensitivity]	Low
❸	[Accumulation Time]	10 ms

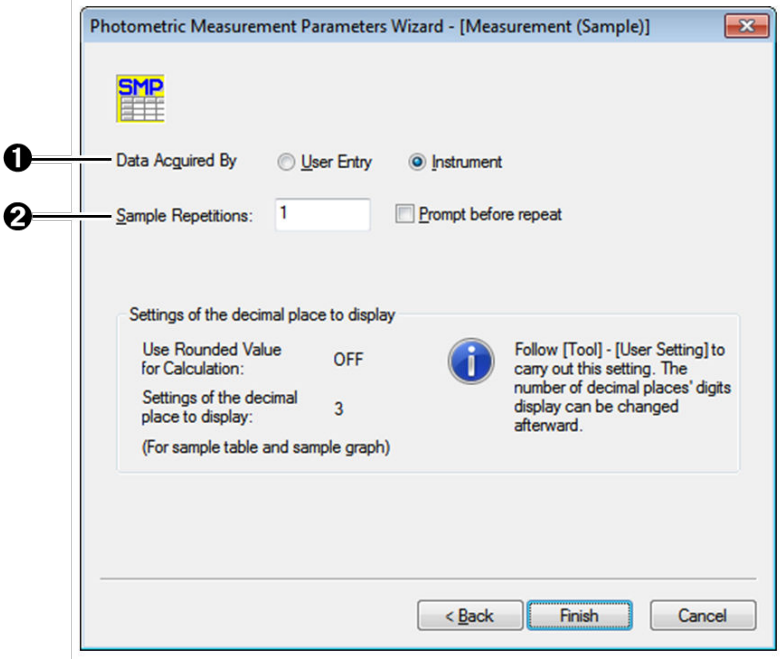
• [Wavelengths]
Click [Add] after setting the following parameters to register the wavelength and automatically create a (modifiable) column name.



[Photometric Measurement Parameters Wizard - [Wavelengths]] Window

No.	Wavelength Condition (Parameter)	Setting
❶	[Type]	Point
❷	[EX Wavelength (nm)]	307
❸	[EM Wavelength (nm)]	340

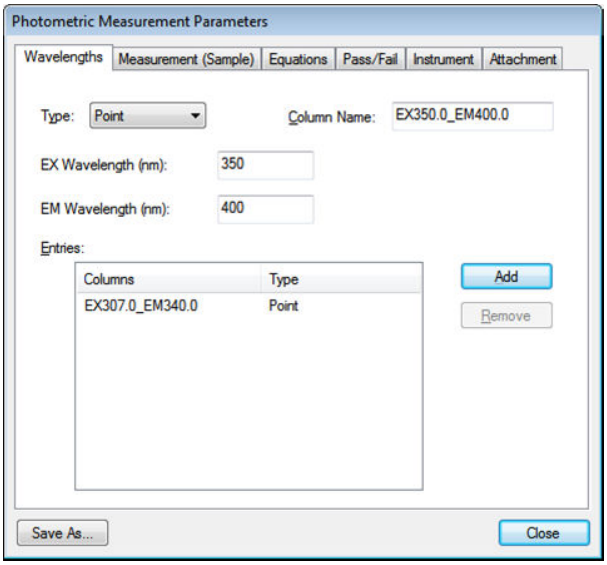
• [Measurement (Sample)]



[Photometric Measurement Parameters Wizard - [Measurement (Sample)]] Window

No.	Measurement Condition (Parameter)	Setting
❶	[Data Acquired By]	Instrument
❷	[Sample Repetitions]	1

The [Photometric Measurement Parameters] window is displayed.



[Photometric Measurement Parameters] Window

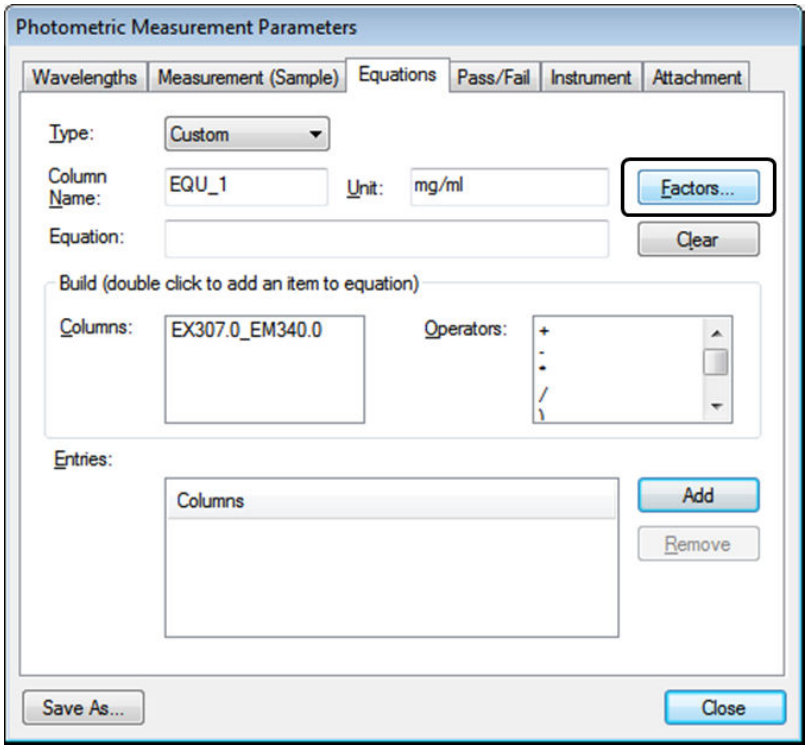
Reference For details on the setting procedure of other parameters (such as for attachments), refer to the help file provided with LabSolutions RF.

7.2.2 Measurement Parameter Settings (Calculation Forumulas / Judgment Equations)

Register a calculation formula / judgment equation in order to display calculation results and judgment results, which use captured measurement values, in the sample table.
This section explains the procedure for displaying measurement results in the sample table together with a pass or fail, which is determined by multiplying a measurement value by the factor K1, where a result of 1000 or more is considered a pass and less than 1000 is a fail.

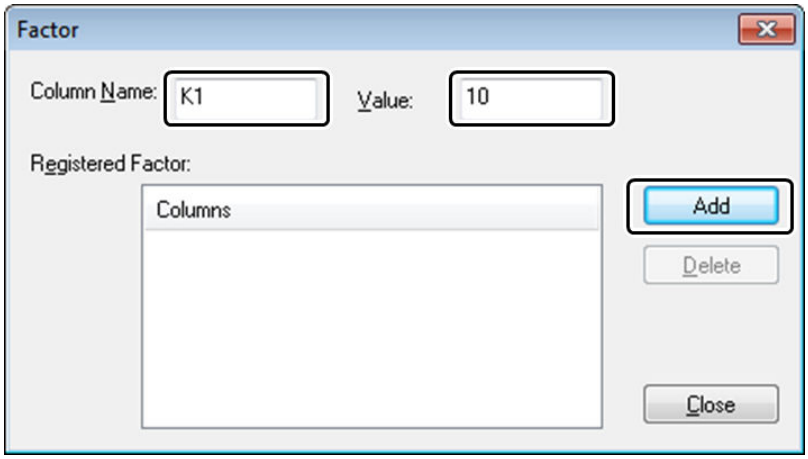
■ Registering a Calculation Formula

1 **Click [Factors] on the [Equations] tab in the [Photometric Measurement Parameters] window.**



[Photometric Measurement Parameters] Window

2 **Enter "K1" for [Column Name] and "10" for [Value] and click [Add].**

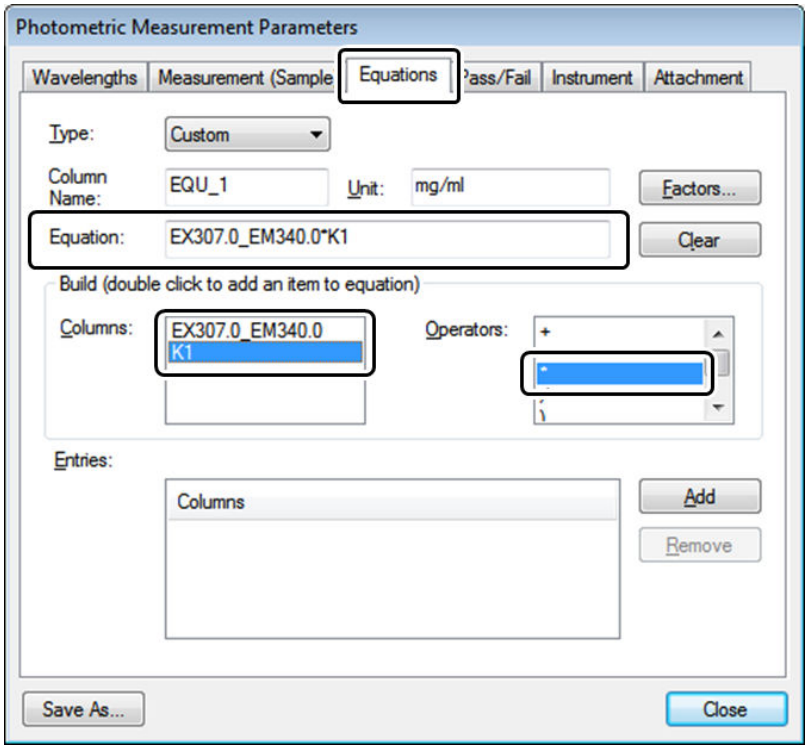


[Factor] Window

3 **Check that "K1" is added to the [Registered Factor] list and then click [Close].**

4 Set the calculation formula.

Do not change the value of [Column Name] ("EQU_1") from its default setting. This item is explained later in this section.



Setting the Calculation Formula

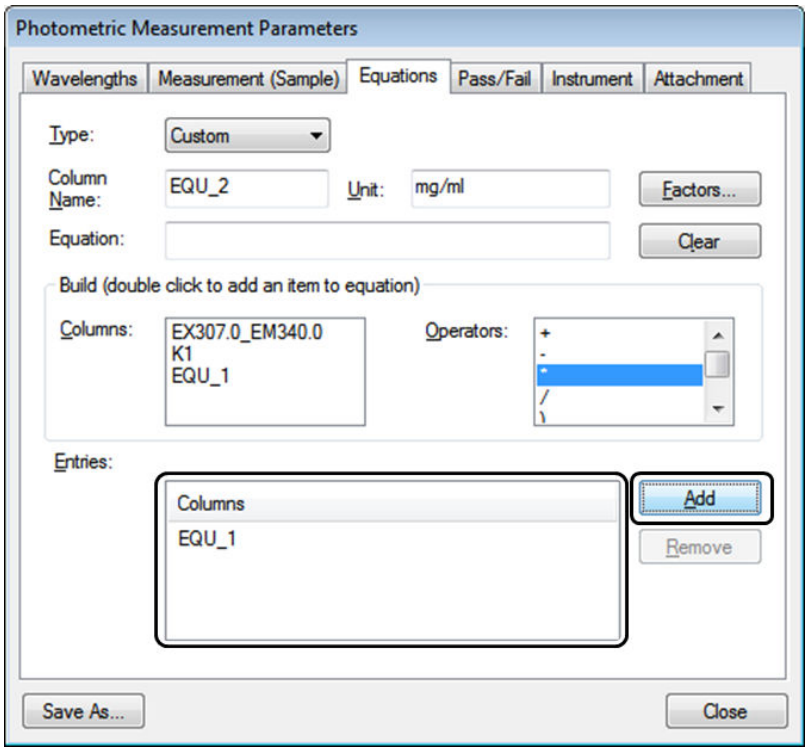
1 Double-click [EX307.0_EM340.0] in the [Columns] list of the [Build] area.

2 Double-click [*] in the [Operators] list of the [Build] area.

3 Double-click [K1] in the [Columns] list of the [Build] area.
The set calculation formula is displayed in the [Equation] field.

5 **Click [Add].**

The created calculation formula is registered with the column name of "EQU_1".



Registering a Calculation Formula

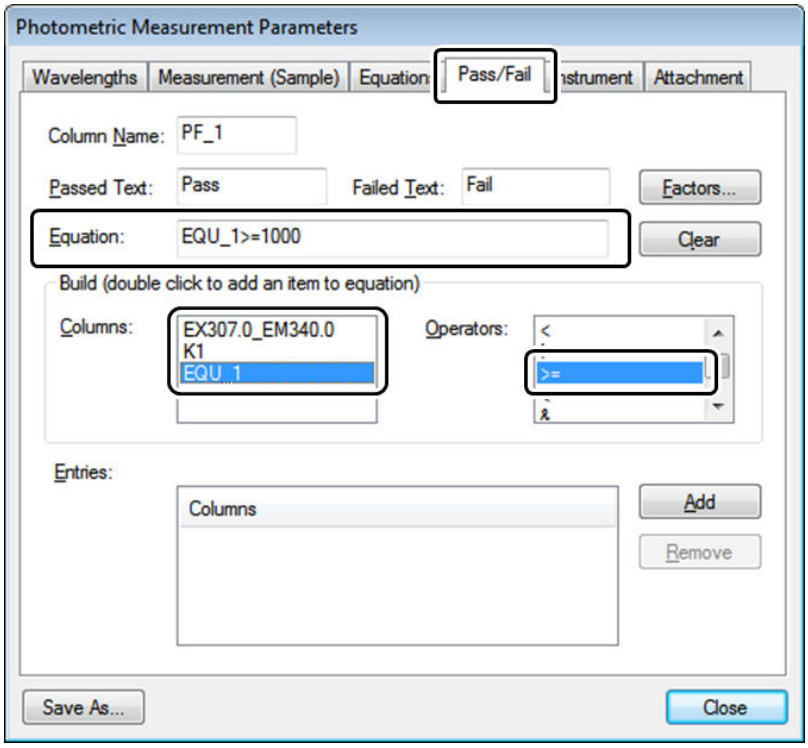
■ Registering a Judgment Equation

1 **Click the [Pass/Fail] tab in the [Photometric Measurement Parameters] window.**

2 **Set the judgment equation.**

Do not change values of [Column Name] ("PF_1"), [Passed Text], or [Failed Text] from their default settings. These items are explained later in this section.

Hint [Passed Text] and [Failed Text] are used as the judgment result in the judgment result column of the sample table.



Setting a Judgment Equation

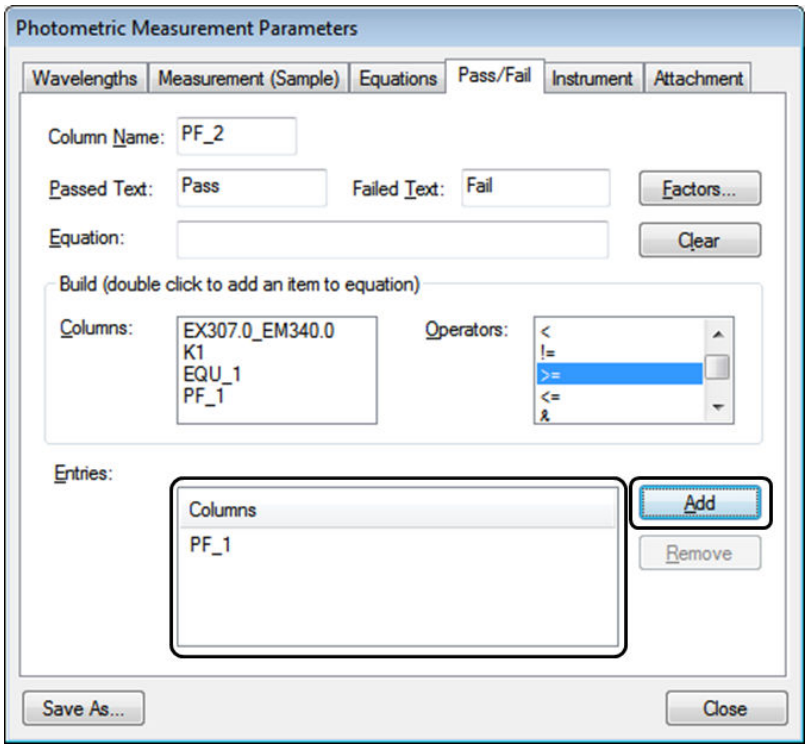
1 Double-click [EQU_1] in the [Columns] list of the [Build] area.

2 Double-click [>=] in the [Operators] list of the [Build] area.

3 Enter "1000" to the end of the string in the [Equation] field.
The set judgment equation is displayed in the [Equation] field.

3 **Click [Add].**

The created judgment equation is registered with the column name of "PF_1".



Registering a Judgment Equation

4 **Click [Close].**

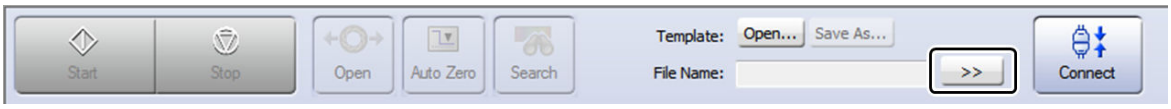
This closes the [Photometric Measurement Parameters] window.

The "EQU_1" column and "K1" column registered on the [Equations] tab and the "PF_1" column registered on the [Pass/Fail] tab are added to the sample table.

7.3 Photometric Measurement

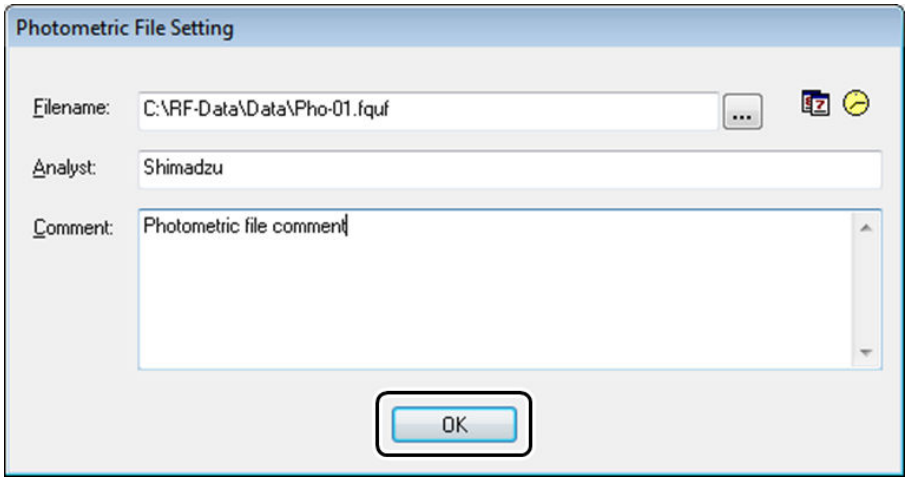
7.3.1 Specifying Filenames

1 **Click [>>] on the photometric measurement toolbar.**



Photometric Measurement Toolbar

2 **Enter the details for [Filename], [Analyst], and [Comment] and click [OK].**
The filename is displayed for [Photometric File] on the photometric measurement toolbar.

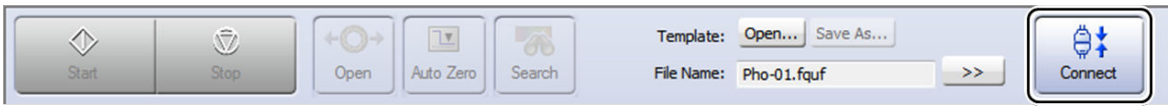


[Photometric File Setting] Window

7.3.2 Connecting to the Instrument

In the photometric general analysis application, a connection with the instrument cannot be established unless the measurement parameters have been configured in advance.

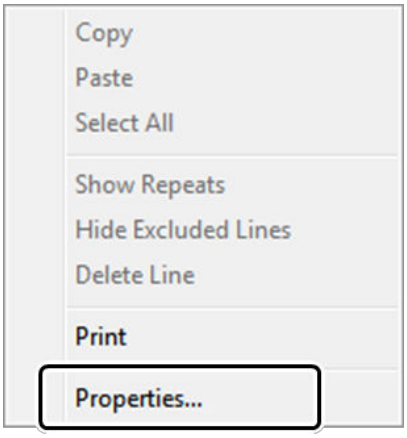
> **NOTE** Closing a photometric file by clicking [Close] on the [File] menu will clear the configured measurement parameters thereby automatically disconnecting from the instrument.



Photometric Measurement Toolbar

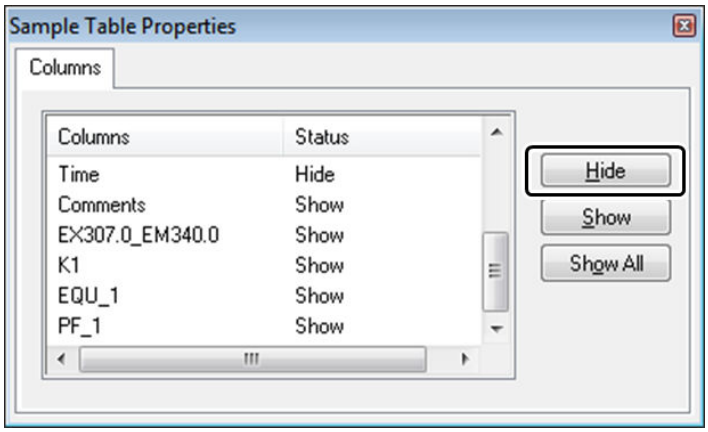
7.3.3 Creating a Sample Table

1 **Open the right-click menu on the sample table and click [Properties].**



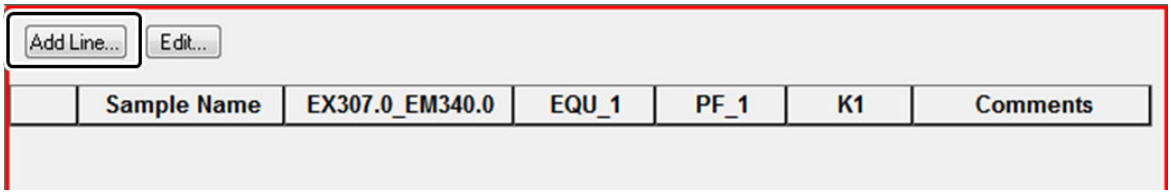
Right-Click Menu of the Sample Table

2 **Hide the columns that are unnecessary in this example (those other than [Sample Name], [Comment], [EQU_1], [K1], and [PF_1]).**



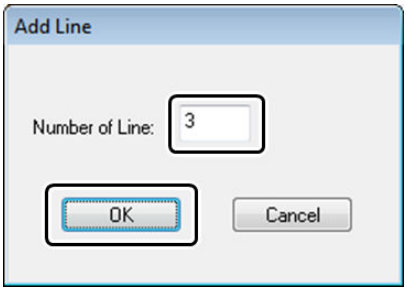
[Sample Table Properties] Window

3 **Click [Add Line] above the sample table.**



[Add Line] Above the Sample Table

4 Enter the number of lines to add and click [OK].

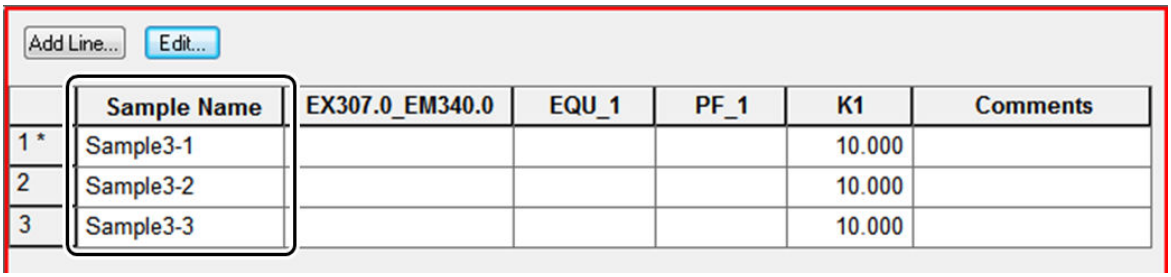


[Add Line] Window

5 Enter the name of the sample to measure.

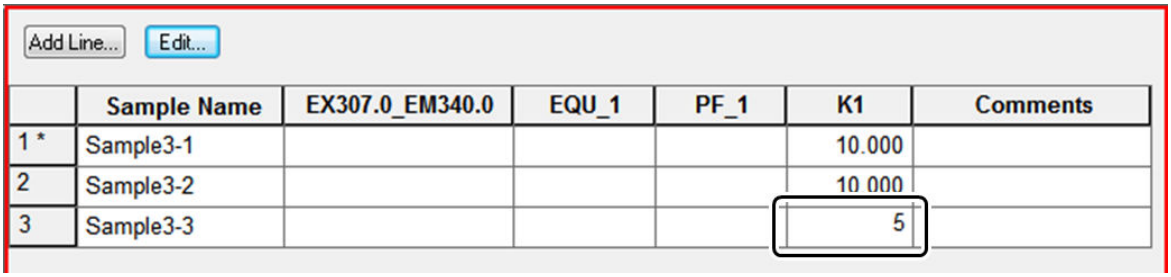
Hint All sample information can also be edited at once using the edit function or copied and pasted from other application software.

Reference For details on the procedure for adding rows or editing tables, see "6.2.4 Creating a Standard Table" or refer to the help file provided with LabSolutions RF.



Entering Sample Names

6 Change the factor under [K1] of "Sample3-3" to "5".



Changing Factors

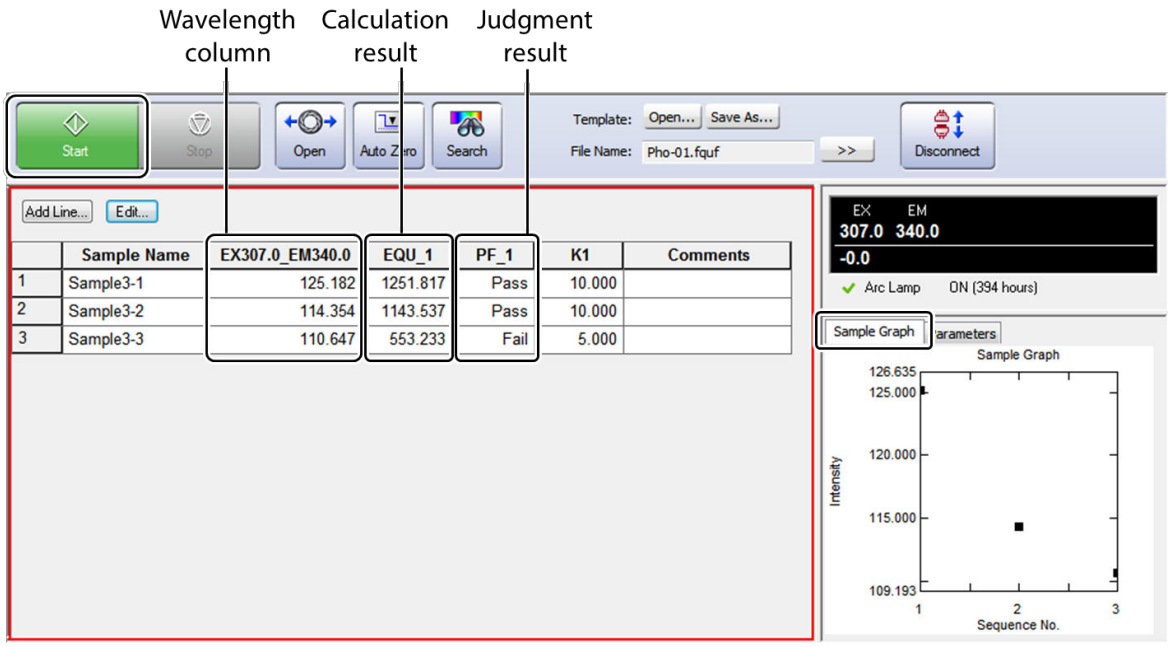
7.3.4 Measuring Samples and Saving Photometric Files

1 **Check that the shutter is closed (Open) and then click [Auto Zero] on the photometric measurement toolbar.**

2 **Place the sample in the instrument's sample compartment and close the lid.**

3 **Click [Start] on the photometric measurement toolbar.**

Measurement values in the wavelength column, calculation results in the [EQU_1] column, and judgment results in the [PF_1] column are displayed. Clicking the [Sample Graph] tab in the graph/parameter view displays the data point plotted on a sample graph.
Repeat the same operations with respect to the other prepared samples.



Sample Measurement Results

4 **Once measurement of all samples is complete, click [Save As] on the main menu bar.**

A photometric file is saved using the filename displayed on the photometric measurement toolbar.

Photometric Measurement Toolbar

8 Time Course

This chapter explains how to operate the time course general analysis application.

Reference For cases and functions not covered in this chapter, refer to the help file provided with LabSolutions RF.

■ Explanations Included in this Chapter

This chapter explains the procedures for measuring time-course intensities, automatically printing results upon completion, and calculating activity values when using samples with intensities that change over time.

NOTE Measurement parameter configuration is explained assuming that a connection is established between an RF-6000 and LabSolutions RF.

■ Functions Used in this Chapter

The following functions are used in time course measurement mode and view mode.

- Configuring measurement parameters (including auto print function settings)
- Auto file function (setting filenames automatically)
- Time course measurement
- Calculating activity values using the main table

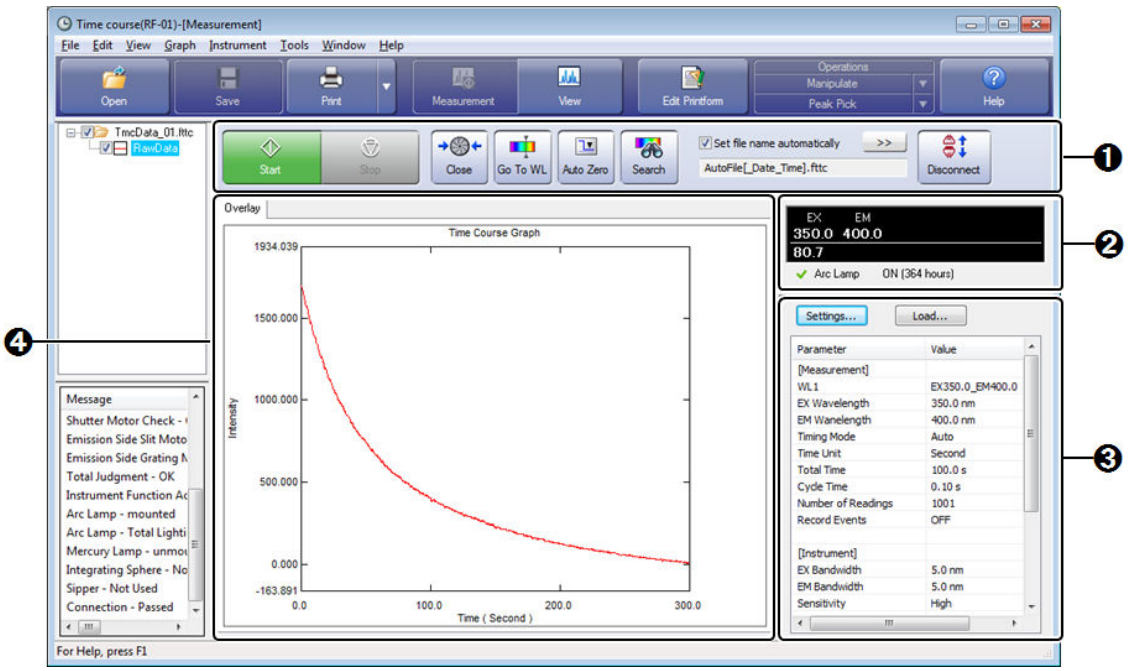
The operation explanation uses a sample that emits fluorescent light at around 340 nm for an applied excitation light of 200 nm as an example.

8.1 Startup

Click [Time course] on the [Fluorescence] tab in the LabSolutions RF launcher to start the time course general analysis application that allows measurement of changes in intensity over time.
The [Time course] window features a "measurement mode", "view mode", and "edit print form mode" and the mode can be changed by clicking the relevant button on the main toolbar.

Reference For details and operation method of the "edit print form mode" window, see "10 Printing" P.135.

8.1.1 [Time course - [Measurement]] Window Layout



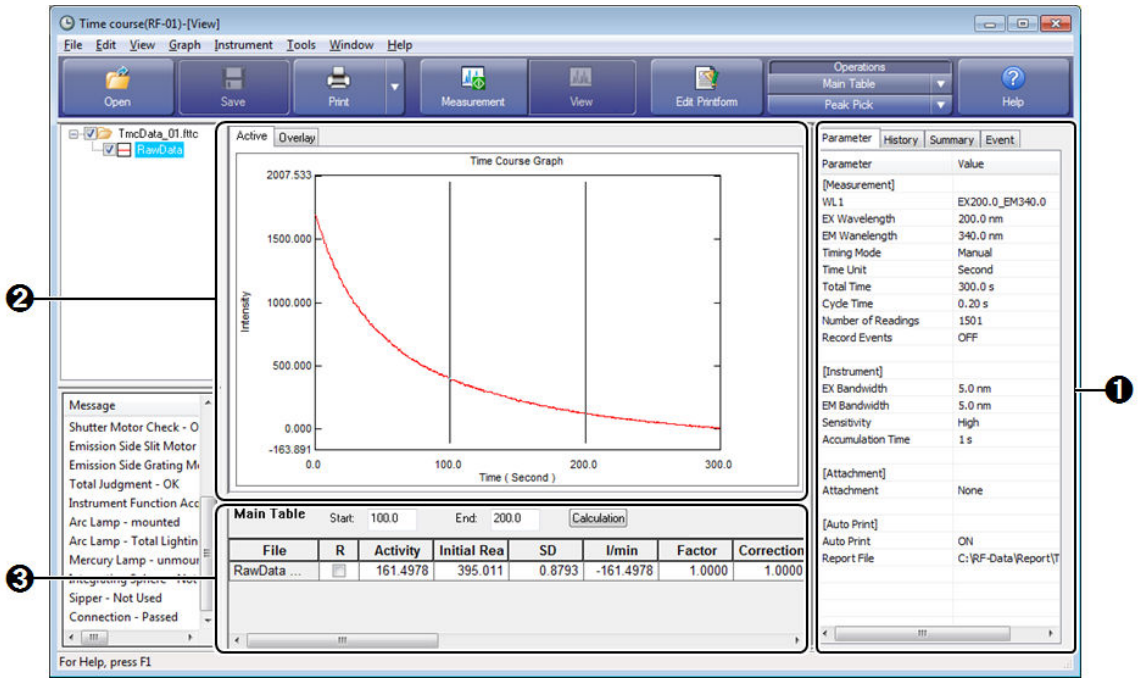
[Time course - [Measurement]] Window

The measurement mode is used when controlling an instrument to perform measurement.

No.	Name	Function
❶	Time course measurement toolbar	The buttons used for starting and stopping measurement and performing instrument control are located on this toolbar. Buttons such as [Start] become active after clicking [Connect] and establishing a connection with the instrument.
❷	Instrument status	The upper section displays the current wavelength and fluorescence intensity and the lower section displays the status of the spectrofluorophotometer. Reference For details on the instrument status, see "2.3.3 Instrument Status" P.23.

No.	Name	Function
❸	Parameter view	Displays the settings of the currently configured measurement parameters (settings such as parameters related to measurement and whether to perform automatic printing). This view is used to configure, save, and load measurement parameters.
❹	Time course graph view	Displays a time course graph in real time during measurement. Only [Overlay] is available as the graph display method. **Hint** Displaying and hiding of the time course graph is performed in the tree view. Reference For details on the operating procedure, see "1.2.1 Tree View Operations" P.13.

8.1.2 Time course - [View] Window Layout



[Time Course - [View]] Window

The view mode is used to perform operations including data processing with respect to captured or saved data.

No.	Name	Function
❶	Parameter view	Displays measurement parameter information, data history, summary information (such as sample information and instrument information), and event records of the active data.
❷	Time course graph view	Displays a time course graph of the loaded data. [Active] and [Overlay] are available as graph display methods. **Hint** Displaying and hiding of the time course graph is performed in the tree view. **Reference** For details on the operating procedure, see "1.2.1 Tree View Operations" P.13.
❸	Data processing view	Displays the parameter setting window for the main table, data printing, and data calculation. **Reference** For details on data processing, see "9 Data Processing" P.118.

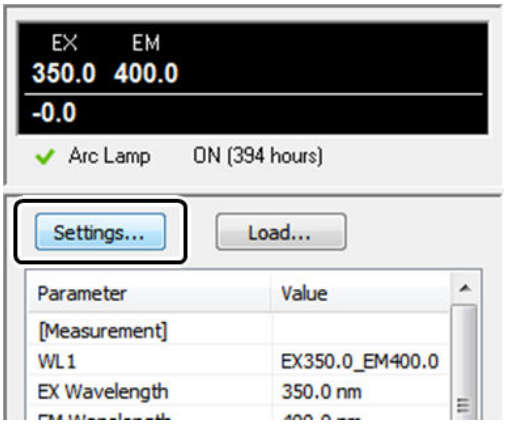
8.2 Configuring and Saving Measurement Parameters

Create (configure) measurement parameters for measuring changes in fluorescence intensity over time and save them to a file.
Measurement parameters can be set by loading a saved measurement parameter file.
Time course measurement parameters comprise "wavelength (parameters)", "measurement (parameters)", "instrument (parameters)", and "attachments" and are configured in the parameter view.

8.2.1 Configuring Measurement Parameters

Reference For details on each measurement parameter item, refer to the help file provided with LabSolutions RF.

