UV-Vis Instruments

Evolution 200 Series
User Guide

Thermo
S C I E N T I F I C

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Contents

Contents

Contents

Contents

Introduction

This document covers INSIGHT software and the Evolution 200 series UV-Visible spectrophotometers and accessories.

Contents

- About the Software and Hardware
- Contacting Us
- Product Warranty
- Trademarks
- Site Preparation and Safety

About the Software and Hardware

Contents

- Overview
- Setting Up the Instrument
- Before Using the Spectrophotometer

Overview

The Evolution™ 200 series UV-visible spectrophotometers integrate advanced hardware features with the power and flexibility of a wide range of Smart Accessories™. The 200 series spectrophotometers include:

- Evolution 201
- Evolution 220
- Evolution 260 Bio

For a list of sampling and other accessories available for these instruments, see Accessories.

All instruments include our INSIGHT™ software for data collection and analysis. The INSIGHT software provides four modes of operation:

- **Fixed**, to measure the light passing through the sample at one or more wavelengths.

- **Scan**, to measure the light that passes through the sample over a range of wavelengths.

- **Quant**, to set up and perform quantitative analyses of sample data.

- **Rate**, to make time-based kinetics measurements.

The Evolution 260 Bio systems also have operating modes for the common life science applications, including Nucleic Acid and Protein A280. See Life Science Applications for more information.

Setting Up the Instrument

The spectrophotometer can be run from the optional touchscreen (Local Control) or from a Windows®-compatible computer connected to the instrument (Computer Control). Local Control instruments include an embedded computer preloaded with software. Computer Control instruments must be connected to an external computer with the proper software installed. All instruments include a keypad.

For instructions to set up a Computer Control or Local Control spectrophotometer and perform basic operations using the keypad, see Using the Spectrophotometer.

Before Using the Spectrophotometer

The spectrophotometer contains precise optical components. Handle it carefully. Before using the system, review the Site Preparation and Safety information and Operating Precautions.

About This Document

Contents

- Organization

- Conventions

Organization

This document has the following main sections:

Section	Description
Introduction	Overview of the instrument and this document plus information about registering your instrument, contacting us, and the system warranty.
Evolution 200 Series Spectrophotometers	Complete instructions for using and maintaining the instrument.

Section	Description
INSIGHT Software	Complete instructions for using software features other than life science applications and Performance Verification (see below).
Life Science Applications	Instructions for using life science applications to analyze samples.
Accessories	Complete instructions for using accessories with the instrument.
Performance Verification	Instructions for setting up and running tests to check the performance of the instrument.

Conventions

This document uses the following conventions:

Note Notes contain helpful supplementary information.

NOTICE Follow instructions labeled "NOTICE" to avoid damaging the system hardware or losing data.

CAUTION Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

WARNING Indicates a hazardous situation which, if not avoided, could result in death or serious injury.

Contacting Us

For Technical Support, please contact:

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For International Support, please contact:

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Telephone: +1 608 273 5017

E-mail: support.madison@thermofisher.com
World Wide Web: http://www.thermo.com/spectroscopy

> **Note** Please have the instrument serial number available when you contact us.

E-mailing Data Files

If you have questions about your data, you can send it to us as an archived workbook file (*.iwbk). Please send us the appropriate file as an e-mail attachment. See the description of E-mail Current Workbook in Menus and the description of E-mail in Data Store Tab for more information.

> **Note** Please do not send exported report files or user-defined workbooks—these do not contain the information we need.

Product Warranty

Warranties herein are for products manufactured by Thermo Fisher Scientific or its authorized dealers.

Thermo Fisher Scientific warrants that this product is free from defects in labor and materials and shall conform to its product specifications as defined in the product user documentation.

This warranty covers parts (except those specified below) and labor, and applies only to equipment which has been installed and operated in accordance with the documentation supplied by Thermo Fisher Scientific, and which has been serviced only by authorized Thermo Fisher Scientific dealers or service personnel. This warranty does not apply to equipment and accessories that have been modified or tampered with in any way, misused, or damaged by accident, neglect, or conditions beyond Thermo Fisher Scientific's control.

Related Topics

Warranty Period

Items Not Covered by Warranty

Warranty Repair

Shipping Cost for Items Covered by Warranty

Update Policy

Warranty Period

With the exception of SPECTRONIC™ 20+, SPECTRONIC 20D+, GENESYS™ 20 and the Helios™ Epsilon spectrophotometers, all UV Visible spectrophotometers come with a standard warranty that is fourteen months from the date of shipment or twelve months from the date of installation (whichever occurs first). The replacement parts and spare components are warranted for 90 days from the date of shipment. If such parts are intended for long term storage, it is recommended that their functionality is tested immediately upon receipt and any problems reported to Thermo Fisher Scientific within the above specified warranty period.

The following warranties apply to instrument light sources:

1. Xenon lamps are warranted against failure for a period of three (3) years.

2. Tungsten and deuterium lamps will be replaced under warranty if they fail on the initial power-up or within the first month of operation.

Thermo Fisher Scientific reserves the right to request the return of failed components that are being replaced under warranty.

User should complete and return the Product Registration card, and retain proof of delivery date.

Items Not Covered by Warranty

This warranty does not apply to glassware, expendable components, peripheral devices or accessories not manufactured by Thermo Fisher Scientific. The manufacturer of these products may offer specific warranties for such parts and components.

Cleaning and calibration service is not covered by this warranty.

Warranty Repair

In the event of failure within the warranty period, Thermo Fisher Scientific will at Thermo Fisher Scientific's option, repair or replace the product not conforming to this warranty. There may be additional charges, including freight, for warranty service performed in some countries. For service, call Thermo Fisher Scientific (or its authorized dealer outside the United States and Canada). Thermo Fisher Scientific reserves the right to ask for proof of delivery date.

Warranty repairs for UV Visible instruments may vary per product line and region. UV Visible products manufactured by Thermo Fisher Scientific are covered by a "return-to-factory" parts and labor warranty. In some regions, on-site warranties, extended warranties and service contracts may be purchased for all products.

In the event that on-site warranty service is required, and no on-site service contract is active on this product, the customer is responsible for any travel expenses, labor costs, and additional expenses which may be incurred in the performance of on-site warranty service.

Please contact your dealer or Thermo Fisher Scientific Technical Service department for further information. A Return Authorization Number must be obtained from Thermo Fisher Scientific Technical Service before returning any product for in-warranty repair or replacement.

Shipping Cost for Items Covered by Warranty

It is customer's responsibility to pay for the shipment of the product under warranty to Thermo Fisher Scientific.

This warranty covers return shipment (standard ground) charges for returning the repaired or replaced product to the customer.

Update Policy

Thermo Fisher Scientific may, from time to time, revise the performance of its products, and in doing so incur no obligation to furnish any such revisions to any Thermo Fisher Scientific customer.

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Site Preparation and Safety

Before using the system, read the site preparation and safety manual on the provided documentation CD. Always follow the safety precautions in that manual and in this document when using the system.

INSIGHT Software

Contents

- Applications
- The INSIGHT Window
- Thermo Software IQ
- Operation
- Options
- System Settings
- Keyboard Shortcuts

Applications

Contents

- Fixed
- Scan
- Quant
- Rate

Life Science Applications may also be available.

Fixed

The Fixed application measures the light passing through the sample at one or more wavelengths. To work with this application, click **Fixed** in the right pane in Home.

Related Topics

The INSIGHT Window

Setting Application Parameters

Measuring Samples

Scan
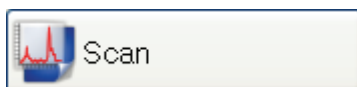
The Scan application measures the light that passes through the sample over a range of wavelengths. To work with this application, click **Scan** in the right pane in Home.

Related Topics

The INSIGHT Window

Setting Application Parameters

Measuring Samples

Math and Analysis Operations

Quant
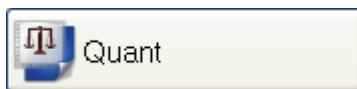
Use the Quant application to set up and perform quantitative analyses of sample data. To work with this application, click **Quant** in the right pane in Home.

Related Topics

Quant

Performing a Quantitative Analysis
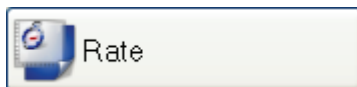
Rate

Use the Rate application to make time-based kinetics measurements. To work with this application, click **Rate** in the right pane in Home.

Related Topics

The INSIGHT Window

Setting Application Parameters

Performing a Kinetics Measurement

Measuring Samples

The INSIGHT Window

The INSIGHT window is divided into panes. At the left is the navigation pane, which contains task buttons and action buttons for displaying software features and performing operations. The right pane provides access to applications, stored data, software settings and data acquisition features.

Click **Home** in the navigation pane at any time to see applications available in the right pane.

Above the panes is a menu bar that can include features for working with workbooks, performing math, analysis and other operations, and getting help. The available features depend on the selected application, whether spectral data is displayed, etc.

To display a keyboard for entering information or for "right-clicking" software features (for example, to display a shortcut menu) on a Local Control system, click this icon in the lower-left corner of the INSIGHT window. See the procedure below for more information.

Alternatively, click this icon on the Windows taskbar. If the taskbar is not visible, click the bottom (or other) edge of the Windows desktop to display it.

❖ **To "right-click" a software feature on a Local Control system**

1. Click the feature.

2. Display the keyboard by clicking ✎ or ▦.

3. Click the key indicated below.
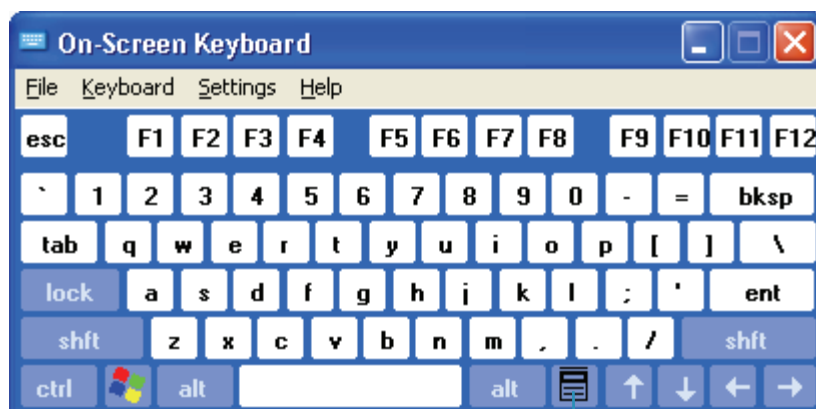
Click this key

Related Topics

Navigation Pane

Right Pane

Menus

Instrument Status Monitors

Navigation Pane

The navigation pane at the left side of the window contains features for the current application:

Task Buttons
Action Buttons
Other Navigation Pane Features

Related Topics

Right Pane

Menus

Task Buttons

The main task buttons (present when the software starts) provide access to basic operations:

Button	Description
Home	Gives access to user groups and their applications. (The default is Classic.)
My Data	Provides tools for storing and retrieving data and other information.

Button	Description
Options	Includes features for controlling how users interact with the software.
System Settings	Provides features for aligning accessories, calibrating lamps, updating firmware and performing other tasks.
	If a Local Control instrument is connected to an external computer running INSIGHT software, use the **Instrument Control** options on the System tab to select the desired location of instrument control.

Other task buttons may be available for specific applications:

Button	Description
Measure (current application)	Displays data acquisition features for the current application.
Reports	Configures reports containing sample data and specifies how to print reports.
Oligo Calculator	Calculates molecular weight, extinction coefficients, concentration factors and melting points for nucleic acid sequences.
Dye/Chrom. Editor	For entering and editing new dyes rather than using one of the precoded default dyes.

Related Topics
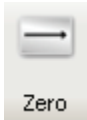
Action Buttons

Other Navigation Pane Features

Action Buttons

These action buttons appear at the top of the navigation pane when appropriate for the opened application:

Button	Description
Measure	Starts sample data acquisition, displaying prompts for confirming samples information, loading samples, saving data or performing other actions. Available only after a blank measurement for some applications. May measure single or multiple samples, depending on the application settings.
Baseline	Measures the baseline for the application.

Button	Description
Zero	Measures the blank for the application.
STOP Stop	Stops data acquisition.
Print	Prints a copy of the spectrum and associated sample data to the default printer.

Note To start data acquisition automatically after a specified delay instead of responding to a prompt, use Enable auto input trigger on the Preferences tab in Options.

Other action buttons may appear for some tasks.

Related Topics

Task Buttons

Other Navigation Pane Features

Other Navigation Pane Features

Feature	Description
Overlay spectra	Displays multiple spectra as they are acquired (instead of displaying only the spectrum being acquired or just acquired). The overlaid sample IDs appear in the upper-left corner of the data display. To display the spectrum of interest in red, click its sample ID. The last sample measured appears in red at the top of the legend.

Related Topics

Task Buttons

Action Buttons

Right Pane

Home   The right pane in Home includes:

Feature	Description
Group	Select a user group to access its applications (see "Application buttons" below). See Applications Tab for information on associating applications with user groups.
Application buttons	Click a button (for example, Fixed or Quant) to open an application. The available applications depend on the selected user group (see "Group" above).
	Click this button to access instrument performance tests. See Performance Verification.
Template list	If the list is present, double-click a template to open it and the associated application.

When the Home screen is not displayed, the right pane is used for application settings, sample measurement results, available workbooks, and other features.

Related Topics

Data Display

Working With Labels

Measurement Results

Navigation Pane

Setting Application Parameters

Measuring Samples

Menus

Data Display

For some applications, clicking the Measure task button provides a data display in the right pane for viewing sample data immediately after acquisition or previously acquired data.

Sample ID

Click to use view finder

X and Y values of pointer location

Click to expand vertically
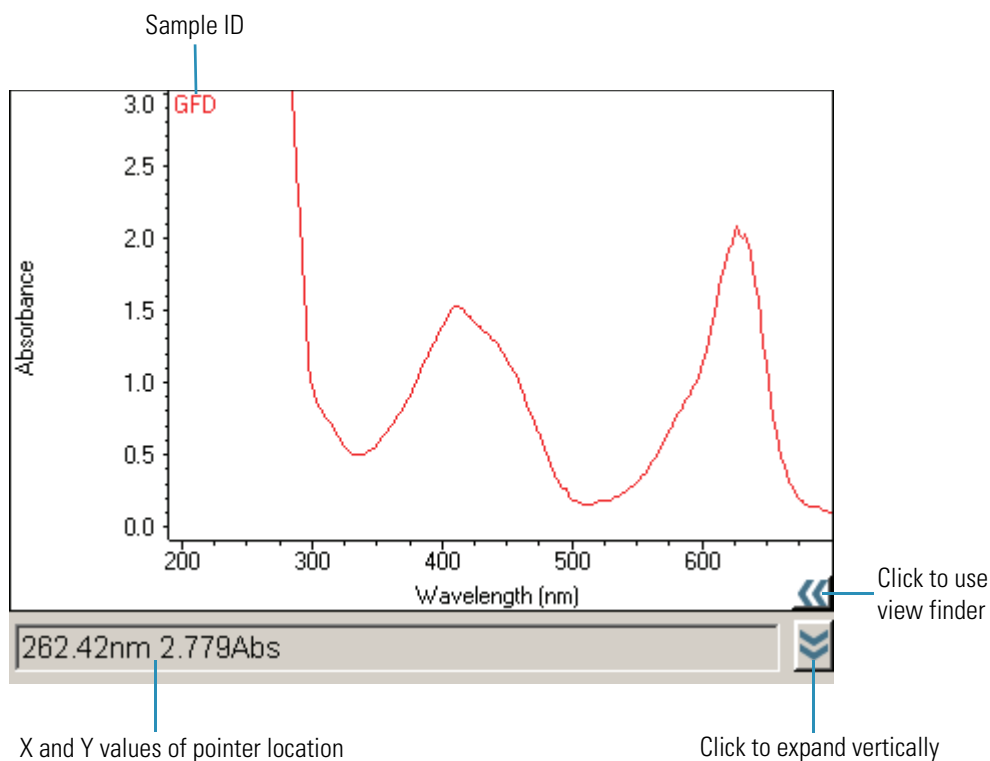
To view data listed below the data display, select them in the list. To select multiple spectra (or sample points), hold down **Shift** or **Ctrl**. To display data from multiple samples as they are measured, select **Overlay spectra** in the navigation pane.

The sample IDs appear at the top of the data display, with the selected spectrum (or sample points) and sample ID in red. To turn off the sample legend, right-click the data display, point to **Sample Legend** and choose **OFF**.

The X and Y values of the pointer location appear below the data display.

To enlarge a region, draw a box around it and click inside the box. Alternatively, click (if available) to reveal the view finder.

To expand the data display vertically, click .

To change the appearance of the axes or data, right-click an axis and choose **Display Attributes** (if available for the current application). View the effects on the display while adjusting the attributes. To change the color of the axes or their labels, click the appropriate color box.

The Sample ID readout to the right of the display shows the name of the sample being measured (or to be measured). The table below shows the results of analysis operations and whether sample points fall within specified control limits.

Right-click the display to access these features (if available for the current data type):

Feature	Description
Autoscale	Adjusts the vertical scale of each spectrum for optimal viewing. Double-clicking the display has the same effect.
Auto Arrange Labels	Positions labels for easier reading.
Set Scale	For setting minimum and maximum values for the axes. To set them automatically, select **Autoscale**.
Sample Labels	Specifies whether to display spectra with annotations (see "Annotate" below) and labels, such as those showing absorbance values for specific wavelengths.
Sample Legend	Specifies whether to display sample IDs near the upper-left corner of the pane.
Line Type	Specifies whether to display scan spectra using solid lines or individual data points.

Feature	Description
Annotate	Provides features for adding annotation to displayed data. (Added annotation is displayed only for the selected data.) See Working With Labels for information about manipulating added labels. Right-click an edge of an added ellipse, rectangle or image to access ways to manipulate or delete the object. The availability of features depends on the current application.
	More:
	Attach to Curve displays the X value of the pointer location as a label attached to a scan spectrum by a line.
	Free Standing Text adds an editable label at the pointer location. Its position is not affected by zooming in and out.
	Ellipse draws an ellipse. To move it, drag its top edge. To resize it, drag a side or bottom edge. Its position, size and shape are affected by zooming in and out.
	Rectangle draws a rectangle. To move it, drag its top edge. To resize it, drag a side or bottom edge or a corner. Its position, size and shape are affected by zooming in and out.
	Image displays a dialog box for locating and selecting an image to add to the display. To move the image, drag its top edge. To resize it, drag the bottom edge or a corner. Its position and size are affected by zooming in and out.
	Floating Image works the same as Image (see above), except the image position and size are not affected by zooming.
	Tool Value displays the measurement made by the Peak/valley measurement tool or peak area tool as a label attached to the spectrum by a line.

Feature	Description
More Display Options (Fixed only)	Specifies how to display fixed sample data and control limits: **Connect points** (in Spectrum) draws connecting lines between sample points. **Show annotations** displays X and Y values of sample points. **Show X grid** draws light vertical lines through sample points, making it easier to see their X values. **Show Y grid** draws light horizontal lines through sample points, making it easier to see their Y values. If control limits were specified by Use control limits on the Instrument tab, **Show limit lines** displays for each sample point the triangular control limit markers. If control limits were specified, **Connect points** (in Limit Lines) draws connecting lines between the triangular control limit markers.

Related Topics

Working With Labels

Measuring Samples

Right Pane

Measurement Results

The INSIGHT Window

Working With Labels

Some operations place labels on the displayed data. Here is an example:
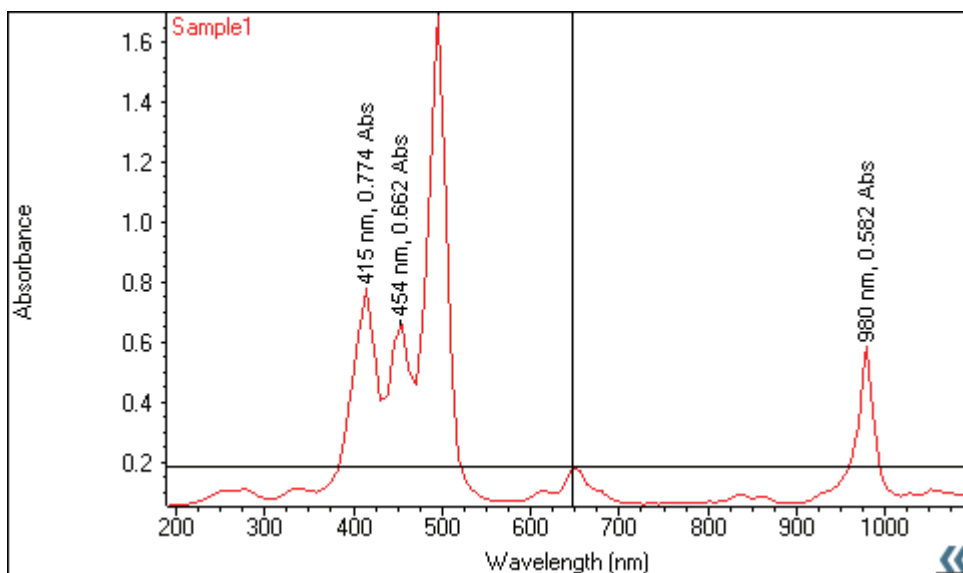
❖ To show or hide labels

Right-click the pane, point to **Sample Labels** and choose **ON** or **OFF**.

❖ To move a label

Drag it to the new position.

❖ To edit a label

Double-click it and use the dialog box that appears to change the text, its font or its color, or right-click the label and choose **Edit**, **Color** or **Font**.

❖ To rotate a label

Right-click it, point to **Rotate** and choose an orientation.

❖ To move a label in front of or behind annotation

Right-click it and choose **Send to Front** or **Send to Back**. Click here for information about adding annotation.

❖ To delete a label

Right-click it and choose **Delete**.

Related Topics

Using the Palette Tools and View Finder

Finding Peaks in Scan Data

Finding Value Level Crossings in Scan Data

Data Display

Measurement Results

Below the data display in some applications is a table of measurement results. To display a spectrum, click its row in the table.

To print a report containing results information for a sample, select it in the table and click **Print** or choose **File** (menu) **> Print Report**. To preview the report, choose **File > Print Preview.** To specify the information to include, use the **Print** tab and **Configuration** tab in Reports.

To view, copy or print information about a spectrum, including its history, right-click it in the table and choose **Properties**.

To delete a spectrum from the workbook, right-click it in the table and choose **Remove** (if available). To delete all the spectra from the workbook, right-click the table and choose **Remove All** (if available).

Any Peak Pick or Value Level results appear to the right of the data display.

Menus

The File menu includes:

Command	Description
New Workbook	Opens a new workbook and closes and saves the current workbook.
Save Workbook	If available, saves the current workbook using its current file name and location.
Save As Workbook	If available, saves the current workbook with the specified file name and location.
Close Workbook and Go Home	Closes and saves the current workbook and returns to Home.
Close All Workbooks and Go Home	Closes all open workbooks (all applications) and returns to Home.
Import	If available, imports an externally collected spectrum (.csv file or .tsv file) into the current Scan workbook.
Print Preview	Shows the current report before printing, with the header and footer specified on the Report Master Page tab in Options.
Print Report	Prints the current report to the default printer.
Use Current Settings as Default	Makes the current workbook settings and report configuration selections the default choices for a newly opened workbook for the application.

Command	Description
Save Workbook Settings as Template	If available, saves the current software settings as a template that can be used later by the specified user group.
E-mail Current Workbook	Automatically attaches the current workbook to a new e-mail message.

The Math menu, when available, includes:

Command	Description
Smooth	Reduces noise in wavelength scan data. The smoothing algorithm uses the Savitzky-Golay method.
Derivative	Converts scan data to a derivative.
Convert Spectra	Converts wavelength scan data to another Y-axis format.
Add	Adds two scan spectra.
Normalize	Adjusts the Y scale of scan data so that a selected data point has the desired Y value.
Subtract	Subtracts one scan spectrum from another.
Ratio	Divides one scan spectrum by another.
Average	Averages two or more scan spectra.
Factor	Adds a constant to scan data, subtracts a constant, multiplies by a constant or divides by a constant.

The Analyze menu, when available, includes:

Command	Description
Peak Pick	Finds peaks, valleys, or maximum and minimum values in a spectrum or region.
Value Level	Finds the wavelengths where a spectrum crosses a specified ordinate value.

The Operations menu, when available, includes:

Command	Description
Export	Saves Measure Rate results in a file with the extension .xml. If opened in Excel®, the data is displayed with one column per spectrum, and one sample per sheet.

The Help menu includes:

Command	Description
Help	Displays the INSIGHT Help system, which can also be accessed from many software screens by pressing F1.
About	Provides information about the software version and instrument type.

Related Topics

Navigation Pane

Right Pane

Instrument Status Monitors
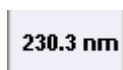
Various instrument status monitors may appear above the data display. They show information such as the current wavelength or readouts from installed accessories. One can double-click some status monitors to set operation parameters such as channel assignment. See Accessories for more information.

To specify the items to monitor, click this icon.

If the system is operating normally, a green check mark appears on the Instrument Status icon at the bottom of the INSIGHT window.

A yellow exclamation mark appears briefly on the icon when the system is busy performing an operation.

If a system problem occurs, a red X may appear on the icon. Click it to see information about the problem.

Related Topics

Accessories

Accessories Tab for Fixed

Accessories Tab for Scan

Accessories Tab for Quant

Accessories Tab for Rate

Thermo Software IQ

Thermo Software IQ performs Installation Qualification (IQ) for the software. IQ verifies that the correct software files were installed and can also be used to verify that these files have not been changed, deleted, or overwritten since they were installed. (For more information, see the Thermo Software IQ user guide available through the Help menu of the software.)

❖ **To start Thermo Software IQ**

1. Click **Start** on the Windows taskbar.

2. Choose **All Programs** (or Programs) **> Thermo > Thermo Software IQ**.

Contact Information

For help with questions or problems with the software, see Contacting Us.

Operation

Contents

- Measuring Samples

- Performing a Quantitative Analysis

- Performing a Kinetics Measurement

- Using the Palette Tools and View Finder

- Setting Application Parameters

- Sharing Custom Templates

- Managing Data

- Math and Analysis Operations

Measuring Samples

If the current application provides a Measure button in the navigation pane, use it to access data acquisition features for the application. The name of the application appears on the button; for example:

Clicking the button displays action buttons for starting sample measurement or other data acquisition. The provided buttons and their availability depend on the current application and whether necessary operations have been performed. See Action Buttons.

Measurement results appear in the right pane.

See Setting Application Parameters for information about setting parameters that affect data acquisition, including those for controlling sampling accessories. See Accessories for information about using accessories.

Related Topics

Quantifying Sample Data

Performing Kinetics Measurements

Making Nucleic Acid Measurements

Making Nucleic Acid Labels Measurements

Making Protein A280 Measurements

Making Proteins and Labels Measurements

Making Pierce BCA Measurements

Making Protein Bradford Assay Measurements

Making Pierce Modified Lowry Assay Measurements

Making Pierce 660 nm Protein Assay Measurements

Making Protein Biuret Assay Measurements

Performing a Quantitative Analysis
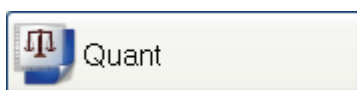
Click **Quant** in the right pane in Home to set up and perform quantitative analyses of sample data. The tasks buttons below become available.

To set Quant parameters, click **Settings**.

To access features for quantifying sample data, click **Measure Quant**.

To specify the predefined formulas, units and advanced equations to be available, click **Options** and use the Formulas & Units tab.

Related Topics

Quant

Quantifying Sample Data

Formulas and Units Tab

Quantifying Sample Data

> **Contents**
> - Quantifying Samples Without Using Standards
> - Quantifying Samples Using Standards

Related Topics

Performing a Quantitative Analysis

Data Display

Quantifying Samples Without Using Standards

> **Note** Select **Manually entered factor** or **Advanced without standards** on the Type tab before using this procedure.

❖ **To quantify samples without using standards**

1. Click **Measure Quant** in Quant.

> **Note** To start an analysis immediately after viewing or changing the template settings, click the **Measure** action button instead and skip to step 3.

2. Click **Measure**.

3. Follow the instructions that appear.

4. When samples information appears, modify it if desired.

    More:

If Sample averaging on the Samples tab in Settings was set to Duplicate, "D" at the end of a sample name indicates the second measurement to be made of the sample. If Sample averaging was set to Triplicate, "D" and "T" at the end of sample names indicate the second and third measurements to be made, respectively.

To enter previously saved samples information, use **Load Samples**. To save the samples information, use **Save Samples**.

5. If only one sample will be measured, install it.

6. Click **Continue**.

7. Follow any instructions that appear, such as to install a specified sample.

The Run Chart tab plots the concentration of the measured component versus sample number. If Use concentration limits was selected on the Samples tab, horizontal limit lines show whether the concentrations are within the specified limits:

To copy this plot, right-click it and choose **Copy to Clipboard**.

The Data tab displays the acquired data (a fixed data point or scan spectrum) for the sample selected in the table. (Right-click the data to access commands for customizing the display, including adding annotation.) See Data Display for more information.

The table contains the columns of information specified on the Configuration tab in Reports. Examples include sample identification, user name, and the results of replicate, duplicate or triplicate measurements and their standard deviation.

To measure a sample again, right-click its row in the results table and choose **Remeasure**. After the remeasurement, the previous information for the sample is crossed out (but not removed from the table).

Related Topics

Quantifying Samples Using Standards

Performing a Quantitative Analysis

Data Display

Quant

Formulas and Units Tab

Quantifying Samples Using Standards

> **Note** Select **Measure single standard**, **Standard curve**, **Standard curve with two wavelengths** or **Advanced standard curve** on the Type tab before using this procedure.

❖ **To quantify samples using standards**

1. Click **Measure Quant** in Quant.

   > **Note** To start an analysis immediately after viewing or changing the template settings, start with the next step.

2. If standards need to be acquired, click **Measure**. If standards have already been acquired, skip to step 7 to acquire sample data.

3. Follow the instructions that appear.

4. When standards information appears, modify it if desired.

   More:

   If Standard averaging on the Standards tab in Settings was set to Duplicate, "D" at the end of a standard name indicates the second measurement to be made of the standard. If Sample averaging was set to Triplicate, "D" and "T" at the end of standard names indicate the second and third measurements to be made, respectively.

   To enter previously saved standards information, use **Import Standards**.

   If Calculate from weight/volume was selected on the Standards tab, enter the weight and volume for each standard in the table.

   To remove a standard, select it, right-click the table and choose **Clear Standard**. To remove all the standards, choose **Clear Table**.

   To save standards information for later use, use **Export Standards**.

5. Click **Continue**.

6. Follow the instructions that appear, installing the specified standards.

The Standard Curve(s) tab displays the resulting standard curve (or curves). Specify the standards to use for the curve (or curves) by selecting **Yes** or **No** in the **Use** column in the table.

More:

If a standard curve is not calibrated...

- Try selecting a different curve fit type.

- Try remeasuring a standard using the correct standard material: select the listed standard, right-click the table and choose **Remeasure**.

- Try changing the setting of **Minimum r^2** on the Standards tab and acquire the standards again in a new workbook.

The table contains the columns of information specified on the Configuration tab in Reports. Examples include sample identification, user name, and the results of replicate, duplicate or triplicate measurements and their standard deviation.

If Standard averaging was set to Duplicate, "D" at the end of a standard name indicates the second measurement. If Standard averaging was set to Triplicate, "D" and "T" indicate the second and third measurements, respectively.

To permanently remove an acquired standard from the analysis, right-click it and choose **Remove**. Its information is crossed out but not removed from the table.

The Data tab displays the acquired data (a fixed data point or scan spectrum) for the standard selected in the table. To access commands for customizing the display, including adding annotation, right-click the data. See Data Display for more information.

7. Click **Measure**.

8. Follow the instructions that appear.

9. When samples information appears, modify it if desired.

   If Calculate from weight/volume was selected on the Standards tab, enter the weight and volume for each sample in the table.

   More:

   If Sample averaging on the Samples tab in Settings was set to Duplicate, "D" at the end of a sample name indicates the second measurement to be made of the sample. If Sample averaging was set to Triplicate, "D" and "T" at the end of sample names indicate the second and third measurements to be made, respectively.

To enter previously saved samples information, use **Load Samples**. To save the samples information, use **Save Samples**.

10. If only one sample will be measured, install it.

11. Click **Continue**.

12. Follow any instructions that appear, such as to install a specified sample.

The sample results table contains the columns of information specified on the Configuration tab in Reports. If Sample averaging was set to Duplicate, "D" at the end of a sample name indicates the second measurement. If Sample averaging was set to Triplicate, "D" and "T" indicate the second and third measurements, respectively.

The Standard Curve(s) tab shows graphically the relationship between the standard curve, measured spectral intensity and calculated concentration for the selected sample: A horizontal line connects the sample spectral intensity value on the Y-axis to the standard curve. A vertical line connects that point to the sample concentration value on the X-axis:

Note If there are two analysis wavelengths, the lines appear for each of the two standard curves.

The Run Chart tab plots the concentration of the measured component versus sample number. (If there are two analysis wavelengths, the concentration value is the average of the values for those wavelengths.) If Use concentration limits was selected on the Samples tab, horizontal limit lines show whether the concentrations are within the specified limits:
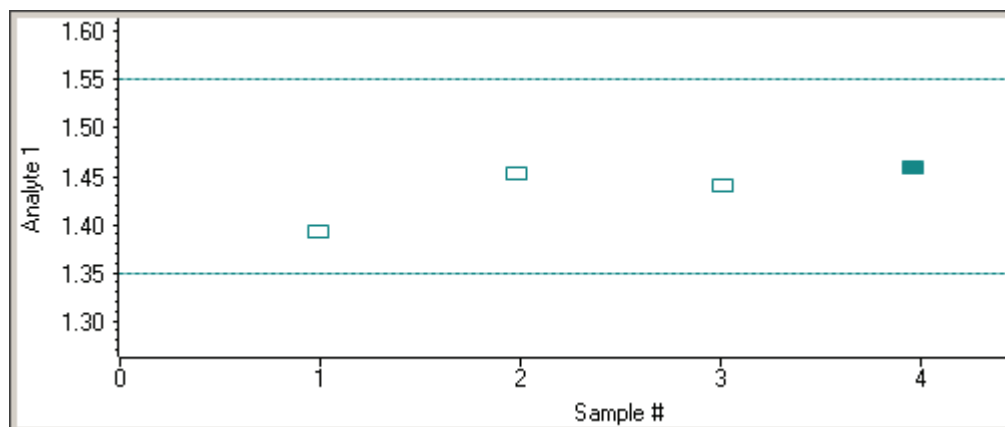
To measure a sample again, right-click its row in the results table and choose **Remeasure**. After the remeasurement, the previous information for the sample is crossed out (but not removed from the table).

To copy the data on the Standard Curve(s) tab or Run Chart tab, right-click the plot and choose **Copy to Clipboard**.

Related Topics

Quantifying Samples Without Using Standards

Performing a Quantitative Analysis

Data Display

Quant

Formulas and Units Tab

Performing a Kinetics Measurement
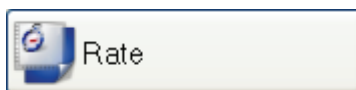
Click **Rate** in the right pane in Home to set up and perform a kinetics measurement. The tasks buttons below become available.

To set Rate parameters, click **Settings**.

To access features for performing the measurement, click **Measure Rate**.

Performing Kinetics Measurements

Contents

- Performing a Fixed Kinetics Measurement

- Performing a Scan Kinetics Measurement

Related Topics

Performing a Scan Kinetics Measurement

Data Display

Performing a Fixed Kinetics Measurement

Kinetics measurements can be made at one wavelength or at more than one wavelength simultaneously. This includes multicell kinetics, which allows running a fixed-wavelength measurement on several samples simultaneously using a sample changer.

❖ **To perform a fixed kinetics measurement**

1. Make sure Single wavelength or Multiple wavelength is selected on the Type tab in Settings in Rate.

2. Click **Measure Rate**.

3. Click **Zero**.

4. In cell position 1 load the sample to use to measure the zero and choose **OK**.

5. Click **Measure**.

If necessary, the Zero action button can be used to remeasure the zero sample.

6. When samples information appears, modify it if desired.

To enter previously saved samples information, use **Load Samples**. To save the samples information, use **Save Samples**.

Enter values in any special columns that were specified on the Samples tab in Settings. These values may appear in the rate data report.

7. Click **Continue**.

8. Follow the instructions that appear.

Each row on the Data tab shows the measurement results for a single sample, and each column is for one wavelength. Each plot on the tab shows a sample's spectral intensity measured at a particular wavelength over time.
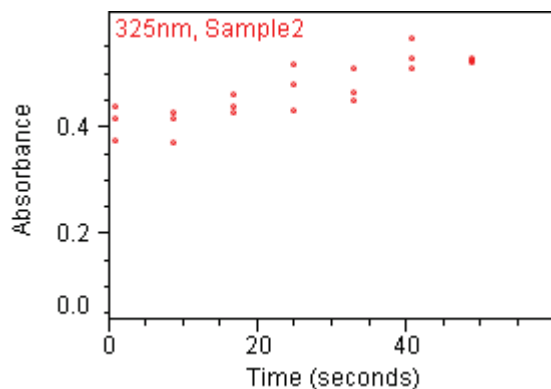
Scroll bars are provided if plots are out of view.

Right-click the **Data tab** to access features for changing the scale or adding annotation. See Data Display for more information.

The results table contains the columns of information specified on the Configuration tab in Reports.

9. To perform rate calculations or modify existing rate calculations on the data in a plot, double-click it.

More:

A dialog box displays the plot and a table containing the default rate calculation values based on the Rate Calculations tab in Settings.

a. If desired, add or change sets of rate calculation values for the displayed data. Each set represents a curve that describes the rate behavior over the specified time period.

To delete a row from the table, right-click it and choose **Delete Selected Row**. To delete all the information from the table, right-click it and choose **Clear Table**.

b. Click **Update** to generate kinetic rate models, each of which appears as a line across the data.
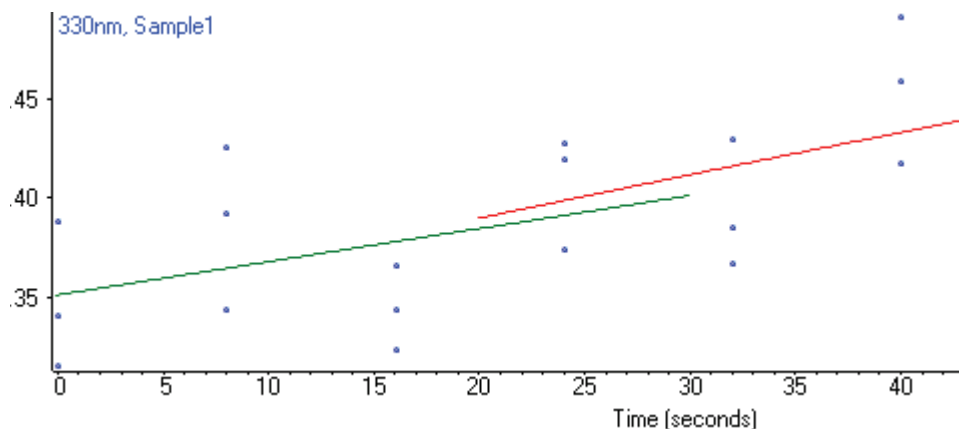
c. Specify how to apply the lines and then click **Accept**.

This option...	Applies the lines to...
This plot only	The displayed data only.
All plots with this wavelength only	All plots for the current wavelength.
All plots	All plots.

The dialog box closes, the lines appear across the specified plots, and the results table is updated with information about the model lines.

Related Topics

Rate

Data Display

Performing a Scan Kinetics Measurement

Performing a Scan Kinetics Measurement

Kinetics measurements can be made on several samples simultaneously using a sample changer or run in a sequential, manual mode.

❖ **To perform a scan kinetics measurement**

1. Make sure Scan data acquisition is selected on the Type tab in Settings in Rate.
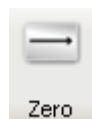
2. Click **Measure Rate**.

3. Click **Zero**.

4. In cell position 1 load the sample to use to measure the zero and choose **OK**.

5. Click **Measure**.

If necessary, the Zero action button can be used to remeasure the zero sample.

6. When samples information appears, modify it if desired.

To enter previously saved samples information, use **Load Samples**. To save the samples information, use **Save Samples**.

Enter values in any special columns that were specified on the Samples tab in Settings. These values may appear in the rate data report.

7. Click **Continue**.

8. Follow the instructions that appear.

Each grid on the Data tab displays all the spectra acquired for a particular sample.
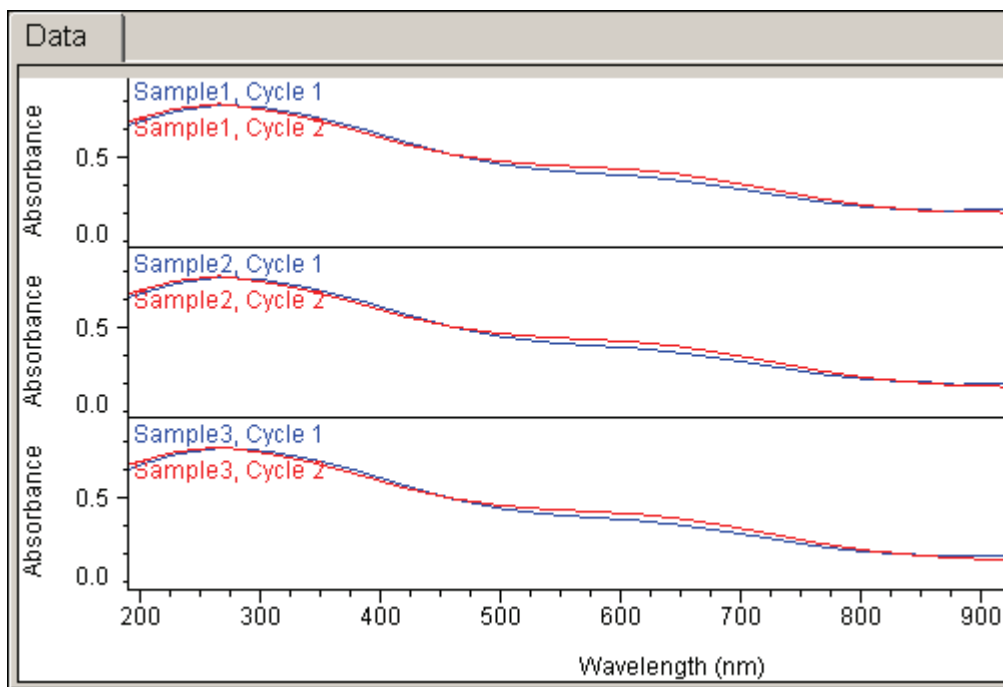
A scroll bar is provided if spectra are out of view.

Right-click the **Data tab** to access features for changing the scale or adding annotation. See Data Display for more information.

A result table appears below the spectra.

Related Topics

Rate

Data Display

Performing a Fixed Kinetics Measurement

Using the Palette Tools and View Finder

Contents

- Using the Selection Tool
- Using the Spectral Cursor Tool
- Using the Peak/Valley Measurement Tool
- Using the Peak Area Tool
- Using the Region-Threshold Tool
- Using the View Finder

Using the Selection Tool

Use the selection tool (if present) to zoom in or move the spectrum.

Note To display the palette, click ⟪.

To zoom in, draw a box and click inside it. To move the spectrum, drag it up or down.

Related Topics

Using the Spectral Cursor Tool

Using the Peak/Valley Measurement Tool

Using the Peak Area Tool

Using the Region-Threshold Tool

Using the View Finder

Using the Spectral Cursor Tool

Use the spectral cursor tool (if present) to view the X and Y values of a point in a spectrum.

> **Note** To display the palette, click ◀◀ .

❖ **To view the X and Y values of a point**

1. Select the spectral cursor tool.

2. Click the data display.

   Cross hairs appear. The X and Y coordinates of their intersection with the spectrum appear below the palette.

   To move the cross hairs, drag across the pane or use the left and right arrow keys on the keyboard.

   To remove the cross hairs from the display, select another tool such as the selection tool.

Related Topics

Using the Selection Tool

Using the Peak/Valley Measurement Tool

Using the Peak Area Tool

Using the Region-Threshold Tool

Using the View Finder

Using the Peak/Valley Measurement Tool

Use the peak/valley measurement tool (if present) to measure the height of a peak or depth of a valley from a specified baseline.

> **Note** To display the palette, click ◀◀ .

❖ **To measure a peak or valley**

1. Select the peak/valley measurement tool.

2. Click the data display.

   A vertical line appears. The X and Y coordinates of its intersection with the spectrum appear below the palette.

3. Drag the line by its diamond-shaped handle to the peak or valley to measure.

4. Drag the triangular baseline handles to the desired baseline endpoints.

   The height or depth of the peak or valley appears below the palette.

To annotate the spectrum with the measured value, right-click the spectrum, point to **Annotate** and choose **Tool Value**. See Working With Labels.

To remove the vertical line and baseline from the display, select another tool such as the selection tool.

Related Topics

Using the Selection Tool

Using the Spectral Cursor Tool

Using the Peak Area Tool

Using the Region-Threshold Tool

Using the View Finder

Using the Peak Area Tool

Use the peak area tool (if present) to measure the corrected area of a peak. This area is bordered by the spectrum, two vertical lines and a baseline.

Note To display the palette, click .

❖ To measure a peak

1. Select the peak area tool.

2. Click the data display.

   Two vertical lines appear (see the illustration below). Their X values define the limits of the region to measure and appear in the Region readout.

3. Drag the lines by their triangular handles to the desired locations.

4. Drag the triangular baseline handles (see the illustration below) to the desired baseline endpoints.

   The X values of the endpoints appear in the Baseline readout. The defined area is shaded, and its measurement appears in the Corrected area readout. Here is an example showing the region limits and baseline endpoints adjusted to measure the corrected area of a peak:
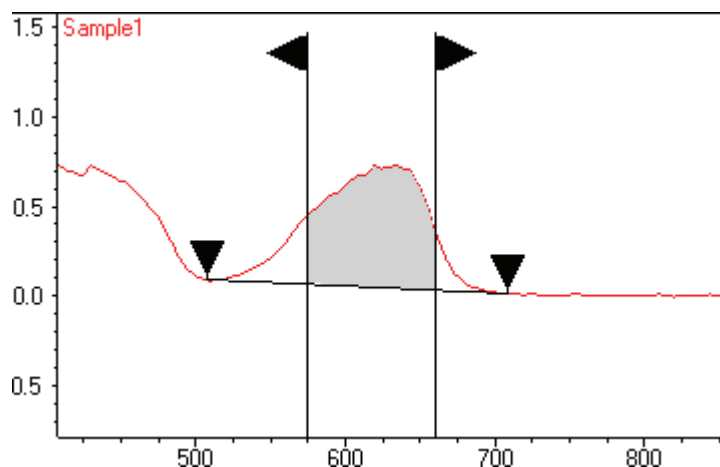
To annotate the spectrum with the measured area, right-click the spectrum, point to **Annotate** and choose **Tool Value**. See Working With Labels.

To remove the vertical lines and baseline from the display, select another tool such as the selection tool.

Related Topics

Using the Selection Tool

Using the Spectral Cursor Tool

Using the Peak/Valley Measurement Tool

Using the Region-Threshold Tool

Using the View Finder

Using the Region-Threshold Tool

For data analysis operations such as locating peaks, use the region-threshold tool (if present) to limit the wavelength region.

Note To display the palette, click .

Drag the vertical lines in the data display or drag horizontally between them to move both at once.

Related Topics

Using the Selection Tool

Using the Spectral Cursor Tool

Using the View Finder

For data analysis operations such as locating peaks, use the view finder (if present) to adjust the data display.

Note To display the view finder, click .

The currently displayed region is indicated by the region markers, the bold vertical lines.

❖ **To expand horizontally**

Click the top half of the **Horizontal Expand/Contract** button. To contract horizontally, click the bottom half.

❖ **To expand vertically**

Click the left half of the **Vertical Expand/Contract** button. To contract vertically, click the right half.

❖ **To expand or contract vertically while keeping the top or bottom of spectra in place**

To expand vertically while keeping the bottom of the spectra in place, click the symbol at the top of this button.

To expand vertically while keeping the top of the spectra in place, click the symbol at the right.

To contract vertically while keeping the bottom of the spectra in place, click the symbol at the bottom.

To contract vertically while keeping the top of the spectra in place, click the symbol at the left.

❖ **To display a different region of the same size**

There are three ways to do this:

• To move the spectrum to the right, click the top half of the **Roll** button.

To roll to the left, click the bottom half.

- Drag between the region markers.

- Click to the left of the left region marker or to the right of the right region marker.

❖ **To change the display limits by moving the region markers**

Drag a region marker left or right.

❖ **To display the entire spectrum**

Double-click between the region markers.

Related Topics

Using the Selection Tool

Using the Spectral Cursor Tool

Using the Peak/Valley Measurement Tool

Using the Peak Area Tool

Using the Region-Threshold Tool

Setting Application Parameters

To set parameters that determine how data will be acquired or quantified with the current application, click **Settings**.

The tabs in the right pane (and their features) depend on the application.

If 🔴 appears on a tab, point to it and read the information to correct the problem.

Action buttons for the current application may include:

Button	Description
	Displays data acquisition features for the application and starts an acquisition.

Button	Description
Reset	Resets the parameters on all the tabs to their default values. For Quant and Rate, also steps through each tab in sequence.
Unlock	Makes the parameters on all the tabs available, closes the current workbook, and creates a new workbook.

Fixed

Settings To set data acquisition parameters for a Fixed workbook, click **Settings** to access:
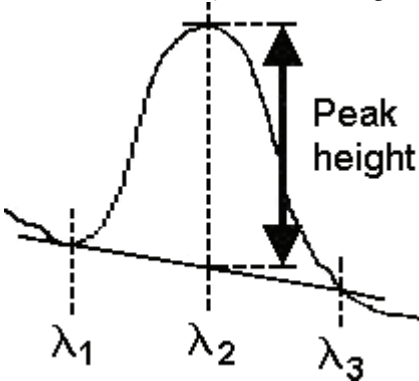
Instrument Tab for Fixed
Accessories Tab for Fixed
Samples Tab for Fixed

Change Fixed workbook settings as desired before making sample measurements. All Fixed measurements are saved in a workbook that includes the data acquisition settings.

Instrument Tab for Fixed

Settings Click **Settings** in Fixed to display the Instrument tab in the right pane.

Feature	Description
Data mode	Y-axis format for acquired data.
Integration time	How long the system acquires and averages data at each measured wavelength. Increasing the integration time improves the signal-to-noise ratio.
Bandwidth	A larger spectral bandwidth increases the amount of energy that passes through the sample. Increasing the bandwidth can improve the signal-to-noise ratio; however, a larger spectral bandwidth decreases the ability to resolve closely spaced spectral features.

Feature	Description
Result mode	Determines how results are calculated and displayed: **Normal** displays the results in the units specified in the Data mode setting (see above). **Peak Height** calculates the peak height with respect to a sloping baseline defined by two wavelengths adjacent to the center peak: The lowest of the three measured wavelengths defines the start of the sloping baseline, the middle wavelength defines the peak location, and the highest wavelength defines the end point of the sloping baseline. **Wavelength 1 + Wavelength 2** adds the Y values at the two measured wavelengths. **Wavelength 1 - Wavelength 2** subtracts the Y value at the second measured wavelength from the Y value at the first. **Wavelength 1 / Wavelength 2** divides the Y value at the first measured wavelength by the Y value at the second.
Reference wavelength correction	If available and selected, subtracts the background intensity at the specified reference wavelength from the sample intensity at all measured wavelengths. The reference wavelength value appears in red in the table of wavelengths.
Use control limits	If available and selected, specifies the control limits for each wavelength in the table. The limits, shown as triangular markers in the data display (and listed in the table to the right of the display), indicate whether each measured data point is within specification. Enter the desired upper and lower limits for each wavelength in the table, using the appropriate units for the selected data mode.

Feature	Description
Table of wavelengths	Wavelengths at which measurements will be made, plus the corresponding control limits if specified (see above). The number of required wavelengths depends on the setting of Result mode (see above). To enter or change the value in a table cell, click it and type. To order the list by wavelength, lower control limit or upper control limit, click the appropriate column heading.
Autoscale	Autoscale automatically adjusts the Y-axis scale for optimal viewing of data during a measurement.
Ordinate Y scale	To specify the Y-axis display limits, deselect **Autoscale** and set **Max** and **Min** to the desired maximum and minimum Y values, respectively, in the range 400 to -400.
Description (optional)	Description of the template.

Related Topics

Setting Application Parameters

Fixed

Accessories Tab for Fixed

Samples Tab for Fixed

Accessories Tab for Fixed

Click **Settings** in Fixed to display the Accessories tab in the right pane. The available parameters depend on the installed accessories. See Accessories for details.

The status of accessories can be monitored during measurements.

Related Topics

Accessories

Setting Application Parameters

Fixed

Instrument Status Monitors

Instrument Tab for Fixed

Samples Tab for Fixed

Samples Tab for Fixed

Settings	Click **Settings** in Fixed to display the Samples tab in the right pane.

Feature	Description
Number of samples	Number of samples in the samples table.
Increment sample name from selected row	For creating sequentially numbered sample names in the samples table if Number of samples (see above) is set to 2 or greater: 1. Select **Increment sample name from selected row**. 2. Click the cell in the Sample Name column for starting the sequence. 3. Type a new sample name. 4. Press **Enter**.
Load Samples	For locating and selecting a .tsv (tab separated values) file or .csv (comma separated values) file containing sample names and descriptions, which are entered in the samples table.
Save Samples	Saves the contents of the samples table in a .tsv (tab separated values) file, .csv (comma separated values) file, or .xml (extensible markup language) file in a specified location.
Samples table	Lists samples by their names and descriptions, up to a maximum of 1000. To change a sample name, click its cell and edit the text. To enter or change text in a table cell, click it and type. To order the list by sample name or description, click the appropriate column heading. If the table contains just one sample and data is acquired with an accessory that automatically changes samples, sample names are incremented.

Related Topics

Setting Application Parameters

Fixed

Instrument Tab for Fixed

Accessories Tab for Fixed

Scan

To set data acquisition parameters for a Scan workbook, click **Settings** to access:

Instrument Tab for Scan
Measurement Tab for Scan
Correction Tab for Scan
Accessories Tab for Scan
Samples Tab for Scan

Instrument Tab for Scan

Click **Settings** in Scan to display the Instrument tab in the right pane.

Feature	Description
Data mode	Y-axis format for acquired data.
	For Abs*Factor, set **Factor** to a value by which to multiply measured absorbance values.
Smooth	Select the desired degree of smoothing (if available for the selected data mode and Derivative setting). Smoothing reduces noise in the data but can also remove some spectral features such as small peaks, valleys and shoulders. For more information, see About Smoothing.
Derivative	Select the desired derivative order for acquired data (if available for the selected data mode).
Start wavelength and End wavelength	Starting and ending values of the wavelength range for acquiring data.
Bandwidth	A larger spectral bandwidth increases the amount of energy that passes through the sample. Increasing the bandwidth can improve the signal-to-noise ratio; however, a larger spectral bandwidth decreases the ability to resolve closely spaced spectral features, especially in scanning measurements.
Integration time	How long the system acquires and averages data at each data interval. Increasing the integration time improves the signal-to-noise ratio but reduces the scan speed.
Data interval	Difference in wavelength between two consecutive data points.
Scan speed	Wavelength range covered per unit time. Varies inversely with integration time. Increases as the data interval increases.

Feature	Description
Estimated time	Estimated duration of data acquisition. Increases as integration time increases and as the data interval decreases. Varies inversely with scan speed.
Autoscale	Auto scale automatically adjusts the Y-axis scale for optimal viewing of data during a measurement.
Ordinate Y scale	To specify the Y-axis display limits, deselect **Autoscale** and set **Max** and **Min** to the desired maximum and minimum Y values, respectively, in the range 400 to -400.
Description (optional)	Description of the template.

Related Topics

Setting Application Parameters

Scan

Measurement Tab for Scan

Correction Tab for Scan

Samples Tab for Scan

Accessories Tab for Scan

Measurement Tab for Scan

When setting up a Scan workbook, click **Settings** to display the Measurement tab in the right pane.

Feature	Description
Result	Data analysis operation to perform automatically after sample measurement.
	Select **Off** to not perform any operation.
	The parameters for a selected operation appear to the right. See Finding Peaks in Scan Data or Finding Value Level Crossings in Scan Data for information on setting them and how results are displayed.

Related Topics

Setting Application Parameters

Scan

Correction Tab for Scan

Click **Settings** in Scan to display the Correction tab in the right pane. Three baseline correction types are available:

Type	Description
100%T baseline	Standard baseline correction. The data may be acquired using an empty holder or using solvent.
0%T or 0%R baseline	Corrects for any inherent variations in the electronic zero line of the instrument.
	More:
	This can be more of a factor at lower light energy levels present in a DRA (Diffuse Reflectance Accessory) and when working at high absorbance levels.
	For more information, see ASTM method E903. The calculation in transmission performed in the instrument is:
	$$\frac{S - 0\%T}{100\%T - 0\%T} \quad \text{or} \quad \frac{S - 0\%R}{100\%R - 0\%R}$$
	Requires a previously acquired 100%T baseline.

Type	Description
Standard reference correction with 0%R or 0%T baseline	Applies a 100%T baseline correction and a zero line correction (0%R baseline) to a sample measured with a reflectance accessory that is not absolute (for example, a Diffuse Reflectance Accessory). More: The software multiplies the scan result at each data point by the corresponding value in the table (explained below). The calculation in reflectance performed in the instrument is: $$\frac{S - 0\%R}{100\%T - 0\%R} \times \text{Std. Ref.}$$ Requires a previously acquired 100%T baseline.
Correct single beam substitution error	Allows the ratioed spectrum acquired with the single-beam sphere to be corrected as if it were acquired with a double-beam instrument (where the baseline is collected in the integrating sphere). Requires that Data mode on the Instrument tab be set to Absorbance, % Transmittance, % Reflectance or Log(1/R).

Select **Standard reference correction with 0%R or 0%T baseline** to display additional features:

Feature	Description
Clear Table	Clears information from the table.
Load Table	Fills the table with wavelength and intensity values from a .tsv (tab separated values) file or .csv (comma separated values) file containing X delimiter Y pairs.
Save Table	Saves in a .tsv file, .csv file, or .xml (extensible markup language) file the wavelength and intensity values in the table.

Related Topics

Setting Application Parameters

Scan

Instrument Tab for Scan

Measurement Tab for Scan

Samples Tab for Scan

Accessories Tab for Scan

Accessories Tab for Scan

Click **Settings** in Scan to display the Accessories tab in the right pane. The available parameters depend on the installed accessories. See Accessories for details.

The status of accessories can be monitored during measurements.

Related Topics

Accessories

Setting Application Parameters

Scan

Instrument Status Monitors

Instrument Tab for Scan

Measurement Tab for Scan

Correction Tab for Scan

Samples Tab for Scan

Samples Tab for Scan

Click **Settings** in Scan to display the Samples tab in the right pane.

Feature	Description
Number of samples	Number of samples in the samples table.
Increment sample name from selected row	For creating sequentially numbered sample names in the samples table if Number of samples (see above) is set to 2 or greater: 1. Select **Increment sample name from selected row**. 2. Click the cell in the Sample Name column for starting the sequence. 3. Type a new sample name. 4. Press **Enter**.

Feature	Description
Load Samples	For locating and selecting a .tsv (tab separated values) file or .csv (comma separated values) file containing sample names and descriptions, which are entered in the samples table.
Save Samples	Saves the contents of the samples table in a .tsv (tab separated values) file, .csv (comma separated values) file, or .xml (extensible markup language) file in a specified location.
Samples table	Lists samples by their names and descriptions, up to a maximum of 1000. To change a sample name, click its cell and edit the text. To enter or change text in a table cell, click it and type. To order the list by sample name or description, click the appropriate column heading.
	If the table contains just one sample and data is acquired with an accessory that automatically changes samples, sample names are incremented.

Related Topics

Setting Application Parameters

Scan

Instrument Tab for Scan

Measurement Tab for Scan

Correction Tab for Scan

Accessories Tab for Scan

Quant

To set parameters that define a Quant template, click **Settings** to access:

Type Tab for Quant
Measurement Tab for Quant
Standards Tab for Quant
Instrument Tab for Quant
Accessories Tab for Quant
Samples Tab for Quant

If only the Type tab appears, set its parameters. Click **Next** at the bottom of the tab to set parameters on the next tab, and so on. To return to the previous tab, click **Previous**. Click **Finish** when ready to complete the process. To cancel the operation, click **Cancel**.

> **Note** Change Quant settings only before sample measurements. All Quant measurements saved in a workbook must be made with the same settings. See Setting Application Parameters for information about unlocking settings.

Related Topics

Quant

Formulas and Units Tab

Quantifying Sample Data

Performing a Quantitative Analysis

Type Tab for Quant

Click **Settings** in Quant to display the Type tab in the right pane.

Feature	Description
Name (if present)	User group name followed by the name of the template of settings (entered when the template was saved using Save Workbook Settings as Template in the File menu).
Description (optional)	Optional description of the template.
Quant Type	Type of quantitative analysis (see the table below). An image representing the selected type appears to the right. The required tabs also appear (click the **Reset** action button to step through them).

Type	How the Type Calculates Sample Concentration
Manually entered factor	Uses the equation C = K * A, where C is the concentration of the analyte in the selected units, K is the entered factor, and A is the absorbance.
Measure single standard	Divides the sample absorbance value by the average absorbance value of a single standard. This is in effect a "Standard curve" quantification (see below) with just one standard.
Standard curve	Uses a simple standard curve based on the absorbance of a set of standards at a specified wavelength.
Standard curve with two wavelengths	Takes the average of values determined by each of two standard curves associated with the specified wavelengths.
Advanced standard curve	Uses a standard curve generated from a specified equation.
Advanced without standards	Uses a "single result equation" specified on the Measurement tab. (Calculates the concentration or answer directly from this equation.)

Related Topics

Quant

Measurement Tab for Quant

Standards Tab for Quant

Instrument Tab for Quant

Samples Tab for Quant

Accessories Tab for Quant

Formulas and Units Tab

Quantifying Sample Data

Performing a Quantitative Analysis

Measurement Tab for Quant

Click **Settings** in Quant to display the Measurement tab in the right pane. The available features depend on the Quant Type setting on the Type tab. The features for each type are described in tables below.

Manually entered factor

Feature	Description
Analysis wavelength(s)	Wavelength(s) to use for the quantitative analysis.
Correction	To use uncorrected data, select **None**.
	Single point subtracts the sample absorbance at the entered wavelength from the absorbance at every data point.
	Sloping baseline draws a line between the data points at the entered wavelengths, finds its Y value at the analytical wavelength, and subtracts it from the measured absorbance.
Component name	Component to quantify.
Unit	Component concentration unit. The available units depend on the Formulas & Units tab settings in Options.
Use user-defined factor	Calculates component concentration using the entered factor (K in the equation C = K *A), with the selected unit.
Use extinction coefficient	Calculates component concentration with absorbance (A) equal to $$\varepsilon\, c\, \ell$$ where ε is the entered extinction coefficient (a constant dependent on the component and wavelength), c is concentration in the selected unit, and ℓ is 1 cm (the pathlength).

Feature	Description
Molecular weight	Molecular weight of the component. Available only if the units specified on this tab are different and require this value for a conversion.
Calculate additional results	For selecting or defining formulas for additional data processing, with the results appearing in the analysis report. The formulas are written in a form similar to that used in a command script language, with constants, mathematical functions, etc. (See "Operations and Functions" for definitions of operations and functions.) All functions are case-sensitive. Spaces are not allowed between a function name and "(". After adding formulas, edit their information in the formula table as desired. To delete a table row, right-click it and choose **Delete Row**. Instructions: ❖ **To use one or more predefined formulas** 1. Click **Select**. 2. Select the desired formulas. Hold down the Ctrl or Shift keys on the keyboard while making multiple selections. The available formulas depend on the Formulas & Units tab settings in Options. 3. Choose **OK**. ❖ **To define a formula** 1. Click **Build**. 2. To enter a formula in its entirety, set **Equation type** to **User defined** and type the equation. To use a provided formula, select it and enter values for the variables. The available formulas depend on the Formulas & Units tab settings. 3. Click **OK**. 4. For selected provided formulas, enter a name and concentration unit in the table. The available units depend on the Formulas & Units tab settings.

Measure single standard

Feature	Description
Analysis wavelength(s)	Wavelength(s) to use for the quantitative analysis.
Correction	See Correction above.
Component name	Component to quantify.
Unit	Component concentration unit. The available units depend on the Formulas & Units tab settings in Options.
Standard concentration	Concentration of the single standard.
Calculate additional results	See Calculate additional results above.

Standard curve

Feature	Description
Analysis wavelength(s)	Wavelength(s) to use for the quantitative analysis.
Correction	See Correction above.
Component name	Component to quantify.
Unit	Component concentration unit. The available units depend on the Formulas & Units tab settings in Options.
Calculate additional results	See Calculate additional results above.

Standard curve with two wavelengths

Feature	Description
Analysis wavelengths	Wavelengths to use for the quantitative analysis.
Correction	See Correction above.
Component name	Component to quantify.
Unit	Component concentration unit. The available units depend on the Formulas & Units tab settings.
Calculate additional results	See Calculate additional results above.