1 **Click [Settings] in the parameter view.**



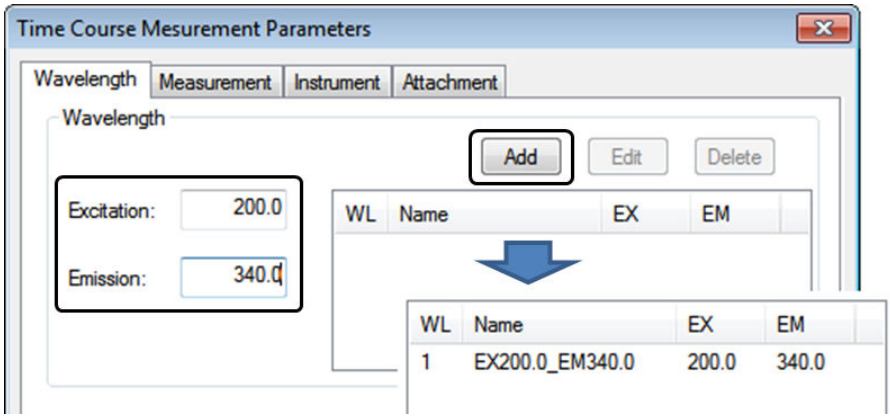
parameter view - [Settings]

The [Time Course Measurement Method] window is displayed.

2 Set the wavelength conditions (parameters) on the [Wavelength] tab and click [Add].

The measurement wavelength is registered and a (modifiable) name is automatically generated.

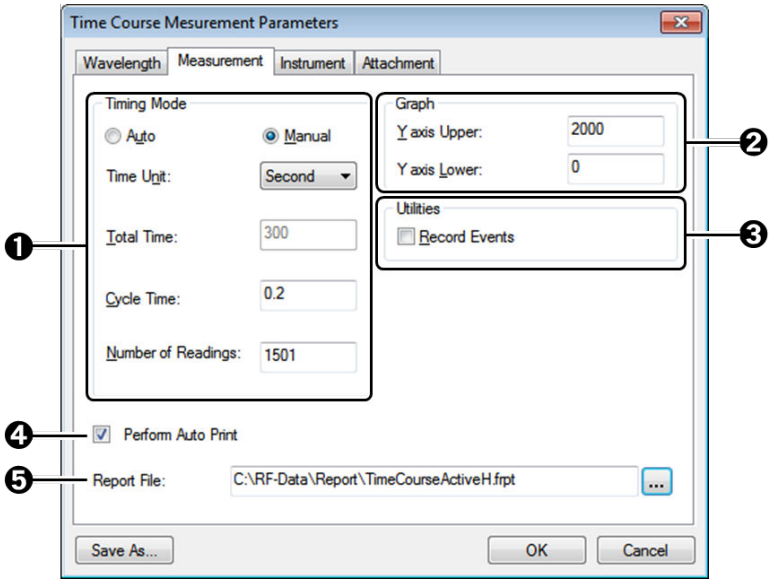
> **NOTE** Delete the wavelengths used in the previous measurement before adding new wavelengths for measurement.



[Time Course Measurement Method] Window ([Wavelength] Tab)

Wavelength Condition (Parameter)	Setting
Wavelength	• [Excitation]: 200.0 (nm) • [Emission]: 340.0 (nm)

3 Configure the measurement conditions (parameters) on the [Measurement] tab.

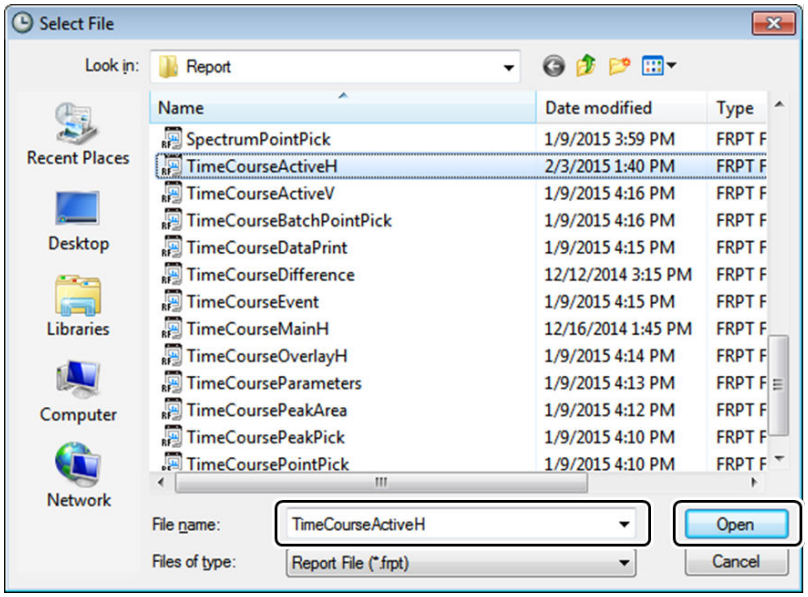


[Time Course Measurement Method] Window ([Measurement] Tab)

No.	Measurement Condition (Parameter)	Setting
❶	[Timing Mode]	• [Timing Mode]: Manual • [Time Unit]: Second • [Total Time]: 300*1 • [Cycle Interval]: 0.2 • [Number of Reading]: 1501
❷	[Graph]	• [Y axis Upper]: 2000 • [Y axis Lower]: 0
❸	[Utilities]	• [Record Events]: Unselected
❹	[Perform Auto Print]	Selected
❺	[Report File]	C:\RF-Data\Report\TimeCourseActiveH.frpt

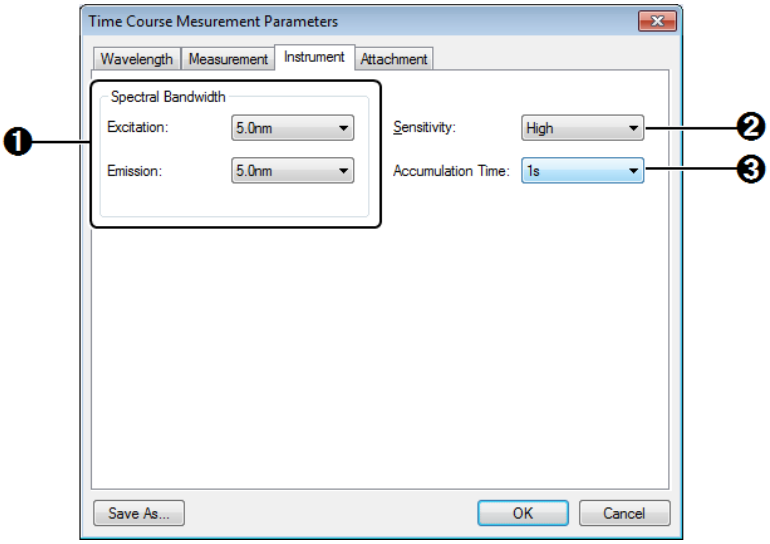
*1 When using the manual setting, the measurement time is automatically calculated using the entered data interval and number of data points.

Hint While the full path of the report filename can be directly entered into the [Report File] field, the report file can also be selected in the [Select File] window displayed by clicking [...] (browse).



[Select File] Window

4 Configure the instrument conditions (parameters) on the [Instrument] tab.



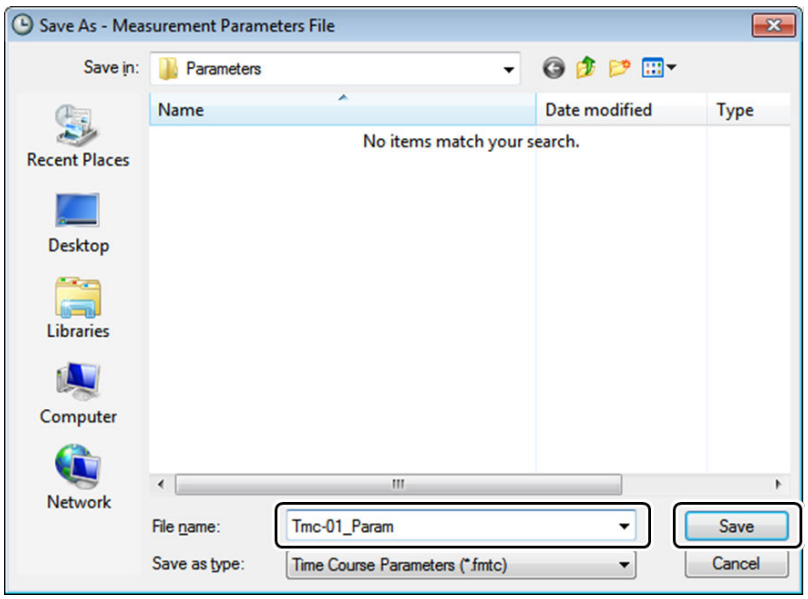
[Instrument] Tab

No.	Instrument Condition (Parameter)	Setting
❶	[Spectral Bandwidth]	• [Excitation]: 5.0 nm • [Emission]: 5.0 nm
❷	[Sensitivity]	High
❸	[Accumulation Time]	1 s

8.2.2 Saving Measurement Parameters

1 **Click [Save As] in the [Time Course Measurement Method] window.**
The [Save As - Measurement Parameters File] window is displayed.

2 **Enter a name for the measurement parameter file and click [Save].**
The file is saved and the configured measurement parameters are accepted for use.



[Save As - Measurement Parameters File] Window

8.3 Configuring the Auto File Function (Setting Filenames Automatically)

Filenames with the measurement start date and time or serial number appended to an arbitrary character string can be created automatically.
This sections explains the settings for starting measurement without displaying the [New Data Set] window after clicking [Start].

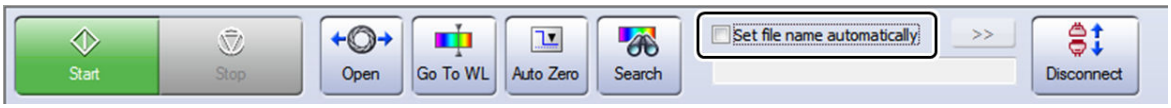
Hint File information, such as the sample name, ID, and comments, can be entered for each measurement by displaying the [New Data Set] window.

Reference For details on this function and setting items, refer to the help file provided with LabSolutions RF.

1 Select the [Set file name automatically] checkbox on the time course measurement toolbar.

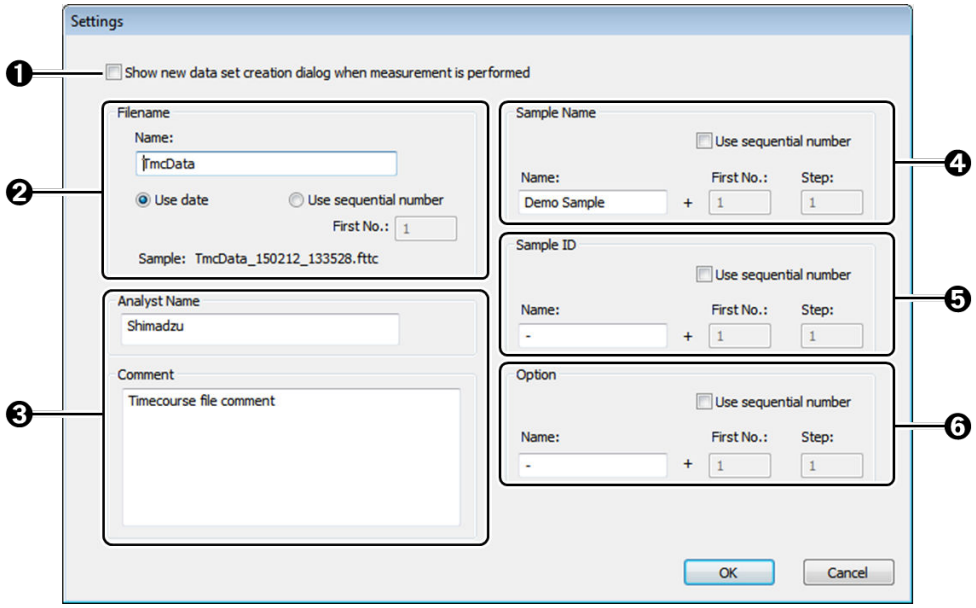
The [Settings] window of the auto file function is displayed.

NOTE If the checkbox is already selected, click >>.



Time Course Measurement Toolbar

2 Set the auto file function conditions (parameters).

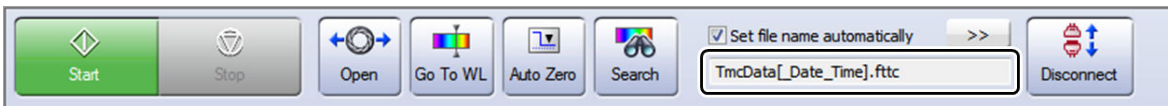


[Settings] Window

No.	Condition (Parameter)	Setting
❶	[Show new data set creation dialog when measurement is performed]	No (unselected)
❷	[Filename]	• [Name]: TmcData • [Use date]/[Use sequential number]: [Use date]
❸	[Analyst Name]	Enter a name.
❹	[Sample Name]	• [Name]: Demo Sample • [Use sequential number]: No (unselected)
❺	[Sample ID]	• [Name]: - • [Use sequential number]: No (unselected)
❻	[Option]	• [Name]: - • [Use sequential number]: No (unselected)

3 Click [OK].

The [Settings] window closes and the filename is displayed on the time course measurement toolbar.



Time Course Measurement Toolbar

8.4 Time Course Measurement

1 **Check that the shutter is closed (** 

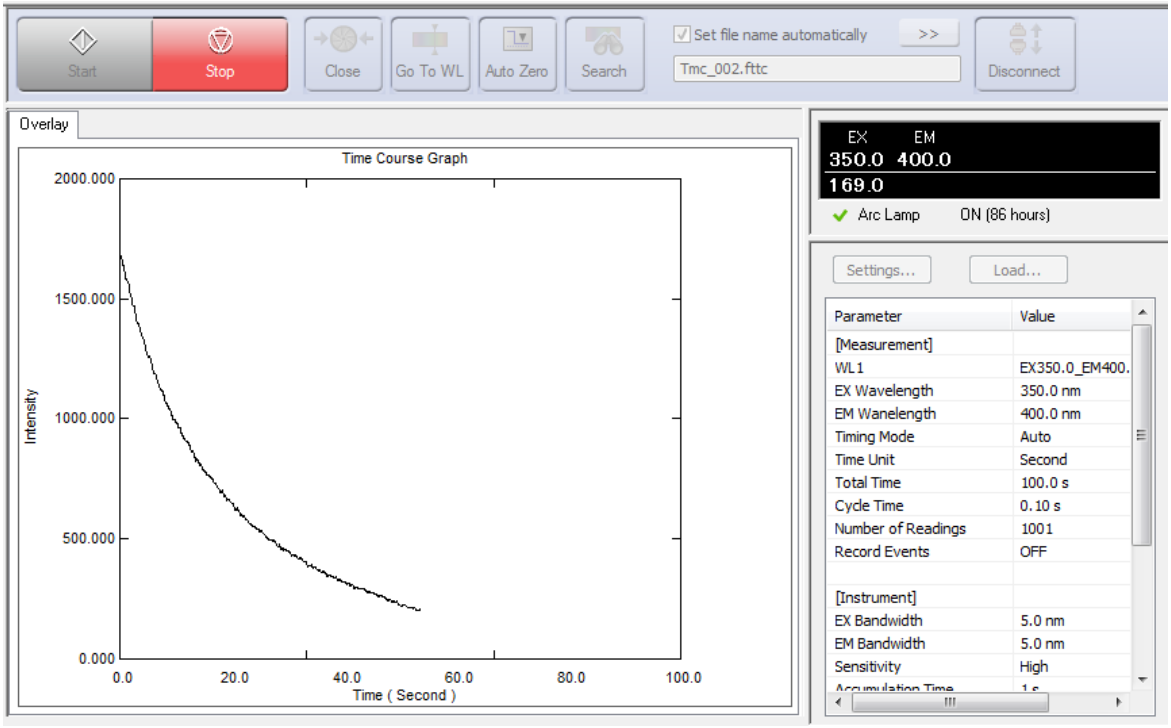
) and then click [Auto Zero] on the time course measurement toolbar.

2 **Place the sample in the instrument's sample compartment and close the lid.**

3 **Click [Start] on the time course measurement toolbar.**

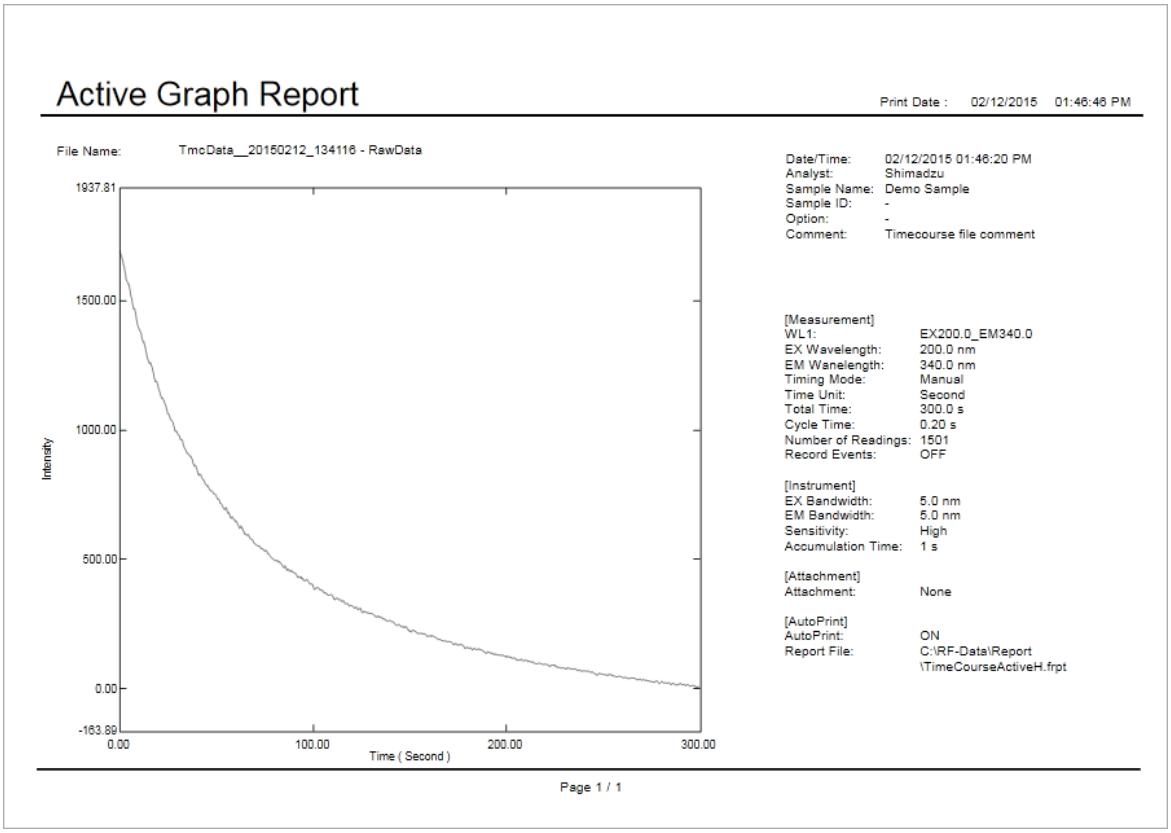
Time course measurement starts and the captured data is graphed in real time.

Reference For details on the procedure for changing the graph scale, see "4.5 Changing the Graph Scale" P.45.



[Time Course] Window

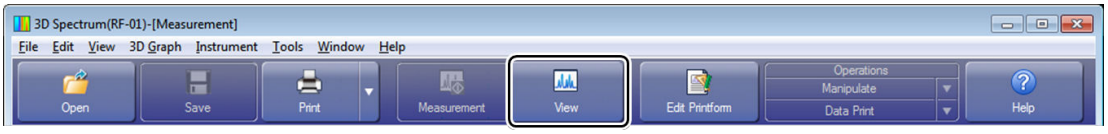
When measurement is complete, printing is executed automatically (automatic printing). The report file set in the measurement parameters is used for printing.



Example of Printout

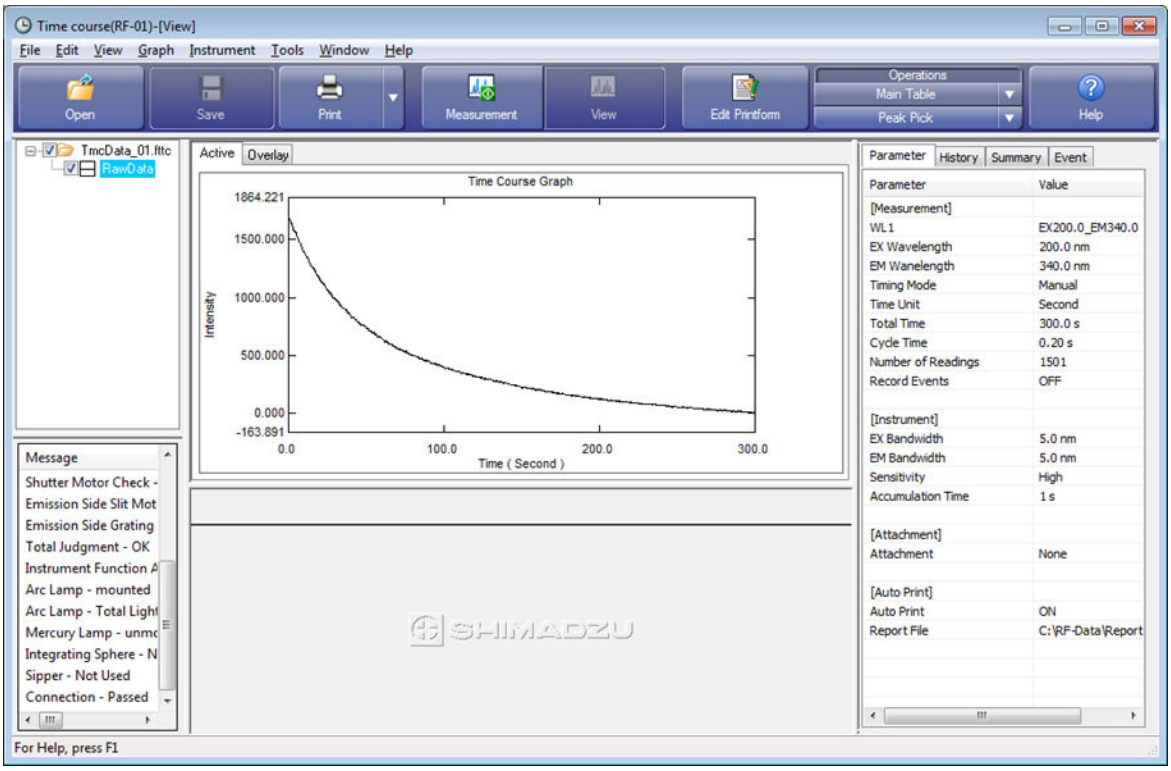
8.5 Calculating Activity Values

1 **Click [View] on the main toolbar.**



Main Toolbar

The window changes to view mode.



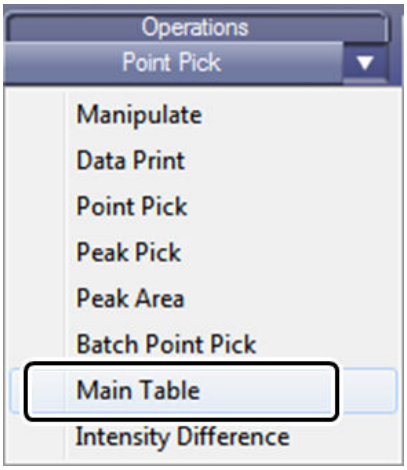
View Mode

8.5.1 Displaying the Main Table

1 **Click [Operations] - [Main Table] on the main toolbar.**

Main Toolbar

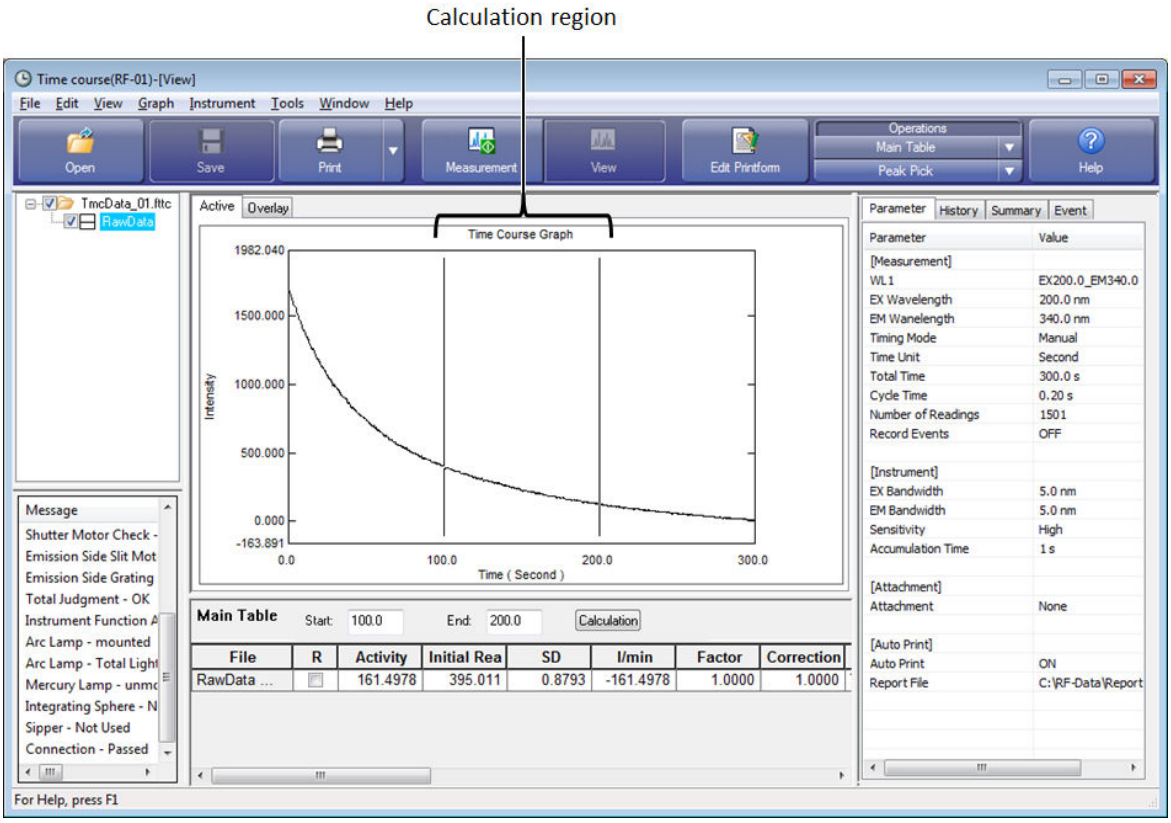
Hint [Operations] displays the two most recent data processing functions that were used. If the data processing function for use is not displayed under [Operations], click [▼] and select the function from the displayed list.



Selecting a Data Processing Function

2 **The main table is displayed in the data processing view.**

The display changes to the active graph and cursors for setting the activity value calculation region are displayed in the graph area.



Main Table Display

8.5.2 Changing the Activity Value Calculation Region

There are two methods for changing the activity value calculation region: moving the cursors on the graph and directly entering values on the main table.

■ Setting the region using the cursors

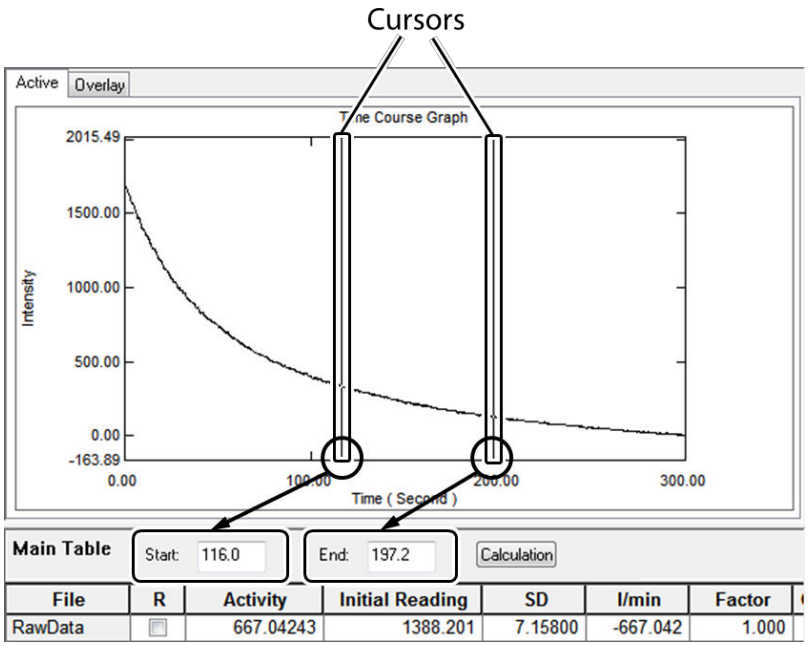
Use the cursors on the graph to set the activity region. The region between the two cursors is the activity value calculation region.

Hint The main table displays all time course data that resides in memory.
When multiple data files are loaded, select (highlight) the target data row before setting the calculation region.

1 **Drag the cursors on the graph.**

The [Start] and [End] times in the settings area of the main table are also updated.

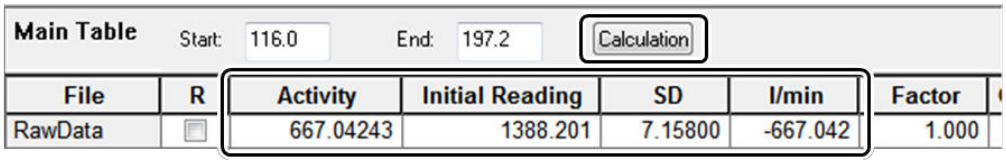
Hint Values can also be directly entered into the [Start] and [End] fields. In this case, the cursors on the graph do not move to reflect the entered values.



Setting the Region

2 **Click [Calculation].**

The activity value is recalculated and the value in the main table is updated.

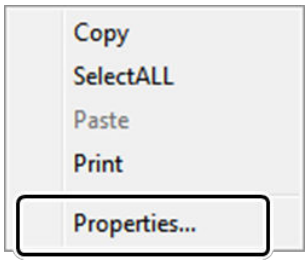


Settings Area of the Main Table

■ Directly Specifying the Start Time and End Time

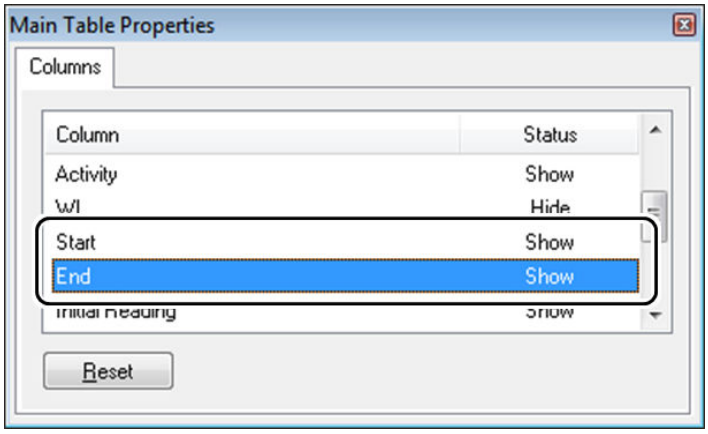
Enter the calculation region directly into columns in the main table.

1 **Open the right-click menu on the main table and click [Properties].**



Right-Click Menu of the Main Table

2 Double-click both [Start] and [End] in the column list to change the display status to "Show".



[Main Table Properties] Window

The [Start] and [End] columns are displayed in the main table.

File	R	Activity	Start	End	Initial Reading	SD	I/min
RawData		151.5280(	116.000	197.200	336.313	0.80193	-151.528

Main Table

3 Enter the end time of the activity value calculation range into [End] in the main table.

Press the "Enter" key to accept the value and automatically recalculate the activity value.

File	R	Activity	Start	End	Initial Reading	SD	I/min
RawData		151.52806	116.00(	200.000	336.313	0.80193	-151.528

Entering the End Time

4 Enter the start time of the activity value calculation range into [Start].

Press the "Enter" key to accept the value and automatically recalculate the activity value.

File	R	Activity	Start	End	Initial Reading	SD	I/min
RawData		151.52802	100.000	200.000	336.313	0.80193	-151.528

Entering the Starting Time and Recalculating the Activity Value

9 Data Processing

This chapter explains how to perform data processing in the spectrum and time course general analysis applications.

Reference For cases and functions not covered in this chapter, refer to the help file provided with LabSolutions RF.

■ Explanations Included in this Chapter

This chapter explains how to perform data processing using operations in the spectrum general analysis application as an example.

■ Functions Used in this Chapter

While data processing consists of the following functions, this chapter uses the examples of Peak Pick, Point Pick, batch Point Pick, and smoothing processing, which can be performed in both the spectrum and time course general analysis applications, to explain these functions and operating procedures.

Data processing in the spectrum application

- Data Print
- Peak Pick
- Point Pick
- Batch Point Pick
- Peak Area
- Manipulate (data set calculation, transformation, arithmetic)

Data processing in the time course application

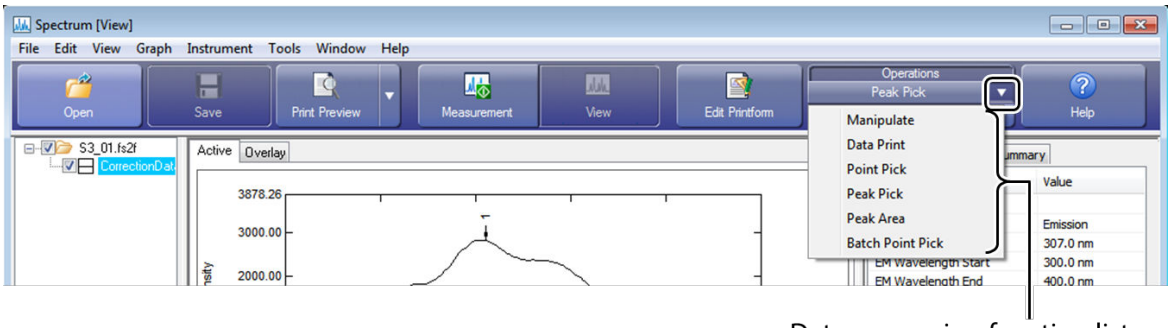
- Data Print
- Peak Pick
- Point Pick
- Batch Point Pick
- Peak Area
- Main Table (activity value calculation)
- Intensity Difference
- Manipulate (data set calculation, transformation, arithmetic)

9.1 Startup

To use a data processing function, click the desired data processing function under [Operations] in view mode.

Clicking ▼ to the left of [Operations] displays a list of data processing commands. The desired data processing can be performed by selecting the required command from the data processing list. (This explanation uses the spectrum application window as an example.)

[Operations] displays the name of the most recently used data processing function.



Displaying the Data Processing List

9.2 Peak Pick

Peaks and valleys are detected according to the set threshold value and number of points.

Hint

- When the number of points is set to n, peak detection occurs after the value consecutively increases for more than n points and then consecutively decreases for more than n points. The top of the peak (peak point) is taken as the point at which the value starts decreasing. Valley detection occurs when the opposite condition (value consecutively decreases for more than n points and then consecutively increases for more than n points) is satisfied.
- The threshold value indicates the distance (fluorescence intensity) between the peak point and a line connecting the valley points on each side (or provisional valley points) of the peak. Peaks with a distance shorter than the set threshold value are excluded. The detection of unwanted peaks and noise can be avoided by adjusting the threshold value and number of points.

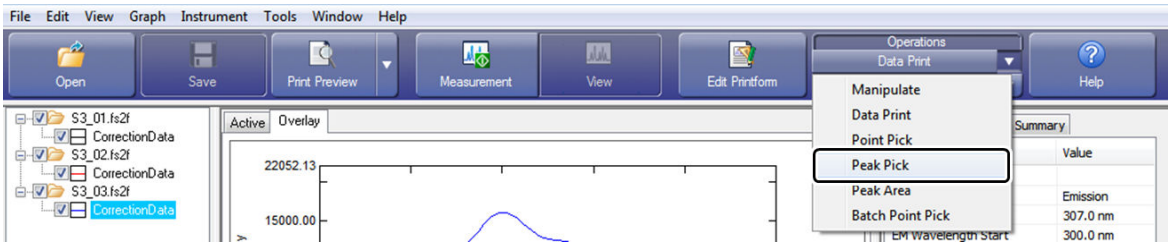
When multiple data is loaded, set the data for peak detection to active.

Hint Double-click the target data set in the tree view to make it the active data (highlight in blue).

Active Data Display

1 **Click [Peak Pick] under [Operations].**

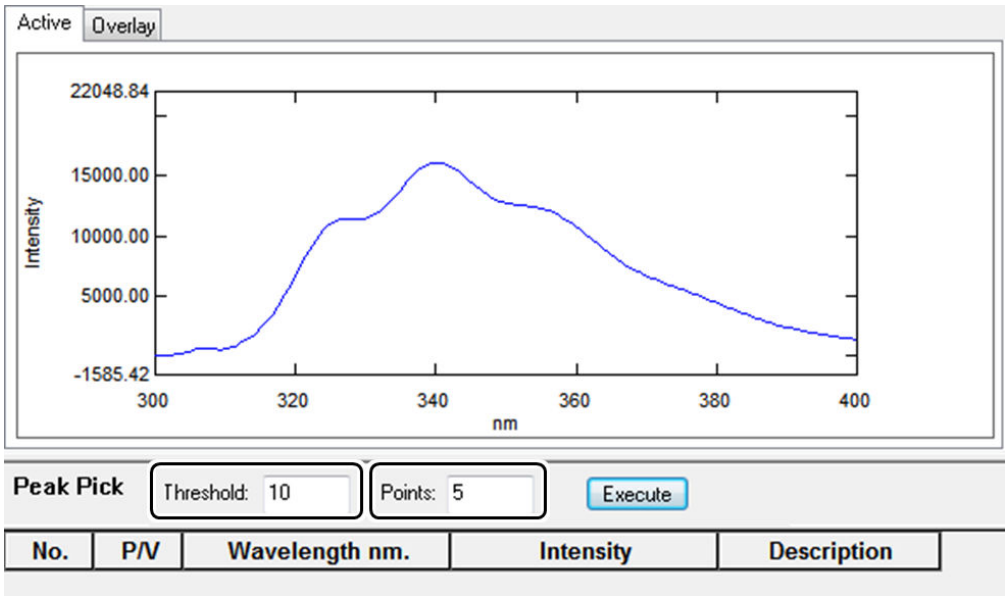
The Peak Pick window is displayed.



[Operations] - [Peak Pick]

2 Enter values for [Threshold] and [Points] and click [Execute].

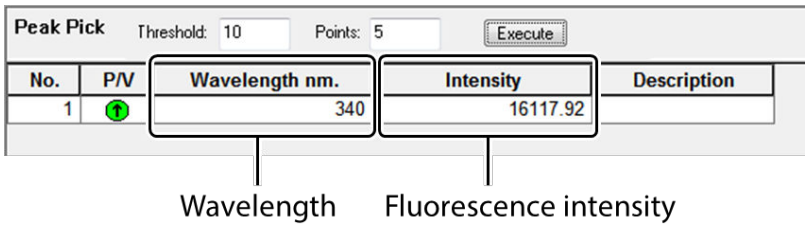
Hint The initial values of the Peak Pick parameters [Threshold] and [Points] are "1" and "4" respectively.



Peak Pick Window

3 The wavelength and fluorescence intensity of each detected peak are displayed in the Peak Pick table.

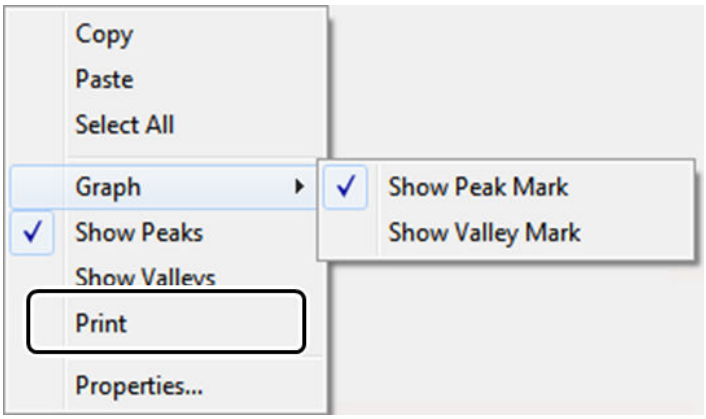
Hint The mark in the [P/V] column indicates whether the detected wavelength is a peak or valley. indicates a peak and indicates a valley.



Wavelength and Fluorescence Intensity of Peaks

4 **Open the right-click menu on the Peak Pick table and click [Print].**

The report file linked to the Peak Pick table is printed.



Right-Click Menu (Peak Pick Table)

Hint The report file to be linked can be set on the [Quick Print] tab of the [User Settings] window, which is displayed by clicking [User Settings] on the [Tools] menu.

9.3 Point Pick

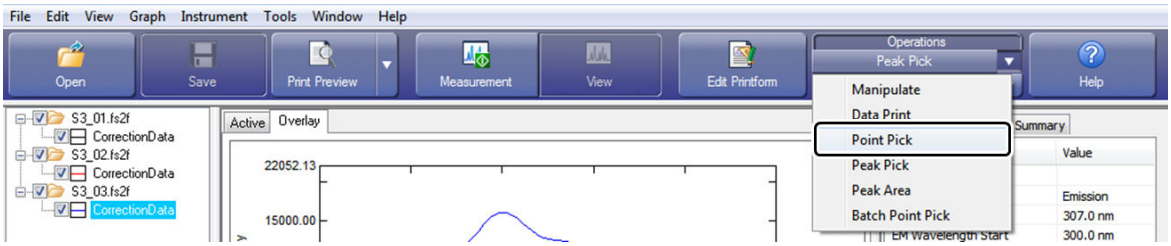
Detect fluorescence intensity at any wavelength (time).

When multiple data is loaded, set the target data to active.

Reference For details on the procedure for setting the target data to active, see "9.2 Peak Pick" P.120.

1 Click [Point Pick] under [Operations].

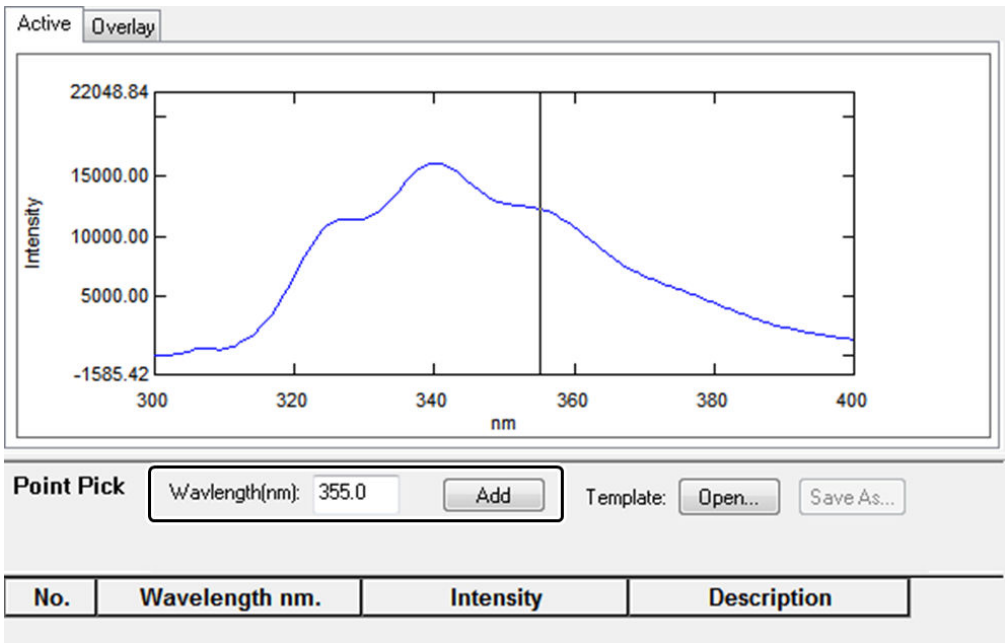
The Point Pick window is displayed.



[Operations] - [Point Pick]

2 Enter a value for [Wavelength] and click [Add].

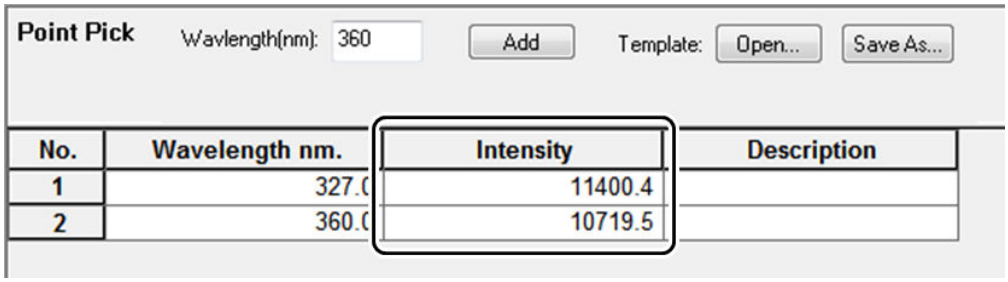
Repeat this operation when detecting multiple wavelengths.



Adding a Wavelength

3 The fluorescence intensity of each set wavelength is displayed in the Point Pick table.

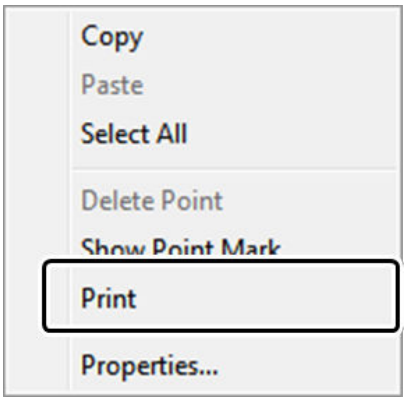
Hint Wavelengths can also be specified using the cursor on the graph.
Dragging the cursor on the graph displays the value of the wavelength at the cursor position in the [Wavelength] field.



Point Pick Table

4 Open the right-click menu on the Point Pick table and click [Print].

The report file linked to the Point Pick table is printed.

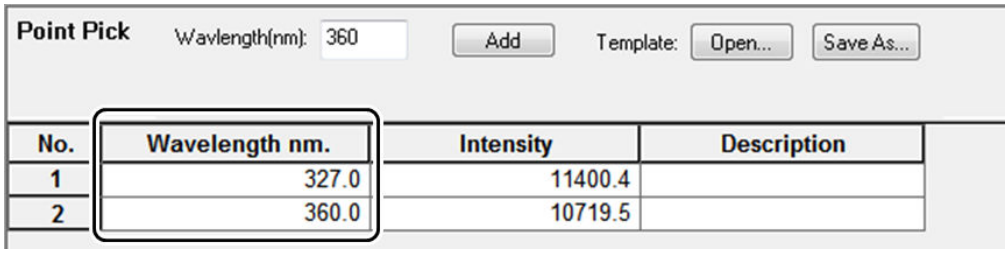


Right-Click Menu (Point Pick Table)

Hint The report file to be linked can be set on the [Quick Print] tab of the [User Settings] window, which is displayed by clicking [User Settings] on the [Tools] menu.

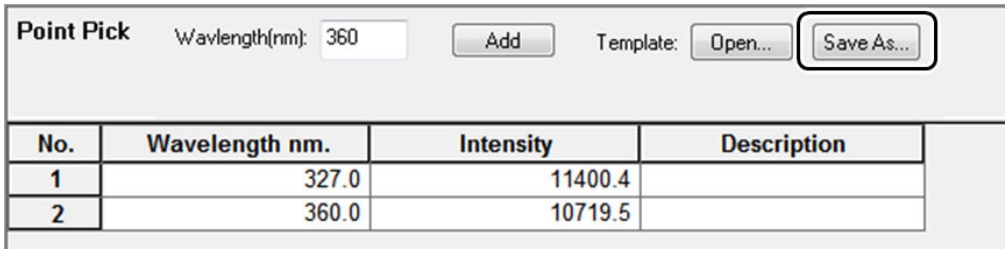
9.3.1 Creating and Saving Template Files

The wavelengths (times) used in the Point Pick table can be saved as a template file.

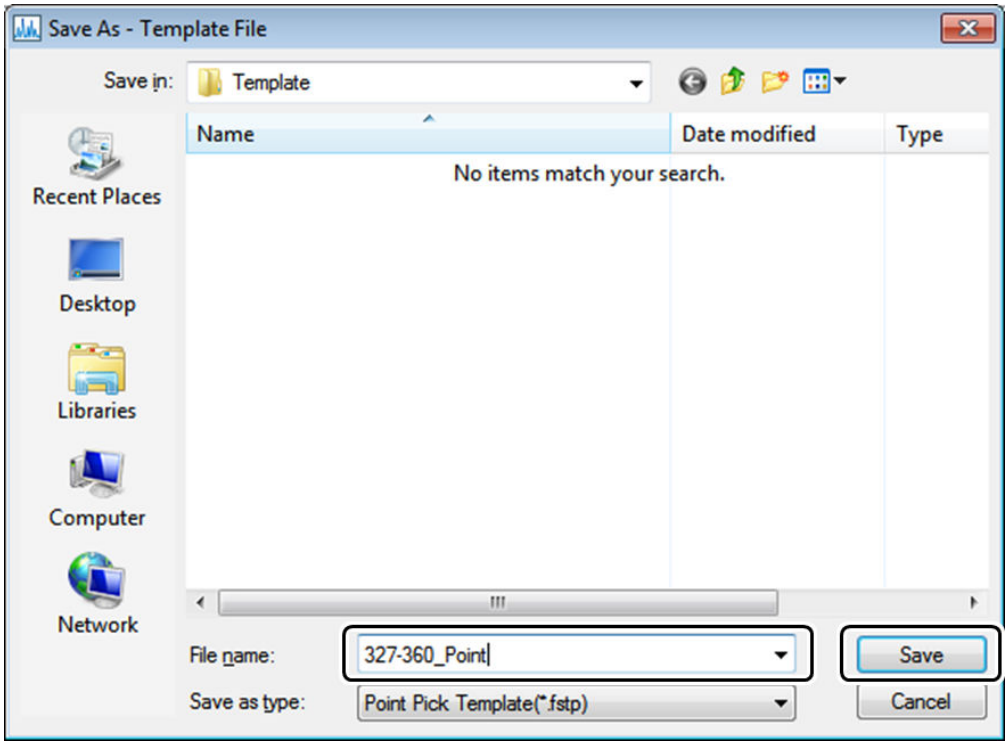


1 **Click [Save As] on the Point Pick table.**

Hint Saving can also be performed by clicking [Save As] - [Template] on the [File] menu.



2 Enter a name for the template file and click [Save].



[Save As - Template File] Window

Hint

- The folder shown as the save location when the [Save As - Template File] window is displayed is the folder specified for [Destination Folder] on the [Tools] menu. This can also be changed when opening a template file.
- Opening a Point Pick template with the target spectrum made active will execute Point Pick on the spectrum.

Reference For details on the operating procedure for Point Pick using templates, see "9.4 Batch Point Pick" P.127.

9.4 Batch Point Pick

Detect fluorescence intensity at any wavelength (time) with respect to all loaded data.

While any wavelength (time) can be detected by directly entering values or moving the cursor in the same manner as for Point Pick, this section explains the Point Pick procedure when using a Point Pick template file.

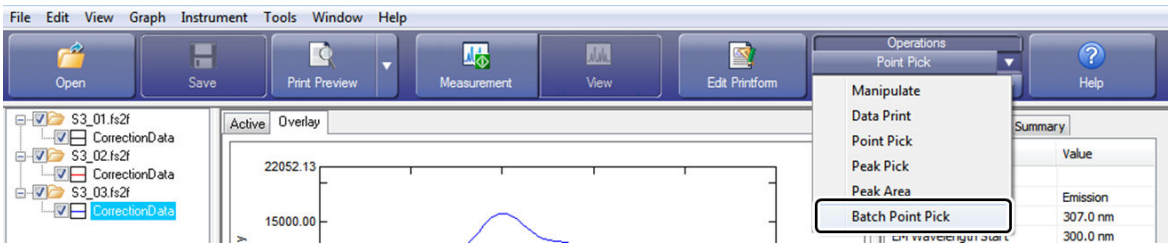
Hint Point Pick template files can be used for both Point Pick and batch Point Pick.

Reference For details on the procedure for directly entering values and moving the cursor, see "9.3 Point Pick" P.123.

9.4.1 Using Template Files

1 **Click [Batch Point Pick] under [Operations].**

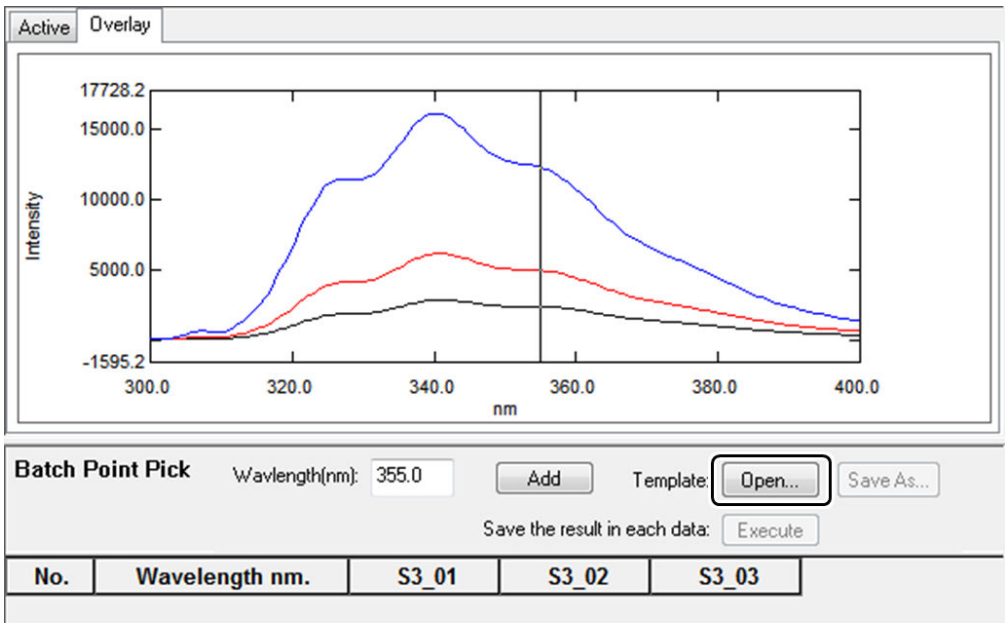
The batch Point Pick window is displayed.



[Operations] - [Batch Point Pick]

2 Click [Open] on the batch Point Pick table.

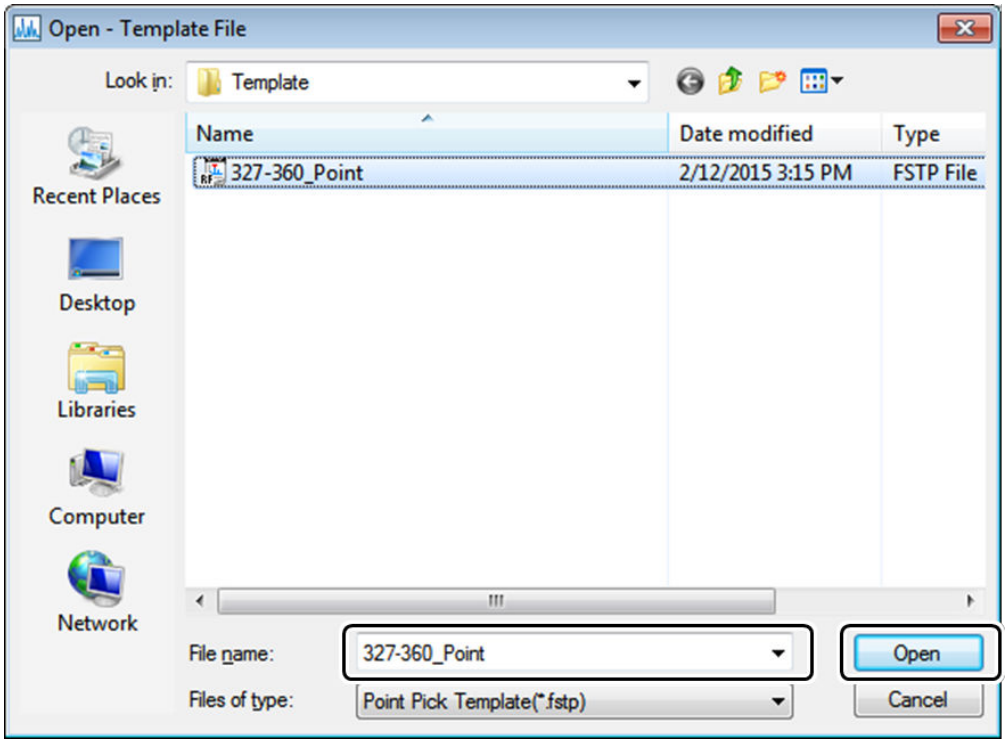
Hint Template files can also be loaded by clicking [Open] - [Template] on the [File] menu.



Batch Point Pick Table

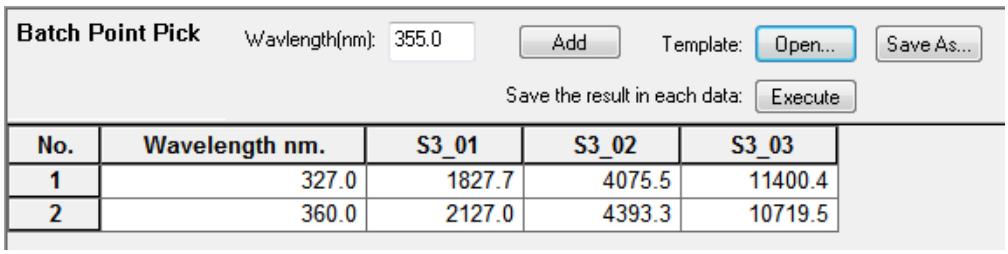
3 Select the template file to use and click [Open].

Hint The folder shown as the save location when the [Open - Template File] window is displayed is the folder specified for [Destination Folder] on the [Tools] menu. This can also be changed when opening a template file.



[Open - Template File] Window

4 Batch Point Pick is performed according to the opened template file.

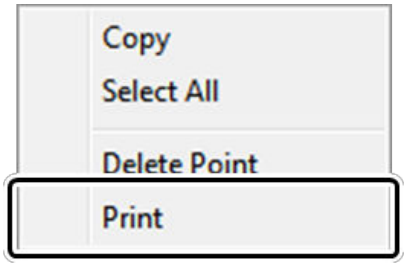


No.	Wavelength nm.	S3_01	S3_02	S3_03
1	327.0	1827.7	4075.5	11400.4
2	360.0	2127.0	4393.3	10719.5

Batch Point Pick Table

5 **Open the right-click menu on the batch Point Pick table and click [Print].**

The report file linked to the batch Point Pick table is printed.



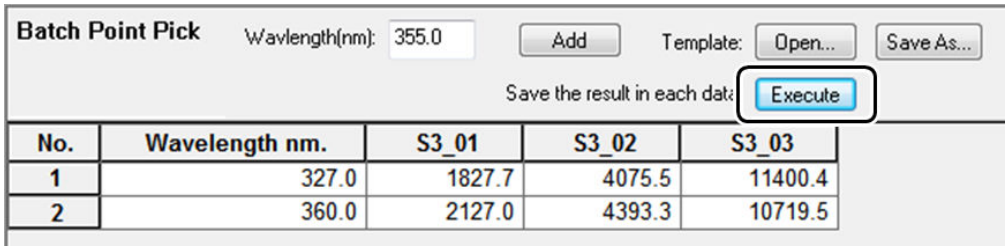
Right-Click Menu (Batch Point Pick Table)

Hint The report file to be linked can be set on the [Quick Print] tab of the [User Settings] window, which is displayed by clicking [User Settings] on the [Tools] menu.

9.4.2 Saving Batch Point Pick Results as a Point Pick Table

The batch Point Pick results can be saved as a Point Pick table for each corresponding data.

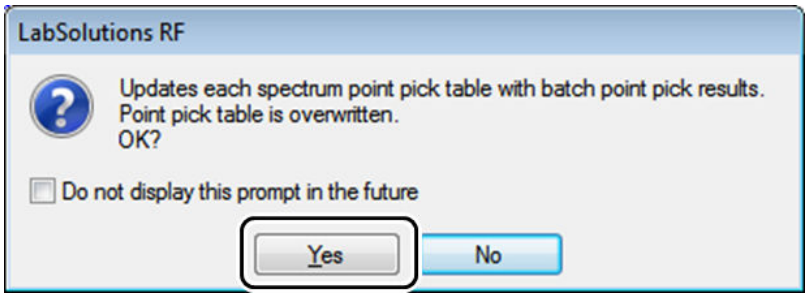
1 **Click [Execute] on the batch Point Pick table.**



No.	Wavelength nm.	S3_01	S3_02	S3_03
1	327.0	1827.7	4075.5	11400.4
2	360.0	2127.0	4393.3	10719.5

2 **Click [Yes] in the displayed confirmation dialog box.**

Point Pick tables are created for all spectrum data and updated with the batch Point Pick results.



Confirmation Dialog Box

NOTE If a template file that has already been executed (with a saved Point Pick table) is loaded, the existing Point Pick table is overwritten.
If a loaded data file that contains an existing Point Pick table that should be preserved, click [No] (do not overwrite) in the confirmation dialog box and then close that particular data file.

9.5 Manipulate - Smoothing Processing

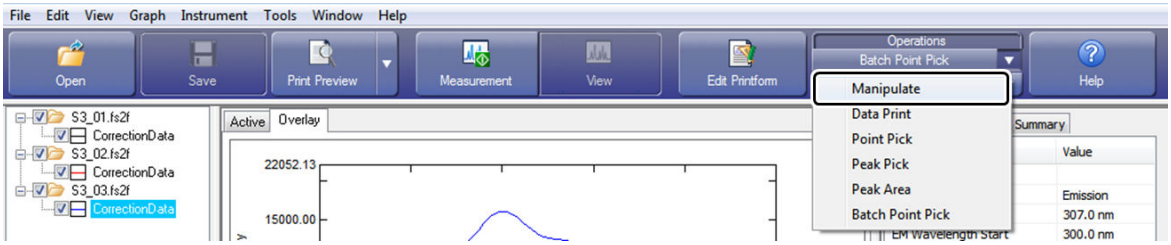
Smoothing processing can be performed on spectrum data and time-course data.

Hint The data created by smoothing processing does not overwrite the original data (data captured in measurement) and resides in the same file as the original data as a new data set.

This section explains the smoothing procedure using the spectrum application as an example.

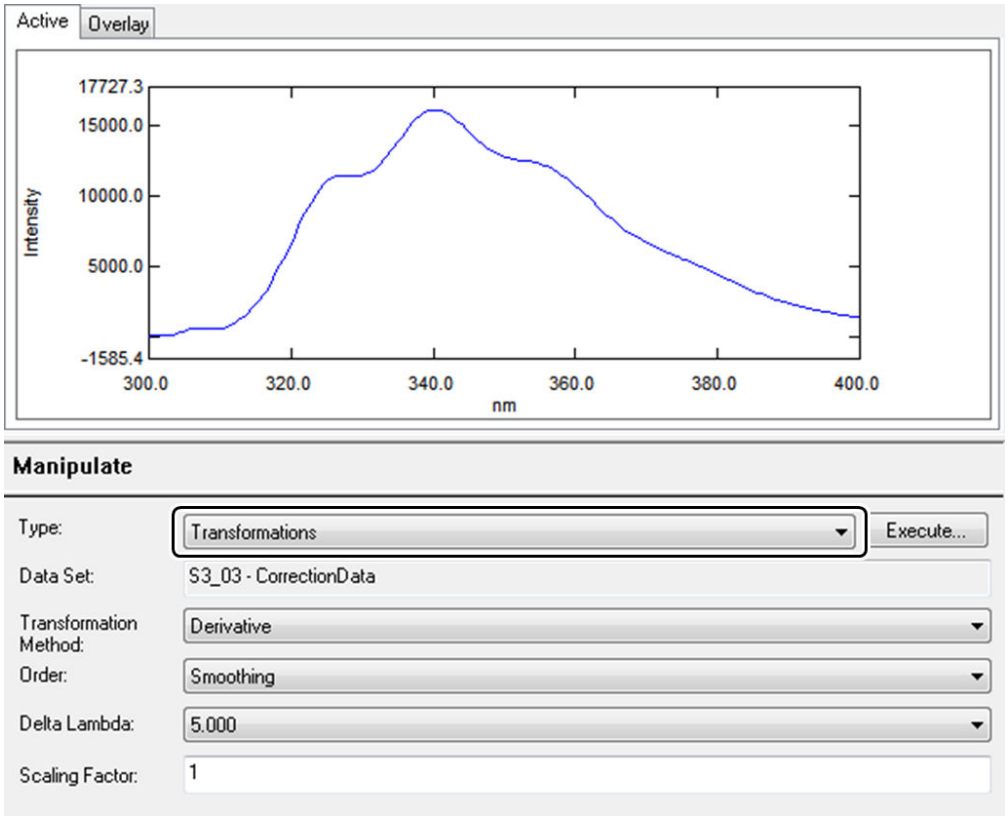
1 Click [Manipulate] under [Operations].

The Manipulate is displayed.



[Operations] - [Manipulate]

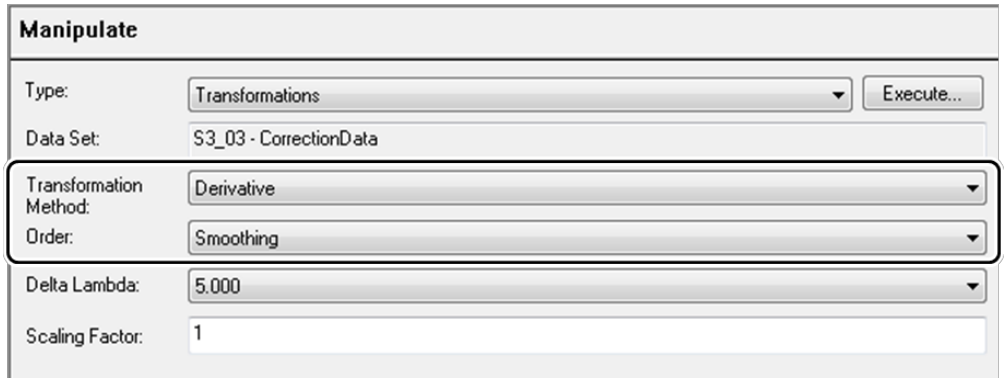
2 Click [Transformations] in the [Type] list.



Data prosseing view

3 Check that [Transformation Method] is set to [Derivative] and [Order] is set to [Smoothing].

Hint The target of data manipulation is the data displayed for [Data Set].
Since the active data is displayed, the target data can be changed by reselecting the active data in the tree view.



Checking the Parameters for Data Transformation

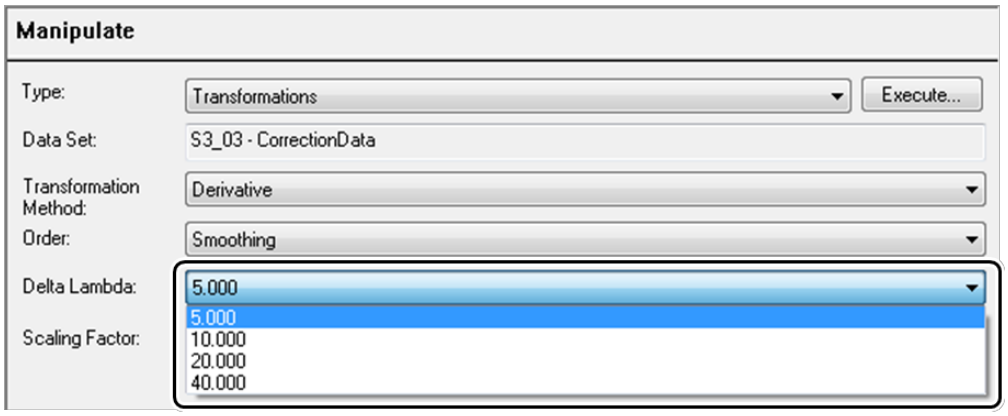
4 Select the value of the derivative wavelength (time) difference in the [Delta Lambda] list ("5.000" in this example) and click [Execute].

The [New Data Set] window is displayed.

Hint

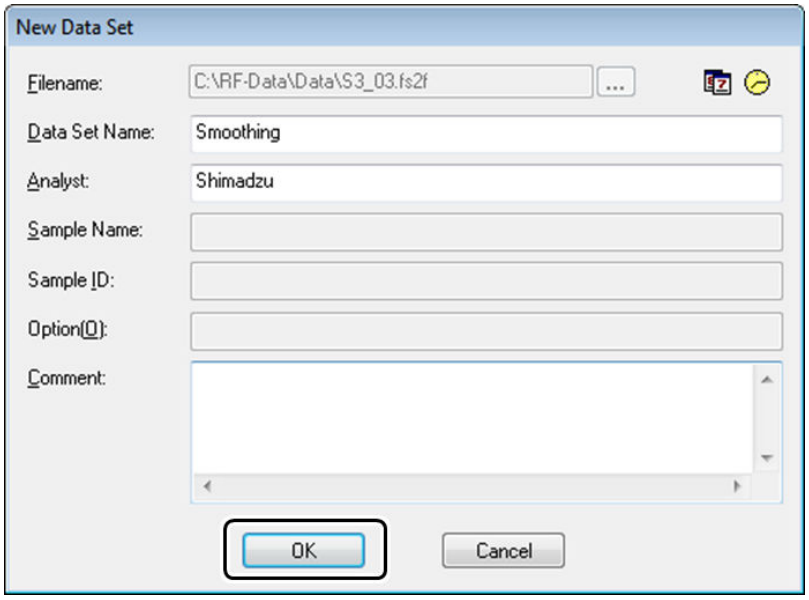
- For smoothing processing, set [Scaling Factor] to "1".
- [Delta Lambda] indicates the derivative wavelength (time) difference. While the value of [Delta Lambda] varies according to the data interval of the data to transform (data interval x 10), there are four levels that can be selected.
  Setting a large derivative wavelength (time) difference will reduce noise but adversely affect resolution.

Reference For details on data transformations, refer to the help file provided with LabSolutions RF.



Setting the Delta Lambda (Derivative Wavelength (Time) Difference)

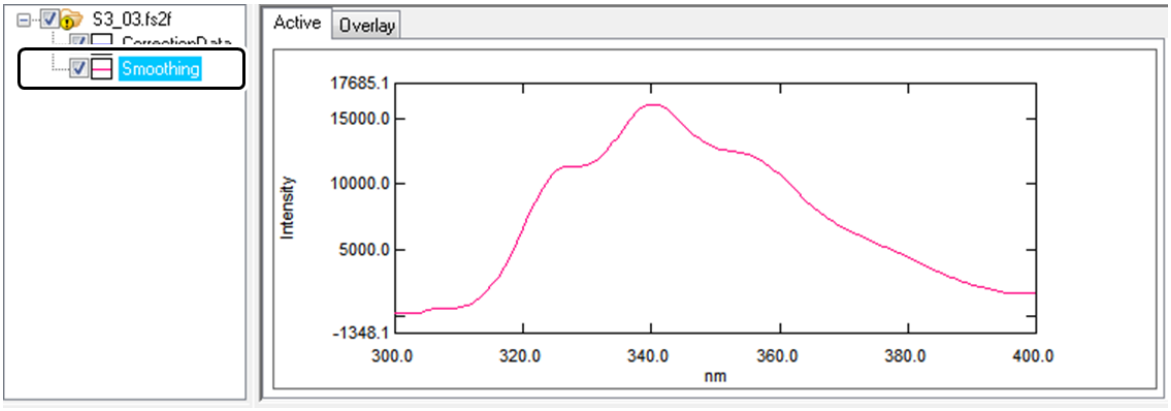
5 **Enter the data set name of the transformation data to create in [Data Set Name] (shown as "Smoothing" here) and click [OK].**



[New Data Set] Window

A transformed data set is created and a spectrum graph is displayed on the [Active] tab in the graph view.

Hint The created transformation data resides in the same file as the original data.



Spectrum Display

10 Printing

This chapter explains the procedure for operating the print function and the function for creating report templates (report files).

Reference For cases and functions not covered in this chapter, refer to the help file provided with LabSolutions RF.

■ Explanations Included in this Chapter

This chapter explains the procedures for creating report files and printing using report files (Quick Print).

The sample data used in explanations is located in the folder for LabSolutions RF-related files that is created during installation.

For example, if LabSolutions RF is installed on the C drive, the data is copied to the "C:\RF-Data\Sample" folder. This location is abbreviated to "\Sample" in this manual.