Advanced standard curve

Feature	Description
Standard Curve Equation	Equation used to quantify samples, written in a form similar to that used in a command script language, with constants, mathematical functions, etc. (See Operations and Functions for definitions of operations and functions.) All functions are not case-sensitive. Spaces are not allowed between a function name and "(". For this Quant type the equation defines the value for the Y-axis of the calibration curve. Instructions: ❖ **To use a predefined equation** 1. Click **Select**. 2. Select the desired equation and click **OK**. The available equations depend on the Formulas & Units tab settings in Options. ❖ **To define an equation** 1. Click **Build**. 2. To enter an equation in its entirety, set **Equation type** to **User defined** and type the equation. To use a provided equation, select it and enter values for the variables. The available equations depend on the Formulas & Units tab settings. 3. Click **OK**.
Component name	Component to quantify.
Unit	Component concentration unit. The available units depend on the Formulas & Units tab settings in Options.
Calculate additional results	See Calculate additional results above.

Advanced without standards

Feature	Description
Single Result Equation	See Standard Curve Equation above for instructions. For this Quant type the equation is used to obtain a single concentration result (without using standards).
Component name	Component to quantify.
Unit	Component concentration unit. The available units depend on the Formulas & Units tab settings in Options.
Calculate additional results	See Calculate additional results above.

Related Topics

Operations and Functions

Quant

Type Tab for Quant

Standards Tab for Quant

Instrument Tab for Quant

Samples Tab for Quant

Accessories Tab for Quant

Formulas and Units Tab

Quantifying Sample Data

Performing a Quantitative Analysis

Operations and Functions

The tables below describe the operations and functions usable in Quant equations specified on the Measurement tab. Arithmetic operations (including functions) are performed first, followed by comparison operations, and finally logical operations.

> **Note** The operators, arguments and functions are not case-sensitive.

Arithmetic Operations

Operator	Description	Example	Returned by Example Operation
+	Addition	2 + 6 + 4	12
-	Subtraction	25 - 4	21
*	Multiplication	25 * 4	100
/	Division	25 / 4	6.25
-	Negation	-4 + 25	21
mod	Modulo division (returns remainder)	16 mod 5	1
&	Text addition	"abc" & "def"	"abcdef"

Comparison Operations

Operator	Description	Example	Result
>=	Greater than or equal	(3 + 2) >= 4	true
<=	Less than or equal	(3 + 2) <= 5	true
=, ==	Equals	(2 + 2) = 4	true
!=, <>	Does not equal	(2 + 2) != 5	true
<	Less than	5 < 4	false
>	Greater than	5 > 4	true
true	The value "true"	(5 > 4) = true	true
false	The value "false"	(5 > 4) = false	false

Logical Operations

Operator	Description	Example	Result
AND	If both sides of the AND are true, result is true	5 > 4 AND 2 = 3	false
OR	If either side of the OR is true, result is true	5 > 4 OR 2 = 3	true

The following equation functions produce a value based on one or more arguments you supply.

Example Function Arguments

Argument	Description
<number>, <angle>, <length>, <value>, <power>, <start>, <len>	An expression that yields a number.
<list>	Any expression that yields a list of numbers.
<text>, <sub>	An expression that yields a text.

Arithmetic Functions

Function	Returned or Performed by Function
abs(<number>)	Absolute value of a number.
ceiling(<number>)	Smallest integer greater than or equal to <number>. Example: Ceiling(2.2) is 3.0
floor(<number>)	Largest integer less than or equal to <number>. Example: Floor(2.7) is 2.0
random()	Random fractional number between 0 and 1.
round(<number>)	Rounds a double value to the nearest integer value.
sqrt(<number>)	Square root of a number.
truncate(<number>)	Truncated number. Everything to the right of the decimal point is removed, leaving only the integer portion of the number. The returned value is not rounded.

Logarithmic Functions

Function	Returned by Function
exp(<number>)	Result of the constant e (2.7182818) raised to the power of the specified number (e^<number>).
ln(<number>)	Natural logarithm (base e logarithm) of a number.
log10(<number>) log(<number>)	Base 10 logarithm of a specified number.
pow(<value>, <power>)	Value raised to the power. Example: pow(2,3) is 8.0

Trigonometric Functions

> **Note** For functions acos and asin, <number> is an expression that yields a number in the range -1 to 1.

> **Note** The formula for converting degrees to radians is radians = degrees * (pi/180).

Function	Returned by Function
acos(<number>)	Arccosine of a number in radians.
asin(<number>)	Arcsine of a number in radians.
atan(<number>)	Arctangent of a number in radians.
atan2(<number1>,<number2>)	Arctangent of <number1> divided by <number2> in radians. The signs of both arguments are used to determine the quadrant of the returned value.
cos(<angle>)	Cosine of an angle measured in radians.
cosh(<angle>)	Hyperbolic cosine of an angle measured in radians.
pi()	Ratio of the circumference of a circle to its diameter.
sin(<angle>)	Sine of an angle measured in radians.
sinh(<angle>)	Hyperbolic sine of an angle measured in radians.
tan(<angle>)	Tangent of an angle measured in radians.
tanh(<angle>)	Hyperbolic tangent of an angle measured in radians.

Statistical Functions

Function	Returned by Function
average(<list>)	Average of a list of numbers (sum divided by the number of items).
max(<list>)	Highest value from two or more numbers.
min(<list>)	Lowest value from two or more numbers.
sum(<list>)	Sum of a list of numbers.

Text Functions

Function	Returned by Function
FindTextIndex(<search>, <text>)	Index of the first occurrence of the <search> text in the specified text. If the text is not found, a -1 is returned.
Lowercase(<text>)	Copy of the text converted to lower case using the casing rules of the current culture.

Function	Returned by Function
PassFail(<expression>)	"Pass" in the language of the current culture if the expression evaluates to true; otherwise, "Fail".
Quote	Text containing the quote (") character.
Return	Text containing a carriage return.
TextLength(<text>)	Number of characters, including spaces, in the specified text. A CRLF is counted as two characters.
ExtractText(<text>, <start>, <len>)	Portion of the specified text. The extracted text starts at the specified <start> index and has a specified length.
Tab	Text containing the tab character.
ToNumber(<text>)	Numeric representation of the text.
ToText(<number>)	Text representation of the number.

Measurement Functions

Function	Returned or Performed by Function
Y(location)	Y-axis value at the given location.
Y(location, baseline)	Y-axis value at the given location with a one-point baseline.
Y(location, baseline1, baseline2)	Y-axis value at the given location with a two-point baseline.
Area(start, end)	Area between two spectral limits.
Area(start, end, baseline)	Area between two spectral limits using a one-point baseline.
Area(start, end, baseline1, baseline2)	Area between two spectral limits using a two-point baseline.
PMin(start, end)	Minimum Y-axis value between two spectral limits.
PMax(start, end)	Maximum Y-axis value between two spectral limits.
PMax(start, end, baseline)	Corrects the spectrum with a one-point baseline and then report the maximum Y-axis value between two spectral limits.
PMax(start, end, baseline1, baseline2)	Corrects the spectrum with a two-point baseline and then report the maximum Y-axis value between two spectral limits.
PLoc(start, end)	Location (X-axis value) at which the maximum Y-axis value occurs between two spectral limits.
PLoc(start, end, baseline)	Corrects the spectrum with a one-point baseline and then report the location (X-axis value) at which the maximum Y-axis value occurs between two spectral limits.

Function	Returned or Performed by Function
PLoc(start, end, baseline1, baseline2)	Corrects the spectrum with a two-point baseline and then report the location (X-axis value) at which the maximum Y-axis value occurs between two spectral limits.
PWidth(start, end, percent)	Determines the peak width between two spectral limits. Report the width at which the peak reaches a specified percentage of the peak maximum.
Pavg(start, end)	Determines the average value of the spectrum between two spectral limits.
Pcut(start, end, percent)	Determines the location (X-axis value) of the cut-on or cut-off point in the specified spectral region. For example, for a region with increasing Y value, a cut-on point occurs where the increase reaches the specified percentage of total increase across the region. Here is an example showing a cut-on point with "percent" set to 60:
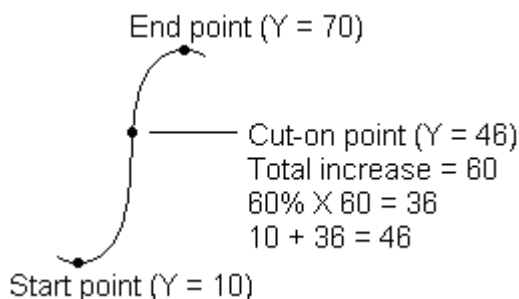
Related Topics

Measurement Tab for Quant

Formulas and Units Tab

Performing a Quantitative Analysis

Standards Tab for Quant

To display the Standards tab in the right pane, click **Settings** in Quant and then set **Quant Type** to Standard curve, Standard curve with two wavelengths, or Advanced standard curve.

Feature	Description
Curve fit type	Type of equation used to create the standard curve from standard concentration values.
Standard averaging	Whether and how to average concentration values from multiple measurements of the same standard or from multiple standards prepared under the same conditions. To average multiple measurements of the same standard, select **Replicate** and set **Number of replicates** to the total number of measurements. To average values from two or three similar standards, select **Duplicate** or **Triplicate**, respectively.
Minimum r^2	The r^2 value indicates how well the standard curve fits the standard data points, with 1.0 a perfect fit. If Minimum r^2 is selected, samples can be quantified only after that value is achieved for the standard curve.
Calculate from weight/volume	If available for the current unit, calculates concentration when the weight and volume of material used to prepare each standard is known. Enter the weight and volume for each standard in the appropriate table cells, or enter it later as part of running an analysis.
Standard Table	Contains concentration and other information about the standards. To add information from a .csv (comma separated values) file or .tsv (tab separated values) file, click **Import Standards**. To save the information in a .csv file or .tsv file, click **Export Standards**.

Related Topics

Quant

Type Tab for Quant

Measurement Tab for Quant

Instrument Tab for Quant

Samples Tab for Quant

Accessories Tab for Quant

Formulas and Units Tab

Quantifying Sample Data

Performing a Quantitative Analysis

Instrument Tab for Quant

Click **Settings** in Quant to display the Instrument tab in the right pane.

Feature	Description
Mode	Specifies Scan or Fixed data acquisition.
Data mode	Y-axis format for acquired data.
	For Abs*Factor (Scan only), set **Factor** to a value by which to multiply measured absorbance values.
Smooth (Scan only)	Select the desired degree of smoothing (if available for the selected data mode and Derivative setting). Smoothing reduces noise in the data but can also remove some spectral features such as small peaks, valleys and shoulders. See About Smoothing.
Derivative (Scan only)	Select the desired derivative order for acquired data (if available for the selected data mode).
Start wavelength and End wavelength (Scan only)	Starting and ending values of the wavelength range for acquiring data.
Bandwidth	A larger spectral bandwidth increases the amount of energy that passes through the sample. Increasing the bandwidth can improve the signal-to-noise ratio; however, a larger spectral bandwidth decreases the ability to resolve closely spaced spectral features.
Integration time	How long the system acquires and averages data at each data interval (for Scan) or at each measured wavelength (for Fixed). Increasing the integration time improves the signal-to-noise ratio but reduces the scan speed.
Data interval (Scan only)	Difference in wavelength between two consecutive data points.
Scan speed (Scan only)	Wavelength range covered per unit time. Varies inversely with integration time. Increases as the data interval increases.
Estimated time (Scan only)	Estimated duration of data acquisition. Increases as integration time increases and as the data interval decreases. Varies inversely with scan speed.
Table of wavelengths (Fixed only)	Shows the analysis wavelength(s) entered on the Measurement tab.

Related Topics

Quant

Type Tab for Quant

Measurement Tab for Quant

Standards Tab for Quant

Samples Tab for Quant

Accessories Tab for Quant

Formulas and Units Tab

Quantifying Sample Data

Performing a Quantitative Analysis

Accessories Tab for Quant

 Click **Settings** in Quant to display the Accessories tab in the right pane. The available parameters depend on the installed accessories. See Accessories for details.

The status of accessories can be monitored during measurements.

Related Topics

Quant

Accessories

Instrument Status Monitors

Type Tab for Quant

Measurement Tab for Quant

Standards Tab for Quant

Instrument Tab for Quant

Samples Tab for Quant

Formulas and Units Tab

Quantifying Sample Data

Performing a Quantitative Analysis

Samples Tab for Quant

[Settings icon] **Settings**	Click **Settings** in Quant to display the Samples tab in the right pane.

Feature	Description
Number of samples	Number of samples in the analysis.
Base name	Beginning of the name for sample spectra, to which a sequential number is appended. For example, the names of three sample spectra using the base name "dye" would be dye1, dye2 and dye3.
Sample averaging	Whether and how to average concentration values from multiple measurements of the same sample or from multiple samples. To average multiple measurements of the same sample, select **Replicate** and set **Number of replicates** to the total number of measurements. To average values from two or three samples, select **Duplicate** or **Triplicate**, respectively.
Use concentration limits	Displays high and low limit lines on the Run Chart tab to show whether sample concentrations are within the specified limits.
Use weight/volume correction	If available for the current unit, corrects sample concentrations using the entered target weight and volume: corrected concentration = measured concentration * (actual weight / target weight) * (target volume / actual volume)

Related Topics

Quant

Type Tab for Quant

Measurement Tab for Quant

Standards Tab for Quant

Instrument Tab for Quant

Accessories Tab for Quant

Formulas and Units Tab

Quantifying Sample Data

Performing a Quantitative Analysis

Rate

To set parameters for the current Rate workbook, click **Settings** to access:

Type Tab for Rate
Measurement Tab for Rate
Instrument Tab for Rate
Accessories Tab for Rate
Samples Tab for Rate
Rate Calculations Tab for Rate

Related Topics

Rate

Performing a Kinetics Measurement

Type Tab for Rate

Click **Settings** in Rate to display the Type tab in the right pane.

Feature	Description
Name	User group name followed by the name of the template of settings (entered when the template was saved using Save Workbook Settings as Template in the File menu).
Description	Description of the template.
Rate Type	Type of kinetics measurement to perform.

Related Topics

Measurement Tab for Rate

Instrument Tab for Rate

Accessories Tab for Rate

Samples Tab for Rate

Rate Calculations Tab for Rate

Performing a Kinetics Measurement

Measurement Tab for Rate

Settings

Click **Settings** in Rate to display the Measurement tab in the right pane.

Feature	Description
Integration time	How long the system acquires and averages data to obtain each data point at each measured wavelength for single and multicell experiments or at each data interval for scan experiments.
Dwell time	How long the sample remains in the light beam.
	Use this setting to vary the number of data points collected per cell per cycle. Dwell time is always a multiple of integration time (see above). Dwell time can be very useful when performing multicell rate measurements. This is because the cell changer accessory will position a cell in the light beam for a specified period of time (dwell time), rather than moving back and forth between cells and increasing the time between measurements (when no sample is in the light beam).
	For example, if the integration time is 0.1 second and dwell time is 0.5 second, five data points will be recorded for each cell before the cell changer moves to the next cell. For fairly fast reactions, multiple samples can be measured, with over ten times as many data points acquired within a short time. This can improve the accuracy of rate calculations for faster multicell rate measurements.
Time unit	Determines the time unit used in the stages table (see below).
Allow multiple stages	Allows the use of the specified number of measurement stages, over which the frequency of data acquisition can be determined. For example, if a reaction has two components, the first component could be fast and require a high data density. The second component could be much slower and longer lived, therefore requiring a lower data density. Defining multiple stages enables the use of the proper data density over a given period of time.
	For single and multiple wavelength experiments only.
Stages table	Defines for each stage the start time, end time and interval (how frequently a measurement is made). For example, using an interval of 10 seconds would measure the sample every 10 seconds from the start time to the end time. In a multicell experiment the interval setting is the measurement interval for each sample.
	For single and multiple wavelength experiments only.
Cycle time	Time between each measurement cycle. For scan experiments only.

Feature	Description
Number of cycles	Number of measurement cycles. For scan experiments only.
Duration	Length of the experiment, calculated by multiplying the cycle time by the number of cycles (see above). For scan experiments only.

Related Topics

Type Tab for Rate

Instrument Tab for Rate

Accessories Tab for Rate

Samples Tab for Rate

Rate Calculations Tab for Rate

Performing a Kinetics Measurement

Instrument Tab for Rate

Click **Settings** in Rate to display the Instrument tab in the right pane.

Feature	Description
Data mode	Y-axis format for acquired data.
	For Abs*Factor, set **Factor** to a value by which to multiply measured absorbance values. For scan experiments only.
Smooth	Select the desired degree of smoothing. Smoothing reduces noise in the data but can also remove some spectral features such as small peaks, valleys and shoulders. For more information, see About Smoothing. For scan experiments only.
Derivative	Select the desired derivative order for acquired data. For scan experiments only.
Start wavelength and End wavelength	Starting and ending values of the wavelength range for acquiring data. For scan experiments only.
Bandwidth	A larger spectral bandwidth increases the amount of energy that passes through the sample. Increasing the bandwidth can improve the signal-to-noise ratio; however, a larger spectral bandwidth decreases the ability to resolve closely spaced spectral features, especially in scanning measurements.

Feature	Description
Integration time	How long the system acquires and averages data at each data interval. Increasing the integration time improves the signal-to-noise ratio but reduces the scan speed. For scan experiments only.
Data interval	Difference in wavelength between two consecutive data points. For scan experiments only.
Scan speed	Wavelength range covered per unit time. Varies inversely with integration time. Increases as the data interval increases. For scan experiments only.
Estimated time	Estimated duration of data acquisition. Increases as integration time increases and as the data interval decreases. Varies inversely with scan speed. For scan experiments only.
Wavelength table	Wavelengths to monitor during the reaction. For single and multiple wavelength experiments only.

Related Topics

Type Tab for Rate

Measurement Tab for Rate

Accessories Tab for Rate

Samples Tab for Rate

Rate Calculations Tab for Rate

Performing a Kinetics Measurement

Accessories Tab for Rate

Click **Settings** in Rate to display the Accessories tab in the right pane. The available parameters depend on the installed accessories. See Accessories for details.

The status of accessories can be monitored during measurements.

Related Topics

Accessories

Instrument Status Monitors

Type Tab for Rate

Measurement Tab for Rate

Samples Tab for Rate

Click **Settings** in Rate to display the Samples tab in the right pane. To

Feature	Description
Number of samples	Number of samples in the experiment.
Base name	Beginning of the name for sample spectra, to which a sequential number is appended.
Set up sample table columns	Specifies the columns of sample information to be entered during the experiment. To add a column, type the desired name in an empty cell and press the Tab key. To delete a column (except the Sample Title column), right-click it and choose **Delete Column**. To delete all the columns (except the Sample Title column), right-click the table and choose **Delete All Columns**.

Related Topics

Rate Calculations Tab for Rate

Click **Settings** in Rate to display the Rate Calculations tab in the right pane (for single and multiple wavelength experiments only).

Feature	Description
Calculate rate constants automatically at end of data acquisition	Calculates rate constants automatically at the end of the experiment.
Calculate Rate	For each measurement stage, enter the starting and ending times of the rate vector, the rate scaling factor, and the order of the reaction. The factor is a constant that is multiplied by a calculated kinetics parameter to give physical significance to the measurement.
	To enter different settings for individual wavelengths, select **Specify settings for individual wavelengths** (available only if Rate Type on the Type tab is set to Multiple wavelength). In the Wavelength column, select or type the desired wavelength for each row of settings. The available wavelengths are those entered on the Instrument tab.
	To delete a row of information from the table, right-click the row and choose **Delete Selected Row**. To delete all the information from the table, right-click it and choose **Clear Table**.

Related Topics

Type Tab for Rate

Measurement Tab for Rate

Instrument Tab for Rate

Accessories Tab for Rate

Samples Tab for Rate

Performing a Kinetics Measurement

Sharing Custom Templates

To share a custom template, paste a copy of it into the desired folder, such as:

```
C:\Users\Public\Documents\Thermo\Insight\Custom Methods
```

```
C:\Documents and Settings\All Users\Documents\Thermo\Insight\Custom Methods
```

Note "Shared Documents" may appear in a path instead of "Documents".

Managing Data

Contents

- My Data

- Reports

My Data

Use **My Data** to access saved workbooks, templates and Performance Verification (PV) result reports. Drag the borders of the panes to change their size and shape.

Use these tabs to select items to open or delete:

Tab	Description
Workbooks	Select a folder in the tree to list its workbooks. Select a listed workbook to see its spectra. To zoom in on the displayed spectra, draw a box and click inside it or use the view finder. To view the full data range, double-click the spectral display.
Templates	Select a group folder in the tree to list its templates.
PV Reports	Select the listed result reports of interest. To select multiple reports, hold down **Shift** or **Ctrl**. (One window will display all the opened results.)
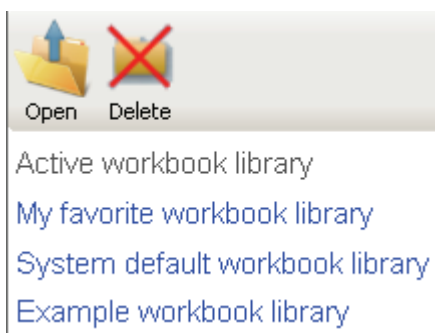
Click **Open** to open the selected workbook or template (and associated application) or the selected PV reports. Alternatively, double-click the item to open it. Additional measurements can be appended to an opened workbook. Opened PV results can be printed and copied from the report window.

Click **Delete** to delete the selected workbook or template.

Use the links below the buttons to display archived workbooks. Click **Active workbook library** to view the directory where a workbook was last saved. To change the path to the default workbook, right-click **My favorite workbook library** and choose **Edit Link**.

Related Topics

Managing Data

Reports

A report contains a table of sample data and other specified information.

| Reports | To configure or view the report after opening a workbook or measuring a sample, click **Reports**. |

These action buttons appear in Reports:

Button	Description
Preview	Shows the current report before printing, with the header and footer specified on the Report Master Page tab in Options.
Print	Prints the current report on the specified printer.
Export	Saves the current report in the specified format (see the table below).

The export formats include:

Format	Description
Report, Excel XML Spreadsheet (*.xml)	Can be opened in Excel®. Only the columns displayed in the report are saved. Configure the report to display the desired information before exporting.
Report, Tab Separated Values (*.tsv)	Can be opened in Notepad or Excel. Only the columns displayed in the report are saved. Configure the report to display the desired information before exporting.
Wavelength Curve, Excel XML Spreadsheet (*.xml)	Saves the absorbance values along with the corresponding wavelengths for a highlighted sample. If multiple samples are highlighted, the corresponding absorbance values for each wavelength are saved onto separate worksheets within one Excel file.
Wavelength Curve, Tab Separated Values (*.tsv)	Saves absorbance values along with the corresponding wavelengths for highlighted samples in a format that can be opened in Notepad or Excel. Multiple samples are saved sequentially in one column.

These tabs appear in the Reports right pane:

Tab	Description
Report	Displays the sample data archived in the opened workbook. To sort the information in the table, click the desired column heading.
	To view particular data, select it in the table. For most applications this displays a sample spectrum. For fixed Rate data, this displays spectral data points for the indicated wavelength and the line resulting from the rate calculations, if specified. For scan Rate data, all of the sample's spectra appear.
	See Data Display for information on using features made available by right-clicking the displayed data.
	To view, print or copy data acquisition and other information about data, right-click it in the list and choose **Properties**.
	To change a sample ID, click its cell and type a new ID.
Configuration	Specifies the report columns to include and their order. The available columns depend on the current application and workbook settings.
	To include a column, select it in the **Available Columns** list and click ➡️.
	To remove an included column, select it in the **Reported Columns** list and click ⬅️.
	To move an included column up, select it and click ⬆️.
	To move an included column down, select it and click ⬇️.
	To restore the most recent configuration, click 🔄.
	Only the information associated with selected columns will be included in exported files. See the information on exporting reports above.
Print	Specifies the items to include in printed reports (see the table below).

The Print tab includes:

Feature	Description
Header/Footer	Includes a header and footer in the printout.
Header Items	Title and subtitle to appear in the header. Use the **Font** buttons to specify their fonts.
Table	Includes a table of sample information. Use the **Font** button to specify the font for the information.

Feature	Description
Settings info	Includes a table of workbook settings. Use the **Font** button to specify the font for the information.
Graphs	Includes spectra and other data plots in printed reports. See "Print report graphs" below for more information.
Page Setup	Specifies the paper size, orientation and other printing attributes.
Print report graphs	Select **Overlay** to print data plots overlaid. Select **Separate** to print data plots separately, with the specified number of plots on a page. These are available only if Graphs is selected (see above).

Note We recommend first defining a master page on the Report Master Page tab in Options.

If the computer is not mapped to recognize that .xml files should be opened with Excel, open the exported file from within Excel.

Math and Analysis Operations

Contents

- Smoothing Scan Data

- Converting Scan Data to a Derivative

- Converting Scan Data to Other Units

- Adding Two Scan Spectra

- Normalizing Scan Data

- Subtracting a Scan Spectrum

- Ratioing Two Scan Spectra

- Averaging Scan Spectra

- Adding, Subtracting, Multiplying or Dividing Scan Data by a Factor

- Finding Peaks in Scan Data

- Finding Value Level Crossings in Scan Data

Smoothing Scan Data

Use **Smooth** in the Math menu to reduce noise in wavelength scan data. The smoothing algorithm uses the Savitzky-Golay method. For more information, see About Smoothing.

❖ **To smooth data**

1. Choose **Math** (menu) **> Smooth**.

   The selected spectrum appears in the Operands pane.

   The workbook spectra are listed at the left. To add others:

   a. Click **Browse**.

   b. Select a folder in the left pane (use the features above it to navigate), a workbook in the middle pane, and spectra in the upper-right pane. To select multiple spectra, hold down **Shift** or **Ctrl**. Selected spectra appear in the lower-right pane.

   c. Click **OK**. Each added spectrum is listed with asterisks at the beginning of its name to indicate the data is not in the current workbook.

2. Select any other listed spectra to smooth and click **Add**.

   To remove a spectrum from the Operands pane, click it and click **Remove**. To remove all the spectra, click **Clear All**.

3. Select the polynomial order.

4. Specify the degree of smoothing (number of points in the smoothing formula) by dragging the slider:
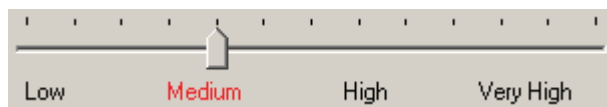
5. To perform a math operation on the smoothed result, click **Operate on Result** and choose an operation. Otherwise, go to the next step.

   > **Note** To use the result in another Smooth operation, use **Workbook** or **Temporary** to add it to the list (see step 6), click **Add** to make it an operand, and continue with step 2.

   Perform the operation as explained in the appropriate related topic below.

   To return to the previous window, click **Back**.

   To perform additional math operations, repeat this step.

6. To save the result in the current workbook, click **Workbook** and name the spectrum or spectra when prompted.

   The data is added to the list and is available for operations.

   To add the result to the list without saving it, click **Temporary**. Asterisks at the beginning of a spectrum name indicate the data is not saved.

7. Click **Close** to close each displayed math window.

Related Topics

About Smoothing

The smoothing feature of INSIGHT software uses a Savitzky-Golay algorithm modified to reduce high frequency breakthrough; that is, to reduce noise in the spectrum. The algorithm is based on performing a least-squares linear regression fit of a polynomial of order k over at least k+1 data points around each point in the spectrum.

Converting Scan Data to a Derivative

Use **Derivative** in the Math menu to convert scan data to the first, second, third or fourth derivative.

❖ **To convert scan data to a derivative**

1. Choose **Math** (menu) **> Derivative.**

   The selected spectrum appears in the Operands pane.

   The workbook spectra are listed at the left. To add others:

   a. Click **Browse**.

   b. Select a folder in the left pane (use the features above it to navigate), a workbook in the middle pane, and spectra in the upper-right pane. To select multiple spectra, hold down **Shift** or **Ctrl**. Selected spectra appear in the lower-right pane.

   c. Click **OK**. Each added spectrum is listed with asterisks at the beginning of its name to indicate the data is not in the current workbook.

2. Select any other listed spectra to convert and click **Add**.

   To remove a spectrum from the Operands pane, click it and click **Remove**. To remove all the spectra, click **Clear All**.

3. Select the derivative order.

4. Select the polynomial order of the derivative formula.

5. Specify the number of points in the derivative formula by dragging the slider:
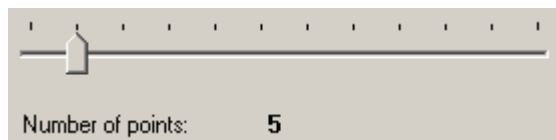
6. To perform a math operation on the converted result, click **Operate on Result** and choose an operation. Otherwise, go to the next step.
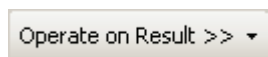
   > **Note** To use the result in another Derivative operation, use **Workbook** or **Temporary** to add it to the list (see step 7), click **Add** to make it an operand, and continue with step 2.

   Perform the operation as explained in the appropriate related topic below.

   To return to the previous window, click **Back**.

   To perform additional math operations, repeat this step.

7. To save the result in the current workbook, click **Workbook** and name the spectrum or spectra when prompted.

   The data is added to the list and is available for operations.

   To add the result to the list without saving it, click **Temporary**. Asterisks at the beginning of a spectrum name indicate the data is not saved.

8. Click **Close** to close each displayed math window.

Related Topics

Smoothing Scan Data

Converting Scan Data to Other Units

Adding Two Scan Spectra

Normalizing Scan Data

Subtracting a Scan Spectrum

Ratioing Two Scan Spectra

Averaging Scan Spectra

Adding, Subtracting, Multiplying or Dividing Scan Data by a Factor

Finding Peaks in Scan Data

Finding Value Level Crossings in Scan Data

Converting Scan Data to Other Units

Use **Convert Spectra** in the Math menu to convert scan data to another Y-axis format.

❖ **To convert scan data to another format**

1. Choose **Math** (menu) **> Convert Spectra.**

   The selected spectrum appears in the Operands pane.

   The workbook spectra are listed at the left. To add others:

   a. Click **Browse**.

   b. Select a folder in the left pane (use the features above it to navigate), a workbook in the middle pane, and spectra in the upper-right pane. To select multiple spectra, hold down **Shift** or **Ctrl**. Selected spectra appear in the lower-right pane.

   c. Click **OK**. Each added spectrum is listed with asterisks at the beginning of its name to indicate the data is not in the current workbook.

2. Select any other listed spectra to convert and click **Add**.

   To remove a spectrum from the Operands pane, click it and click **Remove**. To remove all the spectra, click **Clear All**.

3. Select the desired Y-axis format.

4. To perform a math operation on the converted result, click **Operate on Result** and choose an operation. Otherwise, go to the next step.

   Operate on Result >> ▾

   > **Note** To use the result in another Convert Spectra operation, use **Workbook** or **Temporary** to add it to the list (see step 5), click **Add** to make it an operand, and continue with step 2.

   Perform the operation as explained in the appropriate related topic below.

   To return to the previous window, click **Back**.

   To perform additional math operations, repeat this step.

5. To save the result in the current workbook, click **Workbook** and name the spectrum or spectra when prompted.

The data is added to the list and is available for operations.

To add the result to the list without saving it, click **Temporary**. Asterisks at the beginning of a spectrum name indicate the data is not saved.

6. Click **Close** to close each displayed math window.

Related Topics

Smoothing Scan Data

Converting Scan Data to a Derivative

Adding Two Scan Spectra

Normalizing Scan Data

Subtracting a Scan Spectrum

Ratioing Two Scan Spectra

Averaging Scan Spectra

Adding, Subtracting, Multiplying or Dividing Scan Data by a Factor

Finding Peaks in Scan Data

Finding Value Level Crossings in Scan Data

Adding Two Scan Spectra

Use **Add** in the Math menu to add two scan spectra.

❖ **To add two scan spectra**

1. Choose **Math** (menu) **> Add.**

The selected spectrum appears in the Operand 1 pane. To use a different listed spectrum, select it and click **Add** in the Operand 1 box.

The list includes only current workbook spectra. To add others:

a. Click **Browse**.

b. Select a folder in the left pane (use the features above it to navigate), a workbook in the middle pane, and spectra in the upper-right pane. To select multiple spectra, hold down **Shift** or **Ctrl**. Selected spectra appear in the lower-right pane.

c. Click **OK**. Each added spectrum is listed with asterisks at the beginning of its name to indicate the data is not in the current workbook.

2. Select the second spectrum to add and click **Add** in the Operand 2 box.

3. To multiply the second spectrum by a factor other than 1, drag the slider or use **Factor**.

Type a value in the **Factor** text box or use its up and down arrow buttons. Use **Increment** to set the amount of change these buttons make to the factor when clicked. For example, with Factor set to 1.000 and Increment set to 0.500, clicking the Factor up arrow button changes the factor to 1.500.

4. To perform a math operation on the addition result, click **Operate on Result** and choose an operation. Otherwise, go to the next step.

Operate on Result >> ▾

> **Note** To use the result in another Add operation, use **Workbook** or **Temporary** to add it to the list (see step 5), click **Add** in the Operand 1 box, and continue with step 2.

Perform the operation as explained in the appropriate related topic below.

To return to the previous window, click **Back**.

To perform additional math operations, repeat this step.

5. To save the result in the current workbook, click **Workbook** and name the spectrum when prompted.

The data is added to the list and is available for operations.

To add the result to the list without saving it, click **Temporary**. Asterisks at the beginning of a spectrum name indicate the data is not saved.

6. Click **Close** to close each displayed math window.

Related Topics

Smoothing Scan Data

Converting Scan Data to a Derivative

Normalizing Scan Data

Subtracting a Scan Spectrum

Ratioing Two Scan Spectra

Averaging Scan Spectra

Adding, Subtracting, Multiplying or Dividing Scan Data by a Factor

Finding Peaks in Scan Data

Finding Value Level Crossings in Scan Data

Normalizing Scan Data

Use **Normalize** in the Math menu to adjust the Y scale of a scan spectrum so that a selected data point has the desired Y value.

❖ **To normalize scan data**
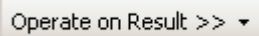
1. Choose **Math** (menu) **> Normalize.**

   The selected spectrum appears in the Operands pane.

   The workbook spectra are listed at the left. To add others:

   a. Click **Browse**.

   b. Select a folder in the left pane (use the features above it to navigate), a workbook in the middle pane, and spectra in the upper-right pane. To select multiple spectra, hold down **Shift** or **Ctrl**. Selected spectra appear in the lower-right pane.

   c. Click **OK**. Each added spectrum is listed with asterisks at the beginning of its name to indicate the data is not in the current workbook.

2. Select any other listed spectra to normalize and click **Add**.

   To remove a spectrum from the Operands pane, click it and click **Remove**. To remove all the spectra, click **Clear All**.

3. Select the desired Y value for the data point specified in the next step.

4. Select the wavelength of the data point.

5. To perform a math operation on the normalized result, click **Operate on Result** and choose an operation. Otherwise, go to the next step.

   Operate on Result >> ▾

   > **Note** To use the result in another Normalize operation, use **Workbook** or **Temporary** to add it to the list (see step 6), click **Add** to make it an operand, and continue with step 2.

   Perform the operation as explained in the appropriate related topic below.

   To return to the previous window, click **Back**.

   To perform additional math operations, repeat this step.

6. To save the result in the current workbook, click **Workbook** and name the spectrum or spectra when prompted.

   The data is added to the list and is available for operations.

   To add the result to the list without saving it, click **Temporary**. Asterisks at the beginning of a spectrum name indicate the data is not saved.

7. Click **Close** to close each displayed math window.

Related Topics

Subtracting a Scan Spectrum

Use **Subtract** in the Math menu to subtract a scan spectrum from another.

❖ **To subtract a scan spectrum**

1. Choose **Math** (menu) **> Subtract.**

   The selected spectrum appears in the Operand 1 pane. To use a different listed spectrum, select it and click **Add** in the Operand 1 box.

   The list includes only current workbook spectra. To add others:

   a. Click **Browse**.

   b. Select a folder in the left pane (use the features above it to navigate), a workbook in the middle pane, and spectra in the upper-right pane. To select multiple spectra, hold down **Shift** or **Ctrl**. Selected spectra appear in the lower-right pane.

   c. Click **OK**. Each added spectrum is listed with asterisks at the beginning of its name to indicate the data is not in the current workbook.

2. Select the spectrum to subtract and click **Add** in the Operand 2 box.

3. To multiply the second spectrum by a factor other than 1, drag the slider or use **Factor**.

Type a value in the **Factor** text box or use its up and down arrow buttons. Use **Increment** to set the amount of change these buttons make to the factor when clicked. For example, with Factor set to 1.000 and Increment set to 0.500, clicking the Factor up arrow button changes the factor to 1.500.

4. To perform a math operation on the subtraction result, click **Operate on Result** and choose an operation. Otherwise, go to the next step.

Operate on Result >> ▾

> **Note** To use the result in another Subtract operation, use **Workbook** or **Temporary** to add it to the list (see step 5), click **Add** in the Operand 1 box, and continue with step 2.

Perform the operation as explained in the appropriate related topic below.

To return to the previous window, click **Back**.

To perform additional math operations, repeat this step.

5. To save the result in the current workbook, click **Workbook** and name the spectrum when prompted.

The data is added to the list and is available for operations.

To add the result to the list without saving it, click **Temporary**. Asterisks at the beginning of a spectrum name indicate the data is not saved.

6. Click **Close** to close each displayed math window.

Related Topics

Smoothing Scan Data

Converting Scan Data to a Derivative

Converting Scan Data to Other Units

Adding Two Scan Spectra

Ratioing Two Scan Spectra

Averaging Scan Spectra

Adding, Subtracting, Multiplying or Dividing Scan Data by a Factor

Finding Peaks in Scan Data

Finding Value Level Crossings in Scan Data

Ratioing Two Scan Spectra

Use **Ratio** in the Math menu to divide a scan spectrum by another.

❖ **To ratio two scan spectra**

1. Choose **Math** (menu) **> Ratio.**

   The selected spectrum appears in the Operand 1 pane. To use a different listed spectrum, select it and click **Add** in the Operand 1 box.

   The list includes only current workbook spectra. To add others:

   a. Click **Browse**.

   b. Select a folder in the left pane (use the features above it to navigate), a workbook in the middle pane, and spectra in the upper-right pane. To select multiple spectra, hold down **Shift** or **Ctrl**. Selected spectra appear in the lower-right pane.

   c. Click **OK**. Each added spectrum is listed with asterisks at the beginning of its name to indicate the data is not in the current workbook.

2. Select the spectrum by which to divide the first and click **Add** in the Operand 2 box.

3. To multiply the second spectrum by a factor other than 1, drag the slider or use **Factor**.

   Type a value in the **Factor** text box or use its up and down arrow buttons. Use **Increment** to set the amount of change these buttons make to the factor when clicked. For example, with Factor set to 1.000 and Increment set to 0.500, clicking the Factor up arrow button changes the factor to 1.500.

4. To perform a math operation on the division result, click **Operate on Result** and choose an operation. Otherwise, go to the next step.

   > **Note** To use the result in another Ratio operation, use **Workbook** or **Temporary** to add it to the list (see step 5), click **Add** in the Operand 1 box, and continue with step 2.

   Perform the operation as explained in the appropriate related topic below.

   To return to the previous window, click **Back**.

   To perform additional math operations, repeat this step.

5. To save the result in the current workbook, click **Workbook** and name the spectrum when prompted.

   The data is added to the list and is available for operations.

   To add the result to the list without saving it, click **Temporary**. Asterisks at the beginning of a spectrum name indicate the data is not saved.

6. Click **Close** to close each displayed math window.

Related Topics

Smoothing Scan Data

Converting Scan Data to a Derivative

Converting Scan Data to Other Units

Adding Two Scan Spectra

Subtracting a Scan Spectrum

Averaging Scan Spectra

Adding, Subtracting, Multiplying or Dividing Scan Data by a Factor

Finding Peaks in Scan Data

Finding Value Level Crossings in Scan Data

Averaging Scan Spectra

Use **Average** in the Math menu to find the average of two or more scan spectra.

❖ **To use Average**

1. Choose **Math** (menu) **> Average.**

   The selected spectrum appears in the Operands pane.

   The workbook spectra are listed at the left. To add others:

   a. Click **Browse**.

   b. Select a folder in the left pane (use the features above it to navigate), a workbook in the middle pane, and spectra in the upper-right pane. To select multiple spectra, hold down **Shift** or **Ctrl**. Selected spectra appear in the lower-right pane.

   c. Click **OK**. Each added spectrum is listed with asterisks at the beginning of its name to indicate the data is not in the current workbook.

2. Select any other listed spectra to average and click **Add**.

   To remove a spectrum from the Operands pane, click it and click **Remove**. To remove all the spectra, click **Clear All**.

   Note A spectrum appears in the Result pane only if two or more spectra are in the Operands pane.

3. To perform a math operation on the result, click **Operate on Result** and choose an operation. Otherwise, go to the next step.

Operate on Result >> ▾

> **Note** To use the result in another Average operation, use **Workbook** or **Temporary** to add it to the list (see step 4), click **Add** to make it an operand, and continue with step 2.

Perform the operation as explained in the appropriate related topic below.

To return to the previous window, click **Back**.

To perform additional math operations, repeat this step.

4. To save the result in the current workbook, click **Workbook** and name the spectrum when prompted.

The data is added to the list and is available for operations.

To add the result to the list without saving it, click **Temporary**. Asterisks at the beginning of a spectrum name indicate the data is not saved.

5. Click **Close** to close each displayed math window.

Related Topics

Smoothing Scan Data

Converting Scan Data to a Derivative

Converting Scan Data to Other Units

Adding Two Scan Spectra

Normalizing Scan Data

Subtracting a Scan Spectrum

Ratioing Two Scan Spectra

Adding, Subtracting, Multiplying or Dividing Scan Data by a Factor

Finding Peaks in Scan Data

Finding Value Level Crossings in Scan Data

Adding, Subtracting, Multiplying or Dividing Scan Data by a Factor

Use **Factor** in the Math menu to add a constant to the Y value of scan data, subtract a constant, multiply by a constant or divide by a constant.

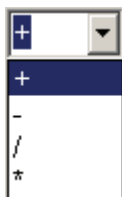❖ **To use Factor**

1. Choose **Math** (menu) **> Factor.**

The selected spectrum appears in the Operands pane.

The workbook spectra are listed at the left. To add others:

  a. Click **Browse**.

  b. Select a folder in the left pane (use the features above it to navigate), a workbook in the middle pane, and spectra in the upper-right pane. To select multiple spectra, hold down **Shift** or **Ctrl**. Selected spectra appear in the lower-right pane.

  c. Click **OK**. Each added spectrum is listed with asterisks at the beginning of its name to indicate the data is not in the current workbook.

2. Select any other listed spectra to operate on and click **Add**.

   To remove a spectrum from the Operands pane, click it and click **Remove**. To remove all the spectra, click **Clear All**.

3. Select the arithmetic operation to perform on the Y value of every data point.

4. Specify the factor: type a value, click the up and down arrow buttons, or drag the slider.
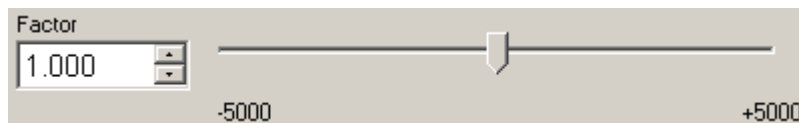
5. To perform a math operation on the result, click **Operate on Result** and choose an operation. Otherwise, go to the next step.

   Note To use the result in another Factor operation, use **Workbook** or **Temporary** to add it to the list (see step 6), click **Add** to make it an operand, and continue with step 2.

   Perform the operation as explained in the appropriate related topic below.

   To return to the previous window, click **Back**.

   To perform additional math operations, repeat this step.

6. To save the result in the current workbook, click **Workbook** and name the spectrum or spectra when prompted.

   The data is added to the list and is available for operations.

   To add the result to the list without saving it, click **Temporary**. Asterisks at the beginning of a spectrum name indicate the data is not saved.

7. Click **Close** to close each displayed math window.

Related Topics

Smoothing Scan Data

Converting Scan Data to a Derivative

Converting Scan Data to Other Units

Adding Two Scan Spectra

Normalizing Scan Data

Subtracting a Scan Spectrum

Ratioing Two Scan Spectra

Averaging Scan Spectra

Finding Peaks in Scan Data

Finding Value Level Crossings in Scan Data

Finding Peaks in Scan Data

Use **Peak Pick** in the Analyze menu to find peaks, valleys, zero crossings, or maximum and minimum values in a spectrum or region.

> **Note** Peaks can be found automatically after data acquisition. See Measurement Tab for Scan.

❖ **To locate peaks**

1. Choose **Analyze** (menu) **> Peak Pick**.

2. Set the parameters and adjust the data display as desired.

Parameter	Description
Find	Specifies whether to find peaks, valleys, both peaks and valleys, or maximum and minimum Y values.
Max number of peaks (or valleys, or peaks and valleys)	Maximum number of items to find.
Sort peaks (or valleys, or peaks and valleys) by	Order for labeling and listing found items in the results table.
Sensitivity	How readily small peaks or valleys are found. To optimize the sensitivity, select **Auto**. To set it manually, deselect **Auto** and drag the slider.

Parameter	Description
Wavelength Range	Wavelength range in which to find items. To use the entire range, select **Full**. To limit the range, deselect **Full** and type the desired limits or use the region-threshold tool: ![icon]
Use threshold	Specifies whether to find only those peaks whose Y values are greater than or equal to a specified value, the threshold. (For % transmittance, the software finds valleys less than or equal to the threshold.) To optimize the threshold value, select **Auto**. To set it manually, deselect **Auto** and set **Threshold** by typing a value or dragging the horizontal line in the data display.
Smooth spectrum	Specifies whether or not to smooth the data before finding peaks or valleys. This tends to reduce the number of small peaks, valleys and shoulders. (For more information, see About Smoothing.) The (blue) smoothed spectrum is overlaid on the original. To optimize the degree of smoothing, select **Auto**. To adjust it manually, deselect **Auto** and drag the slider.

To adjust the data display, use the view finder. To zoom in or move the spectrum, use the selection tool:

The results appear in the data display pane and the table below it:

Results table   Peak label
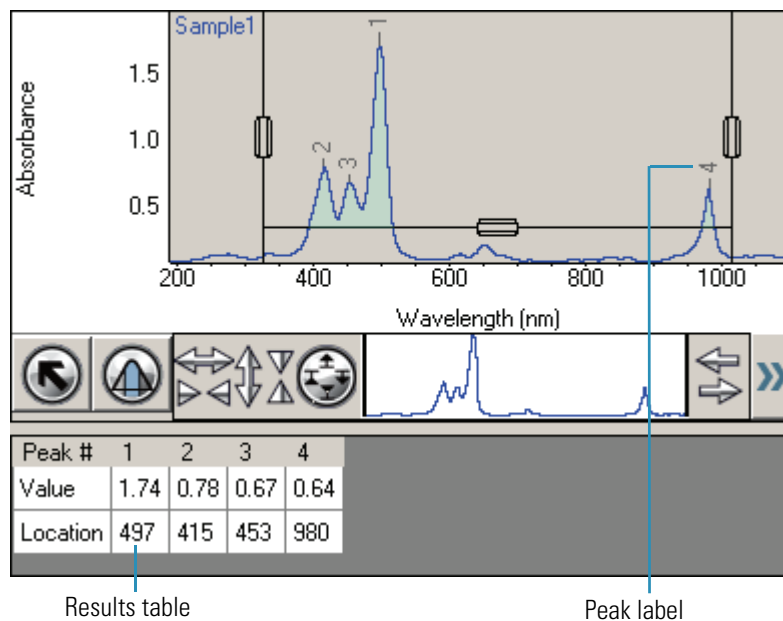
3. Click **OK**.

The found peaks have labels, and the peak results are listed at the right.

The settings are saved in the workbook and will be used for measuring samples with Result on the Measurement tab set to Peak Pick.

Related Topics

Smoothing Scan Data

Converting Scan Data to a Derivative

Converting Scan Data to Other Units

Adding Two Scan Spectra

Subtracting a Scan Spectrum

Ratioing Two Scan Spectra

Averaging Scan Spectra

Adding, Subtracting, Multiplying or Dividing Scan Data by a Factor

Finding Value Level Crossings in Scan Data

Finding Value Level Crossings in Scan Data

Use **Value Level** in the Analyze menu to find the wavelengths where a spectrum crosses a specified ordinate value.

> **Note** Crossings can be found automatically after data acquisition. See Measurement Tab for Scan.

❖ **To locate value level crossings**

1. Choose **Analyze** (menu) **> Value Level**.

2. Set the parameters and adjust the data display as desired.

Parameter	Description
Level for crossing	Specifies the ordinate (Y) value. One can also drag the horizontal line in the data display.
Sort crossings by	Order for listing crossings in the results table.
Wavelength Range	Wavelength range in which to find crossings. To use the entire range, select **Full**. To limit the range, deselect **Full** and type the desired limits or use the region-threshold tool:
Sensitivity	How readily small-amplitude crossings are detected. To optimize the sensitivity, select **Auto**. To set it manually, deselect **Auto** and drag the slider. A high sensitivity finds locations where the spectrum crosses the horizontal line only a short distance.

To adjust the data display, use the view finder. To zoom in or move the spectrum, use the selection tool:

The results appear in the data display pane and the table below it:

Results table   Crossing label

3. Click **OK**.

The found crossings have labels, and the crossing results are listed at the right.

The settings are saved in the workbook and will be used for measuring samples with Result on the Measurement tab set to Value Level.

Related Topics

Smoothing Scan Data

Converting Scan Data to a Derivative

Converting Scan Data to Other Units

Adding Two Scan Spectra

Subtracting a Scan Spectrum

Ratioing Two Scan Spectra

Averaging Scan Spectra

Adding, Subtracting, Multiplying or Dividing Scan Data by a Factor

Finding Peaks in Scan Data

Options

These are available in Options:

Applications Tab

Click **Options** to display the Applications tab in the right pane. Use it to add new user groups and give them access to particular applications. The Group drop-down list box shows the name of the current group.

❖ **To add a new group**

Enter the desired group name in the **Groups** box and click **Add**.

❖ **To customize the current group**

Drag the desired applications from the **Applications** list to the buttons at the right. To remove an application from the group, drag it from its button to the Applications list.

❖ **To delete the current group**

Click **Delete Group** and then click **Yes** when prompted.

❖ **To reset the application buttons for the current group**

Click **Clear App Buttons** and then click **Yes** when prompted.

❖ **To make custom templates available for groups other than Classic**

Drag the List of Templates application to one of the top nine menu buttons.

Report Master Page Tab

Click **Options** to display the Report Master Page tab in the right pane. Use it to define the appearance of all printed reports.

Feature	Description
Company name	Enter a company name and press **Enter**. Select an orientation for the name, and use **Font** to specify the font.
Date	Date of the report creation. Use **Font** to specify the font for Date and Time.
Time	Time of the report creation. Use **Font** to specify the font for Time and Date.
Logo	Select an orientation for the logo, and use **Browse** to locate and select a logo image file.
Footer text	Text at the bottom of the report. Use **Font** to specify the font for the footer.
Page number	Format for page numbers. Select **None** to not include page numbers.

Preferences Tab

 Click **Options** to display the Preferences tab in the right pane.

Feature	Description
Data Value Digits	Specify the number of digits to the right of the decimal point to use for X and Y values for spectral data.
Triggering	Starting data acquisition normally requires a response to a prompt (displayed by Measure or another action button). To start acquisition automatically a specified number of seconds after the prompt appears, select **Enable auto input trigger** and set the number of seconds.

Use **Output trigger** to specify whether and when to produce a signal that triggers an installed accessory to begin an operation. |
| Support DYMO® label printer | Select this to use a standalone device to print reports on various sized labels. |
| Directories | The paths used for saving template files, Performance Verification reports, and workbooks. Type a path for each or click the button to specify a path. |

Data Store Tab

 Click **Options** to display the Data Store tab in the right pane. Use it to specify how to save workbooks, export data and e-mail results.

Feature	Description
Workbook Save Options	To be prompted to save data before acquiring it, select **Data saved on each measure**. Save Workbook and Save As Workbook will not be available in the File menu. To save acquired data only by using Save Workbook or Save As Workbook, select **Data saved only by Save Workbook in File menu**. (A prompt to save appears when INSIGHT software is closed if the current workbook has not been saved.)
Convert Data	Select **Auto export data** to automatically save acquired data using the selected format in the specified location. To change the location, type a new path or use **Browse**.
E-mail	Select **Auto e-mail result (workbook)** to automatically e-mail the current workbook. Enter the desired recipient address, subject and message.

Formulas and Units Tab

Click **Options** to display the Formulas and Units tab in the right pane. Use it to specify the default formulas, units and advanced equations for setting up quantitative analyses.

In the appropriate table, select in the **Show** column the items to be available.

To add an item, enter it (or the appropriate information) in the row that starts with a plus (+) sign.

To delete an item, right-click it and choose **Delete Row**. Items with a lock icon cannot be edited or deleted.

To return to the default selections, click **Reset**.

Related Topics

Quanto

Quantifying Sample Data

Performing a Quantitative Analysis

System Settings

System Settings These are available in System Settings:

> **Note** The Diagnostics tab is for our use only.

Alignment Tab

Use the **Alignment** tab in System Settings to view sample and reference detector intensities while aligning an accessory.

❖ **To perform an alignment**

1. To measure intensities using a green light (510 nm), select **Green**. To use no filter, select **White**.

   The correct setting depends on the installed accessory. See Accessories.

2. Set **Bandwidth** as desired.

   The available settings depend on the instrument.

3. Click **Start**.

   Every half second the sample and reference detector intensities are plotted and displayed by the Sample beam and Reference readouts.
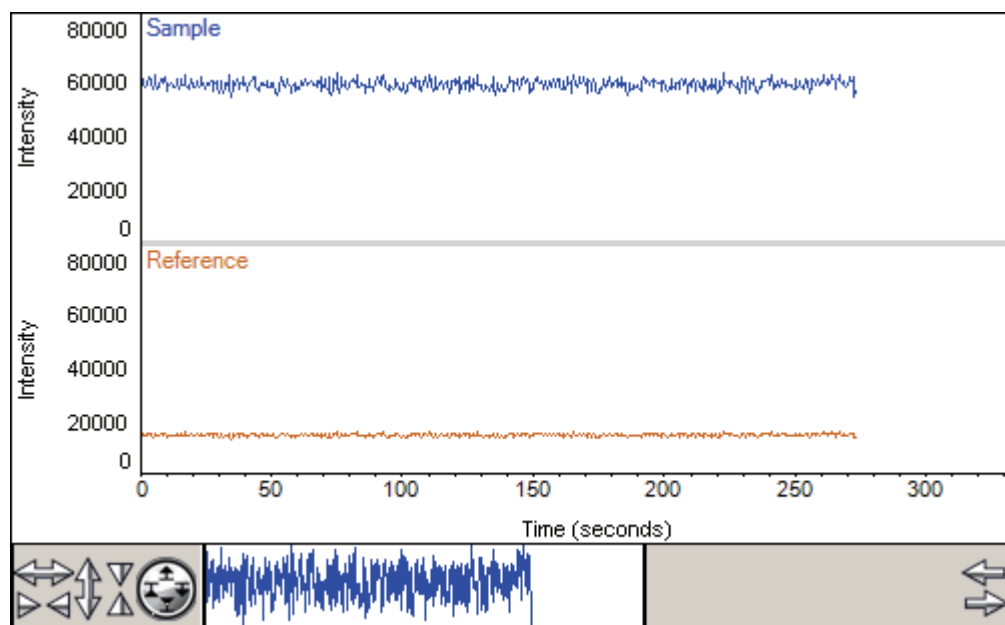
To overlay the plots instead of stacking them, deselect **Stack**.

> **Note** If the instrument has variable slit wheels, the start of intensity measurement is delayed while they move to their 2 nm position.

The Time readout shows the elapsed time. Intensities can be measured and plotted for up to 15 minutes without restarting the process.

If the plot of sample detector intensity is not at the desired position for viewing, adjust the detector gain by dragging the **Gain** slider up or down.

To adjust the display, use the view finder. To zoom in, draw a box and click inside it. To return to full display, double-click the pane.

4. Align the accessory to achieve the desired sample detector intensity (see Accessories).

5. When finished, click **Stop**.

Related Topics

Calibrations Tab

Lamp Tab

System Tab

Calibrations Tab

Use the **Calibrations** tab in System Settings to calibrate the instrument wavelength or accessories. To calibrate using a particular lamp, click its **Calibrate** button and follow the instructions that appear. See Mercury Lamp for instructions for using a mercury lamp safely.

Related Topics

Alignment Tab

Lamp Tab

System Tab

Lamp Tab

The Lamp tab in System Settings displays status information about the xenon lamp.

Related Topics

Alignment Tab

Calibrations Tab

System Tab

System Tab

The System tab in System Settings includes:

Feature	Description
Instrument Control	Switches instrument control between the Local Control option and INSIGHT software running on an external computer. Select the desired setting and respond appropriately to the message that appears.
Firmware Update	Click **Load Update** to install the selected instrument firmware. Follow the instructions that appear.
Instrument Boot Record	Click **Display** to view the instrument's power-up boot record, which can be saved or copied.

Related Topics

Alignment Tab

Calibrations Tab

Lamp Tab

Keyboard Shortcuts

These are available in INSIGHT software:

Keyboard Shortcut	Description
Alt+F4	Exits INSIGHT software.
Ctrl+F (from Home)	Displays Fixed.
Ctrl+Q (from Home)	Displays Quant.
Ctrl+R (from Home)	Displays Rate.
F1	Displays Help.
F2	Displays Home.
F4	Displays the Measure screen for the current application.
F5	Acquires zero or baseline data.
F6	Chooses the Measure button.
F7	Prints the Measure screen.
F8	Prints the report.
F9	Displays My Data.
F10	Creates a new workbook.
F11 (from Home)	Displays Performance Verification.
F12	Chooses the Stop button.

Evolution 200 Series Spectrophotometers

The Evolution™ 200 series UV-visible spectrophotometers include three models:

- Evolution 201

- Evolution 220

- Evolution 260 Bio (includes life science applications).

Contents

- Safety Considerations

- Operating Precautions

- Spectrophotometer Basics

- Accessories

- Using the Spectrophotometer

- Maintenance

- Ordering Parts

Safety Considerations

Each person using the spectrophotometer should read the general safety information in the Site and Safety Information guide (see the documentation CD) and the instrument-specific safety information provided here.

Contents

- Safety Label Locations

- Lifting or Moving the Instrument

WARNING Do not operate this system without following the safety precautions described in this manual and the documentation that came with your system.

Languages

WARNING n'utilisez le système qu'en suivant les consignes de sécurité qui figurent dans ce manuel et dans la documentation accompagnant le système.

> **WARNING** Betreiben Sie dieses System nur unter Beachtung der Sicherheitshinweise in diesem Handbuch und in der im Lieferumfang des Systems enthaltenen Dokumentation.

> **WARNING** Non utilizzare questo sistema senza seguire le norme di sicurezza descritte in questo manuale e nella documentazione di accompagnamento del sistema.

> **WARNING** No opere este sistema sin seguir las precauciones de seguridad descritas en este manual y en la documentación proporcionada con el sistema.

Safety Label Locations

This section shows the locations of safety labels on the spectrophotometer. Contact us if there are questions or problems with the safety labels. See Contacting Us.

Back view

Compliance label
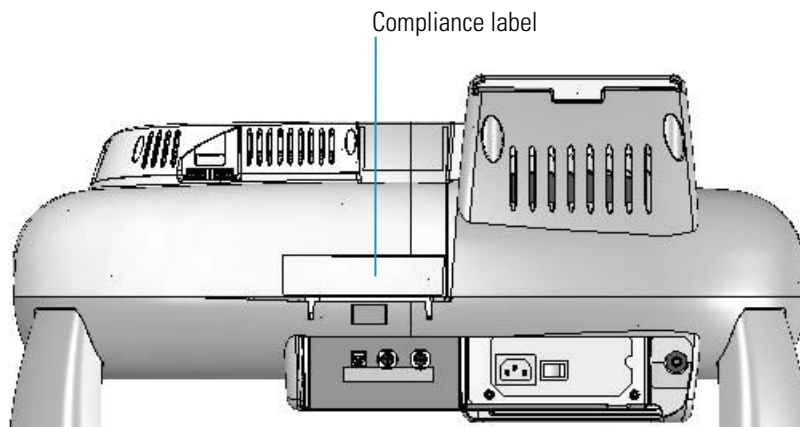
Right side view

UV radiation warning label (under mercury lamp access cover)
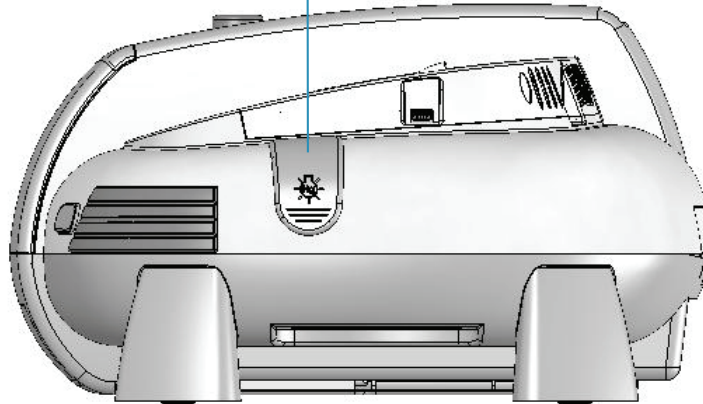
Left side view

UV radiation warning label (under detector access cover)
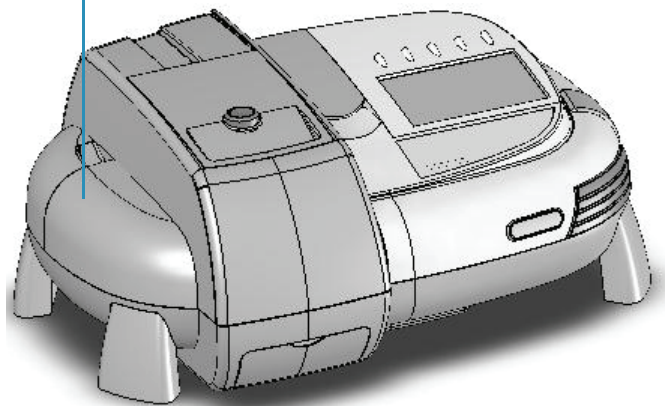
Related Topics

Mercury Lamp

Removing and Installing the Detector Module

Lifting or Moving the Instrument

To avoid risk of injury, use proper techniques when lifting or moving the instrument or other system components.

Hand hold

Hand hold
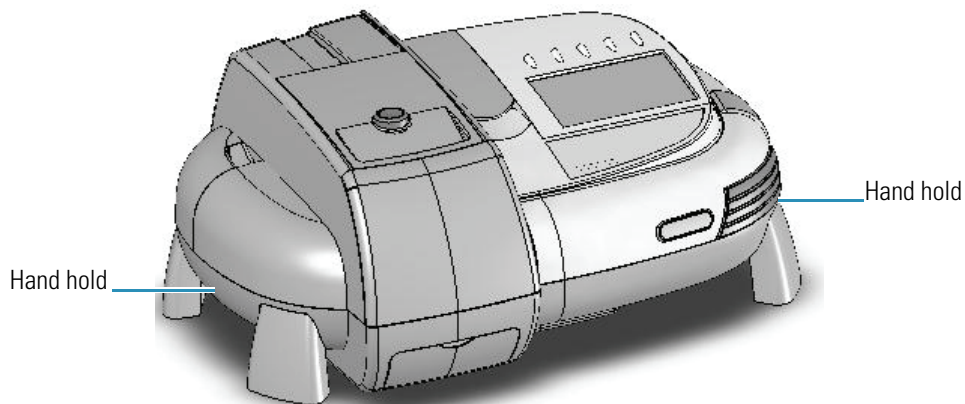
Operating Precautions

The spectrophotometer contains precise optical components. Handle it carefully and follow these precautions:

- Do not allow moisture to leak into the instrument interior.

- Wipe off spilled chemicals immediately.

- Do not drop the instrument.

- Protect the instrument from mechanical shock.

- Protect the instrument from dust.

Spectrophotometer Basics

Contents

- Spectrophotometer Components

- Connectors

- Removable Panels

- Corrosion Protection

Spectrophotometer Components

The following illustration identifies major components visible on the outside of a typical spectrophotometer. (Some components may not be present on all instruments.)

The z-height (distance from the bottom of the cell to the center of the light beam) for the

spectrophotometer is 8.5 mm.

Related Topics

Opening and Closing the Sample and Reference Compartment Doors

Local Control or Computer Control

INSIGHT Software

Keypad

Touchscreen

Opening and Closing the Sample and Reference Compartment Doors

To open the sample compartment, press the button on its door. To close the compartment, slide the door forward until it latches.

To access the reference compartment, lift or lower the door.

Related Topics

Sample Compartment Front Panel

Tubing Access Panel

Local Control or Computer Control

The spectrophotometer can be run from the optional touchscreen (Local Control) or from a Windows®-compatible computer connected to the instrument (Computer Control). Local Control instruments include an embedded computer preloaded with software. Computer Control instruments must be connected to an external computer with the proper software installed.

Related Topics

Local Control Instruments

Computer Control Instruments

INSIGHT Software

All instruments include our INSIGHT™ software for data collection and analysis. See INSIGHT Software.