■ Functions Used in this Chapter

- Creating and editing report files
- Data Print (Quick Print)

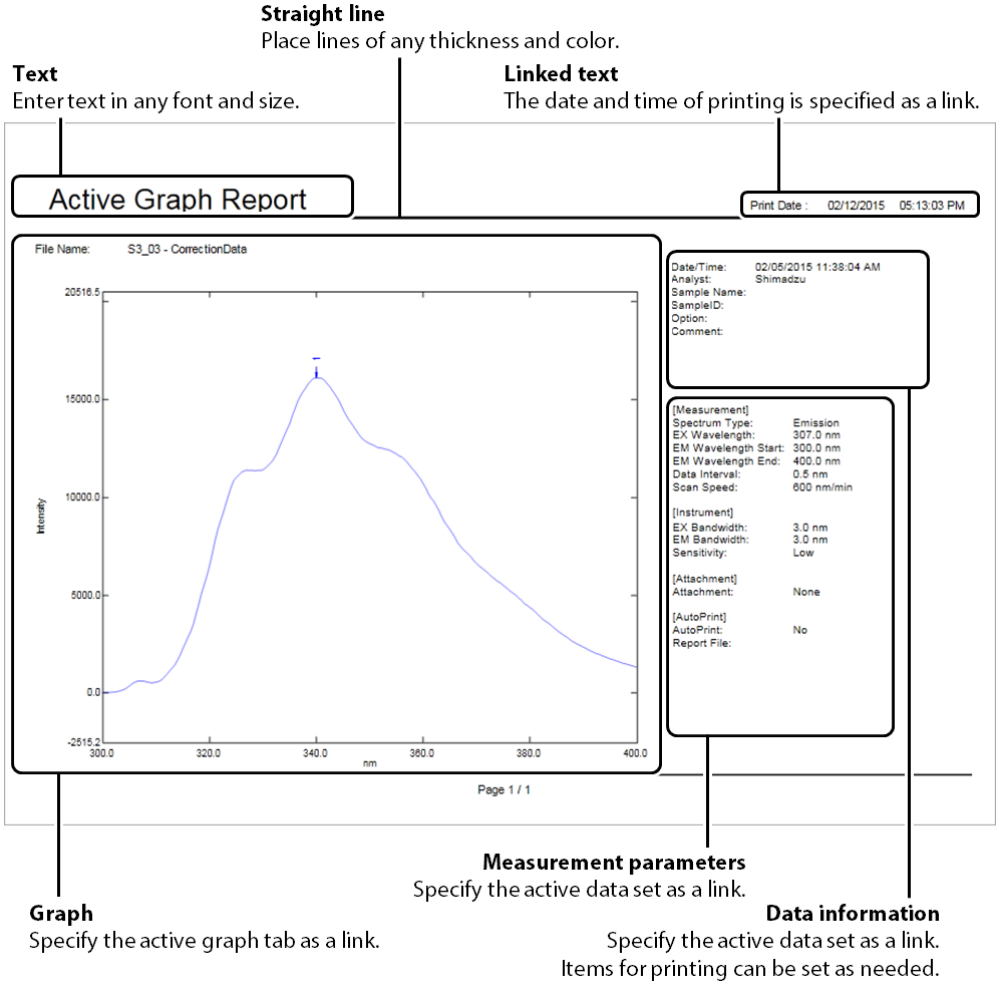
10.1 Quick Print

The general analysis applications feature a Quick Print function that allows printing of graphs and data processing tables using specified report files. This section explains the procedure for printing using the Quick Print function.

10.1.1 Report Files

A report file is a template file for printing that contains the following printable objects arranged on a mock-up page.

- Graphs
- Measurement parameter information
- Data processing results
- Quantitation results
- File information etc.



Example of a Report File (spectrum_active graph_landscape.frpt)

LabSolutions RF provides report files with a combination of various printable objects and these files are configured with initial settings that allow them to be used with the Quick Print function in each application.

Report files are located in the folder for LabSolutions RF-related files that is created during installation.

Hint If LabSolutions RF is installed on the C drive, the report files are copied to the "C:\RF-Data\Report" folder.

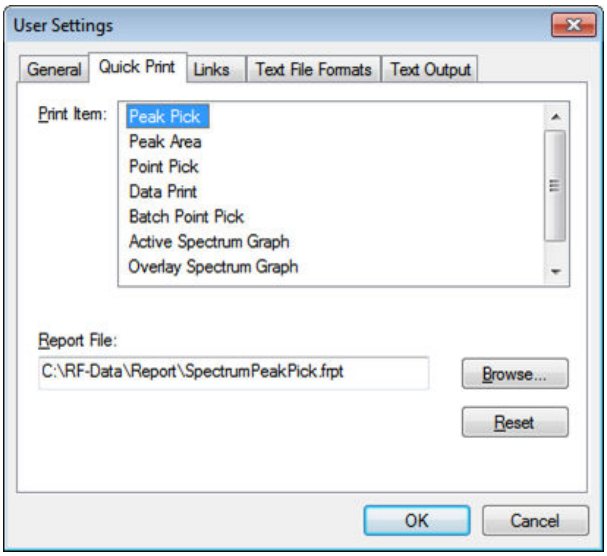
The following table lists the report files prepared for the printing of spectra.
Report files can be edited in the "edit print form mode" of each general analysis application.

Reference For details on the procedure for editing report files, see "10.3 Creating Report Files" P.148.

Report Filename	Description
SpectrumActiveV.frpt	Includes a layout of objects such as the active graph tab, linked graph objects, and measurement parameter information objects. The page orientation is portrait.
SpectrumOverlayH.frpt	Includes a layout of objects such as the overlay graph tab, linked graph objects, and legend information. The page orientation is landscape.
SpectrumParameters.frpt	Includes a layout of measurement parameter information objects corresponding to the active data. The page orientation is portrait.
SpectrumDataPrint.frpt	Includes a layout of the displayed data print table. The page orientation is portrait.
SpectrumPeakPick.frpt	Includes a layout of the peak pick table of the active data and objects related to information regarding the file. The page orientation is portrait.
SpectrumPointPick.frpt	Includes a layout of the point pick table of the active data and objects related to file information. The page orientation is portrait.
SpectrumBatchPointPick.frpt	Includes a layout of the displayed batch point pick table and graph objects (linked to the overlay graph). The page orientation is portrait.
SpectrumPeakArea.frpt	Includes a layout of the point pick table of the active data and objects related to file information. The page orientation is portrait.

10.1.2 Quick Print Settings

The report file for use with Quick Print can be set on the [Quick Print] tab of the [User Settings] window, which is displayed by clicking [User Settings] on the [Tools] menu.



[User Settings] Window (Spectrum Application)

The initial settings are configured as listed in the following table.

Application	View Area Printable Using Quick Print	Report Filename
Spectrum	Active graph	SpectrumActiveV.frpt
	Overlay graph	SpectrumOverlayH.frpt
	Measurement parameters	SpectrumParameters.frpt
	Data Print table	SpectrumDataPrint.frpt
	Peak Pick table	SpectrumPeakPick.frpt
	Point Pick table	SpectrumPointPick.frpt
	Batch Point Pick table	SpectrumBatchPointPick.frpt
	Peak Area table	SpectrumPeakArea.frpt
3D Spectrum	Active graph (Contour Plot)	3Spectrum3DActiveContour.frpt
	Active graph (3D Spectrum Graph)	Spectrum3DActiveShift2D.frpt
	Measurement parameters	Spectrum3DParameters.frpt
	Tiles 1×2	Spectrum3DTile1x2.frpt
	Tiles 2×1	Spectrum3DTile2x1.frpt
	Tiles 2×2	Spectrum3DTile2x2.frpt
	Tiles 2×3	Spectrum3DTile2x3.frpt
	Tiles 3×2	Spectrum3DTile3x2.frpt

Application	View Area Printable Using Quick Print	Report Filename
Quantitation	Standard table	QuantitationStandardTable.frpt
	Sample table	QuantitationSampleTable.frpt
	Measurement parameters	QuantitationParameters.frpt
	Calibration curve	QuantitationCalibrationCurve.frpt
	Sample graph	QuantitationSampleGraph.frpt
Photometric	Measurement parameters	PhotometricParameters.frpt
	Sample table	PhotometricSampleTable.frpt
	Sample graph	PhotometricSampleGraph.frpt
Time course	Active graph	TimeCourseActiveV.frpt
	Overlay graph	TimeCourseOverlayH.frpt
	Measurement parameters	TimeCourseParameters.frpt
	Data Print table	TimeCourseDataPrint.frpt
	Peak Pick table	TimeCoursePeakPick.frpt
	Point Pick table	TimeCoursePointPick.frpt
	Batch Point Pick table	TimeCourseBatchPointPick.frpt
	Peak Area table	TimeCoursePeakArea.frpt
	Main Table	TimeCourseMainH.frpt
	Intensity Difference table	TimeCourseDifference.frpt
	Event table	TimeCourseEvent.frpt

10.1.3 Printing Using Quick Print

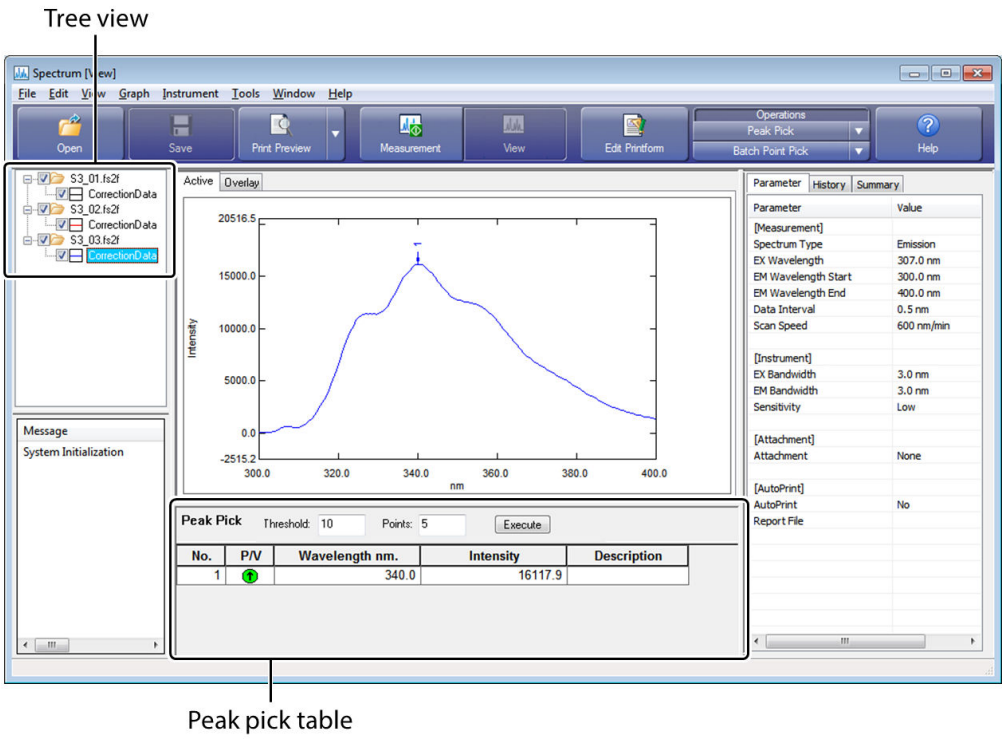
This section explains the procedure for printing with the Quick Print function using a report file linked to the peak pick table in the spectrum general analysis application.

1 **Set the spectrum data targeted for printing to active and display the peak pick table.**

This example uses the sample data in the "S3_03.fs2f" file located in the "\Sample" folder.

Hint Double-click on the target spectrum data in the tree view to set it to active.

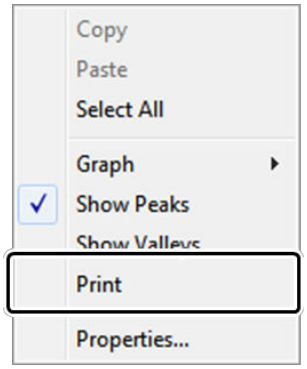
Reference For details on peak pick, see "9.2 Peak Pick".



Displaying the Peak Pick Table

2 **Open the right-click menu on the peak pick table and click [Print].**

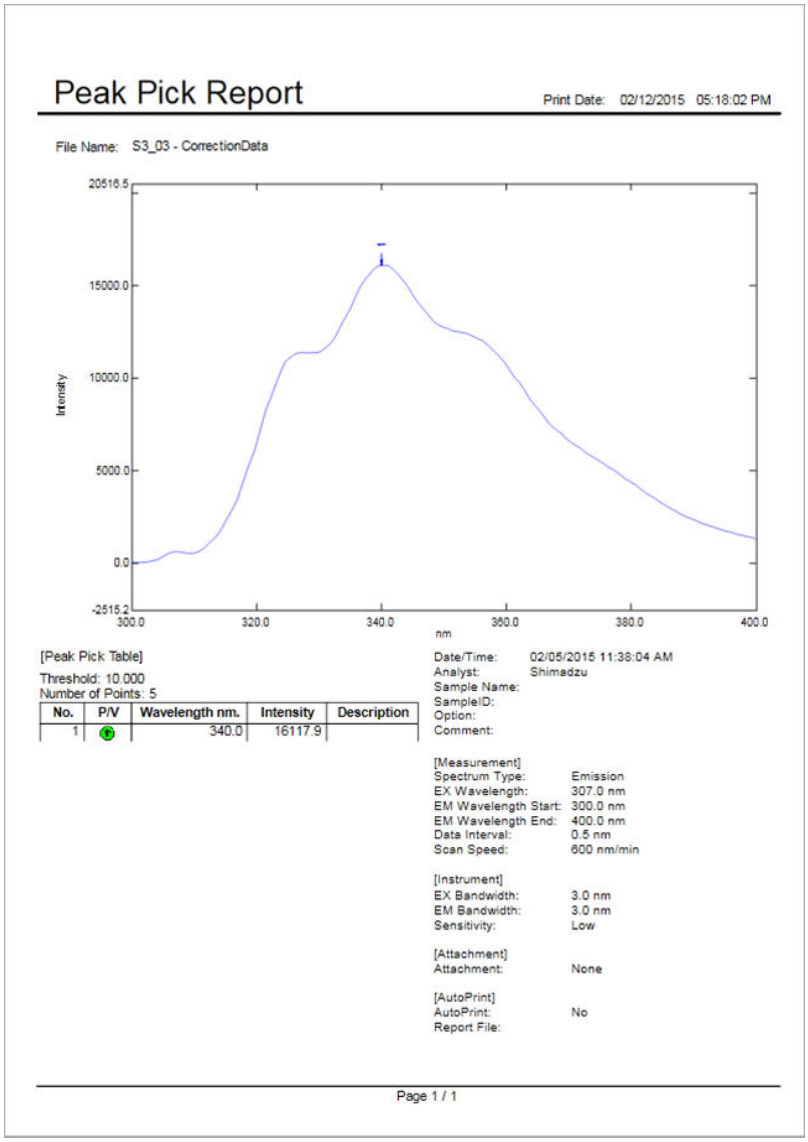
Printing is performed on the printer set as the default printer on the PC in use.



Printing

Printing is performed using the report file linked to the peak pick table.

Hint To print after checking the mock-up page, click the view area of the target for printing (the peak pick table in the above example) to select it and then click [Print Preview] on the main toolbar or the [File] menu.



Peak Pick Report

Print Date: 02/12/2015 05:18:02 PM

File Name: S3_03 - CorrectionData

[Peak Pick Table]

Threshold: 10.000
Number of Points: 5

No.	P/V	Wavelength nm.	Intensity	Description
1	P	340.0	16117.9	

Date/Time: 02/05/2015 11:38:04 AM
Analyst: Shimadzu
Sample Name:
SampleID:
Option:
Comment:

[Measurement]
Spectrum Type: Emission
EX Wavelength: 307.0 nm
EM Wavelength Start: 300.0 nm
EM Wavelength End: 400.0 nm
Data Interval: 0.5 nm
Scan Speed: 600 nm/min

[Instrument]
EX Bandwidth: 3.0 nm
EM Bandwidth: 3.0 nm
Sensitivity: Low

[Attachment]
Attachment: None

[AutoPrint]
AutoPrint: No
Report File:

Page 1 / 1

Example of Printout

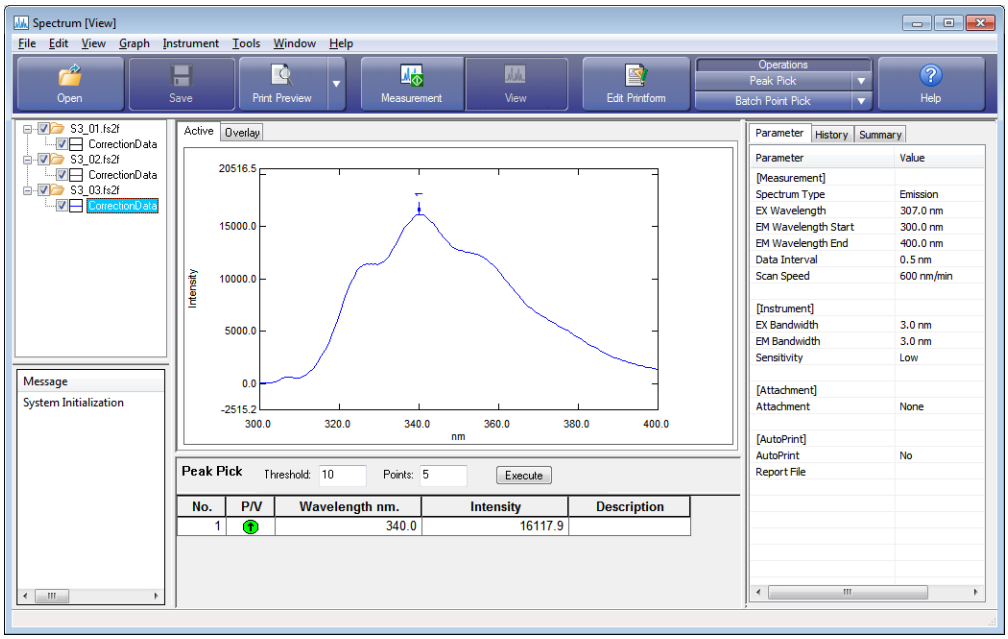
10.2 Printing in Edit Print Form Mode

To print by selecting an existing report file or by selecting the target data for printing, print using the edit print form mode.

This section uses a report file ("spectrum_print operation example.frpt") that contains a layout of spectrum printing objects to explain the procedure for printing any spectrum information and data out of multiple spectrum data that is loaded.

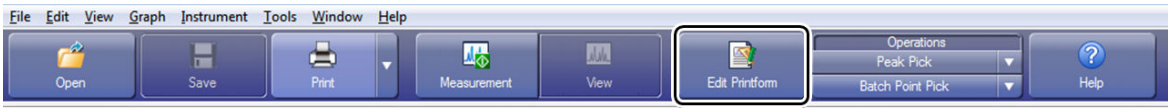
1 Open the spectrum sample data files in the order of "S3_01.fs2f", "S3_02.fs2f", and "S3_03.fs2f".

Click [Open] on the main toolbar to display the [Open-Data File] window, specify the "\Sample" folder, and open the files.



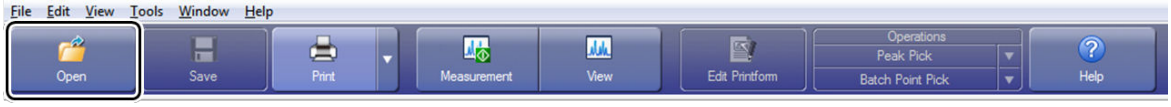
2 Click [Edit Printform] on the main toolbar.

The window changes to edit print form mode.



Main Toolbar

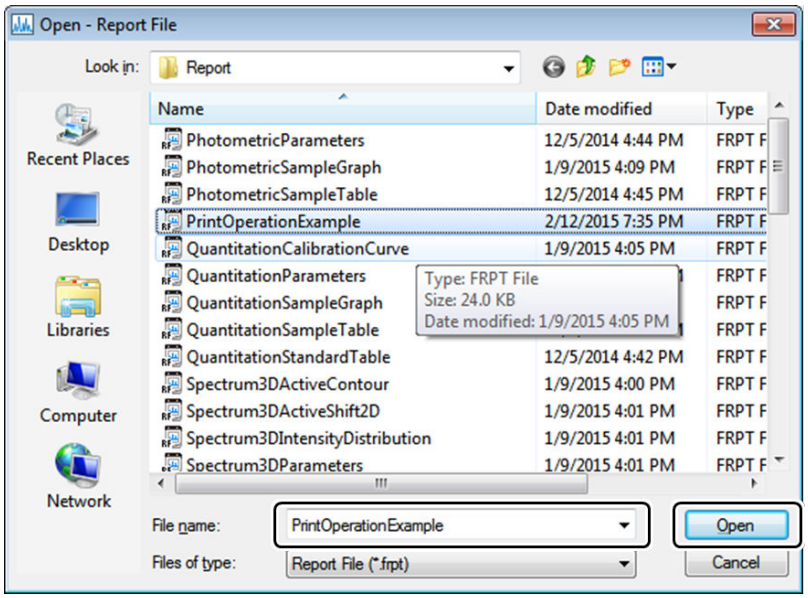
3 Click [Open] on the main toolbar.



Main Toolbar

4 Select a file and click [Open].

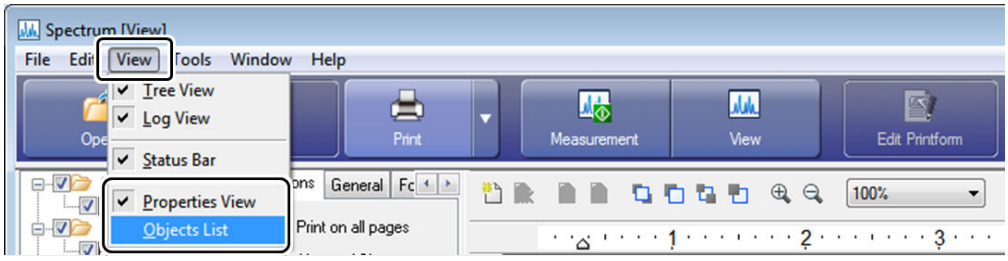
In this example, select "\Report\PrintOperationExample.frpt".



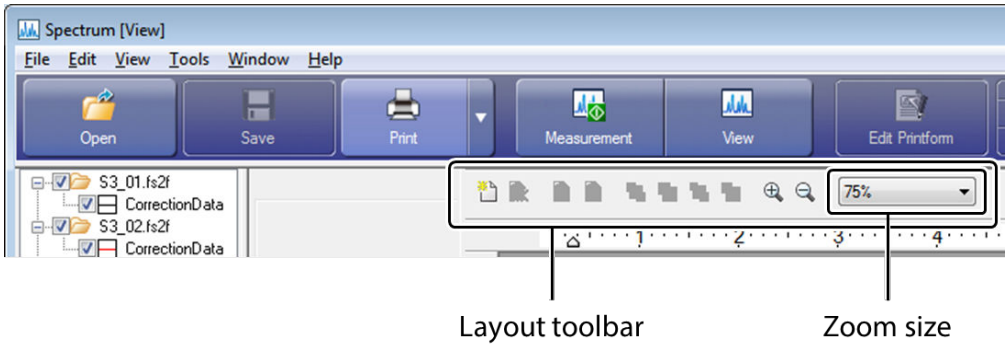
[Open] Window

Hint The folder shown for [Look in] when the [Open] window is displayed is the folder specified for [Destination Folder] on the [Tools] menu.

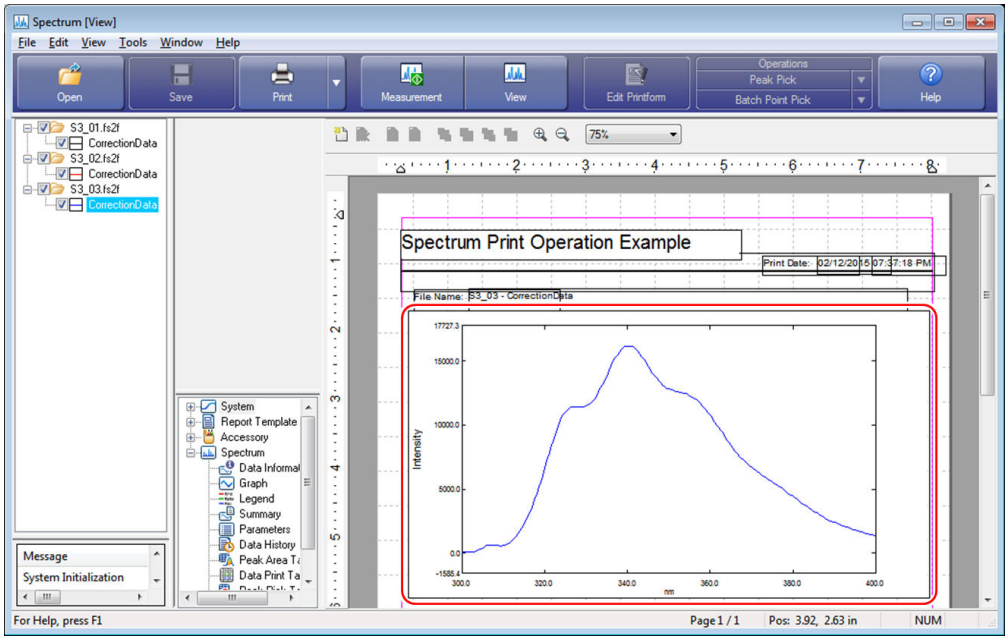
5 Open the [View] menu and put checkmarks on [Properties View] and [Objects List].



6 Change the zoom size on the layout toolbar to [75%].



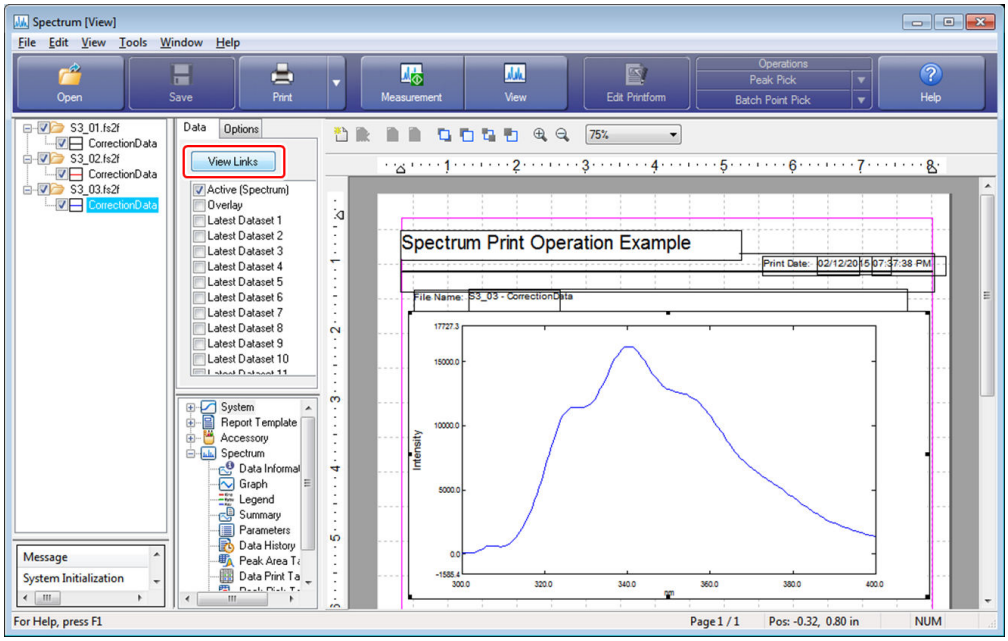
7 Click the graph object in the report editing area.



Report Object Properties

The properties of the graph object are displayed in the window.

8 Click [View Links] on the [Data] tab.

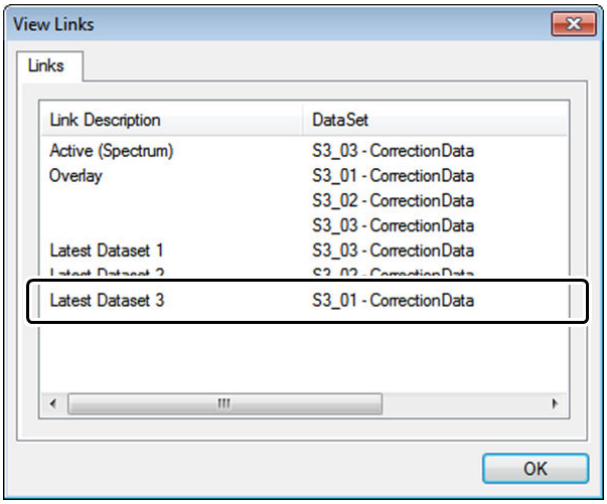


Selecting [View Links]

The [View Links] window is displayed.

9 **Check that the spectrum targeted for printing is displayed as follows and click [OK].**

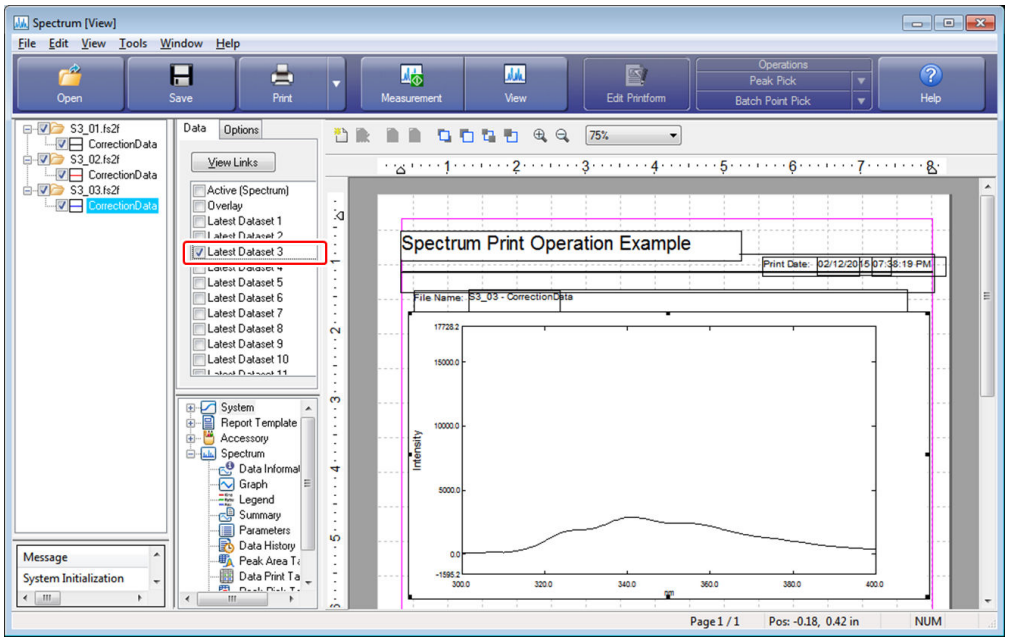
[Latest Dataset 3]: S3_01- CorrectionData



[View Links] Window

10 **Select the [Latest Dataset 3] checkbox in the data list on the [Data] tab.**

This displays the spectrum of "S3_01.fs2f" on the upper graph object in the report.



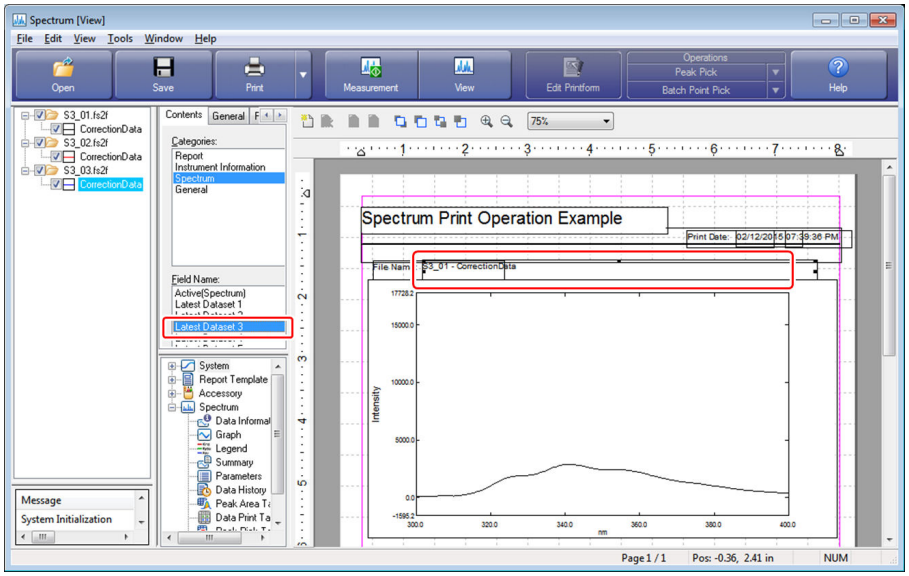
Changing the Upper Graph object

Hint When a latest spectrum data is selected, the scale of the overlay graph in view mode is used as the graph scale.

11 Click the linked text object that displays the filename and then double-click [Latest Dataset 3] in the [Field Name] data list.

The filename of "S3_01 - CorrectionData" is displayed on the linked text object.

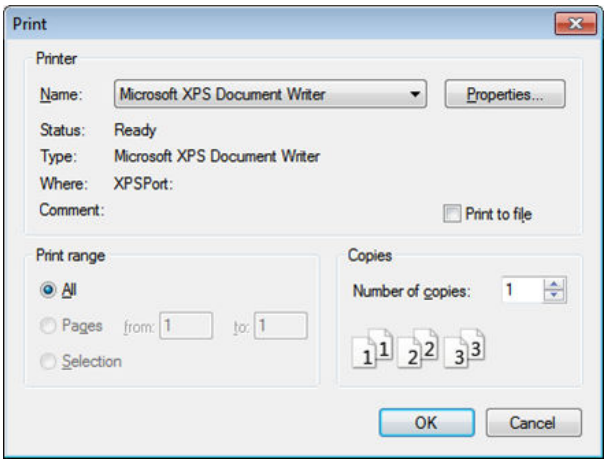
Hint The display format of the displayed filename is the display format of the dataset set via [User Settings] on the [Tools] menu in view mode window.



Changing the Lower Graph object

12 Click [Print] on the main toolbar.

The [Print] window is displayed.



[Print] Window

Hint When [Print Preview] is displayed on the main toolbar, click ▼ to select [Print].

13 Click [OK] to print.

10.3 Creating Report Files

Create and edit report files in the edit print form mode of each analysis application.

This section explains the procedure for creating a report file that contains a layout of objects including the filename of the active data, a graph, data information, and a peak pick table.

Prepare spectrum data that has undergone peak pick and load the data in advance.

10.3.1 Configuring Page Settings and Editing Area User Settings

Configure the page settings of page size and margin and user settings of grid size of the editing area.

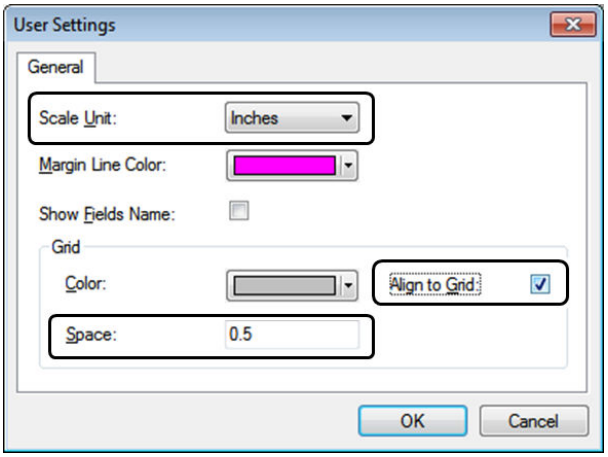
1 **Click [New] on the [File] menu in the edit print form mode of the spectrum application.**

The application changes to the state for creating a new report file.

2 **Click [User Setting] on the [Tool] menu.**

The [User Settings] window is displayed.

3 **Select [Inches] for [Scale Unit], enter "0.5" for [Space] under [Grid], and select the [Align to Grid] checkbox.**



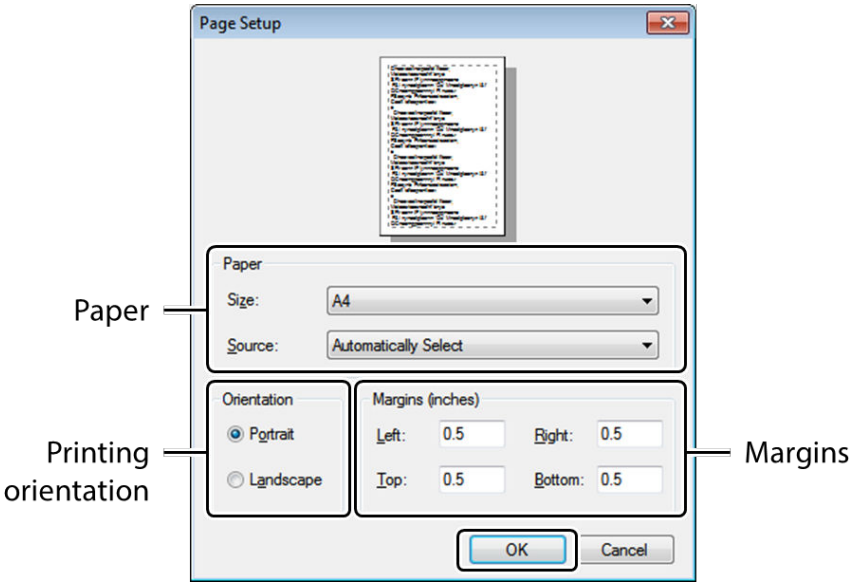
[User Settings] Window

4 **Click [OK].**

5 **Click [Page Setup] on the [File] menu.**

The [Page Setup] window is displayed.

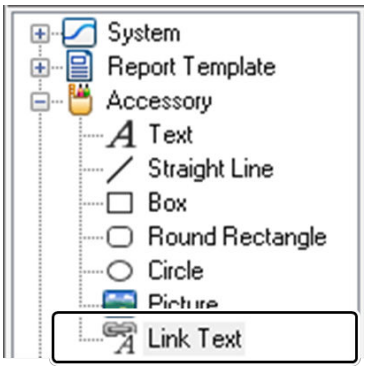
6 **Set the [Paper], [Orientation], and [Margins] settings and click [OK].**



[Page Setup] Window

10.3.2 Placing an Object for Printing the Filename

Use [Link Text] to print the filename of the active spectrum.



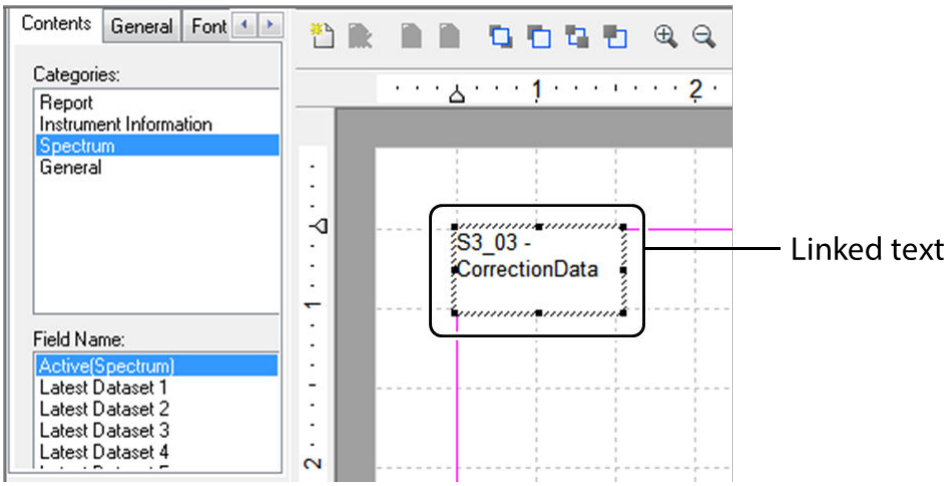
[Link Text]

1 **Drag and drop [Accessory] - [Link Text] in the objects list to the desired location in the editing area.**

Hint This item can also be placed in the editing area by double-clicking on the object item in the objects list.

2 Display the filename of the active spectrum on the linked text item.

1. Click the [Contents] tab (on the properties display of the inserted linked text object) in the property view.
2. Click [Spectrum] in the [Categories] list.
3. Double-click [Active(Spectrum)] in the [Field Name] list.



Displaying the Filename

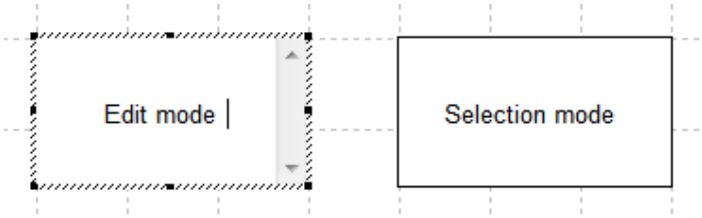
Hint The display format of the displayed filename is the display format selected via [User Settings] on the [Tools] menu in view mode.

3 Click on the [Font] tab in the properties view and set the type and size of the text font.

4 **Adjust the position of the linked text and size of the layout frame using the mouse.**

Hint

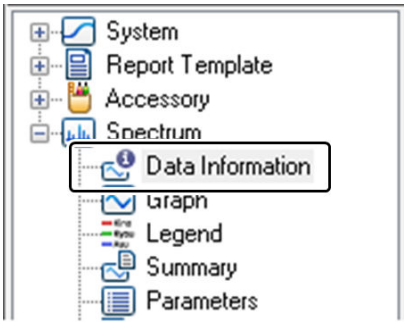
- Aligning the mouse over any of the handles (■) around the layout frame for edit mode or selection mode changes the mouse cursor to an arrow. The size of the linked text can be changed in the direction of the arrow by dragging in this state.
- Aligning the mouse over the layout frame in edit mode or on an object in selection mode will display crossed arrows under the mouse cursor or change the mouse cursor itself into crossed arrows. The position of linked text can be moved by dragging in this state.



Layout Frames

10.3.3 Placing a Data Information Object

Use data information objects to print data information (such as analysis date and time and sample name) of the active spectrum.

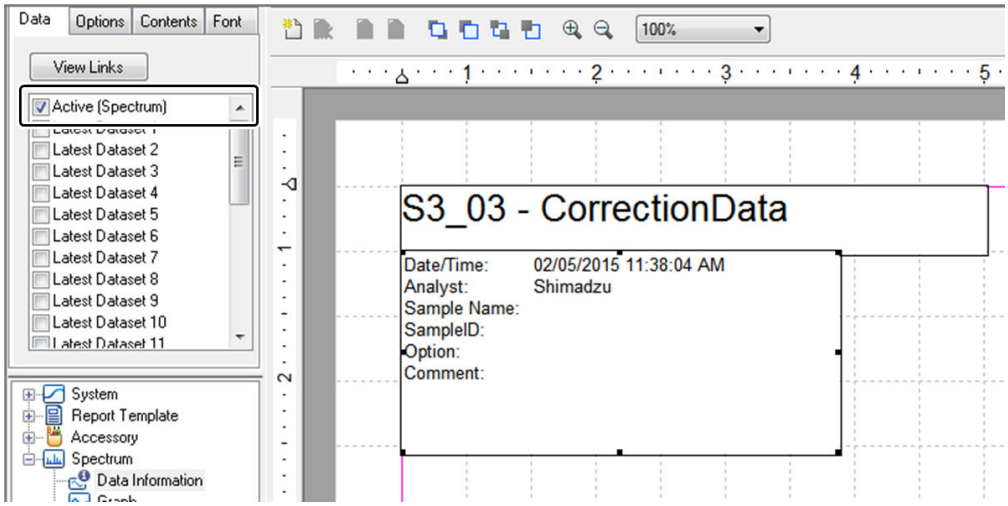


[Data Information]

1 **Drag and drop [Spectrum] - [Data Information] in the objects list to the desired location in the editing area.**

Hint This item can also be placed in the editing area by double-clicking on the object item in the objects list.

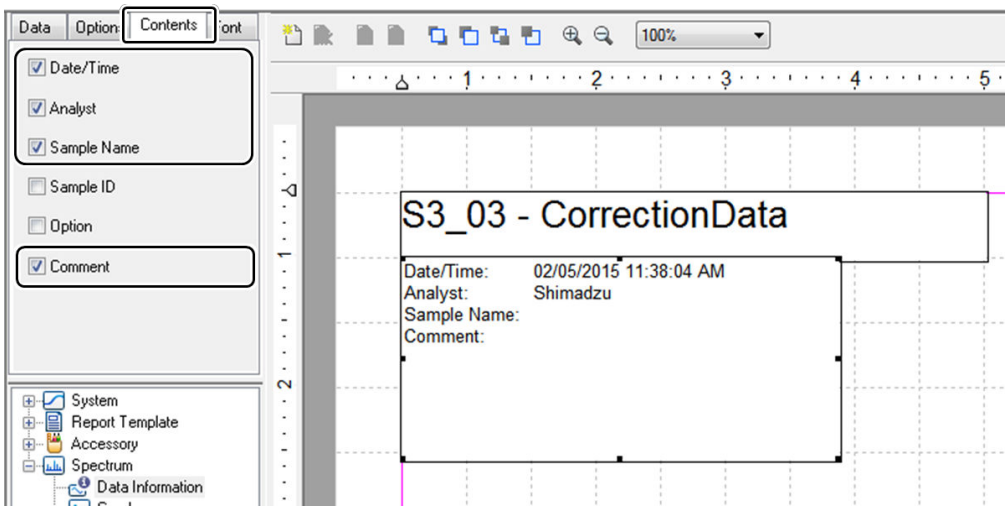
2 **Select the [Active (Spectrum)] checkboxes on the [Data] tab in the properties view.**



Specifying the Active Spectrum

3 **Select the [Date/Time], [Analyst], [Sample Name], and [Comment] checkboxes on the [Contents] tab in the properties view.**

The selected items are displayed in the data information object.

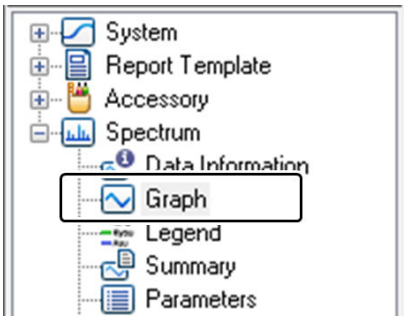


Displaying Data Information

4 **Adjust the position of the data information object and size of the layout frame using the mouse.**

10.3.4 Placing a Graph Object

Use a graph object to print a graph of the active spectrum.

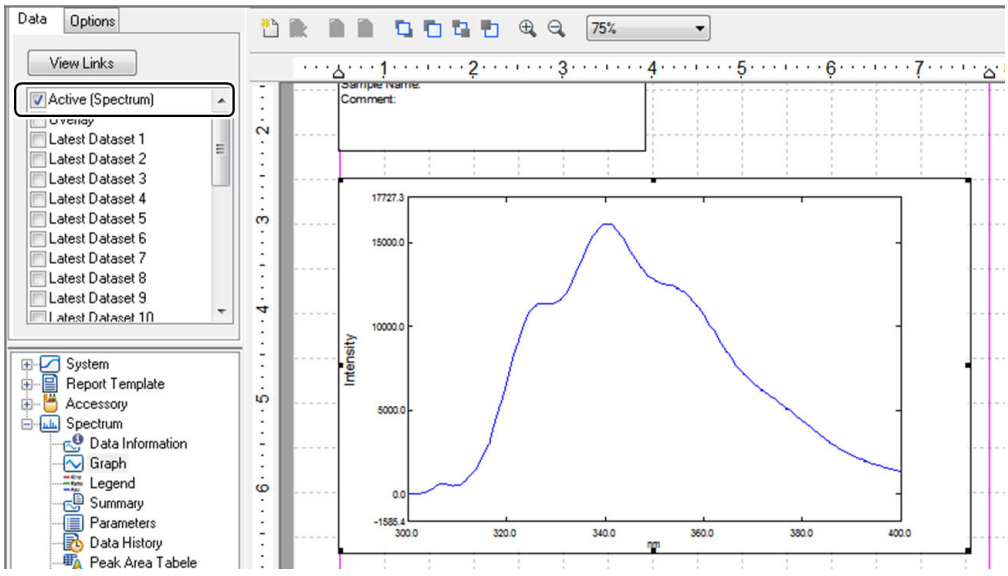


[Graph]

1 **Drag and drop [Spectrum] - [Graph] in the objects list to the desired location in the editing area.**

Hint This item can also be placed in the editing area by double-clicking on the object item in the objects list.

2 **Check that the [Active (Spectrum)] checkbox on the [Data] tab in the properties view is selected.**

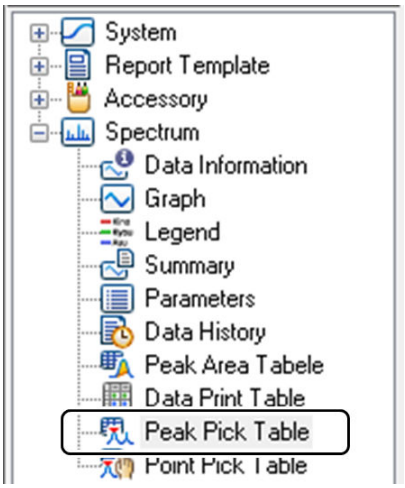


Specifying the Active Spectrum

3 **Adjust the position of the graph object and size of the layout frame using the mouse.**

10.3.5 Placing a Peak Pick Table Object

Use a peak pick table object to print the peak pick results of the active spectrum.

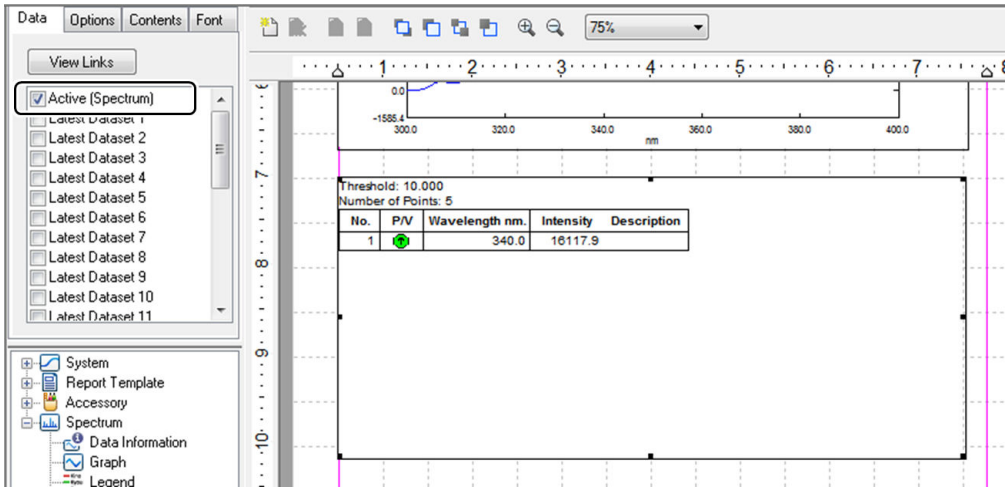


[Peak Pick Table]

1 **Drag and drop [Spectrum] - [Peak Pick Table] in the objects list to the desired location in the editing area.**

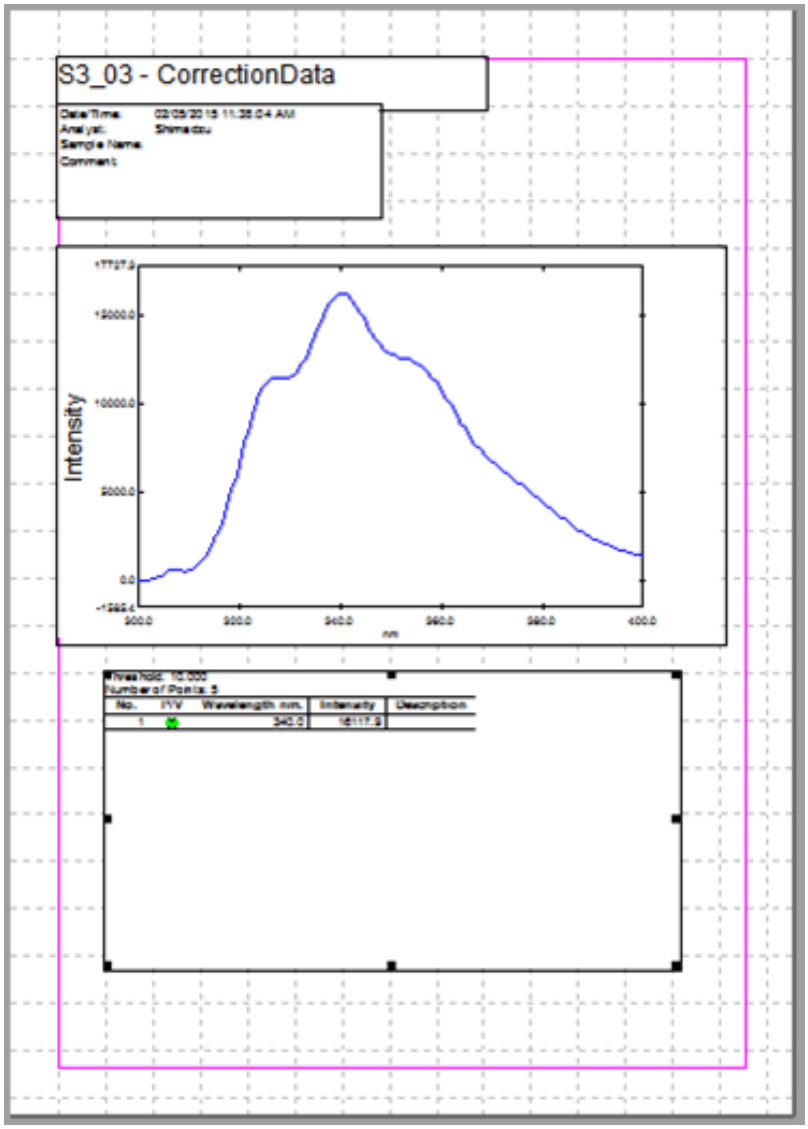
Hint This item can also be placed in the editing area by double-clicking on the object item in the objects list.

2 **Check that the [Active (Spectrum)] checkbox on the [Data] tab in the properties view is selected.**



Specifying the Active Spectrum

3 **Adjust the position of the peak pick table object and size of the layout frame using the mouse.**



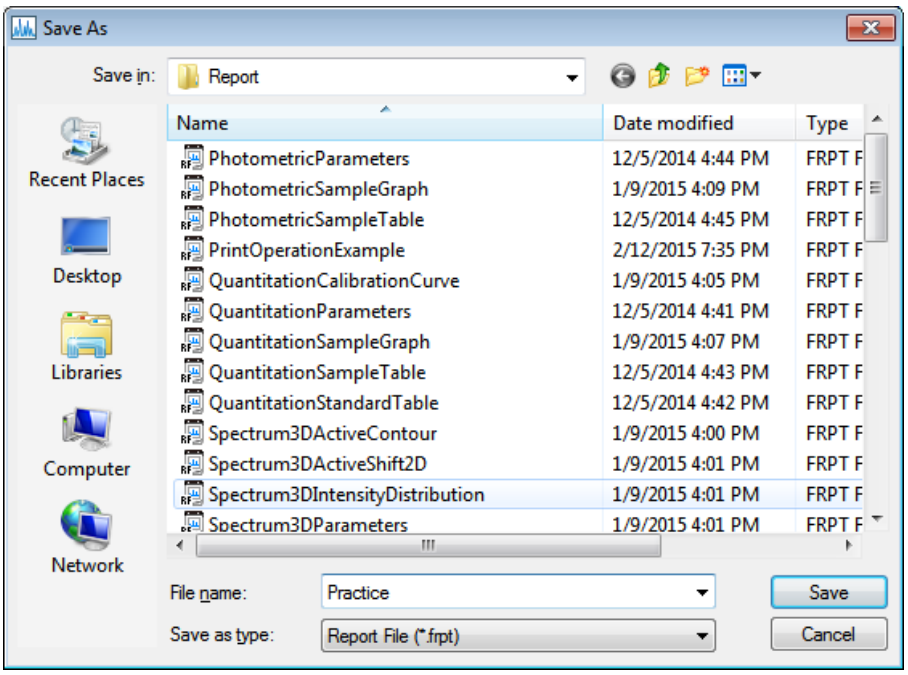
Example of Printing Object Layout

Hint The displayed column (row) width of the peak pick table is linked to the column width of the peak pick table in the view mode window.

10.3.6 Saving a Report File

1 **Click [Save As] on the [File] menu.**
The [Save As] window is displayed.

2 **Enter a filename and click [Save].**
A report file is saved to the specified folder.



[Save As] Window

Hint The folder shown for [Save in] when the [Save As] window is displayed is the folder specified for [Destination Folder] on the [Tools] menu.

11 Quantum Yield

This chapter explains how to operate the dedicated analysis application for quantum yield.

Reference For cases and functions not covered in this chapter, refer to the help file provided with LabSolutions RF.

■ Explanations Included in this Chapter

This chapter explains the procedures for measuring sample fluorescence spectra and calculating quantum yield, changing the settings of display items in the results table, and printing reports.

■ Functions Used in this Chapter

The following functions are used in the quantum yield measurement program.

- Configuring measurement and instrument parameters
- Entering sample information and performing sample measurement
- Changing display items in the standard sample and unknown sample tables and setting the number of digits for displaying values
- Printing reports

11.1 Startup

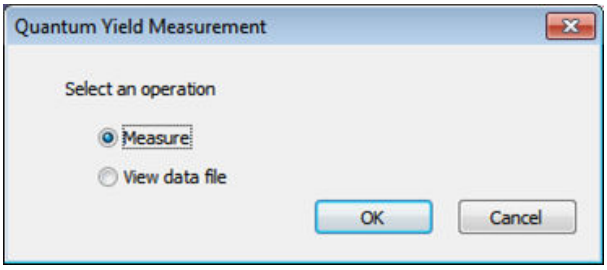
The quantum yield measurement program comprises a measurement mode and file check mode.

In measurement mode, a "preparation window" for performing tasks including configuring parameters for measurement and a "measurement window" for checking measurement results are used.

In file check mode, the content of opened data files can be viewed in the "measurement window".

1 **Click [Quantum yield] on the [Fluorescence] tab in the LabSolutions RF launcher.**

The dedicated analysis application for quantum yield starts and the [Quantum Yield Measurement] window is displayed.

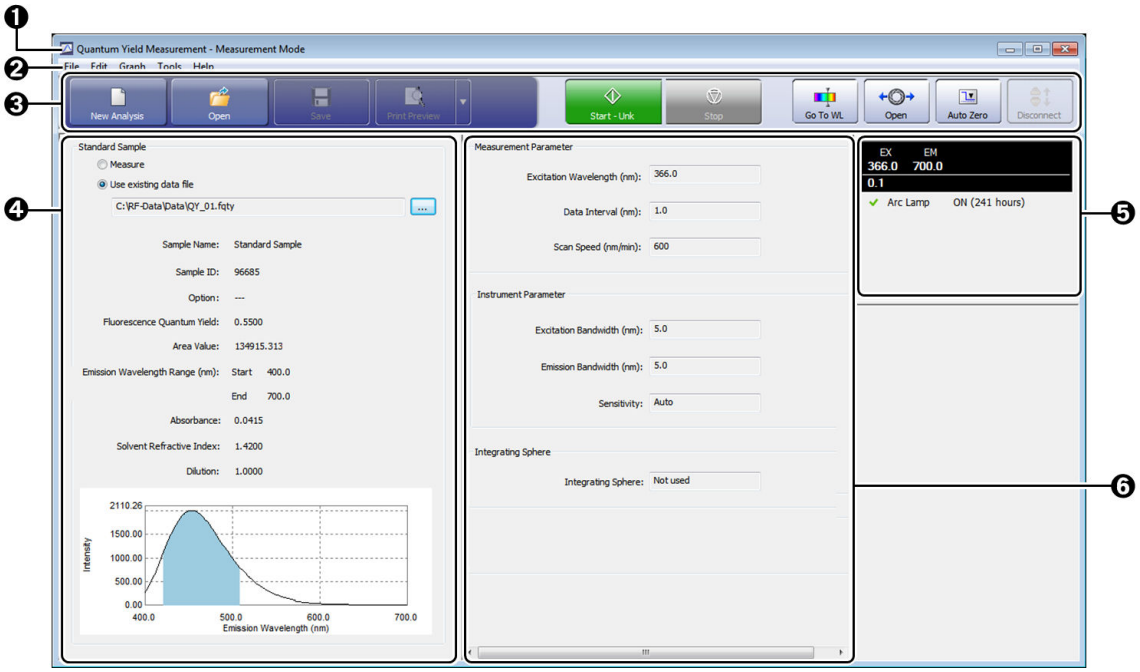


[Quantum Yield Measurement] Window

2 **Select an operation and click [OK].**

- Selecting [Measure] displays the preparation window in measurement mode.
- Selecting [View data file] displays the measurement window in file check mode.

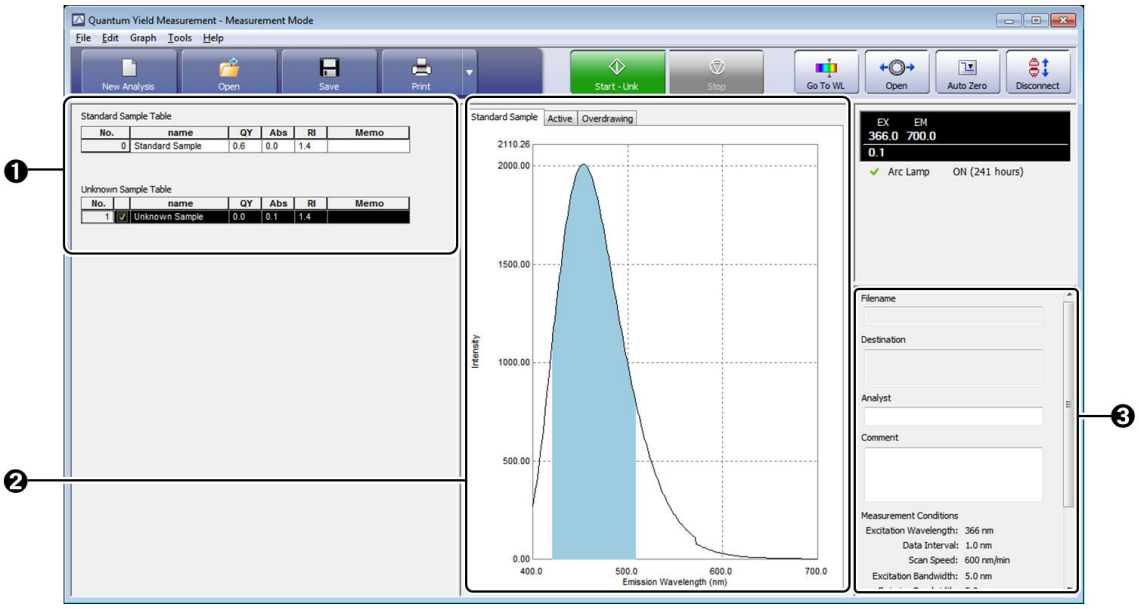
11.1.1 Preparation Window Layout



Quantum Yield - "Preparation Window"

No.	Name	Function
❶	Title bar	Displays the application name and window mode ("Measurement Mode" or "File Check Mode").
❷	Menu bar	Displays the application menus. Selecting a menu along the bar displays multiple command menus. The displayed command menus differ depending on the application type and window mode.
❸	Main toolbar	Displays tool buttons for executing main functions, such as starting and stopping measurement, performing file operations, and printing.
❹	Standard sample view	For the standard sample, set whether to perform a new measurement or use previously measured standard sample data.
❺	Instrument status	The upper section displays the current wavelength and fluorescence intensity and the lower section displays the current status of the spectrofluorophotometer. ▶▶ Reference For details on the instrument status, see "2.3.3 Instrument Status" P.23.
❻	Parameter view	Set the various parameters required for measurement.

11.1.2 Measurement Window Layout



Quantum Yield - "Measurement Window"

No.	Name	Function
❶	Analysis result view	Displays the analysis results in a standard table and unknown sample table.
❷	File information view	Displays file information (such as filename, analyst name, and measurement conditions) on a data file being measured or an open data file.
❸	Graph view	Displays the fluorescence spectrum graph of the standard sample and unknown samples. • [Standard Sample] tab Displays the fluorescence spectrum of the standard sample. • [Active] tab Displays the fluorescence spectrum of the selected unknown sample. Select an unknown sample by clicking on a row in the unknown sample table. • [Overdrawing] tab Displays the fluorescence spectrum of any unknown samples. Whether to overlay the graph of each unknown sample can be performed by selecting the corresponding checkbox in the unknown sample table.

11.2 Preparation for Analysis

Measure the fluorescence spectrum of the sample to prepare for quantum yield calculation.

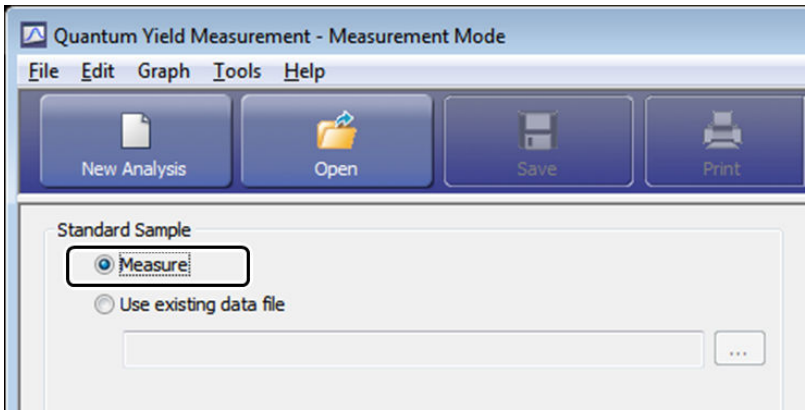
This section explains how to configure the standard sample settings and analysis parameters.

11.2.1 Setting the Standard Sample

A fluorescence spectrum of a standard sample with a known quantum yield value is required to determine the quantum yield of an unknown sample.

■ When measuring the fluorescence spectrum of a standard sample

When measuring the fluorescence spectrum of a standard sample prior to measuring the fluorescence spectrum of an unknown sample, select [Measure] under [Standard Sample].

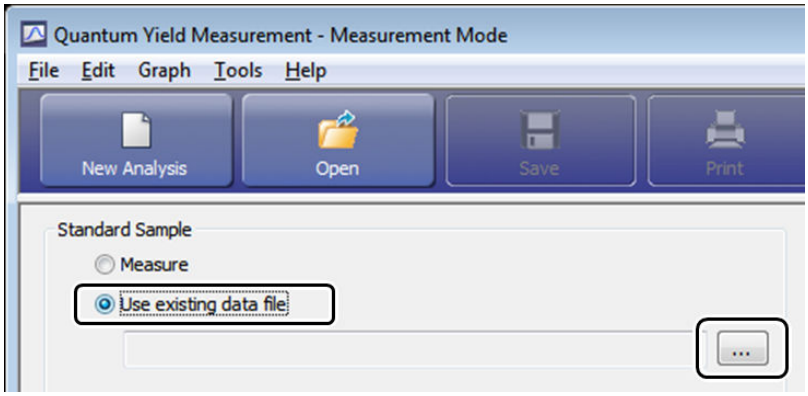


Standard Sample View (Preparation Window)

■ When using a previously measured standard sample fluorescence spectrum

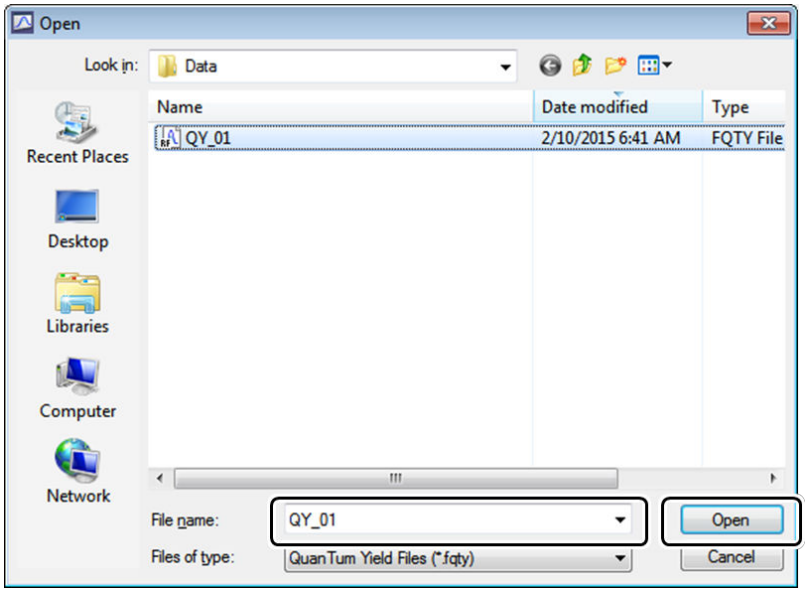
To reference previous measurement data without measuring a new standard sample fluorescence spectrum, use the following procedure.

1 **Select [Use existing data file] and click [...].**



Standard Sample View (Preparation Window)

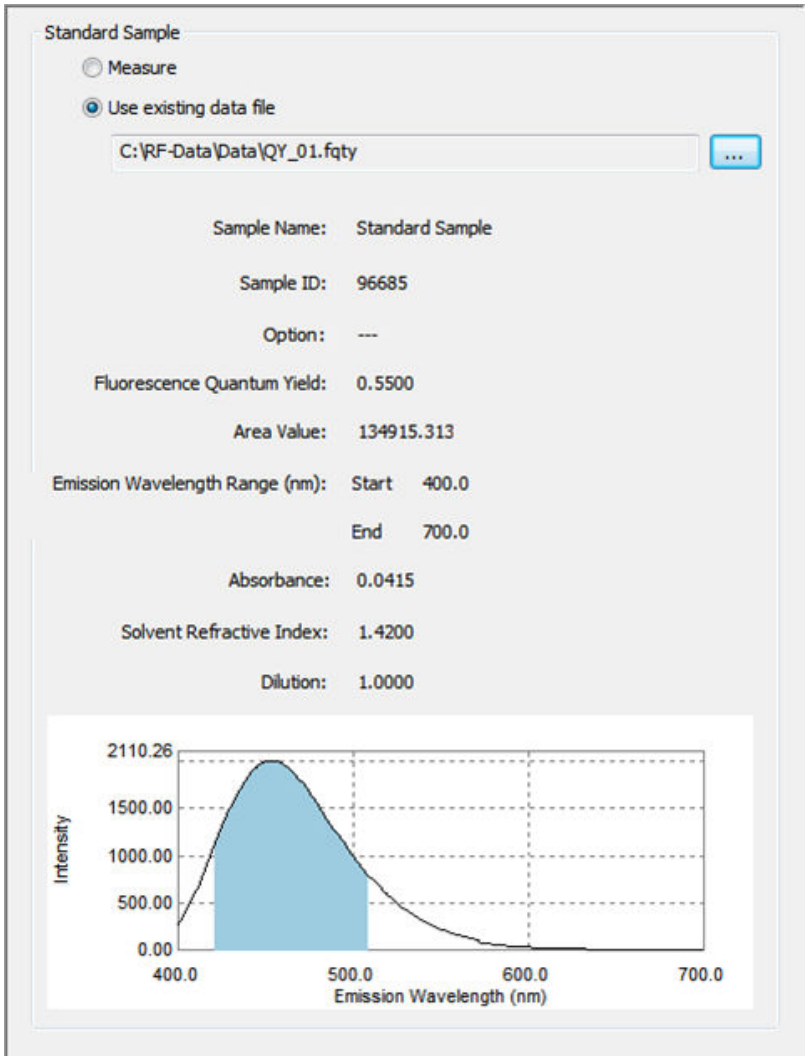
2 **Select the quantum yield data file to use as the standard sample data and click [Open].**



[Open] Window

3 **Select the quantum yield data file (.fqty) to use as standard sample data from the relevant folder.**

Selecting a quantum yield data file loads the information on the standard sample contained in the file and displays the information under [Standard Sample].



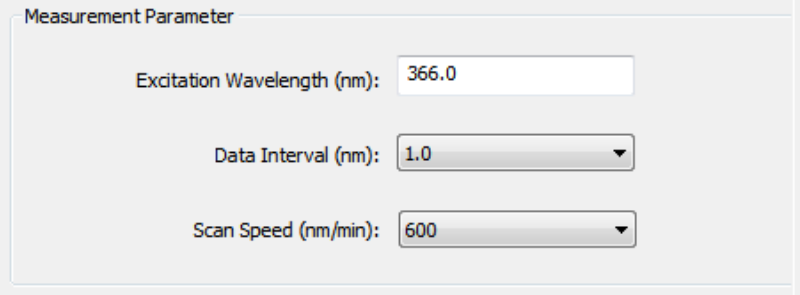
Standard Sample View (Preparation Window)

11.2.2 Setting Analysis Parameters

When [Measure] is selected under [Standard Sample], set the analysis parameters according to the following procedure.

Hint When [Use existing data file] is selected under [Standard Sample], the analysis parameters are automatically set to the same settings in the loaded data file and therefore do not require configuration.

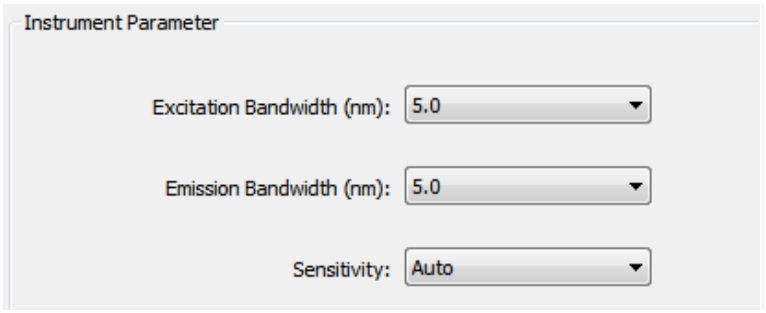
1 Set the parameters under [Measurement Parameter].



Measurement Parameters (Parameter View)

Measurement Parameter	Setting
[Excitation Wavelength]	366 (nm)
[Data Interval]	1.0 (nm)
[Scan Speed]	600 (nm/min)

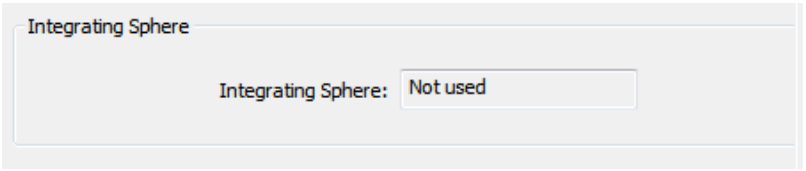
2 Set the parameters under [Instrument Parameter].



Instrument Parameters (Parameter View)

Instrument Parameter	Setting
[Excitation Bandwidth]	5.0 (nm)
[Emission Bandwidth]	5.0 (nm)
[Sensitivity]	Auto

3 Set the integrating sphere setting under [Integrating Sphere].



Integrating Sphere (Parameter View)

Instrument Parameter	Setting
[Integrating Sphere]	Not used

11.3 Entering Sample Information and Performing Sample Measurement

11.3.1 Measuring the Standard Sample

When [Measure] is selected under [Standard Sample], measure the standard sample first. Standard sample measurement is not performed when [Use existing data file] is selected under [Standard Sample]. In this case, proceed to "11.3.2 Measuring the Unknown Sample" P.169.