Keypad

All instruments include the keypad shown below. For a list of keypad functions, see Using the Spectrophotometer.
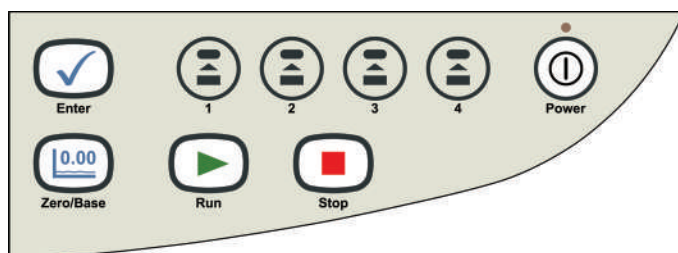
Related Topics

Keypad Operation

Touchscreen

The touchscreen is included only on Local Control versions of the spectrophotometer.

Related Topics

Touchscreen keyboard

Cleaning the Touchscreen

Connectors

This section shows the locations of the connectors inside and outside the spectrophotometer.

Contents

- Outside Cover

- Inside the Sample Compartment

Outside Cover

This illustration shows the connectors on the instrument outside cover.

Back view
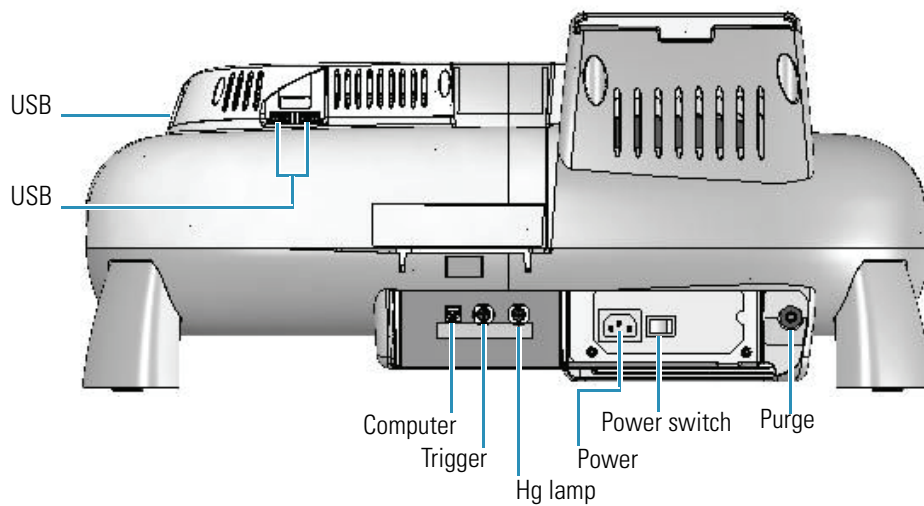
Label	Function
Computer	Dedicated USB port for connecting an external computer. See Computer Control Instruments.
Hg lamp	Connects to optional Mercury Lamp.
Power	Connects to main power cord.
Power switch	System power On/Off switch.
Purge	Connects to optional purge source. See Purging the Sample Compartment.

Label	Function
Trigger	Connects to optional accessories that accommodate external trigger input or output. See Attaching Cables and Probes.
	INSIGHT can be used to send a 3.3V TTL output signal that triggers an installed accessory to begin an operation. The signal can be sent at the start or end of a measurement. See **Options > Preferences > Triggering**.
	INSIGHT accepts a contact closure input trigger (equivalent to pressing Run on the instrument keypad).
USB	General purpose USB connectors (Local Control systems only). See below for proper shielding of USB cables.

WARNING Avoid shock hazard. Power off the spectrophotometer and disconnect the power cord from the wall outlet or power strip before disconnecting the power cord from the spectrophotometer.

The system supports these USB devices:

- External USB mouse

- External USB keyboard

- Portable USB memory

- Windows-compatible USB printer

To ensure proper shielding of USB devices, install a Ferrite ring (samples provided) on the end of any USB cable connected to the instrument. Loop the cable once and clamp the ring over the loop as shown below.

Ferrite ring

Note The spectrophotometer does not support high power USB devices.

Related Topics

Triggering

Purging the Sample Compartment

Mercury Lamp

Attaching Cables and Probes

Computer Control Instruments

Inside the Sample Compartment

This illustration identifies the connectors inside the sample compartment.

Smart Accessory connector
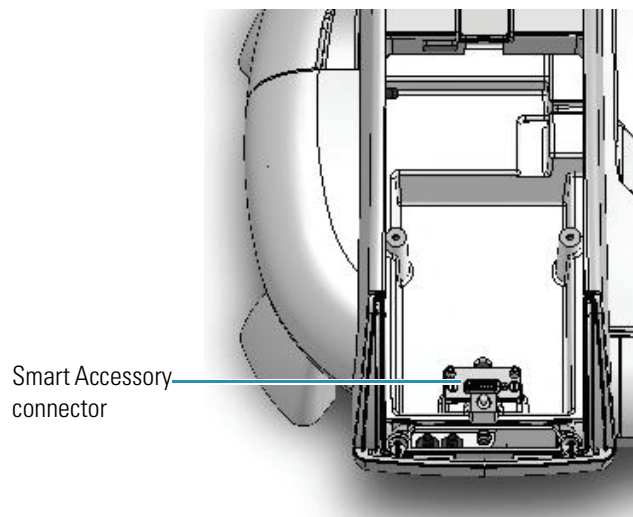
Related Topics

Installing a Smart Accessory

Removable Panels

This section covers panels that can be removed to allow access to features on the instrument.

Contents

- Sample Compartment Front Panel
- Tubing Access Panel
- Mercury Lamp Access Cover
- Detector Access Cover
- Detector Access Panel

Sample Compartment Front Panel

To remove the front panel, open the sample compartment door and then pull the panel forward and up to free it.

To replace the panel, align the tab on the bottom edge with the slot in the instrument cover and press the panel in place.

Removable panel

Tab
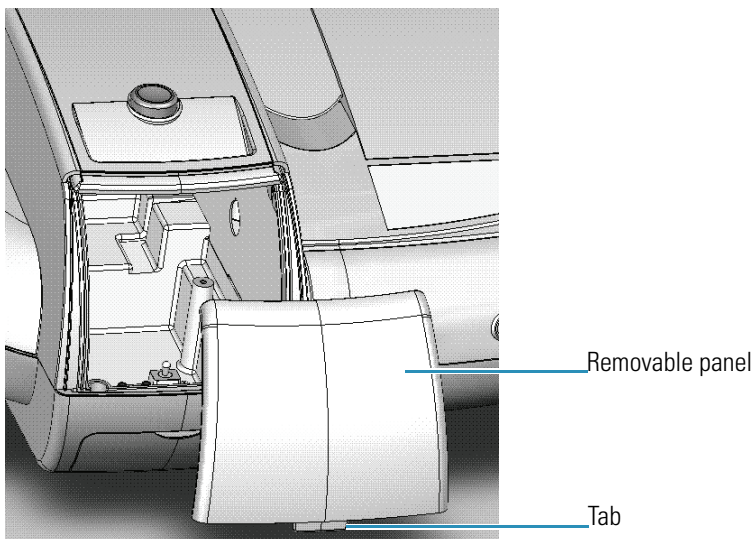
Related Topics

Installing a Manual Accessory

Installing a Liquid Thermostatted Accessory

Installing a Smart Accessory

Tubing Access Panel

To access external ports for routing fluid from a recirculator to the instrument, remove the panel below the sample compartment.

External fluid ports
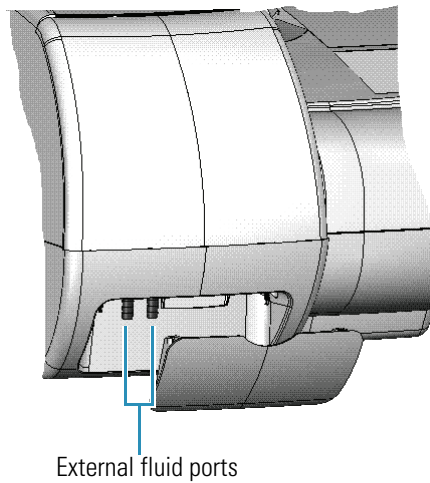
Internal fluid ports for routing fluid from the instrument to an installed accessory are located inside the sample compartment.

Foam
Internal fluid ports   Screw
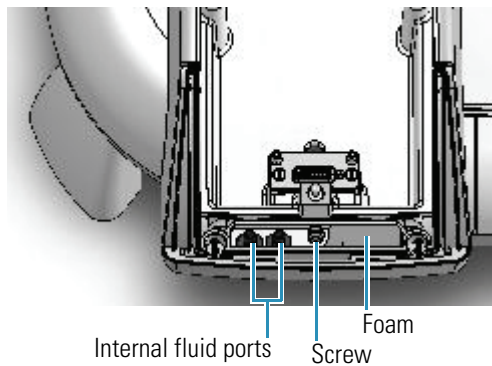
The connectors fit 1/4-inch internal diameter tubing. An adapter may be required to connect the tubing to the accessory or recirculator. Purchase adapters separately.

Cords and cables for installed accessories can also be routed behind this panel. Push the cord through the foam and the opening below it. The panel itself can be removed temporarily to accommodate a large connector. To remove the panel, loosen the screw.

Related Topics

Installing a Liquid Thermostatted Accessory

Mercury Lamp Access Cover

WARNING Avoid UV radiation hazard in the mercury lamp compartment. Protect eyes and skin from exposure.

Languages

AVERTISSEMENT Évitez tout risque de rayonnement à l'intérieur du compartiment de la lampe à vapeur de mercure. Protéger vos yeux et votre peau de toute exposition au rayonnement.

WARNUNG Gefährliche UV-Strahlung im Gehäuse der Quecksilberlampe ist zu vermeiden. Augen und Haut müssen vor der Strahlung geschützt werden.

AVVERTENZA Evitare il rischio di radiazione UV nel vano della lampada al mercurio. Proteggere occhi e pelle dall'esposizione.

ADVERTENCIA Evite el riesgo de radiación ultravioleta en el compartimento de la lámpara de mercurio. Proteja sus ojos y la piel de la exposición.

Lift the cover to install the optional Mercury Lamp.

Right side view

Mercury lamp access cover
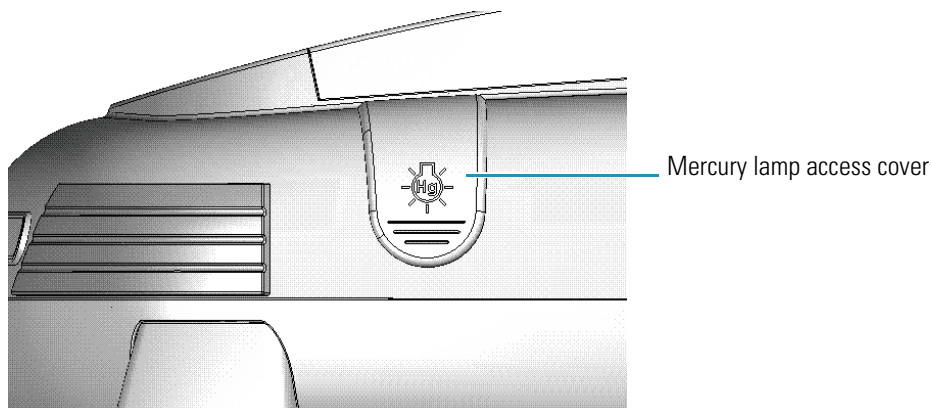
Related Topics

Mercury Lamp

Detector Access Cover

Some accessories require removing the instrument detector module. The module is beneath the detector access cover shown below. Avoid UV radiation hazard in the detector compartment. Protect eyes and skin from exposure.

> **CAUTION** Safety glasses with side shields or goggles with solid side pieces are the only
> equipment that provides adequate eye protection against direct and reflected UV light.

Languages

> **CAUTION** Seules les lunettes de sécurité avec écrans latéraux ou les lunettes
> protectrices avec parties latérales solides protègent les yeux de façon adéquate
> contre la lumière UV directe et réfléchie.

> **CAUTION** Sicherheitsbrillen mit seitlichem Schutz bzw. Schutzbrillen mit festen
> Seitenteilen bieten als einzige Ausrüstungsgegenstände adäquaten Schutz der
> Augen gegen direkte und reflektierte UV-Strahlung.

> **CAUTION** Gli occhiali protettivi con schermi laterali o con schermi laterali
> monolente sono l'unica attrezzatura che fornisce un'adeguata protezione degli
> occhi dalla luce UV diretta e riflessa.

> **CAUTION** Las gafas protectoras con protección lateral de seguridad o con piezas
> laterales sólidas son el único equipo que proporciona la protección para los ojos
> adecuada contra la luz ultravioleta directa y reflejada.

Left side view

Detector access cover
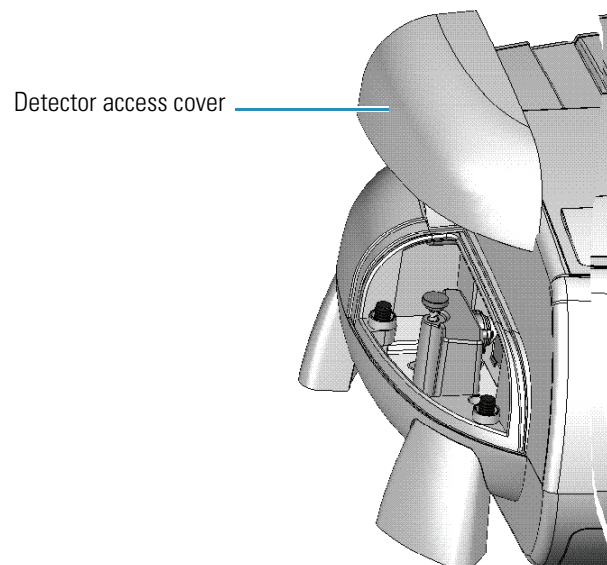
Related Topics

Removing and Installing the Detector Module

Detector Access Panel

Detector Access Panel

To remove the panel between the detector and sample compartment, remove the sample compartment window and then loosen the thumbscrew.

Thumbscrew
Window (optional)
Removable panel
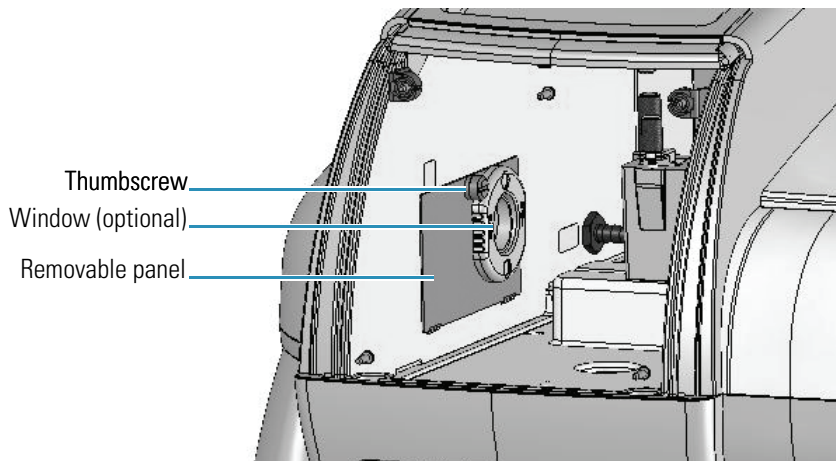
To replace the panel, hook the tabs on the bottom edge over the slots in the sample compartment side wall and tighten the thumbscrew.

Related Topics

Removing and Installing the Detector Module

Detector Access Cover

Installing Sample Compartment Windows

Corrosion Protection

The spectrophotometer contains precise optical components that may be damaged by a corrosive environment. Before using the instrument to analyze volatile, corrosive or caustic samples, install the optional sample compartment windows and, if necessary, purge the sample compartment.

Related Topics

Installing Sample Compartment Windows

Purging the Sample Compartment

Installing Sample Compartment Windows

The optional windows attach to the sample compartment side walls using magnets.

Sample compartment window (2)
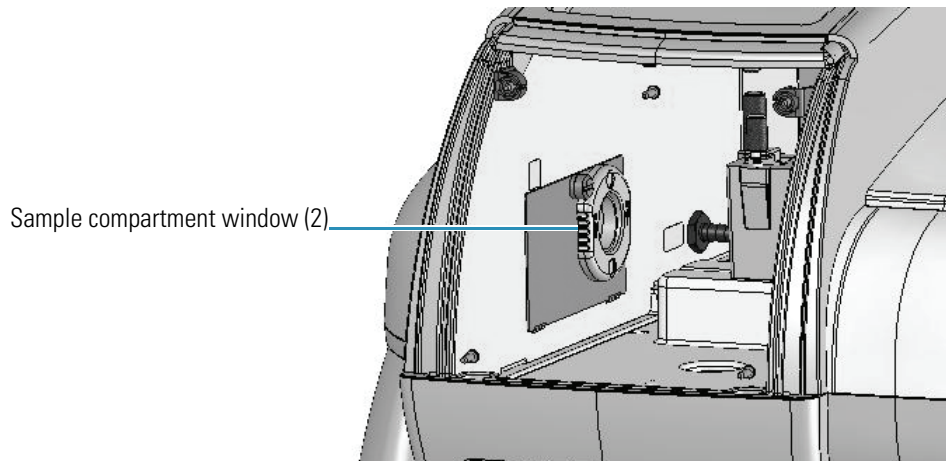
> **NOTICE** The warranty does not cover damage to internal optics or electronics caused by failure to use sample compartment windows.

Related Topics

Purging the Sample Compartment

Purging the Sample Compartment

Purging the sample compartment removes moisture from the sampling area for subambient temperature-controlled measurements. When purging the instrument, install sample compartment windows in addition to purge.

Related Topics

Installing Sample Compartment Windows

Selecting a Purge Gas

Installing Purge

Selecting a Purge Gas

Use dry air or dry nitrogen to reduce or eliminate condensation. The purge gas must be free of moisture, oil and other reactive materials. To remove particulate matter and oil, install a 10-micrometer filter.

> **WARNING** *Never* use a flammable gas to purge the instrument.

Languages

> **AVERTISSEMENT** N'utilisez jamais de gaz inflammable pour purger l'instrument.

> **WARNUNG** Verwenden Sie niemals entflammbares Gas zum Spülen des Instru¬ments.

> **AVVERTENZA** Non utilizzare mai un gas infiammabile per spurgare lo strumento.

> **ADVERTENCIA** Nunca use un gas inflamable para purgar el instrumento.

Related Topics

Installing Sample Compartment Windows

Installing Purge

Installing Purge

Use 1/4-inch internal diameter tubing to connect a purge gas source to the purge fitting on the back of the spectrophotometer.

Related Topics

Installing Sample Compartment Windows

Selecting a Purge Gas

Accessories

Contents

- Standard Cell Holders

- Installing a Manual Accessory

- Installing a Smart Accessory

- Installing a Liquid Thermostatted Accessory

- Installing a Reference Cell Holder

Standard Cell Holders

The instrument includes one sample and one reference cell holder. For a list of optional cell holders and other accessories, see Accessories.

Related Topics

10 mm Rectangular Sample Cell Holder

Rectangular Reference Cell Holder

10 mm Rectangular Sample Cell Holder

This single-cell holder is mounted on the standard baseplate and accommodates standard 10 mm pathlength cells. See Installing a Manual Accessory.

Use the cell lifter to raise the cell for easy removal. This cell holder allows fine adjustment of the vertical and horizontal position of the cell. This feature is useful for aligning reduced volume and microcuvettes with the light beam. See z-height.

Cell lifter and vertical alignment
Horizontal alignment
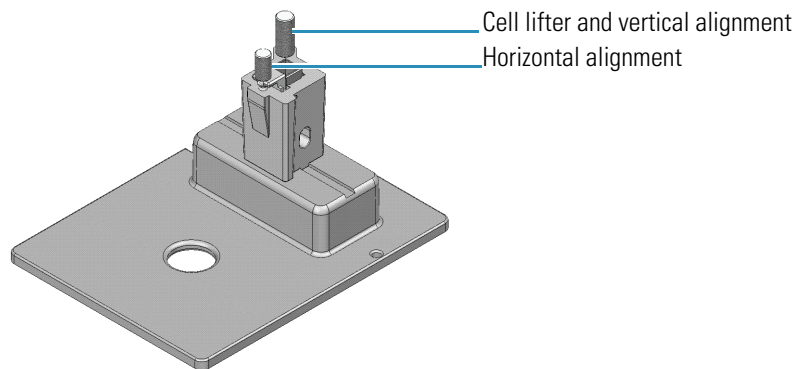
Related Topics

Rectangular Reference Cell Holder

Sample Position Cell Holders

Reference Cell Holders

Spectrophotometer Z-height

Rectangular Reference Cell Holder

For measurements with a reference sample, install a reference cell holder in the reference position. See Installing a Reference Cell Holder.

The standard reference holder accommodates rectangular reference cells with these pathlengths: 10 mm, 20 mm, 40 mm, 50 mm and 100 mm.
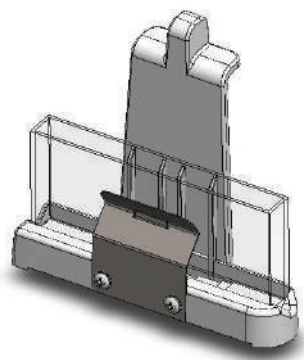
Related Topics

10 mm Rectangular Sample Cell Holder

Sample Position Cell Holders

Reference Cell Holders

Installing a Manual Accessory

Manual sampling accessories are mounted on a common baseplate. The kinematic mount ensures correct alignment of the accessory within the instrument.

It is not necessary to power off the instrument while installing or removing a manual accessory.

Sample compartment top view
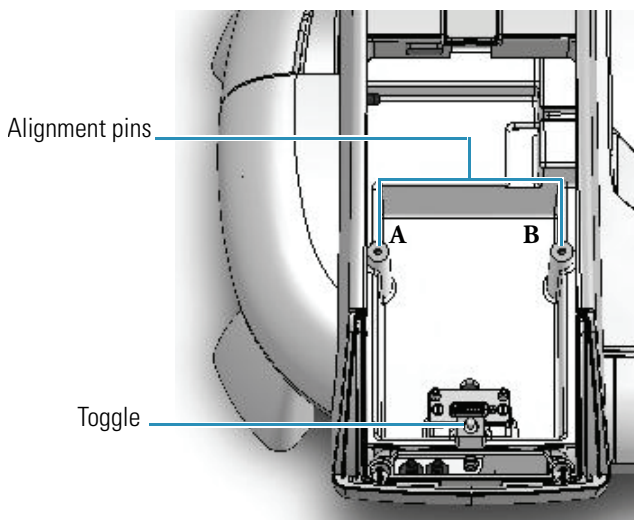
❖ **To install a manual accessory**

1. Open the sample compartment door. See Opening and Closing the Sample and Reference Compartment Doors.

2. Remove any accessory from the compartment (see the instructions below).

3. Position the accessory so the two alignment holes on its baseplate fit over pins A and B in the sample compartment.

4. Gently push down on the front edge of the baseplate until it snaps in place under the toggle.

5. Close the sample compartment door. See Opening and Closing the Sample and Reference Compartment Doors.

For operating instructions and installation details, see the accessory name under Accessories.

❖ **To remove a manual accessory**

1. Use the handle or finger hole on the accessory baseplate to release the plate from the toggle.

2. Lift the plate off the alignment pins and remove the accessory from the sample compartment.

Related Topics

Installing a Liquid Thermostatted Accessory

Installing a Smart Accessory

Installing a Reference Cell Holder

Installing a Smart Accessory

Smart Accessories include cell changers and sample holders that feature auto recognition, smart alignment and serial number reporting. Smart Accessories ensure software methods are properly configured.

These accessories install in the sample compartment. A connector under the accessory baseplate provides data communication and power.

It is not necessary to power off the instrument while installing or removing a Smart Accessory.

Sample compartment top view
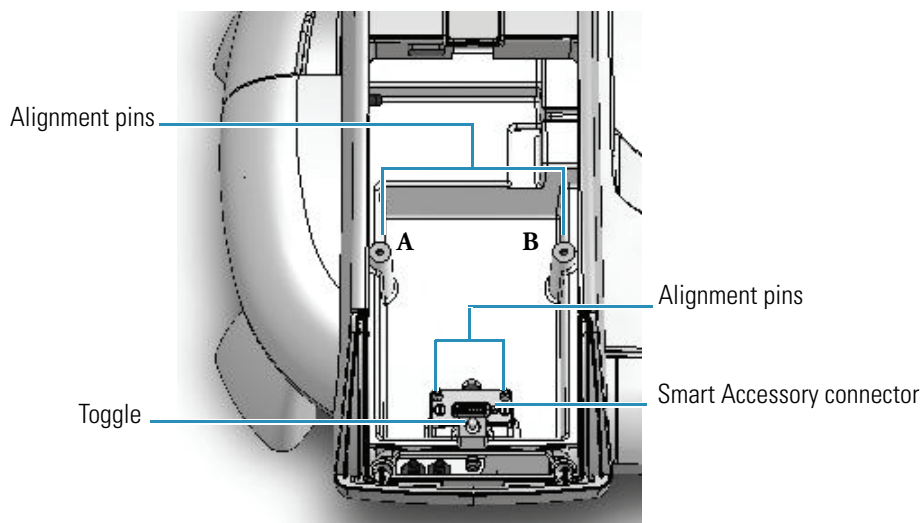
❖ **To install a Smart Accessory**

1. Open the sample compartment door. See Opening and Closing the Sample and Reference Compartment Doors.

2. Remove the sample compartment front panel. See Sample Compartment Front Panel.

3. Remove any cell holder or accessory. See To remove a Smart Accessory.

4. Insert the accessory.

   a. Grasp the accessory by the handles and lower it into the sample compartment aligning the connector under the baseplate with the connector in the sample compartment floor.

   Use the alignment pins on either side of the connector as guides.
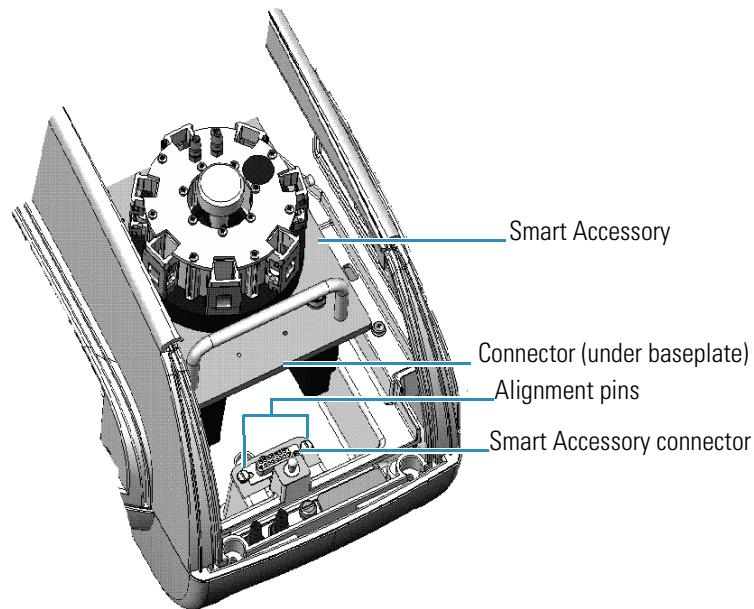
b. Line up the two holes at the back of the accessory with pins A and B in the sample compartment.

c. Press down on the front of the accessory to secure the connection.

    The software displays a prompt to initialize the accessory.

CAUTION Avoid pinch hazard. Keep hands and objects clear of the accessory during initialization.

Languages

ATTENTION Évitez tout risque de pincement. Gardez vos mains, ainsi que tout objet, à l'écart de l'accessoire pendant l'initialisation.

VORSICHT Quetschungen sind zu vermeiden. Hände und Objekte sind während der Initialisierung vom Zubehör fern zu halten.

CAUTELA Evitare il rischio di pizzicamento. Tenere mani e oggetti lontano dall'accessorio durante l'inizializzazione.

PRECAUCIÓN Evite riesgos de atrapamiento. Mantenga manos y objetos lejos del alcance del accesorio durante la inicialización.

5. Replace the sample compartment front panel. See Sample Compartment Front Panel.

6. Close the sample compartment door. See Opening and Closing the Sample and Reference Compartment Doors.

7. Click **OK** to initialize the accessory.

   Initialization reads information about the accessory and, for cell changers, moves it to position 1.

For operating instructions and installation details, see the accessory name under Accessories.

❖ **To remove a Smart Accessory**

1. Open the sample compartment door. See Opening and Closing the Sample and Reference Compartment Doors.

2. Remove the sample compartment front panel. See Sample Compartment Front Panel.

3. Grasp the handles and pull the accessory up and out of the sample compartment.

   The software confirms the accessory has been removed.

4. Replace the sample compartment front panel. See Sample Compartment Front Panel.

5. Close the sample compartment door. See Opening and Closing the Sample and Reference Compartment Doors.

Related Topics

Installing a Liquid Thermostatted Accessory

Installing a Manual Accessory

Installing a Reference Cell Holder

Installing a Liquid Thermostatted Accessory

A liquid thermostatted accessory has ports and internal chambers for circulating fluids through the unit for temperature-controlled measurements. Other accessories circulate fluids to cool heated components.

The Recirculator Tubing Kit provides parts for connecting an accessory to a fluid recirculator.

❖ **To install a thermostatted accessory**

1. Install the accessory.

   See Installing a Manual Accessory or Installing a Smart Accessory.

2. Remove the tubing access panel. See Tubing Access Panel.

3. Use 1/4-inch internal diameter tubing to connect the water supply or recirculator to the external fluid ports on the instrument.

   If the connectors on the recirculator are a different size, use a tubing adapter.
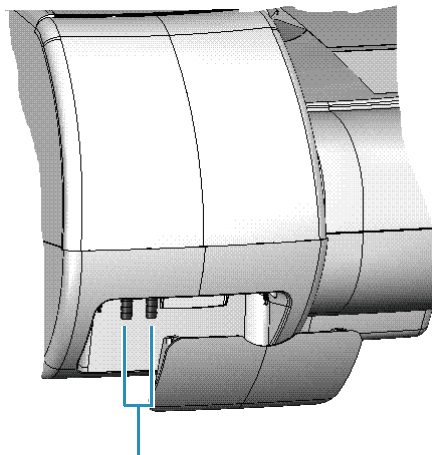
External fluid ports

4. Use additional tubing and adapters (not included), if necessary, to connect the fluid ports inside the sample compartment to the ports on the accessory.

   For a cell changer, set the changer to position 1 before connecting the tubing to the ports on the accessory. Use just enough tubing to allow the cell changer to move through all possible positions. This requires approximately 10 inches (25 cm) of tubing for each port.
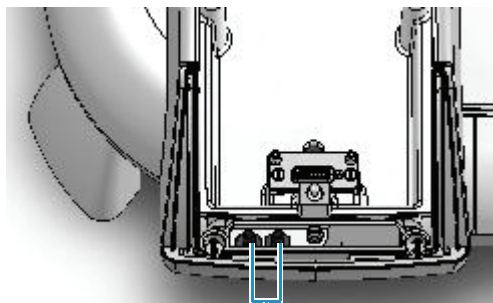
Internal fluid ports

> **Note** Ensure the tubing does not obstruct the light beam or prevent the sample compartment door from closing. If necessary, secure the tubing using the supplied clips.

Related Topics

Installing a Smart Accessory

Installing a Manual Accessory

Installing a Reference Cell Holder

Installing a Reference Cell Holder

❖ **To install a reference cell holder**

1. Open the reference compartment cover. See Opening and Closing the Sample and Reference Compartment Doors.

2. Grasp the cell holder by the handle and lower it into the reference compartment.

Handle
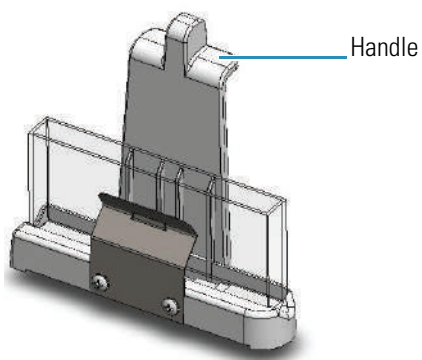
3. Insert the pin in the alignment hole and press the holder in place.

4. Close the reference compartment cover.

For operating instructions, see Reference Cell Holders.

Related Topics

Installing a Smart Accessory

Installing a Manual Accessory

Installing a Liquid Thermostatted Accessory

Using the Spectrophotometer

This section explains how to set up a Computer Control or Local Control spectrophotometer and perform basic operations using the keypad.

Contents

- Computer Control Instruments

- Local Control Instruments

Computer Control Instruments

Computer Control instruments must be connected to an external computer with the proper software installed.

All instrument features can be run from the computer using our INSIGHT software. Basic operations such as powering the spectrophotometer on and off, measuring a sample or baseline and running predefined macros can also be performed from the instrument keypad (see Keypad Operation).

Related Topics

Setting up a Computer Control Instrument

Turning off a Computer Control Instrument

Local Control Instruments

Setting up a Computer Control Instrument

❖ **To set up a Computer Control instrument**

1. Connect the supplied USB cable to the Computer port on the back of the spectrophotometer.

2. Connect the other end of the cable to the USB port on the back of the computer.

3. Turn on the spectrophotometer main power switch (on the back panel).

4. If the main power switch is already on, press the **Power** button on the keypad.

   Wait for the system to initialize. This may take several minutes. The power indicator on the keypad stops blinking when initialization is complete.

   Note If the instrument fails to initialize, the power indicator blinks rapidly. Contact us.

5. Turn on the remote computer.

6. Double-click the INSIGHT desktop icon to start the software.

   Tip For routine use, leave the power switch on the instrument back panel in the On position and use the **Power** button on the keypad to turn the instrument on and off (press and hold the keypad **Power** button **4 seconds** to power off).

Related Topics

Turning off a Computer Control Instrument

Local Control Instruments

Turning off a Computer Control Instrument

❖ **To turn off the instrument**

1. Close INSIGHT software.

2. Hold down the **Power** button on the keypad for **4 seconds**.

3. If necessary, turn off the spectrophotometer main power switch (on the back panel).

Related Topics

Setting up a Computer Control Instrument

Local Control Instruments

Local Control Instruments

Local Control instruments include a touchscreen and an embedded computer preloaded with INSIGHT software. Follow these steps to set up a Local Control instrument to run from the touchscreen or from a remote computer.

All instrument features can be run from the touchscreen or remote computer. Basic operations such as powering the spectrophotometer on and off, measuring a sample or baseline and running predefined macros can also be performed from the instrument keypad (see Keypad Operation).

Related Topics

Setting up a Local Control instrument for touchscreen operation

Setting up a Local Control instrument for remote operation

Turning off a Local Control Instrument

Computer Control Instruments

Setting up a Local Control instrument for touchscreen operation

❖ **To set up a Local Control instrument (no computer connected to the instrument)**

1. Turn on the spectrophotometer main power switch (on the back panel).

2. Press the **Power** button on the keypad.

   Wait for the system to initialize. The power indicator on the keypad stops blinking when initialization is complete. INSIGHT software starts automatically and appears on the touchscreen.

> **Tip** For routine use, leave the power switch on the instrument back panel in the On position and use the **Power** button on the keypad to turn the instrument on and off.

Related Topics

Setting up a Local Control instrument for remote operation

Turning off a Local Control Instrument

Computer Control Instruments

Touchscreen keyboard

Setting up a Local Control instrument for remote operation

❖ **To set up a Local Control instrument to run from a remote computer**

1. Connect the supplied USB cable to the Computer port on the back of the spectrophotometer.

2. Connect the other end of the cable to the USB port on the back of the computer.

3. Turn on the spectrophotometer main power switch (on the back panel).

4. Press the **Power** button on the keypad.

   Wait for the system to initialize. The power indicator on the keypad stops blinking when initialization is complete. INSIGHT software starts automatically and appears on the touchscreen.

5. Make sure the remote computer is on.

6. Do one of the following:

   • Hold down the **Function 4** and **Function 2** keys on the instrument keypad for **4 seconds**.

   • From the INSIGHT software displayed on the touchscreen, choose **System Settings > System.** In the Instrument Control group, select **Computer.**

7. Double-click the **INSIGHT** desktop icon on the remote computer to start the software.

> **Note** To return control to the touchscreen, from the INSIGHT software displayed on the remote computer:
>
> 1. Do one of the following:
>
>   • Choose **System Settings > System.** In the Instrument Control group, select **Instrument Local**.
>
>   • Hold down the **Function 4** and **Function 1** keys on the instrument keypad for **4 seconds**.
>
> 2. Double-click the **INSIGHT** desktop icon on the touchscreen to start the software.

Related Topics

Setting up a Local Control instrument for touchscreen operation

Turning off a Local Control Instrument

Computer Control Instruments

Turning off a Local Control Instrument

❖ **To turn off the instrument**

1. Close INSIGHT software.

2. Press the **Power** button on the keypad.

3. Respond to the prompt to shut down Windows software.

4. If necessary, turn off the spectrophotometer main power switch (on the back panel).

> **Tip** For routine use, leave the power switch on the instrument back panel in the On position and use the **Power** button on the keypad to turn the instrument off.

Related Topics

Setting up a Local Control instrument for touchscreen operation

Setting up a Local Control instrument for remote operation

Computer Control Instruments

Keypad Operation

Use the keypad to perform the following operations.

Button	Label	Function
	Enter	Confirm highlighted choices in menus and text entry boxes.
	Run	Perform the measurements specified using the current settings. When the Loading Guide is displayed, pressing Run is equivalent to clicking the OK button in the software.
	Stop	Stop the current operation. When the Loading Guide is displayed, pressing Stop is equivalent to clicking the Cancel button in the software.
	Zero/Base	Perform a zero measurement or baseline scan.
	Power	Turn the instrument on or off (press and hold 4 seconds to power off).
	Function	Start an assigned program or CUE script. See Assigning CUE Scripts to Function Keys. Use the CUE application to edit scripts. See the CUE on-line help for details.

Keypad Shortcuts

Action	Keypad Shortcut
For Local Control instruments:	
• Switch INSIGHT control from touchscreen to remote computer	Function 4/Function 2 (hold down 4 seconds)
• Switch INSIGHT control from remote computer to touchscreen	Function 4/Function 1 (hold down 4 seconds)

Maintenance

Contents

- Routine Maintenance
- Cleaning the Instrument
- Cleaning the Touchscreen
- Removing and Installing the Detector Module

Routine Maintenance

Clean the instrument regularly using approved methods (wipe off spilled chemicals immediately).

Related Topics

Cleaning the Instrument

Cleaning the Touchscreen

Removing and Installing the Detector Module

Cleaning the Instrument

Clean the exterior of the instrument and the sample and reference compartment interior periodically. These compartments have a port to allow small amounts of liquid to drain from the instrument.

NOTICE   Do not allow moisture to leak into the instrument interior.

To clean the touchscreen, see Cleaning the Touchscreen.

❖ **To clean the instrument exterior and the sample or reference compartment interior**

1. Use a lint-free cloth dampened with a weak solution of detergent and water to wipe the surface as necessary.

2. Repeat using a cloth dampened with plain water.

3. Dry the surface with another cloth.

Related Topics

Routine Maintenance

Cleaning the Touchscreen

Removing and Installing the Detector Module

Cleaning the Touchscreen

Clean the instrument touchscreen as needed to remove dust, fingerprints and other materials.

❖ **To clean the touchscreen**

1. Press the **Power** button on the keypad to turn off the spectrophotometer.

2. Wipe the screen gently with a soft, lint-free cloth dampened (not wet) with distilled water.

   To remove stubborn materials or oil, use a standard screen cleaner kit that includes antistatic wipes. Spray a little solution on the wipe and rub it gently across the screen.

3. Dry the screen with a clean, lint-free cloth.

Related Topics

Routine Maintenance

Cleaning the Instrument

Removing and Installing the Detector Module

Removing and Installing the Detector Module

Some accessories have a dedicated detector and require removing the instrument detector module before they can be installed.

Avoid UV radiation hazard in the detector compartment. Protect eyes and skin from exposure.

> **CAUTION** Safety glasses with side shields or goggles with solid side pieces are the only equipment that provides adequate eye protection against direct and reflected UV light.

Languages

> **CAUTION** Seules les lunettes de sécurité avec écrans latéraux ou les lunettes protectrices avec parties latérales solides protègent les yeux de façon adéquate contre la lumière UV directe et réfléchie.

> **CAUTION** Sicherheitsbrillen mit seitlichem Schutz bzw. Schutzbrillen mit festen Seitenteilen bieten als einzige Ausrüstungsgegenstände adäquaten Schutz der Augen gegen direkte und reflektierte UV-Strahlung.

> **CAUTION** Gli occhiali protettivi con schermi laterali o con schermi laterali monolente sono l'unica attrezzatura che fornisce un'adeguata protezione degli occhi dalla luce UV diretta e riflessa.

> **CAUTION** Las gafas protectoras con protección lateral de seguridad o con piezas laterales sólidas son el único equipo que proporciona la protección para los ojos adecuada contra la luz ultravioleta directa y reflejada.

❖ **To remove the detector module**

1. Turn off the spectrophotometer main power switch (on the back panel).

2. Remove the detector access cover. See Detector Access Cover.

3. Loosen the thumbscrew that attaches the detector module to the instrument, and carefully lift the module straight up.

> **NOTICE** Avoid touching the connector pins on the bottom of the detector module.
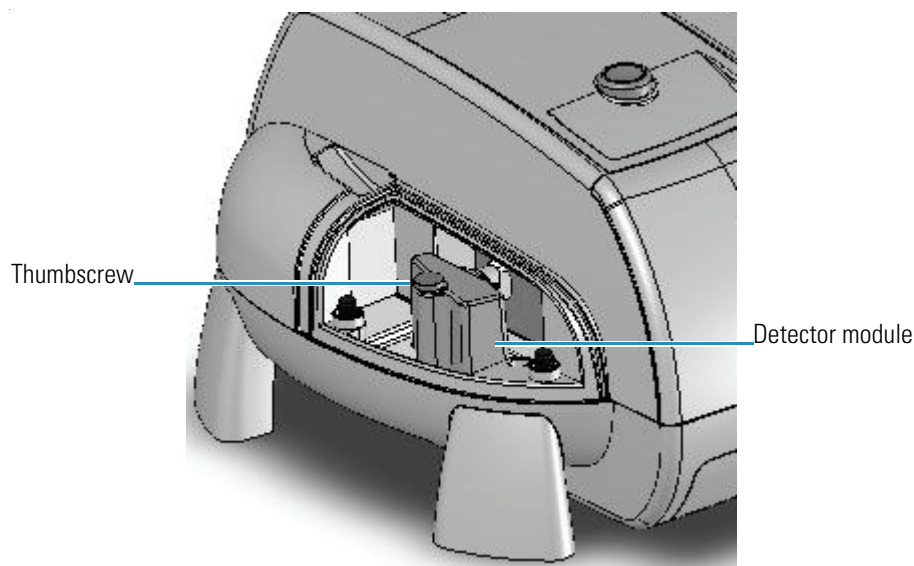
4. Replace the detector access cover.

5. Store the detector module in a secure, dust-free location.

❖ **To install the detector module**

1. Turn off the spectrophotometer. See Using the Spectrophotometer.

2. Remove the detector access cover. See Detector Access Cover.

3. Unplug the accessory detector cable if necessary.

4. Position the detector module so its thumbscrew faces left.
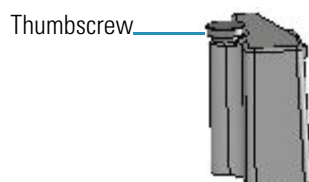
5. Line up the connector on the bottom of the detector module with the connector in the detector compartment, and then press down on the module to secure the connection.

6. Tighten the thumbscrew by hand.

7. Replace the detector access cover.

Related Topics

Routine Maintenance

Cleaning the Instrument

Cleaning the Touchscreen

Detector Access Cover

Detector Access Panel

Ordering Parts

To order replacement parts, see Contacting Us.

Life Science Applications

Contents

- About the Life Science Applications
- Nucleic Acid
- Nucleic Acid Labels
- Protein A280
- Proteins and Labels
- Pierce BCA
- Protein Bradford
- Pierce Modified Lowry
- Pierce 660 nm Protein Assay

About the Life Science Applications

There are two types of protein assay methods included, direct UV and colorimetric assays. The colorimetric assays include several assays that are similar. Likewise, the direct protein methods are also very similar. Use the table below to find the appropriate assay procedure. Click the links to access complete information about the assays.

Direct UV Assays	Colorimetric Assays
Protein A280	Protein A280
Proteins and Labels	Protein Bradford
	Pierce BCA
	Pierce Modified Lowry
	Pierce 660 nm Protein Assay
	Protein Biuret

Below are the default values for the methods. Wavelengths are in nanometers.

Method	Analytical Wavelength (Quant)	Reference Wavelength	Start (Scan)	Stop (Scan)	Bandwidth	Integration Time (sec) (Fixed, Scan)	Data Interval (Scan)	Scan Speed (nm/min)
Nucleic Acid		340	220	350	1.0	1.0, 0.08	0.50	375
Nucleic Acid Labels		340	220	850	1.0	1.0, 0.16	1.00	375
Protein A280		340	220	850	1.0	1.0, 0.08	0.5	375
Proteins & Labels		340	220	850	1.0	1.0, 0.16	1.0	375
Pierce BCA	562	340	750	450	1.0	1.0, 0.12	1.00	500
Protein Bradford	595	340	750	450	1.0	1.0, 0.12	1.00	500
Pierce Modified Lowry	750	405	900	600	1.0	1.5, 0.12	1.00	500
Pierce 660 nm Protein Assay	660	340	850	550	1.0	1.5, 0.12	1.00	500
Protein Biuret	550	340	750	450	1.0	1.0, 0.12	1.00	500

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Nucleic Acid

Contents

- Overview
- Nucleic Acid Concentration Calculations
- Application Settings
- Unique Screen Features
- Making Nucleic Acid Measurements
- Oligo Calculator

Overview

Nucleic Acid

Use the Nucleic Acid application to measure nucleic acid samples for concentration and purity.

See Unique Screen Features for information about the results the application calculates. See Nucleic Acid Concentration Calculations for information about the calculations.

Related Topics

Nucleic Acid Concentration Calculations

Application Settings

Unique Screen Features

Making Nucleic Acid Measurements

Oligo Calculator

Nucleic Acid Concentration Calculations

The Nucleic Acid application is used for determining the concentration and purity of nucleic acid samples. The nucleic acid concentration is determined by multiplying the absorbance at 260 nm by a factor (default, 50). This factor is essentially the extinction coefficient in units of ng-cm/ml. Using this coefficient gives the manipulated equation

$$c = (A * \varepsilon)/\ell$$

where c is the nucleic acid concentration in ng/microliter, A is the absorbance in AU, ε is the wavelength-dependent extinction coefficient in ng-cm/microliter, and ℓ is the pathlength in centimeters.

The generally accepted extinction coefficients for nucleic acids are:

Coefficient	Value
Double-stranded DNA	50 ng-cm/µl
Single-stranded DNA	33 ng-cm/µl
RNA	40 ng-cm/µl

Related Topics

Overview

Application Settings

Unique Screen Features

Making Nucleic Acid Measurements

Oligo Calculator

Nucleic Acid Purity Measurements

The 260/280 nm ratio assay determines the purity of nucleic acids based on the 260/280 ratio.

The 260/230 ratio assay determines the purity of nucleic acids in the presence of phenol, which absorbs strongly at 230 nm.

A ratio of approximately 1.8 is generally accepted as "pure" for DNA, approximately 2.0 for RNA. If either ratio is appreciably lower, protein, phenol or other contaminants that absorb strongly near 280 nm may be present.

The 260/230 values for a "pure" nucleic acid are often higher than the respective 260/280 values and are commonly in the range 1.8 to 2.2. If the ratio is appreciably lower, copurified contaminants may be present.

Application Settings

To set data acquisition parameters for a Nucleic Acid workbook, click **Settings** to access:

Type Tab for Nucleic Acid
Measurement Tab for Nucleic Acid
Instrument Tab for Nucleic Acid
Accessories Tab for Nucleic Acid
Samples Tab for Nucleic Acid

Related Topics

Overview

Nucleic Acid Concentration Calculations

Unique Screen Features

Making Nucleic Acid Measurements

Oligo Calculator

Type Tab for Nucleic Acid

Click **Settings** in Nucleic Acid to display the Type tab in the right pane.

Feature	Description
Name	Application name.
Description (optional)	Description of the template.

Feature	Description
Nucleic Acid Type	Type of analysis to perform. ssDNA is for single-stranded DNA. Oligo DNA and Oligo RNA use the appropriate extinction coefficient based on entered DNA or RNA base sequence. The entry will appear on the Oligo Calculator tab. For Custom, enter a factor (extinction coefficient) by which to multiply the measured absorbance. The factor used for other types cannot be changed.
Pathlength	Distance the light travels through the sample.

Related Topics

Measurement Tab for Nucleic Acid

Instrument Tab for Nucleic Acid

Accessories Tab for Nucleic Acid

Samples Tab for Nucleic Acid

Measurement Tab for Nucleic Acid

Click **Settings** in Nucleic Acid to display the Measurement tab in the right pane.

Feature	Description
Analysis wavelength	Wavelength(s) to use for the analysis.
Correction	Specifies bichromatic normalization of the absorbance data. To use uncorrected data, select **None**. Without baseline correction, spectra may be offset from the baseline. If this offset is significant, the calculated protein concentration may be higher than the true value. **Single point** subtracts the sample absorbance at the entered wavelength from the absorbance at every data point. **Sloping baseline** draws a line between the data points at the entered wavelengths, finds its absorbance value at the analytical wavelength, and subtracts it from the measured absorbance.
Component name	Component to quantify.

Feature	Description
Unit	Component concentration unit. The available units depend on the Formulas & Units tab settings in Options.
Calculate additional results	For selecting or defining formulas for additional data processing, with the results appearing in the analysis report. The formulas are written in a form similar to that used in a command script language, with constants, mathematical functions, etc. All functions are not case-sensitive. Spaces are not allowed between a function name and "(". After adding formulas, edit their information in the formula table as desired. To delete a table row, right-click it and choose **Delete Row**. Some information in the table cannot be modified or deleted.

Instructions:

❖ **To add one or more predefined formulas**

1. Click **Select**.

2. For each desired formula, select it in the list and click **Add**.

   The available formulas depend on the Formulas & Units tab settings in Options.

3. Click **Close**.

❖ **To define a formula**

1. Click **Build**.

2. To enter a formula in its entirety, set **Equation type** to **User defined** and type the equation. To use a provided formula, select it and enter values for the variables.

   The available formulas depend on the Formulas & Units tab settings.

3. Click **OK**.

4. For selected provided formulas, enter a name and concentration unit in the table.

   The available units depend on the Formulas & Units tab settings.

Related Topics

Type Tab for Nucleic Acid

Instrument Tab for Nucleic Acid

Instrument Tab for Nucleic Acid

| | Settings | Click **Settings** in Nucleic Acid to display the Instrument tab in the right pane. |

Feature	Description
Mode	Specifies Scan or Fixed data acquisition.
Data mode	Y-axis format for acquired data.
Start wavelength and End wavelength (Scan only)	Starting and ending values of the wavelength range for acquiring data.
Bandwidth	A larger spectral bandwidth increases the amount of energy that passes through the sample. Increasing the bandwidth can improve the signal-to-noise ratio; however, a larger spectral bandwidth decreases the ability to resolve closely spaced spectral features.
Integration time	How long the system acquires and averages data at each data interval (for scanning measurements) or at each measured wavelength (for fixed-wavelength measurements). Increasing the integration time improves the signal-to-noise ratio but reduces the scan speed.
Data interval (Scan only)	Difference in wavelength between two consecutive data points.
Scan speed (Scan only)	Wavelength range covered per unit time. Varies inversely with integration time. Increases as the data interval increases.
Estimated time (Scan only)	Estimated duration of data acquisition. Increases as integration time increases and as the data interval decreases. Varies inversely with scan speed.
Table of wavelengths (Fixed only)	Shows the analysis wavelength(s) entered on the Measurement tab.

Related Topics

Accessories Tab for Nucleic Acid

 Click **Settings** in Nucleic Acid to display the Accessories tab in the right pane. The available parameters depend on the installed accessories. See Accessories for details.

The status of accessories can be monitored during measurements. See Instrument Status Monitors.

Related Topics

Type Tab for Nucleic Acid

Measurement Tab for Nucleic Acid

Instrument Tab for Nucleic Acid

Samples Tab for Nucleic Acid

Samples Tab for Nucleic Acid

 Click **Settings** in Nucleic Acid to display the Samples tab in the right pane.

Feature	Description
Number of samples	Number of samples in the analysis.
Base name	Beginning of the name for sample spectra, to which a sequential number is appended. For example, the names of three sample spectra using the base name "dye" would be dye1, dye2 and dye3.
Sample averaging	Whether and how to average concentration values from multiple measurements of the same sample or from multiple samples. To average multiple measurements of the same sample, select **Replicate** and set **Number of replicates** to the total number of measurements. To average values from two or three samples, select **Duplicate** or **Triplicate**, respectively.
Use concentration limits	Displays high and low limit lines on the Run Chart tab to show whether sample concentrations are within the specified limits.

Related Topics

Type Tab for Nucleic Acid

Measurement Tab for Nucleic Acid

Instrument Tab for Nucleic Acid

Accessories Tab for Nucleic Acid

Unique Screen Features

Measure Nucleic Acid

The right pane in Measure Nucleic Acid displays workbook parameters specific to the application. Task buttons in the left pane are described in Task Buttons.

| | 350.0 nm | -0.1979 Abs | **Pathlength 10.0 mm** | Calibration Not Required | |

| Data | Run Chart | | Type | Oligo DNA | 32.41 |

Conc. **45.333** mg/ml

A260 **1.437**

A280 **0.996**

260 / 280 **1.442**

260 / 230 **0.924**

#	Sample ID	Date and Time	Nucleic Acid Conc.
1	Sample1	5/24/2010 2:48 PM	45.333
2	Sample2	5/24/2010 2:49 PM	33.107
3	Sample3	5/24/2010 2:49 PM	32.007
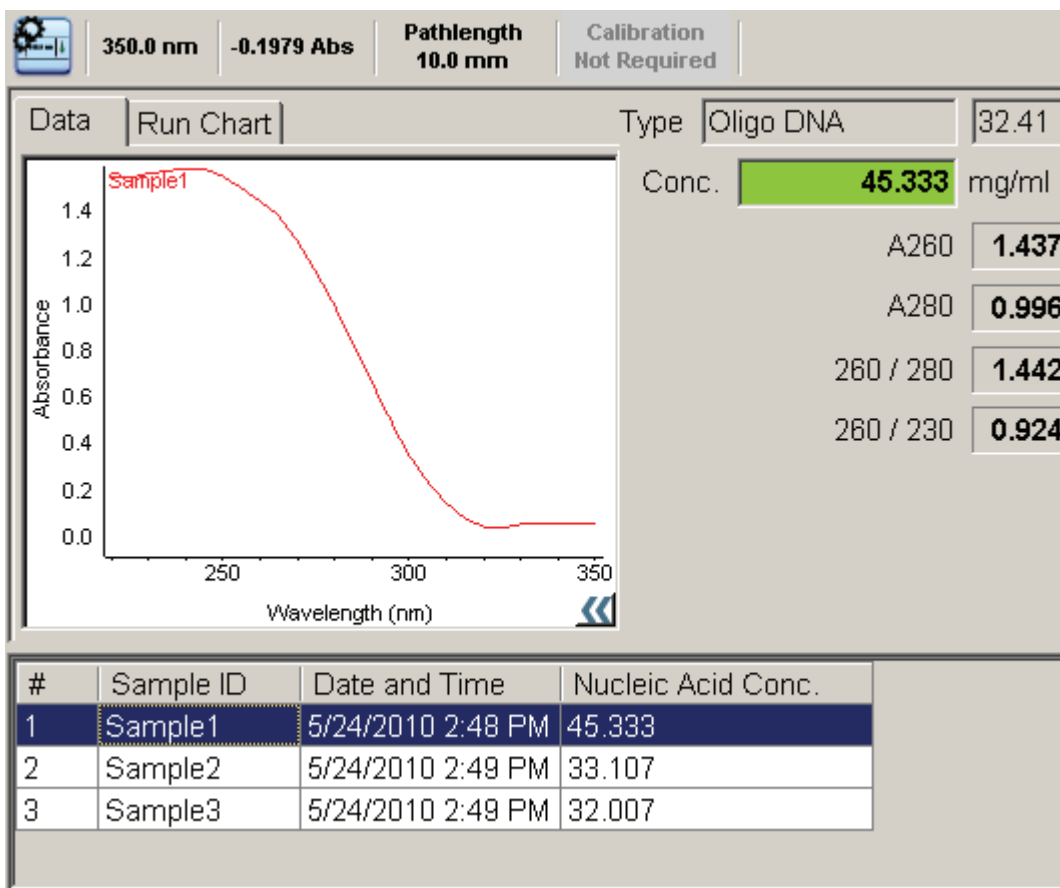
The spectral display shows data for the current sample.

These features are to the right of the spectral display:

Feature	Description
Type	Type of analysis to perform. To the right is the factor value from the Type tab.
Conc.	Concentration determined by multiplying the absorbance at 260 nm by a factor (default, 50) after correction is applied. Beer's law is used to calculate the nucleic acid concentration (see Nucleic Acid Concentration Calculations).
A260	Absorbance at 260 nm.

Feature	Description
A280	Absorbance at 280 nm.
260/280	Ratio of sample absorbance at 260 nm and 280 nm, used to assess the purity of DNA and RNA. A ratio of about 1.8 is generally accepted as "pure" for DNA, about 2.0 for RNA. If either ratio is appreciably lower, protein, phenol or other contaminants that absorb strongly near 280 nm may be present. See Nucleic Acid Purity Measurements for more information.
260/230	Ratio of absorbance at 260 nm and 230 nm, a secondary measure of nucleic acid purity.

Related Topics

Overview

Nucleic Acid Concentration Calculations

Application Settings

Making Nucleic Acid Measurements

Oligo Calculator

Making Nucleic Acid Measurements

While performing this procedure, click here for information about features to the right of the spectral display.

❖ **To measure nucleic acids**

1. Click **Measure Nucleic Acid** in Nucleic Acid.

    Note To start an analysis immediately after viewing or changing the template settings, click the **Measure** action button instead and skip to step 3.

2. Click **Measure**.

3. Follow the instructions that appear.

    Use the appropriate buffer for the blank, generally the same buffer used to prepare or dissolve the sample. The buffer should be the same pH and of a similar ionic strength as the sample solution.

4. When samples information appears, modify it if desired.

More:

If Sample averaging on the Samples tab in Settings was set to Duplicate, "D" at the end of a sample name indicates the second measurement to be made of the sample. If Sample averaging was set to Triplicate, "D" and "T" at the end of sample names indicate the second and third measurements to be made, respectively.

To enter previously saved samples information, use **Load Samples**. To save the samples information, use **Save Samples**.

5. If only one sample will be measured, insert it.

6. Click **Continue**.

7. Follow any instructions that appear, such as to install a specified sample.

The Run Chart tab plots the concentration of the measured component versus sample number. If Use concentration limits was selected on the Samples tab, horizontal limit lines show whether the concentrations are within the specified limits:

To copy this plot, right-click it and choose **Copy to Clipboard**.

The Data tab displays the acquired data (a fixed data point or scan spectrum) for the sample selected in the table. (Right-click the data to access commands for customizing the display, including adding annotation. See Data Display for more information.)

The table contains the columns of information specified on the Configuration tab in Reports. Examples include sample identification, user name, and the results of replicate, duplicate or triplicate measurements and their standard deviation.

To measure a sample again, right-click its row in the results table and choose **Remeasure**. After the remeasurement, the previous information for the sample is crossed out (but not removed from the table).

Related Topics

Oligo Calculator

 Use **Oligo Calculator** to calculate molecular weight, extinction coefficients, concentration factors and melting points for specific nucleic acid sequences. Clicking this task button displays:

Tab	Description
Oligo Calculator	For entering sequences of interest and selecting appropriate sample type variables.
Melting	Displays the calculated melting points of a DNA strand. Available only for DNA sequences.

❖ **To use Oligo Calculator**

1. Enter a base sequence on the Oligo Calculator tab.

More:

Use:

- The buttons below the Base Sequence box.

- The A, C, G, T and U keys on the keyboard.

- Copy and paste a base sequence (A, C, G, T and U only) from another application.

To clear the sequence, click **Clear**. Individual bases can be deleted only manually.

2. Select the nucleic acid type to analyze.

3. Select the degree of phosphorylation if applicable: mono-phosphate for DNA; mono- or tri-phosphate for RNA.

4. Select **Double-stranded** if applicable. The complementary base sequence will be included in the analysis.

5. Enter the molecular weights of any additions to the base sequence in the **Modification** box.

The calculated results appear:

Result	Description
Molecular weight	Calculated base sequence molecular weight.
Molar extinction coefficient	Calculated 260 nm extinction coefficient in ng-cm/microliter.
Concentration factor	Factor, based on the extinction coefficient, used to calculate the concentration of the base sequence.
Number of bases	Number of bases in the entered sequence.
% GC	Percentage of the total number of bases made up by guanine and cytosine.

❖ **To calculate the melting point of a DNA sequence**

1. Enter the base sequence on the Oligo Calculator tab.

2. Enter appropriate values on the Melting tab:

Parameter	Description
Oligo molarity	Concentration of the Oligo in molar units.
Cation molarity	Concentration of cations in the sample.
% Formamide	Percentage concentration of formamide in the sample.

The calculated results appear:

Result	Description
Salt-adjusted	Calculated melting point of the base sequence, corrected for the concentration of cation in the sample. This method does not account for the effect of interaction between neighboring bases.
Nearest-neighbor	Melting point of the base sequence when the effect of interaction between neighboring bases is taken into account.

Nucleic Acid Labels

Contents

- Overview

- Dye/Chromophore Editor

- Application Settings

- Unique Screen Features

- Making Nucleic Acid Labels Measurements

- Oligo Calculator

Overview

 Use the Nucleic Acid Labels application to measure nucleic acid samples for concentration and purity.

Related Topics

Dye/Chromophore Editor

Application Settings

Unique Screen Features

Making Nucleic Acid Labels Measurements

Oligo Calculator

Dye/Chromophore Editor

 Use the Dye Chromophore Editor to select predefined dyes, modify existing dyes for protocols, or enter new dyes.

To enter a new dye, type its information in the appropriate cells of the bottom row of the table and select a unit. Refer to the dye manufacturer for appropriate correction factors. The 260 nm corrections will be used for nucleic acid sample concentration calculations. Entered information is saved automatically.

To delete a user-defined dye, right-click its row and choose **Delete Row**. Predefined dyes, identified by the lock icon, cannot be edited or deleted.

Application Settings

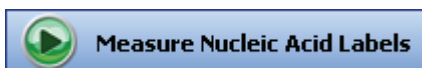To set data acquisition parameters for a Nucleic Acid Labels workbook, click **Settings** to access:

Type Tab for Nucleic Acid Labels
Measurement Tab for Nucleic Acid Labels
Instrument Tab for Nucleic Acid Labels
Accessories Tab for Nucleic Acid Labels
Samples Tab for Nucleic Acid Labels

Related Topics

Overview

Dye/Chromophore Editor

Unique Screen Features

Making Nucleic Acid Labels Measurements

Oligo Calculator

Type Tab for Nucleic Acid Labels

Click **Settings** in Nucleic Acid Labels to display the Type tab in the right pane.

Feature	Description
Name	Application name.
Description (optional)	Description of the template.
Nucleic Acid Type	Type of analysis to perform.
	ssDNA is for single-stranded DNA.
	Oligo DNA and Oligo RNA use the appropriate extinction coefficient based on the entered DNA or RNA base sequence. The entry will appear on the Oligo Calculator tab.
	For Custom, enter a factor (extinction coefficient) by which to multiply the measured absorbance. The factor used for other types cannot be changed.
	Set Dye 1 and Dye 2 to the fluorescent dyes whose absorbance will be used in concentration correction calculations.
Pathlength	Distance the light travels through the sample.

Related Topics

Measurement Tab for Nucleic Acid Labels

 Click **Settings** in Nucleic Acid Labels to display the Measurement tab in the right pane.

Feature	Description
Analysis wavelength	Wavelength(s) to use for the analysis.
Correction	Specifies bichromatic normalization of the absorbance data.
	To use uncorrected data, select **None**. Without baseline correction, spectra may be offset from the baseline. If this offset is significant, the calculated protein concentration may be higher than the true value.
	Single point subtracts the sample absorbance at the entered wavelength from the absorbance at every data point.
	Sloping baseline draws a line between the data points at the entered wavelengths, finds its absorbance value at the analytical wavelength, and subtracts it from the measured absorbance.
Component name	Component to quantify.

Feature	Description
Unit	Component concentration unit. The available units depend on the Formulas & Units tab settings in Options.
Calculate additional results	For selecting or defining formulas for additional data processing, with the results appearing in the analysis report. The formulas are written in a form similar to that used in a command script language, with constants, mathematical functions, etc. All functions are not case-sensitive. Spaces are not allowed between a function name and "(". After adding formulas, edit their information in the formula table as desired. To delete a table row, right-click it and choose **Delete Row**. Some information in the table cannot be modified or deleted.

Instructions:

❖ **To add one or more predefined formulas**

1. Click **Select**.

2. For each desired formula, select it in the list and click **Add**.

   The available formulas depend on the Formulas & Units tab settings in Options.