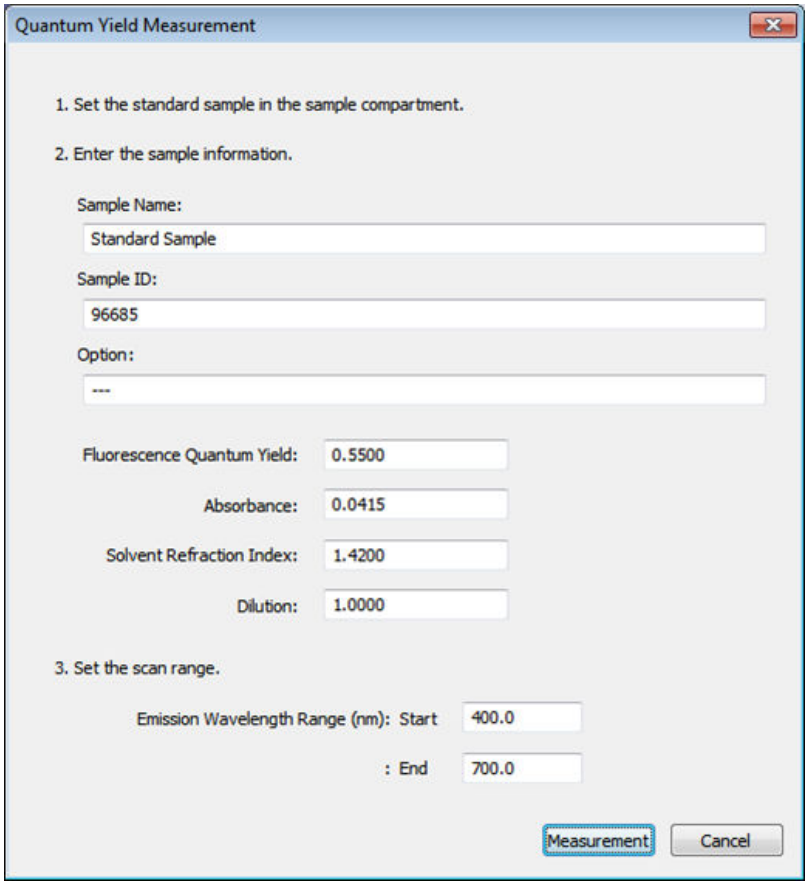
1 **Set the standard sample into the sample compartment.**

2 **Click [Start - Std].**

The "preparation window" changes to the "measurement window" and the [Quantum Yield Measurement] window is displayed.

Starting Standard Sample Measurement (Main Toolbar)

3 Enter the sample information and scan range.

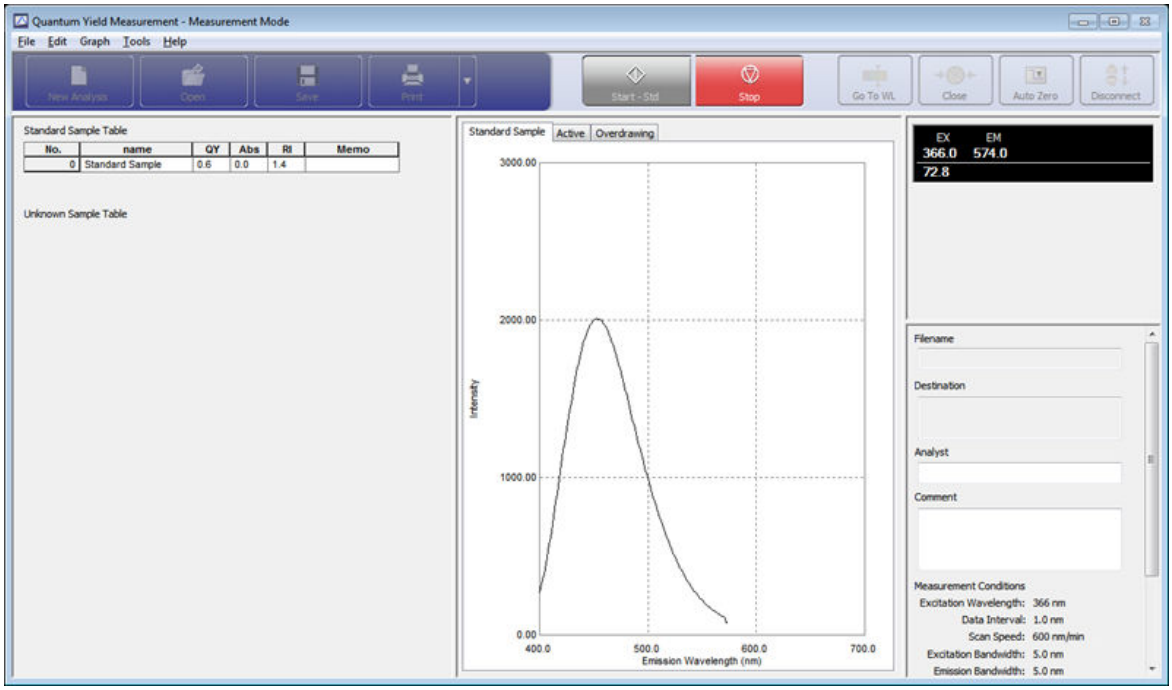


[Quantum Yield Measurement] Window (Entering Standard Sample Information)

Standard Sample Information	Setting
[Sample Name]	Standard Sample
[Sample ID]	96685
[Option]	---
[Fluorescence Quantum Yield]	0.55
[Absorbance]	0.0415
[Solvent Refraction Index]	1.4200
[Dilution]	1.0000
[Emission Wavelength Range]	[Start]: 400.0 (nm), [End]: 700.0 (nm)

4 Click [Measurement].

Measurement of the fluorescence spectrum of the standard sample starts. The captured data is graphed in real time.



Measurement Window

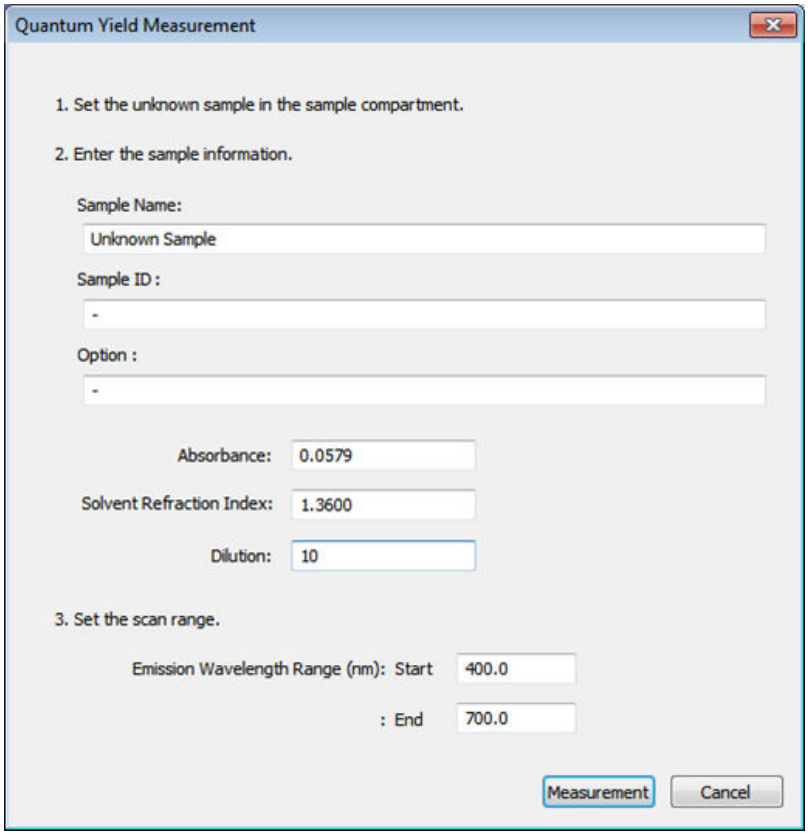
11.3.2 Measuring the Unknown Sample

When measurement of the standard sample is complete, measure the unknown sample.

1 **Set the unknown sample into the sample compartment.**

2 **Click [Start - Unk].**

3 **Enter the sample information and scan range.**

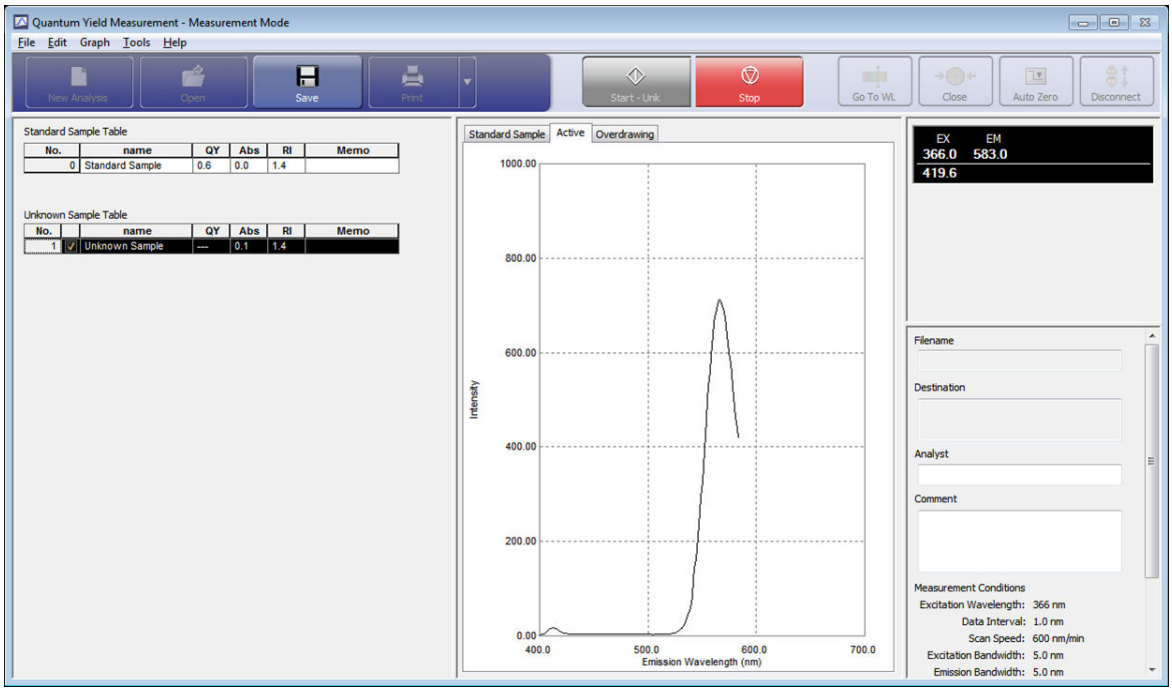


[Quantum Yield Measurement] Window (Entering Unknown Sample Information)

Unknown Sample Information	Setting
[Sample Name]	Unknown Sample01
[Sample ID]	-
[Option]	-
[Absorbance]	0.0579
[Solvent Refractive Index]	1.36
[Dilution]	10
[Emission Wavelength Range]	[Start]: 400.0 (nm), [End]: 700.0 (nm)

4 Click [Measurement].

Measurement of the fluorescence spectrum of the unknown sample starts. The captured data is graphed in real time.



"Measurement Window"

11.4 Performing Additional Unknown Sample Measurements

To continue measuring multiple unknown samples, use [Start - Unk] on the toolbar.

1 **Set the unknown sample into the sample compartment.**

2 **Click [Start - Unk].**
The [Quantum Yield Measurement] window is displayed.

3 **Perform steps 3 and 4 in** **"11.3.2 Measuring the Unknown Sample" P.169****.**

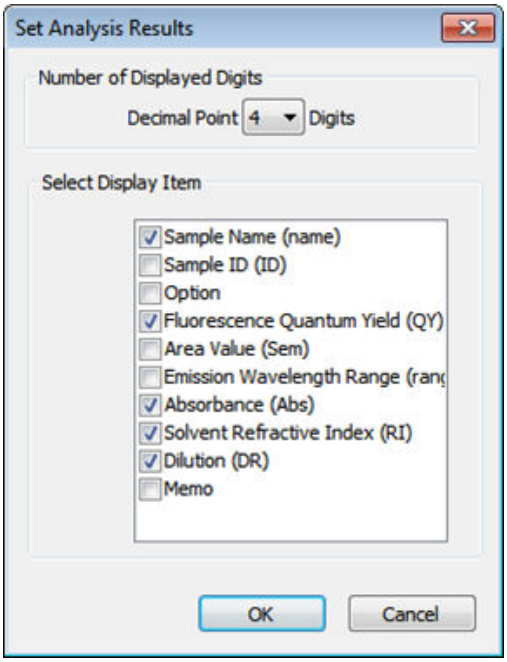
11.5 Changing the Items Displayed in the Analysis Result Table

Change the items displayed in the analysis result table in the "measurement window" as well as the number of digits used to display calculation results.

1 Click [Set Analysis Results] on the [Tools] menu.

The [Set Analysis Results] window is displayed.

Set the number of displayed digits and whether to show or hide display items.



[Set Analysis Results] Window

Item	Setting	
[Number of Displayed Digits]	4	
[Select Display Item]	[Sample Name (name)]	Selected
	[Sample ID (ID)]	Unselected
	[Option]	Unselected
	[Fluorescence Quantum Yield (QY)]	Selected
	[Area Value (Sem)]	Unselected
	[Emission Wavelength Range (range)]	Unselected
	[Absorbance (Abs)]	Selected
	[Solvent Refractive Index (RI)]	Selected
	[Dilution (DR)]	Selected
	[Memo]	Unselected

11.6 Printing

This section explains how to print reports of measurement results.

There are two types of reports that can be printed: detailed reports and summary reports.

11.6.1 Printing a Detailed Report

In detailed report printing, a detailed report for the standard sample or any unknown sample is printed.

■ Printing a detailed report of the standard sample

1 **Click the [Standard Sample] tab in the graph view.**

The standard sample graph is displayed.

2 **Click [Print] on the main toolbar.**

The [Print] window is displayed.

3 **Confirm that the printer for output is correct and click [OK].**

A detailed report for the standard sample is printed.

■ Printing a detailed report of an unknown sample

1 **Click the [Active] tab in the graph view.**

2 **Click a row in the unknown sample table to select the unknown sample for printing.**

3 **Click [Print] on the main toolbar.**

The [Print] window is displayed.

4 **Confirm that the printer for output is correct and click [OK].**

A detailed report for the unknown sample graphed on the [Active] tab is printed.

11.6.2 Printing a Summary Report

In summary report printing, two types of layouts can be selected: table printing and simple table printing.

■ Printing using [Print Table]

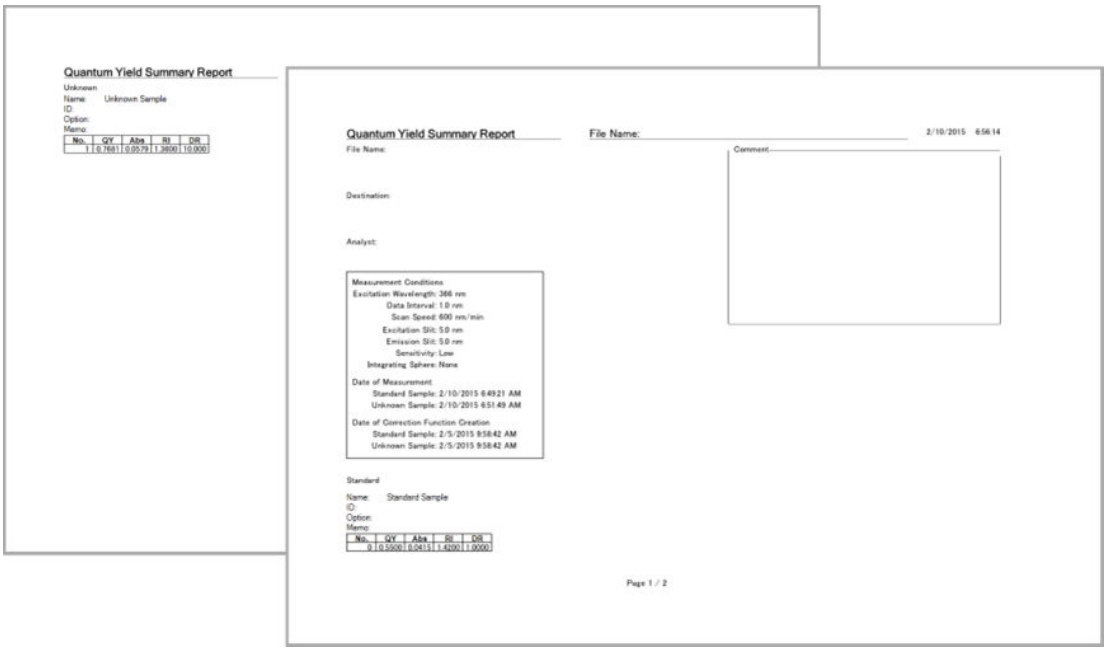
1 **Click [Print Layout] - [Print Table] (or [Print Simple Table]) on the [Tools] menu.**

2 **Click the [Overdrawing] tab in the graph view.**

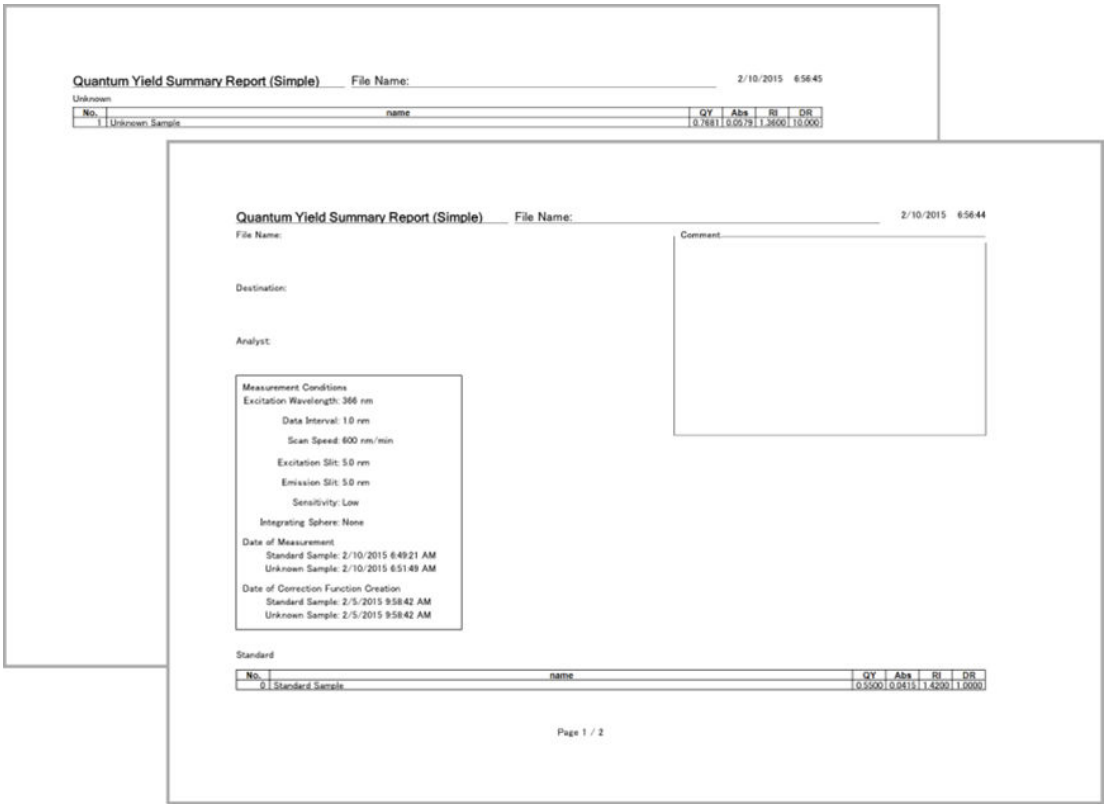
3 **Click [Print] on the main toolbar.**
The [Print] window is displayed.

4 **Confirm that the printer for output is correct and click [OK].**

Printing is executed.



Example of Printing with [Print Table]



Example of Printing with [Print Simple Table]

12 Quantum Efficiency

This chapter explains how to operate the special analysis application for quantum efficiency.

Reference For cases and functions not covered in this chapter, refer to the help file provided with LabSolutions RF.

■ Explanations Included in this Chapter

This application calculates quantum efficiency from the difference between the peak areas of a blank spectrum measured without a sample placed in the sample compartment (integrating sphere) and the sample spectrum measured with the sample in the sample compartment.

This chapter explains the procedures for measuring sample fluorescence spectra and calculating quantum efficiency, changing the area calculation range, and printing reports.

NOTE An integrating sphere must be installed in the sample compartment when performing measurement using this application.

■ Functions Used in this Chapter

The following functions are used in the quantum efficiency measurement program.

- Configuring measurement and instrument parameters
- Entering sample information and performing sample measurement
- Changing the area calculation range
- Printing reports

12.1 Startup

The quantum efficiency measurement program comprises a "measurement mode" and "file check mode".

In "measurement mode", a "preparation window" for performing tasks including configuring parameters for measurement and a "measurement window" for checking measurement results are used.

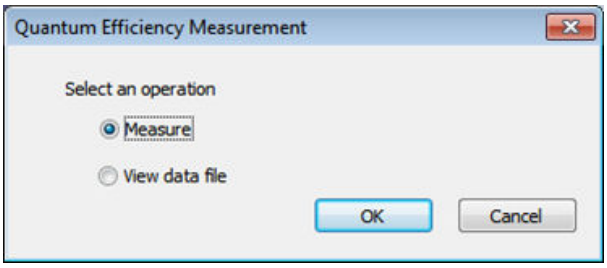
In "file check mode", the content of opened data files can be viewed in the "measurement window".

> **NOTE** An integrating sphere is required to perform measurement using this application. Only start this application after registering instrument information and installing an integrating sphere for which any required spectrum correction functions have been measured and saved.

Reference For details on registering instrument information, see "13.2 Registering an Integrating Sphere" P.196. For details on measuring and saving spectrum correction functions, see "13.3 Measuring Integrating Sphere Correction Functions" P.200.

1 Click [Quantum efficiency] on the [Fluorescence] tab in the LabSolutions RF launcher.

The special analysis application for quantum efficiency starts and the [Quantum Efficiency Measurement] window is displayed.

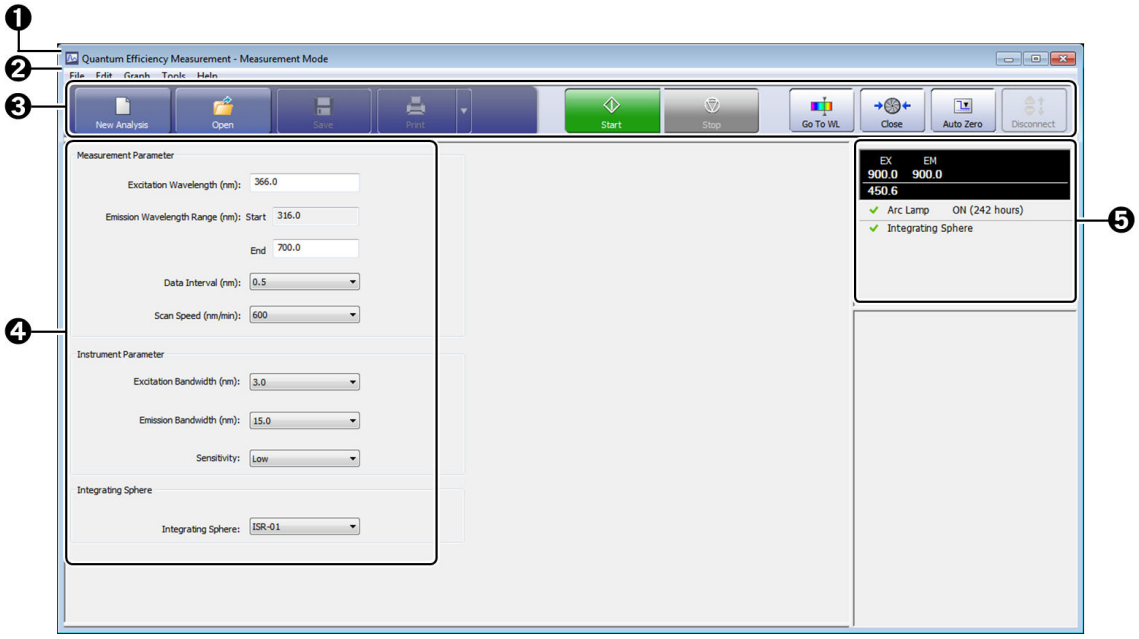


[Quantum Efficiency Measurement] Window

2 Select an operation and click [OK].

- Selecting [Measure] displays the preparation window in measurement mode.
- Selecting [View data file] displays the measurement window in file check mode.

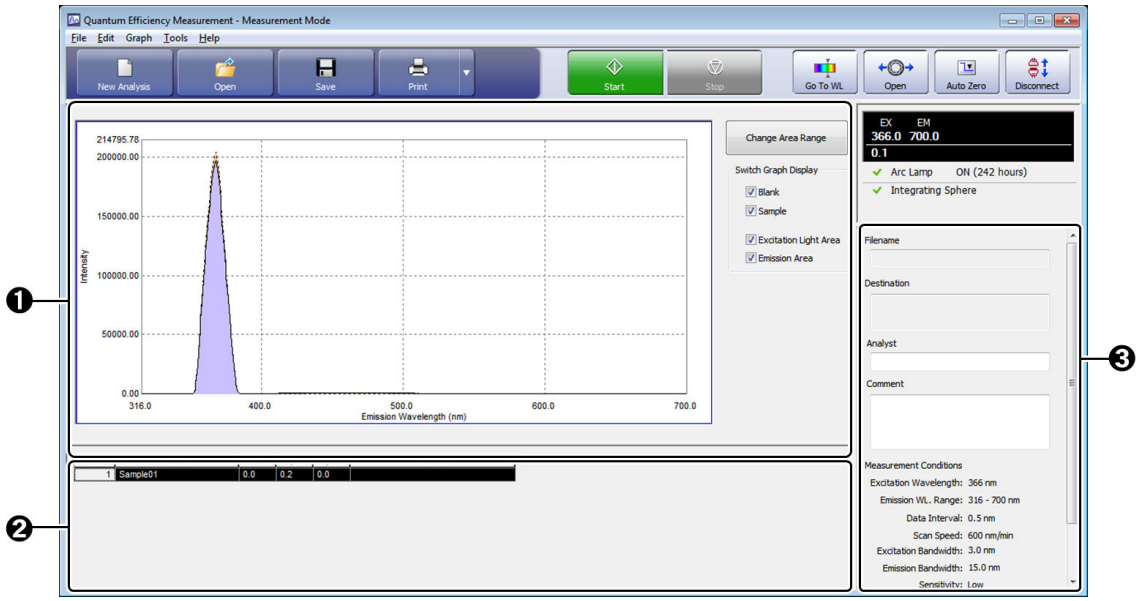
12.1.1 Preparation Window Layout



Quantum Efficiency - "Preparation Window"

No.	Name	Function
❶	Title bar	Displays the application name and window mode ("Measurement Mode" or "File Check Mode").
❷	Menu bar	Displays the application menus. Selecting a menu along the bar displays multiple command menus. The displayed command menus differ depending on the application type and window mode.
❸	Main toolbar	Displays tool buttons for executing main functions, such as starting and stopping measurement, performing file operations, and printing.
❹	Parameter view	Set the various parameters required for measurement.
❺	Instrument status	The upper section displays the current wavelength and fluorescence intensity and the lower section displays the current status of the spectrofluorophotometer. ▶▶ Reference For details on the instrument status, see "2.3.3 Instrument Status" P.23.

12.1.2 Measurement Window Layout



Quantum Efficiency - "Measurement Window"

No.	Name	Function
❶	Graph view	Displays a spectrum graph of the sample. Making changes to the graph display, such as overlaying the blank spectrum or changing the peak area color, can be performed using the checkboxes on the right side of the graph. The wavelength range used in area calculation can also be changed by clicking [Change Area Range]. ▶▶ Reference "12.5 Changing the Graph Display Range" P.186
❷	Analysis result view	Displays the measurement results for the sample in a table. The items displayed in the table and the number of digits used to display calculation results can be changed via [Set Analysis Results] on the [Tools] menu.
❸	File information view	Displays information on the currently loaded data file. The analyst name and comments can be edited.

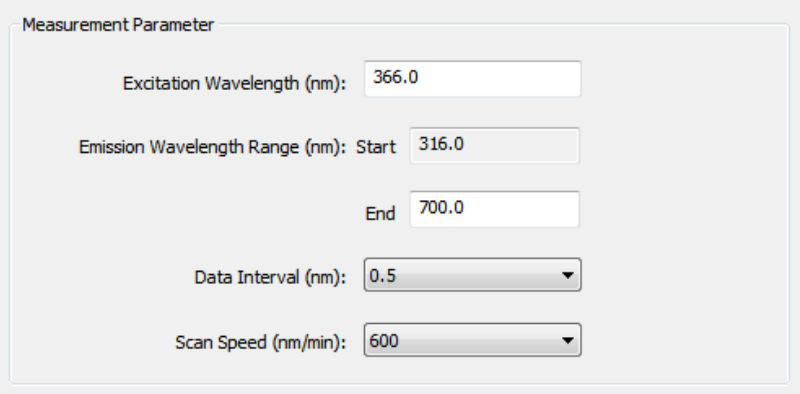
12.2 Preparation for Analysis

Measure the fluorescence spectrum of the sample to prepare for quantum efficiency calculation.

This section explains the how to configure the required analysis parameter settings.

12.2.1 Setting Analysis Parameters

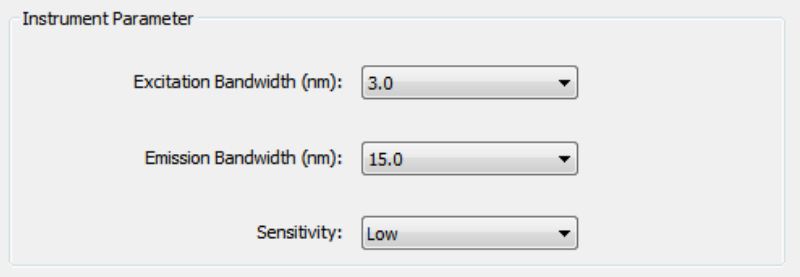
1 **Set the parameters under [Measurement Parameter].**



Measurement Parameters (Parameter View)

Measurement Parameter	Setting
[Excitation Wavelength]	366 (nm)
[Emission Wavelength Range]	[Start]: 316.0 (nm), [End]: 700.0 (nm) **Hint** The start wavelength is automatically calculated from the set excitation wavelength (excitation wavelength - 50 nm) and set.
[Data Interval	0.5 (nm)
[Scan Speed]	600 nm/min

2 Set the parameters under [Instrument Parameter].

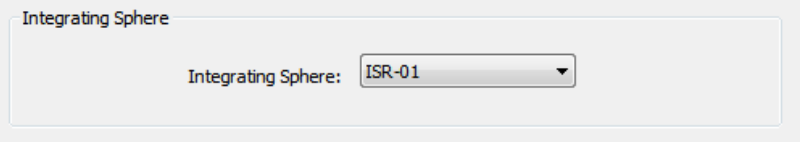


Instrument Parameters (Parameter View)

Instrument Parameter	Setting
[Excitation Bandwidth]	3.0 (nm)
[Emission Bandwidth]	15.0 (nm)
[Sensitivity]	Low

3 Set the integrating sphere setting under [Integrating Sphere].

The integrating spheres registered using the instrument registration tool are displayed. Select the integrating sphere to use from the list.



Integrating Sphere (Parameter View)

Instrument Parameter	Setting
[Integrating Sphere]	ISR-01

Hint The [Integrating Sphere] list displays the names of registered integrating spheres.

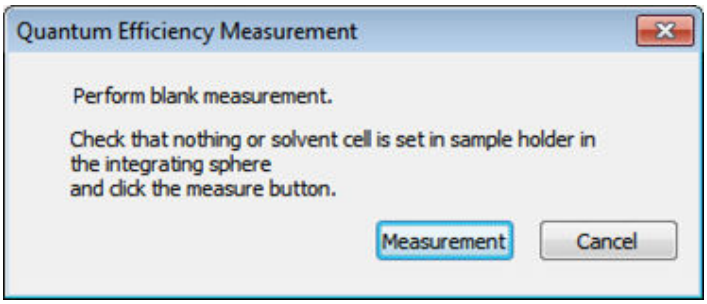
12.3 Entering Sample Information and Performing Sample Measurement

12.3.1 Blank Measurement

1 **Click [Start] on the main toolbar.**

A message is displayed to confirm that the sample compartment is configured for blank measurement.

2 **Check that no sample is set in the sample compartment and then click [Measurement].**

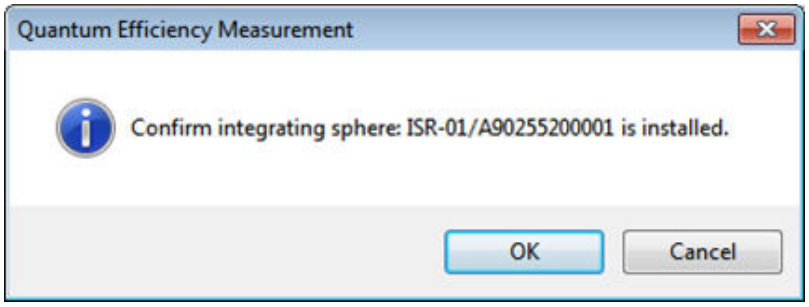


Sample Compartment Confirmation

A message is displayed to confirm whether the integrating sphere specified in the analysis parameters is installed.

> **NOTE** The correction function used differs depending on the integrating sphere. Be aware that incorrect data will be created if measurement is performed using an integrating sphere that differs from the integrating sphere selected in the analysis parameters.

3 **If the set integrating sphere is correct, click [OK].**



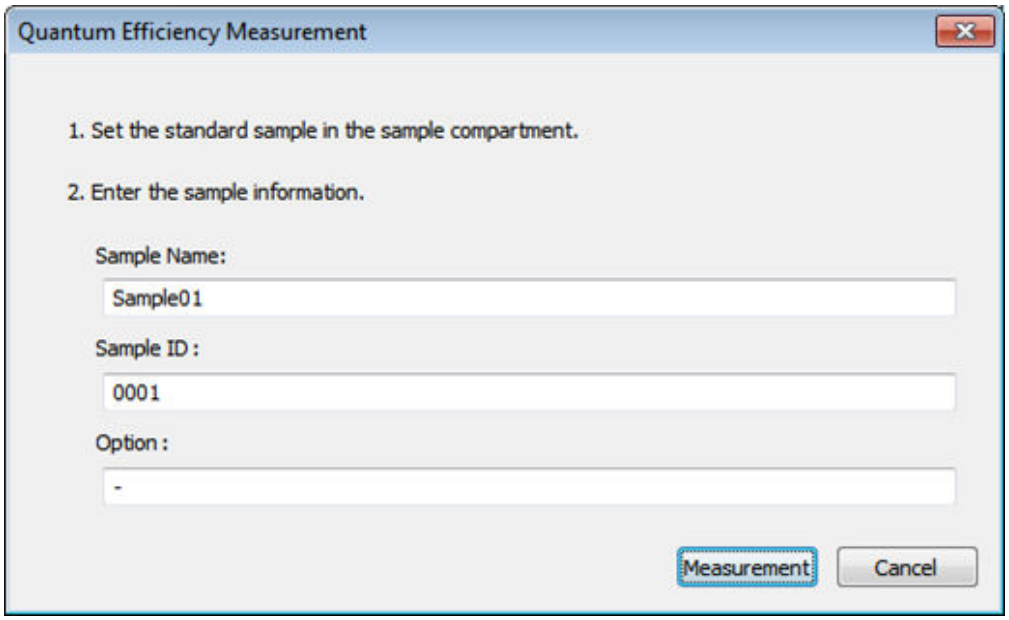
Integrating Sphere Confirmation

The "preparation window" changes to the "measurement window" and blank spectrum measurement starts.

12.3.2 Sample Measurement

When blank spectrum measurement is complete, the window for setting sample information is displayed.

1 **Set the sample into the integrating sphere and enter the sample information.**



Window for Setting Sample Information

Sample Information	Setting
[Sample Name]	Sample01
[Sample ID]	0001
[Option]	-

2 **Click [Measurement].**

Measurement of the fluorescence spectrum of the sample starts. The captured data is graphed in real time.

12.4 Performing Additional Sample Measurements

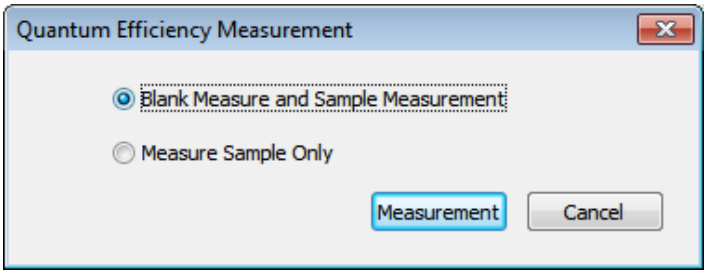
When measuring multiple samples, whether to perform blank spectrum measurement can be selected for the second and subsequent sample measurements.

12.4.1 When Performing Blank Spectrum Measurement Again

1 **Click [Start] on the main toolbar.**

A window is displayed for selecting whether to perform blank measurement.