3. Click **Close**.

❖ **To define a formula**

1. Click **Build**.

2. To enter a formula in its entirety, set **Equation type** to **User defined** and type the equation. To use a provided formula, select it and enter values for the variables.

   The available formulas depend on the Formulas & Units tab settings.

3. Click **OK**.

4. For selected provided formulas, enter a name and concentration unit in the table.

   The available units depend on the Formulas & Units tab settings.

Related Topics

Type Tab for Nucleic Acid Labels

Instrument Tab for Nucleic Acid Labels

Accessories Tab for Nucleic Acid Labels

Samples Tab for Nucleic Acid Labels

Instrument Tab for Nucleic Acid Labels

| | Click **Settings** in Nucleic Acid Labels to display the Instrument tab in the right pane. |

Feature	Description
Mode	Specifies Scan or Fixed data acquisition.
Data mode	Y-axis format for acquired data.
Start wavelength and End wavelength (Scan only)	Starting and ending values of the wavelength range for acquiring data.
Bandwidth	A larger spectral bandwidth increases the amount of energy that passes through the sample. Increasing the bandwidth can improve the signal-to-noise ratio; however, a larger spectral bandwidth decreases the ability to resolve closely spaced spectral features.
Integration time	How long the system acquires and averages data at each data interval (for scanning measurements) or at each measured wavelength (for fixed-wavelength measurements). Increasing the integration time improves the signal-to-noise ratio but reduces the scan speed.
Data interval (Scan only)	Difference in wavelength between two consecutive data points.
Scan speed (Scan only)	Wavelength range covered per unit time. Varies inversely with integration time. Increases as the data interval increases.
Estimated time (Scan only)	Estimated duration of data acquisition. Increases as integration time increases and as the data interval decreases. Varies inversely with scan speed.
Table of wavelengths (Fixed only)	Shows the analysis wavelength(s) entered on the Measurement tab.

Related Topics

Type Tab for Nucleic Acid Labels

Measurement Tab for Nucleic Acid Labels

Accessories Tab for Nucleic Acid Labels

Samples Tab for Nucleic Acid Labels

Accessories Tab for Nucleic Acid Labels

Click **Settings** in Nucleic Acid Labels to display the Accessories tab in the right pane. The available parameters depend on the installed accessories. See Accessories for details.

The status of accessories can be monitored during measurements. See Instrument Status Monitors.

Related Topics

Type Tab for Nucleic Acid Labels

Measurement Tab for Nucleic Acid Labels

Instrument Tab for Nucleic Acid Labels

Samples Tab for Nucleic Acid Labels

Samples Tab for Nucleic Acid Labels

Click **Settings** in Nucleic Acid Labels to display the Samples tab in the right pane.

Feature	Description
Number of samples	Number of samples in the analysis.
Base name	Beginning of the name for sample spectra, to which a sequential number is appended. For example, the names of three sample spectra using the base name "dye" would be dye1, dye2 and dye3.
Sample averaging	Whether and how to average concentration values from multiple measurements of the same sample or from multiple samples. To average multiple measurements of the same sample, select **Replicate** and set **Number of replicates** to the total number of measurements. To average values from two or three samples, select **Duplicate** or **Triplicate**, respectively.
Use concentration limits	Displays high and low limit lines on the Run Chart tab to show whether sample concentrations are within the specified limits.

Related Topics

Type Tab for Nucleic Acid Labels

Measurement Tab for Nucleic Acid Labels

Instrument Tab for Nucleic Acid Labels

Accessories Tab for Nucleic Acid Labels

Unique Screen Features

The right pane in Measure Nucleic Acid Labels includes:

Feature	Description
Type	Type of analysis to perform. To the right is the factor value from the Type tab.
Conc.	Concentration based on absorbance at 260 nm, the default or user-defined extinction coefficient, and the specified pathlength. (The extinction coefficient is reported for a 10 mm pathlength.) Beer's law is used to calculate the nucleic acid concentration (see Nucleic Acid Concentration Calculations).
	The displayed A260 value is baseline corrected. The A260 value actually used to calculate the concentration takes into account the appropriate dye correction factors and any absorbance correction due to the selected analysis correction wavelength.
A260	Absorbance at 260 nm.
260/280	Ratio of sample absorbance at 260 nm and 280 nm, used to assess the purity of DNA and RNA. A ratio of ~1.8 is generally accepted as "pure" for DNA, ~2.0 for RNA. If either ratio is appreciably lower, protein, phenol or other contaminants that absorb strongly near 280 nm may be present. See Nucleic Acid Purity Measurements for more information.
Dye(s) Conc.	Concentration of the user-selected dye(s).

Related Topics

Overview

Dye/Chromophore Editor

Application Settings

Making Nucleic Acid Labels Measurements

Oligo Calculator

Making Nucleic Acid Labels Measurements

While performing this procedure, click here for information about features to the right of the spectral display.

❖ **To make a Nucleic Acid Labels measurement**

1. Click **Measure Nucleic Acid Labels** in Nucleic Acid Labels.

> **Note** To start an analysis immediately after viewing or changing the template settings, click the **Measure** action button instead and skip to step 3.

2. Click **Measure**.

3. Follow the instructions that appear.

Use the appropriate buffer for the blank, generally the same buffer used to prepare or dissolve the sample. The buffer should be the same pH and of a similar ionic strength as the sample solution.

4. When samples information appears, modify it if desired.

More:

If Sample averaging on the Samples tab in Settings was set to Duplicate, "D" at the end of a sample name indicates the second measurement to be made of the sample. If Sample averaging was set to Triplicate, "D" and "T" at the end of sample names indicate the second and third measurements to be made, respectively.

To enter previously saved samples information, use **Load Samples**. To save the samples information, use **Save Samples**.

5. If only one sample will be measured, insert it.

6. Click **Continue**.

7. Follow any instructions that appear, such as to install a specified sample.

> **Note** Use a fresh aliquot of sample for each measurement.

The Run Chart tab plots the concentration of the measured component versus sample number. If Use concentration limits was selected on the Samples tab, horizontal limit lines show whether the concentrations are within the specified limits:

To copy this plot, right-click it and choose **Copy to Clipboard**.

The Data tab displays the acquired data (a fixed data point or scan spectrum) for the sample selected in the table. (Right-click the data to access commands for customizing the display, including adding annotation. See Data Display for more information.)

The table contains the columns of information specified on the Configuration tab in Reports. Examples include sample identification, user name, and the results of replicate, duplicate or triplicate measurements and their standard deviation.

To measure a sample again, right-click its row in the results table and choose **Remeasure**. After the remeasurement, the previous information for the sample is crossed out (but not removed from the table).

Related Topics

Overview

Dye/Chromophore Editor

Application Settings

Unique Screen Features

Data Display

Oligo Calculator

After the Measurement

- When using the cuvette option, remove the cuvette, rinse thoroughly and dry between samples.

Oligo Calculator

Use **Oligo Calculator** to calculate molecular weight, extinction coefficients, concentration factors and melting points for specific nucleic acid sequences. Clicking this task button displays:

Tab	Description
Oligo Calculator	For entering sequences of interest and selecting appropriate sample type variables.
Melting	Displays the calculated melting points of a DNA strand. Available only for DNA sequences.

❖ **To use Oligo Calculator**

1. Enter a base sequence on the Oligo Calculator tab.

More:

Use:

- The buttons below the Base Sequence box.

- The A, C, G, T and U keys on the keyboard.

- Copy and paste a base sequence (A, C, G, T and U only) from another application.

To clear the sequence, click **Clear**. Individual bases can be deleted only manually.

2. Select the nucleic acid type to analyze.

3. Select the degree of phosphorylation if applicable: mono-phosphate for DNA; mono- or tri-phosphate for RNA.

4. Select **Double-stranded** if applicable. The complementary base sequence will be included in the analysis.

5. Enter the molecular weights of any additions to the base sequence in the **Modification** box.

The calculated results appear:

Result	Description
Molecular weight	Calculated base sequence molecular weight.
Molar extinction coefficient	Calculated 260 nm extinction coefficient in ng-cm/microliter.
Concentration factor	Factor, based on the extinction coefficient, used to calculate the concentration of the base sequence.

Result	Description
Number of bases	Number of bases in the entered sequence.
% GC	Percentage of the total number of bases made up by guanine and cytosine.

❖ **To calculate the melting point of a DNA sequence**

1. Enter the base sequence on the Oligo Calculator tab.

2. Enter appropriate values on the Melting tab:

Parameter	Description
Oligo molarity	Concentration of the Oligo in molar units.
Cation molarity	Concentration of cations in the sample.
% Formamide	Percentage concentration of formamide in the sample.

The calculated results appear:

Result	Description
Salt-adjusted	Calculated melting point of the base sequence, corrected for the concentration of cation in the sample. This method does not account for the effect of interaction between neighboring bases.
Nearest-neighbor	Melting point of the base sequence when the effect of interaction between neighboring bases is taken into account.

Protein A280

Contents

- Overview

- Application Settings

- Unique Screen Features

- Making Protein A280 Measurements

Overview

The Protein A280 method is used to quantify proteins on the basis of their absorbance at 280 nm.

Tyrosine, tryptophan, phenylalanine and to a small extent lysine and Cys-Cys disulphide bonds have an absorbance peak around 280 nm. This method does not require generation of a standard curve and is ready for protein sample quantitation at software startup. Colorimetric assays such as Pierce BCA, Pierce 660 nm, Bradford and Lowry are more commonly used for uncharacterized protein solutions and cell lysates.

The Protein A280 application displays the UV spectrum, measures the protein's absorbance at 280 nm (A280), and calculates the concentration (mg/ml).

Related Topics

Application Settings

Unique Screen Features

Making Protein A280 Measurements

Application Settings

To set data acquisition parameters for a Protein A280 workbook, click **Settings** to access:

Type Tab for Protein A280
Measurement Tab for Protein A280
Instrument Tab for Protein A280
Accessories Tab for Protein A280
Samples Tab for Protein A280

Related Topics

Overview

Unique Screen Features

Making Protein A280 Measurements

Type Tab for Protein A280

Click **Settings** in Protein A280 to display the Type tab in the right pane.

Feature	Description
Name	Application name.
Description (optional)	Description of the template.

Feature	Description
Protein A280 Type	Type of analysis to perform.
	1 Abs = 1 mg / mL is a general reference setting based on a 0.1% (1 mg/ml) protein solution. It produces an absorbance of 1.0 A at 280 nm (where the pathlength is 10 mm, or 1 cm).
	BSA is a Bovine Serum Albumin reference. Protein concentrations are calculated using the mass extinction coefficient of 6.7 at 280 nm for a 1% (10 mg/ml) BSA solution.
	IgG is an IgG reference. Protein concentrations are calculated using the mass extinction coefficient of 13.7 at 280 nm for a 1% (10 mg/ml) IgG solution.
	For **Lysozyme**, protein concentrations are calculated using the mass extinction coefficient of 26.4 at 280 nm for a 1% (10 mg/ml) Lysozyme solution.
	Other protein (ε & MW) is the entered molar extinction coefficient (M^{-1} cm^{-1}) and molecular weight (MW) in kilodaltons (kDa) for the respective protein reference. The maximum values are 99999000 for ε and 9999000 for MW.
	Other protein (ε 1%) is the mass extinction coefficient (l g^{-1} cm^{-1}) for a 10 mg/ml (1%) solution of the respective reference protein. Enter an ε/1000 value.
Pathlength	Distance the light travels through the sample.

Related Topics

Measurement Tab for Protein A280

Instrument Tab for Protein A280

Accessories Tab for Protein A280

Samples Tab for Protein A280

Measurement Tab for Protein A280

Click **Settings** in Protein A280 to display the Measurement tab in the right pane.

Feature	Description
Analysis wavelength	Wavelength(s) to use for the analysis.
Correction	Specifies bichromatic normalization of the absorbance data.
	To use uncorrected data, select **None**. Without baseline correction, spectra may be offset from the baseline. If this offset is significant, the calculated protein concentration may be higher than the true value.
	Single point subtracts the sample absorbance at the entered wavelength from the absorbance at every data point.
	Sloping baseline draws a line between the data points at the entered wavelengths, finds its absorbance value at the analytical wavelength, and subtracts it from the measured absorbance.
Component name	Component to quantify.

Feature	Description
Unit	Component concentration unit. The available units depend on the Formulas & Units tab settings in Options.
Calculate additional results	For selecting or defining formulas for additional data processing, with the results appearing in the analysis report. The formulas are written in a form similar to that used in a command script language, with constants, mathematical functions, etc. All functions are not case-sensitive. Spaces are not allowed between a function name and "(". After adding formulas, edit their information in the formula table as desired. To delete a table row, right-click it and choose **Delete Row**. Some information in the table cannot be modified or deleted.

Instructions:

❖ **To add one or more predefined formulas**

1. Click **Select**.

2. For each desired formula, select it in the list and click **Add**.

   The available formulas depend on the Formulas & Units tab settings in Options.

3. Click **Close**.

❖ **To define a formula**

1. Click **Build**.

2. To enter a formula in its entirety, set **Equation type** to **User defined** and type the equation. To use a provided formula, select it and enter values for the variables.

   The available formulas depend on the Formulas & Units tab settings.

3. Click **OK**.

4. For selected provided formulas, enter a name and concentration unit in the table.

   The available units depend on the Formulas & Units tab settings.

Related Topics

Type Tab for Protein A280

Instrument Tab for Protein A280

Instrument Tab for Protein A280

| | Settings | Click **Settings** in Protein A280 to display the Instrument tab in the right pane. |

Feature	Description
Mode	Specifies Scan or Fixed data acquisition.
Data mode	Y-axis format for acquired data.
Start wavelength and End wavelength (Scan only)	Starting and ending values of the wavelength range for acquiring data.
Bandwidth	A larger spectral bandwidth increases the amount of energy that passes through the sample. Increasing the bandwidth can improve the signal-to-noise ratio; however, a larger spectral bandwidth decreases the ability to resolve closely spaced spectral features.
Integration time	How long the system acquires and averages data at each data interval (for scanning measurements) or at each measured wavelength (for fixed-wavelength measurements). Increasing the integration time improves the signal-to-noise ratio but reduces the scan speed.
Data interval (Scan only)	Difference in wavelength between two consecutive data points.
Scan speed (Scan only)	Wavelength range covered per unit time. Varies inversely with integration time. Increases as the data interval increases.
Estimated time (Scan only)	Estimated duration of data acquisition. Increases as integration time increases and as the data interval decreases. Varies inversely with scan speed.
Table of wavelengths (Fixed only)	Shows the analysis wavelength(s) entered on the Measurement tab.

Related Topics

Type Tab for Protein A280

Measurement Tab for Protein A280

Accessories Tab for Protein A280

Samples Tab for Protein A280

Accessories Tab for Protein A280

Click **Settings** in Protein A280 to display the Accessories tab in the right pane. The available parameters depend on the installed accessories. See Accessories for details.

The status of accessories can be monitored during measurements. See Instrument Status Monitors.

Related Topics

Type Tab for Protein A280

Measurement Tab for Protein A280

Instrument Tab for Protein A280

Samples Tab for Protein A280

Samples Tab for Protein A280

Click **Settings** in Protein A280 to display the Samples tab in the right pane.

Feature	Description
Number of samples	Number of samples in the analysis.
Base name	Beginning of the name for sample spectra, to which a sequential number is appended. For example, the names of three sample spectra using the base name "dye" would be dye1, dye2 and dye3.
Sample averaging	Whether and how to average concentration values from multiple measurements of the same sample or from multiple samples. To average multiple measurements of the same sample, select **Replicate** and set **Number of replicates** to the total number of measurements. To average values from two or three samples, select **Duplicate** or **Triplicate**, respectively.
Use concentration limits	Displays high and low limit lines on the Run Chart tab to show whether sample concentrations are within the specified limits.

Related Topics

Type Tab for Protein A280

Measurement Tab for Protein A280

Instrument Tab for Protein A280

Unique Screen Features

 The right pane in Measure Protein A280 may include:

Feature	Description
Type	Type of analysis to perform.
ε/1000 and Molecular Weight (kDa)	ε/1000 and molecular weight for the Other protein (ε & MW) sample type.
Ext. Coeff, ε 1% (L/g-cm)	Extinction coefficient and ε 1% for the Other protein (ε 1%) sample type.
Conc.	Concentration based on absorbance at 280 nm, after correction is applied, and the selected extinction coefficient.
A280	Absorbance at 280 nm for the protein sample being measured.
260/280	Ratio of absorbance at 260 nm and 280 nm.

Related Topics

Overview

Application Settings

Making Protein A280 Measurements

Making Protein A280 Measurements

While performing this procedure, click here for information about features to the right of the spectral display.

❖ **To make a Protein A280 measurement**

1. Click **Measure Protein A280** in Protein A280.

> **Note** To start an analysis immediately after viewing or changing the template settings, click the **Measure** action button instead and skip to step 3.

2. Click **Measure**.

3. Follow the instructions that appear.

   Use the appropriate buffer for the blank, generally the same buffer used to prepare or dissolve the sample. The buffer should be the same pH and of a similar ionic strength as the sample solution.

4. When samples information appears, modify it if desired.

More:

   If Sample averaging on the Samples tab in Settings was set to Duplicate, "D" at the end of a sample name indicates the second measurement to be made of the sample. If Sample averaging was set to Triplicate, "D" and "T" at the end of sample names indicate the second and third measurements to be made, respectively.

   To enter previously saved samples information, use **Load Samples**. To save the samples information, use **Save Samples**.

5. If only one sample will be measured, insert it.

6. Click **Continue**.

7. Follow any instructions that appear, such as to install a specified sample.

   The Run Chart tab plots the concentration of the measured component versus sample number. If Use concentration limits was selected on the Samples tab, horizontal limit lines show whether the concentrations are within the specified limits:

To copy this plot, right-click it and choose **Copy to Clipboard**.

The Data tab displays the acquired data (a fixed data point or scan spectrum) for the sample selected in the table. (Right-click the data to access commands for customizing the display, including adding annotation. See Data Display for more information.)

The table contains the columns of information specified on the Configuration tab in Reports. Examples include sample identification, user name, and the results of replicate, duplicate or triplicate measurements and their standard deviation.

To measure a sample again, right-click its row in the results table and choose **Remeasure**. After the remeasurement, the previous information for the sample is crossed out (but not removed from the table).

Related Topics

Overview

Application Settings

Unique Screen Features

Data Display

Proteins and Labels

Contents

- Overview
- Dye/Chromophore Editor
- Application Settings
- Unique Screen Features
- Making Proteins and Labels Measurements

Overview

Proteins & Labels

The Proteins & Labels application determines protein concentration using the protein's intrinsic absorption at 280 nm as well as the concentration of a fluorescent dye modification (protein array conjugates). It can also measure the purity of metalloproteins (such as hemoglobin) using wavelength ratios.

Related Topics

Dye/Chromophore Editor

Dye/Chromophore Editor

 Use the Dye Chromophore Editor to select predefined dyes, modify existing dyes for protocols, or enter new dyes.

To enter a new dye, type its information in the appropriate cells of the bottom row of the table and select a unit. Refer to the dye manufacturer for appropriate correction factors. The 260 nm corrections will be used for nucleic acid sample concentration calculations. Entered information is saved automatically.

To delete a user-defined dye, right-click its row and choose **Delete Row**. Predefined dyes, identified by the lock icon, cannot be edited or deleted.

Application Settings

 To set data acquisition parameters for a Proteins and Labels workbook, click **Settings** to access:

Type Tab for Proteins and Labels
Measurement Tab for Proteins and Labels
Instrument Tab for Proteins and Labels
Accessories Tab for Proteins and Labels
Samples Tab for Proteins and Labels

Related Topics

Overview

Dye/Chromophore Editor

Unique Screen Features

Making Proteins and Labels Measurements

Type Tab for Proteins and Labels

 Click **Settings** in Proteins and Labels to display the Type tab in the right pane.

Feature	Description
Name	Application name.
Description (optional)	Description of the template.
Type	Type of analysis to perform.
	1 Abs = 1 mg / mL is a general reference setting based on a 0.1% (1 mg/ml) protein solution. It produces an absorbance of 1.0 A at 280 nm (where the pathlength is 10 mm, or 1 cm).
	BSA is a Bovine Serum Albumin reference. Protein concentrations are calculated using the mass extinction coefficient of 6.7 at 280 nm for a 1% (10 mg/ml) BSA solution.
	IgG is an IgG reference. Protein concentrations are calculated using the mass extinction coefficient of 13.7 at 280 nm for a 1% (10 mg/ml) IgG solution.
	For **Lysozyme**, protein concentrations are calculated using the mass extinction coefficient of 26.4 at 280 nm for a 1% (10 mg/ml) Lysozyme solution.
	Other protein (ε & MW) is the entered molar extinction coefficient (M^{-1} cm^{-1}) and molecular weight (MW) in kilodaltons (kDa) for the respective protein reference. The maximum values are 99999 X 1000 for ε and 9999 X 1000 for MW
	Other protein (ε 1%) is the mass extinction coefficient ($l\,g^{-1}$ cm^{-1}) for a 10 mg/ml (1%) solution of the respective reference protein.
Dye 1 and Dye 2	Fluorescent dyes whose absorbance will be used in concentration correction calculations.
Pathlength	Distance the light travels through the sample.

Related Topics

Measurement Tab for Proteins and Labels

Instrument Tab for Proteins and Labels

Accessories Tab for Proteins and Labels

Samples Tab for Proteins and Labels

Measurement Tab for Proteins and Labels

	Settings	Click **Settings** in Proteins and Labels to display the Measurement tab in the right pane.

Feature	Description
Analysis wavelength	Wavelength(s) to use for the analysis.
Correction	Specifies bichromatic normalization of the absorbance data.
	To use uncorrected data, select **None**. Without baseline correction, spectra may be offset from the baseline. If this offset is significant, the calculated protein concentration may be higher than the true value.
	Single point subtracts the sample absorbance at the entered wavelength from the absorbance at every data point.
	Sloping baseline draws a line between the data points at the entered wavelengths, finds its absorbance value at the analytical wavelength, and subtracts it from the measured absorbance.
Component name	Component to quantify.

Feature	Description
Unit	Component concentration unit. The available units depend on the Formulas & Units tab settings in Options.
Calculate additional results	For selecting or defining formulas for additional data processing, with the results appearing in the analysis report. The formulas are written in a form similar to that used in a command script language, with constants, mathematical functions, etc. All functions are not case-sensitive. Spaces are not allowed between a function name and "(". After adding formulas, edit their information in the formula table as desired. To delete a table row, right-click it and choose **Delete Row**. Some information in the table cannot be modified or deleted.

Instructions:

❖ **To add one or more predefined formulas**

1. Click **Select**.

2. For each desired formula, select it in the list and click **Add**.

   The available formulas depend on the Formulas & Units tab settings in Options.

3. Click **Close**.

❖ **To define a formula**

1. Click **Build**.

2. To enter a formula in its entirety, set **Equation type** to **User defined** and type the equation. To use a provided formula, select it and enter values for the variables.

   The available formulas depend on the Formulas & Units tab settings.

3. Click **OK**.

4. For selected provided formulas, enter a name and concentration unit in the table.

   The available units depend on the Formulas & Units tab settings.

Related Topics

Instrument Tab for Proteins and Labels

	Click **Settings** in Proteins and Labels to display the Instrument tab in the right pane.
Settings	

Feature	Description
Mode	Specifies Scan or Fixed data acquisition.
Data mode	Y-axis format for acquired data.
Start wavelength and End wavelength (Scan only)	Starting and ending values of the wavelength range for acquiring data.
Bandwidth	A larger spectral bandwidth increases the amount of energy that passes through the sample. Increasing the bandwidth can improve the signal-to-noise ratio; however, a larger spectral bandwidth decreases the ability to resolve closely spaced spectral features.
Integration time	How long the system acquires and averages data at each data interval (for scanning measurements) or at each measured wavelength (for fixed-wavelength measurements). Increasing the integration time improves the signal-to-noise ratio but reduces the scan speed.
Data interval (Scan only)	Difference in wavelength between two consecutive data points.
Scan speed (Scan only)	Wavelength range covered per unit time. Varies inversely with integration time. Increases as the data interval increases.
Estimated time (Scan only)	Estimated duration of data acquisition. Increases as integration time increases and as the data interval decreases. Varies inversely with scan speed.
Table of wavelengths (Fixed only)	Shows the analysis wavelength(s) entered on the Measurement tab.

Related Topics

Type Tab for Proteins and Labels

Measurement Tab for Proteins and Labels

Accessories Tab for Proteins and Labels

Accessories Tab for Proteins and Labels

Click **Settings** in Proteins and Labels to display the Accessories tab in the right pane. The available parameters depend on the installed accessories. See Accessories for details.

The status of accessories can be monitored during measurements. See Instrument Status Monitors.

Related Topics

Type Tab for Proteins and Labels

Measurement Tab for Proteins and Labels

Instrument Tab for Proteins and Labels

Samples Tab for Proteins and Labels

Samples Tab for Proteins and Labels

Click **Settings** in Proteins and Labels to display the Samples tab in the right pane.

Feature	Description
Number of samples	Number of samples in the analysis.
Base name	Beginning of the name for sample spectra, to which a sequential number is appended. For example, the names of three sample spectra using the base name "dye" would be dye1, dye2 and dye3.
Sample averaging	Whether and how to average concentration values from multiple measurements of the same sample or from multiple samples. To average multiple measurements of the same sample, select **Replicate** and set **Number of replicates** to the total number of measurements. To average values from two or three samples, select **Duplicate** or **Triplicate**, respectively.
Use concentration limits	Displays high and low limit lines on the Run Chart tab to show whether sample concentrations are within the specified limits.

Related Topics

Type Tab for Proteins and Labels

Unique Screen Features

 The right pane in Measure Protein & Labels includes:

Feature	Description
Type	Type of analysis to perform.
ε/1000 and Molecular Weight (kDa)	ε/1000 and molecular weight for the Other protein (ε & MW) sample type.
Ext. Coeff, ε 1% (L/g-cm)	Extinction coefficient and ε 1% for the Other protein (ε 1%) sample type.
Conc.	Concentration based on absorbance at 280 nm, after correction is applied, and the selected extinction coefficient.
Dye(s) Conc.	Concentration of the user-selected dye(s).

Related Topics

Overview

Dye/Chromophore Editor

Application Settings

Making Proteins and Labels Measurements

Making Proteins and Labels Measurements

While performing this procedure, click here for information about features to the right of the spectral display.

❖ **To make a Proteins and Labels measurement**

1. Click **Measure Proteins & Labels** in Proteins and Labels.

Note To start an analysis immediately after viewing or changing the template settings, click the **Measure** action button instead and skip to step 3.

2. Click **Measure**.

3. Follow the instructions that appear.

Use the appropriate buffer for the blank, generally the same buffer used to prepare or dissolve the sample. This solution should be the same pH and of a similar ionic strength as the sample solution.

4. When samples information appears, modify it if desired.

More:

If Sample averaging on the Samples tab in Settings was set to Duplicate, "D" at the end of a sample name indicates the second measurement to be made of the sample. If Sample averaging was set to Triplicate, "D" and "T" at the end of sample names indicate the second and third measurements to be made, respectively.

To enter previously saved samples information, use **Load Samples**. To save the samples information, use **Save Samples**.

5. If only one sample will be measured, insert it.

6. Click **Continue**.

7. Follow any instructions that appear, such as to install a specified sample.

The Run Chart tab plots the concentration of the measured component versus sample number. If Use concentration limits was selected on the Samples tab, horizontal limit lines show whether the concentrations are within the specified limits:

To copy this plot, right-click it and choose **Copy to Clipboard**.

The Data tab displays the acquired data (a fixed data point or scan spectrum) for the sample selected in the table. (Right-click the data to access commands for customizing the display, including adding annotation. See Data Display for more information.)

The table contains the columns of information specified on the Configuration tab in Reports. Examples include sample identification, user name, and the results of replicate, duplicate or triplicate measurements and their standard deviation.

The A280 value in the result table is the value using the absorbance at 750 nm as the baseline. The A280 value used to calculate the protein concentration takes into account the appropriate dye correction factors and any absorbance correction due to the selected analysis correction nm. Therefore, the displayed A280 value is not the value used to calculate the sample concentration.

To measure a sample again, right-click its row in the results table and choose **Remeasure**. After the remeasurement, the previous information for the sample is crossed out (but not removed from the table).

Related Topics

Overview

Dye/Chromophore Editor

Application Settings

Unique Screen Features

Data Display

Pierce BCA

Contents

- Overview
- Application Settings
- Working With Standard Curves
- Making Pierce BCA Measurements

Overview

Pierce BCA

The BCA Protein Assay, which was patented by Pierce Biotechnology, part of Thermo Fisher Scientific, remains a cornerstone for accurately measuring protein concentration in biological samples. The method uses bicinchoninic acid (BCA) as the detection reagent for Cu^+, which is formed when Cu^{2+} is reduced by protein in an alkaline environment. A purple-colored reaction product is formed by the chelation of two molecules of BCA with one cuprous ion (Cu^+). The resulting Cu-BCA chelate formed in the presence of protein is measured at 562 nm. While this assay is linear over a wide concentration range, the calibration curves are best represented as second order. Preformulated reagents of BCA and $CuSO_4$ are available in kit form from us.

Related Topics

Application Settings

Working With Standard Curves

Making Pierce BCA Measurements

BCA Kits and Protocols

Commercial BCA Protein kit manufacturers typically outline procedures for two different protein concentration ranges:

- A regular assay uses a 20:1 reagent/sample volume ratio.

- A mini assay uses a 1:1 reagent/sample volume ratio. To prepare sufficient volume of these 1:1 mixtures for cuvette measurements, use a sample volume of at least 3 ml and 3 ml of BCA reagent.

Follow the assay kit manufacturer's recommendations for all standards and samples (unknowns). Ensure each is subjected to the same timing and temperature throughout the assay.

> **Note** If running the assay at 60 °C, doubling the volumes may afford greater insurance against skewed results from evaporation/condensation within the sealed reaction tube.

Protein standards (BSA) for generating a standard curve may also be provided by the manufacturer for the BCA assay.

Application Settings

| | To set data acquisition parameters for a Pierce BCA workbook, click **Settings** to access: |

Type Tab for Pierce BCA
Measurement Tab for Pierce BCA
Standards Tab for Pierce BCA
Instrument Tab for Pierce BCA
Accessories Tab for Pierce BCA
Samples Tab for Pierce BCA

Related Topics

Overview

Working With Standard Curves

Making Pierce BCA Measurements

Type Tab for Pierce BCA

| | Click **Settings** in Pierce BCA to display the Type tab in the right pane. |

Feature	Description
Name	Application name.
Description (optional)	Description of the template.
Standard curve	Type of quantitative analysis used.
Pathlength	Distance the light travels through the sample.

Related Topics

Measurement Tab for Pierce BCA

Standards Tab for Pierce BCA

Instrument Tab for Pierce BCA

Accessories Tab for Pierce BCA

Samples Tab for Pierce BCA

Measurement Tab for Pierce BCA

Settings	Click **Settings** in Pierce BCA to display the Measurement tab in the right pane.

Feature	Description
Analysis wavelength	Wavelength(s) to use for the analysis.
Correction	Specifies bichromatic normalization of the absorbance data.
	To use uncorrected data, select **None**. Without baseline correction, spectra may be offset from the baseline. If this offset is significant, the calculated protein concentration may be higher than the true value.
	Single point subtracts the sample absorbance at the entered wavelength from the absorbance at every data point.
	Sloping baseline draws a line between the data points at the entered wavelengths, finds its absorbance value at the analytical wavelength, and subtracts it from the measured absorbance.
Component name	Component to quantify.

Feature	Description
Unit	Component concentration unit. The available units depend on the Formulas & Units tab settings in Options.
Calculate additional results	For selecting or defining formulas for additional data processing, with the results appearing in the analysis report. The formulas are written in a form similar to that used in a command script language, with constants, mathematical functions, etc. All functions are not case-sensitive. Spaces are not allowed between a function name and "(". After adding formulas, edit their information in the formula table as desired. To delete a table row, right-click it and choose **Delete Row**. Some information in the table cannot be modified or deleted.

Instructions:

❖ **To add one or more predefined formulas**

1. Click **Select**.

2. For each desired formula, select it in the list and click **Add**.

   The available formulas depend on the Formulas & Units tab settings in Options.

3. Click **Close**.

❖ **To define a formula**

1. Click **Build**.

2. To enter a formula in its entirety, set **Equation type** to **User defined** and type the equation. To use a provided formula, select it and enter values for the variables.

   The available formulas depend on the Formulas & Units tab settings.

3. Click **OK**.

4. For selected provided formulas, enter a name and concentration unit in the table.

   The available units depend on the Formulas & Units tab settings.

Related Topics

Type Tab for Pierce BCA

Standards Tab for Pierce BCA

Instrument Tab for Pierce BCA

Accessories Tab for Pierce BCA

Samples Tab for Pierce BCA

Standards Tab for Pierce BCA

Click **Settings** in Pierce BCA to display the Standards tab in the right pane.

Feature	Description
Curve fit type	Type of equation used to create the standard curve from standard concentration values.
Standard averaging	Whether and how to average concentration values from multiple measurements of the same standard or from multiple standards prepared under the same conditions. To average multiple measurements of the same standard, select **Replicate** and set **Number of replicates** to the total number of measurements. To average values from two or three similar standards, select **Duplicate** or **Triplicate**, respectively.
Minimum r^2	The r^2 value indicates how well the standard curve fits the standard data points, with 1.0 a perfect fit. If Minimum r^2 is selected, samples can be quantified only after that value is achieved for the standard curve.
Calculate from weight/volume	If available for the current unit, calculates concentration when the weight and volume of material used to prepare each standard is known. Enter the weight and volume for each standard in the appropriate table cells, or enter it later as part of running an analysis.
Standard Table	Contains concentration and other information about the standards. To add information from a .csv (comma separated values) file or .tsv (tab separated values) file, click **Import Standards**. To save the information in a .csv file or .tsv file, click **Export Standards**.

Related Topics

Type Tab for Pierce BCA

Measurement Tab for Pierce BCA

Instrument Tab for Pierce BCA

Accessories Tab for Pierce BCA

Instrument Tab for Pierce BCA

Settings

Click **Settings** in Pierce BCA to display the Instrument tab in the right pane.

Feature	Description
Mode	Specifies Scan or Fixed data acquisition.
Data mode	Y-axis format for acquired data.
Start wavelength and End wavelength (Scan only)	Starting and ending values of the wavelength range for acquiring data.
Bandwidth	A larger spectral bandwidth increases the amount of energy that passes through the sample. Increasing the bandwidth can improve the signal-to-noise ratio; however, a larger spectral bandwidth decreases the ability to resolve closely spaced spectral features.
Integration time	How long the system acquires and averages data at each data interval (for scanning measurements) or at each measured wavelength (for fixed-wavelength measurements). Increasing the integration time improves the signal-to-noise ratio but reduces the scan speed.
Data interval (Scan only)	Difference in wavelength between two consecutive data points.
Scan speed (Scan only)	Wavelength range covered per unit time. Varies inversely with integration time. Increases as the data interval increases.
Estimated time (Scan only)	Estimated duration of data acquisition. Increases as integration time increases and as the data interval decreases. Varies inversely with scan speed.
Table of wavelengths (Fixed only)	Shows the analysis wavelength(s) entered on the Measurement tab.

Related Topics

Type Tab for Pierce BCA

Measurement Tab for Pierce BCA

Standards Tab for Pierce BCA

Accessories Tab for Pierce BCA

Samples Tab for Pierce BCA

Accessories Tab for Pierce BCA

Click **Settings** in Pierce BCA to display the Accessories tab in the right pane. The available parameters depend on the installed accessories. See Accessories for details.

The status of accessories can be monitored during measurements. See Instrument Status Monitors.

Related Topics

Type Tab for Pierce BCA

Measurement Tab for Pierce BCA

Standards Tab for Pierce BCA

Instrument Tab for Pierce BCA

Samples Tab for Pierce BCA

Samples Tab for Pierce BCA

Click **Settings** in Pierce BCA to display the Samples tab in the right pane.

Feature	Description
Number of samples	Number of samples in the analysis.
Base name	Beginning of the name for sample spectra, to which a sequential number is appended. For example, the names of three sample spectra using the base name "dye" would be dye1, dye2 and dye3.
Sample averaging	Whether and how to average concentration values from multiple measurements of the same sample or from multiple samples. To average multiple measurements of the same sample, select **Replicate** and set **Number of replicates** to the total number of measurements. To average values from two or three samples, select **Duplicate** or **Triplicate**, respectively.
Use concentration limits	Displays high and low limit lines on the Run Chart tab to show whether sample concentrations are within the specified limits.
Use weight/volume correction	If available for the current unit, corrects sample concentrations using the entered target weight and volume: corrected concentration = measured concentration * (actual weight / target weight) * (target volume / actual volume)

Related Topics

Working With Standard Curves

A standard curve is required for colorimetric protein analysis.

- A standard curve can be generated using two or more standards.

- The multipoint curve capability allows multiple replicates for each standards. Standards can be run in any order; however, best practice dictates that the standards be measured from the lowest concentration to the highest.

- Determine whether or not to use a standard when analyzing samples against the standard curve.

- Establishing a new standard curve requires creating a new workbook.

- If a previously saved workbook is used, all concentration calculations for newly measured samples will be based on the standard absorbance values saved in the workbook.

> **Note** Each workbook will archive only one standard curve.

Related Topics

Making Pierce BCA Measurements

Sample and Standards Preparation

- See the manufacturers' guidelines and recommendations for standard and sample preparation.

- Prepare both standards and unknowns in the same manner. Use a diluent of the same pH and ionic strength for all blanks, standards and unknown samples.

> **Note** Standards diluted from a stock standard must cover the expected range of the unknown samples. Protein concentrations are not extrapolated beyond measured standard concentrations.

Procedure

❖ **To make a Pierce BCA measurement**

1. Click **Measure Pierce BCA** in Pierce BCA.

> **Note** To start an analysis immediately after viewing or changing the template settings, click the **Measure** action button instead and skip to step 3.

2. If standards need to be acquired, click **Measure**. If standards have already been acquired, skip to step 7 to acquire sample data.

3. Follow the instructions that appear.

   Use the appropriate buffer for the blank. See the reagent directions for details.

4. When the standards information appears, modify it if desired.

More:

   If Standard averaging on the Standards tab in Settings was set to Duplicate, "D" at the end of a standard name indicates the second measurement to be made of the standard. If Sample averaging was set to Triplicate, "D" and "T" at the end of standard names indicate the second and third measurements to be made, respectively.

   To enter previously saved standards information, use **Import Standards**.

   If Calculate from weight/volume was selected on the Standards tab, enter the weight and volume for each standard in the table.

   To remove a standard, select it, right-click the table and choose **Clear Standard**. To remove all the standards, choose **Clear Table**.

   To save standards information for later use, use **Export Standards**.

5. Click **Continue**.

6. Follow the instructions that appear, installing the specified standards.

The Standard Curve(s) tab displays the resulting standard curve (or curves). Specify the standards to use for the curve (or curves) by selecting **Yes** or **No** in the **Use** column in the table.

More:

Method Uncalibrated	If a standard curve is not calibrated... • Try selecting a different curve fit type. • Try remeasuring a standard using the correct standard material: select the listed standard, right-click the table and choose **Remeasure**. • Try changing the setting of **Minimum r^2** on the Standards tab and acquire the standards again in a new workbook.
Method Calibrated	This is only an indicator that the required minimum number of points have been established for the selected curve fit type. It does not validate the integrity of the curve. For example, additional standards may be required to cover the expected assay concentration range.

The table contains the columns of information specified on the Configuration tab in Reports. Examples include sample identification, user name, and the results of replicate, duplicate or triplicate measurements and their standard deviation.

If Standard averaging was set to Duplicate, "D" at the end of a standard name indicates the second measurement. If Standard averaging was set to Triplicate, "D" and "T" indicate the second and third measurements, respectively.

To permanently remove an acquired standard from the analysis, right-click it and choose **Remove**. Its information is crossed out but not removed from the table.

The Data tab displays the acquired data (a fixed data point or scan spectrum) for the standard selected in the table. To access commands for customizing the display, including adding annotation, right-click the data. See Data Display for more information.

7. Click **Measure**.

8. Follow the instructions that appear.

9. When samples information appears, modify it if desired.

If Calculate from weight/volume was selected on the Standards tab, enter the weight and volume for each sample in the table.

More:

If Sample averaging on the Samples tab in Settings was set to Duplicate, "D" at the end of a sample name indicates the second measurement to be made of the sample. If Sample averaging was set to Triplicate, "D" and "T" at the end of sample names indicate the second and third measurements to be made, respectively.

To enter previously saved samples information, use **Load Samples**. To save the samples information, use **Save Samples**.

10. If only one sample will be measured, install it.

11. Click **Continue**.

12. Follow any instructions that appear, such as to install a specified sample.

    The sample results table contains the columns of information specified on the Configuration tab in Reports. If Sample averaging was set to Duplicate, "D" at the end of a sample name indicates the second measurement. If Sample averaging was set to Triplicate, "D" and "T" indicate the second and third measurements, respectively.

    The Standard Curve(s) tab shows graphically the relationship between the standard curve, measured spectral intensity and calculated concentration for the selected sample: A horizontal line connects the sample spectral intensity value on the Y-axis to the standard curve. A vertical line connects that point to the sample concentration value on the X-axis:

    The Run Chart tab plots the concentration of the measured component versus sample number. If Use concentration limits was selected on the Samples tab, horizontal limit lines show whether the concentrations are within the specified limits:

To measure a sample again, right-click its row in the results table and choose **Remeasure**. After the remeasurement, the previous information for the sample is crossed out (but not removed from the table).

To copy the data on the Standard Curve(s) tab or Run Chart tab, right-click the plot and choose **Copy to Clipboard**.

Related Topics

Overview

Application Settings

Data Display

Protein Bradford

Contents

- Overview

- Application Settings

- Bradford Standard Curves

- Making Protein Bradford Assay Measurements

Overview

Protein Bradford

The Protein Bradford assay measures absorbance at 595 nm; it determines concentration for either standard or micro sample concentrations.

This assay is commonly used for determining protein concentration. It is often used for more dilute protein solutions where lower detection sensitivity is needed and/or in the presence of components that also have significant UV (280 nm) absorbance. Like the other colorimetric assays, the Bradford assay requires generating a standard curve before measuring sample proteins.

The Bradford procedure uses the protein-induced absorbance shift of Coomassie Blue dye to 595 nm to measure protein concentration. The bound protein-dye complex is measured at 595 nm and normalized at 750 nm. A single stabilized reagent mixture containing Coomassie Blue dye, alcohol, and surfactant in kit form is available from numerous manufacturers.

Related Topics

Application Settings

Bradford Standard Curves

Making Protein Bradford Assay Measurements

Bradford Reagent Kits and Protocols

Follow the assay kit manufacturer's recommendations for all standards and samples (unknowns), ensuring they are subjected to the same timing and temperature throughout the assay.

Protein standards (BSA) for generating a standard curve may also be provided by the Bradford assay manufacturer.

Application Settings

To set data acquisition parameters for a Protein Bradford workbook, click **Settings** to access:

Type Tab for Protein Bradford
Measurement Tab for Protein Bradford
Standards Tab for Protein Bradford
Instrument Tab for Protein Bradford
Accessories Tab for Protein Bradford
Samples Tab for Protein Bradford

Related Topics

Overview

Bradford Standard Curves

Making Protein Bradford Assay Measurements

Type Tab for Protein Bradford

Settings	Click **Settings** in Protein Bradford to display the Type tab in the right pane.

Feature	Description
Name	Application name.
Description (optional)	Description of the template.
Standard curve	Type of quantitative analysis used.
Pathlength	Distance the light travels through the sample.

Related Topics

Measurement Tab for Protein Bradford

Standards Tab for Protein Bradford

Instrument Tab for Protein Bradford

Accessories Tab for Protein Bradford

Samples Tab for Protein Bradford

Measurement Tab for Protein Bradford

Settings	Click **Settings** in Protein Bradford to display the Measurement tab in the right pane.

Feature	Description
Analysis wavelength	Wavelength(s) to use for the analysis.
Correction	Specifies bichromatic normalization of the absorbance data. To use uncorrected data, select **None**. Without baseline correction, spectra may be offset from the baseline. If this offset is significant, the calculated protein concentration may be higher than the true value. **Single point** subtracts the sample absorbance at the entered wavelength from the absorbance at every data point. **Sloping baseline** draws a line between the data points at the entered wavelengths, finds its absorbance value at the analytical wavelength, and subtracts it from the measured absorbance.
Component name	Component to quantify.

Feature	Description
Unit	Component concentration unit. The available units depend on the Formulas & Units tab settings in Options.
Calculate additional results	For selecting or defining formulas for additional data processing, with the results appearing in the analysis report. The formulas are written in a form similar to that used in a command script language, with constants, mathematical functions, etc. All functions are not case-sensitive. Spaces are not allowed between a function name and "(". After adding formulas, edit their information in the formula table as desired. To delete a table row, right-click it and choose **Delete Row**. Some information in the table cannot be modified or deleted. Instructions: ❖ **To add one or more predefined formulas** 1. Click **Select**. 2. For each desired formula, select it in the list and click **Add**. The available formulas depend on the Formulas & Units tab settings in Options. 3. Click **Close**. ❖ **To define a formula** 1. Click **Build**. 2. To enter a formula in its entirety, set **Equation type** to **User defined** and type the equation. To use a provided formula, select it and enter values for the variables. The available formulas depend on the Formulas & Units tab settings. 3. Click **OK**. 4. For selected provided formulas, enter a name and concentration unit in the table. The available units depend on the Formulas & Units tab settings.

Related Topics

Type Tab for Protein Bradford

Standards Tab for Protein Bradford

Instrument Tab for Protein Bradford

Accessories Tab for Protein Bradford

Samples Tab for Protein Bradford

Standards Tab for Protein Bradford

 Click **Settings** in Protein Bradford to display the Standards tab in the right pane.

Feature	Description
Curve fit type	Type of equation used to create the standard curve from standard concentration values.
Standard averaging	Whether and how to average concentration values from multiple measurements of the same standard or from multiple standards prepared under the same conditions. To average multiple measurements of the same standard, select **Replicate** and set **Number of replicates** to the total number of measurements. To average values from two or three similar standards, select **Duplicate** or **Triplicate**, respectively.
Minimum r^2	The r^2 value indicates how well the standard curve fits the standard data points, with 1.0 a perfect fit. If Minimum r^2 is selected, samples can be quantified only after that value is achieved for the standard curve.
Calculate from weight/volume	If available for the current unit, calculates concentration when the weight and volume of material used to prepare each standard is known. Enter the weight and volume for each standard in the appropriate table cells, or enter it later as part of running an analysis.
Standard Table	Contains concentration and other information about the standards. To add information from a .csv (comma separated values) file or .tsv (tab separated values) file, click **Import Standards**. To save the information in a .csv file or .tsv file, click **Export Standards**.

Related Topics

Type Tab for Protein Bradford

Measurement Tab for Protein Bradford

Instrument Tab for Protein Bradford

Accessories Tab for Protein Bradford

Instrument Tab for Protein Bradford

Settings

Click **Settings** in Protein Bradford to display the Instrument tab in the right pane.

Feature	Description
Mode	Specifies Scan or Fixed data acquisition.
Data mode	Y-axis format for acquired data.
Start wavelength and End wavelength (Scan only)	Starting and ending values of the wavelength range for acquiring data.
Bandwidth	A larger spectral bandwidth increases the amount of energy that passes through the sample. Increasing the bandwidth can improve the signal-to-noise ratio; however, a larger spectral bandwidth decreases the ability to resolve closely spaced spectral features.
Integration time	How long the system acquires and averages data at each data interval (for scanning measurements) or at each measured wavelength (for fixed-wavelength measurements). Increasing the integration time improves the signal-to-noise ratio but reduces the scan speed.
Data interval (Scan only)	Difference in wavelength between two consecutive data points.
Scan speed (Scan only)	Wavelength range covered per unit time. Varies inversely with integration time. Increases as the data interval increases.
Estimated time (Scan only)	Estimated duration of data acquisition. Increases as integration time increases and as the data interval decreases. Varies inversely with scan speed.
Table of wavelengths (Fixed only)	Shows the analysis wavelength(s) entered on the Measurement tab.

Related Topics

Type Tab for Protein Bradford

Measurement Tab for Protein Bradford

Standards Tab for Protein Bradford

Accessories Tab for Protein Bradford

Samples Tab for Protein Bradford

Accessories Tab for Protein Bradford

Click **Settings** in Protein Bradford to display the Accessories tab in the right pane. The available parameters depend on the installed accessories. See Accessories for details.

The status of accessories can be monitored during measurements. See Instrument Status Monitors.

Related Topics

Type Tab for Protein Bradford

Measurement Tab for Protein Bradford

Standards Tab for Protein Bradford

Instrument Tab for Protein Bradford

Samples Tab for Protein Bradford

Samples Tab for Protein Bradford

Click **Settings** in Protein Bradford to display the Samples tab in the right pane.

Feature	Description
Number of samples	Number of samples in the analysis.
Base name	Beginning of the name for sample spectra, to which a sequential number is appended. For example, the names of three sample spectra using the base name "dye" would be dye1, dye2 and dye3.
Sample averaging	Whether and how to average concentration values from multiple measurements of the same sample or from multiple samples. To average multiple measurements of the same sample, select **Replicate** and set **Number of replicates** to the total number of measurements. To average values from two or three samples, select **Duplicate** or **Triplicate**, respectively.
Use concentration limits	Displays high and low limit lines on the Run Chart tab to show whether sample concentrations are within the specified limits.
Use weight/volume correction	If available for the current unit, corrects sample concentrations using the entered target weight and volume: corrected concentration = measured concentration * (actual weight / target weight) * (target volume / actual volume)

Related Topics

Type Tab for Protein Bradford

Measurement Tab for Protein Bradford

Standards Tab for Protein Bradford

Instrument Tab for Protein Bradford

Accessories Tab for Protein Bradford

Bradford Standard Curves

A standard curve is required for colorimetric protein analysis.

- A standard curve can be generated using two or more standards.

- The multipoint curve capability allows multiple replicates for each standards. Standards can be run in any order; however, best practice dictates that the standards be measured from the lowest concentration to the highest.

- Determine whether or not to use a standard when analyzing samples against the standard curve.

- Establishing a new standard curve requires creating a new workbook.

- If a previously saved workbook is used, all concentration calculations for newly measured samples will be based on the standard absorbance values saved in the workbook.

  Note Each workbook will archive only one standard curve.

Related Topics

Overview

Application Settings

Bradford Standard Curves

Making Protein Bradford Assay Measurements

Making Protein Bradford Assay Measurements

See Sample and Standards Preparation for more information.

❖ **To make Bradford assay measurements**

1. Click **Measure Protein Bradford** in Protein Bradford.

> **Note** To start an analysis immediately after viewing or changing the template settings, click the **Measure** action button instead and skip to step 3.

2. If standards need to be acquired, click **Measure**. If standards have already been acquired, skip to step 7 to acquire sample data.

3. Follow the instructions that appear.

Use the appropriate buffer for the blank. See the reagent directions for details.

4. When the standards information appears, modify it if desired.

More:

If Standard averaging on the Standards tab in Settings was set to Duplicate, "D" at the end of a standard name indicates the second measurement to be made of the standard. If Sample averaging was set to Triplicate, "D" and "T" at the end of standard names indicate the second and third measurements to be made, respectively.

To enter previously saved standards information, use **Import Standards**.

If Calculate from weight/volume was selected on the Standards tab, enter the weight and volume for each standard in the table.

To remove a standard, select it, right-click the table and choose **Clear Standard**. To remove all the standards, choose **Clear Table**.

To save standards information for later use, use **Export Standards**.

5. Click **Continue**.

6. Follow the instructions that appear, installing the specified standards.

The Standard Curve(s) tab displays the resulting standard curve (or curves). Specify the standards to use for the curve (or curves) by selecting **Yes** or **No** in the **Use** column in the table.

More:

Method Uncalibrated

If a standard curve is not calibrated...

- Try selecting a different curve fit type.

- Try remeasuring a standard using the correct standard material: select the listed standard, right-click the table and choose **Remeasure**.

- Try changing the setting of **Minimum r^2** on the Standards tab and acquire the standards again in a new workbook.

Method Calibrated

This is only an indicator that the required minimum number of points have been established for the selected curve fit type. It does not validate the integrity of the curve. For example, additional standards may be required to cover the expected assay concentration range.

The table contains the columns of information specified on the Configuration tab in Reports. Examples include sample identification, user name, and the results of replicate, duplicate or triplicate measurements and their standard deviation.

If Standard averaging was set to Duplicate, "D" at the end of a standard name indicates the second measurement. If Standard averaging was set to Triplicate, "D" and "T" indicate the second and third measurements, respectively.

To permanently remove an acquired standard from the analysis, right-click it and choose **Remove**. Its information is crossed out but not removed from the table.

The Data tab displays the acquired data (a fixed data point or scan spectrum) for the standard selected in the table. To access commands for customizing the display, including adding annotation, right-click the data. See Data Display for more information.

7. Click **Measure**.

8. Follow the instructions that appear.

9. When samples information appears, modify it if desired.

   If Calculate from weight/volume was selected on the Standards tab, enter the weight and volume for each sample in the table.
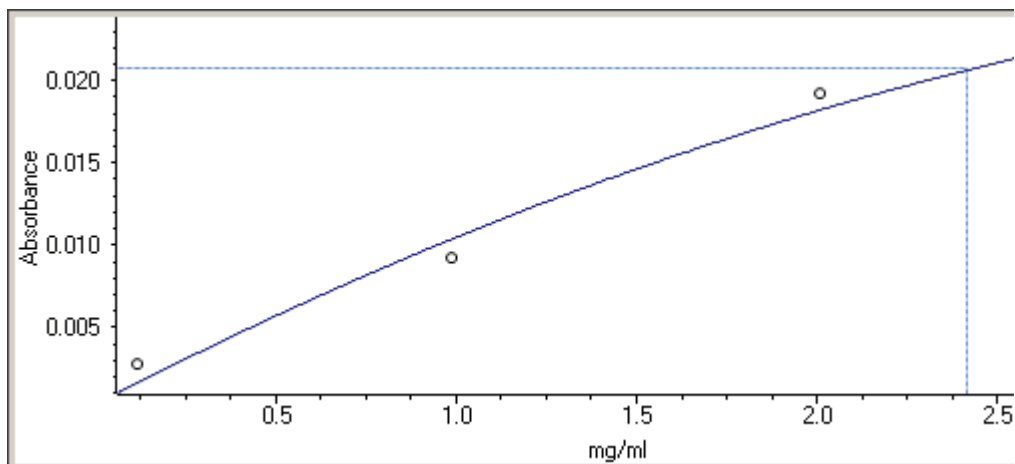
More:

   If Sample averaging on the Samples tab in Settings was set to Duplicate, "D" at the end of a sample name indicates the second measurement to be made of the sample. If Sample averaging was set to Triplicate, "D" and "T" at the end of sample names indicate the second and third measurements to be made, respectively.

To enter previously saved samples information, use **Load Samples**. To save the samples information, use **Save Samples**.
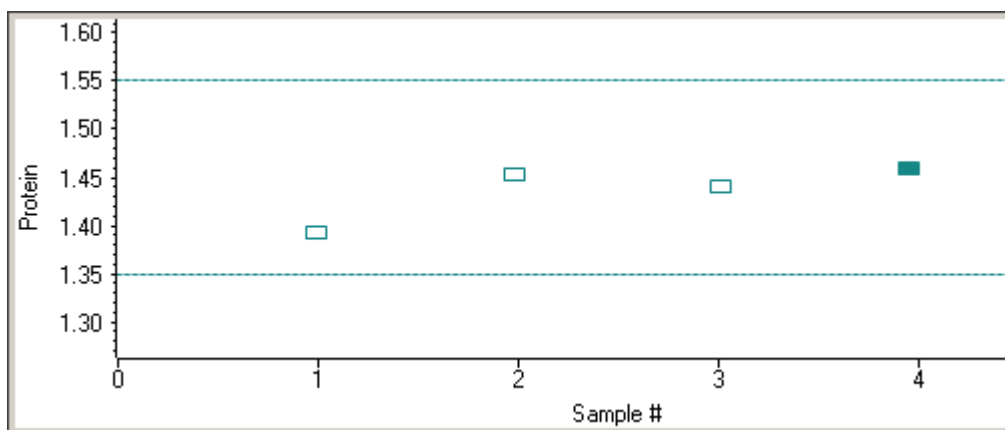
10. If only one sample will be measured, install it.

11. Click **Continue**.

12. Follow any instructions that appear, such as to install a specified sample.

The sample results table contains the columns of information specified on the Configuration tab in Reports. If Sample averaging was set to Duplicate, "D" at the end of a sample name indicates the second measurement. If Sample averaging was set to Triplicate, "D" and "T" indicate the second and third measurements, respectively.

The Standard Curve(s) tab shows graphically the relationship between the standard curve, measured spectral intensity and calculated concentration for the selected sample: A horizontal line connects the sample spectral intensity value on the Y-axis to the standard curve. A vertical line connects that point to the sample concentration value on the X-axis:

The Run Chart tab plots the concentration of the measured component versus sample number. If Use concentration limits was selected on the Samples tab, horizontal limit lines show whether the concentrations are within the specified limits:

To measure a sample again, right-click its row in the results table and choose **Remeasure**. After the remeasurement, the previous information for the sample is crossed out (but not removed from the table).

To copy the data on the Standard Curve(s) tab or Run Chart tab, right-click the plot and choose **Copy to Clipboard**.

Related Topics

Overview

Application Settings

Bradford Standard Curves

Data Display

Pierce Modified Lowry

Contents

- Overview

- Application Settings

- Lowry Standard Curves

- Making Pierce Modified Lowry Assay Measurements

Overview

Pierce Modified Lowry   The Pierce Modified Lowry assay measures absorbance at 750 nm to determine concentration.

This assay is an alternative method for determining protein concentration based on the widely used and cited Lowry procedure for protein quantitation. Like the other colorimetric assays, the Lowry assay requires generating a standard curve before measuring sample proteins.

The Pierce Modified Lowry procedure involves reaction of protein with cupric sulfate in alkaline solution, resulting in formation of tetradentate copper-protein complexes. The Folin-Ciocalteu Reagent is effectively reduced in proportion to the chelated copper-complexes, resulting in a water-soluble blue product that is measured at 650 nm and normalized at 405 nm. Preformulated reagents, used in the assay, are available in kit form from numerous manufacturers.

Modified Lowry Kits and Protocols

Follow the assay kit manufacturer's recommendations for all standards and samples (unknowns). Ensure each is subjected to the same timing and temperature throughout the assay.

Protein standards (BSA) for generating a standard curve may also be provided by the manufacturer for the Lowry assay.

Application Settings

To set data acquisition parameters for a Pierce Modified Lowry workbook, click **Settings** to access:

Type Tab for Pierce Modified Lowry
Measurement Tab for Pierce Modified Lowry
Standards Tab for Pierce Modified Lowry
Instrument Tab for Pierce Modified Lowry
Accessories Tab for Pierce Modified Lowry
Samples Tab for Pierce Modified Lowry

Type Tab for Pierce Modified Lowry

Click **Settings** in Pierce Modified Lowry to display the Type tab in the right pane.

Feature	Description
Name	Application name.
Description (optional)	Description of the template.

Feature	Description
Standard curve	Type of quantitative analysis used.
Pathlength	Distance the light travels through the sample.

Related Topics

Measurement Tab for Pierce Modified Lowry

Standards Tab for Pierce Modified Lowry

Instrument Tab for Pierce Modified Lowry

Accessories Tab for Pierce Modified Lowry

Samples Tab for Pierce Modified Lowry

Measurement Tab for Pierce Modified Lowry

 Click **Settings** in Protein Lowry to display the Measurement tab in the right pane.

Feature	Description
Analysis wavelength	Wavelength(s) to use for the analysis.
Correction	Specifies bichromatic normalization of the absorbance data.
	To use uncorrected data, select **None**. Without baseline correction, spectra may be offset from the baseline. If this offset is significant, the calculated protein concentration may be higher than the true value.
	Single point subtracts the sample absorbance at the entered wavelength from the absorbance at every data point.
	Sloping baseline draws a line between the data points at the entered wavelengths, finds its absorbance value at the analytical wavelength, and subtracts it from the measured absorbance.
Component name	Component to quantify.

Feature	Description
Unit	Component concentration unit. The available units depend on the Formulas & Units tab settings in Options.
Calculate additional results	For selecting or defining formulas for additional data processing, with the results appearing in the analysis report. The formulas are written in a form similar to that used in a command script language, with constants, mathematical functions, etc. All functions are not case-sensitive. Spaces are not allowed between a function name and "(". After adding formulas, edit their information in the formula table as desired. To delete a table row, right-click it and choose **Delete Row**. Some information in the table cannot be modified or deleted. Instructions: ❖ **To add one or more predefined formulas** 1. Click **Select**. 2. For each desired formula, select it in the list and click **Add**. The available formulas depend on the Formulas & Units tab settings in Options. 3. Click **Close**. ❖ **To define a formula** 1. Click **Build**. 2. To enter a formula in its entirety, set **Equation type** to **User defined** and type the equation. To use a provided formula, select it and enter values for the variables. The available formulas depend on the Formulas & Units tab settings. 3. Click **OK**. 4. For selected provided formulas, enter a name and concentration unit in the table. The available units depend on the Formulas & Units tab settings.

Related Topics

Type Tab for Pierce Modified Lowry

Standards Tab for Pierce Modified Lowry

Instrument Tab for Pierce Modified Lowry

Accessories Tab for Pierce Modified Lowry

Samples Tab for Pierce Modified Lowry

Standards Tab for Pierce Modified Lowry

| | Settings | Click **Settings** in Pierce Modified Lowry to display the Standards tab in the right pane. |

Feature	Description
Curve fit type	Type of equation used to create the standard curve from standard concentration values.
Standard averaging	Whether and how to average concentration values from multiple measurements of the same standard or from multiple standards prepared under the same conditions. To average multiple measurements of the same standard, select **Replicate** and set **Number of replicates** to the total number of measurements. To average values from two or three similar standards, select **Duplicate** or **Triplicate**, respectively.
Minimum r^2	The r^2 value indicates how well the standard curve fits the standard data points, with 1.0 a perfect fit. If Minimum r^2 is selected, samples can be quantified only after that value is achieved for the standard curve.
Calculate from weight/volume	If available for the current unit, calculates concentration when the weight and volume of material used to prepare each standard is known. Enter the weight and volume for each standard in the appropriate table cells, or enter it later as part of running an analysis.
Standard Table	Contains concentration and other information about the standards. To add information from a .csv (comma separated values) file or .tsv (tab separated values) file, click **Import Standards**. To save the information in a .csv file or .tsv file, click **Export Standards**.

Related Topics

Type Tab for Pierce Modified Lowry

Measurement Tab for Pierce Modified Lowry

Instrument Tab for Pierce Modified Lowry

Accessories Tab for Pierce Modified Lowry

Instrument Tab for Pierce Modified Lowry

Settings

Click **Settings** in Pierce Modified Lowry to display the Instrument tab in the right pane.

Feature	Description
Mode	Specifies Scan or Fixed data acquisition.
Data mode	Y-axis format for acquired data.
Start wavelength and End wavelength (Scan only)	Starting and ending values of the wavelength range for acquiring data.
Bandwidth	A larger spectral bandwidth increases the amount of energy that passes through the sample. Increasing the bandwidth can improve the signal-to-noise ratio; however, a larger spectral bandwidth decreases the ability to resolve closely spaced spectral features.
Integration time	How long the system acquires and averages data at each data interval (for scanning measurements) or at each measured wavelength (for fixed-wavelength measurements). Increasing the integration time improves the signal-to-noise ratio but reduces the scan speed.
Data interval (Scan only)	Difference in wavelength between two consecutive data points.
Scan speed (Scan only)	Wavelength range covered per unit time. Varies inversely with integration time. Increases as the data interval increases.
Estimated time (Scan only)	Estimated duration of data acquisition. Increases as integration time increases and as the data interval decreases. Varies inversely with scan speed.
Table of wavelengths (Fixed only)	Shows the analysis wavelength(s) entered on the Measurement tab.

Related Topics

Type Tab for Pierce Modified Lowry

Measurement Tab for Pierce Modified Lowry

Standards Tab for Pierce Modified Lowry

Accessories Tab for Pierce Modified Lowry

Samples Tab for Pierce Modified Lowry

Accessories Tab for Pierce Modified Lowry

Click **Settings** in Pierce Modified Lowry to display the Accessories tab in the right pane. The available parameters depend on the installed accessories. See Accessories for details.

The status of accessories can be monitored during measurements. See Instrument Status Monitors.

Related Topics

Type Tab for Pierce Modified Lowry

Measurement Tab for Pierce Modified Lowry

Standards Tab for Pierce Modified Lowry

Instrument Tab for Pierce Modified Lowry

Samples Tab for Pierce Modified Lowry

Samples Tab for Pierce Modified Lowry

Click **Settings** in Pierce Modified Lowry to display the Samples tab in the right pane.

Feature	Description
Number of samples	Number of samples in the analysis.
Base name	Beginning of the name for sample spectra, to which a sequential number is appended. For example, the names of three sample spectra using the base name "dye" would be dye1, dye2 and dye3.
Sample averaging	Whether and how to average concentration values from multiple measurements of the same sample or from multiple samples. To average multiple measurements of the same sample, select **Replicate** and set **Number of replicates** to the total number of measurements. To average values from two or three samples, select **Duplicate** or **Triplicate**, respectively.
Use concentration limits	Displays high and low limit lines on the Run Chart tab to show whether sample concentrations are within the specified limits.
Use weight/volume correction	If available for the current unit, corrects sample concentrations using the entered target weight and volume: corrected concentration = measured concentration * (actual weight / target weight) * (target volume / actual volume)

Related Topics

Type Tab for Pierce Modified Lowry

Measurement Tab for Pierce Modified Lowry

Standards Tab for Pierce Modified Lowry

Instrument Tab for Pierce Modified Lowry

Accessories Tab for Pierce Modified Lowry

Lowry Standard Curves

A standard curve is required for colorimetric protein analysis.

- A standard curve can be generated using two or more standards.

- The multipoint curve capability allows multiple replicates for each standards. Standards can be run in any order; however, best practice dictates that the standards be measured from the lowest concentration to the highest.

- Determine whether or not to use a standard when analyzing samples against the standard curve.

- Establishing a new standard curve requires creating a new workbook.

- If a previously saved workbook is used, all concentration calculations for newly measured samples will be based on the standard absorbance values saved in the workbook.

  Note Each workbook will archive only one standard curve.

Related Topics

Overview

Application Settings

Lowry Standard Curves

Making Pierce Modified Lowry Assay Measurements

Making Pierce Modified Lowry Assay Measurements

See Sample and Standards Preparation for more information.

❖ **To make Pierce Modified Lowry Assay measurements**

1. Click **Measure Pierce Modified Lowry** in Pierce Modified Lowry.

   Note To start an analysis immediately after viewing or changing the template settings, click the **Measure** action button instead and skip to step 3.

2. If standards need to be acquired, click **Measure**. If standards have already been acquired, skip to step 7 to acquire sample data.

3. Follow the instructions that appear.

   Use the appropriate buffer for the blank. See the reagent directions for details.

4. When the standards information appears, modify it if desired.

More:

   If Standard averaging on the Standards tab in Settings was set to Duplicate, "D" at the end of a standard name indicates the second measurement to be made of the standard. If Sample averaging was set to Triplicate, "D" and "T" at the end of standard names indicate the second and third measurements to be made, respectively.

   To enter previously saved standards information, use **Import Standards**.

   If Calculate from weight/volume was selected on the Standards tab, enter the weight and volume for each standard in the table.

   To remove a standard, select it, right-click the table and choose **Clear Standard**. To remove all the standards, choose **Clear Table**.

   To save standards information for later use, use **Export Standards**.

5. Click **Continue**.

6. Follow the instructions that appear, installing the specified standards.

   The Standard Curve(s) tab displays the resulting standard curve (or curves). Specify the standards to use for the curve (or curves) by selecting **Yes** or **No** in the **Use** column in the table.

More:

Method Uncalibrated

If a standard curve is not calibrated...

- Try selecting a different curve fit type.

- Try remeasuring a standard using the correct standard material: select the listed standard, right-click the table and choose **Remeasure**.

- Try changing the setting of **Minimum r^2** on the Standards tab and acquire the standards again in a new workbook.

Method Calibrated

This is only an indicator that the required minimum number of points have been established for the selected curve fit type. It does not validate the integrity of the curve. For example, additional standards may be required to cover the expected assay concentration range.

The table contains the columns of information specified on the Configuration tab in Reports. Examples include sample identification, user name, and the results of replicate, duplicate or triplicate measurements and their standard deviation.

If Standard averaging was set to Duplicate, "D" at the end of a standard name indicates the second measurement. If Standard averaging was set to Triplicate, "D" and "T" indicate the second and third measurements, respectively.

To permanently remove an acquired standard from the analysis, right-click it and choose **Remove**. Its information is crossed out but not removed from the table.

The Data tab displays the acquired data (a fixed data point or scan spectrum) for the standard selected in the table. To access commands for customizing the display, including adding annotation, right-click the data. See Data Display for more information.

7. Click **Measure**.

8. Follow the instructions that appear.

9. When samples information appears, modify it if desired.

   If Calculate from weight/volume was selected on the Standards tab, enter the weight and volume for each sample in the table.
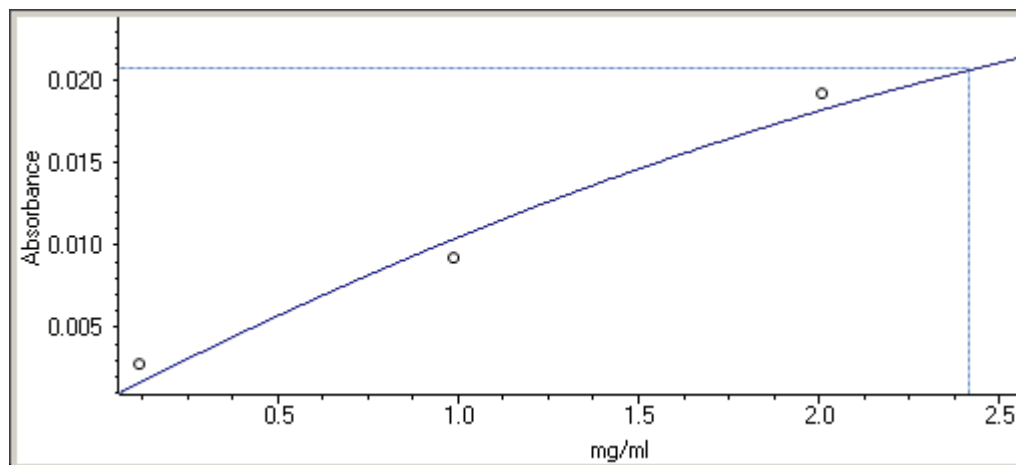
More:

   If Sample averaging on the Samples tab in Settings was set to Duplicate, "D" at the end of a sample name indicates the second measurement to be made of the sample. If Sample averaging was set to Triplicate, "D" and "T" at the end of sample names indicate the second and third measurements to be made, respectively.

To enter previously saved samples information, use **Load Samples**. To save the samples information, use **Save Samples**.
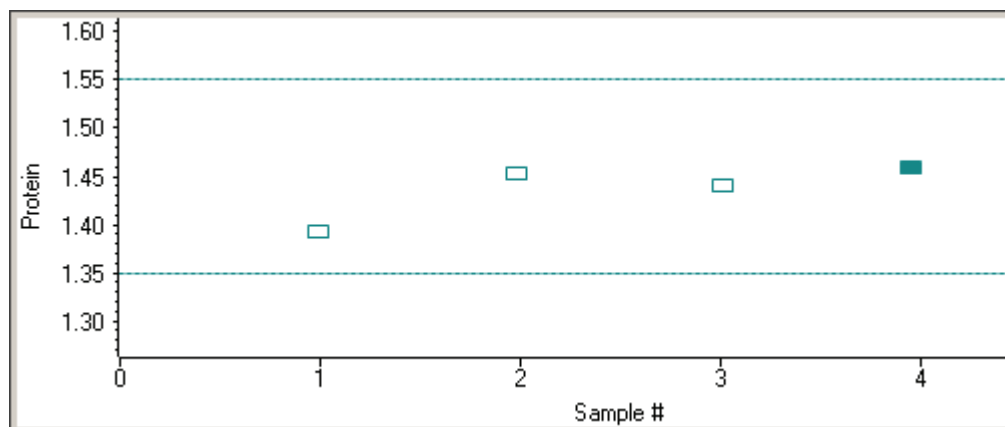
10. If only one sample will be measured, install it.

11. Click **Continue**.

12. Follow any instructions that appear, such as to install a specified sample.

The sample results table contains the columns of information specified on the Configuration tab in Reports. If Sample averaging was set to Duplicate, "D" at the end of a sample name indicates the second measurement. If Sample averaging was set to Triplicate, "D" and "T" indicate the second and third measurements, respectively.

The Standard Curve(s) tab shows graphically the relationship between the standard curve, measured spectral intensity and calculated concentration for the selected sample: A horizontal line connects the sample spectral intensity value on the Y-axis to the standard curve. A vertical line connects that point to the sample concentration value on the X-axis:

The Run Chart tab plots the concentration of the measured component versus sample number. If Use concentration limits was selected on the Samples tab, horizontal limit lines show whether the concentrations are within the specified limits:

To measure a sample again, right-click its row in the results table and choose **Remeasure**. After the remeasurement, the previous information for the sample is crossed out (but not removed from the table).

To copy the data on the Standard Curve(s) tab or Run Chart tab, right-click the plot and choose **Copy to Clipboard**.

Related Topics

Overview

Application Settings

Lowry Standard Curves

Data Display

Pierce 660 nm Protein Assay

Contents

- Overview
- Application Settings
- Pierce 660 nm Assay Workbooks
- Standard Curves
- Making Pierce 660 nm Protein Assay Measurements

Overview

The Thermo Scientific Pierce 660 nm Protein Assay reagent is a ready-to-use formulation that offers rapid, accurate and reproducible colorimetric detection of minute amounts of protein in solution. The reagent is ideal for measuring total protein concentration in samples containing reducing agents and/or detergents.

The proprietary dye-metal complex binds to protein in acidic conditions, causing a shift in the dye's absorption maximum, which is measured at 660 nm. The complex is reddish-brown and turns green upon protein binding. This color change is produced by deprotonation of the dye at low pH facilitated by interactions with positively charged amino acid groups in the protein. Consequently, the complex interacts primarily with basic residues in the protein, such as histidine, arginine and lysine, and to a lesser extent tyrosine, tryptophan and phenylalanine.

Related Topics

Application Settings

Pierce 660 nm Assay Workbooks

Standard Curves

Making Pierce 660 nm Protein Assay Measurements

Pierce 660 nm Reagent and Protocols

Follow the assay kit manufacturer's recommendations for all standards and samples (unknowns), ensuring they are subjected to the same timing and temperature throughout the assay.

Protein standards (BSA) for generating a standard curve may also be provided by the Pierce 660 nm assay manufacturer.

Application Settings

To set data acquisition parameters for a Pierce 660 nm Protein Assay workbook, click **Settings** to access:

Type Tab for Pierce 660 nm Protein Assay
Measurement Tab for Pierce 660 nm Protein Assay
Standards Tab for Pierce 660 nm Protein Assay
Instrument Tab for Pierce 660 nm Protein Assay
Accessories Tab for Pierce 660 nm Protein Assay
Samples Tab for Pierce 660 nm Protein Assay

Related Topics

Overview

Pierce 660 nm Assay Workbooks

Standard Curves

Making Pierce 660 nm Protein Assay Measurements

Type Tab for Pierce 660 nm Protein Assay

Click **Settings** in Pierce 660 nm Protein Assay to display the Type tab in the right pane.

Feature	Description
Name	Application name.
Description (optional)	Description of the template.
Standard curve	Type of quantitative analysis used.
Pathlength	Distance the light travels through the sample.

Related Topics

Measurement Tab for Pierce 660 nm Protein Assay

Standards Tab for Pierce 660 nm Protein Assay

Instrument Tab for Pierce 660 nm Protein Assay

Accessories Tab for Pierce 660 nm Protein Assay

Samples Tab for Pierce 660 nm Protein Assay

Measurement Tab for Pierce 660 nm Protein Assay

Click **Settings** in Pierce 660 nm Protein Assay to display the Measurement tab in the right pane.

Feature	Description
Analysis wavelength	Wavelength(s) to use for the analysis.
Correction	Specifies bichromatic normalization of the absorbance data.
	To use uncorrected data, select **None**. Without baseline correction, spectra may be offset from the baseline. If this offset is significant, the calculated protein concentration may be higher than the true value.
	Single point subtracts the sample absorbance at the entered wavelength from the absorbance at every data point.
	Sloping baseline draws a line between the data points at the entered wavelengths, finds its absorbance value at the analytical wavelength, and subtracts it from the measured absorbance.
Component name	Component to quantify.

Feature	Description
Unit	Component concentration unit. The available units depend on the Formulas & Units tab settings in Options.
Calculate additional results	For selecting or defining formulas for additional data processing, with the results appearing in the analysis report. The formulas are written in a form similar to that used in a command script language, with constants, mathematical functions, etc. All functions are not case-sensitive. Spaces are not allowed between a function name and "(". After adding formulas, edit their information in the formula table as desired. To delete a table row, right-click it and choose **Delete Row**. Some information in the table cannot be modified or deleted.

Instructions:

❖ **To add one or more predefined formulas**

1. Click **Select**.

2. For each desired formula, select it in the list and click **Add**.

   The available formulas depend on the Formulas & Units tab settings in Options.

3. Click **Close**.

❖ **To define a formula**

1. Click **Build**.

2. To enter a formula in its entirety, set **Equation type** to **User defined** and type the equation. To use a provided formula, select it and enter values for the variables.

   The available formulas depend on the Formulas & Units tab settings.

3. Click **OK**.

4. For selected provided formulas, enter a name and concentration unit in the table.

   The available units depend on the Formulas & Units tab settings.

Related Topics

Type Tab for Pierce 660 nm Protein Assay

Standards Tab for Pierce 660 nm Protein Assay

Instrument Tab for Pierce 660 nm Protein Assay

Accessories Tab for Pierce 660 nm Protein Assay

Samples Tab for Pierce 660 nm Protein Assay

Standards Tab for Pierce 660 nm Protein Assay

Settings — Click **Settings** in Pierce 660 nm Protein Assay to display the Standards tab in the right pane.

Feature	Description
Curve fit type	Type of equation used to create the standard curve from standard concentration values.
Standard averaging	Whether and how to average concentration values from multiple measurements of the same standard or from multiple standards prepared under the same conditions. To average multiple measurements of the same standard, select **Replicate** and set **Number of replicates** to the total number of measurements. To average values from two or three similar standards, select **Duplicate** or **Triplicate**, respectively.
Minimum r^2	The r^2 value indicates how well the standard curve fits the standard data points, with 1.0 a perfect fit. If Minimum r^2 is selected, samples can be quantified only after that value is achieved for the standard curve.
Calculate from weight/volume	If available for the current unit, calculates concentration when the weight and volume of material used to prepare each standard is known. Enter the weight and volume for each standard in the appropriate table cells, or enter it later as part of running an analysis.
Standard Table	Contains concentration and other information about the standards. To add information from a .csv (comma separated values) file or .tsv (tab separated values) file, click **Import Standards**. To save the information in a .csv file or .tsv file, click **Export Standards**.

Related Topics

Type Tab for Pierce 660 nm Protein Assay

Measurement Tab for Pierce 660 nm Protein Assay

Instrument Tab for Pierce 660 nm Protein Assay

Accessories Tab for Pierce 660 nm Protein Assay

Instrument Tab for Pierce 660 nm Protein Assay

Click **Settings** in Pierce 660 nm Protein Assay to display the Instrument tab in the right pane.

Feature	Description
Mode	Specifies Scan or Fixed data acquisition.
Data mode	Y-axis format for acquired data.
Start wavelength and End wavelength (Scan only)	Starting and ending values of the wavelength range for acquiring data.
Bandwidth	A larger spectral bandwidth increases the amount of energy that passes through the sample. Increasing the bandwidth can improve the signal-to-noise ratio; however, a larger spectral bandwidth decreases the ability to resolve closely spaced spectral features.
Integration time	How long the system acquires and averages data at each data interval (for scanning measurements) or at each measured wavelength (for fixed-wavelength measurements). Increasing the integration time improves the signal-to-noise ratio but reduces the scan speed.
Data interval (Scan only)	Difference in wavelength between two consecutive data points.
Scan speed (Scan only)	Wavelength range covered per unit time. Varies inversely with integration time. Increases as the data interval increases.
Estimated time (Scan only)	Estimated duration of data acquisition. Increases as integration time increases and as the data interval decreases. Varies inversely with scan speed.
Table of wavelengths (Fixed only)	Shows the analysis wavelength(s) entered on the Measurement tab.

Related Topics

Type Tab for Pierce 660 nm Protein Assay

Measurement Tab for Pierce 660 nm Protein Assay

Standards Tab for Pierce 660 nm Protein Assay

Accessories Tab for Pierce 660 nm Protein Assay

Samples Tab for Pierce 660 nm Protein Assay

Accessories Tab for Pierce 660 nm Protein Assay

Click **Settings** in Pierce 660 nm Protein Assay to display the Accessories tab in the right pane. The available parameters depend on the installed accessories. See Accessories for details.

The status of accessories can be monitored during measurements. See Instrument Status Monitors.

Related Topics

Type Tab for Pierce 660 nm Protein Assay

Measurement Tab for Pierce 660 nm Protein Assay

Standards Tab for Pierce 660 nm Protein Assay

Instrument Tab for Pierce 660 nm Protein Assay

Samples Tab for Pierce 660 nm Protein Assay

Samples Tab for Pierce 660 nm Protein Assay

Click **Settings** in Pierce 660 nm Protein Assay to display the Samples tab in the right pane.

Feature	Description
Number of samples	Number of samples in the analysis.
Base name	Beginning of the name for sample spectra, to which a sequential number is appended. For example, the names of three sample spectra using the base name "dye" would be dye1, dye2 and dye3.
Sample averaging	Whether and how to average concentration values from multiple measurements of the same sample or from multiple samples. To average multiple measurements of the same sample, select **Replicate** and set **Number of replicates** to the total number of measurements. To average values from two or three samples, select **Duplicate** or **Triplicate**, respectively.
Use concentration limits	Displays high and low limit lines on the Run Chart tab to show whether sample concentrations are within the specified limits.
Use weight/volume correction	If available for the current unit, corrects sample concentrations using the entered target weight and volume: corrected concentration = measured concentration * (actual weight / target weight) * (target volume / actual volume)

Related Topics

Type Tab for Pierce 660 nm Protein Assay

Measurement Tab for Pierce 660 nm Protein Assay

Standards Tab for Pierce 660 nm Protein Assay

Instrument Tab for Pierce 660 nm Protein Assay

Accessories Tab for Pierce 660 nm Protein Assay

Pierce 660 nm Assay Workbooks

When opened, the Pierce 660 nm Protein Assay application may prompt for a new standard curve, requiring the creation of a new workbook. If a previously saved workbook is used, all concentration calculations for newly measured samples will be based on the saved curve archived in the workbook.

Related Topics

Overview

Application Settings

Standard Curves

Making Pierce 660 nm Protein Assay Measurements

Standard Curves

A standard curve is required for colorimetric protein analysis.

- A standard curve can be generated using two or more standards.

- The multipoint curve capability allows multiple replicates for each standards. Standards can be run in any order; however, best practice dictates that the standards be measured from the lowest concentration to the highest.

- Determine whether or not to use a standard when analyzing samples against the standard curve.

- Establishing a new standard curve requires creating a new workbook.

- If a previously saved workbook is used, all concentration calculations for newly measured samples will be based on the standard absorbance values saved in the workbook.

> **Note** Each workbook will archive only one standard curve.

Related Topics

Overview

Application Settings

Pierce 660 nm Assay Workbooks

Making Pierce 660 nm Protein Assay Measurements

Making Pierce 660 nm Protein Assay Measurements

See Sample and Standards Preparation for more information.

❖ **To make Pierce 660 nm Protein assay measurements**

1. Click **Measure Pierce 660 nm Protein Assay** in Pierce 660 nm Protein Assay.

> **Note** To start an analysis immediately after viewing or changing the template settings, click the **Measure** action button instead and skip to step 3.

2. If standards need to be acquired, click **Measure**. If standards have already been acquired, skip to step 7 to acquire sample data.

3. Follow the instructions that appear.

   Use the appropriate buffer for the blank. See the reagent directions for details.

4. When the standards information appears, modify it if desired.

More:

If Standard averaging on the Standards tab in Settings was set to Duplicate, "D" at the end of a standard name indicates the second measurement to be made of the standard. If Sample averaging was set to Triplicate, "D" and "T" at the end of standard names indicate the second and third measurements to be made, respectively.

To enter previously saved standards information, use **Import Standards**.

If Calculate from weight/volume was selected on the Standards tab, enter the weight and volume for each standard in the table.

To remove a standard, select it, right-click the table and choose **Clear Standard**. To remove all the standards, choose **Clear Table**.

To save standards information for later use, use **Export Standards**.

5. Click **Continue**.

6. Follow the instructions that appear, installing the specified standards.

The Standard Curve(s) tab displays the resulting standard curve (or curves). Specify the standards to use for the curve (or curves) by selecting **Yes** or **No** in the **Use** column in the table.

More:

If a standard curve is not calibrated...

- Try selecting a different curve fit type.

- Try remeasuring a standard using the correct standard material: select the listed standard, right-click the table and choose **Remeasure**.

- Try changing the setting of **Minimum r^2** on the Standards tab and acquire the standards again in a new workbook.

This is only an indicator that the required minimum number of points have been established for the selected curve fit type. It does not validate the integrity of the curve. For example, additional standards may be required to cover the expected assay concentration range.

The table contains the columns of information specified on the Configuration tab in Reports. Examples include sample identification, user name, and the results of replicate, duplicate or triplicate measurements and their standard deviation.

If Standard averaging was set to Duplicate, "D" at the end of a standard name indicates the second measurement. If Standard averaging was set to Triplicate, "D" and "T" indicate the second and third measurements, respectively.

To permanently remove an acquired standard from the analysis, right-click it and choose **Remove**. Its information is crossed out but not removed from the table.

The Data tab displays the acquired data (a fixed data point or scan spectrum) for the standard selected in the table. To access commands for customizing the display, including adding annotation, right-click the data. See Data Display for more information.

7. Click **Measure**.

8. Follow the instructions that appear.

9. When samples information appears, modify it if desired.

   If Calculate from weight/volume was selected on the Standards tab, enter the weight and volume for each sample in the table.

More:

   If Sample averaging on the Samples tab in Settings was set to Duplicate, "D" at the end of a sample name indicates the second measurement to be made of the sample. If Sample averaging was set to Triplicate, "D" and "T" at the end of sample names indicate the second and third measurements to be made, respectively.

   To enter previously saved samples information, use **Load Samples**. To save the samples information, use **Save Samples**.

10. If only one sample will be measured, install it.

11. Click **Continue**.

12. Follow any instructions that appear, such as to install a specified sample.

   The sample results table contains the columns of information specified on the Configuration tab in Reports. If Sample averaging was set to Duplicate, "D" at the end of a sample name indicates the second measurement. If Sample averaging was set to Triplicate, "D" and "T" indicate the second and third measurements, respectively.

   The Standard Curve(s) tab shows graphically the relationship between the standard curve, measured spectral intensity and calculated concentration for the selected sample: A horizontal line connects the sample spectral intensity value on the Y-axis to the standard curve. A vertical line connects that point to the sample concentration value on the X-axis:

   The Run Chart tab plots the concentration of the measured component versus sample number. If Use concentration limits was selected on the Samples tab, horizontal limit lines show whether the concentrations are within the specified limits:

To measure a sample again, right-click its row in the results table and choose **Remeasure**. After the remeasurement, the previous information for the sample is crossed out (but not removed from the table).

To copy the data on the Standard Curve(s) tab or Run Chart tab, right-click the plot and choose **Copy to Clipboard**.

Related Topics

Overview

Application Settings

Pierce 660 nm Assay Workbooks

Standard Curves

Data Display

Protein Biuret

Contents

- Overview

- Application Settings

- Standard Curves

- Making Protein Biuret Assay Measurements

Overview
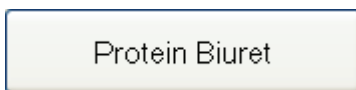
Protein Biuret

The Protein Biuret application is similar to the Pierce Modified Lowry application; however, it involves a single incubation and requires more protein for the analysis. The protein-dye complex that is formed in the assay has a deep purple color and is measured at 545 nm. The calibration curve for this assay is linear with standards that range in concentration from 2 µg/ml to 10 µg/ml.

Related Topics

Application Settings

Standard Curves

Making Protein Biuret Assay Measurements

Application Settings

Settings

To set data acquisition parameters for a Protein Biuret workbook, click **Settings** to access:

Type Tab for Protein Biuret
Measurement Tab for Protein Biuret
Standards Tab for Protein Biuret
Instrument Tab for Protein Biuret
Accessories Tab for Protein Biuret
Samples Tab for Protein Biuret

Related Topics

Overview

Standard Curves

Making Protein Biuret Assay Measurements

Type Tab for Protein Biuret

Settings

Click **Settings** in Protein Biuret to display the Type tab in the right pane.

Feature	Description
Name	Application name.
Description (optional)	Description of the template.

Feature	Description
Standard curve	Type of quantitative analysis used.
Pathlength	Distance the light travels through the sample.

Related Topics

Measurement Tab for Protein Biuret

Standards Tab for Protein Biuret

Instrument Tab for Protein Biuret

Accessories Tab for Protein Biuret

Samples Tab for Protein Biuret

Measurement Tab for Protein Biuret

Settings	Click **Settings** in Protein Biuret to display the Measurement tab in the right pane.

Feature	Description
Analysis wavelength	Wavelength(s) to use for the analysis.
Correction	Specifies bichromatic normalization of the absorbance data. To use uncorrected data, select **None**. Without baseline correction, spectra may be offset from the baseline. If this offset is significant, the calculated protein concentration may be higher than the true value. **Single point** subtracts the sample absorbance at the entered wavelength from the absorbance at every data point. **Sloping baseline** draws a line between the data points at the entered wavelengths, finds its absorbance value at the analytical wavelength, and subtracts it from the measured absorbance.
Component name	Component to quantify.

Feature	Description
Unit	Component concentration unit. The available units depend on the Formulas & Units tab settings in Options.
Calculate additional results	For selecting or defining formulas for additional data processing, with the results appearing in the analysis report. The formulas are written in a form similar to that used in a command script language, with constants, mathematical functions, etc. All functions are not case-sensitive. Spaces are not allowed between a function name and "(". After adding formulas, edit their information in the formula table as desired. To delete a table row, right-click it and choose **Delete Row**. Some information in the table cannot be modified or deleted.

Instructions:

❖ **To add one or more predefined formulas**

1. Click **Select**.

2. For each desired formula, select it in the list and click **Add**.

   The available formulas depend on the Formulas & Units tab settings in Options.

3. Click **Close**.

❖ **To define a formula**

1. Click **Build**.

2. To enter a formula in its entirety, set **Equation type** to **User defined** and type the equation. To use a provided formula, select it and enter values for the variables.

   The available formulas depend on the Formulas & Units tab settings.

3. Click **OK**.

4. For selected provided formulas, enter a name and concentration unit in the table.

   The available units depend on the Formulas & Units tab settings.

Related Topics

Type Tab for Protein Biuret

Standards Tab for Protein Biuret

Instrument Tab for Protein Biuret

Accessories Tab for Protein Biuret

Samples Tab for Protein Biuret

Standards Tab for Protein Biuret

Settings

Click **Settings** in Protein Biuret to display the Standards tab in the right pane.

Feature	Description
Curve fit type	Type of equation used to create the standard curve from standard concentration values.
Standard averaging	Whether and how to average concentration values from multiple measurements of the same standard or from multiple standards prepared under the same conditions. To average multiple measurements of the same standard, select **Replicate** and set **Number of replicates** to the total number of measurements. To average values from two or three similar standards, select **Duplicate** or **Triplicate**, respectively.
Minimum r^2	The r^2 value indicates how well the standard curve fits the standard data points, with 1.0 a perfect fit. If Minimum r^2 is selected, samples can be quantified only after that value is achieved for the standard curve.
Calculate from weight/volume	If available for the current unit, calculates concentration when the weight and volume of material used to prepare each standard is known. Enter the weight and volume for each standard in the appropriate table cells, or enter it later as part of running an analysis.
Standard Table	Contains concentration and other information about the standards. To add information from a .csv (comma separated values) file or .tsv (tab separated values) file, click **Import Standards**. To save the information in a .csv file or .tsv file, click **Export Standards**.

Related Topics

Type Tab for Protein Biuret

Measurement Tab for Protein Biuret

Instrument Tab for Protein Biuret

Accessories Tab for Protein Biuret

Instrument Tab for Protein Biuret

| Settings | Click **Settings** in Protein Biuret to display the Instrument tab in the right pane. |

Feature	Description
Mode	Specifies Scan or Fixed data acquisition.
Data mode	Y-axis format for acquired data.
Start wavelength and End wavelength (Scan only)	Starting and ending values of the wavelength range for acquiring data.
Bandwidth	A larger spectral bandwidth increases the amount of energy that passes through the sample. Increasing the bandwidth can improve the signal-to-noise ratio; however, a larger spectral bandwidth decreases the ability to resolve closely spaced spectral features.
Integration time	How long the system acquires and averages data at each data interval (for scanning measurements) or at each measured wavelength (for fixed-wavelength measurements). Increasing the integration time improves the signal-to-noise ratio but reduces the scan speed.
Data interval (Scan only)	Difference in wavelength between two consecutive data points.
Scan speed (Scan only)	Wavelength range covered per unit time. Varies inversely with integration time. Increases as the data interval increases.
Estimated time (Scan only)	Estimated duration of data acquisition. Increases as integration time increases and as the data interval decreases. Varies inversely with scan speed.
Table of wavelengths (Fixed only)	Shows the analysis wavelength(s) entered on the Measurement tab.

Related Topics

Type Tab for Protein Biuret

Measurement Tab for Protein Biuret

Standards Tab for Protein Biuret

Accessories Tab for Protein Biuret

Samples Tab for Protein Biuret

Accessories Tab for Protein Biuret

Settings

Click **Settings** in Protein Biuret to display the Accessories tab in the right pane. The available parameters depend on the installed accessories. See Accessories for details.

The status of accessories can be monitored during measurements. See Instrument Status Monitors.

Related Topics

Type Tab for Protein Biuret

Measurement Tab for Protein Biuret

Standards Tab for Protein Biuret

Instrument Tab for Protein Biuret

Samples Tab for Protein Biuret

Samples Tab for Protein Biuret

Settings

Click **Settings** in Protein Biuret to display the Samples tab in the right pane.

Feature	Description
Number of samples	Number of samples in the analysis.
Base name	Beginning of the name for sample spectra, to which a sequential number is appended. For example, the names of three sample spectra using the base name "dye" would be dye1, dye2 and dye3.
Sample averaging	Whether and how to average concentration values from multiple measurements of the same sample or from multiple samples. To average multiple measurements of the same sample, select **Replicate** and set **Number of replicates** to the total number of measurements. To average values from two or three samples, select **Duplicate** or **Triplicate**, respectively.
Use concentration limits	Displays high and low limit lines on the Run Chart tab to show whether sample concentrations are within the specified limits.
Use weight/volume correction	If available for the current unit, corrects sample concentrations using the entered target weight and volume: corrected concentration = measured concentration * (actual weight / target weight) * (target volume / actual volume)

Related Topics

Type Tab for Protein Biuret

Measurement Tab for Protein Biuret

Standards Tab for Protein Biuret

Instrument Tab for Protein Biuret

Accessories Tab for Pierce 660 nm Protein Assay

Standard Curves

A standard curve is required for colorimetric protein analysis.

- A standard curve can be generated using two or more standards.

- The multipoint curve capability allows multiple replicates for each standards. Standards can be run in any order; however, best practice dictates that the standards be measured from the lowest concentration to the highest.

- Determine whether or not to use a standard when analyzing samples against the standard curve.

- Establishing a new standard curve requires creating a new workbook.

- If a previously saved workbook is used, all concentration calculations for newly measured samples will be based on the standard absorbance values saved in the workbook.

  Note Each workbook will archive only one standard curve.

Related Topics

Overview

Application Settings

Making Protein Biuret Assay Measurements

Making Protein Biuret Assay Measurements

See Sample and Standards Preparation for more information.

❖ **To make Protein Biuret assay measurements**

1. Click **Measure Protein Biuret** in Protein Biuret.

Measure Protein Biuret

Note To start an analysis immediately after viewing or changing the template settings, click the **Measure** action button instead and skip to step 3.

2. If standards need to be acquired, click **Measure**. If standards have already been acquired, skip to step 7 to acquire sample data.

3. Follow the instructions that appear.

   Use the appropriate buffer for the blank. See the reagent directions for details.

4. When the standards information appears, modify it if desired.

More:

   If Standard averaging on the Standards tab in Settings was set to Duplicate, "D" at the end of a standard name indicates the second measurement to be made of the standard. If Sample averaging was set to Triplicate, "D" and "T" at the end of standard names indicate the second and third measurements to be made, respectively.

   To enter previously saved standards information, use **Import Standards**.

   If Calculate from weight/volume was selected on the Standards tab, enter the weight and volume for each standard in the table.

   To remove a standard, select it, right-click the table and choose **Clear Standard**. To remove all the standards, choose **Clear Table**.

   To save standards information for later use, use **Export Standards**.

5. Click **Continue**.

6. Follow the instructions that appear, installing the specified standards.

   The Standard Curve(s) tab displays the resulting standard curve (or curves). Specify the standards to use for the curve (or curves) by selecting **Yes** or **No** in the **Use** column in the table.

More:

Method Uncalibrated

If a standard curve is not calibrated...

- Try selecting a different curve fit type.

- Try remeasuring a standard using the correct standard material: select the listed standard, right-click the table and choose **Remeasure**.

- Try changing the setting of **Minimum r^2** on the Standards tab and acquire the standards again in a new workbook.

Method Calibrated

This is only an indicator that the required minimum number of points have been established for the selected curve fit type. It does not validate the integrity of the curve. For example, additional standards may be required to cover the expected assay concentration range.

The table contains the columns of information specified on the Configuration tab in Reports. Examples include sample identification, user name, and the results of replicate, duplicate or triplicate measurements and their standard deviation.

If Standard averaging was set to Duplicate, "D" at the end of a standard name indicates the second measurement. If Standard averaging was set to Triplicate, "D" and "T" indicate the second and third measurements, respectively.

To permanently remove an acquired standard from the analysis, right-click it and choose **Remove**. Its information is crossed out but not removed from the table.

The Data tab displays the acquired data (a fixed data point or scan spectrum) for the standard selected in the table. To access commands for customizing the display, including adding annotation, right-click the data. See Data Display for more information.

7. Click **Measure**.

8. Follow the instructions that appear.

9. When samples information appears, modify it if desired.

   If Calculate from weight/volume was selected on the Standards tab, enter the weight and volume for each sample in the table.

More:

   If Sample averaging on the Samples tab in Settings was set to Duplicate, "D" at the end of a sample name indicates the second measurement to be made of the sample. If Sample averaging was set to Triplicate, "D" and "T" at the end of sample names indicate the second and third measurements to be made, respectively.

To enter previously saved samples information, use **Load Samples**. To save the samples information, use **Save Samples**.

10. If only one sample will be measured, install it.

11. Click **Continue**.

12. Follow any instructions that appear, such as to install a specified sample.

The sample results table contains the columns of information specified on the Configuration tab in Reports. If Sample averaging was set to Duplicate, "D" at the end of a sample name indicates the second measurement. If Sample averaging was set to Triplicate, "D" and "T" indicate the second and third measurements, respectively.

The Standard Curve(s) tab shows graphically the relationship between the standard curve, measured spectral intensity and calculated concentration for the selected sample: A horizontal line connects the sample spectral intensity value on the Y-axis to the standard curve. A vertical line connects that point to the sample concentration value on the X-axis:

The Run Chart tab plots the concentration of the measured component versus sample number. If Use concentration limits was selected on the Samples tab, horizontal limit lines show whether the concentrations are within the specified limits:

To measure a sample again, right-click its row in the results table and choose **Remeasure**. After the remeasurement, the previous information for the sample is crossed out (but not removed from the table).

To copy the data on the Standard Curve(s) tab or Run Chart tab, right-click the plot and choose **Copy to Clipboard**.

Related Topics

Overview

Application Settings

Standard Curves

Data Display

Accessories

- Sample Position Cell Holders

- Reference Cell Holders

- 8 Degree Near Normal Specular Reflectance

- 15 Degree Specular Reflectance

- 20 Degree Specular Reflectance

- 30 Degree Specular Reflectance

- 45 Degree Specular Reflectance

- 60 Degree Specular Reflectance

- Calibrated Validation Carousel (CVC)

- Depolarizer

- Grazing Angle Specular Reflectance

- Integrated Fiber Optic Module

- Integrating Sphere Diffuse Reflectance

- Mercury Lamp

- Peltier Thermostatted Single Cell Holder

- TPS-1500W Sealed Peltier Recirculator

- Probe Handling and Maintenance

- Rapid Mix Accessory

- Smart Linear 8-Cell Changer

- SPE-8W Smart Peltier Linear Cell Changer

- Smart Rotary Cell Changer

- Smart Sipper

- Temperature Probe

- Variable Angle Transmission

- VERSA Probe

8 Degree Near Normal Specular Reflectance

For Local Control instruments:

D://2616_HARRICK_8NN Spec Accy_UG.pdf

For Computer Control instruments:

C://2616_HARRICK_8NN Spec Accy_UG.pdf

If these links do not work, see your documentation CD.

Related Topics

Installing a Manual Accessory

Accessories

15 Degree Specular Reflectance

For Local Control instruments:

D://2222_PIKE_15spec Accy_UG.pdfFor Computer Control instruments:

C://2222_PIKE_15spec Accy_UG.pdfIf these links do not work, see your documentation CD.

Related Topics

Installing a Manual Accessory

Accessories

20 Degree Specular Reflectance

For Local Control instruments:

D://2614_PIKE_20spec Accy_UG.pdfFor Computer Control instruments:

C://2614_PIKE_20spec Accy_UG.pdfIf these links do not work, see your documentation CD.

Related Topics

Installing a Manual Accessory

Accessories

30 Degree Specular Reflectance

For Local Control instruments:

D://2223_PIKE_30spec Accy_UG.pdfFor Computer Control instruments:

C://2223_PIKE_30spec Accy_UG.pdfIf these links do not work, see your documentation CD.

Related Topics

Installing a Manual Accessory

Accessories

45 Degree Specular Reflectance

For Local Control instruments:

D://2224_PIKE_45spec Accy_UG.pdfFor Computer Control instruments:

C://2224_PIKE_45spec Accy_UG.pdfIf these links do not work, see your documentation CD.

Related Topics

Installing a Manual Accessory

Accessories

60 Degree Specular Reflectance

For Local Control instruments:

D://2615_PIKE_60spec Accy_UG.pdfFor Computer Control instruments:

C://2615_PIKE_60spec Accy_UG.pdfIf these links do not work, see your documentation CD.

Related Topics

Installing a Manual Accessory

Accessories

Calibrated Validation Carousel (CVC)

The Calibrated Validation Carousel (CVC) is an automated performance verification accessory.

> **NOTICE**
>
> - Do not touch the exposed surface of the standards in the CVC.
>
> - Do not allow moisture to leak into the accessory.

Contents

- Installing the Carousel on the Smart Base Unit

- Installing Complete CVC in the Instrument

- CVC Test Limits

- Using the CVC

- Maintenance

The CVC carousel uses the same Smart base unit as the Smart Thermostatted Rotary 7-Cell Changer (Rotary Cell Changer). The CVC is also supplied without the base unit for customers wishing to use the CVC with an existing Rotary Cell Changer base.

The CVC accurately positions the required standards for each test in the sample beam. The following table describes the tests and test materials included with the CVC.

Test	Standard	USP	EP
Wavelength Accuracy	Holmium perchlorate	Holmium perchlorate	Holmium perchlorate
Wavelength Repeatability	Holmium perchlorate	Holmium perchlorate	Holmium perchlorate
Absorbance Accuracy	1A Neutral Density filter	Potassium dichromate	Potassium dichromate
UV Absorbance Accuracy	Potassium dichromate	Potassium dichromate	Potassium dichromate
Absorbance Repeatability	1A Neutral Density filter	Potassium dichromate	Potassium dichromate
Stray Light	220, 340 nm cut-off filters	Sodium Iodide	Potassium chloride
Noise	0A and 1A Neutral Density filter	Instrument lamp	Instrument lamp

INSIGHT software stores all instrument performance specifications and tolerances.

Installing the Carousel on the Smart Base Unit

If purchased as "carousel only", install the CVC on a Smart base supplied with the Rotary Cell Changer.

1. Remove the Rotary Cell Changer (if installed).

   Turn the knurled knob counterclockwise on the top of the cell changer and pull it upwards.

2. Install the CVC.

   - Identify the position of the notch on the motor shaft of the Smart base unit.

   - View the underside of the carousel to locate the position of the tab.

Tab on underside of carousel

Notch on motor shaft of Smart base unit.
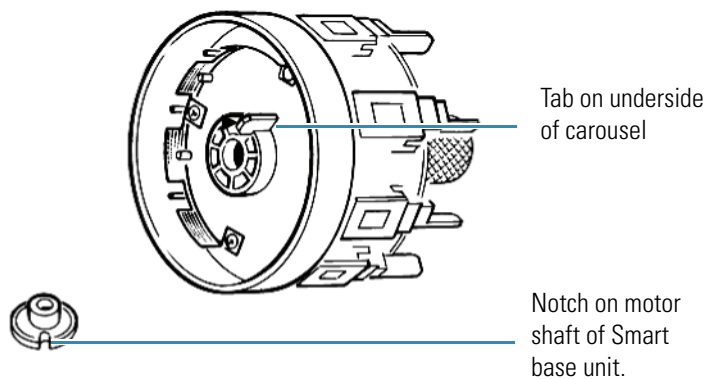
> **Note** Ensure a positive location of the tab in the notch.

3. Place the carousel on the shaft; turn the knurled knob clockwise to tighten.

Related Topics

Installing Complete CVC in the Instrument

CVC Test Limits

Using the CVC

Maintenance

Installing Complete CVC in the Instrument

Install the Smart Accessory as described in Installing a Smart Accessory.

Contents

- Initialization
- Loading CVC Calibration Data

Initialization

The accessory must be initialized each time it is installed and after changing the cell holder when the Smart base unit is installed. Initializing verifies the cell position and resets the cell holder to position 1.

CAUTION Avoid pinch hazard. Keep hands and objects clear of the accessory during initialization.

Languages

ATTENTION Évitez tout risque de pincement. Gardez vos mains, ainsi que tout objet, à l'écart de l'accessoire pendant l'initialisation.

VORSICHT Quetschungen sind zu vermeiden. Hände und Objekte sind während der Initialisierung vom Zubehör fern zu halten.

CAUTELA Evitare il rischio di pizzicamento. Tenere mani e oggetti lontano dall'accessorio durante l'inizializzazione.

PRECAUCIÓN Evite riesgos de atrapamiento. Mantenga manos y objetos lejos del alcance del accesorio durante la inicialización.

❖ **To initialize a cell changer**

1. In the selected application, choose **Settings > Accessories > Cell Changer.**

2. Click **Reset**.

Related Topics

Installing a Smart Accessory

Installing the Carousel on the Smart Base Unit

Loading CVC Calibration Data

Loading CVC Calibration Data

Each CVC has unique calibration data shipped with the accessory. Before a CVC can be used for performance testing, it's serial number and calibration file must be read by INSIGHT software. It is not necessary to reload the data unless you purchase a new CVC or have it recalibrated.

> **Note** The software can store one calibration file for each type of CVC.

Make a backup copy of the calibration data before use. Store the master and the Certificate of Calibration in a secure location.

❖ **To load CVC calibration data**

1. From the INSIGHT software Home screen, click **Performance Verification**.

2. Click **Load CVC Calibration**. A dialog box lets you browse for the calibration file. The file is provided on a memory stick or other medium. The following format is used for the file name:

   evodata_[x]_[y].cal

   where: x is the serial number of the CVC carousel, and
   y is the CVC type (e for EP, u for USP and s for Standard).

3. Locate and select the calibration file that matches the installed CVC and click **OK**.

Related Topics

Installing a Smart Accessory

Installing the Carousel on the Smart Base Unit

Initialization

CVC Test Limits

Using the CVC

Maintenance

CVC Test Limits

The pass/fail limits are based on the instrument specification and any other tolerances associated with the Certified Reference Material (CRM). The software stores all tolerances and any instrument pass/fail limits with the calibration data and reports these values as appropriate.

Related Topics

Installing a Smart Accessory

Installing the Carousel on the Smart Base Unit

Installing Complete CVC in the Instrument

Loading CVC Calibration Data

Using the CVC

Maintenance

Using the CVC

Contents

- Running Performance Verification Tests
- Viewing CVC Test Reports

Before using the CVC, mount the CVC carousel on the base unit and install the accessory in the spectrophotometer. See Installing the Carousel on the Smart Base Unit and Installing Complete CVC in the Instrument.

If using this CVC for the first time, load the calibration data. See Loading CVC Calibration Data.

Running Performance Verification Tests

The CVC performance tests appear only when the CVC is properly installed and a valid calibration file has been loaded.

> **Note** If you are running security software, you can perform performance verification tests only if you have been given the right to do so by the system administrator.

❖ **To run CVC performance verification tests**

1. Click **Performance Verification** in Home.

   The available tests appear in the right pane.

Note The available tests depend on the type of CVC installed.
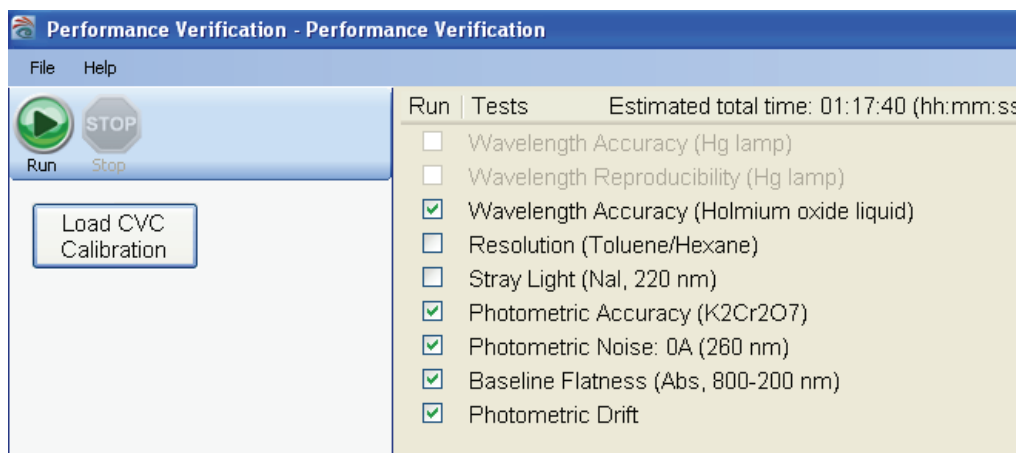
2. Select the tests to run.

CAUTION Avoid pinch hazard. Keep hands and objects clear of the accessory during operation.

Languages

ATTENTION Évitez les risques de pincement. Éloignez les mains et les objets de l'accessoire pendant son fonctionnement.

VORSICHT Quetschungen sind zu vermeiden. Hände und Objekte sind während des Betriebs vom Zubehör fern zu halten.

CAUTELA Evitare il rischio di pizzicamento. Tenere mani e oggetti lontano dall'accessorio durante l'operazione.

PRECAUCIÓN Evite riesgos de atrapamiento. Mantenga manos y objetos alejados del accesorio durante el funcionamiento.

CAUTION 防止被夹住的危险。 作业期间，请让手和其它物件远离辅助设备之处。

3. Click **Run**.

> **Note** If the serial number of the CVC carousel does not match the serial number stored with the current calibration data for the CVC type, an error message appears. See Loading CVC Calibration Data.

The status window shows the data and progress.

To end the tests before they are finished, click **Stop**.

When all the tests are completed, a dialog box shows the report.
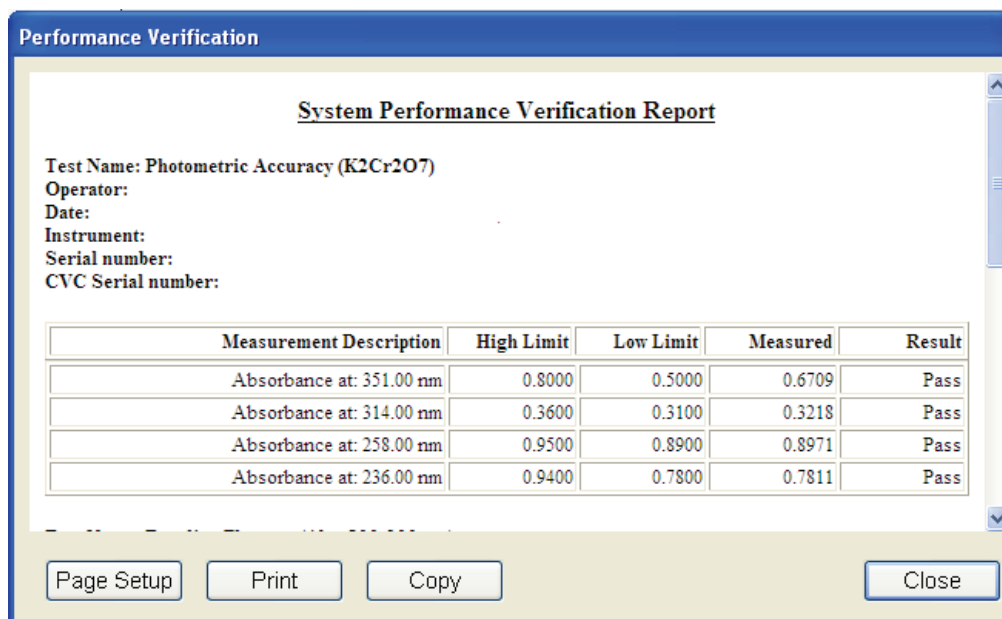
The report can be printed or copied. A signature block appears at the end.

The report is saved automatically and appears on the PV Reports tab in My Data. See Viewing CVC Test Reports for details.

4. Click **Close**.

Related Topics

Installing the Carousel on the Smart Base Unit

Installing Complete CVC in the Instrument

Loading CVC Calibration Data

CVC Test Limits

CVC Test Results

Viewing CVC Test Reports

CVC Test Results

For each test in the suite, the report shows:

- Test name

- Operator

- Time and date of the test

- Instrument type

- Instrument serial number

- CVC serial number

- Expected result or range, measured result and a pass or fail result

Related Topics

Installing the Carousel on the Smart Base Unit

Installing Complete CVC in the Instrument

Loading CVC Calibration Data

CVC Test Limits

Running Performance Verification Tests

Viewing CVC Test Reports

Maintenance

Viewing CVC Test Reports

❖ **To view a CVC test report**

1. From the INSIGHT software Home screen, click **My Data**.

2. Click the **PV Reports** tab.

   The right pane shows all the performance tests run with the instrument.

- To sort by Report or Date, click the column heading.

- To open a report, double-click the row.

- To combine reports, hold down Shift or Ctrl to select multiple rows, and then double-click a selected row.

See My Data and Performance Verification for more information.

Related Topics

Installing the Carousel on the Smart Base Unit

Installing Complete CVC in the Instrument

Loading CVC Calibration Data

CVC Test Limits

Running Performance Verification Tests

CVC Test Results

Maintenance

Maintenance

Contents

- Routine Maintenance

- Recertification

NOTICE   Do not touch the exposed surface of the standards in the CVC.

Routine Maintenance

Very little maintenance is required to keep the accessory in good working condition. The exterior surface of the accessory should be kept clean and free of spilled chemicals and dust.

Use the provided bulb to remove dust from the exposed surface of the standards.

Always keep the accessory in its case when not in use. Always keep the cover closed. Never expose the standards to airborne smoke or dust.

Related Topics

Installing the Carousel on the Smart Base Unit

Installing Complete CVC in the Instrument

Loading CVC Calibration Data

Using the CVC

Recertification

Recertification

We offer a recertification and repair service for the CVC. It is recommended that you return your accessory for recertification every two years — or whenever you have reason to believe that it no longer exhibits its certified value. Before returning your accessory, contact technical support.

Related Topics

Installing the Carousel on the Smart Base Unit

Installing Complete CVC in the Instrument

Loading CVC Calibration Data

Using the CVC

Routine Maintenance

Depolarizer

For Local Control instruments:

D://2613_HARRICK_Depolarizer Accy_UG.pdfFor Computer Control instruments:

C://2613_HARRICK_Depolarizer Accy_UG.pdfIf these links do not work, see your documentation CD.

Related Topics

Installing a Manual Accessory

Accessories

Grazing Angle Specular Reflectance

This manual accessory is designed to analyze "mirror like" planar surfaces and/or coatings on planar surfaces by recording the specular reflectance at 85 degrees. The energy profile as a function of angle is a Gaussian peak centered on 85° and approximately 6° wide.

For more information for Local Control instruments:

D://2625_Grazing Angle Spec Accy_UG.pdfFor Computer Control instruments:

C://2625_Grazing Angle Spec Accy_UG.pdfIf these links do not work, see your documentation CD.

Related Topics

Installing a Manual Accessory

Accessories

Integrated Fiber Optic Module

This accessory provides transfer optics and an integrated detector for SMA (SubMiniature version A)-terminated fiber optic probes. Probes must be purchased separately. A test cable is included for aligning the accessory.

Detector cable

Test cable

Fiber optic module

Detector cable opening
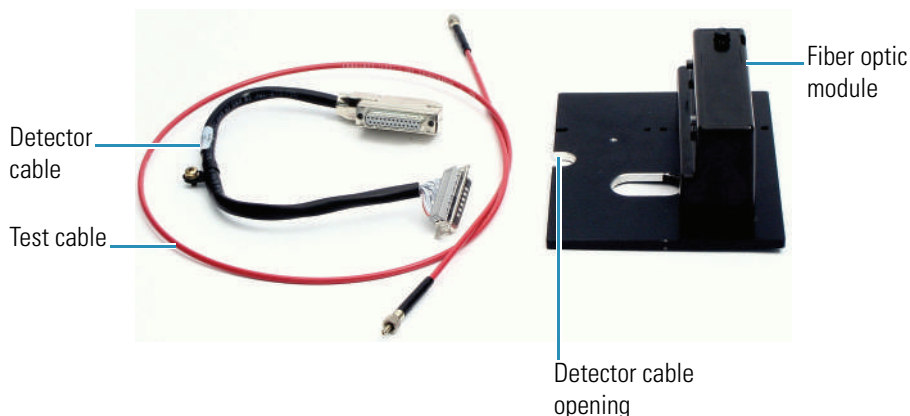
Contents

- Safety Considerations
- Operating Precautions
- Installation
- Attaching Cables and Probes
- Operation
- Maintenance
- Troubleshooting

Safety Considerations

To avoid injury while using the accessory, do not stare at the UV beam or UV light leaving a coupled fiber optic cable.

Related Topics

Operating Precautions

Operating Precautions

Handle the accessory carefully:

- Do not allow moisture to leak into the accessory.

- Wipe off spilled chemicals immediately.

- Do not drop the accessory.

- Protect the accessory from mechanical shock.

- Do not touch the exposed optics.

- Keep the protective caps on the ends of the fiber optic ports when they are not in use.

- Store the accessory in a dust-free location.

- Handle the test cable gently and follow the operating precautions for any fiber optic cable attached to a probe. See Probe Handling and Maintenance.

Related Topics

Safety Considerations

Installation

❖ **To install the accessory**

1. Turn off the spectrophotometer. See Using the Spectrophotometer.

2. Remove the instrument detector.

   Avoid UV radiation hazard in the detector compartment. Protect eyes and skin from exposure.

   > **CAUTION** Safety glasses with side shields or goggles with solid side pieces are the only equipment that provides adequate eye protection against direct and reflected UV light.

Languages

> **Remarque** Seules les lunettes de sécurité avec écrans latéraux ou les lunettes protectrices avec parties latérales solides protègent les yeux de façon adéquate contre la lumière UV directe et réfléchie.

> **Anmerkung** Sicherheitsbrillen mit seitlichem Schutz bzw. Schutzbrillen mit festen Seitenteilen bieten als einzige Ausrüstungsgegenstände adäquaten Schutz der Augen gegen direkte und reflektierte UV-Strahlung.

> **N.B.** Gli occhiali protettivi con schermi laterali o con schermi laterali monolente sono l'unica attrezzatura che fornisce un'adeguata protezione degli occhi dalla luce UV diretta e riflessa.

> **Nota** Las gafas protectoras con protección lateral de seguridad o con piezas laterales sólidas son el único equipo que proporciona la protección para los ojos adecuada contra la luz ultravioleta directa y reflejada.

See Removing and Installing the Detector Module.

3. Remove the detector access panel. See Detector Access Panel.

4. Insert the connector on the accessory interface cable into the socket on the bottom of the accessory.

5. Install the accessory. See Installing a Manual Accessory.

   Before installing, route the interface cable under the baseplate and through the detector cable opening so the free connector is above the accessory baseplate.

6. Pass the connector through the opening between the sample and detector compartments.

7. Plug it into the socket in the detector compartment and press to secure it.

WARNING Avoid UV radiation hazard. Do not stare at the beam or light leaving a coupled fiber optic cable.

Languages

AVERTISSEMENT Évitez l'exposition au rayonnements UV. Ne regardez jamais le faisceau de lumière qui sort d'une fibre optique couplé.

WARNUNG Gefahren durch UV-Strahlung sind zu vermeiden. Nicht in den Strahl eines gekoppelten Glasfaserkabels blicken.

AVVERTENZA Evitare il rischio di radiazioni UV.Non fissare il raggio di luce che esce dal cavo a fibre ottiche accoppiato.

ADVERTENCIA Evite el riesgo de radiación ultravioleta.No mire al rayo luminoso que sale de un cable de fibra óptica acoplado.

> ⚠ **WARNING** 防止 UV 放射危险。　请勿注视光纤电缆耦合留下的光束。

8. Turn on the spectrophotometer and wait until it initializes. See Using the Spectrophotometer.

9. If the instrument has the Application Focused Beam Geometry™ (AFBG) option, select an application, click **Settings > Instrument** and set **Bandwidth** to **Fiber**.

> **Note** If you change the application, reset **Bandwidth** to **Fiber**, or create a template for fiber optic sampling for this application and save your data in a workbook based on that template.

10. Align the accessory.

Related Topics

Attaching Cables and Probes

Aligning the Accessory

Attaching Cables and Probes

The accessory is compatible with probes and cables that have SMA connectors. Contact us for compatible probes. See Contacting Us.

Install the accessory and align it before installing cables and probes.

❖ **To attach cables and probes**

1. Remove the protective caps from the probe cables and accessory ports.

   Store the caps securely so they can be replaced when the probe or accessory is removed from the instrument.

   > **NOTICE** When attaching fiber optic cables to the accessory ports, avoid:
   >
   > • Twisting or bending the cable.
   >
   > • Touching the tips with your fingers.
   >
   > • Overtightening or using tools to tighten the connectors.

2. Route the cables through the detector compartment on the instrument.

3. Attach the probe's Light Input cable to the Light Output port on the accessory.

   To attach a cable, insert the SMA connector and gently tighten the ferrule by hand.

Light Output port
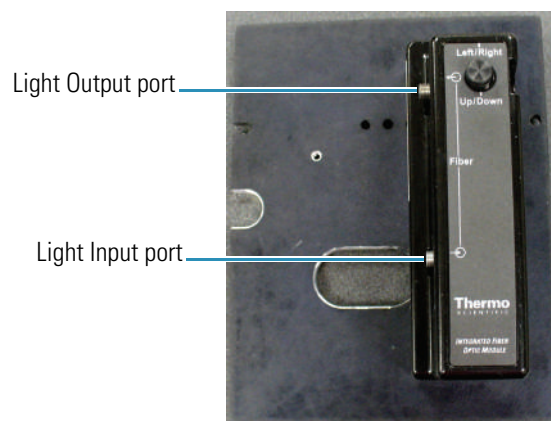
Light Input port

4. Attach the probe's Light Output cable to the Light Input port on the accessory.

Related Topics

Installation

Aligning the Accessory

Operation

Follow the probe manufacturer's recommendations for compatible samples and operating procedures.

If the instrument has the AFBG option, in each application click **Settings > Instrument** and set **Bandwidth** to Fiber.

Related Topics

Installation

Attaching Cables and Probes

Aligning the Accessory

Maintenance

Contents

- Routine Maintenance

- Aligning the Accessory

Routine Maintenance

Follow these guidelines:

- Align the accessory each time it is installed or if performance degrades.

- Follow the manufacturer's recommendations for probe maintenance.

Related Topics

Installation

Attaching Cables and Probes

Aligning the Accessory

Troubleshooting

Aligning the Accessory

Align the accessory each time it is installed it or if performance degrades.

❖ **To align the accessory**

1. Remove the protective caps from the test cable and from the ports on the accessory.

   Store the end caps securely so they can be replaced when the cable or accessory is removed from the instrument.

   > **NOTICE** When attaching fiber optic cables to the accessory ports, avoid:
   >
   > - Twisting or bending the cable.
   >
   > - Touching the cable ends with your fingers.
   >
   > - Overtightening or using tools to tighten the connectors.
   >
   > - Scratching the cable ends.

2. Route the test cable through the detector compartment.

3. Attach both connectors to the ports on the accessory.

   To attach a cable, insert the SMA connector and gently tighten the ferrule by hand.

4. From INSIGHT software, choose **System Settings > Alignment**.

   See Alignment Tab.

5. Set the filter.

   Set **Filter** to **Green** (typical) or **White** (no filter) if the signal is low.

6. Set **Bandwidth** to **Fiber**.

7. Click **Start**.

8. Maximize the signal strength:

   a. Use the Up/Down knob on the accessory to adjust the signal strength.

Up/Down alignment knob

Left/Right alignment knob
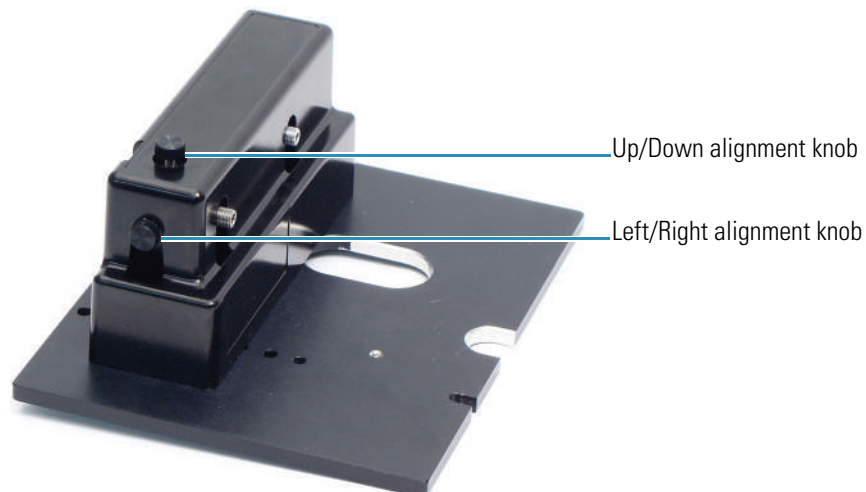
   b. Adjust the Left/Right knob on the accessory to increase the signal further.

   c. Repeat steps a and b until the signal is at its maximum value.

9. Click **Stop**.

Related Topics

Installation

Attaching Cables and Probes

Routine Maintenance

Troubleshooting

Troubleshooting

Problem	Possible Cause	Solution
Unexpected changes in signal strength or no signal	• Soiled probe, optical fibers, connectors or ports on the Fiber Optic Coupler • Fiber Optic Coupler is not aligned properly • Damaged probe, optical fiber or Fiber Optic Coupler.	Use the test cable provided with the Fiber Optic Coupler to test its performance without the probe. • If performance is acceptable with the test cable but not with the probe, clean the probe and replace any worn seals or O-rings. See Cleaning Probes. • If performance is still unacceptable, contact us. See Contacting Us.

Related Topics

Installation

Attaching Cables and Probes

Operation

Maintenance

Integrating Sphere Diffuse Reflectance

This 60 mm Spectralon® integrating sphere accessory supports reflectance and transmittance measurements. Specular included and specular excluded measurements are supported for reflectance. Solids and solutions, in up to 50 mm pathlength cuvettes, are supported for transmittance.

Related Topics

Installing a Manual Accessory

Accessories

Mercury Lamp

This mercury lamp can be used to calibrate and verify the performance of your UV-Visible spectrophotometer.
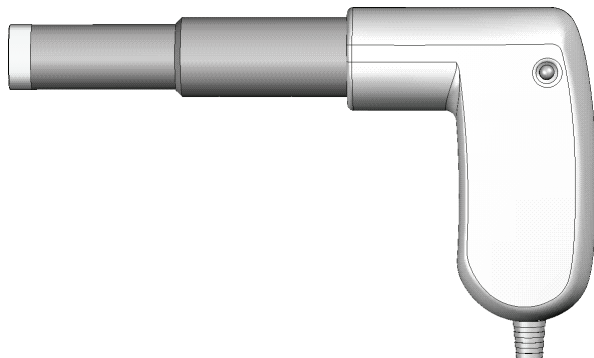
Contents

- Safety Considerations

- Operating Precautions

- Installation and Operation

Safety Considerations

The mercury lamp has a safety interlock to prevent accidental exposure to dangerous levels of UV radiation during operation. After the lamp is installed, removing the lamp from the port while the instrument is powered on will activate the interlock to block all radiation from the lamp.

To avoid defeating the safety interlock, keep all magnets and strong magnetic fields (such as those produced by a mass spectrometer or various medical instruments) away from the lamp while the instrument is powered on and the lamp cable is connected.

Consignes de sécurité

La lampe à vapeur de mercure comprend un verrouillage de sécurité destiné à prévenir toute exposition accidentelle à des doses dangereuses de rayonnement ultraviolet pendant le fonctionnement de l'instrument. Une fois la lampe installée, et lorsque l'instrument est sous tension, le retrait de la lampe du port active le verrouillage afin de bloquer le rayonnement de la lampe.