2 **Select [Blank Measure and Sample Measurement] and click [Measurement].**



Blank Measurement Selection Window (When Performing Blank Measurement)

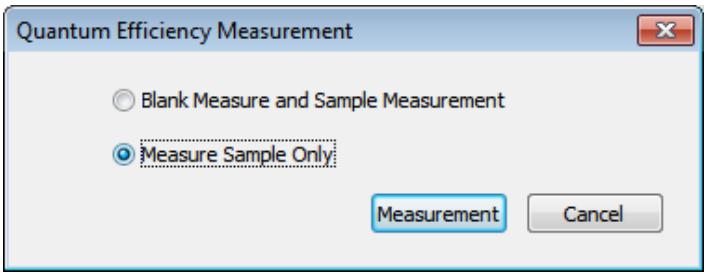
3 **Measure the blank spectrum and sample spectrum according to the procedure described in "12.3 Entering Sample Information and Performing Sample Measurement" P.182.**

12.4.2 When Skipping Blank Spectrum Measurement

1 **Click [Start] on the main toolbar.**

A window is displayed for selecting whether to perform blank measurement.

2 **Select [Measure Sample Only] and click [Measurement].**



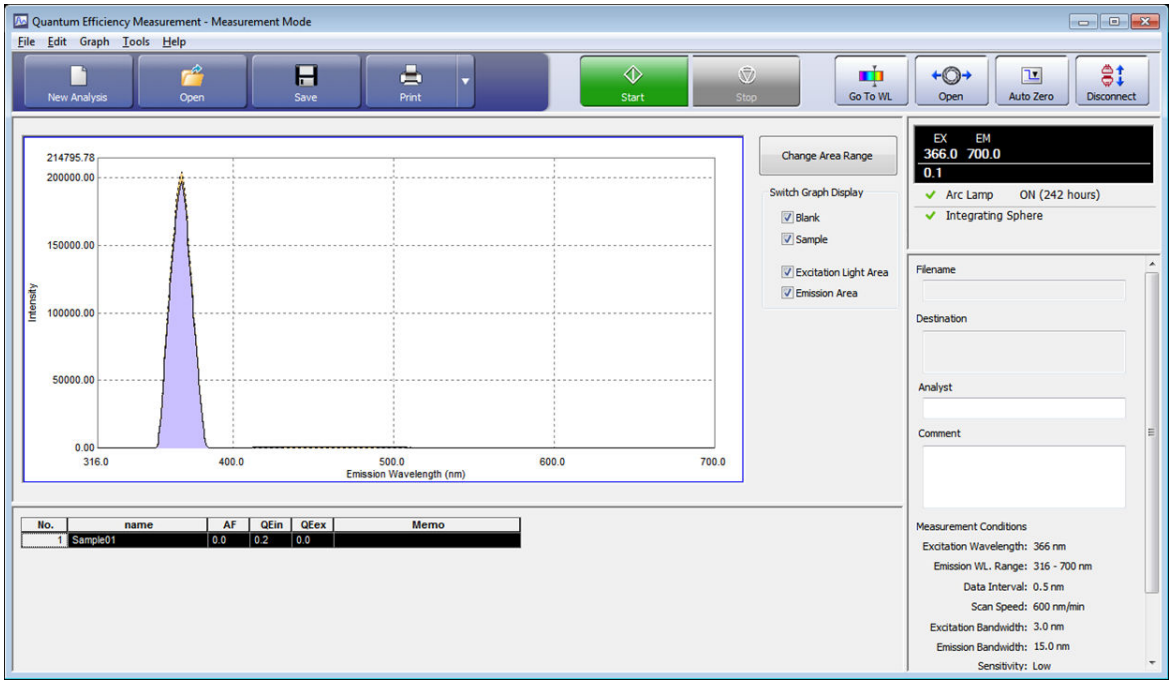
Blank Measurement Selection Window (When Skipping Blank Measurement)

3 **Measure the sample spectrum according to the procedure described in "12.3 Entering Sample Information and Performing Sample Measurement" P.182.**

NOTE This only performs sample measurement without performing blank spectrum measurement. The blank spectrum information for this sample is copied from the last sample in the result table.

12.5 Changing the Graph Display Range

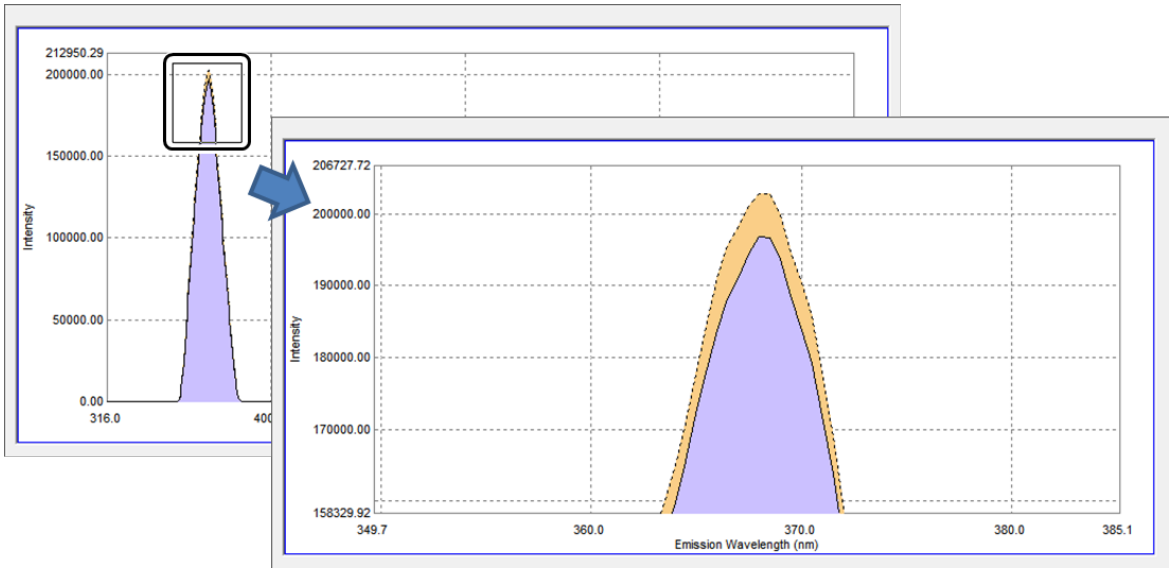
The graph display range in the measurement window can be changed by dragging out a range using the mouse or directly entering values for the upper and lower limits of the graph frame.



"Measurement Window"

■ Specifying the display range with the mouse

Use the mouse to drag out a rectangular frame of the range to magnify and then release the left mouse button. The area enclosed by the rectangular frame is drawn magnified.

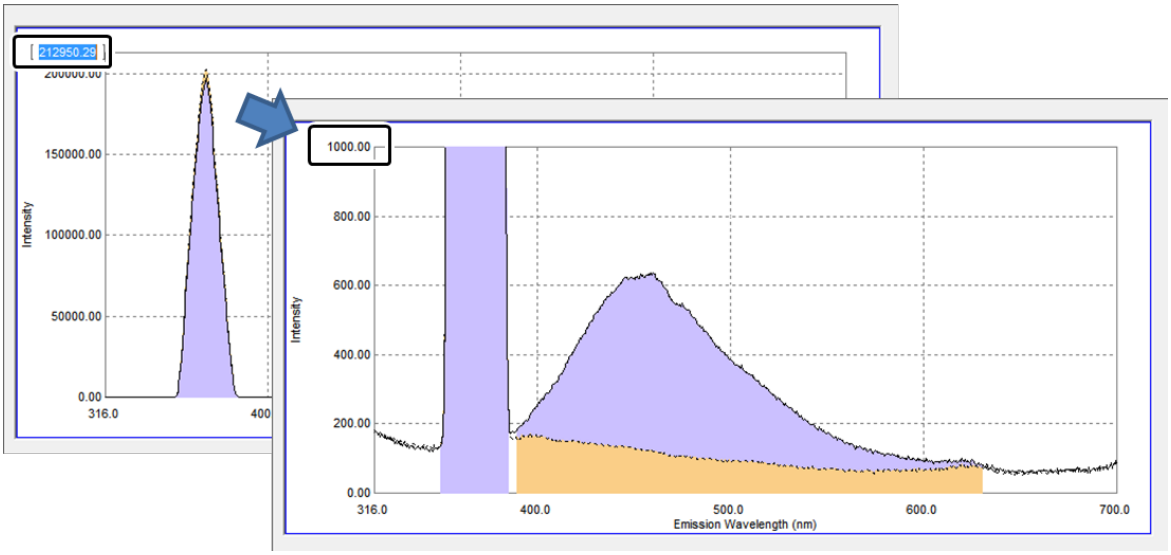


Example of Magnification Using the Mouse

■ Directly entering upper and lower limit values on the graph axes

The upper and lower limit values of the horizontal and vertical axes on the graph can be changed by clicking on them so they are highlighted.

Enter a value and click on a location outside of the highlighted area to accept the entered value. The graph is then redrawn.



Example of Directly Entering an Upper Limit Value on the Vertical Axis

12.6 Changing the Area Calculation Range

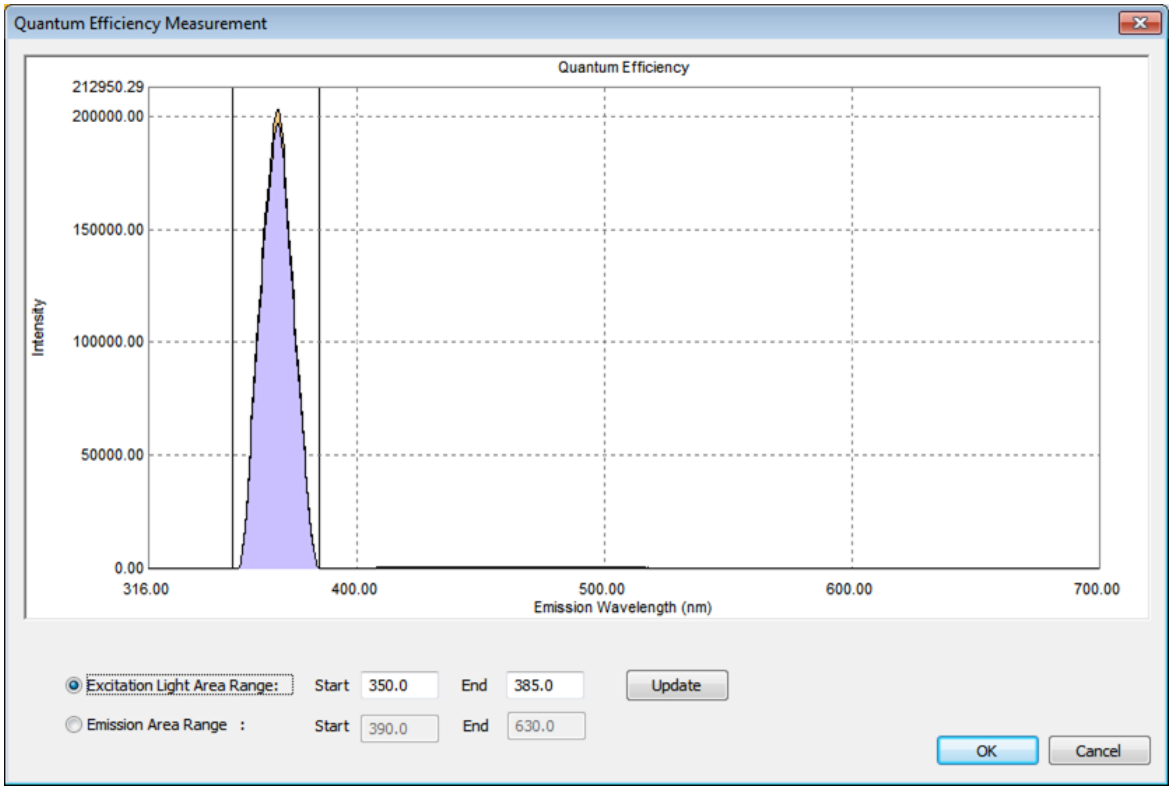
Change the wavelength range used to calculate the peak area of the fluorescence spectrum and then recalculate the quantum efficiency.

1 Click [Change Area Range] on the right side of the graph view in the measurement window.

The window for changing the area range is displayed.
The area range of both the excitation light and emission light can be changed in this window.

Hint The drawing range of the graph can be changed by directly changing the upper and lower limit values on the horizontal and vertical axes of the graph.

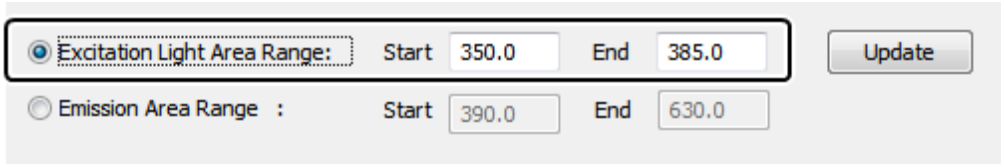
Reference "Directly entering upper and lower limit values on the graph axes" P.187



Window for Changing Area Ranges

2 **Select [Excitation Light Area Range], enter wavelengths for [Start] and [End], and click [Update].**

The wavelength range is accepted.

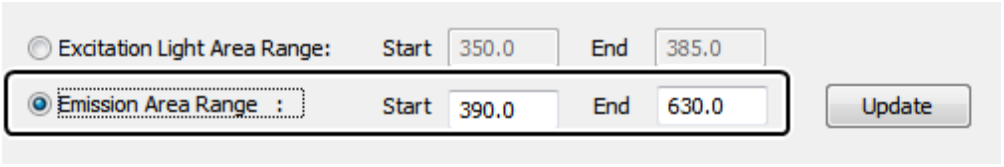


Changing the Excitation Light Area Range

Item	Setting
[Excitation Light Area Range]	Select
[Start] (wavelength)	350.0 (nm)
[End] (wavelength)	385.0 (nm)

3 **Select [Emission Area Range], enter wavelengths for [Start] and [End], and click [Update].**

The wavelength range is accepted.



Changing the Emission Light Area Range

Item	Setting
[Emission Area Range]	Select
[Start] (wavelength)	390.0 (nm)
[End] (wavelength)	630.0 (nm)

4 **Click [OK].**

The quantum efficiency is recalculated using the new area range and the result table is updated.

12.7 Printing

This section explains how to print reports of measurement results.
There are two types of reports that can be printed: detailed reports and summary reports.

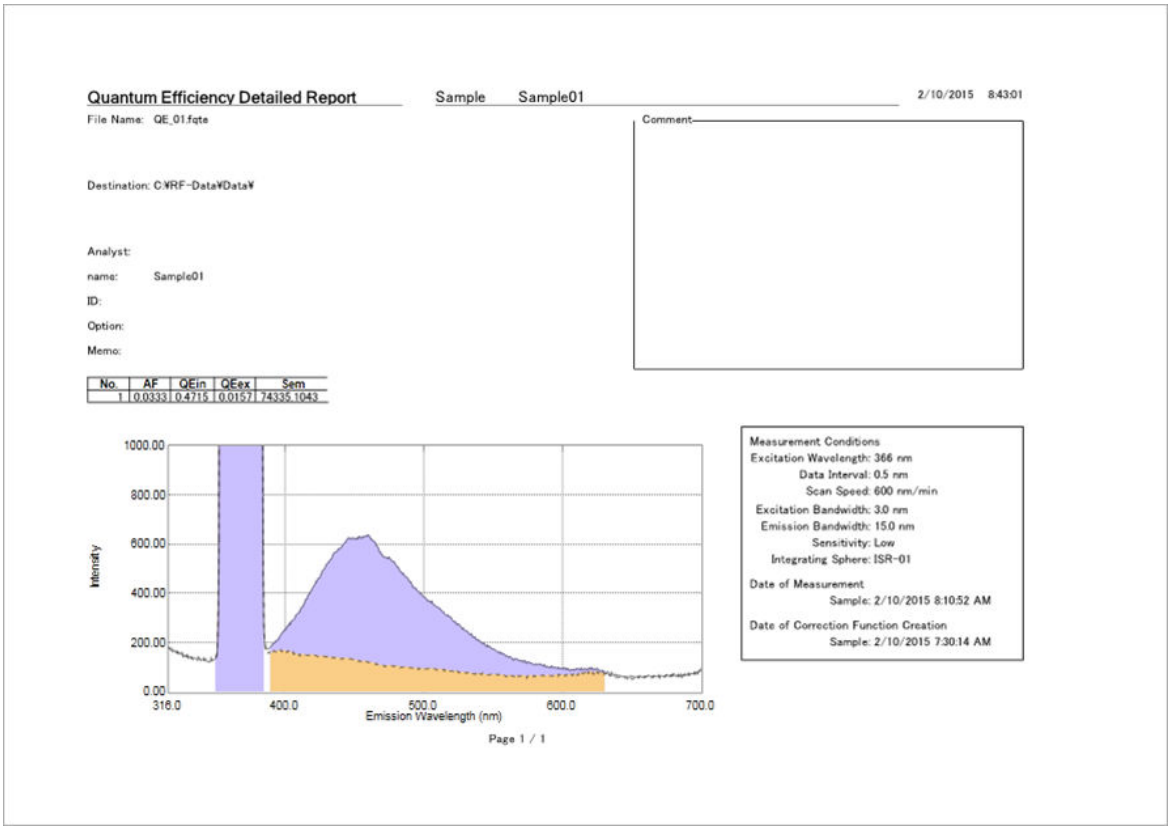
12.7.1 Printing a Detailed Report

In detailed report printing, a detailed report for the sample is printed.

1 **Click on the graph view.**
The graph periphery is enclosed in a blue frame.

2 **Click [Print] on the main toolbar.**
The [Print] window is displayed.

3 **Confirm that the printer for output is correct and click [OK].**
A detailed report for the standard sample is printed.



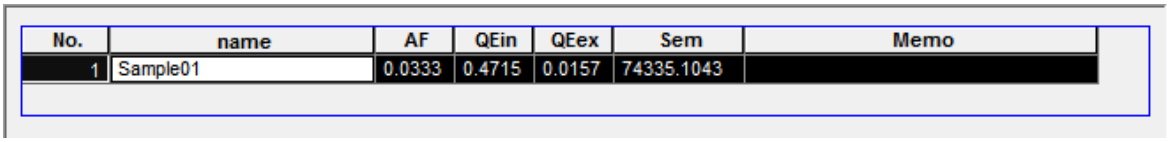
Example of a Printed Detailed Report

12.7.2 Printing a Summary Report

In summary report printing, two types of layouts can be selected: table printing and simple table printing.

1 **Click [Print Layout] - [Print Table] (or [Print Simple Table]) on the [Tools] menu.**

2 **Click on the result table in the analysis results view.**
The table periphery is enclosed in a blue frame.

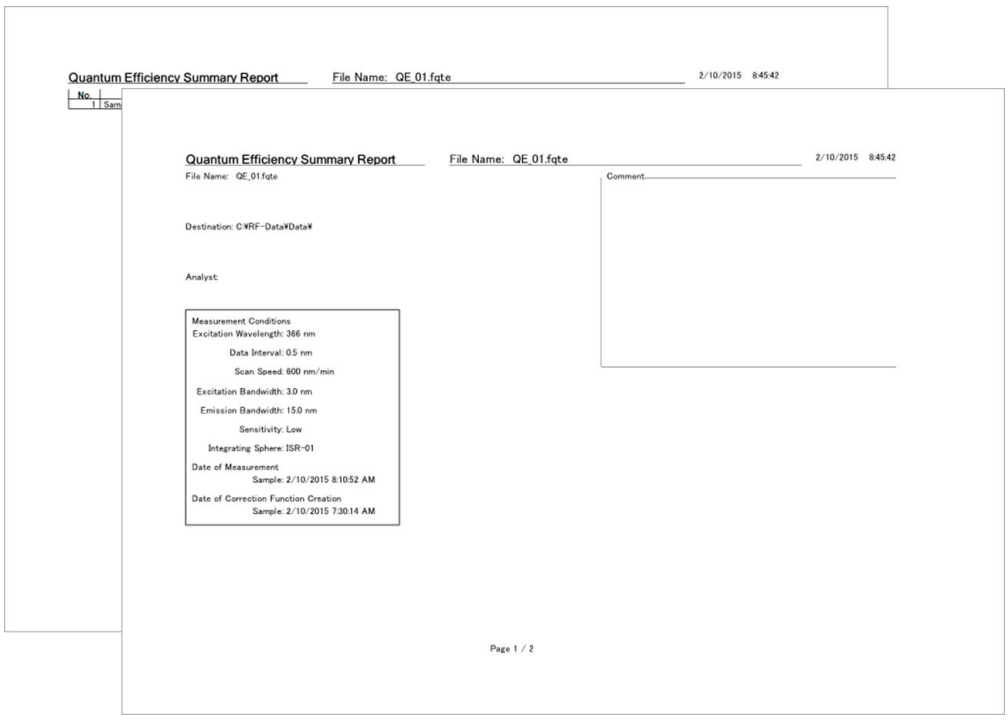


No.	name	AF	QEin	QEex	Sem	Memo
1	Sample01	0.0333	0.4715	0.0157	74335.1043	

Result Table (Analysis Result View)

3 **Click [Print] on the main toolbar.**
The [Print] window is displayed.

4 **Confirm that the printer for output is correct and click [OK].**
Printing is executed.



Example of Printing with [Print Simple Table]

13 Management Tools

This chapter explains how to operate the management tools used for instrument management, registration, and performance checks.

Reference For cases and functions not covered in this chapter, refer to the help file provided with LabSolutions RF.

■ Explanations Included in this Chapter

Three management tools are provided with LabSolutions RF.

RF performance validation software ([Validation])

Check the performance of an RF-6000 instrument.

Instrument registration tool ([Register Device])

Register instruments for control and data processing by LabSolutions RF and register optional integrating spheres for use in applications.

Spectrum correction function measurement tool ([Correction])

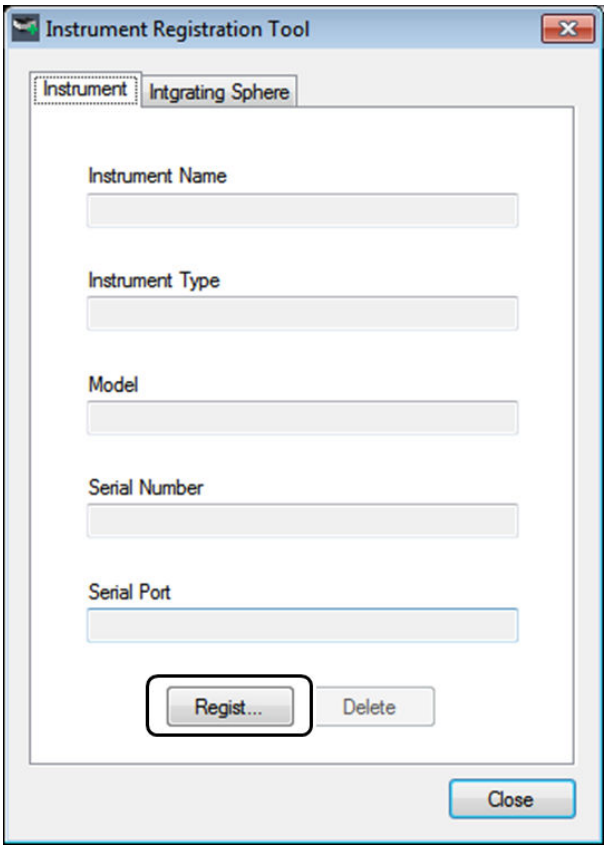
Measure spectrum correction functions for optional integrating spheres and check the results.

13.1 Registering an Instrument

Instrument registration must be performed before starting any of the LabSolutions RF applications.

1 **Click [Register Device] on the [Manage] tab in the LabSolutions RF launcher.**
The [Instrument Registration Tool] window is displayed.

2 **Click [Regist] on the [Instrument] tab.**

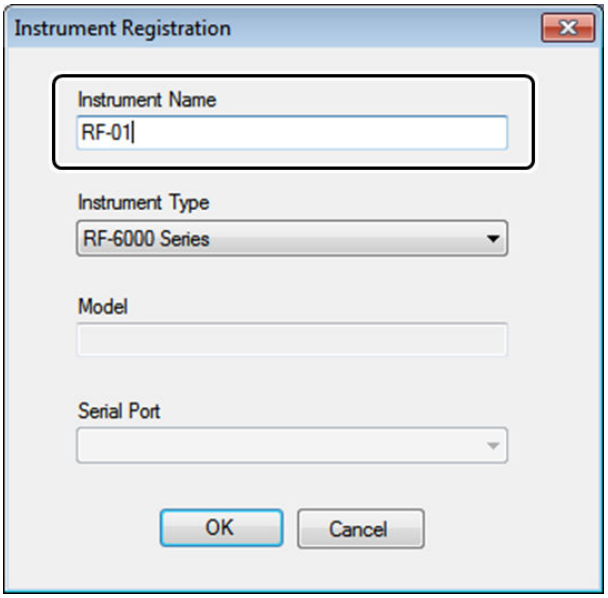


[Instrument Registration Tool] Window (Initial Display)

3 Enter the instrument name.

Enter the instrument name of the connected spectrofluorophotometer. In this case, enter "RF-01".

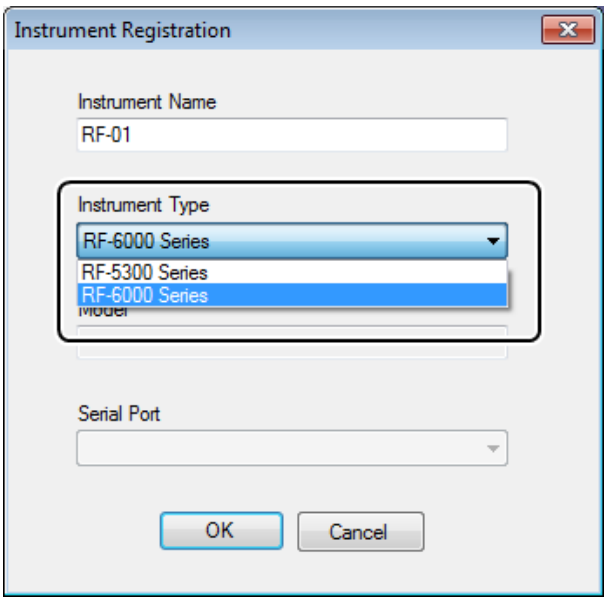
Hint Normally enter the name used on the system or a control number used to differentiate the instrument from other instruments. If the instrument does not have any particular name, enter the model name.



Entering the Instrument Name

4 Select the instrument type.

Select the instrument type of the connected spectrofluorophotometer. In this case, select "RF-6000 Series".



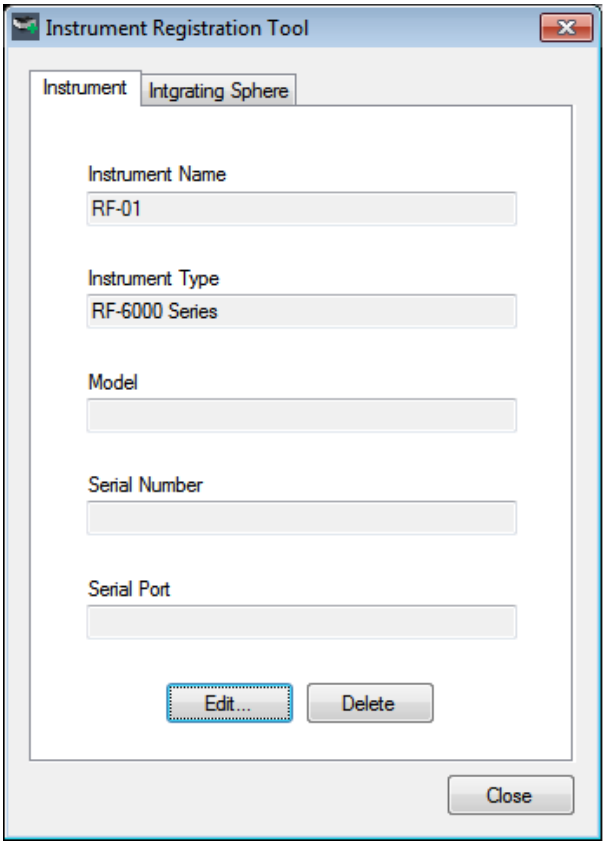
Selecting the Model Name

5 **Click [OK].**

A confirmation message is displayed. Clicking [OK] registers the instrument with the entered information.

Hint

- When registering an RF-6000 series instrument, [Model] and [Serial Number] do not need to be entered because they are read from the instrument upon establishing a connection.
- Set [Serial Port] when registering an RF-5300 series instrument that uses an RS-232C cable as the communication cable.



[Instrument Registration Tool] Window (Instrument Registration Complete)

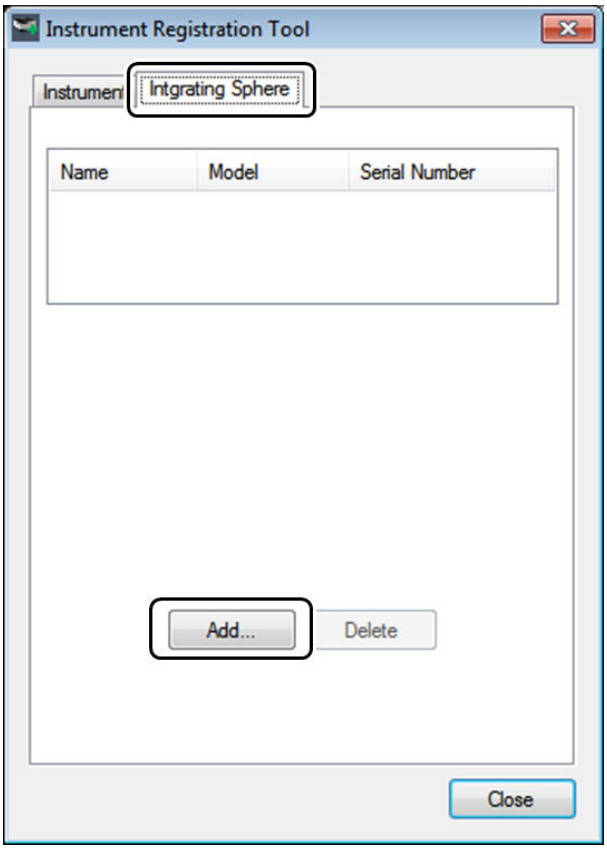
13.2 Registering an Integrating Sphere

An integrating sphere must be registered in advance in order to perform measurements in each application that require the use of an integrating sphere.

1 **Click [Register Device] on the [Manage] tab in the LabSolutions RF launcher.**

The [Instrument Registration Tool] window is displayed.

2 **Click [Add] on the [Integrating Sphere] tab.**



[Instrument Registration Tool] Window (Initial Display)

3 Enter the integrating sphere name.

Enter the name of the integrating sphere for registration. In this case, enter "ISR-01".

Hint Normally enter the name used on the system or a control number used to differentiate the instrument from other instruments. If the instrument does not have any particular name, enter the model name.

Entering the Integrating Sphere Name

4 Enter the model name and serial number.

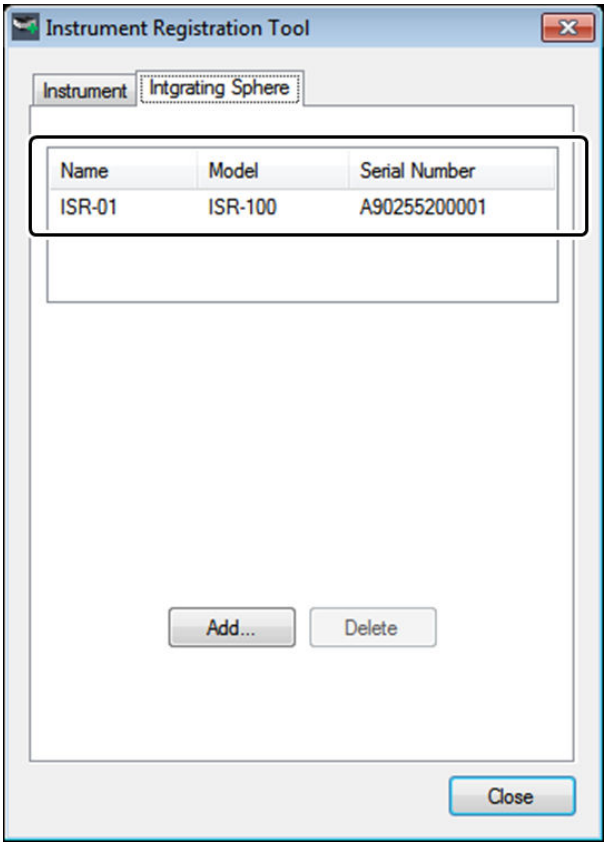
Enter the model name and serial number of the integrating sphere for registration. In this case, enter "ISR-100" for the model name and "A90255200001" for the serial number.

Hint The model name and serial number are indicated on the name plate on the storage case of the instrument.

Entering the Model and Serial Number

5 **Click [OK].**

Clicking [OK] on the confirmation message registers the integrating sphere with the entered information.



[Instrument Registration Tool] Window (Integrating Sphere Registration Complete)

13.3 Measuring Integrating Sphere Correction Functions

When performing measurement using an integrating sphere, a spectrum correction function must be measured and saved after completing registration of an integrating sphere (see "13.2 Registering an Integrating Sphere" P.196).

Hint Measure and save a spectrum correction function once every year. If the inside of the integrating sphere is stained, also create a new correction function.

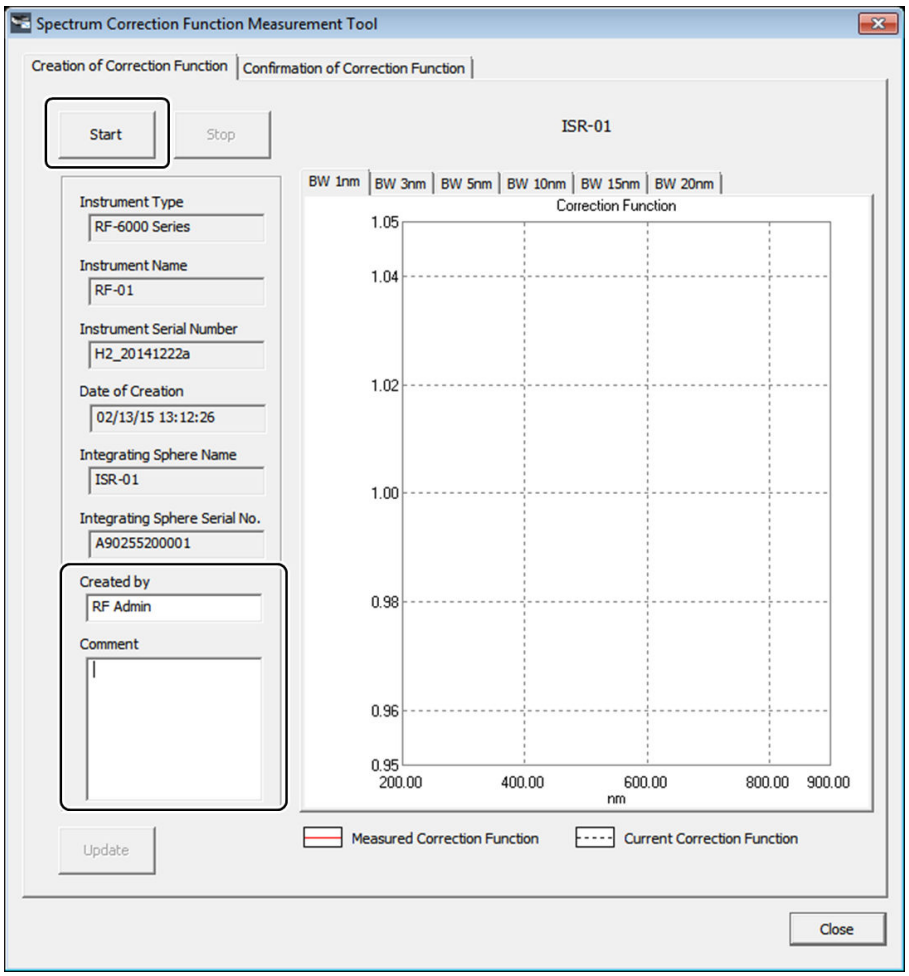
1 **Click [Correction] on the [Manage] tab in the LabSolutions RF launcher.**

The [Spectrum Correction Function Measurement Tool] window is displayed.

Hint A confirmation message is displayed when a correction function has not been created for a registered integrating sphere.

2 Enter the name of the personnel who is creating the correction function as well as any comments and click [Start].

Hint When multiple integrating spheres are registered, select the target integrating sphere with [Integrating Sphere Name].



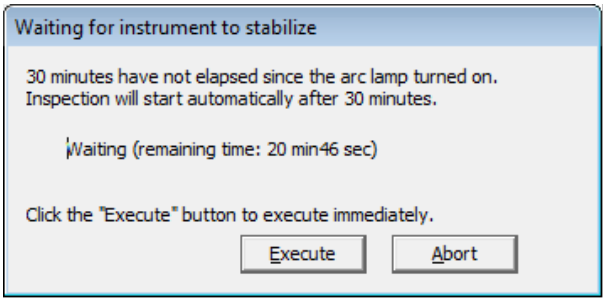
Entering Name of the Correction Function Creator and Comments

3 **Check the following points and click [OK] according to the onscreen messages.**

- The target integrating sphere is installed in the instrument's sample compartment.
- No sample is set in the integrating sphere.
- The provided mesh assembly is attached to the emission side filter holder of the instrument's sample compartment.