Pour ne pas déjouer le verrouillage de sécurité, tenez les aimants et autres champs magnétiques puissants (tels que ceux produits par un spectromètre de masse ou divers instruments médicaux) éloignés de la lampe lorsque l'instrument est sous tension et que le câble de la lampe est raccordé.

Sicherheitshinweise

Die Quecksilberlampe ist mit einem Sicherheitsschalter ausgerüstet, um während des Betriebs eine ungewollte Exposition mit einer gefährlichen Intensität an UV-Strahlung zu vermeiden. Wenn die Lampe nach der Lampeninstallation bei eingeschaltetem Instrument aus dem Anschluss entfernt wird, wird der Sicherheitsschalter aktiviert, um die Strahlungsabgabe der Lampe vollständig zu sperren.

Um eine Deaktivierung des Sicherheitsschalters zu vermeiden, halten Sie alle Magnete und starken Magnetfelder (z. B. solche, die von einem Massenspektrometer oder verschiedenen Medizingeräten produziert werden) von der Lampe fern, während das Instrument eingeschaltet und das Lampenkabel angeschlossen ist.

Considerazioni sulla sicurezza

La lampada al mercurio è dotata di un dispositivo di sicurezza per evitare l'esposizione accidentale a livelli pericolosi di radiazione UV durante il funzionamento. Una volta installata la lampada, la rimozione della lampada stessa dalla porta mentre lo strumento è acceso, attiverà il dispositivo di sicurezza per bloccare tutte le radiazioni prodotte dalla lampada.

Per evitare la disattivazione del dispositivo di sicurezza, tenere tutti i magneti e i forti campi magnetici (come quelli prodotti da uno spettrometro di massa o da vari strumenti medicali) lontano dalla lampada mentre lo strumento è acceso e il cavo della lampada è collegato.

Consideraciones sobre seguridad

La lámpara de mercurio tiene un sistema de interrupción de seguridad para impedir exposiciones accidentales a niveles peligrosos de radiación ultravioleta durante el funcionamiento. Una vez instalada la lámpara, su extracción de la conexión con el instrumento encendido activará el sistema de interrupción para bloquear toda su radiación.

Para evitar neutralizar el sistema de interrupción de seguridad, mantenga todos los imanes y campos magnéticos intensos (como los producidos por un espectrómetro de masas o diversos instrumentos médicos) lejos de la lámpara mientras el instrumento esté encendido y el cable de la lámpara esté conectado.

Related Topics

Operating Precautions

Installation and Operation

Operating Precautions

Handle the accessory carefully:

- Do not allow moisture to leak into the accessory.

- Wipe off spilled chemicals immediately.

- Do not drop the accessory.

- Protect the accessory from mechanical shock.

- Do not touch the exposed lens near the end of the lamp shaft (fingerprints and dirt will degrade performance.

- Store the accessory in its case.

Related Topics

Safety Considerations

Installation and Operation

Installation and Operation

Use this accessory to perform wavelength and bandwidth tests or a wavelength calibration.

 WARNING Avoid UV radiation hazard in the mercury lamp compartment. Protect eyes and skin from exposure.

Languages

 AVERTISSEMENT Évitez tout risque de rayonnement à l'intérieur du compartiment de la lampe à vapeur de mercure. Protéger vos yeux et votre peau de toute exposition au rayonnement.

 WARNUNG Gefährliche UV-Strahlung im Gehäuse der Quecksilberlampe ist zu vermeiden. Augen und Haut müssen vor der Strahlung geschützt werden.

 AVVERTENZA Evitare il rischio di radiazione UV nel vano della lampada al mercurio. Proteggere occhi e pelle dall'esposizione.

ADVERTENCIA Evite el riesgo de radiación ultravioleta en el compartimento de la lámpara de mercurio. Proteja sus ojos y la piel de la exposición.

❖ **To install the mercury lamp**

1. Plug the lamp cable into the Hg Lamp connector on the back of the spectrophotometer. See Connectors.

WARNING Avoid defeating the safety interlock. Keep magnets and strong magnetic fields away from the mercury lamp when it is installed and the instrument is running.

Languages

AVERTISSEMENT Éviter de déjouer le verrouillage de sécurité. Tenez les aimants et autres champs magnétiques puissants éloignés de la lampe à vapeur de mercure lorsque celle-ci est installée et que l'instrument est en marche.

WARNUNG Der Sicherheitsschalter darf nicht deaktiviert werden. Magneten und starke Magnetfelder müssen von der Quecksilberlampe fern gehalten werden, wenn die Lampe installiert ist und das Instrument läuft.

AVVERTENZA Evitare la disattivazione del dispositivo di sicurezza. Tenere i magneti e i forti campi magnetici lontano dalla lampada al mercurio mentre è installata e lo strumento è in funzione.

ADVERTENCIA Evite neutralizar el sistema de interrupción de seguridad. Mantenga los imanes y campos magnéticos intensos lejos de la lámpara de mercurio cuando esté instalada y el instrumento en funcionamiento.

2. Follow these instructions to run the mercury lamp Performance Verification (PV) tests or to perform a wavelength calibration.

   • To run a PV test, in INSIGHT software click **Home** and then click **Performance Verification**. If you have a custom button configuration, click **Home**, select the **Classic** group and then click **Performance Verification**.

   Select the following PV tests (deselect all other tests) and then click **Run**:

   • Wavelength Accuracy - Hg Lines

   • Wavelength Reproducibility - Hg 546

See Performance Verification for more information.

> **Note** Calibrate only if the instrument fails the Wavelength Accuracy test.

- To run wavelength calibration, in INSIGHT software choose **System Settings > Calibrations**. In the **Lamps** group, under the **Hg Lamp** heading, click **Calibrate**.

3. When prompted, lift the Mercury Lamp Access Cover and insert the lamp into the port. Press gently until it is secure.

A blue light on the lamp handle indicates when the accessory is properly installed.

4. Click **OK** to start the selected operation (PV test or calibration).

The lamp requires a few minutes to warm up. When the lamp is ready, the selected operation starts automatically. A status bar shows the progress. When the operation is completed, a prompt appears showing the calibration or test results.

If the calibration fails, an error message appears. Contact Technical Support. See Contacting Us.

If a mercury lamp PV test fails, perform the wavelength calibration and then rerun both tests. If a test fails again, contact Technical Support.

5. To run another operation with the mercury lamp, leave the lamp in the instrument, click **OK** and proceed.

6. When finished, click **OK** at the prompt, remove the mercury lamp from the port and secure the access cover.

Samples can be analyzed only when the lamp is not in the port.

❖ **To disconnect the mercury lamp**

Unplug the lamp cable and place the lamp in the provided case.

Related Topics

Safety Considerations

Operating Precautions

nanoCell

The nanoCell is designed to make small volume measurements of solutions.

The nanoCell has two basic components: the nanoCell accessory that fits in a standard 1 cm cell holder and the mirrored lid used for the measurement.

nanoCell

0.2 mm and 1.0 mm pathlength lids
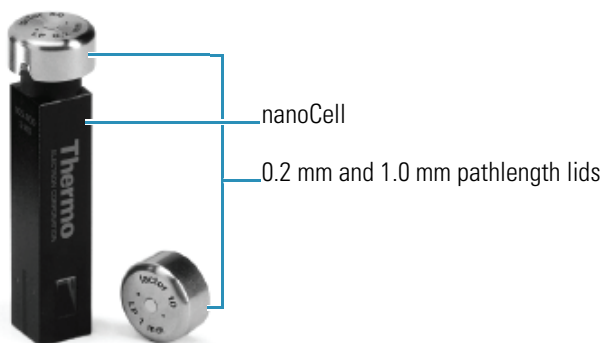
Contents

- Getting Started
- Overview
- Introduction to Small Volume Measurements
- Using the nanoCell
- Cleaning the nanoCell
- Pathlength Correction Factors
- Frequently Asked Questions

Getting Started

This section explains how to measure a sample using the nanoCell.

> **NOTICE** Never submerge any portion of the nanoCell in liquid.

❖ **To measure samples with the nanoCell**

1. Insert the nanoCell into the sample position single cell holder.

   Make sure one of the quartz windows is facing the light beam entering the nanoCell.

Quartz window

2. Load the solution (buffer, water) used for the baseline (scan) or zero (fixed wavelength) measurement.

   Using a small volume pipette, load 0.7 to 3.0 µL of liquid in the sample loading area at the top of the nanoCell.

Sample loading area

3. Install an appropriate lid on top of the nanoCell.

   Align the grooves in the lid with the two pins near the top of the nanoCell.

Locator pins

Locator grooves
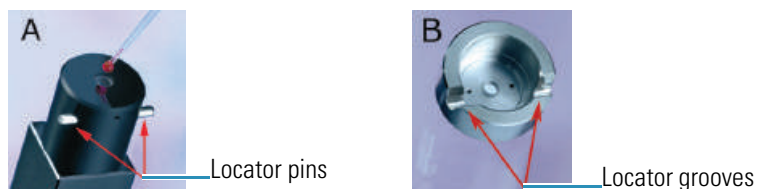
4. Measure the zero or baseline.

5. When the measurement is finished, use the pipette to remove the excess liquid.

6. Use a laboratory tissue or microfiber cloth to wipe the sample loading area and the mirror in the lid.

7. Repeat the loading and cleaning steps to measure your samples.

Related Topics

Using the nanoCell

Cleaning the nanoCell

Pathlength Correction Factors

Frequently Asked Questions

Overview

The nanoCell is designed to make accurate, reproducible measurements using very small volumes of solution. The nanoCell is most commonly used to measure the concentrations of life science samples (DNA, RNA, proteins). The accessory can also be used to measure the absorbance of any highly concentrated sample such as small molecule pharmaceuticals or dyes used in the textile industry.

The nanoCell allows you to make quick, easy measurements of microliter samples without limiting your instrument to only small volume measurements. Simply insert the nanoCell into the cell holder, load the cell, install the lid, and begin the measurements.

The nanoCell is identical in dimensions to a standard cuvette, and can be used with a single cell holder. Liquid samples are loaded on the sample loading window at the top of the accessory and remain there throughout the measurement process.

A schematic of the light path of the nanoCell is shown in Figure 1. Light from the spectrophotometer enters the nanoCell and reaches the sample loading area via an optical system containing small fiber optic cables. This light passes out the sample loading window, through the sample, and reflects off a mirror in the lid of the nanoCell. The position of the mirrored lid relative to the sample loading window defines the pathlength of the accessory. The lid also helps to prevent rapid evaporation of the sample.

The light that passes through the sample is coupled into a second fiber optic cable and is launched out of the nanoCell accessory. The absorbance of the solution is measured using the detector in the spectrophotometer.

Figure 1. Light path of the nanoCell accessory
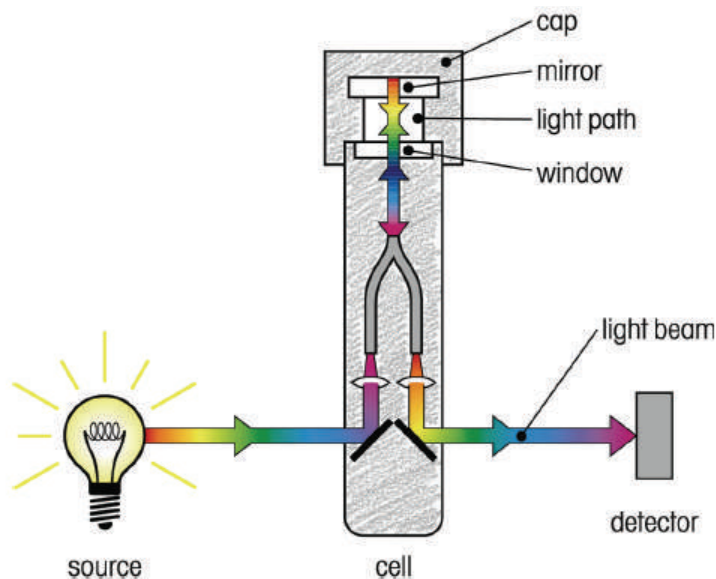
Related Topics

Using the nanoCell

Cleaning the nanoCell

Pathlength Correction Factors

Frequently Asked Questions

Introduction to Small Volume Measurements

Small volume samples are measured by reducing the measurement pathlength to accommodate the reduced volume. For example, it would be impossible to measure a 1 µl drop of solution in a standard 1 cm cuvette.

To make small volume measurements, the pathlength of the nanoCell accessory is decreased by a factor of 10 (1.0 mm pathlength) or 50 (0.2 mm pathlength) compared to a traditional 10 mm pathlength cuvette.

The Beer Lambert law relates the measured absorbance of a solution to the concentration of that solution. The Beer Lambert equation is:

$$Abs = \varepsilon \, c \, l$$

where ε is the extinction coefficient
c is the concentration
l is the pathlength

The linear relationship between absorbance, pathlength, and concentration in the Beer Lambert law means that if we decrease the pathlength by a factor of 10, the observed absorption will also decrease by a factor of 10.

> **Note** Reducing the pathlength from 1 cm to 1 mm is equivalent to a 10-fold dilution.

> **Note** The factor(s) multiplied by absorbance measurements to give concentration values need to be adjusted for a change in the pathlength. For common DNA, RNA, and oligonucleotide concentration factors, see Pathlength Correction Factors.

Related Topics

Using the nanoCell

Cleaning the nanoCell

Pathlength Correction Factors

Frequently Asked Questions

Using the nanoCell

The nanoCell accessory has two basic components: the nanoCell and the mirrored lid used for the measurement. The nanoCell contains the optics and sample loading window and fits in a standard 1 cm cell holder.

Any UV-Visible measurement can be made using the nanoCell over a wavelength range of 190-1100 nm. This includes scanning, fixed wavelength, and kinetics measurements. The measurement range, reproducibility, and wavelength range of the nanoCell is determined by the spectrophotometer used to make the measurement.

Contents

- Installing the nanoCell
- Loading a sample
- Measurements

Installing the nanoCell

The nanoCell ships configured for a z-height (distance from the bottom of the cell to the center of the light beam) of 8.5 mm. An adapter is included for 15 mm z-height instruments. The adapter simply screws on the base of the nanoCell accessory.

To install the nanoCell, insert the accessory into a single cell holder in the sample light path of the spectrophotometer. One of the quartz windows on the side of the nanoCell accessory (see Figure 2) should face the light beam. The nanoCell accessory can be installed with either side of the nanoCell facing the light source.

Figure 2.   The quartz windows of the nanoCell allow light to enter and exit this accessory. Align these windows in the path of the beam.

Quartz window

> **Tip** To ensure the highest precision data, do not remove the nanoCell from the cell holder until all measurements are complete

> **NOTICE**   Install the nanoCell only in accessories designed to hold a single cell. Using the nanoCell in a multi-cell holder could lead to inaccurate data.

Related Topics

Loading a sample

Measurements

Cleaning the nanoCell

Pathlength Correction Factors

Frequently Asked Questions

Loading a sample

To load a sample on the nanoCell, use a small volume pipette to place between 0.70 µl and 3.0 µl of solution on the sample loading window.

Figure 3.   Use a small volume pipette to load samples on the nanoCell.
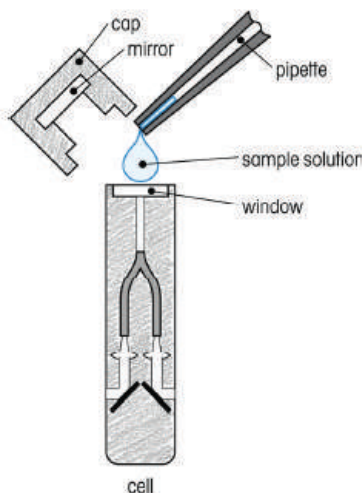
> **Note** Use a calibrated pipette to deliver liquid to the sample loading area of the nanoCell. Do not use a standard dropper, transfer pipette, Pasteur pipette, or other large volume device.

The sample loading window is slightly recessed (see Figure 4) to help the liquid form a drop that touches both the sample loading window and the mirror in the lid. Make sure the entire surface of the sample loading window is covered with liquid and all of the liquid is loaded into the recessed sample loading window. Do no leave excess liquid on the top of the nanoCell outside the sample loading window.

Figure 4.   Recessed sample loading window at the top of the nanoCell.

Carefully place the appropriate lid on top of the sample loading area so that it sits in each of the two locator pins near the top of the nanoCell.

Figure 5.   (A) Locator pins on the top of the nanoCell used to position the lid.
(B) Locator grooves in the lid.
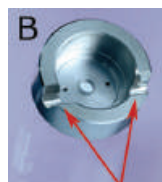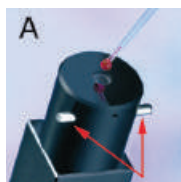
> **Note** Install the lid immediately after loading the sample to prevent evaporation of the sample.

Figure 6. The nanoCell accessory with the lid installed.
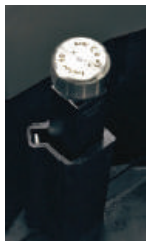
Related Topics

Installing the nanoCell

Measurements

Cleaning the nanoCell

Storing the nanoCell

Pathlength Correction Factors

Frequently Asked Questions

Measurements

Always collect the zero or baseline measurement with a blank solution in the nanoCell.

> **Note** If a high background signal or inconsistent data is observed, remeasure the blank solution for the baseline or zero. Some measurement errors are due to a poor baseline or zero.

Related Topics

Installing the nanoCell

Loading a sample

Cleaning the nanoCell

Storing the nanoCell

Pathlength Correction Factors

Frequently Asked Questions

Cleaning the nanoCell

❖ **To clean the nanoCell**

1. Remove the cap from the nanoCell.

2. Use a pipette to remove the excess sample from the sample loading area on the top of the nanoCell.

3. Use a lint-free laboratory tissue, lint-free lens tissue, or microfiber cloth to wipe excess liquid from the sample loading area and the mirror in the lid.

   Pressurized air can be used to remove lint or dust as necessary.

4. If desired, a suitable solvent such as methanol, ethanol, or isopropanol can be added to the cleaning process.

   Apply the solvent to a laboratory tissue and wipe the sample loading surface. *Never add the solvent directly to the sample loading surface.*

   NOTICE   Never submerge any portion of the nanoCell in liquid.

   NOTICE   Do not use strong acids and bases or any of the following solvents with the nanoCell: ethylamine, diethylene triamine, methylene chloride, and phosphoric acid.

Related Topics

Using the nanoCell

Storing the nanoCell

Pathlength Correction Factors

Frequently Asked Questions

Storing the nanoCell

Store the nanoCell and lids in the provided case.

Related Topics

Using the nanoCell

Cleaning the nanoCell

Pathlength Correction Factors

Frequently Asked Questions

Pathlength Correction Factors

Direct UV Assays for DNA, RNA, Oligonucleotides and Protein Concentration

Assay	Unit	Calculation Factor 1.0 cm Pathlength	Calculation Factor 1.0 mm Pathlength nanoCell	Calculation Factor 0.2 mm Pathlength nanoCell	Reference
dsDNA	ng/µL	50	500	2500	Maniatis, T; Fritch, E. F.; Sambrook, J., Molecular Cloning: A Laboratory Handbook, 2nd Edition, Cold Spring Harbor Laboratory Press, Plainview, NY 1989, Vol. 3.
ssDNA	ng/µL	37	370	3650	
RNA	ng/µL	40	400	2000	
Oligos	ng/µL	33	330	1650	
Protein 280 nm	mg/mL	1	10	50	Fasman, D. G., Ed. Practical Handbook of Biochemistry and Molecular Biology, CRC Press, Boston 1992. Stoscheck, C. M., Methods Enzymol, 1990, 182, 50-69.
Protein 205 nm	mg/mL	31	310	1550	

Direct UV Assays for DNA, RNA, Oligonucleotides and Protein Concentration

Assay	Unit	Equation	Factors 1.0 mm Pathlength	Calculation Factor 1.0 mm Pathlength nanoCell	Calculation Factor 0.2 mm Pathlength nanoCell	References
260/280 DNA/ Protein	µg/mL	DNA and Protein Concentrations determined using: DNA conc = $[(A_{260} - A_{ref})f_1 - (A_{230} - A_{ref})f_2]$ Protein conc = $[(A_{230} - A_{ref})f_3 - (A_{260} - A_{ref})f_4]$ $$260\!:\!280 \text{ Ratio} = \frac{A_{260} - A_{ref}}{A_{280} - A_{ref}}$$ Where: A_{260} = absorption at 260 nm A_{280} = absorption at 280 nm A_{ref} = background absorption at 320 nm	$f_1 = 62.9$ $f_2 = 36.0$ $f_3 = 1,552$ $f_4 = 757.3$	$f_1 = 629$ $f_2 = 360$ $f_3 = 15,520$ $f_4 = 7,573$	$f_1 = 3,145$ $f_2 = 1,800$ $f_3 = 77,600$ $f_4 = 37,865$	Warburg, O.; Christian, W. Biochem Z. 1942, 310, 384-421. Groves, W. E.; Davis, F. C., Jr.; Sells, B. H., Anal. Biochem. 1968, 22, 195-210.
260/230 DNA/ Protein (Phenol)	µg/mL	DNA and Protein Concentrations determined using: DNA conc = $[(A_{260} - A_{ref})f_1 - (A_{230} - A_{ref})f_2]$ Protein conc = $[(A_{230} - A_{ref})f_3 - (A_{260} - A_{ref})f_4]$ $$260\!:\!230 \text{ Ratio} = \frac{A_{260} - A_{ref}}{A_{230} - A_{ref}}$$ Where: A_{260} = absorption at 260 nm A_{230} = absorption at 230 nm A_{ref} = background absorption at 320 nm	$f_1 = 49.1$ $f_2 = 3.48$ $f_3 = 183$ $f_4 = 75.8$	$f_1 = 491$ $f_2 = 34.8$ $f_3 = 1,830$ $f_4 = 758$	$f_1 = 12,300$ $f_2 = 870$ $f_3 = 45,750$ $f_4 = 18,950$	Kalb, V. F., Jr.; Bernlohr, R.W., Anal. Biochem. 1977, 82, 362-371.
Warburg-Christian	mg/mL	Protein concentration is determined using: Protein conc = $[(A_{280} \times f_1) - (A_{260} \times f_2)]$ Where: A_{280} = absorption at 280 nm A_{260} = absorption at 260 nm	1.55 0.76	15.5 7.6	3,875 1,900	Warburg, O.; Christian, W., Biochem Z. 1942, 310, 384-421.

Related Topics

Frequently Asked Questions

Frequently Asked Questions

Q1   My nanoCell has two numbers on the lid (Factor 50 and LP 0.2 mm). What do these numbers mean?

A1   **Factor 50**
This is the correction factor for this lid. If a 1 cm cuvette is used and equations are set up for a 1 cm pathlength, multiply the 1.0 mm pathlength result by this factor (1 cm result x 50, in this case) to get the correct concentration result. This is a factor of 50 reduction, or 50-fold dilution. See Pathlength Correction Factors.
LP 0.2 mm (Light Path 0.2 mm)
This is the pathlength of the nanoCell or the total distance the light travels through the accessory. This distance is necessary for concentration calculations using the Beer-Lambert law, which relates the absorbance of the solution to its concentration. See Introduction to Small Volume Measurements and Pathlength Correction Factors.

Q2   When using the nanoCell, is the correction for the pathlength (0.2 mm or 1.0 mm) made automatically by the spectrophotometer, or does the end-user have to make this correction?

A2   No. There is no mechanism for the instrument to know what pathlength nanoCell is installed. The user will need to correct for the pathlength using the factor.

Q3   If the end-user has to make the correction, what is the correction for each nanoCell pathlength?

A3   See Pathlength Correction Factors for a comprehensive list of correction factors for most life science assays.

Q4   Does the quartz surface at the top of the nanoCell accessory and in the lid have to be cleaned of all chemicals and fingerprint residue?

A4   Yes. The quartz sample loading area of the nanoCell accessory and the mirror in the lid are the same as a traditional quartz cuvette. See Cleaning the nanoCell.

Q5   What needs to be cleaned after each use? The top of the nanoCell only, or the inner part of the lid as well?

A5   To eliminate sample carry-over or mixing two liquids together and improve accuracy, clean the inner part of the lid between measurements. See Cleaning the nanoCell.

Q6   Can I use solvents to clean the surface of the nanoCell? If so, which solvents?

A6   The most suitable solvents for cleaning are methanol, ethanol, and isopropanol. Do not use strong acids and bases or any of the following solvents with the nanoCell: ethylamine, diethylene triamine, methylene chloride, and phosphoric acid. See Cleaning the nanoCell.

Related Topics

Using the nanoCell

Cleaning the nanoCell

Storing the nanoCell

Pathlength Correction Factors

TPS-1500W Sealed Peltier Recirculator

The Peltier Recirculator is a sealed unit that can be used to pump temperature-controlled liquid through any thermostatted accessory. The recirculator provides constant temperatures in the range between 20 °C and 60 °C (68 °F and 140 °F). The unit comes with fuses, insulated tubing, tubing size adapters, a refill bottle and a USB cable.

Peltier recirculator

Contents

- General Safety Information

- Product Description

- Preinstallation

- Installation

- Operation

- Maintenance

- Troubleshooting

Related Topics

Peltier Thermostatted Single Cell Holder

SPE-8W Smart Peltier Linear Cell Changer

Accessories

General Safety Information

This equipment has been designed with an emphasis on quality, reliability and safety. We accept warranty responsibility for this accessory under the following conditions:

- Electrical installation in the room or building complies with regulations specified in the country where the equipment is to be used.

- The equipment is used in accordance with the provided instructions for use.

- All modifications and repairs are carried out by an authorized agent.

- Only modifications suggested and documented by us are to be made to any part of the accessory.

- The equipment installation is carried out in accordance with local requirements for responsibility and warranty.

CAUTION Always disconnect the power supply before starting any work inside the instrument.

CAUTION Take the necessary precautions when using flammable or explosive substances in this accessory.

Related Topics

Product Description

Preinstallation

Installation

Operation

Maintenance

Troubleshooting

Product Description

The recirculator is a Peltier-effect thermostatting system. It uses an internal sealed liquid circuit that is compatible with all of our thermostattable accessories.

The accessory features:

- Internal flow pump to circulate the liquid.

- Manual or remote control through an RS-232 or USB port.

- Thermally isolated tubing to connect with any thermostattable accessory.

- Water level sensor to prevent operation when the fluid level is below normal.

- High temperature sensor to prevent overheating.

> **Contents**
> - Front and Back Panel
> - Specifications

Front and Back Panel

The accessory has two internal fans and front and back vents to dissipate heat.

> **NOTICE** Blocked vents may affect performance or cause the accessory to fail.

The front panel features an LCD display with a three-button keypad.

The back panel houses the main power connector with voltage selector, RS-232 and USB connectors for remote control, main power switch and connectors for transporting liquid into and out of the unit.

Related Topics

Specifications

General Safety Information

Preinstallation

Installation

Operation

Maintenance

Troubleshooting

Specifications

Contents

- Display/Keypad

- Programmable Parameters

- Displayed Values

- Operating Specifications

- External Control

- Dimensions

- Electrical Data

- Description of Symbols

- Environmental Conditions

Display/Keypad

The accessory has an LCD screen and 3-button keypad to access the functions and set temperature.

Programmable Parameters

- Temperature

Displayed Values

- Actual thermostat temperature

- Set temperature

- Heating/cooling power

Operating Specifications

- Temperature range: 20 °C to 60 °C (68 °F to 140 °F)

- Temperature accuracy: ±0.15 °C (±0.27 °F) from 20 °C to 60 °C (68 °F to 140 °F)

- Temperature repeatability: typically ±1 °C (1.8 °F)

- Temperature stability: typically ±0.1 °C (±0.18 °F)

- Specifications valid for ambient temperatures from 15 °C to 35 °C (59 °F to 95 °F)

External Control

- RS-232

- USB

Dimensions

- Width: 235 mm (9.25 in)

- Height: 254 mm (10 in)

- Depth: 473 mm (18.63 in)

- Weight: 11.6 kg (25.6 lbs)

Electrical Data

- Voltage: 115/120 V or 220/240 V ±10% (factory setting 220/240 V)

- Frequency: 50/60 Hz

- Power: 120 VA

- CE marked

Description of Symbols

CAUTION Symbol identifying the use of substances dangerous for health and the environment. For these substances, refer to the laws and terms in force for the laboratory using the instrument. Take the necessary precautions when using flammable or explosive substances.

Environmental Conditions

Performance and safety of the accessory are guaranteed if operated under the following conditions:

- Pollution degree 2 (standard CEI EN 61010-1).

- Installation category II with smaller transient over voltages (standard IEC 664).

- Mains voltage fluctuations must not exceed 10% of the nominal voltage.

- Location of use is indoors at an altitude <2000 m (6562 ft).

- Location of use exhibits a relative humidity <80% noncondensing.

- Location of use exhibits an ambient temperature between 10 °C and 35 °C (50 °F and 95 °F).

- Location of use is free from dust and vapors of solvents and acids.

Related Topics

Front and Back Panel

General Safety Information

Preinstallation

Installation

Operation

Maintenance

Troubleshooting

Preinstallation

Review this section before installing the accessory.

> **Contents**
> - Verifying the Power Supply and Fuse
> - Changing the Voltage Setting or Fuse

Verifying the Power Supply and Fuse

> **NOTICE**   The unit is factory set to operate at 220 V.

For operation at 120 V, configure the voltage selector on the Peltier back panel and insert the correct fuse as described in the following table.

Power Supply	Type of fuse - 250 V
240 V	T 1A, Slo Blo
120 V	T 2A, Slo Blo

Adjustment for frequency change between 50 and 60 Hz is not necessary.

Voltage display window

Fuse drawer tab

FUSE
(SLO - BLO)
240 V | 1 A.T.
120 V | 2 A.T

Related Topics

Changing the Voltage Setting or Fuse

The current voltage setting is shown in the voltage display window above the power switch.

❖ **To change the voltage setting or fuse**

5. Turn off the Peltier unit and disconnect the power cord from the wall outlet.

6. Use a small screwdriver to pry the fuse drawer out of the fuse compartment by pulling the tab up and away from the drawer.
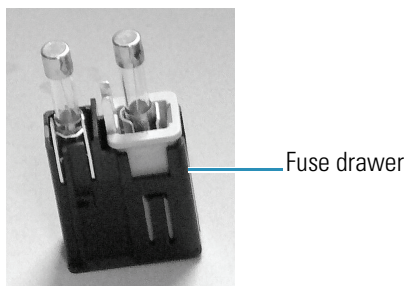
Fuse drawer

7. To change the voltage setting, remove the voltage selector cube from the drawer and carefully remove the fuse from the cube.

Voltage selector cube
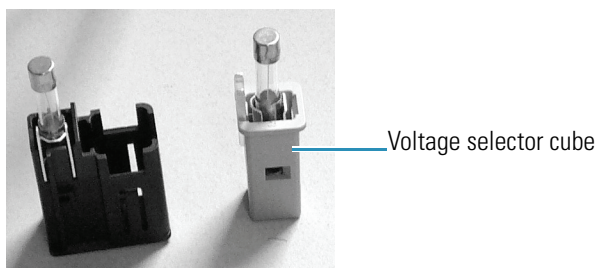
8. Rotate the cube 180 degrees and then replace the cube in the drawer. The correct voltage setting should display in the window on the bottom of the fuse drawer.

9. Replace the fuse with a new one that is appropriate for the selected voltage. See Verifying the Power Supply and Fuse.

10. Slide the fuse drawer back into the fuse compartment until it locks in place.

11. Connect the power cord to the wall outlet.

12. Turn on the main power switch on the Peltier unit back panel.

If the unit does not perform normally or if the replacement fuse blows, contact technical support.

Related Topics

Verifying the Power Supply and Fuse

General Safety Information

Preinstallation

Installation

Operation

Maintenance

Troubleshooting

Installation

Before powering on the Peltier recirculator:

- Check the power supply voltage setting and fuse. See Verifying the Power Supply and Fuse.

- Connect the recirculator to a thermostatted accessory and fill the reservoir.

    NOTICE   The recirculator is filled with distilled water before shipment. During installation, when connecting the tubing, the water level in the reservoir will drop and must be refilled before use. Use only distilled water to refill the reservoir. A refill bottle is provided for this purpose. See Filling the Reservoir.

Before starting the recirculator, familiarize yourself with the software features described in Operation.

❖ **To install the recirculator**

1. Position the recirculator in a suitable location.

    NOTICE   Leave at least 5 cm (2 in) in front and back of the unit for air circulation.

2. Remove the screw from the vent on the recirculator back panel. Store the screw in a safe place and use it to plug the vent before shipment.

Remove and save this screw (replace for shipment)
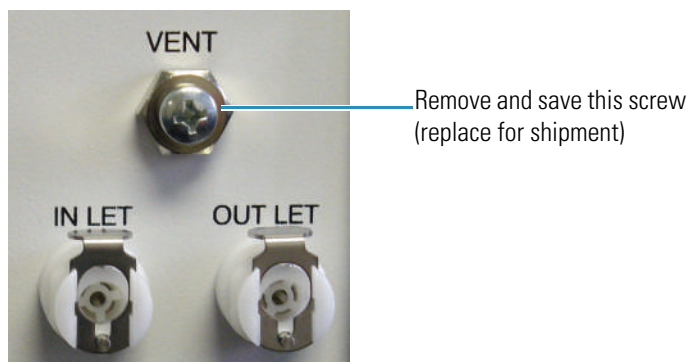
3. Screw in the vent connector supplied with the instrument.

Vent control ring
Vent connector
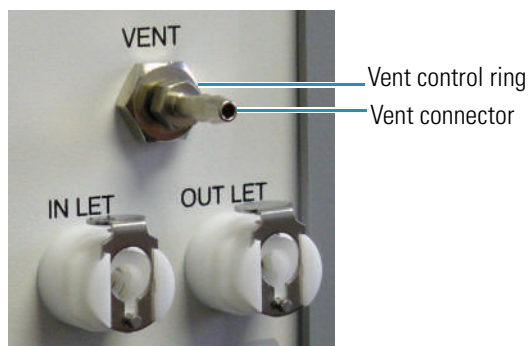
4. Close the vent by turning the control ring clockwise until it is tight.

5. Connect the supplied tubes to the Inlet and Outlet ports on the recirculator back panel.

   The ports and tubes are equipped with quick connect fittings.

6. Connect the other ends of the tubes to the fluid in and out ports on any thermostatted accessory or to the fluid in and out ports on the spectrophotometer. See Installing a Liquid Thermostatted Accessory. Use the provided adapters if necessary.

7. Connect the power cord to the power connector on the recirculator back panel and turn on the power switch.

Power switch
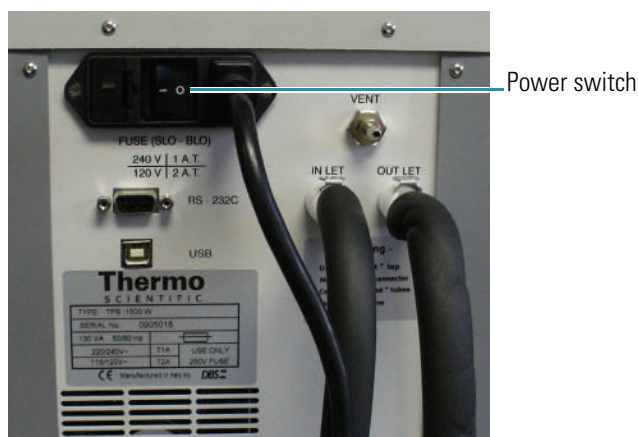
Wait one minute for the recirculator to warm up. A water level alarm typically occurs because the tubing and reservoir in the thermostatted accessory have increased the capacity.

8. If a water level alarm occurs, turn off the recirculator, disconnect the inlet (or outlet) tube and fill the reservoir. See Filling the Reservoir.

9. Reconnect the tube and turn on the recirculator.

10. If a water level alarm occurs again, repeat steps 8 and 9.

The recirculator may be operated manually (see Operation) or remotely through an RS-232 or USB connection.

Related Topics

General Safety Information

Product Description

Preinstallation

Operation

Maintenance

Troubleshooting

Operation

To start the recirculator, turn on the power switch on the back panel. The display appears in one of three modes:

• Stand-By mode

• Normal mode

- Alarm mode

The image below indicates Normal mode.

Actual thermostat temperature   Heating/cooling power scale
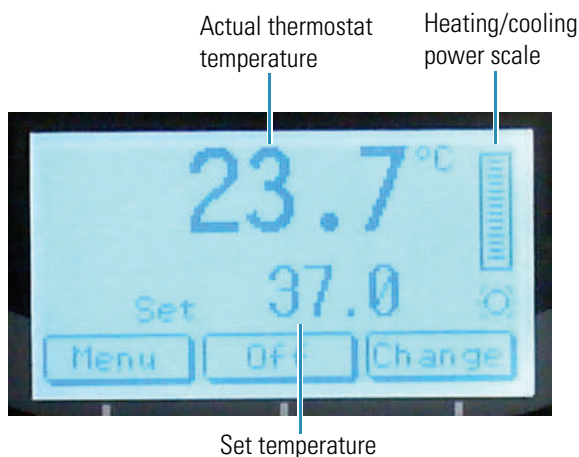
Set temperature

Table 1. Startup modes and overview of button functions

Page	Mode	Display	Left button	Center button	Right button
Startup	Standby	Standby		On (go to Normal Mode)	
	Normal	Actual temperature Set temperature Heating/cooling power (right)	Menu (go to Main Menu page)	Off (go to Standby Mode)	Change (go to Change Set Point page)
	Alarm	Alarm description	Menu (go to Main Menu page)	Beep (turn off audible alarm)	Reset* (reset audible alarm)

*Only if the **Manual reset prealarm** is set to Yes. See Parameters Menu.

Contents

- Standby Mode

- Normal Mode

- Alarm Mode

Standby Mode

- Press and hold the **Center** button for one to two seconds to proceed to Normal Mode.

Related Topics

Normal Mode

Alarm Mode

Preinstallation

Installation

Maintenance

Troubleshooting

Normal Mode

Contents

- Button Functions

- Parameters Menu

- Configure Menu

- Diagnostic Menu

Button Functions

- Press the **left** (Menu) button to go to the Main Menu page.

- Press and hold the **center** (Off) button for one to two seconds to return to Stand-By Mode.

- Press the **right** (Change) button to go to the Change Set Point page.

Table 2. Normal Mode functions

Page	Display	Description	Left button	Center button	Right button
Main Menu	Parameter	User Parameters	Scroll	Select	Exit
	Configure	Configuration Parameters	Scroll	Up	Exit
	Diagnostic	Diagnostic Values	Down	Up	Exit
Change Set Point	Flashes selected parameter	Change Temperature Set Point	Down	Up	Change

❖ **Changing the set temperature**

1. From the main Normal Mode page, press the **Change** button to highlight **Set Temperature**.

   The Change Set Point page appears with down and up arrows above the Left and Center buttons.

2. Use the **down** and **up** arrow buttons to change the set temperature.

3. When the desired set temperature is displayed, press **Change** to return to the main Normal Mode page.

Parameters Menu

- From the main Normal Mode page, press the **Menu** button to display the Main Menu page.

- Use the **left** (Scroll) button to highlight **Parameters** and press the **center** (Select) button to select it. A list of available parameters appears.

- Use the **left** (Scroll) button to highlight a parameter.

- Use the **center** (Select) button to select the highlighted parameter.

- Use the **right** (Exit) button to return to the Parameters Menu.

Table 3. User parameters and button functions

Number	Description	Default value
P-01	Temperature units	°C
P-02	Auto start	NO
P-03	Display contrast	5
P-04	Beeper	YES
P-05	Manual reset pre-alarm	NO

Configure Menu

- From the main Normal Mode page, press the **Menu** button to display the Main Menu page.

- Use the **left** (Scroll) button to highlight **Configure** and press the **center** (Select) button to select it. A password entry page appears.

NOTICE   A password is required to display the Configure menu. These parameters are set at the factory and cannot be changed by the user.

- Use the **right** (Exit) button to return to the main Normal Mode page.

Diagnostic Menu

- From the main Normal Mode page, press the **Menu** button to display the Main Menu page.

- Use the **left** (Scroll) button to highlight **Diagnostics** and press the **center** (Select) button to select it. A list of diagnostic readouts appears.

- Use the **left** and **center** buttons to scroll the screen up and down.

- Use the **right** (Exit) button to return to the main Normal Mode page.

Description	Unit
Cell temperature	°C
Radiator temperature	°C
Water resistance	Kohm
Power	%
Cell voltage	Volt

Related Topics

Standby Mode

Alarm Mode

Preinstallation

Installation

Maintenance

Troubleshooting

Alarm Mode

System alarms indicate failure of the accessory due to malfunction or incorrect use. See Troubleshooting for more information. Here is an alarm mode due to water failure.

- Use the **left** (Menu) button to display the Main Menu page.

- Use the **center** (Beep) button to turn off the audible alarm.

- Use the **right** (Reset) button, if available, to reset the audible alarm. See **Manual reset prealarm** in the Parameters Menu to configure the Reset option to display in Alarm Mode.

Related Topics

Standby Mode

Normal Mode

Preinstallation

Installation

Maintenance

Troubleshooting

Maintenance

> **Contents**
>
> - Routine Maintenance
> - Cleaning the Accessory
> - Filling the Reservoir

Routine Maintenance

The accessory requires little routine maintenance.

> **CAUTION** Do not open the unit while the power cord is connected. Any action that makes it necessary to open the unit must be executed by authorized service personnel.

Related Topics

Cleaning the Accessory

Filling the Reservoir

Preinstallation

Installation

Operation

Troubleshooting

Cleaning the Accessory

To clean the accessory, use a cloth dampened with water or neutral detergent only. Do not use organic or abrasive solvents.

Related Topics

Routine Maintenance

Filling the Reservoir

Preinstallation

Installation

Operation

Troubleshooting

Filling the Reservoir

Fill the reservoir after connecting an accessory to the recirculator and after a water level alarm. Use distilled water only.

❖ **To fill the reservoir**

1. Open the vent by turning the control ring counterclockwise. Place a container under the vent opening to catch drips.

Vent control ring
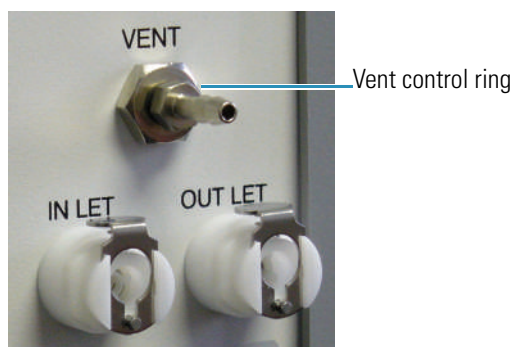
2. Fill the supplied bottle with distilled water.

The bottle lid has a tube with a quick connect fitting.
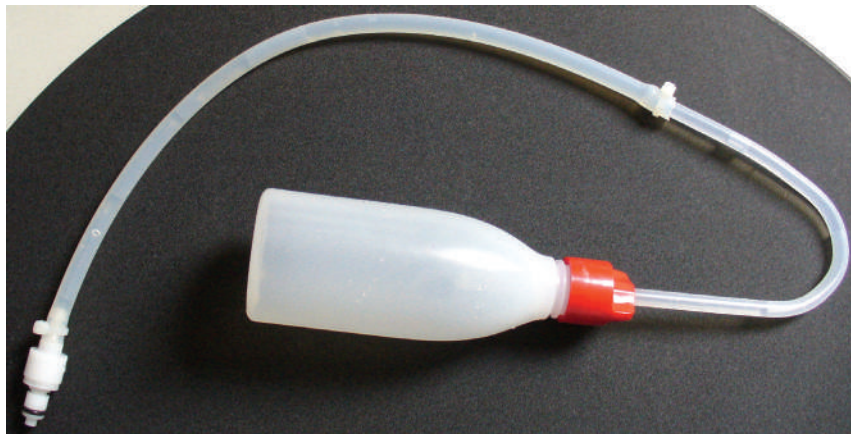
3. Turn off the power switch on the recirculator back panel.

4. Unplug any tubing from the inlet connector on the recirculator back panel and connect the tube from the fill bottle.

5. Turn the fill bottle upside down and squeeze it until liquid escapes through the vent.

   The reservoir holds approximately 150 mls.

6. Disconnect the fill bottle and reconnect the tubing.

7. Turn on the recirculator power switch.

8. If a water level alarm occurs, turn off the recirculator and repeat steps 3 through 7.

9. If the water level is okay, open the vent to evacuate any air bubbles in the lines.

10. Close the vent.

    Leave the vent closed while the recirculator is in use.

Related Topics

Routine Maintenance

Cleaning the Accessory

Preinstallation

Installation

Operation

Troubleshooting

Troubleshooting

System alarms indicate failure of the accessory due to malfunction or incorrect use. Alarms may be visible on the display, indicated acoustically or communicated via RS-232 or USB connections.

Contents

- Acoustic Alarm

- Water Level Failure

- Other System Failures

Acoustic Alarm

The accessory sends an acoustic alarm when it detects a leak or if another failure occurs.

❖ **If an alarm occurs**

1. Determine the cause of the alarm by consulting the recirculator front panel display.

2. Press the **right** (Reset) button, if available, on the recirculator front panel.

   See **Manual reset prealarm** in the Parameters Menu to configure the Reset option to display in Alarm Mode.

3. Turn off the power switch on the recirculator back panel.

4. Fix the problem. See Water Level Failure and Other System Failures.

5. Turn on the recirculator power switch.

6. If the alarm occurs again, turn off the power switch and contact technical support. See Contacting Us.

Related Topics

Water Level Failure

Other System Failures

Preinstallation

Installation

Operation

Maintenance

Water Level Failure

The accessory is equipped with a water level sensor that detects small leaks.

❖ **If a water level failure occurs**

1. Press the **Reset** button, if available, on the recirculator front panel.

   See **Manual reset prealarm** in the Parameters Menu to configure the Reset option to display in Alarm Mode.

2. Turn off the power switch on the recirculator back panel.

3. Open the sample compartment and clean up any liquids that may have leaked from the accessory.

4. Tighten all connectors to and from the recirculator.

5. Fill the reservoir. See Filling the Reservoir.

6. Turn on the recirculator power switch.

7. If the water level alarm occurs again, turn off the power switch, fill the reservoir again and turn on the power switch.

> **Note** You may need to fill the reservoir several times before the water level alarm resets.

Related Topics

Acoustic Alarm

Other System Failures

Preinstallation

Installation

Operation

Maintenance

Other System Failures

Problem	Possible Cause	Solution
Temperature or memory failure	Recirculator malfunction or incorrect use	Immediately turn off the main power switch and then turn it on again. If the failure reoccurs, turn off the power and contact technical support. See Contacting Us.

Related Topics

Acoustic Alarm

Water Level Failure

Preinstallation

Installation

Operation

Maintenance

Peltier Thermostatted Single Cell Holder

This accessory includes a thermostatted single cell holder for standard 10 mm pathlength cuvettes and a Peltier temperature controller that connects to a USB port on the spectrophotometer or computer. The accessory requires a water pump or recirculator which must be purchased separately. Cell temperature can be controlled two ways: from the Peltier controller front panel or from the spectrophotometer using INSIGHT software. The Peltier controller may also be used to agitate the sample by placing a magnetic stirrer in the cuvette and selecting the stir speed.

Controller

Cell holder

Contents

- General Safety Information

- Product Description

- Preinstallation

- Installation

- Operation

- Maintenance

- Troubleshooting

Related Topics

TPS-1500W Sealed Peltier Recirculator

SPE-8W Smart Peltier Linear Cell Changer

Accessories

General Safety Information

This equipment has been designed with an emphasis on quality, reliability and safety. We accept warranty responsibility for this accessory under the following conditions:

- Electrical installation in the room or building complies with regulations specified in the country where the equipment is to be used.

- The equipment is used in accordance with the provided instructions for use.

- All modifications and repairs are carried out by an authorized agent.

- Only modifications suggested and documented by us are to be made to any part of the accessory.

- The equipment installation is carried out in accordance with local requirements for responsibility and warranty.

CAUTION Always disconnect the power supply before starting any work inside the instrument.

CAUTION Take the necessary precautions when using flammable or explosive substances in this accessory.

Related Topics

Product Description

Preinstallation

Installation

Operation

Maintenance

Troubleshooting

Product Description

The Peltier Single Cell Holder delivers precise temperature control in a compact design. The accessory permits spectrophotometric measurements at controlled temperatures between 0 °C and 100 °C (32 °F and 212 °F). Measurements can be made at constant temperatures.

Contents

- Temperature Controller Front and Rear Panels

- Specifications

Related Topics

General Safety Information

Preinstallation

Installation

Operation

Maintenance

Troubleshooting

Temperature Controller Front and Rear Panels

The controller front panel features an LCD display with a three-button keypad.

The rear panel houses the main power connection with voltage selector, RS-232 and USB connectors for remote control, main power switch and cell holder connector.

Related Topics

Specifications

Specifications

This section describes the specifications for the Peltier temperature controller.

> **Contents**
>
> - Display/Keypad
>
> - Programmable Parameters
>
> - Displayed Values
>
> - Operating Specifications
>
> - External Control
>
> - Dimensions
>
> - Electrical Data
>
> - Description of Symbols
>
> - Environmental Conditions

Display/Keypad

The controller has an LCD screen and 3-button keypad to access the functions and set sample temperature and stirring rate. See Operation for details.

Programmable Parameters

- Temperature

- Stirring speed

Displayed Values

- Peltier block temperature

- Set temperature

- Stirring speed

- Heating/cooling power

Operating Specifications

- Stirring speed 0 to 1800 rpm

- Temperature range: 0 °C to 100 °C (32 °F to 212 °F)

- Temperature accuracy: ±0.15 °C (±0.27 °F) from 0 °C to 100 °C (32 °F to 212 °F)

- Temperature repeatability: typically ±0.1 °C (±0.18 °F)

- Temperature stability: typically ±0.1 °C (±0.18 °F)

- Specifications valid for ambient temperatures of 15 °C to 35 °C (59 °F to 95 °F)

External Control

- RS-232

- USB

Dimensions

- Width: 213 mm (8.3 in)

- Height: 178 mm (7 in)

- Depth: 269 mm (10.6 in)

- Weight: 3 kg (8 lbs)

Electrical Data

- Voltage: 115/120 V or 220/240 V ±10%

- Frequency: 50/60 Hz

- Power: 80 VA

- CE marked

Description of Symbols

CAUTION Symbol identifies the use of substances dangerous for health and the environment. For these substances, refer to the laws and terms in force for the laboratory using the instrument. Take the necessary precautions when using flammable or explosive substances.

Environmental Conditions

Performance and safety of the accessory are guaranteed if operated under the following conditions:

- Pollution degree 2 (standard CEI EN 61010-1).

- Installation category II with smaller transient over voltages (standard IEC 664).

- Mains voltage fluctuations must not exceed 10% of the nominal voltage.

- Location of use is indoors at an altitude <2000 m (6562 ft).

- Location of use exhibits a relative humidity <80% noncondensing.

- Location of use exhibits an ambient temperature between 10 °C and 35 °C (50 °F and 95 °F).

- Location of use is free from dust and vapors of solvents and acids.

Related Topics

Temperature Controller Front and Rear Panels

General Safety Information

Preinstallation

Installation

Operation

Maintenance

Troubleshooting

Preinstallation

Review this section before installing the accessory.

Contents

- Verifying the Power Supply and Fuse
- Changing the Voltage Setting or Fuse

Verifying the Power Supply and Fuse

NOTICE   The unit is factory set to operate at 220 V.

For operation at 120 V, configure the voltage selector on the Peltier back panel and insert the correct fuse as described in the following table.

Power Supply	Type of fuse - 250 V
240 V	T 1A, Slo Blo
120 V	T 2A, Slo Blo

Adjustment for frequency change between 50 and 60 Hz is not necessary.

Voltage display window

Fuse drawer tab

Related Topics

Changing the Voltage Setting or Fuse

General Safety Information

Preinstallation

Installation

Operation

Maintenance

Troubleshooting

Changing the Voltage Setting or Fuse

The current voltage setting is shown in the voltage display window above the power switch.

❖   **To change the voltage setting or fuse**

8. Turn off the Peltier unit and disconnect the power cord from the wall outlet.

9. Use a small screwdriver to pry the fuse drawer out of the fuse compartment by pulling the tab up and away from the drawer.
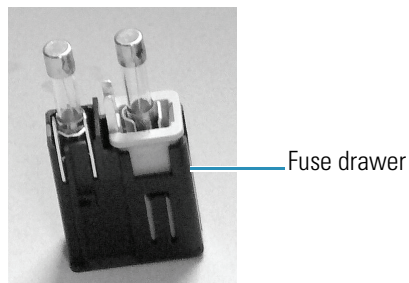
Fuse drawer

10. To change the voltage setting, remove the voltage selector cube from the drawer and carefully remove the fuse from the cube.

Voltage selector cube
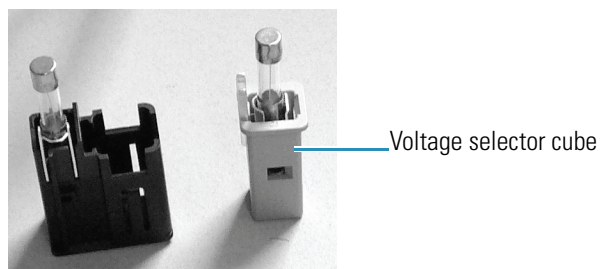
11. Rotate the cube 180 degrees and then replace the cube in the drawer. The correct voltage setting should display in the window on the bottom of the fuse drawer.

12. Replace the fuse with a new one that is appropriate for the selected voltage. See Verifying the Power Supply and Fuse.

13. Slide the fuse drawer back into the fuse compartment until it locks in place.

14. Connect the power cord to the wall outlet.

15. Turn on the main power switch on the Peltier unit back panel.

If the unit does not perform normally or if the replacement fuse blows, contact technical support.

Related Topics

Verifying the Power Supply and Fuse

General Safety Information

Installation

It is necessary to connect the cell holder to a water pump or fluid recirculator and to the temperature controller.

> **NOTICE** Avoid damage to the cell block. Do not operate the accessory without a water pump or fluid recirculator.

> **NOTICE** Avoid damage to the electronics. Do not connect or disconnect cables while the accessory is powered on.

Use only 12.5 mm (10 mm pathlength) square cuvettes with this accessory. Use at least 3 ml of solution for the analysis.

Before starting the Peltier accessory, familiarize yourself with the software features described in Operation. To agitate the sample during the measurement, place a magnetic stirrer in the cuvette and use the software to set the stirring speed.

❖ **To install the cell holder**

1. Open the sample compartment cover.

2. Remove the sample compartment front panel. See Sample Compartment Front Panel.

3. Remove the tubing access panel. See Tubing Access Panel.

4. Remove any existing cell holder or accessory.

5. Connect one end of the provided flat cable to the cell holder.
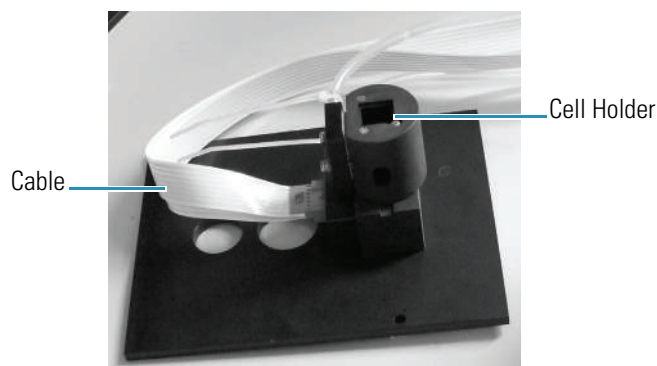
Cell Holder

Cable

6. Install the cell holder in the spectrophotometer sample compartment. See Installing a Manual Accessory.

7. Feed the other end of the cable through the opening behind the tubing access panel. See Tubing Access Panel.

8. Connect the free end of the cable to the Cell Holder socket on the back of the temperature controller.

9. Use appropriate tubing and the provided adapters to connect the two fluid ports on the cell holder to a water pump or fluid recirculator. See Installing a Liquid Thermostatted Accessory.

   Ensure the tubing does not obstruct the light beam.

Water ports

10. Replace the sample compartment front panel. See Sample Compartment Front Panel.

11. Close the sample compartment cover.

12. Turn on the power switch on the controller back panel.

13. Press and hold the **On** (center) button on the temperature controller for 2 seconds.

    The Normal Mode display shows the current temperature settings.

14. Set the software parameters to configure the temperature controller for operation. See Operation.

Related Topics

General Safety Information

Product Description

Preinstallation

Operation

Maintenance

Troubleshooting

Operation

Contents

- Setting the Target Temperature and Stir Speed

- Measuring Samples

Setting the Target Temperature and Stir Speed

INSIGHT software can be used to define a target temperature and display a temperature status monitor. A target temperature can also be set from the temperature controller front panel.

Contents

- Using INSIGHT Software to Set Temperature and Stir Speed
- Using the Peltier Controller to Set Temperature and Stir Speed

Related Topics

Using the Peltier Controller to Set Temperature and Stir Speed

Measuring Samples

Using INSIGHT Software to Set Temperature and Stir Speed

Contents

- Temperature and Stir Speed Settings
- Configuring a Target Temperature
- Displaying the Temperature Status Monitor

Temperature and Stir Speed Settings

In the selected application, use **Settings > Accessories > Temperature** to display the available settings for a temperature probe or controller. The Temperature features appear only when the driver for a temperature probe or controller is installed.

Feature	Description
Record temperature with measurement	If a temperature probe is used, records the temperature of the sample after each measurement. Temperature readings are stored in the sample properties.
Use temperature controller	If a Peltier cell holder or changer is used, defines a setpoint temperature for the cell block and a stir speed if desired. The available settings depend on the specifications for the temperature-controlled accessory.

Feature	Description
Start measurements at target temperature	Starts the measurement when the sample (requires a temperature probe) or cell block (requires a Peltier cell holder or changer) reaches a specified temperature.
Match probes to cell changer positions	If a temperature probe is used, maps probe channels 1 through 8 with up to eight cell changer positions. Useful only when using an automatic cell changer with multiple temperature probes.
	Deselect this to always record the temperature of probe 1.

Related Topics

Configuring a Target Temperature

Displaying the Temperature Status Monitor

Configuring a Target Temperature

❖ **To configure a target temperature**

1. Select **Start measurement at target temperature**.

2. Enter the **Target temperature** and **Tolerance** in °C.

   - **For a temperature probe.**
     To start the measurement when the probe reaches the target temperature, set **Start on** to **Probe temperature** and then select the **Probe channel**. The number of channels in the list box will match the available ports on the temperature probe interface box.

     The probe channel, current temperature and target range appear during the measurement.

     Monitoring temperature using Omega TC-08

     Channel 1 temperature: **30.0°C**

     Target range: 36.5 - 37.5 °C

     Measurement will proceed when temperature is in range.

     Press Cancel to cancel the measurement.

     [Start] [Cancel]

   - **For a temperature-controlled accessory.**
     To start the measurement when the cell block reaches the target temperature, set **Start on** to **Block temperature**.

Only the current temperature and target range appear during the measurement.

The Start button is disabled since the measurement is configured to start automatically at the target temperature.

3. To allow time for equilibration, select **Wait for equilibration** and enter the duration.

The remaining equilibration time is displayed during the measurement.

Monitoring temperature using Omega TC-08

Channel 1 temperature: **26.5°C**

Target range: 36.5 - 37.5 °C   Equilibration time: 2:00

Measurement will proceed when temperature is in range.

Press Cancel to cancel the measurement.

Start   Cancel

If the temperature moves outside the target range, the countdown resets when the temperature is again within range.

The **Start** button becomes active when the temperature remains in the target range for the entire equilibration period.

4. To start the measurement automatically after equilibration, select **Start measurement after equilibration**. This disables the Start button in the status dialog box. The measurement starts automatically when the temperature remains in the target range during the entire equilibration period.

Related Topics

Temperature and Stir Speed Settings

Displaying the Temperature Status Monitor

Displaying the Temperature Status Monitor

When a Peltier temperature-controlled accessory is installed, the INSIGHT software can be configured to display a temperature status monitor above the data display.

❖ **To display the temperature status monitor**

1. Click the **Configure** button above the data display for the selected application. See Instrument Status Monitors for more information.

A dialog box lists the available status monitors.

> **Note** The temperature controller option appears only when a temperature controller software driver is installed.

2. Select **Temperature controller status** and click **OK**.

The status monitor appears above the data display.

Related Topics

Temperature and Stir Speed Settings

Configuring a Target Temperature

Using the Peltier Controller to Set Temperature and Stir Speed

To start the controller, turn on the power switch on the controller back panel.

> **Contents**
> - Startup Mode
> - Standby Mode
> - Normal Mode

Startup Mode

After the controller power is turned on, the display appears in one of three modes: Stand-By, Normal, or Alarm. The image below indicates Normal mode.

Stirring speed   Actual block temperature   Heating/cooling power scale

Block set temperature
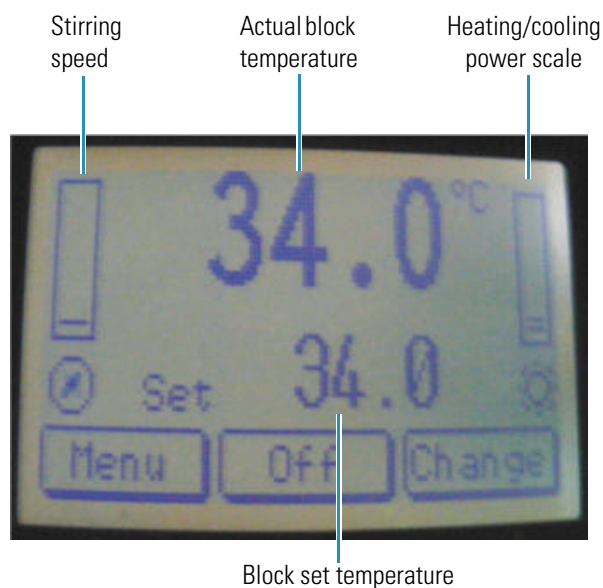
Table 4. Startup modes and button functions

Page	Mode	Display	Left button	Center button	Right button
Startup	Standby	Standby		On	
	Normal	Actual block temperature	Menu	Off	Change (Go to Change Set Point Page)
		Block Set temperature	(Go to Main Menu)		
		Stirring speed (left)			
		Heating/cooling power (right)			
	Alarm	Alarm description	Menu	Beep on/off	Reset alarm/change*
*Only if the manual alarm reset option has been configured					

Standby Mode

- Press and hold the **Center** button for one to two seconds to proceed to Normal Mode.

Normal Mode

Button Functions

- Press the **Left** button to go to the Main Menu page.

- Press the **Right** button to go to the Change Set Point page.

- Press and hold the **Center** button for one to two seconds to return to Stand-By Mode.

- From the Startup page in Normal Mode, use the **Change** button to move about the screen.

Table 5. Normal Mode functions

Page	Display	Description	Left button	Center button	Right button
Change Set Point	Flashing selected parameter	Change Temperature or Stirring Speed Set Point	Down	Up	Change
Main Menu	Parameter	User Parameters	Scroll	Select	Exit
	Configure	Configuration Parameters	Scroll	Up	Exit
	Diagnostic	Diagnostic Values	Down	Up	Exit

❖ **Changing the set temperature**

1. Highlight **Set Temperature**.

   The Change Set Point page is displayed with down and up arrows above the Left and Center buttons.

2. Use the **down** and **up** arrow buttons to change the set temperature.

3. When the desired set temperature is displayed, press **Change** to return to the Startup page.

❖ **Setting the stirring speed**

1. Highlight **Stirring Speed**.

2. The Change Set Point page is displayed with down and up arrows above the Left and Center buttons.

3. Use the **down** and **up** arrow buttons to change the stirring speed.

4. When the desired stirring speed is reached, press **Change** to return to the Startup page.

Parameters Menu

• Use the **Left** and **Center** buttons to scroll the screen up and down.

• Use the **Right** button to exit the screen and return to the Main Menu.

Table 6. User parameters and button functions

Number	Description	Default value
P-01	Temperature units	°C
P-02	Auto start	NO
P-03	Display contrast	5
P-04	Beeper	YES
P-05	Manual reset pre-alarm	NO

Configure Menu

Note A password is required to enter this menu.

NOTICE The Configure menu parameters are set at the factory and cannot be changed by the user.

Diagnostic Menu

• Use the **Left** and **Center** buttons to scroll the screen up and down.

• Use the **Right** button to exit the screen and return to the Main Menu.

Description	Measure unit
Cell temperature	°C
Radiator temperature	°C

Description	Measure unit
Water resistance	Kohm
Power	%
Cell voltage	Volt

Measuring Samples

Use INSIGHT software to measure samples with this accessory. See INSIGHT Software.

Related Topics

Using INSIGHT Software to Set Temperature and Stir Speed

Using the Peltier Controller to Set Temperature and Stir Speed

Maintenance

Contents

- Routine Maintenance
- Cleaning the Accessory

Routine Maintenance

The accessory requires little routine maintenance.

CAUTION Do not open the unit while the power cord is connected. Any action that makes it necessary to open the unit must be executed by authorized service personnel.

Related Topics

Cleaning the Accessory

Preinstallation

Installation

Operation

Troubleshooting

Cleaning the Accessory

To clean the accessory, use a cloth dampened with water or neutral detergent only. Do not use organic or abrasive solvents.

Related Topics

Routine Maintenance

Preinstallation

Installation

Operation

Troubleshooting

Troubleshooting

Problem	Possible Cause	Solution
Temperature or memory failure	• Temperature controller malfunction or incorrect use	**NOTICE** Immediately turn off the main power switch and then turn it on again. If the failure reoccurs, turn off the power and contact technical support. See Contacting Us.

Related Topics

General Safety Information

Product Description

Preinstallation

Installation

Operation

Maintenance

Troubleshooting

Probe Handling and Maintenance

This section provides general information for fiber optic probes including:

Contents

- Safety Considerations
- Operating Precautions
- Installation
- Operation
- Maintenance

Safety Considerations

To avoid injury while using cables and probes, do not stare at the UV beam or UV light leaving a coupled fiber optic cable.

Related Topics

Operating Precautions

Installation

Operation

Maintenance

Operating Precautions

Handle probes carefully:

- Do not allow hard materials (glass, metal, ceramic, etc.) to contact the probe's optical surfaces.
- Do not drop the probe or knock it against a hard surface.
- Do not subject the probe to rapid or excessive changes in temperature.
- Wipe off spilled chemicals immediately.

Handle fiber optic cables gently and follow these precautions:

- Do not drop the cables or knock them against a hard surface.

- Do not bend the cables or tightly coil them.

- Do not touch the end of a fiber optic cable connector.

- Do not overtighten or use tools to tighten the connectors when attaching the cables to the ports.

- Avoid twisting the cables when attaching them to the connectors.

- Keep a protective cap on each end of the cable when not in use.

Related Topics

Safety Considerations

Installation

Operation

Maintenance

Installation

Install the Integrated Fiber Optic Module before installing a probe.

WARNING Avoid UV radiation hazard. Do not stare at the beam or light leaving a coupled fiber optic cable.

Languages

AVERTISSEMENT Évitez l'exposition au rayonnements UV. Ne regardez jamais le faisceau de lumière qui sort d'une fibre optique couplé.

WARNUNG Gefahren durch UV-Strahlung sind zu vermeiden. Nicht in den Strahl eines gekoppelten Glasfaserkabels blicken.

AVVERTENZA Evitare il rischio di radiazioni UV.Non fissare il raggio di luce che esce dal cavo a fibre ottiche accoppiato.

ADVERTENCIA Evite el riesgo de radiación ultravioleta.No mire al rayo luminoso que sale de un cable de fibra óptica acoplado.

WARNING 防止 UV 放射危险。 请勿注视光纤电缆耦合留下的光束。

To install a probe, follow instructions for your instrument. See Attaching Cables and Probes.

NOTICE   When attaching fiber optic cables to the accessory ports, avoid:

- Twisting or bending the cable.
- Touching the tips with your fingers.
- Overtightening or using tools to tighten the connectors.

If the probe has a remote start cable, plug the connector into the Trigger port on the spectrophotometer. See Connectors.

Related Topics

Safety Considerations

Operating Precautions

Operation

Maintenance

Operation

Follow the probe manufacturer's recommendations for compatible samples and operating procedures.

Related Topics

Safety Considerations

Operating Precautions

Installation

Maintenance

Maintenance

Contents
- Routine Maintenance
- Cleaning Probes

Routine Maintenance

Follow these guidelines:

- Clean probes immediately after each measurement and before storing them. Refer to the cleaning instructions that came with the probe or, if you purchased the probe from us, follow these steps.

- Follow the manufacturer's recommendations for probe maintenance. (Check seals and O-rings regularly for excessive wear, especially from corrosive samples or extreme temperatures).

Related Topics

Safety Considerations

Operating Precautions

Installation

Operation

Cleaning Probes

Troubleshooting

Cleaning Probes

Clean probes immediately after each measurement and before storing them.

Follow these instructions to clean a probe purchased from us. For recommended agents and procedures to clean other probes, refer to the manufacturer's instructions.

NOTICE

- Do not use an ultrasonic bath to clean fiber optic probes.

- Use only recommended cleaning agents.

❖ **To clean a probe purchased from us**

1. Dampen lens paper or a soft cotton swab with one of the following agents:

   - Methanol

   - Isopropyl alcohol

   - Deionized water (can leave spots that affect performance).

2. Using minimal pressure, wipe the probe optics and shaft with the dampened lens paper or swab.

   NOTICE Do not soak the lens paper or swab with the cleaning agent. This may leave pools of liquid that do not dry properly.

   To remove stubborn materials, use a small amount of acetone.

Related Topics

Safety Considerations

Operating Precautions

Installation

Operation

Routine Maintenance

Troubleshooting

Rapid Mix Accessory

For Local Control instruments:

D://2606_APPL PHOTOPHYSICS_Stop Flow Accy_UG.pdfFor Computer Control instruments:

C://2606_APPL PHOTOPHYSICS_Stop Flow Accy_UG.pdfIf these links do not work, see your documentation CD.

Related Topics

Installing a Manual Accessory

Accessories

Reference Cell Holders

This section describes the reference cell holders available for your spectrophotometer. See Installing a Reference Cell Holder.

Contents

- Rectangular Reference Cell Holder
- Cylindrical Reference Cell Holder

Rectangular Reference Cell Holder

This holder accommodates rectangular reference cells with the following pathlengths: 10 mm, 20 mm, 40 mm, 50 mm and 100 mm. This is the standard reference cell holder provided with your spectrophotometer.
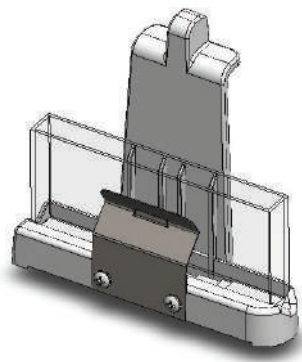
Related Topics

Installing a Reference Cell Holder

Sample Position Cell Holders

Cylindrical Reference Cell Holder

Cylindrical Reference Cell Holder

This holder fits cylindrical cells with the following pathlengths: 10 mm, 20 mm, 50 mm and 100 mm.
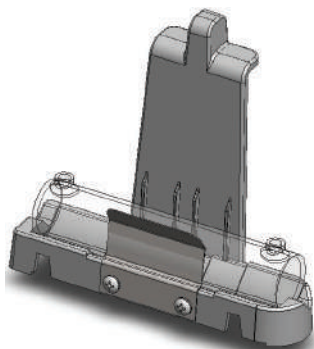
Related Topics

Installing a Reference Cell Holder

Sample Position Cell Holders

Rectangular Reference Cell Holder

Sample Position Cell Holders

This section describes cell holders that can be used in the sample position of your spectrophotometer. See Installing a Manual Accessory and Installing a Liquid Thermostatted Accessory for installation instructions.

> **Contents**
>
> - 10 mm Rectangular Cell Holder
> - Water Thermostatted 10 mm Rectangular Cell Holder
> - Cell Holder for 15 mm Beam Height Cells
> - Cylindrical Cell Holder
> - Solid Sample Holders
> - Universal Sample Holder Slide
> - Rotatable Test Tube and Cell Holder
> - Sample Holder for 1-Inch Square Cells
> - Sample Holder for Small Test Tubes and Vials
> - Variable Pathlength Rectangular Cell Holder
> - Variable Pathlength Cell Holder Slide

10 mm Rectangular Cell Holder

This single-cell holder is mounted on the standard baseplate and accommodates standard 10 mm pathlength cells.

Use the cell lifter to raise the cell for easy removal. This cell holder allows fine adjustment of the vertical and horizontal position of the cell. This feature is useful for aligning reduced volume and microcuvettes with the light beam.

Cell lifter and vertical alignment
Horizontal alignment
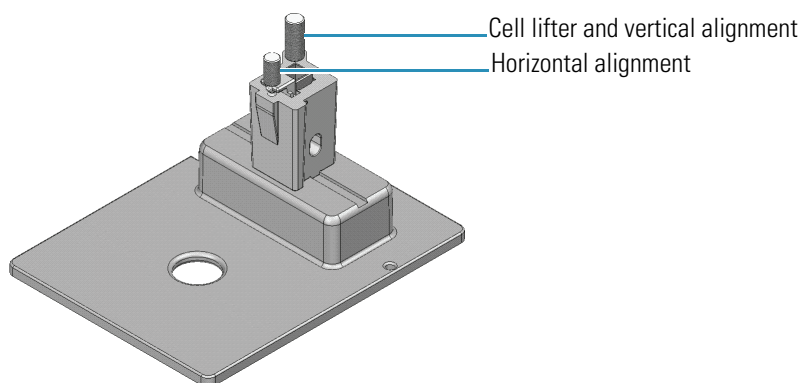
Related Topics

Installing a Manual Accessory

Reference Cell Holders

Water Thermostatted 10 mm Rectangular Cell Holder

Cell Holder for 15 mm Beam Height Cells

Cylindrical Cell Holder

Solid Sample Holders

Universal Sample Holder Slide

Rotatable Test Tube and Cell Holder

Sample Holder for 1-Inch Square Cells

Sample Holder for Small Test Tubes and Vials

Variable Pathlength Rectangular Cell Holder

Variable Pathlength Cell Holder Slide

Water Thermostatted 10 mm Rectangular Cell Holder

This is a temperature-controllable version of the rectangular cell holder. Fluids can be circulated through chambers in the cell holder block, allowing temperature-controlled measurements in the range between 5 °C and 95 °C (see Installing a Liquid Thermostatted Accessory). Two ports are provided to connect the cell holder to a recirculating liquid temperature control device. The connectors accept 1/4-inch internal diameter tubing.
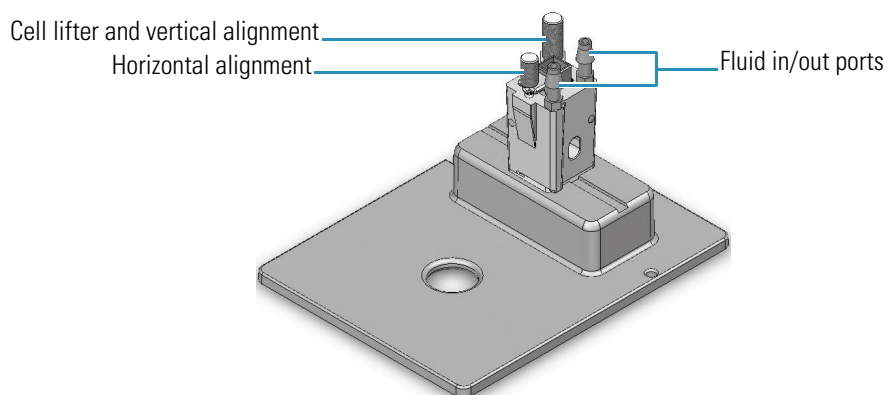
Cell lifter and vertical alignment

Horizontal alignment

Fluid in/out ports

Related Topics

Installing a Manual Accessory

Reference Cell Holders

10 mm Rectangular Cell Holder

Cell Holder for 15 mm Beam Height Cells

Cylindrical Cell Holder

Solid Sample Holders

Universal Sample Holder Slide

Rotatable Test Tube and Cell Holder

Sample Holder for 1-Inch Square Cells

Sample Holder for Small Test Tubes and Vials

Variable Pathlength Rectangular Cell Holder

Variable Pathlength Cell Holder Slide

Cell Holder for 15 mm Beam Height Cells

This cell holder accommodates 10 mm pathlength cells designed for instruments with a 15 mm z-height. The holder positions a 15 mm z-height cell properly for use with your spectrophotometer.
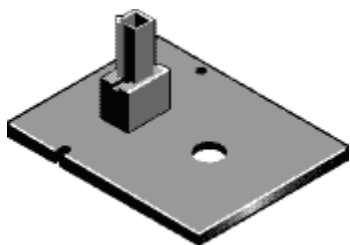
Related Topics

Cylindrical Cell Holder

This accessory accommodates cylindrical cells with a 22 mm external diameter and a pathlength of up to 100 mm. A flexible clip holds the cell in place.
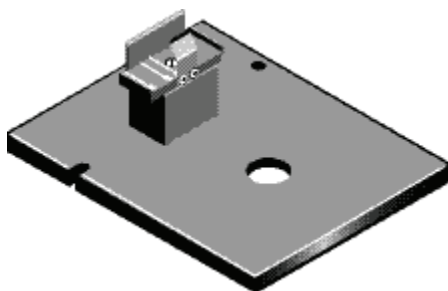
Related Topics

Installing a Manual Accessory

Reference Cell Holders

10 mm Rectangular Cell Holder

Water Thermostatted 10 mm Rectangular Cell Holder

Cell Holder for 15 mm Beam Height Cells

Solid Sample Holders

Universal Sample Holder Slide

Rotatable Test Tube and Cell Holder

Sample Holder for 1-Inch Square Cells

Sample Holder for Small Test Tubes and Vials

Variable Pathlength Rectangular Cell Holder

Variable Pathlength Cell Holder Slide

Solid Sample Holders

There are two types of solid sample holders, fixed position and variable position. These holders support slides and sample mounting accessories that conform to industry standard dimensions.

Height	Width	Thickness
50.8 mm (2 inches)	76.2 mm (3 inches)	2 mm (1/16 inch)

The fixed position Sample Slide Holder offers two positioning options, left (detector) side and right (monochromator) side.
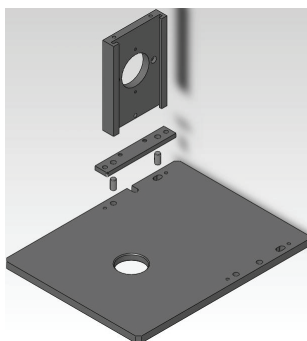
The variable position Sample Slide Holder comes with one slide holder that can be adjusted along a slide-rail from the extreme detector side of the sample compartment to within 3 cm of the monochromator side. For applications requiring more than one mounting slide, right and left slide holders are available.

• The right side slide holder can be positioned anywhere along the beam from the extreme right (monochromator) side of the sample compartment to within 3 cm of the left (detector) side.

• The left side slide holder is identical to the slide holder supplied with the baseplate.
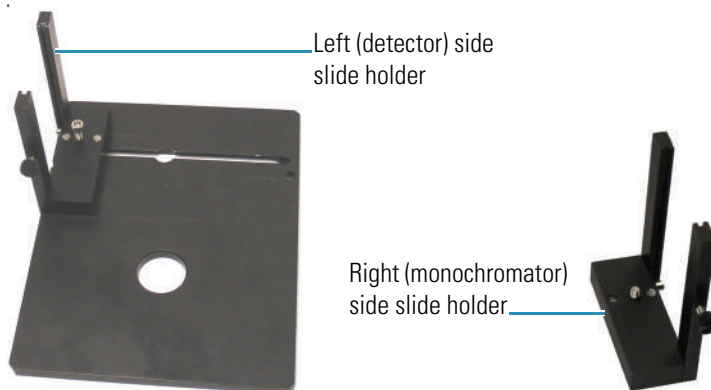
Left (detector) side slide holder

Right (monochromator) side slide holder

Related Topics

Installing a Manual Accessory

Reference Cell Holders

10 mm Rectangular Cell Holder

Water Thermostatted 10 mm Rectangular Cell Holder

Cell Holder for 15 mm Beam Height Cells

Cylindrical Cell Holder

Universal Sample Holder Slide

Rotatable Test Tube and Cell Holder

Sample Holder for 1-Inch Square Cells

Sample Holder for Small Test Tubes and Vials

Variable Pathlength Rectangular Cell Holder

Variable Pathlength Cell Holder Slide

Universal Sample Holder Slide

This accessory accommodates custom samples and requires a variable position Solid Sample Holder.
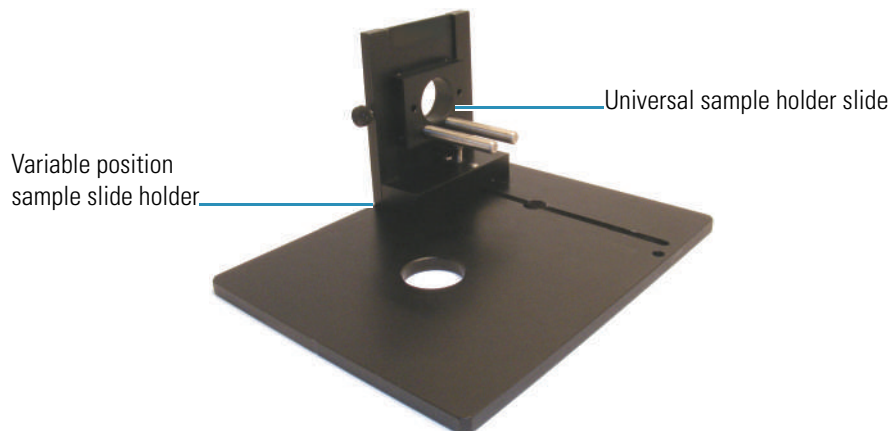
Universal sample holder slide

Variable position sample slide holder

Related Topics

Installing a Manual Accessory

Reference Cell Holders

10 mm Rectangular Cell Holder

Water Thermostatted 10 mm Rectangular Cell Holder

Cell Holder for 15 mm Beam Height Cells

Cylindrical Cell Holder

Solid Sample Holders

Rotatable Test Tube and Cell Holder

Sample Holder for 1-Inch Square Cells

Sample Holder for Small Test Tubes and Vials

Variable Pathlength Rectangular Cell Holder

Variable Pathlength Cell Holder Slide

Rotatable Test Tube and Cell Holder

This sample holder accommodates test tubes up to 1-inch in diameter and 5 inches high or a standard 10 mm pathlength cell. The base can be rotated to properly position the cell or test tube at the center of the sample compartment. The clip can also be used to secure filters, thin films and other solid samples in the light beam.
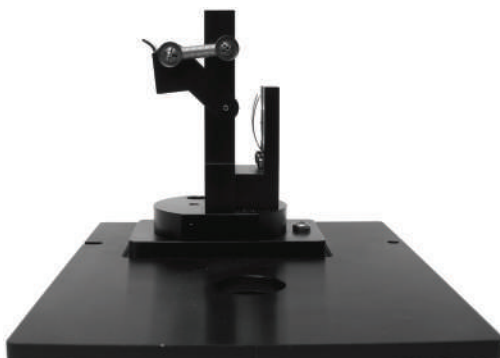
Related Topics

Sample Holder for 1-Inch Square Cells

This sample holder accommodates cells that are 1-inch square such as Hach® cells and AccuVac® vials.

Related Topics

Installing a Manual Accessory

Reference Cell Holders

10 mm Rectangular Cell Holder

Water Thermostatted 10 mm Rectangular Cell Holder

Cell Holder for 15 mm Beam Height Cells

Cylindrical Cell Holder

Solid Sample Holders

Universal Sample Holder Slide

Rotatable Test Tube and Cell Holder

Sample Holder for Small Test Tubes and Vials

Variable Pathlength Rectangular Cell Holder

Variable Pathlength Cell Holder Slide

Sample Holder for Small Test Tubes and Vials

This accessory can be used with test tubes and vials from 10 mm to 16 mm in diameter and up to 100 mm high.

NOTICE Exceeding the recommended diameter will cause the retaining clip to block the light beam.
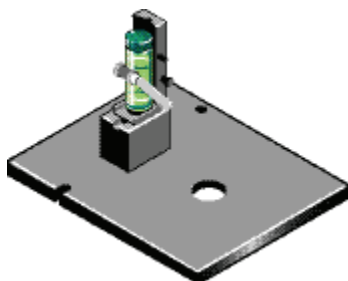
Related Topics

Installing a Manual Accessory

Reference Cell Holders

10 mm Rectangular Cell Holder

Water Thermostatted 10 mm Rectangular Cell Holder

Cell Holder for 15 mm Beam Height Cells

Cylindrical Cell Holder

Solid Sample Holders

Universal Sample Holder Slide

Rotatable Test Tube and Cell Holder

Sample Holder for 1-Inch Square Cells

Variable Pathlength Rectangular Cell Holder

Variable Pathlength Cell Holder Slide

Variable Pathlength Rectangular Cell Holder

This accessory accommodates rectangular cells with pathlengths ranging from 1 mm to 100 mm.

Use the knob to adjust the accessory to accommodate your cell.

> **NOTICE** Overtightening the accessory may damage or break the cell.
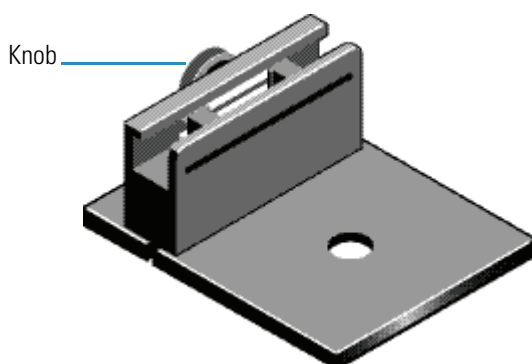
Knob

Related Topics

Installing a Manual Accessory

Reference Cell Holders

10 mm Rectangular Cell Holder

Water Thermostatted 10 mm Rectangular Cell Holder

Cell Holder for 15 mm Beam Height Cells

Cylindrical Cell Holder

Solid Sample Holders

Universal Sample Holder Slide

Rotatable Test Tube and Cell Holder

Sample Holder for 1-Inch Square Cells

Sample Holder for Small Test Tubes and Vials

Variable Pathlength Cell Holder Slide

Variable Pathlength Cell Holder Slide

This accessory accommodates rectangular cells with pathlengths ranging from 1 mm to 50 mm and requires a variable position Solid Sample Holder).
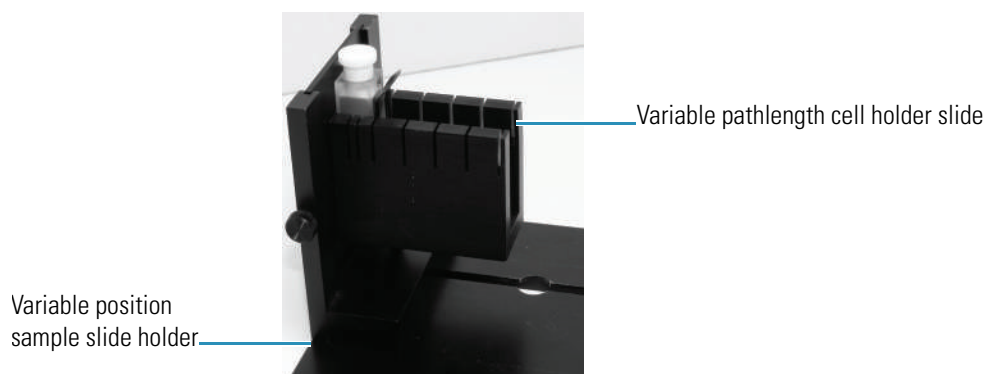
Variable pathlength cell holder slide

Variable position
sample slide holder

Related Topics

Installing a Manual Accessory

Reference Cell Holders

10 mm Rectangular Cell Holder

Water Thermostatted 10 mm Rectangular Cell Holder

Cell Holder for 15 mm Beam Height Cells

Cylindrical Cell Holder

Solid Sample Holders

Universal Sample Holder Slide

Rotatable Test Tube and Cell Holder

Sample Holder for 1-Inch Square Cells

Sample Holder for Small Test Tubes and Vials

Variable Pathlength Rectangular Cell Holder

Smart Linear 8-Cell Changer

The Linear Cell Changer allows automated measurements with up to eight cells. The accessory is mounted on our Smart Accessory base and accommodates 10 mm pathlength cuvettes. Purchase cells separately.

The unit can be used with a fluid recirculator or other device to control sample temperature and is compatible with our temperature probes.

8-cell holder

Smart Accessory base
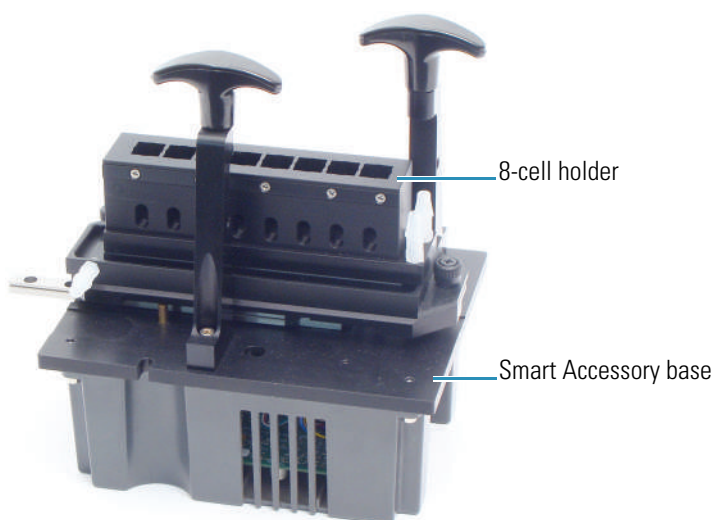
Contents

- Safety Considerations

- Operating Precautions

- Installation

- Operation

- Maintenance

- Troubleshooting

Related Topics

SPE-8W Smart Peltier Linear Cell Changer

Smart Rotary Cell Changer

Accessories

Safety Considerations

To avoid injury while using the accessory, keep hands and objects clear of the cell holder when calibrating, initializing or measuring samples with the cell changer.

Related Topics

Operating Precautions

Installation

Operation

Maintenance

Troubleshooting

Operating Precautions

Handle the accessory carefully:

- Secure any tubing to avoid blocking the light beam (move the cell holder through all possible positions).

- Do not allow moisture to leak into the accessory.

- Wipe off spilled chemicals immediately.

- Do not drop the accessory.

- Protect the accessory from mechanical shock.

Related Topics

Safety Considerations

Installation

Operation

Maintenance

Troubleshooting

Installation

Contents

- Installing a Smart Cell Changer

- Replacing the Cell Holder

Related Topics

Installing a Smart Cell Changer

It is not necessary to power off the instrument while installing or removing a Smart Accessory.

> **Note** The Smart Rotary Cell Changer and the Smart Linear Cell Changer cannot be used at the same time for double-beam instruments.

❖ **To install a cell changer**

1. Open the sample compartment door.

2. Remove the sample compartment front panel.

3. Remove any existing cell holder or accessory.

4. Install the accessory.

   The software displays a prompt to initialize the accessory.

CAUTION Avoid pinch hazard. Keep hands and objects clear of the accessory during initialization.

Languages

ATTENTION Évitez tout risque de pincement. Gardez vos mains, ainsi que tout objet, à l'écart de l'accessoire pendant l'initialisation.

VORSICHT Quetschungen sind zu vermeiden. Hände und Objekte sind während der Initialisierung vom Zubehör fern zu halten.

CAUTELA Evitare il rischio di pizzicamento. Tenere mani e oggetti lontano dall'accessorio durante l'inizializzazione.

PRECAUCIÓN Evite riesgos de atrapamiento. Mantenga manos y objetos lejos del alcance del accesorio durante la inicialización.

5. Replace the sample compartment front panel.

6. Close the sample compartment door.

7. Click **OK** to initialize the accessory.

   Initialization reads information about the accessory and moves it to position 1.

8. To use a temperature probe with the cell changer, see "Temperature Probe".

9. To connect a fluid recirculator or other device to control sample temperature on a thermostatted cell changer, see "Installing a Thermostatted Accessory."

10. Calibrate the cell changer (linear cell changers only) and set the software parameters to display the cell changer status monitor and configure the accessory for operation.

Related Topics

Opening and Closing the Sample and Reference Compartment Doors

Removable Panels

Installing a Smart Accessory

Installing a Liquid Thermostatted Accessory

Temperature Probe

Replacing the Cell Holder

Calibrating the Cell Changer

Cell Changer Settings

Displaying the Cell Changer Status Monitor

Installation

Replacing the Cell Holder

❖ **To remove the cell holder**

1. Loosen the two locking screws.
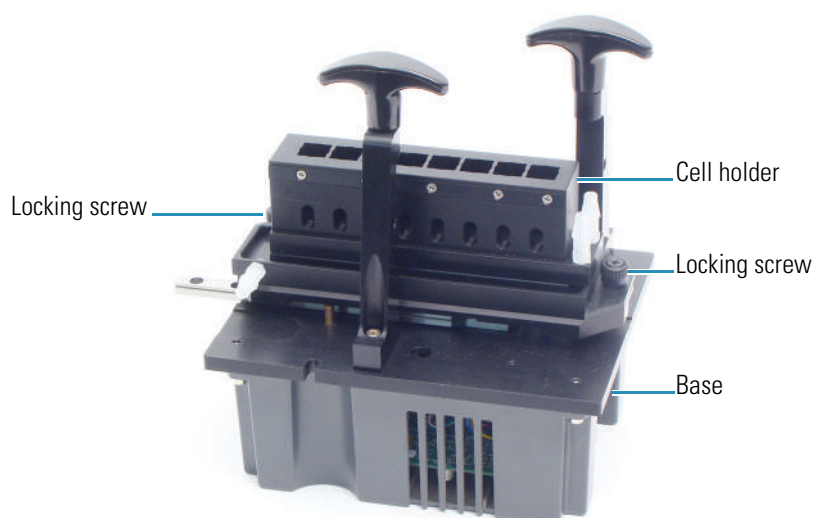
2. Lift the cell holder off the base.

❖ **To install the cell holder**

1. Line up the cell holder with the two alignment pins on the cell changer base.

2. Hand tighten the two locking screws.

3. Initialize the accessory. See Initializing the Cell Changer.

Related Topics

Installing a Smart Cell Changer

Installation

Operation

Contents

- Calibrating the Cell Changer
- Initializing the Cell Changer
- Cell Changer Settings
- Measuring Samples with the Cell Changer
- Displaying the Cell Changer Status Monitor

Related Topics

Safety Considerations

Operating Precautions

Calibrating the Cell Changer

The linear cell changer must be calibrated the first time it is installed in a spectrophotometer. Calibration aligns each cell with the light beam. This is especially important when using microcells with the cell changer. The calibration settings are stored in the instrument.

> **CAUTION** Avoid pinch hazard. Keep hands and objects clear of the accessory during operation.

Languages

> **Remarque** Évitez les risques de pincement. Éloignez les mains et les objets de l'accessoire pendant son fonctionnement.

> **Anmerkung** Quetschungen sind zu vermeiden. Hände und Objekte sind während des Betriebs vom Zubehör fern zu halten

> **N.B.** Evitare il rischio di pizzicamento.Tenere mani e oggetti lontano dall'accessorio durante l'operazione.

> **Nota** Evite riesgos de atrapamiento.Mantenga manos y objetos alejados del accesorio durante el funcionamiento.

> 防止被夹住的危险。 作业期间，请让手和其它物件远离辅助设备之处。 **CAUTION**

❖ **To calibrate the linear cell changer**

1. In INSIGHT software choose **System Settings > Calibrations**.

2. In the **Linear Cell Changer** group, click **Calibrate**.

   A status box shows several intensity values collected on each side of the expected best location for each cell. The average of the highest readings is stored for each cell.

   A message box appears when calibration is completed.

3. Click **OK**.

Related Topics

Initializing the Cell Changer

The accessory must be initialized each time it is installed and after changing the cell holder when the Smart base unit is installed. Initializing verifies the cell position and resets the cell holder to position 1.

 CAUTION Avoid pinch hazard. Keep hands and objects clear of the accessory during initialization.

Languages

 ATTENTION Évitez tout risque de pincement. Gardez vos mains, ainsi que tout objet, à l'écart de l'accessoire pendant l'initialisation.

 VORSICHT Quetschungen sind zu vermeiden. Hände und Objekte sind während der Initialisierung vom Zubehör fern zu halten.

 CAUTELA Evitare il rischio di pizzicamento. Tenere mani e oggetti lontano dall'accessorio durante l'inizializzazione.

 PRECAUCIÓN Evite riesgos de atrapamiento. Mantenga manos y objetos lejos del alcance del accesorio durante la inicialización.

❖ **To initialize a cell changer**

1. In the selected application, choose **Settings > Accessories > Cell Changer.**

2. Click **Reset**.

Related Topics

Calibrating the Cell Changer

Cell Changer Settings

Measuring Samples with the Cell Changer

Displaying the Cell Changer Status Monitor

Operation

Cell Changer Settings

In the selected application, use **Settings > Accessories > Cell Changer** to display the available settings for a cell changer. The Cell Changer features appear only when a cell changer accessory is installed.

Feature	Description
Accessory name	Shows the type and serial number read from the installed sample changer.
Current cell	The numbered boxes match the cells in the changer head. The green box indicates the cell positioned for measurement. To manually position a cell in the light beam, click its numbered box.
Available cells	The check boxes indicate cells enabled for use in the current template or active workbook. To disable or enable a cell, click its associated check box. Note that cell one is always enabled.
Reset	Initializes the cell changer and moves cell one into the light beam.

Related Topics

Calibrating the Cell Changer

Initializing the Cell Changer

Measuring Samples with the Cell Changer

Displaying the Cell Changer Status Monitor

Operation

Measuring Samples with the Cell Changer

The cell changer performs automated measurements based on the sample list.

> **CAUTION** Avoid pinch hazard. Keep hands and objects clear of the accessory during operation.

Languages

> **Remarque** Évitez les risques de pincement. Éloignez les mains et les objets de l'accessoire pendant son fonctionnement.

> **Anmerkung** Quetschungen sind zu vermeiden. Hände und Objekte sind während des Betriebs vom Zubehör fern zu halten.

> **N.B.** Evitare il rischio di pizzicamento. Tenere mani e oggetti lontano dall'accessorio durante l'operazione.

> **Nota** Evite riesgos de atrapamiento. Mantenga manos y objetos alejados del accesorio durante el funcionamiento.

> **CAUTION** 防止被夹住的危险。 作业期间，请让手和其它物件远离辅助设备之处。

❖ **To measure samples with the cell changer**

3. Click **Home** and click an application such as **Fixed** or **Scan**.

4. Choose **Settings > Accessories> Cell Changer.**

5. Under **Available Cells**, select the check boxes for the cells that will be used in the cell changer.

   To skip a cell changer position, deselect its check box.

   > **Note** Position 1 can not be deselected.

6. Set the other measurement parameters as desired. See the Settings tab for the selected application.

7. To measure a blank without using the sample list, click **Measure Fixed** and then click **Zero** (or **Measure Scan** and then **Baseline**).

   The Loading Guide shows one entry for the blank measurement.

Place the approproate material (or nothing) in position 1 of the cell changer and click **OK** to perform the measurement.

8. Click **Measure**.

A dialog box shows the current sample list.

9. Set **Number of samples** to the number of samples to be measured.

10. Use **Load Samples** to import the sample list or enter sample names and descriptions if desired. See **Settings > Samples** to create the list ahead of time.

11. Click **OK**.

The loading guide shows the measurement sequence for the cell changer as defined in the sample list.

12. Place the cuvettes in the correct cell changer positions.

> **Note** If the application requires a blank and it was not measured in step 4, the first cell changer position will be measured as the blank.

13. Click **OK** or press **Run** on the instrument keypad.

    To cancel, click **Cancel** or press **Stop** on the instrument keypad.

    If a blank is required, it will be measured first, followed by the samples in order.

    If the sample list has more entries than there are spaces in the cell changer, the Loading Guide reappears after the last cuvette is measured.

14. If the loading guide appears, remove all cuvettes from the cell changer and fill it with the next set of samples as defined in the loading guide.

15. Click **OK**.

16. Continue as above until all entries in the sample list have been measured.

Related Topics

Calibrating the Cell Changer

Initializing the Cell Changer

Cell Changer Settings

Displaying the Cell Changer Status Monitor

Operation

Displaying the Cell Changer Status Monitor

When a supported cell changer is installed, the selected application can be configured to display a cell changer status monitor above the data display.

❖ **To display a status monitor for an installed cell changer**

1. Click **Configure** above the data display for the selected application. See "Instrument Status Monitors" for more information.

   A dialog box appears.

   > **Note** The cell changer option appears in the dialog box only when a supported cell changer accessory is installed.

2. Select **Cell changer status** and click **OK**.

   A status monitor showing the current cell changer position appears above the data display.

Related Topics

Instrument Status Monitors

Calibrating the Cell Changer

Initializing the Cell Changer

Cell Changer Settings

Measuring Samples with the Cell Changer

Operation

Maintenance

Contents

- Routine Maintenance
- Cleaning the Accessory

Related Topics

Safety Considerations

Operating Precautions

Installation

Operation

Troubleshooting

Routine Maintenance

Clean the accessory regularly using approved methods (wipe off spilled chemicals immediately). See Cleaning the Accessory.

Related Topics

Cleaning the Accessory

Maintenance

Troubleshooting

Cleaning the Accessory

NOTICE Do not allow moisture to leak into the accessory interior.

❖ **To clean the accessory exterior**

1. Remove the accessory from the sample compartment. See Installing a Smart Accessory.

2. Use a cloth dampened with plain water to wipe the surface of the Smart Accessory base and cell holder.

3. Dry the surface with another cloth.

Related Topics

Routine Maintenance

Maintenance

Troubleshooting

Troubleshooting

Problem	Possible Cause	Solution
Absorbance values are inconsistent or higher than expected	The accessory is not aligned properly	Calibrate and then initialize the cell changer. See Calibrating the Cell Changer and Initializing the Cell Changer.

Related Topics

Safety Considerations

Operating Precautions

Installation

Operation

Maintenance

SPE-8W Smart Peltier Linear Cell Changer

This accessory includes a thermostatted linear 8-cell changer for 10 mm pathlength square cuvettes and a Peltier temperature controller that connects to a USB port on the spectrophotometer or computer. The accessory requires a water pump or recirculator, which must be purchased separately. Cell temperature can be controlled two ways: from the Peltier controller front panel or from the spectrophotometer using INSIGHT software. The Peltier controller may also be used to agitate the sample by placing a magnetic stirrer in the cuvette and selecting the stir speed.

Peltier temperature controller   Linear cell changer

Contents

- General Safety Information
- Product Description
- Preinstallation
- Installation
- Operation
- Maintenance
- Troubleshooting

Related Topics

Peltier Thermostatted Single Cell Holder

Smart Linear 8-Cell Changer

Accessories

General Safety Information

This equipment has been designed with an emphasis on quality, reliability and safety. We accept warranty responsibility for this accessory under the following conditions:

- Electrical installation in the room or building complies with regulations specified in the country where the equipment is to be used.

- The equipment is used in accordance with the provided instructions for use.

- All modifications and repairs are carried out by an authorized agent.

- Only modifications suggested and documented by us are to be made to any part of the accessory.

- The equipment installation is carried out in accordance with local requirements for responsibility and warranty.

CAUTION Always disconnect the power supply before starting any work inside the instrument.

CAUTION Take the necessary precautions when using flammable or explosive substances in this accessory.

Related Topics

Product Description

Preinstallation

Installation

Operation

Maintenance

Troubleshooting

Product Description

The Peltier Linear Cell Changer permits spectrophotometric measurements at controlled temperatures between 0 °C and 100 °C. Measurements can be made at constant temperatures.

The accessory provides thermoelectric heating and cooling through the cell block.

> **Contents**
>
> - System Connections
> - External Connections
> - Temperature Controller Front and Rear Panel
> - Specifications

Related Topics

General Safety Information

Preinstallation

Installation

Operation

Maintenance

Troubleshooting

System Connections
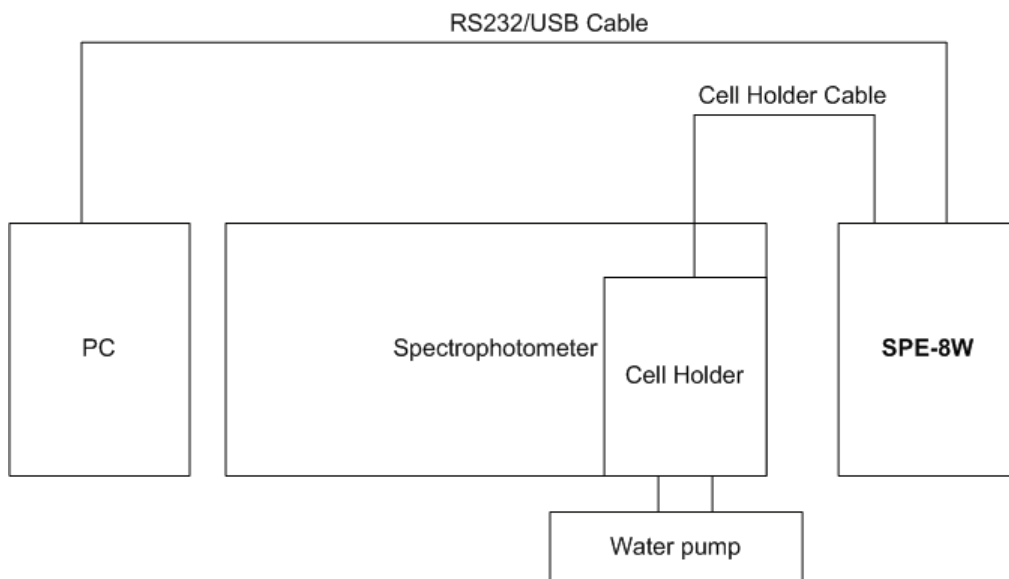
Related Topics

External Connections

Temperature Controller Front and Rear Panel

Specifications

External Connections

Communications are performed manually or via remote control through the RS-232 or USB connector.

Related Topics

System Connections

Temperature Controller Front and Rear Panel

Specifications

Temperature Controller Front and Rear Panel

The controller front panel features an LCD display with a three-button keypad.

The rear panel houses the main power connection with voltage selector, RS-232 and USB connectors for remote control, main power switch and cell holder connector.
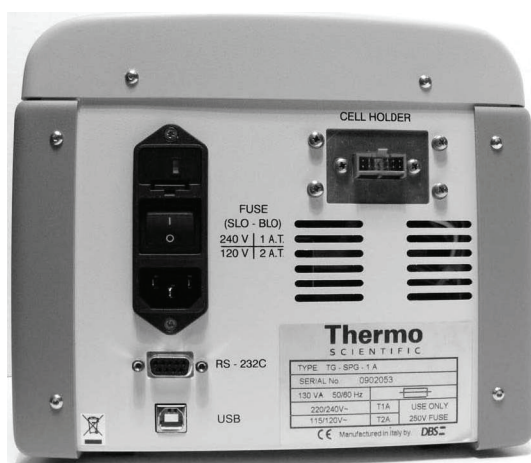
Related Topics

System Connections

External Connections

Specifications

Specifications

This section describes the specifications for the Peltier temperature controller.

Contents

- Display/Keypad

- Programmable Parameters

- Displayed Values

- Operating Specifications

- External Control

- Dimensions

- Electrical Data

- Description of Symbols

- Environmental Conditions

Display/Keypad

The controller has an LCD screen and 3-button keypad to access the functions and set sample temperature and stirring rate. See Operation for details.

Programmable Parameters

- Temperature

- Stirring speed

Displayed Values

- Peltier block temperature

- Set temperature

- Stirring speed

- Heating/cooling power

Operating Specifications

- Stirring speed 0 to 1800 rpm

- Temperature range: 0 °C to 100 °C (32 °F to 212 °F)

- Temperature accuracy: ±0.15 °C (±0.27 °F) from 0 °C to 100 °C (32 °F to 212 °F)

- Temperature repeatability: typically ±0.1 °C (±0.18 °F)

- Temperature stability: typically ±0.1 °C (±0.18 °F)

- Specifications valid for ambient temperatures from 15 °C to 35 °C (59 °F to 95 °F)

External Control

- RS-232

- USB

Dimensions

- Width: 216 mm (8.5 in)

- Height: 184 mm (7.25 in)

- Depth: 269 mm (10.6 in)

- Weight: 3 kg (8 lbs)

Electrical Data

- Voltage: 115/120 V or 220/240 V ±10% (factory setting 220/240 V)

- Frequency: 50/60 Hz

- Power: 100 VA

- CE marked

Description of Symbols

CAUTION Symbol identifying the use of substances dangerous for health and the environment. For these substances, refer to the laws and terms in force for the laboratory using the instrument. Take the necessary precautions when using flammable or explosive substances.

Environmental Conditions

Performance and safety of the accessory are guaranteed if operated under the following conditions:

- Pollution degree 2 (standard CEI EN 61010-1).

- Installation category II with smaller transient over voltages (standard IEC 664).

- Mains voltage fluctuations must not exceed 10% of the nominal voltage.

- Location of use is indoors at an altitude <2000 m (6562 ft).

- Location of use exhibits a relative humidity <80% noncondensing.

- Location of use exhibits an ambient temperature between 10 °C and 35 °C (50 °F and 95 °F).

- Location of use is free from dust and vapors of solvents and acids.

Related Topics

System Connections

External Connections

Temperature Controller Front and Rear Panel

Preinstallation

Review this section before installing the accessory.

> **Contents**
> - Verifying the Power Supply and Fuse
> - Changing the Voltage Setting or Fuse

Related Topics

General Safety Information

Product Description

Installation

Operation

Maintenance

Troubleshooting

Verifying the Power Supply and Fuse

> **NOTICE**   The unit is factory set to operate at 220 V.

For operation at 120 V, configure the voltage selector on the Peltier back panel and insert the correct fuse as described in the following table.

Power Supply	Type of fuse - 250 V
240 V	T 1A, Slo Blo
120 V	T 2A, Slo Blo

Adjustment for frequency change between 50 and 60 Hz is not necessary.

Voltage display window

Fuse drawer tab
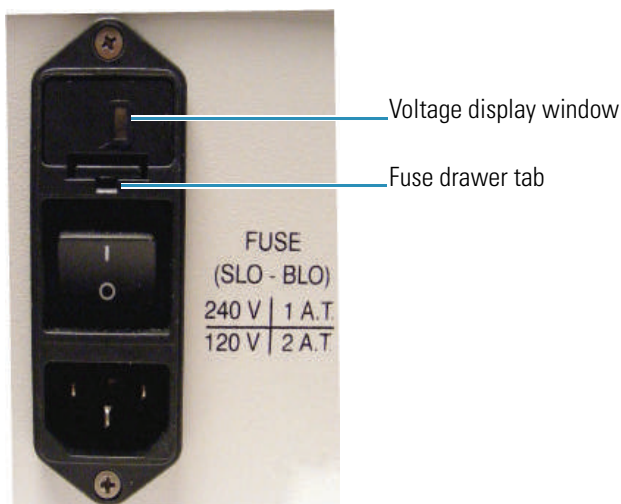
Related Topics

Changing the Voltage Setting or Fuse

The current voltage setting is shown in the voltage display window above the power switch.

❖ **To change the voltage setting or fuse**

4. Turn off the Peltier unit and disconnect the power cord from the wall outlet.

5. Use a small screwdriver to pry the fuse drawer out of the fuse compartment by pulling the tab up and away from the drawer.
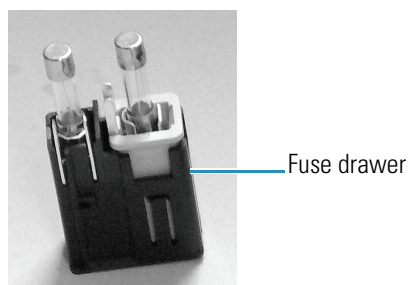
Fuse drawer

6. To change the voltage setting, remove the voltage selector cube from the drawer and carefully remove the fuse from the cube.

Voltage selector cube
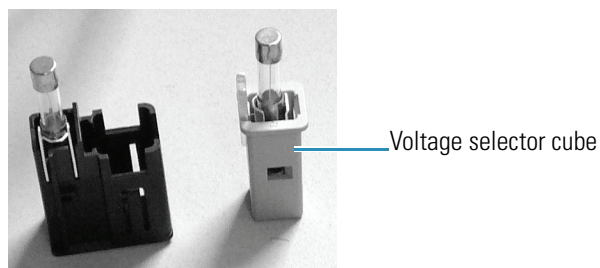
7. Rotate the cube 180 degrees and then replace the cube in the drawer. The correct voltage setting should display in the window on the bottom of the fuse drawer.

8. Replace the fuse with a new one that is appropriate for the selected voltage. See Verifying the Power Supply and Fuse.

9. Slide the fuse drawer back into the fuse compartment until it locks in place.

10. Connect the power cord to the wall outlet.

11. Turn on the main power switch on the Peltier unit back panel.

If the unit does not perform normally or if the replacement fuse blows, contact technical support.

Related Topics

Verifying the Power Supply and Fuse

Preinstallation

Installation

It is necessary to connect the cell holder to a water pump or fluid recirculator and to the temperature controller.

> **NOTICE**   Avoid damage to the cell block. Do not operate the accessory without a water pump or fluid recirculator.

> **NOTICE**   Avoid damage to the electronics. Do not connect or disconnect cables while the accessory is powered on.

Use only 12.5 mm (10 mm pathlength) square cuvettes with this accessory. Use at least 3 ml of solution for the analysis.

Before starting the accessory, familiarize yourself with the software features described in Operation. To agitate the sample during the measurement, place a magnetic stirrer in the cuvette and use the software to set the stirring speed.

❖ **To install the cell changer**

1. Open the sample compartment cover.

2. Remove the sample compartment front panel. See Sample Compartment Front Panel.

3. Remove the tubing access panel. See Tubing Access Panel.

4. Remove any existing cell holder or accessory.

5. Connect one end of the provided flat cable to the cell holder.

Cable Connector
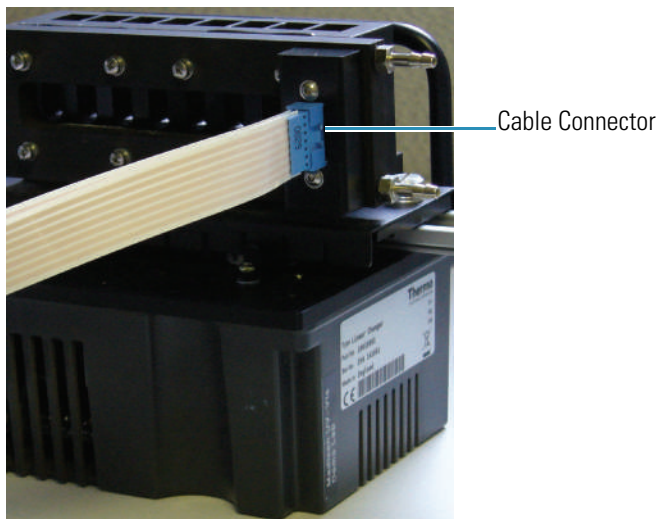
6. Install the cell changer in the spectrophotometer sample compartment. See Installing a Smart Accessory.

   The software displays a prompt to initialize the accessory.

CAUTION Avoid pinch hazard. Keep hands and objects clear of the accessory during initialization.

Languages

ATTENTION Évitez tout risque de pincement. Gardez vos mains, ainsi que tout objet, à l'écart de l'accessoire pendant l'initialisation.

VORSICHT Quetschungen sind zu vermeiden. Hände und Objekte sind während der Initialisierung vom Zubehör fern zu halten.

CAUTELA Evitare il rischio di pizzicamento. Tenere mani e oggetti lontano dall'accessorio durante l'inizializzazione.

PRECAUCIÓN Evite riesgos de atrapamiento. Mantenga manos y objetos lejos del alcance del accesorio durante la inicialización.

7. Feed the other end of the cable through the opening behind the tubing access panel. See Tubing Access Panel.

8. Connect the free end of the cable to the Cell Holder socket on the back of the temperature controller.

9. Use appropriate tubing and the provided adapters to connect the two fluid ports on the cell holder to a water pump or fluid recirculator. See Installing a Liquid Thermostatted Accessory.

    Ensure the tubing and cable do not obstruct the light beam. Use the provided clips if necessary and test all cell changer positions.
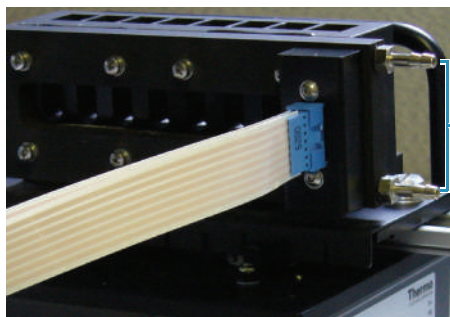
10. Replace the sample compartment front panel. See Sample Compartment Front Panel.

11. Close the sample compartment cover.

12. Turn on the power switch on the controller back panel.

13. Press and hold the **On** (center) button on the temperature controller for 2 seconds.

    The Normal Mode display shows the current temperature settings.

14. Calibrate the cell changer. See Calibrating the Cell Changer.

15. Set the software parameters to display status monitors and configure the temperature controller and cell changer for operation. See Operation.

Related Topics

General Safety Information

Product Description

Preinstallation

Operation

Maintenance

Troubleshooting

Operation

Contents

- Calibrating the Cell Changer

- Initializing the Cell Changer

- Setting the Target Temperature and Stir Speed

- Configuring the Cell Changer

- Measuring Samples with the Cell Changer

Related Topics

General Safety Information

Product Description

Preinstallation

Installation

Maintenance

Troubleshooting

Calibrating the Cell Changer

The linear cell changer must be calibrated the first time it is installed in a spectrophotometer. Calibration aligns each cell with the light beam. This is especially important when using microcells with the cell changer. The calibration settings are stored in the instrument.

> **CAUTION** Avoid pinch hazard. Keep hands and objects clear of the accessory during operation.

Languages

> **Remarque** Évitez les risques de pincement. Éloignez les mains et les objets de l'accessoire pendant son fonctionnement.

> **Anmerkung** Quetschungen sind zu vermeiden. Hände und Objekte sind während des Betriebs vom Zubehör fern zu halten

> **N.B.** Evitare il rischio di pizzicamento.Tenere mani e oggetti lontano dall'accessorio durante l'operazione.

> **Nota** Evite riesgos de atrapamiento.Mantenga manos y objetos alejados del accesorio durante el funcionamiento.

> 防止被夹住的危险。 作业期间，请让手和其它物件远离辅助设备之处。 **CAUTION**

❖ **To calibrate the linear cell changer**

1. In INSIGHT software choose **System Settings > Calibrations**.

2. In the **Linear Cell Changer** group, click **Calibrate**.

   A status box shows several intensity values collected on each side of the expected best location for each cell. The average of the highest readings is stored for each cell.

   A message box appears when calibration is completed.

3. Click **OK**.

Related Topics

Initializing the Cell Changer

Setting the Target Temperature and Stir Speed

Configuring the Cell Changer

Operation

Initializing the Cell Changer

The accessory must be initialized each time it is installed and after changing the cell holder when the Smart base unit is installed. Initializing verifies the cell position and resets the cell holder to position 1.

 CAUTION Avoid pinch hazard. Keep hands and objects clear of the accessory during initialization.

Languages

 ATTENTION Évitez tout risque de pincement. Gardez vos mains, ainsi que tout objet, à l'écart de l'accessoire pendant l'initialisation.

 VORSICHT Quetschungen sind zu vermeiden. Hände und Objekte sind während der Initialisierung vom Zubehör fern zu halten.

 CAUTELA Evitare il rischio di pizzicamento. Tenere mani e oggetti lontano dall'accessorio durante l'inizializzazione.

 PRECAUCIÓN Evite riesgos de atrapamiento. Mantenga manos y objetos lejos del alcance del accesorio durante la inicialización.

❖ **To initialize a cell changer**

1. In the selected application, choose **Settings > Accessories > Cell Changer.**

2. Click **Reset**.

Related Topics

Calibrating the Cell Changer

Configuring the Cell Changer

Operation

Setting the Target Temperature and Stir Speed

INSIGHT software can be used to define a target temperature and display a temperature status monitor. A target temperature can also be set from the temperature controller front panel.

Contents

- Using INSIGHT Software to Set Temperature and Stir Speed

- Using the Peltier Controller to Set Temperature and Stir Speed

Related Topics

Calibrating the Cell Changer

Initializing the Cell Changer

Configuring the Cell Changer

Operation

Using INSIGHT Software to Set Temperature and Stir Speed

Contents

- Temperature and Stirrer Settings

- Configuring a Target Temperature

- Displaying the Temperature Status Monitor

Related Topics

Using the Peltier Controller to Set Temperature and Stir Speed

Operation

Temperature and Stirrer Settings

In the selected application, use **Settings > Accessories > Temperature** to display the available settings for a temperature probe or controller. The Temperature features appear only when the driver for a temperature probe or controller is installed.

Feature	Description
Record temperature with measurement	If a temperature probe is used, records the temperature of the sample after each measurement. Temperature readings are stored in the sample properties.
Use temperature controller	If a Peltier cell holder or changer is used, defines a setpoint temperature for the cell block and a stir speed if desired. The available settings depend on the specifications for the temperature-controlled accessory.
Start measurements at target temperature	Starts the measurement when the sample (requires a temperature probe) or cell block (requires a Peltier cell holder or changer) reaches a specified temperature.
Match probes to cell changer positions	If a temperature probe is used, maps probe channels 1 through 8 with up to eight cell changer positions. Useful only when using an automatic cell changer with multiple temperature probes.
	Deselect this to always record the temperature of probe 1.

Related Topics

Configuring a Target Temperature

Displaying the Temperature Status Monitor

Using INSIGHT Software to Set Temperature and Stir Speed

Configuring a Target Temperature

❖ **To configure a target temperature**

1. Select **Start measurement at target temperature**.

2. Enter the **Target temperature** and **Tolerance** in °C.

   - **For a temperature probe.**
     To start the measurement when the probe reaches the target temperature, set **Start on** to **Probe temperature** and then select the **Probe channel**. The number of channels in the list box will match the available ports on the temperature probe interface box.

     The probe channel, current temperature and target range appear during the measurement.

- **For a temperature-controlled accessory.**
  To start the measurement when the cell block reaches the target temperature, set **Start on** to **Block temperature**.

  Only the current temperature and target range appear during the measurement.

  The Start button is disabled since the measurement is configured to start automatically at the target temperature.

3. To allow time for equilibration, select **Wait for equilibration** and enter the duration.

   The remaining equilibration time is displayed during the measurement.

   If the temperature moves outside the target range, the countdown resets when the temperature is again within range.

   The **Start** button becomes active when the temperature remains in the target range for the entire equilibration period.

4. To start the measurement automatically after equilibration, select **Start measurement after equilibration**. This disables the Start button in the status dialog box. The measurement starts automatically when the temperature remains in the target range during the entire equilibration period.

Related Topics

Temperature and Stirrer Settings

Displaying the Temperature Status Monitor

When a Peltier temperature-controlled accessory is installed, the INSIGHT software can be configured to display a temperature status monitor above the data display.

❖ **To display the temperature status monitor**

1. Click the **Configure** button above the data display for the selected application. See Instrument Status Monitors for more information.

   A dialog box lists the available status monitors.

   > **Note** The temperature controller option appears only when a temperature controller software driver is installed.

2. Select **Temperature controller status** and click **OK**.

   The status monitor appears above the data display.

Related Topics

Using the Peltier Controller to Set Temperature and Stir Speed

To start the controller, turn on the power switch on the controller back panel.

Contents

- Startup Mode
- Standby Mode
- Normal Mode

Startup Mode

After the controller power is turned on, the display appears in one of three modes: Stand-By, Normal, or Alarm. The image below indicates Normal mode.

Block set temperature

Table 7. Startup modes and button functions

Page	Mode	Display	Left button	Center button	Right button
Startup	Standby	Standby		On	
	Normal	Actual block temperature	Menu	Off	Change (Go to Change Set Point Page)
		Block Set temperature	(Go to Main Menu)		
		Stirring speed (left)			
		Heating/cooling power (right)			
	Alarm	Alarm description	Menu	Beep on/off	Reset alarm/change*

*Only if the manual alarm reset option has been configured

Standby Mode

- Press and hold the **Center** button for one to two seconds to proceed to Normal Mode.

Normal Mode

Button Functions

- Press the **Left** button to go to the Main Menu page.

- Press the **Right** button to go to the Change Set Point page.

- Press and hold the **Center** button for one to two seconds to return to Stand-By Mode.

- From the Startup page in Normal Mode, use the **Change** button to move about the screen.

Table 8. Normal Mode functions

Page	Display	Description	Left button	Center button	Right button
Change Set Point	Flashing selected parameter	Change Temperature or Stirring Speed Set Point	Down	Up	Change
Main Menu	Parameter	User Parameters	Scroll	Select	Exit
	Configure	Configuration Parameters	Scroll	Up	Exit
	Diagnostic	Diagnostic Values	Down	Up	Exit

❖ **Changing the set temperature**

1. Highlight **Set Temperature**.

   The Change Set Point page is displayed with down and up arrows above the Left and Center buttons.

2. Use the **down** and **up** arrow buttons to change the set temperature.

3. When the desired set temperature is displayed, press **Change** to return to the Startup page.

❖ **Setting the stirring speed**

1. Highlight **Stirring Speed**.

2. The Change Set Point page is displayed with down and up arrows above the Left and Center buttons.

3. Use the **down** and **up** arrow buttons to change the stirring speed.

4. When the desired stirring speed is reached, press **Change** to return to the Startup page.

Parameters Menu

- Use the **Left** and **Center** buttons to scroll the screen up and down.

- Use the **Right** button to exit the screen and return to the Main Menu.

Table 9. User parameters and button functions

Number	Description	Default value
P-01	Temperature units	°C
P-02	Auto start	NO
P-03	Display contrast	5
P-04	Beeper	YES
P-05	Manual reset pre-alarm	NO

Configure Menu

> **Note** A password is required to enter this menu.

> **NOTICE** The Configure menu parameters are set at the factory and cannot be changed by the user.

Diagnostic Menu

- Use the **Left** and **Center** buttons to scroll the screen up and down.

- Use the **Right** button to exit the screen and return to the Main Menu.

Description	Measure unit
Cell temperature	°C
Radiator temperature	°C
Water resistance	Kohm
Power	%
Cell voltage	Volt

Related Topics

Using INSIGHT Software to Set Temperature and Stir Speed

Operation

Configuring the Cell Changer

> **Contents**
> - Cell Changer Settings
> - Displaying the Cell Changer Status Monitor

Related Topics

Calibrating the Cell Changer

Initializing the Cell Changer

Setting the Target Temperature and Stir Speed

Operation

Cell Changer Settings

In the selected application, use **Settings > Accessories > Cell Changer** to display the available settings for a cell changer. The Cell Changer features appear only when a cell changer accessory is installed.

Feature	Description
Accessory name	Shows the type and serial number read from the installed sample changer.
Current cell	The numbered boxes match the cells in the changer head. The green box indicates the cell positioned for measurement. To manually position a cell in the light beam, click its numbered box.
Available cells	The check boxes indicate cells enabled for use in the current template or active workbook. To disable or enable a cell, click its associated check box. Note that cell one is always enabled.
Reset	Initializes the cell changer and moves cell one into the light beam.

Related Topics

Displaying the Temperature Status Monitor

Operation

Displaying the Cell Changer Status Monitor

When a supported cell changer is installed, the selected application can be configured to display a cell changer status monitor above the data display.

❖ **To display a status monitor for an installed cell changer**

1. Click **Configure** above the data display for the selected application. See "Instrument Status Monitors" for more information.

   A dialog box appears.

   > **Note** The cell changer option appears in the dialog box only when a supported cell changer accessory is installed.

2. Select **Cell changer status** and click **OK**.

   A status monitor showing the current cell changer position appears above the data display.

Related Topics

Configuring a Target Temperature

Operation

Measuring Samples with the Cell Changer

The cell changer performs automated measurements based on the sample list.

> **CAUTION** Avoid pinch hazard. Keep hands and objects clear of the accessory during operation.

Languages

> **Remarque** Évitez les risques de pincement. Éloignez les mains et les objets de l'accessoire pendant son fonctionnement.

> **Anmerkung** Quetschungen sind zu vermeiden. Hände und Objekte sind während des Betriebs vom Zubehör fern zu halten.

> **N.B.** Evitare il rischio di pizzicamento.Tenere mani e oggetti lontano dall'accessorio durante l'operazione.

> **Nota** Evite riesgos de atrapamiento. Mantenga manos y objetos alejados del accesorio durante el funcionamiento.

> 防止被夹住的危险。 作业期间，请让手和其它物件远离辅助设备之处。 **CAUTION**

❖ **To measure samples with the cell changer**

3. Click **Home** and click an application such as **Fixed** or **Scan**.

4. Choose **Settings > Accessories> Cell Changer.**

5. Under **Available Cells**, select the check boxes for the cells that will be used in the cell changer.

   To skip a cell changer position, deselect its check box.

   > **Note** Position 1 can not be deselected.

6. Set the other measurement parameters as desired. See the Settings tab for the selected application.

7. To measure a blank without using the sample list, click **Measure Fixed** and then click **Zero** (or **Measure Scan** and then **Baseline**).

The Loading Guide shows one entry for the blank measurement.

Place the approproate material (or nothing) in position 1 of the cell changer and click **OK** to perform the measurement.

8. Click **Measure**.

A dialog box shows the current sample list.

9. Set **Number of samples** to the number of samples to be measured.

10. Use **Load Samples** to import the sample list or enter sample names and descriptions if desired. See **Settings > Samples** to create the list ahead of time.

11. Click **OK**.

The loading guide shows the measurement sequence for the cell changer as defined in the sample list.

12. Place the cuvettes in the correct cell changer positions.

> **Note** If the application requires a blank and it was not measured in step 4, the first cell changer position will be measured as the blank.

13. Click **OK** or press **Run** on the instrument keypad.

    To cancel, click **Cancel** or press **Stop** on the instrument keypad.

    If a blank is required, it will be measured first, followed by the samples in order.

    If the sample list has more entries than there are spaces in the cell changer, the Loading Guide reappears after the last cuvette is measured.

14. If the loading guide appears, remove all cuvettes from the cell changer and fill it with the next set of samples as defined in the loading guide.

15. Click **OK**.

16. Continue as above until all entries in the sample list have been measured.

Related Topics

Calibrating the Cell Changer

Initializing the Cell Changer

Setting the Target Temperature and Stir Speed

Configuring the Cell Changer

Operation

Maintenance

Contents

- Routine Maintenance

- Cleaning the Accessory

Related Topics

General Safety Information

Product Description

Preinstallation

Installation

Operation

Troubleshooting

Routine Maintenance

The accessory requires little routine maintenance.