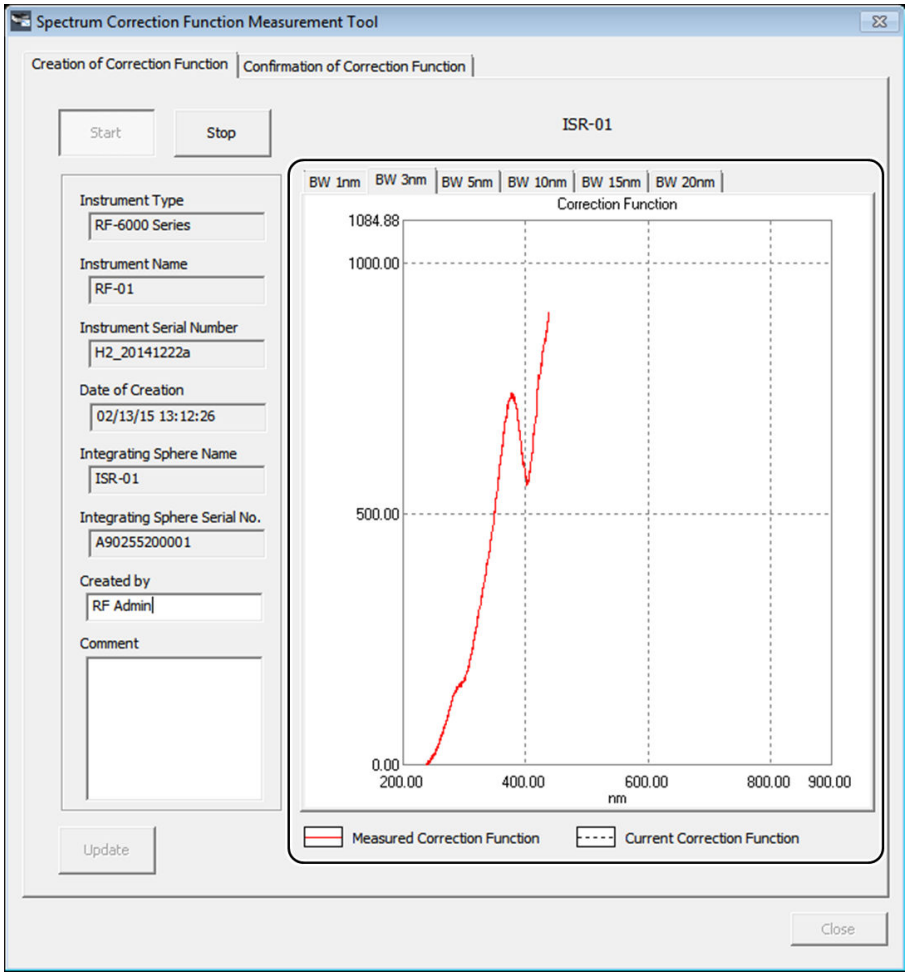
If 30 minutes has not elapsed since lighting the xenon arc lamp, a standby window is displayed to allow the instrument to stabilize.

Hint Measurement starts automatically after 30 minutes elapse.



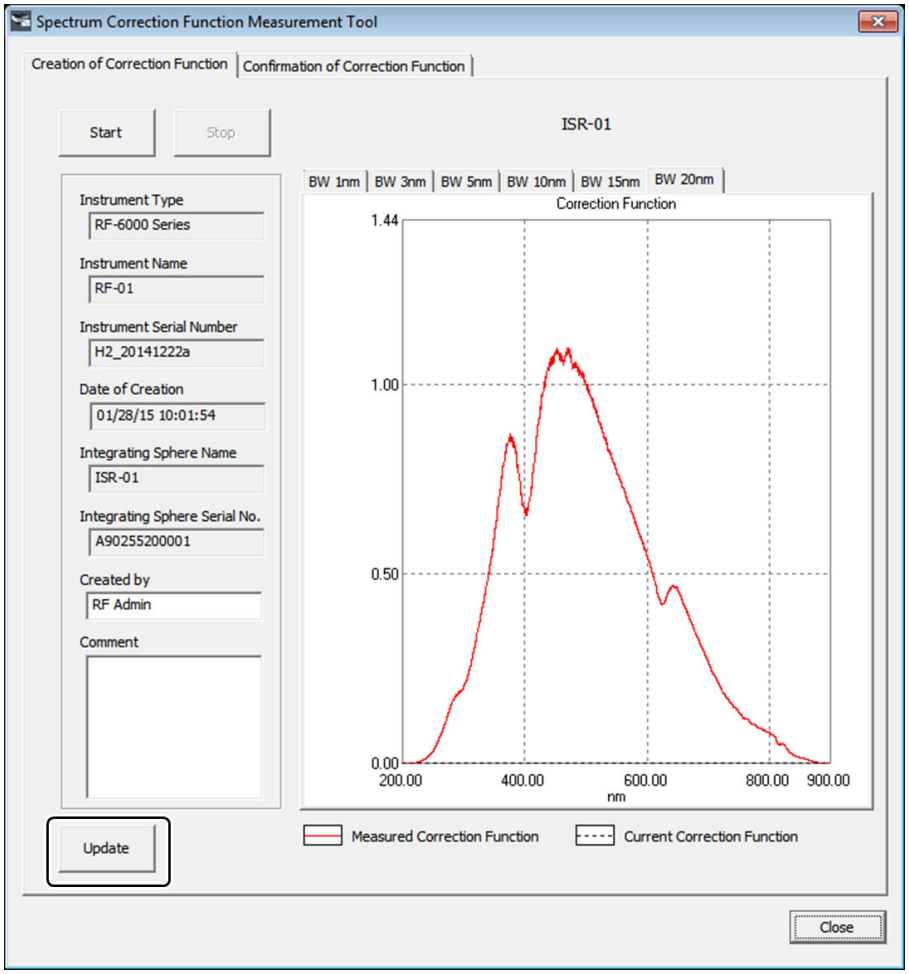
[Waiting for instrument to stabilize] Window

When measurement starts, spectrum data is displayed in real time in the graph area.



[Spectrum Correction Function Measurement Tool] Window (During Measurement)

4 **After measurement is complete, check that the measured spectrum is free from abnormalities and then click [Update].**



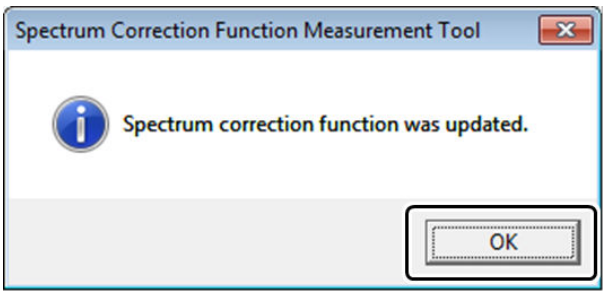
[Spectrum Correction Function Measurement Tool] Window (Measurement Complete)

A message to confirm updating is displayed.

5 **Click [Yes] to update.**

A message indicating that updating has completed is displayed and the spectrum correction function obtained in measurement is saved.

6 **Click [OK] to close the message.**



Update Complete Message

13.4 Checking Integrating Sphere Correction Functions

1 **Click [Correction] on the [Manage] tab in the LabSolutions RF launcher.**

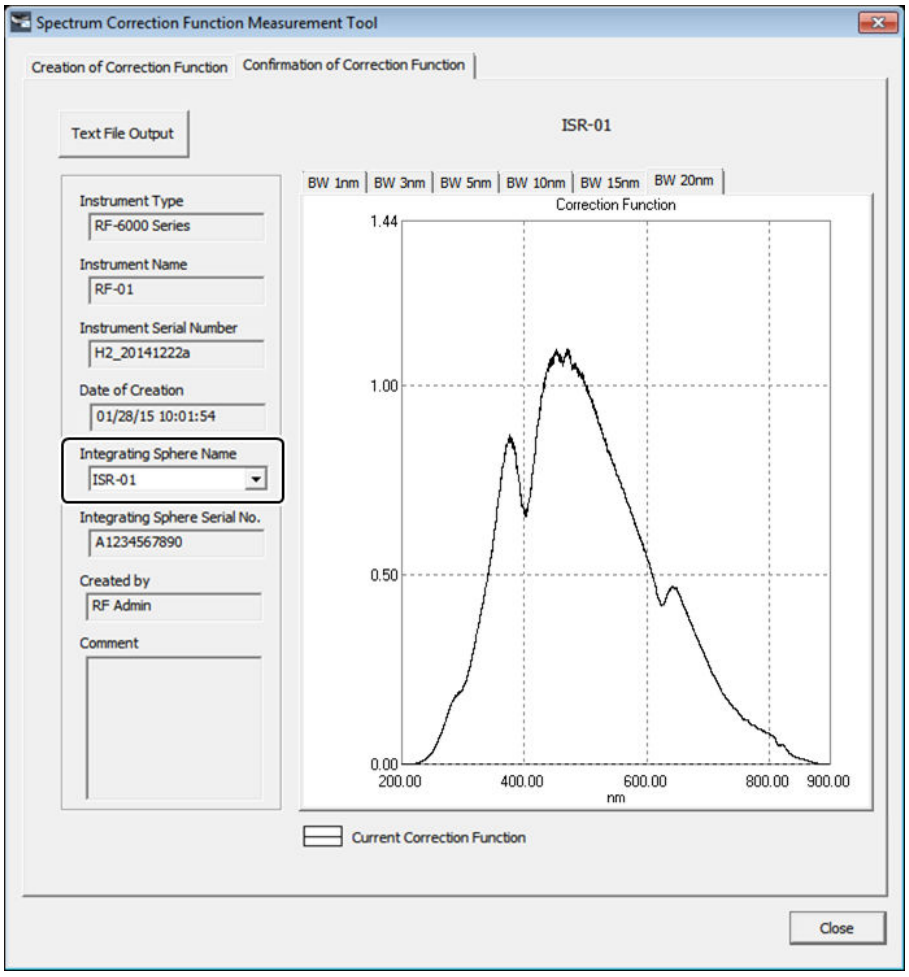
The [Spectrum Correction Function Measurement Tool] window is displayed.

Hint A confirmation message is displayed when a correction function has not been created for a registered integrating sphere.

2 **Click the [Confirmation of Correction Function] tab.**

3 **When multiple integrating spheres are registered, select the target integrating sphere with [Integrating Sphere Name].**

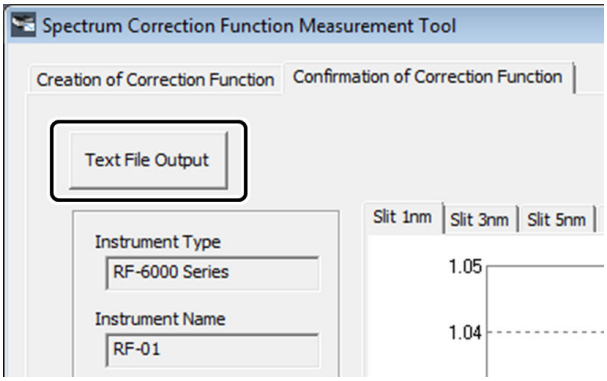
The data of the spectrum correction function in use is displayed in the graph area.



[Spectrum Correction Function Measurement Tool] Window (Checking the Correction Function)

Hint The data of the spectrum correction function in use can be saved in text format.

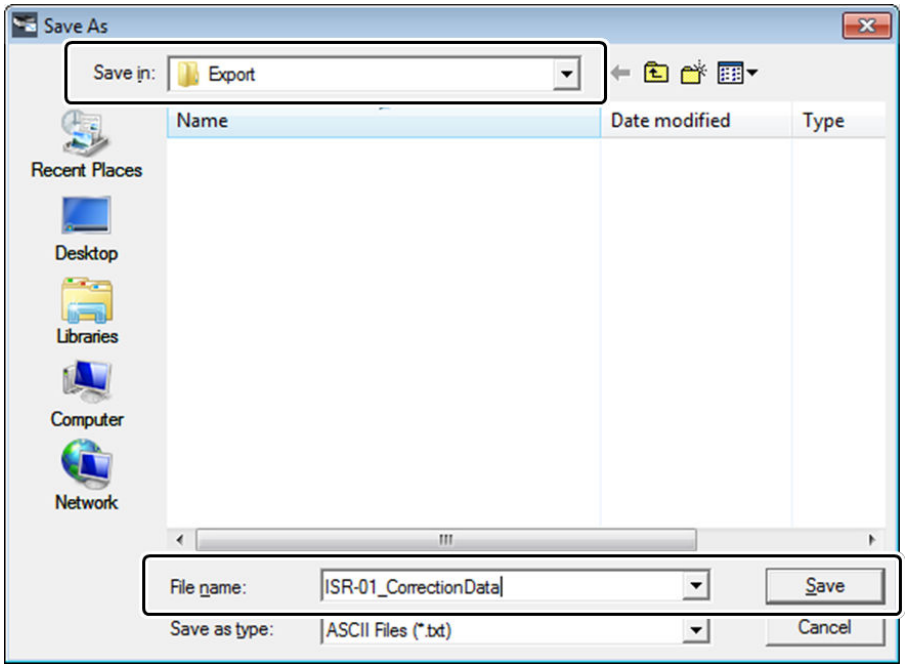
4 **Click [Text File Output].**



[Text File Output]

The [Save As] window is displayed.

5 **Specify the save destination, enter a filename, and click [Save].**



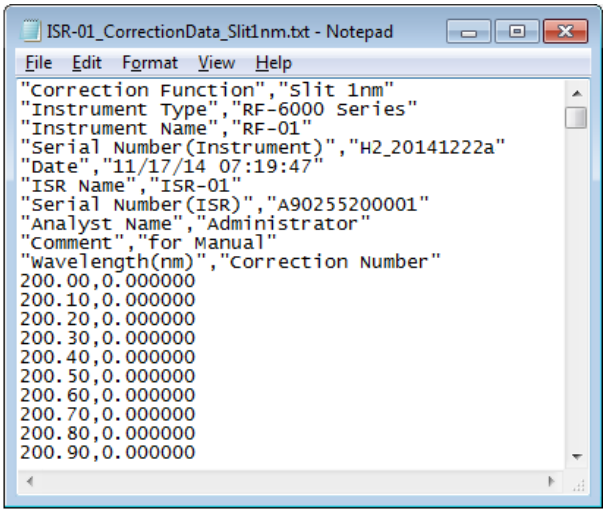
[Save As] Window

A message indicating that the data was output in text format is displayed.

6 **Click [OK].**

A text file is created in the specified folder.

7 Check the content of the text file.



Checking the Text File

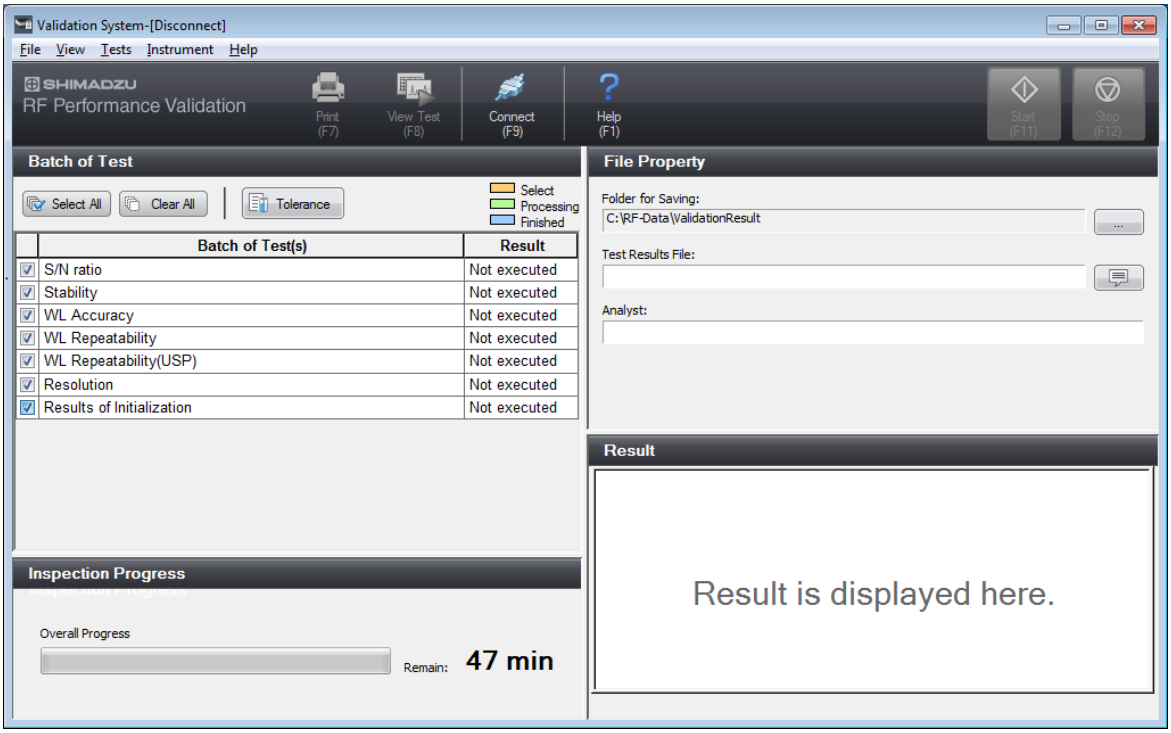
13.5 Checking RF-6000 Performance

Instrument performance can be checked using the RF performance validation software.

13.5.1 Startup

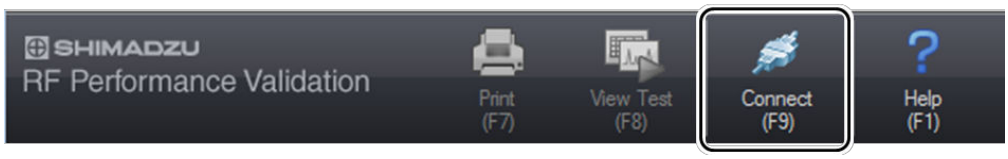
1 **Click [Validation] on the [Manage] tab in the LabSolutions RF launcher.**

The RF performance validation software starts.



[Validation System] Window (Initial Display)

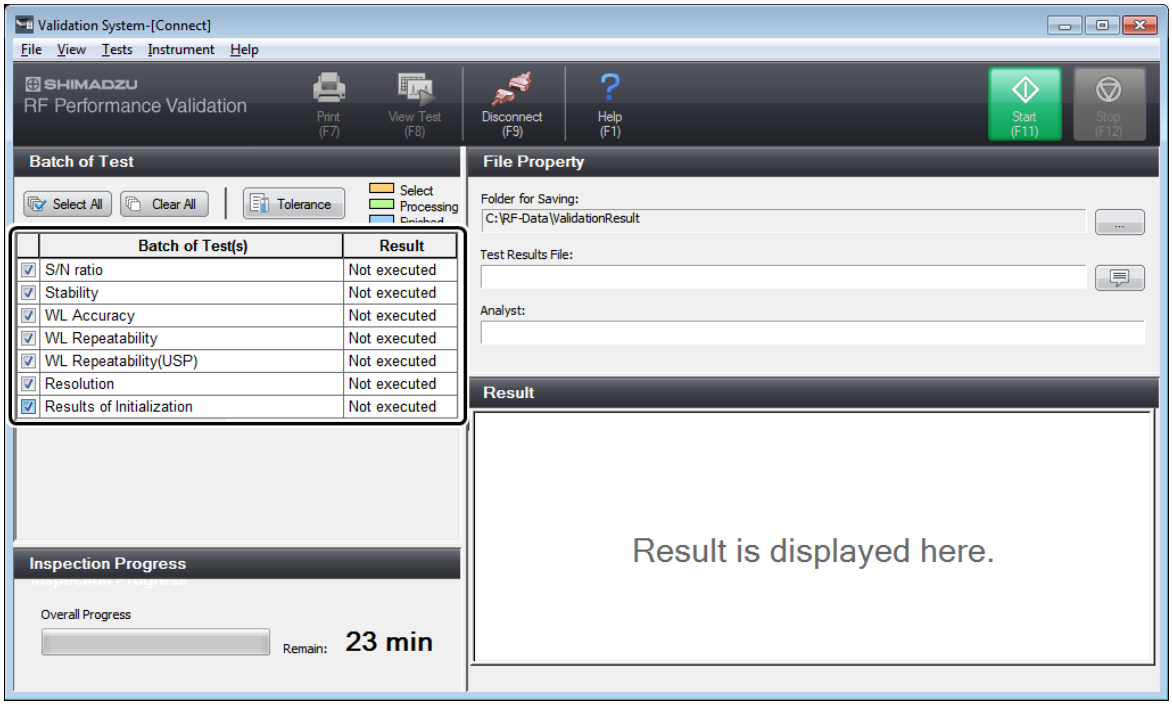
2 Click [Connect] on the main toolbar.



Tool Buttons

The available test items are displayed when a connection is established with the instrument.

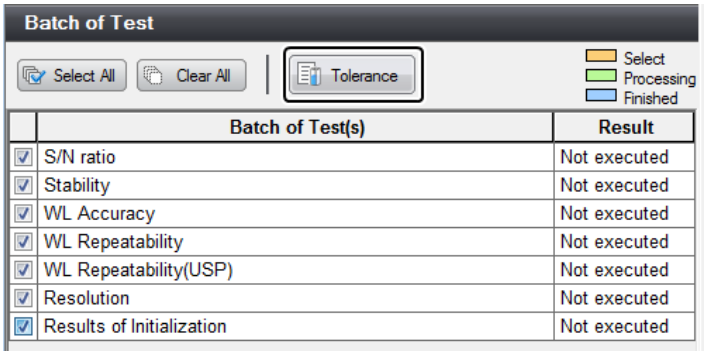
Hint If the optional mercury lamp unit is installed, wavelength accuracy, wavelength repeatability, and resolution test items are also available.



[Validation System] Window (Connected)

13.5.2 Setting Judgment Criteria

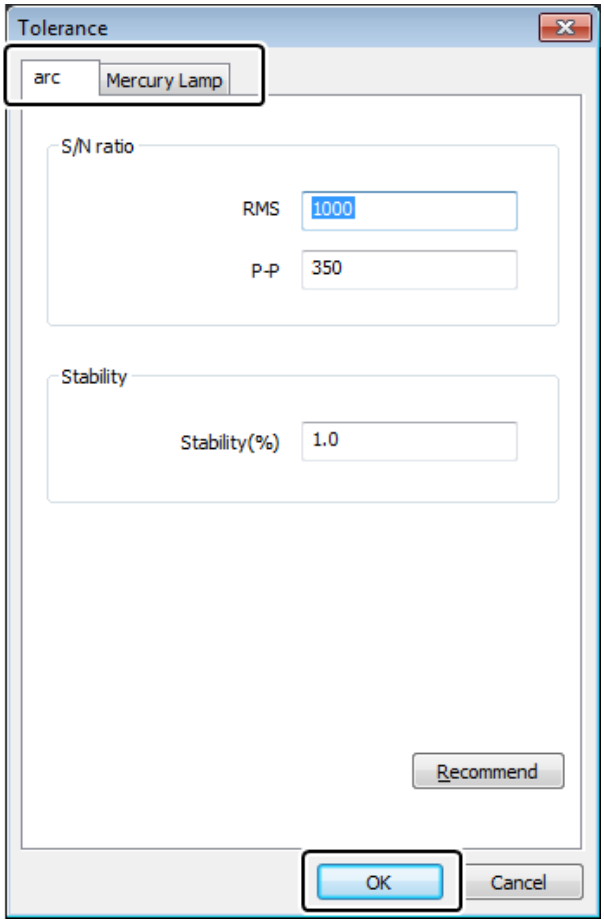
1 **Click [Tolerance] in the test item area.**



Setting Tolerances

The [Tolerance] window is displayed.

2 **Switch between the tabs to check and change the tolerance settings, and then click [OK].**



[Tolerance] Window

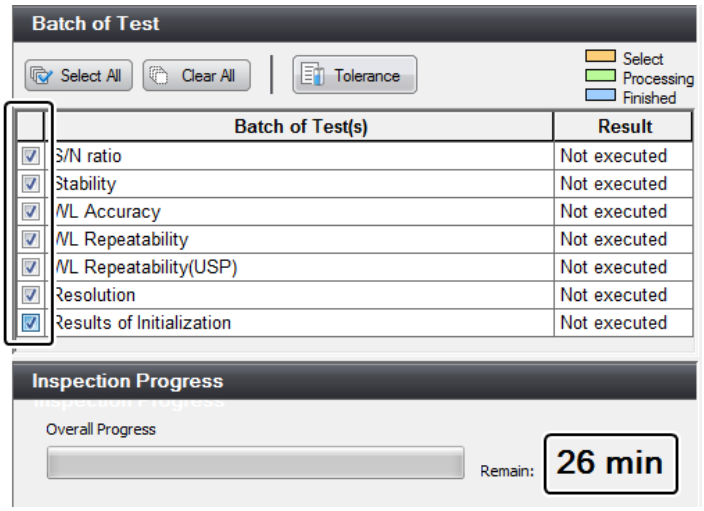
Accept the tolerance settings and close the [Tolerance] window.

Reference For details on each test item and recommended values, see the help file provided with LabSolutions RF.

13.5.3 Executing Testing

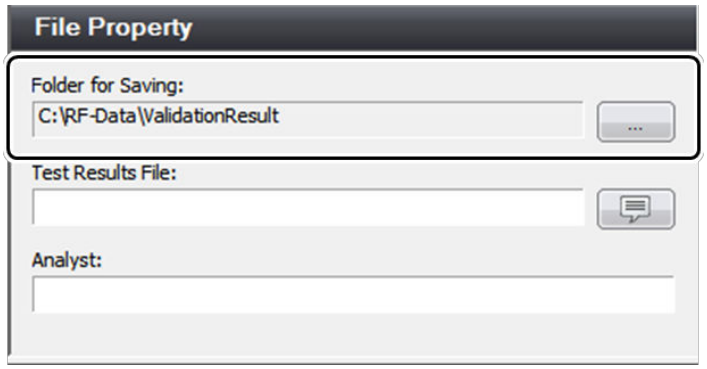
1 **Select the checkboxes of the test items to perform in the test item area.**

In this case, perform all test items. The total testing time is displayed in the test progress area according to the items selected for testing.



Test Item Area/Test Progress Area

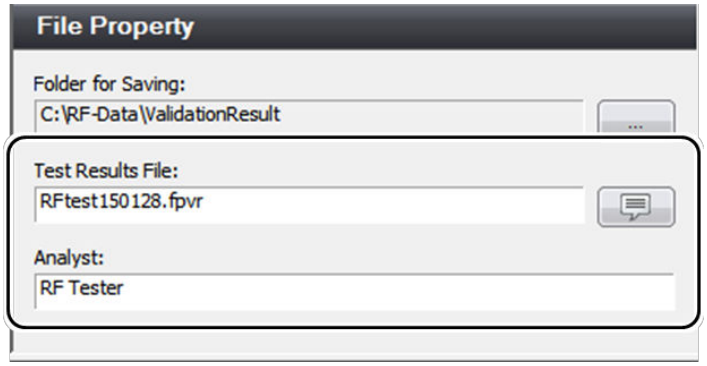
2 **Check the save destination of the result file in the file information area.**



Checking the Save Destination

Hint The save destination can be changed by clicking ... .

3 Enter the test result filename and analyst name.

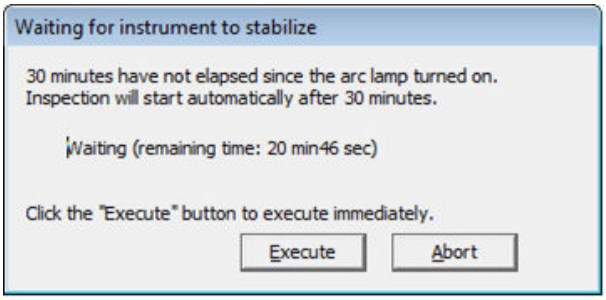


Entering the Filename and Analyst Name

Hint Comments can also be entered for the result file by clicking .

4 Click [Start] on the main toolbar.

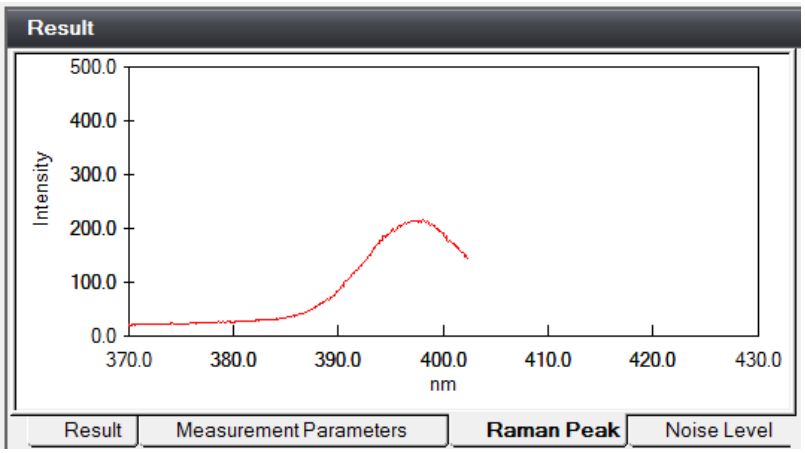
If 30 minutes has not elapsed since lighting the xenon arc lamp, a standby window is displayed to allow the instrument to stabilize. Testing starts automatically after 30 minutes elapse.



[Waiting for instrument to stabilize] Window

5 **Set distilled water or a PTFE block onto the cell holder according to the displayed message, and click [OK].**

Measurement starts and a spectrum and time-course graph are displayed in real time in the test result area.



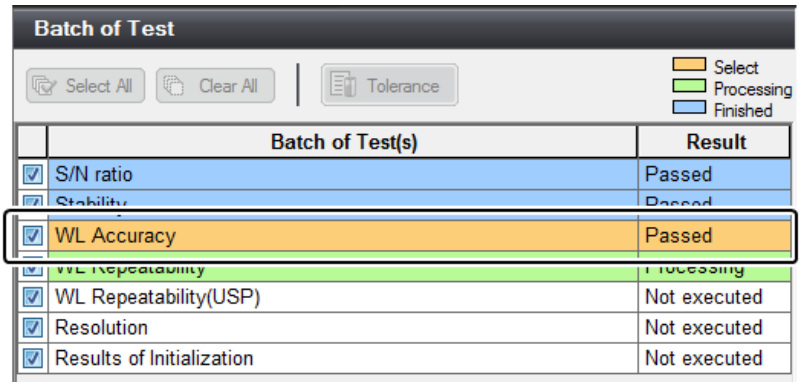
Test Result Area (Test State Display)

13.5.4 Checking Test Results

The results of completed items can be checked during testing.

1 **Click the title of the item for checking in the test item area.**

In this case, click the [WL Accuracy] item for which testing has completed (indicated in blue).

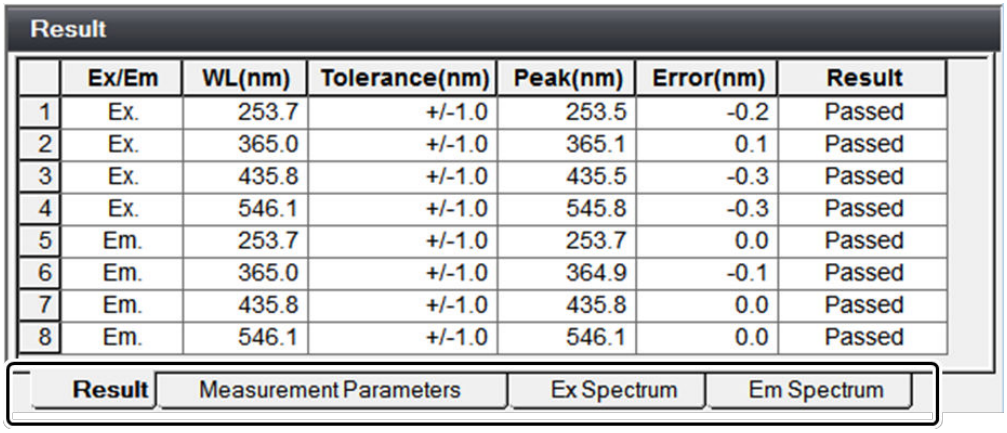


Test Item Area

The test result of the selected item is displayed in the test result area.

2 Check the test result.

The spectrum can also be checked by switching between tabs.



	Ex/Em	WL(nm)	Tolerance(nm)	Peak(nm)	Error(nm)	Result
1	Ex.	253.7	+/-1.0	253.5	-0.2	Passed
2	Ex.	365.0	+/-1.0	365.1	0.1	Passed
3	Ex.	435.8	+/-1.0	435.5	-0.3	Passed
4	Ex.	546.1	+/-1.0	545.8	-0.3	Passed
5	Em.	253.7	+/-1.0	253.7	0.0	Passed
6	Em.	365.0	+/-1.0	364.9	-0.1	Passed
7	Em.	435.8	+/-1.0	435.8	0.0	Passed
8	Em.	546.1	+/-1.0	546.1	0.0	Passed

Test Result Area (Test Result Display Mode)

3 Click [View Test] on the main toolbar.

Main Toolbar

This returns to the window that displays the current state of testing.

13.5.5 Printing

1 **Click [Print] on the main toolbar.**

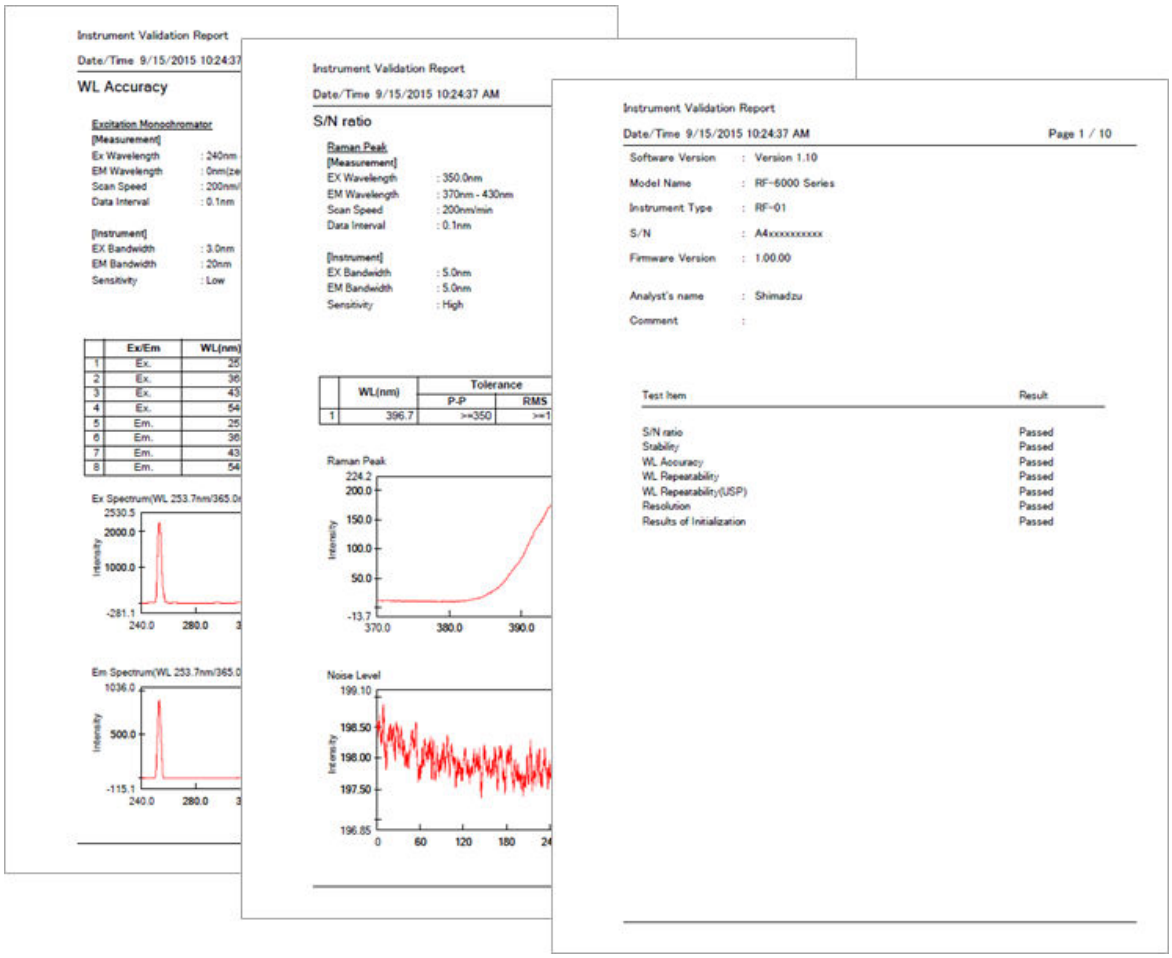
The [Print] window is displayed.

Main Toolbar

2 **Confirm that the printer for output is correct and click [OK].**

Summary information and test results of the test result file are printed.

> **NOTE** The layout of printed results cannot be changed.



Example of Printed Test Results

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