> **CAUTION** Do not open the unit while the power cord is connected. Any action that makes it necessary to open the unit must be executed by authorized service personnel.

Related Topics

Cleaning the Accessory

Maintenance

Troubleshooting

Cleaning the Accessory

To clean the accessory, use a cloth damped with water or neutral detergent only. Do not use organic or abrasive solvents.

Related Topics

Routine Maintenance

Maintenance

Troubleshooting

Troubleshooting

Problem	Possible Cause	Solution
Absorbance values are inconsistent or higher than expected	The accessory is not aligned properly	Calibrate and then initialize the cell changer. See Calibrating the Cell Changer and Initializing the Cell Changer.
Temperature or memory failure	Recirculator malfunction or incorrect use	**NOTICE** Immediately turn off the main power switch and then turn it on again. If the failure reoccurs, turn off the power and contact technical support. See Contacting Us.

Related Topics

General Safety Information

Product Description

Preinstallation

Installation

Operation

Maintenance

Smart Rotary Cell Changer

The Smart Rotary Cell Changer includes a cell holder mounted on a Smart Accessory base. The cell holder accommodates seven standard 10 mm pathlength cuvettes.

The accessory can be connected to a fluid recirculator or other device to control sample temperature and is compatible with our temperature probes.

Standard cuvette

Cell holder

Smart Accessory base
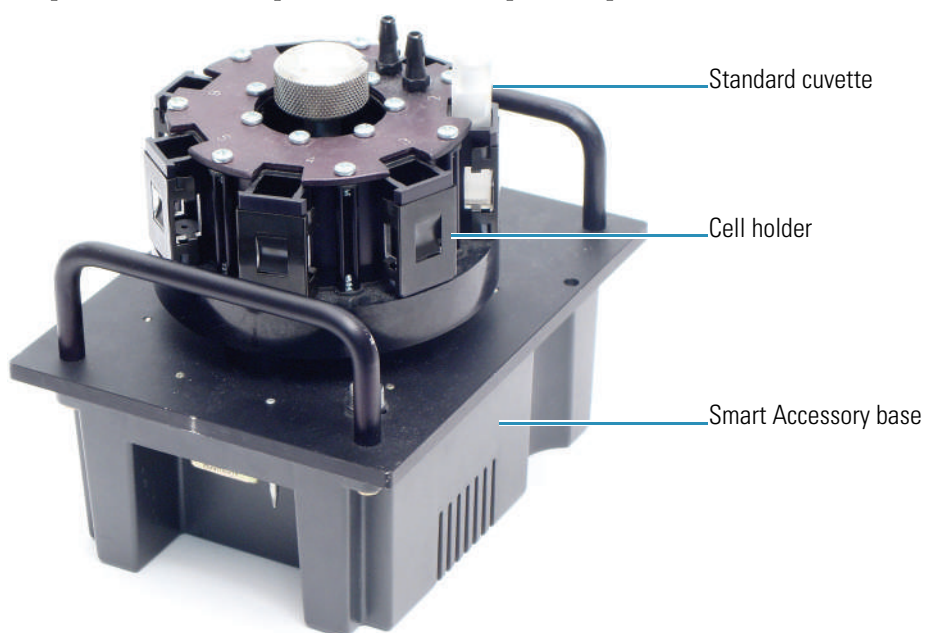
Contents

- Safety Considerations

- Operating Precautions

- Installation

- Operation

- Maintenance

Related Topics

Smart Linear 8-Cell Changer

Accessories

Safety Considerations

To avoid injury while using the accessory, keep hands and objects clear of the cell holder when initializing or measuring samples with the cell changer.

Related Topics

Operating Precautions

Installation

Operation

Maintenance

Operating Precautions

Handle the accessory carefully:

- Secure all tubing to avoid blocking the light beam (move the cell holder through all possible positions).

- Do not allow moisture to leak into the accessory.

- Wipe off spilled chemicals immediately.

- Do not drop the accessory.

- Protect the accessory from mechanical shock.

Related Topics

Safety Considerations

Installation

Operation

Maintenance

Installation

Contents
- Installing a Smart Cell Changer
- Replacing the Cell Holder

Related Topics

Safety Considerations

Operating Precautions

Operation

Maintenance

Installing a Smart Cell Changer

It is not necessary to power off the instrument while installing or removing a Smart Accessory.

Note The Smart Rotary Cell Changer and the Smart Linear Cell Changer cannot be used at the same time for double-beam instruments.

❖ **To install a cell changer**

1. Open the sample compartment door.

2. Remove the sample compartment front panel.

3. Remove any existing cell holder or accessory.

4. Install the accessory.

   The software displays a prompt to initialize the accessory.

CAUTION Avoid pinch hazard. Keep hands and objects clear of the accessory during initialization.

Languages

ATTENTION Évitez tout risque de pincement. Gardez vos mains, ainsi que tout objet, à l'écart de l'accessoire pendant l'initialisation.

VORSICHT Quetschungen sind zu vermeiden. Hände und Objekte sind während der Initialisierung vom Zubehör fern zu halten.

CAUTELA Evitare il rischio di pizzicamento. Tenere mani e oggetti lontano dall'accessorio durante l'inizializzazione.

PRECAUCIÓN Evite riesgos de atrapamiento. Mantenga manos y objetos lejos del alcance del accesorio durante la inicialización.

5. Replace the sample compartment front panel.

6. Close the sample compartment door.

7. Click **OK** to initialize the accessory.

   Initialization reads information about the accessory and moves it to position 1.

8. To use a temperature probe with the cell changer, see "Temperature Probe".

9. To connect a fluid recirculator or other device to control sample temperature on a thermostatted cell changer, see "Installing a Thermostatted Accessory."

10. Calibrate the cell changer (linear cell changers only) and set the software parameters to display the cell changer status monitor and configure the accessory for operation.

Related Topics

Opening and Closing the Sample and Reference Compartment Doors

Removable Panels

Installing a Smart Accessory

Installing a Liquid Thermostatted Accessory

Temperature Probe

Replacing the Cell Holder

Installation

Replacing the Cell Holder

Initialize the accessory after installing a cell holder.

❖   **To install a cell holder**

1. Line up the tab on the underside of the cell holder with the notch on the motor shaft.

Tab on underside of cell holder

Notch on motor shaft of Smart base unit
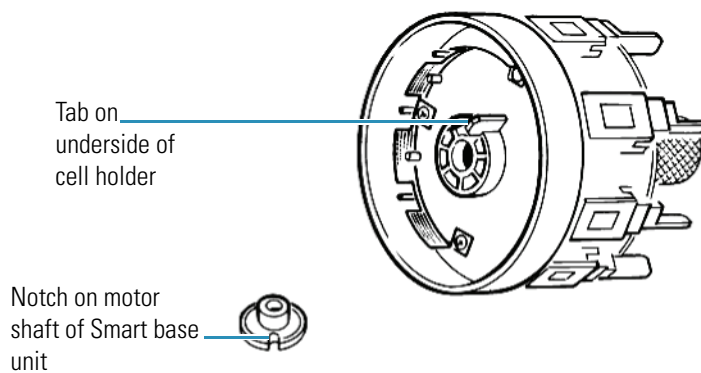
2. Place the cell holder on the shaft.

3. Turn the knurled knob clockwise until tight.

4. Initialize the accessory. See Initializing the Cell Changer.

❖ **To remove a cell holder**

1. Grasp the cell holder with one hand and turn the knurled knob counterclockwise until the holder is released.

2. Lift the cell holder off the cell changer base.

Related Topics

Installing a Smart Cell Changer

Installation

Operation

Contents
- Initializing the Cell Changer
- Cell Changer Settings
- Measuring Samples with a Cell Changer
- Measuring Standards with a Cell Changer
- Displaying the Cell Changer Status Monitor

Related Topics

Safety Considerations

Operating Precautions

Installation

Maintenance

Initializing the Cell Changer

The accessory must be initialized each time it is installed and after changing the cell holder when the Smart base unit is installed. Initializing verifies the cell position and resets the cell holder to position 1.

CAUTION Avoid pinch hazard. Keep hands and objects clear of the accessory during initialization.

Languages

ATTENTION Évitez tout risque de pincement. Gardez vos mains, ainsi que tout objet, à l'écart de l'accessoire pendant l'initialisation.

VORSICHT Quetschungen sind zu vermeiden. Hände und Objekte sind während der Initialisierung vom Zubehör fern zu halten.

CAUTELA Evitare il rischio di pizzicamento. Tenere mani e oggetti lontano dall'accessorio durante l'inizializzazione.

PRECAUCIÓN Evite riesgos de atrapamiento. Mantenga manos y objetos lejos del alcance del accesorio durante la inicialización.

❖ **To initialize a cell changer**

1. In the selected application, choose **Settings > Accessories > Cell Changer.**

2. Click **Reset**.

Related Topics

Cell Changer Settings

Measuring Samples with a Cell Changer

Measuring Standards with a Cell Changer

Displaying the Cell Changer Status Monitor

Operation

Cell Changer Settings

In the selected application, use **Settings > Accessories > Cell Changer** to display the available settings for a cell changer. The Cell Changer features appear only when a cell changer accessory is installed.

Feature	Description
Accessory name	Shows the type and serial number read from the installed sample changer.
Current cell	The numbered boxes match the cells in the changer head. The green box indicates the cell positioned for measurement. To manually position a cell in the light beam, click its numbered box.
Available cells	The check boxes indicate cells enabled for use in the current template or active workbook. To disable or enable a cell, click its associated check box. Note that cell one is always enabled.
Reset	Initializes the cell changer and moves cell one into the light beam.

Related Topics

Initializing the Cell Changer

Measuring Samples with a Cell Changer

Measuring Standards with a Cell Changer

Displaying the Cell Changer Status Monitor

Operation

Measuring Samples with a Cell Changer

The cell changer performs automated measurements based on the sample list.

> **CAUTION** Avoid pinch hazard. Keep hands and objects clear of the accessory during operation.

Languages

> **Remarque** Évitez les risques de pincement. Éloignez les mains et les objets de l'accessoire pendant son fonctionnement.

> **Anmerkung** Quetschungen sind zu vermeiden. Hände und Objekte sind während des Betriebs vom Zubehör fern zu halten.

N.B. Evitare il rischio di pizzicamento.Tenere mani e oggetti lontano dall'accessorio durante l'operazione.

Nota Evite riesgos de atrapamiento. Mantenga manos y objetos alejados del accesorio durante el funcionamiento.

防止被夹住的危险。 作业期间，请让手和其它物件远离辅助设备之处。 **CAUTION**

❖ **To measure samples with the cell changer**

3. Click **Home** and click an application such as **Fixed** or **Scan**.

4. Choose **Settings > Accessories> Cell Changer.**

5. Under **Available Cells**, select the check boxes for the cells that will be used in the cell changer.

   To skip a cell changer position, deselect its check box.

   Note Position 1 can not be deselected.

6. Set the other measurement parameters as desired. See the Settings tab for the selected application.

7. To measure a blank without using the sample list, click **Measure Fixed** and then click **Zero** (or **Measure Scan** and then **Baseline**).

   The Loading Guide shows one entry for the blank measurement.

   Place the approproate material (or nothing) in position 1 of the cell changer and click **OK** to perform the measurement.

8. Click **Measure**.

   A dialog box shows the current sample list.

9. Set **Number of samples** to the number of samples to be measured.

10. Use **Load Samples** to import the sample list or enter sample names and descriptions if desired. See **Settings > Samples** to create the list ahead of time.

11. Click **OK**.

   The loading guide shows the measurement sequence for the cell changer as defined in the sample list.

12. Place the cuvettes in the correct cell changer positions.

   Note If the application requires a blank and it was not measured in step 4, the first cell changer position will be measured as the blank.

13. Click **OK** or press **Run** on the instrument keypad.

   To cancel, click **Cancel** or press **Stop** on the instrument keypad.

   If a blank is required, it will be measured first, followed by the samples in order.

   If the sample list has more entries than there are spaces in the cell changer, the Loading Guide reappears after the last cuvette is measured.

14. If the loading guide appears, remove all cuvettes from the cell changer and fill it with the next set of samples as defined in the loading guide.

15. Click **OK**.

16. Continue as above until all entries in the sample list have been measured.

Related Topics

Initializing the Cell Changer

Cell Changer Settings

Measuring Standards with a Cell Changer

Displaying the Cell Changer Status Monitor

Operation

Measuring Standards with a Cell Changer

The cell changer can be used to measure blanks, reference samples, standards and samples for quantitative analysis. The measurement sequence depends on the quantitative analysis type and other measurement settings. During the measurement, the loading guide will indicate when and how to load the cell changer. Follow the instructions that appear.

Related Topics

Initializing the Cell Changer

Cell Changer Settings

Measuring Samples with a Cell Changer

Displaying the Cell Changer Status Monitor

Displaying the Cell Changer Status Monitor

When a supported cell changer is installed, the selected application can be configured to display a cell changer status monitor above the data display.

❖ **To display a status monitor for an installed cell changer**

1. Click **Configure** above the data display for the selected application. See "Instrument Status Monitors" for more information.

   A dialog box appears.

   > **Note** The cell changer option appears in the dialog box only when a supported cell changer accessory is installed.

2. Select **Cell changer status** and click **OK**.

A status monitor showing the current cell changer position appears above the data display.

Related Topics

Initializing the Cell Changer

Cell Changer Settings

Measuring Samples with a Cell Changer

Measuring Standards with a Cell Changer

Operation

Maintenance

Contents

- Routine Maintenance
- Cleaning the Accessory

Related Topics

Safety Considerations

Operating Precautions

Installation

Operation

Routine Maintenance

Clean the accessory regularly using approved methods (wipe off spilled chemicals immediately). See Cleaning the Accessory.

Related Topics

Cleaning the Accessory

Maintenance

Cleaning the Accessory

NOTICE   Do not allow moisture to leak into the accessory interior.

❖ **To clean the accessory exterior**

1. Remove the accessory from the sample compartment. See Installing a Smart Accessory.

2. Use a cloth dampened with plain water to wipe the surface of the Smart Accessory base and cell holder.

3. Dry the surface with another cloth.

Related Topics

Routine Maintenance

Maintenance

Smart Sipper

The Smart Sipper™ includes a pump (see Pump Specifications for details) and cell holder mounted on a Smart Accessory base, standard and acid-compatible tubing packs, and a special sample compartment front panel.

Cell holder

Pump

Smart Accessory base
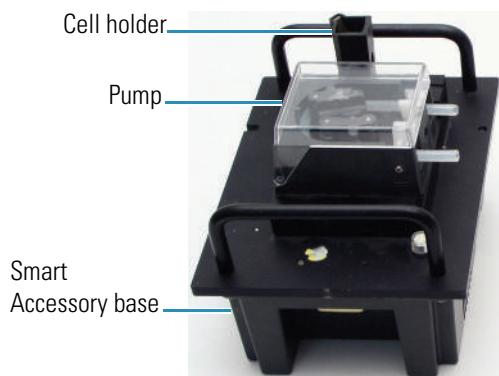
The provided tubing packs include:

- Pump tubing (silicone rubber or Viton®).

- Flow cell tubing (fluorinated ethylene polymer, or FEP).

- Low volume flow cell tubing (polytetrafluoroethylene, or PTFE).

- Connectors.

Contents

- Safety Considerations

- Operating Precautions

- Installation

- Calibration

- Maintenance

- Specifications

- Troubleshooting

Related Topics

Accessories

Safety Considerations

To avoid injury, remove the Smart Sipper from the spectrophotometer or turn off the spectrophotometer main power switch before installing pump tubing.

Consignes de sécurité

Pour éviter tout risque de blessure, retirez le système d'aspiration Smart Sipper du spectrophotomètre ou mettez l'interrupteur d'alimentation du spectrophotomètre en position off avant d'installer la tubulure de la pompe.

Sicherheitshinweise

Entfernen Sie vor der Installation der Pumpenschläuche den Smart-Sipper aus dem Spektrophotometer oder schalten Sie den die Spannungsversorgung am Hauptschalter des Spektrophotometers aus, um Verletzungen zu vermeiden.

Considerazioni sulla sicurezza

Per evitare lesioni rimuovere lo Smart Sipper dallo spettrofotometro oppure spegnere l'interruttore di alimentazione dello spettrofotometro prima di installare le tubazioni della pompa.

Consideraciones sobre seguridad

Para evitar lesiones, extraiga el aspirador de muestras Smart del espectrofotómetro o ponga el interruptor de alimentación en la posición de apagado antes de instalar los tubos de la bomba.

Related Topics

Operating Precautions

Installation

Calibration

Operation

Maintenance

Specifications

Troubleshooting

Operating Precautions

Handle the accessory carefully:

- Do not drop the accessory.

- Protect the accessory from mechanical shock.

- Use tubing that is compatible with your sample material.

- Remove the tubing from the pump before storing the accessory.

- Leave the instrument and accessory powered on when the pump is idle and some liquid in the sample intake container. The accessory will periodically "sip" a small volume to redistribute the pressure on the tubing.

Related Topics

Safety Considerations

Installation

Calibration

Operation

Maintenance

Specifications

Troubleshooting

Installation

Contents
- Installing Pump Tubing

- Installing the Smart Sipper

- Installing a Flow Cell

Related Topics

Safety Considerations

Operating Precautions

Calibration

Operation

Maintenance

Specifications

Troubleshooting

Installing Pump Tubing

We provide two kinds of pump tubing with the Smart Sipper: silicone rubber (Standard Tubing Pack) and Viton® (Acid Tubing Pack).

Verify tubing size and sample compatibility prior to installation. See Specifications.

CAUTION Avoid pinch hazard. Do not install pump tubing while the instrument is powered on.

Languages

ATTENTION Évitez tout risque de pincement. N'installez pas la tubulure de la pompe lorsque l'instrument est sous tension.

VORSICHT Quetschungen sind zu vermeiden. Die Pumpenschläuche dürfen nicht installiert werden, während das Instrument eingeschaltet ist.

CAUTELA Evitare il rischio di pizzicamento. Non installare le tubazioni della pompa mentre lo strumento è acceso.

PRECAUCIÓN Evite riesgos de atrapamiento. No instale los tubos de la bomba con el instrumento encendido.

❖   **To install pump tubing**

1. Remove the Smart Sipper from the spectrophotometer or turn off the spectrophotometer main power switch.

2. Cut an 18 cm length of pump tubing.

3. Taking care not to stretch, slacken or twist the tubing, feed it counterclockwise around the track while manually rotating the pump head.

4. Press the tubing into both clamps.

> **NOTICE** Leave at least 2 cm of tubing extending beyond each clamp.
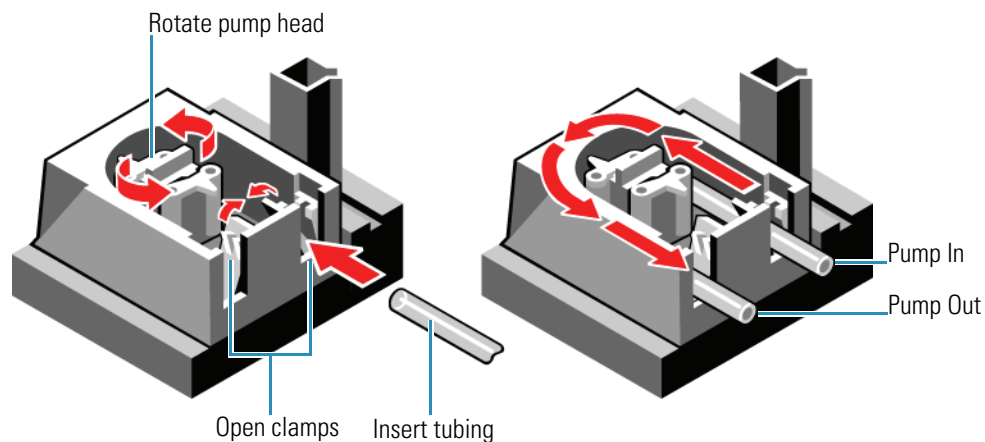
5. Insert a nipple (provided) into each end of the tubing.
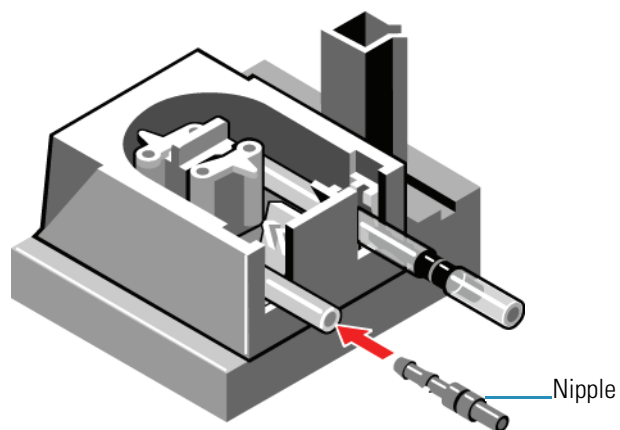
> **NOTICE** Remove the tubing from the pump before storing the accessory. Leave the instrument and accessory powered on when the pump is idle.

Related Topics

Installing the Smart Sipper

Installing a Flow Cell

Installation

Installing the Smart Sipper

It is not necessary to power off the instrument when installing or removing a Smart Accessory.

❖ **To install the Smart Sipper**

1. Open the sample compartment. See Opening and Closing the Sample and Reference Compartment Doors.

2. Remove the sample compartment front panel. See Sample Compartment Front Panel.

3. Remove any existing cell holder or accessory.

4. Install the accessory. See Installing a Smart Accessory.

   The software displays a prompt to initialize the accessory.

CAUTION Avoid pinch hazard. Keep hands and objects clear of the accessory during initialization.

Languages

ATTENTION Évitez tout risque de pincement. Gardez vos mains, ainsi que tout objet, à l'écart de l'accessoire pendant l'initialisation.

VORSICHT Quetschungen sind zu vermeiden. Hände und Objekte sind während der Initialisierung vom Zubehör fern zu halten.

CAUTELA Evitare il rischio di pizzicamento. Tenere mani e oggetti lontano dall'accessorio durante l'inizializzazione.

PRECAUCIÓN Evite riesgos de atrapamiento. Mantenga manos y objetos lejos del alcance del accesorio durante la inicialización.

5. Click **OK** to initialize the accessory.

   Initialization reads information about the accessory and reset the pump motors.

6. Install the Sipper sample compartment front panel.

   Align the tab on the bottom edge with the slot in the instrument cover and press the panel in place.
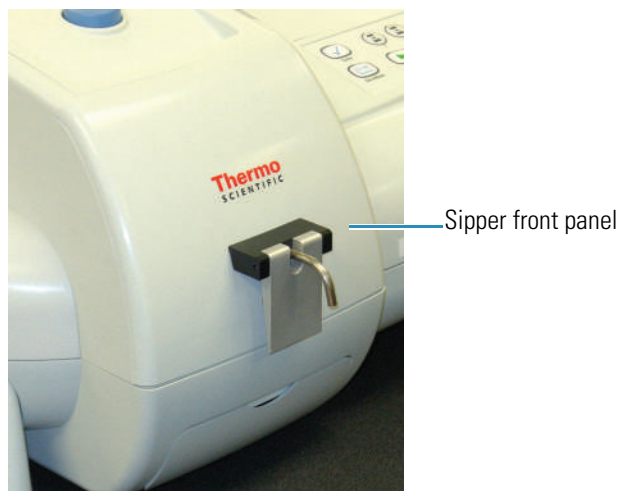
Sipper front panel

7. Connect the cable from the Sipper front panel to the socket on the Smart Sipper base and hand tighten the collar.

Align the pins before plugging in the connector.

Connector
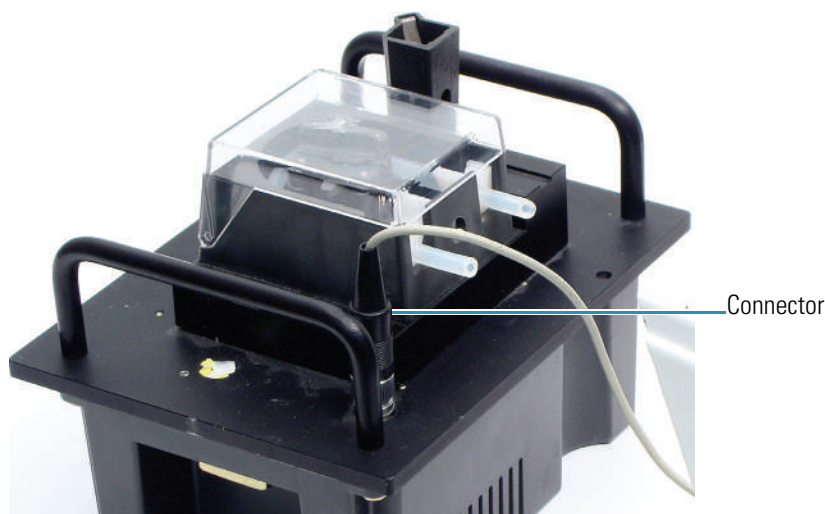
Related Topics

Installing Pump Tubing

Installing a Flow Cell

Installation

Installing a Flow Cell

The provided cell holder accommodates 12.5 mm x 12.5 mm flow cells. Other compatible holders and flow cells are available. All compatible cell holders have a central screw that mounts to the Smart Sipper base.

Do not stretch, slacken or twist the tubing during installation.

> **Tip** To prevent leaks, push tubing onto connectors as far as possible (wet the tubing first if necessary).

Flow Cell Out
Flow Cell In
Cell holder
From Sipper front panel
Pump In
Pump Out
To waste container
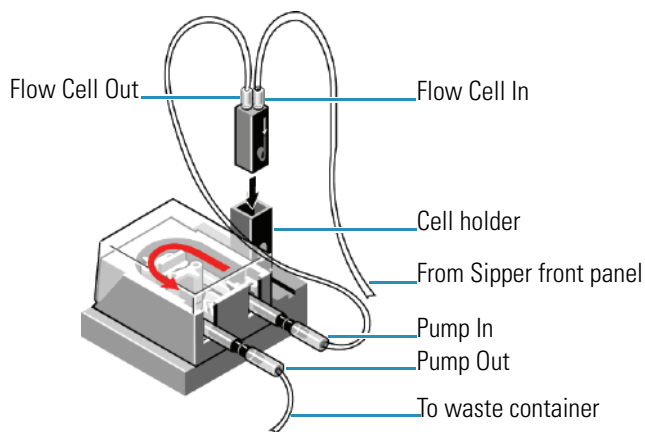
❖ **To install a flow cell**

1. Connect a length of appropriate tubing between the Flow Cell Out connector and the pump In connector on the Smart Sipper.

   Use pump tubing if it fits the cell port. If the flow cell ports are not marked, check the documentation that came with the cell.

   For flow cells with glass connectors, slide one end of the tubing over the Flow Cell Out connector and the other end over the connector on the Pump In tubing.

   For flow cells with screw-caps, install screw connectors, O-rings and washers that fit the cell ports, and tubing that has a flanged end (samples are provided).

   a. In this order, slide the plastic O-ring, rubber washer and screw connector over the open end of the tubing until they contact the flange.

   Flanged tube
   Screw connector
   Rubber washer
   Plastic O-ring
   Flange
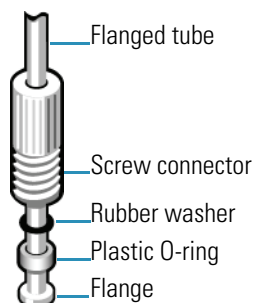
   b. Screw the cap into the Out port on the flow cell.

   c. Attach the open end of the tubing to the Pump In connector.

If the flow cell tubing does not fit over the connector, attach a short piece of extra pump tubing to the connector and insert the flow cell tubing into the sleeve. If the connection is too loose, use a clamp or add another sleeve of narrower tubing to ensure a tight fit.

2. Cut an appropriate length of PTFE or FEP tubing to reach from the Flow Cell In port through the Sipper front panel to the sample container.

   Depending on the depth of your sample container, leave at least 5 cm of tubing protruding from the guide.

3. Feed one end of the tubing all the way through the metal guide in the Sipper front panel.

4. Connect the loose end to the Flow Cell In port.

   If the tubing does not fit over the Flow Cell In connector, make a sleeve with extra tubing as described above.

   For a screw-cap flow cell, use flanged tubing and another screw cap, O-ring and washer to connect the tubing to the Flow Cell In port.

5. Position the flow cell with the In port on the right, and place it in the cell holder on the Smart Sipper.

6. Connect an appropriate length of tubing to the Pump Out port, and route it through one of the slits in the Sipper front panel to your waste container.

7. Calibrate the sipper configuration. See Calibration.

8. Set the parameters to operate the Sipper manually or configure workflows for autosampling with the Sipper. See Operation.

Related Topics

Installing Pump Tubing

Installing the Smart Sipper

Installation

Calibration

Calibrate the Sipper configuration before using the accessory to analyze samples.

Install the pump tubing, Smart Sipper and flow cell, including all tubing connections (see Installation) before calibration.

> **CAUTION** Avoid pinch hazard. Keep hands and objects clear of the accessory during operation.

Languages

> **Remarque** Évitez les risques de pincement. Éloignez les mains et les objets de l'accessoire pendant son fonctionnement.

> **Anmerkung** Quetschungen sind zu vermeiden. Hände und Objekte sind während des Betriebs vom Zubehör fern zu halten.

> **N.B.** Evitare il rischio di pizzicamento.Tenere mani e oggetti lontano dall'accessorio durante l'operazione.

> **Nota** Evite riesgos de atrapamiento. Mantenga manos y objetos alejados del accesorio durante el funcionamiento.

❖ **To calibrate the Smart Sipper**

1. Fill a measuring cylinder with laboratory grade purified water or the solvent to be used for sample measurements.

   The calibration will be more accurate if the viscosity of the solution used for calibration is similar to the viscosity of the sample solution.

2. Place the Sipper intake tube in the cylinder.

3. Open INSIGHT software and click **System Settings > Calibrations**.

   A prompt appears.

4. Enter the volume to be drawn for the calibration test in the **Sip Volume** box (typically 10 ml).

5. To display a prompt before each test, select **Prompt**.

   To sip automatically after a period of time, select **Count down** and enter the time.

6. Click **Next**.

   A prompt appears. The contents depends on the **Prompting** setting.

7. Record the volume of liquid in the cylinder.

8. Click **OK** or **Pump Now** (or wait until the counter is finished).

   The Sipper attempts to draw the specified volume, and then a prompt requests the actual volume drawn.

9. Remove the inlet tube from the cylinder and record the volume of liquid remaining.

10. Subtract the volume remaining in the cylinder from the initial volume to calculate the actual volume drawn through the inlet tube. Enter this value in the **Actual** box and click **Next**.

11. Repeat steps 7 through 10 until the **Actual** volume matches the **Expected** volume.

12. Click **Done**.

Related Topics

Safety Considerations

Operating Precautions

Installation

Operation

Maintenance

Specifications

Troubleshooting

Operation

In the selected INSIGHT software application, click **Settings > Accessories > Sipper** to display the settings for the Smart Sipper. The Sipper features appear only when a Smart Sipper is installed.

Feature	Description
Sip volume entry box	For automated sipper workflows, defines the volume to draw for each measurement. The sip volume must be greater than 0.
	Use sufficient volume to push any previous solution out of the flow cell. When the cell is filled, the sample material should also fill at least 8 cm of the inlet tube in front of the flow cell to prevent air bubbles from entering the cell. (Use an air gap if the sample material is limited.) Check the system for cross-contamination before taking measurements.
Settle time	For automated sipper workflows, specifies a delay before the sample is measured to allow air bubbles to dissipate. Enter 0 to skip this step.
Air gap duration	For automated sipper workflows that include a "draw air" step, defines how long to draw air through the system to move a small sample volume to the flow cell. The correct setting depends on the **Sip volume** setting and the length of the inlet tube. Typically, draw sufficient air to push the sample into the cell but leave enough sample material to fill at least 8 cm of the inlet tube in front of the flow cell.
	Enter 0 to skip this step.
Rinse duration	For automated sipper workflows that include a "rinse" step, specifies how long to draw the rinse solution through the system. Enter 0 to skip this step.

Feature	Description
Sipper Workflows	Defines automated sipper workflows. Use the **Measure** button in the software to start the workflow. • **Sip, settle, measure, prompt, return** draws the specified sip volume, delays the specified settle time, measures the sample, and prompts to move the inlet tube to the return container. When the user clicks **OK** or presses the Sipper front panel switch, returns the sample to the container. • **Sip, draw air, settle, measure, prompt, rinse, draw air** draws the specified sip volume and prompts to remove the inlet tube. When the user clicks **OK** or presses the front panel switch, draws air for the specified period, waits the specified settle time, measures the sample and prompts to place the inlet tube in the rinse solution. When the user clicks **OK** or presses the switch, draws the rinse solution for the specified time and prompts to remove the inlet tube. When the user clicks **OK** or presses the switch, draws air for the specified period. Samples are measured using the selected application. Results are placed in the selected workbook.
Manual Control	Activates the Sipper front panel switch as a pump control. When the check box is selected, pressing the switch once causes the pump to draw through the inlet tube; pressing it again stops it.
Sip Volume button	Immediately causes the pump to draw the specified sip volume through the inlet tube.
Pump On/Pump Off buttons	Toggles between **Pump On** and **Pump Off**. **Pump On** causes the pump to draw continuously through the inlet tube; **Pump Off** causes it to stop.

Related Topics

Safety Considerations

Operating Precautions

Installation

Calibration

Maintenance

Specifications

Troubleshooting

Maintenance

Contents

- Routine Maintenance
- Cleaning the Accessory
- Replacing Pump Tubing

Related Topics

Safety Considerations

Operating Precautions

Installation

Calibration

Operation

Specifications

Troubleshooting

Routine Maintenance

Clean the accessory regularly using approved methods (wipe off spilled chemicals immediately).

Related Topics

Cleaning the Accessory

Replacing Pump Tubing

Cleaning Flow Cells

Replacing Flow Cell Tubing

Maintenance

Cleaning the Accessory

NOTICE Do not allow moisture to leak into the accessory interior.

❖ **To clean the accessory exterior**

1. Remove the accessory from the sample compartment. See Installing a Smart Accessory.

2. Use a lint-free cloth dampened with plain water to wipe the area near the cell holder.

3. Dry the surface with another cloth.

Related Topics

Routine Maintenance

Replacing Pump Tubing

Cleaning Flow Cells

Replacing Flow Cell Tubing

Maintenance

Replacing Pump Tubing

Examine pump tubing weekly and when pumping efficiency is impaired. Replace crimped or worn tubing (see Installing Pump Tubing).

If you install a different type or size tubing, recalibrate before analyzing samples (see Calibration).

Related Topics

Routine Maintenance

Cleaning the Accessory

Cleaning Flow Cells

Replacing Flow Cell Tubing

Maintenance

Cleaning Flow Cells

Rinse the flow cell and inlet tubing thoroughly with laboratory grade purified water after each analysis and before turning off the Smart Sipper. Keep the cell filled with purified water when not in use.

At least once a week, remove the flow cell from the accessory and soak it in a solution of Decon™ detergent (or equivalent), diluted according to the manufacturer's instructions. When finished, reconnect the cell and flush it thoroughly with laboratory grade purified water.

Related Topics

Routine Maintenance

Cleaning the Accessory

Replacing Pump Tubing

Replacing Flow Cell Tubing

Maintenance

Replacing Flow Cell Tubing

Examine flow cell tubing regularly. Replace tubing that is kinked, worn or contaminated with sample material.

Related Topics

Routine Maintenance

Cleaning the Accessory

Replacing Pump Tubing

Cleaning Flow Cells

Maintenance

Specifications

Contents
- Pump Tubing Chemical Compatibility
- Pump Tubing Specifications
- Pump Specifications

Related Topics

Safety Considerations

Operating Precautions

Installation

Calibration

Operation

Maintenance

Troubleshooting

Pump Tubing Chemical Compatibility

We provide two kinds of pump tubing: silicone rubber (Standard Tubing Pack) and Viton® (Acid Tubing Pack). Silicone rubber is suitable for most aqueous solutions and is recommended when the pump will be used for prolonged periods. Viton withstands many strong acids, alkalis and organic solvents, which corrode silicone rubber.

Use the table below to verify that your chemicals are compatible with the provided tubing, or other tubing that is compatible and meets our specifications.

The table is only a general guide. Each rating is based on ideal testing conditions used by tubing manufacturers. Temperature, length of service, chemical concentration, etc. can affect chemical resistance. Test the tubing under your experimental conditions.

Chemical Compatibility for Silicone, Viton and Norprene Tubing

Key	Meaning
X	Can be used
—	Marginal
Blank	Not tested
N	Not recommended

Chemical	Nor	Sil	Vit	Chemical	Nor	Sil	Vit
Acetaldehyde	X	X	N	Arsenic salts	X		X
Acetates	X	—	N	Barium salts	X	X	X
Acetic acid (<5%)	X	X	X	Benzaldehyde	X	N	N
Acetic acid (>5%)	X	X	—	Benzene	N	N	X
Acetic anhydride	X	N		Benzene sulfonic acid			X
Acetonitrile		—		Benzoic acid	X	—	X
Acetone	X	—		Benzyl alcohol	X		X
Acetyl bromide				Bleaching liquors	X	—	X
Acetyl chloride				Boric acid	X	X	X
Air	X	X	X	Bromine	X	N	X
Alcohols	X	X	X	Butane	X	N	X
Aliphatic hydrocarbon	X	—	N	Butyl acetate			N
Aluminum chloride	X	—	N	Butyl alcohol	X	—	N
Aluminum sulfate	X	X	X	Butyric acid	X		—

Chemical	Nor	Sil	Vit	Chemical	Nor	Sil	Vit
Alums	X	X		Calcium oxide		X	X
Ammonia	X	X	N	Calcium salts	X	—	X
Ammonium acetate	X			Carbon bisulfide			X
Ammonium carbonate	X			Carbon dioxide	X	—	X
Ammonium chloride	X			Carbon tetrachloride	N	N	X
Ammonium hydroxide	X	X	X	Chloracetic acid	X		N
Ammonium nitrate	X	—		Chlorine (wet)	X	N	X
Ammonium phosphate	X	X		Chlorine (dry)	X	N	N
Ammonium sulfate	X	X	X	Chlorobenzene	N		X
Amyl acetate	X	N	N	Chlorobromomethane		N	X
Amyl alcohol	X	N	X	Chloroform	N	N	X
Amyl chloride		N	X	Chloronaphthalene	N	N	
Aniline		N	—	Chlorosulfonic acid		N	N
Aniline hydrochloride		N	X	Chromic acid	X	N	X
Antimony salts	X		—	Chromium salts	X		
Aqua regia	X		—	Copper salts	X	X	X
Aromatic hydrocarbons	N	—	X	Cresol		X	X
Cyclohexane	N	N	X	Hydrobromic acid	X	—	X
Cyclohexanone		N	X	Hydrochloric acid (dil)	X	N	X
Diacetone alcohol		N	N	Hydrochloric acid (med)	X	N	
Dichloromethane	N	N		Hydrochloric acid (conc)	X	N	X
Dimethyl formamide		—	N	Hydrocyanic acid	X	N	X
Dimethyl sulfoxide	X	X		Hydrofluoric acid	N	N	X
Essential oils	X			Hydrogen peroxide (dil)	X	X	X
Ethers	X	N	—	Hydrogen peroxide (conc)	X	X	—
Ethyl acetate	N	N	N	Hydrogen sulfide	X	X	N
Ethyl alcohol	X	—	X	Hydrochlorous acid			X
Ethyl bromide			X	Iodine solutions	X		X
Ethyl chloride	N	N	X	Kerosene	N	N	X
Ethylamine			X	Ketones	N	N	N
Ethylene dichloride		N	X	Lacquer solvents		N	N
Ethylene glycol	X	X	X	Lactic acid	X	—	X

Chemical	Nor	Sil	Vit	Chemical	Nor	Sil	Vit
Ethylene oxide		N	N	Lead acetate	X	N	N
Fatty acids		—	X	Lithium hydroxide (5%)		N	X
Ferric chloride	X	—	X	Magnesium chloride	X	X	X
Ferric sulfate	X	—	X	Magnesium sulfate			X
Ferrous chloride		—	X	Malic acid		X	X
Ferrous sulfate		—	X	Manganese salts	X	X	X
Fluoroborate salts	X			Mercury salts	X		X
Fluoroboric acid	X			Methane	X	N	X
Formaldehyde	X	—	X	Methanol	X	X	
Formic acid	X	—	N	Methyl chloride		—	X
Freon	N	N	—	Methylethyl ketone	N	N	
Gasoline	—	N	X	Molybdenum disulfide		—	
Glucose	X	X	X	Monoethanolamine		—	
Glue			X	Naphtha	N	N	X
Glycerine	X	X	X	Natural gas	X	X	X
Hydrazine (64% in H_2O)	X	X		Nickel salts	X	X	X
Nitric acid (dil)	X	—	X	Sodium borate	X	X	X
Nitric acid (med)	—	N	X	Sodium carbonate	X	X	X
Nitric acid (conc)	N	N	—	Sodium chlorate	X		X
Nitrobenzene	N	N	XN	Sodium chloride	X	X	X
Nitrogen oxides	X	—	—	Sodium ferrocyanide	X		X
Nitrous acid	X		—	Sodium hydrosulfite	X	—	X
Oils, animal	X	—	X	Sodium hydroxide (dil)	X	—	X
Oils, mineral	X	—	X	Sodium hydroxide (med)	X	—	X
Oils, vegetable	X	X	X	Sodium hydroxide (conc)	—	—	—
Oleic acid	X	N	—	Sodium hypochlorite (<5%)	X		X
Oxalic acid	X	—	X	Sodium hypochlorite (>5%)	X		X
Perchloric acid	N	N	X	Sodium sulfide	X	X	X
Perchloroethylene	N	N	X	Sodium sulfite	X	X	X
Phenol	N	N	X	Steam (up to 40psi)		N	N
Phosphoric acid	X	—	X	Stearic acid	X	—	X
Phthalic acid	X	X	X	Sulfur chloride		N	X

Chemical	Nor	Sil	Vit	Chemical	Nor	Sil	Vit
Plating solutions	X	N	X	Sulfur dioxide	X	—	X
Polyglycol				Sulfur hexafluoride		—	N
Potassium carbonate	X		X	Sulfur trioxide	X	—	X
Potassium chlorate	X		X	Sulfuric acid (dil)	X	N	X
Potassium hydroxide (med)		—	Z	Sulfuric acid (med)	X	N	X
Potassium hydroxide (conc)	—		X	Sulfuric acid (conc)	—	N	X
Potassium iodide	X		X	Tannic acid	X	—	X
Pyridine	X	N	N	Tanning extracts	X		X
Silicone fluids		—	X	Tartaric acid		—	X
Silicone oil		—	Z	Tetrachloroethane	N	N	
Silver nitrate	X	X	X	Tetrahydrofuran	N	N	
Soap solutions	X	X	X	Tin salts			
Sodium bicarbonate	X	X	X	Titanium salts			
Sodium bisulfate	X		X	Toluene	N	N	X
Sodium bisulfite	X	X	X	Trichloroaecetic acid			N
Trichloroethylene			X	Vinyl plastisol		—	
Trichlorofluoroethane	N	N		Water	X	X	X
Trisodium phosphate	X		X	Water (brine)	X	X	X
Turpentine	X	N	X	Xylene	N	N	X
Urea	X	X	X	Zinc chloride	X		X
Uric acid	X						

Related Topics

Pump Tubing Specifications

Pump Specifications

Specifications

Pump Tubing Specifications

Note Tubing that is too tight will cause excessive pump strain and wear. Tubing that is too loose will decrease pumping efficiency.

Pump Tubing Specifications	
Maximum outer diameter	5.08 mm (0.200 in)
Minimum outer diameter	2.54 mm (0.100 in)
Inner diameter	1.65 mm ±0.127 mm (0.065 in ±0.005 in)
Wall thickness	0.89 mm ±0.07 mm (0.035 in ±0.003 in)
Volume repeatability	±5% for all pump times >3 sec

Related Topics

Pump Tubing Chemical Compatibility

Pump Specifications

Specifications

Pump Specifications

Pump Specifications		
Setting	Speed (rpm)	Flow Rate (ml/min)
Slow	60	8.0
Medium	105	14.0
Fast	150	20.0
Pump time (seconds)	Variable: 0.0 to 999.0	
Purge time (seconds)	Variable: 0.0 to 999.0	
Auto function	Purge, Return, Off	
Setting time (seconds)	Variable: 0.0 to 999.0	
Number of rinses	Variable: 0 to 4	

Related Topics

Pump Tubing Chemical Compatibility

Pump Tubing Specifications

Specifications

Troubleshooting

Problem	Possible Cause	Solution
Pump does not operate	The accessory is not installed properly or the wrong pump tubing is used.	Remove and reinstall the accessory, install the Sipper front panel and connect the data cable. See Installation.

Ensure the pump tubing is the correct diameter and material. See Pump Tubing Specifications and Pump Tubing Chemical Compatibility. |
| Pump does not draw | Pump tubing is crimped or damaged | Check the entire pumping system for damage or excessive wear and replace sections as necessary. See Installing Pump Tubing and Installing a Flow Cell.

To prevent crimping, remove pump tubing before storing the accessory. When the pump is idle, leave the instrument and accessory powered on and some liquid in the sample intake container. The accessory periodically "sips" a small volume to redistribute the pressure on the tubing.

Ensure the tubing is compatible with your sample material. Many factors (temperature, length of service, chemical concentration, etc.) can affect chemical resistance; test the tubing under your conditions. See Pump Tubing Chemical Compatibility.

Rinse flow cells and tubing thoroughly after use. See Cleaning Flow Cells. |
| Noise peaks in the spectral data or inconsistent results | There are air bubbles in the flow cell | Inspect the flow cell for bubbles, which diffract the light so less energy is passed to the detector. To prevent air bubbles from entering the cell, use sufficient volume so the sample material fills at least 8 cm of the inlet tube in front of the flow cell. (Use an air gap if the sample material is limited.) See Operation.

To remove air bubbles adhering to flow cell walls (occurs frequently with biological materials), remove the cell and soak it in a recommended detergent. See Cleaning Flow Cells. When finished, reconnect the cell and flush it thoroughly with laboratory grade purified water. |

Related Topics

Safety Considerations

Operating Precautions

Installation

Calibration

Operation

Maintenance

Specifications

Temperature Probe

The Temperature Probe allows measurements with the following specifications:

- Range: 0 °C to 100 °C

- Accuracy: ±0.5 °C + 0.2% of the temperature reading

The kit includes a probe, two Teflon® stoppers, a multi-channel USB interface and a software driver. The probe has a 304 stainless-steel tip that resists many chemicals. A square stopper accommodates standard 10 mm pathlength rectangular cuvettes with square lids, and a round one fits cuvettes with stoppers.

USB interface
Stoppers
Probe

Contents
- Operating Precautions
- Installation
- Operation
- Maintenance
- Troubleshooting

Related Topics

Accessories

Operating Precautions

Handle the accessory carefully:

- Do not allow moisture to leak into the accessory.

- Allow liquid to contact only the narrow measurement tip; do not submerge the probe.

- Wipe off spilled chemicals immediately.

- Do not drop the accessory.

- Protect the accessory from mechanical shock.

- Do not bend the probe tip.

Related Topics

Installation

Operation

Maintenance

Troubleshooting

Installation

The interface box can be connected to any USB port on the instrument or remote computer. Probes are routed behind the tubing access panel and into the sample compartment.

> **Note** Install the driver for the temperature probe on the system computer (local or remote) to enable the probe features in INSIGHT software. If using a Local Control instrument that has an optional remote computer, install the driver on both computers and connect the interface box to the active computer.

❖ **To connect the temperature probe**

1. Remove the tubing access panel. See Tubing Access Panel.

2. Connect the interface box cable to a standard USB port on the spectrophotometer.

   If the spectrophotometer is set up for computer control, the cable also connects to any USB port on the remote computer.

3. Install a cell holder or changer that accommodates cuvettes that are compatible with the temperature probe.

4. Install a cuvette in the cell holder or changer.

5. Insert the probe into an appropriate stopper (round or square, depending on the selected cuvette).

   > **NOTICE**   Do not force the probe into the stopper.

Stopper   Probe tip

   a. Loosen the screw on the stopper base.

   b. Align the probe tip with the central hole in the stopper and gently push the probe into the stopper as far as it will go.

      Ensure the probe tip extends about 2 mm beyond the stopper.

   c. Tighten the screw on the stopper base.

6. Route the probe cable into the sample compartment and out the tubing access compartment. (Push it through the slit in the foam panel.)

7. Insert the probe connector into an open port on the interface box.

8. Fill the cuvette with the sample or reference solution.

   Use sufficient volume to wet the probe tip when installed, but do not overfill the cell. The probe will displace a small amount of liquid.

9. Insert the probe and stopper into the cuvette.

   Ensure the probe extends at least 2 mm below the surface of the liquid but not so deep that it blocks the light beam.

   Ensure the cable does not obstruct the light beam, especially when using probes with a cell changer (move the changer through all positions).

10. Set the software parameters to display the probe status monitor and record sample temperature. See Operation.

Related Topics

Operating Precautions

Operation

Maintenance

Troubleshooting

Operation

Contents

- Temperature Settings

- Configuring a Target Temperature

- Displaying a Temperature Status Monitor

Related Topics

Operating Precautions

Installation

Maintenance

Troubleshooting

Temperature Settings

In the selected application, use **Settings > Accessories > Temperature** to display the available settings for a temperature probe or controller. The Temperature features appear only when the driver for a temperature probe or controller is installed.

Feature	Description
Record temperature with measurement	If a temperature probe is used, records the temperature of the sample after each measurement. Temperature readings are stored in the sample properties.
Use temperature controller	If a Peltier cell holder or changer is used, defines a setpoint temperature for the cell block and a stir speed if desired. The available settings depend on the specifications for the temperature-controlled accessory.
Start measurements at target temperature	Starts the measurement when the sample (requires a temperature probe) or cell block (requires a Peltier cell holder or changer) reaches a specified temperature.
Match probes to cell changer positions	If a temperature probe is used, maps probe channels 1 through 8 with up to eight cell changer positions. Useful only when using an automatic cell changer with multiple temperature probes. Deselect this to always record the temperature of probe 1.

Related Topics

Configuring a Target Temperature

Displaying a Temperature Status Monitor

Operation

Configuring a Target Temperature

❖ **To configure a target temperature**

1. Select **Start measurement at target temperature**.

2. Enter the **Target temperature** and **Tolerance** in °C.

   • **For a temperature probe.**
   To start the measurement when the probe reaches the target temperature, set **Start on** to **Probe temperature** and then select the **Probe channel**. The number of channels in the list box will match the available ports on the temperature probe interface box.

   The probe channel, current temperature and target range appear during the measurement.

   Monitoring temperature using Omega TC-08

   Channel 1 temperature: **30.0°C**

   Target range: 36.5 - 37.5 °C

   Measurement will proceed when temperature is in range.

   Press Cancel to cancel the measurement.

   [Start]   [Cancel]

   • **For a temperature-controlled accessory.**
   To start the measurement when the cell block reaches the target temperature, set **Start on** to **Block temperature**.

   Only the current temperature and target range appear during the measurement.

   The Start button is disabled since the measurement is configured to start automatically at the target temperature.

3. To allow time for equilibration, select **Wait for equilibration** and enter the duration.

   The remaining equilibration time is displayed during the measurement.

If the temperature moves outside the target range, the countdown resets when the temperature is again within range.

The **Start** button becomes active when the temperature remains in the target range for the entire equilibration period.

4. To start the measurement automatically after equilibration, select **Start measurement after equilibration**. This disables the Start button in the status dialog box. The measurement starts automatically when the temperature remains in the target range during the entire equilibration period.

Related Topics

Temperature Settings

Displaying a Temperature Status Monitor

Operation

Displaying a Temperature Status Monitor

The INSIGHT software can be configured to display a temperature status monitor for each installed probe.

❖ **To display a temperature probe status monitor**

1. Click the **Configure** button above the data display for the selected application. See "Instrument Status Monitors" for more information.

A dialog box lists the available status monitors.

> **Note** Temperature options appear only when a software driver for the temperature probe is installed.

2. Select the **Temperature status** option that matches the probe channel and click **OK**.

The status monitor appears above the data display. Here is an example.

3. To edit the probe name or channel, double-click the probe status monitor. A dialog box appears.
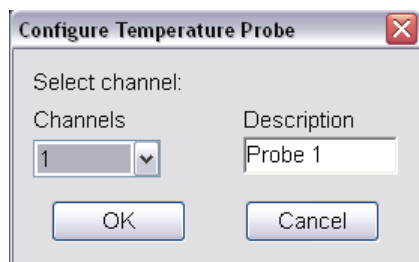
Enter a name in the **Description** box, select the **Channel** and click **OK**.

Related Topics

Instrument Status Monitors

Temperature Settings

Configuring a Target Temperature

Operation

Maintenance

Contents

- Routine Maintenance

- Cleaning Temperature Probes

- Replacing Stopper O-Rings

Related Topics

Operating Precautions

Installation

Operation

Troubleshooting

Routine Maintenance

- Clean probes immediately after each measurement and before storing them. See Cleaning Temperature Probes.

- Check stopper O-rings regularly for wear and replace them when necessary. See Replacing Stopper O-Rings.

> **Note** Use of the temperature probe with corrosive samples or extreme temperatures can cause O-rings to break down faster.

Related Topics

Cleaning Temperature Probes

Replacing Stopper O-Rings

Maintenance

Cleaning Temperature Probes

Clean temperature probes frequently to avoid contaminating subsequent samples. Wipe off spilled chemicals immediately.

To clean a probe, rinse the tip with water and then with methanol or isopropyl alcohol and air dry.

Related Topics

Routine Maintenance

Replacing Stopper O-Rings

Maintenance

Replacing Stopper O-Rings

Check stopper gaskets and O-rings regularly for wear and replace them when necessary. The square stopper has two gaskets and internal O-ring. The round stopper has an internal O-ring.

A 4 mm screw (at least 3 mm long) is required to remove the liner that supports the internal O-ring.

❖ **To replace the internal O-ring (round or square stopper)**

1. Insert the 4 mm screw several turns into the stopper base, and use it to pull the liner out of the base (leave the screw in the liner).

Screw

2. Use tweezers or a pointed tool to remove the small O-ring from the end of the liner.

O-ring
Liner

3. Press the new O-ring fully into the liner.

   The O-ring must remain in place when you turn the liner upside down.

4. Use the screw to insert the liner back into the stopper (press to secure the O-ring).

5. Remove the screw from the liner.

❖ **To replace the gaskets on the square stopper**

1. Use tweezers or a pointed tool to remove the gaskets.

2. Stretch each new gasket onto the stopper and press it into the groove.

Gaskets
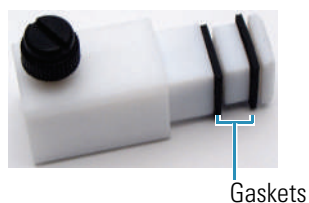
Related Topics

Routine Maintenance

Cleaning Temperature Probes

Maintenance

Troubleshooting

Problem	Possible Cause	Solution
Temperature readings do not match expected values.	The probe is soiled or damaged, or there is not enough liquid in the cuvette.	Clean and reseat the probe in the cuvette ensuring at least 2 mm of the probe tip extends below the sample surface. If performance is still unacceptable, replace the probe.
The temperature of the sample or reference solution (as measured by the probe) does not match the temperature of the external fluid recirculator.	Sample temperature is affected by the: • type of cell used for the measurement • length of the recirculator tubing • degree of insulation around the tubing • difference between the recirculator set temperature and the ambient temperature.	Set the external recirculator temperature slightly higher than the target temperature for the measurement (or apply a correction factor if your recirculator offers that feature). When using multiple thermostatted accessories with a common recirculator, it may be necessary to increase the Tolerance setting in the software to account for the temperature differential between the heated components.

Related Topics

Operating Precautions

Installation

Operation

Maintenance

Variable Angle Transmission

For Local Control instruments:

D://2612_HARRICK_Var Angle Trans Accy_UG.pdfFor Computer Control instruments:

C://2612_HARRICK_Var Angle Trans Accy_UG.pdfIf these links do not work, see your documentation CD.

Related Topics

Installing a Manual Accessory

Accessories

VERSA Probe

The VERSA fiber optic probe uses a standard SMA connector and disposable quartz tips. The probe is compatible with measurements between 200 and 1100 nm at temperatures up to 125 °C. Quartz tips are available with a pathlength of 10 mm or 20 mm.

VERSA probe

Quartz tip
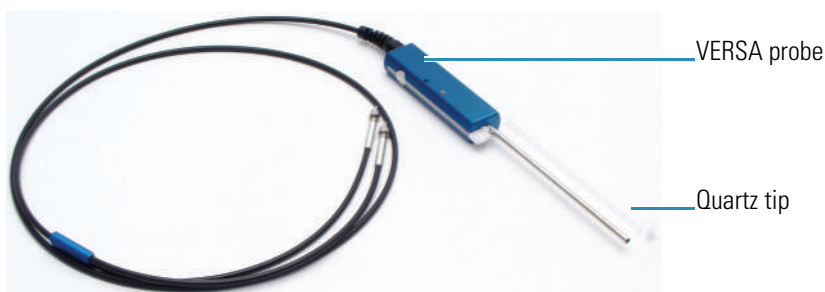
Contents

- Operating Precautions
- Installation
- Operation
- Routine Maintenance

Related Topics

Integrated Fiber Optic Module

Probe Handling and Maintenance

Accessories

Operating Precautions

Fiber Optic Probes

Handle probes carefully:

- Do not allow hard materials (glass, metal, ceramic, etc.) to contact the probe's optical surfaces.
- Do not drop the probe or knock it against a hard surface.
- Do not subject the probe to rapid or excessive changes in temperature.

• Wipe off spilled chemicals immediately.

Fiber Optic Cables

Handle fiber optic cables gently and follow these precautions:

- Do not drop the cables or knock them against a hard surface.

- Do not bend the cables or tightly coil them.

- Do not touch the end of a fiber optic cable connector.

- Do not overtighten or use tools to tighten the connectors when attaching the cables to the ports.

- Avoid twisting the cables when attaching them to the connectors.

- Keep a protective cap on each end of the cable when not in use.

Related Topics

Installation

Operation

Routine Maintenance

Installation

Contents
- Installing the VERSA Probe
- Installing Tips

Related Topics

Operating Precautions

Operation

Routine Maintenance

Installing the VERSA Probe

Install the Integrated Fiber Optic Module before installing a probe.

WARNING Avoid UV radiation hazard. Do not stare at the beam or light leaving a coupled fiber optic cable.

Languages

AVERTISSEMENT Évitez l'exposition au rayonnements UV. Ne regardez jamais le faisceau de lumière qui sort d'une fibre optique couplé.

WARNUNG Gefahren durch UV-Strahlung sind zu vermeiden. Nicht in den Strahl eines gekoppelten Glasfaserkabels blicken.

AVVERTENZA Evitare il rischio di radiazioni UV.Non fissare il raggio di luce che esce dal cavo a fibre ottiche accoppiato.

ADVERTENCIA Evite el riesgo de radiación ultravioleta.No mire al rayo luminoso que sale de un cable de fibra óptica acoplado.

WARNING 防止 UV 放射危险。 请勿注视光纤电缆耦合留下的光束

To install a probe, follow instructions for your instrument. See Attaching Cables and Probes in Integrated Fiber Optic Module.

NOTICE   When attaching fiber optic cables to the accessory ports, avoid:

- Twisting or bending the cable.
- Touching the ends with your fingers.
- Overtightening or using tools to tighten the connectors.

If the probe has a remote start cable, plug the connector into the Trigger port on the spectrophotometer. See Connectors.

Related Topics

Installing Tips

Installation

Installing Tips

Tips must be installed to take measurements.

Notch

Quartz tip

Release button   Pin   Shaft
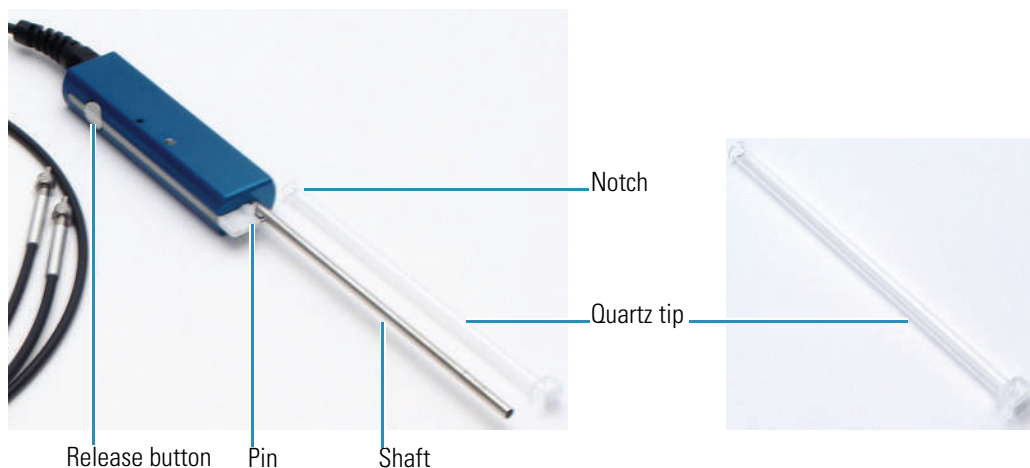
❖ To install a tip

1. Slide a quartz tip onto the probe shaft.

2. Align the notch at the base of the tip with the pin on the probe handle.

3. Press and hold the release button and slide the notch under the pin.

4. Release the button.

   Verify the tip is secure by touching the middle portion of the tip and gently attempting to slide it. If the tip is secure, it will not move.

❖ To remove the tip

Press the release button.

Related Topics

Installing the VERSA Probe

Installation

Operation

Install a tip before using the probe. See Installing Tips.

When inserting the probe into a solution, shake the probe gently to release any air bubbles trapped in the probe tip.

To improve the signal-to-noise ratio, try using slower scan speeds and longer integration times.

WARNING Avoid UV radiation hazard. Do not stare at the beam or light leaving a coupled fiber optic cable.

Languages

AVERTISSEMENT Évitez l'exposition au rayonnements UV. Ne regardez jamais le faisceau de lumière qui sort d'une fibre optique couplé.

WARNUNG Gefahren durch UV-Strahlung sind zu vermeiden. Nicht in den Strahl eines gekoppelten Glasfaserkabels blicken.

AVVERTENZA Evitare il rischio di radiazioni UV.Non fissare il raggio di luce che esce dal cavo a fibre ottiche accoppiato.

ADVERTENCIA Evite el riesgo de radiación ultravioleta.No mire al rayo luminoso que sale de un cable de fibra óptica acoplado.

WARNING 方止 UV 放射危险。　请勿注视光纤电缆耦合留下的光束

❖ **To use the VERSA probe**

1. Insert the probe into the baseline solution and collect a baseline or zero measurement.
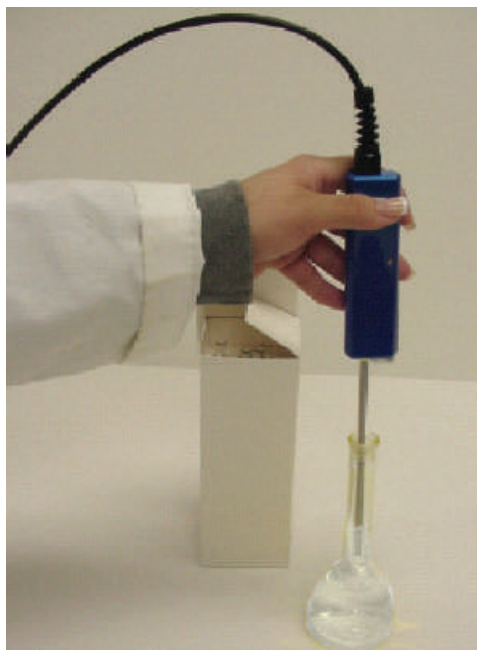
2. When finished collecting a baseline, dry the tip and insert the probe into the sample.
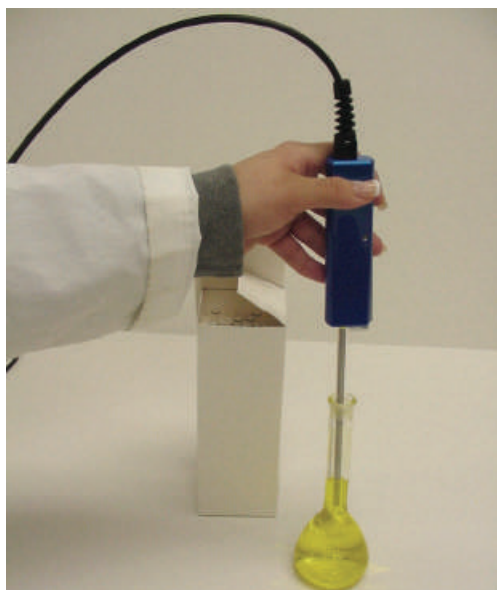
3. When finished measuring a sample, discard the tip or clean it before making additional measurements.

Related Topics

Operating Precautions

Installation

Routine Maintenance

Routine Maintenance

Follow these guidelines:

- Clean the probe immediately after each measurement and before storing it. See Cleaning Probes.

- Follow the manufacturer's recommendations for probe maintenance.

Related Topics

Cleaning Probes

Troubleshooting

Operating Precautions

Installation

Operation

Performance Verification

Contents

Overview of PV
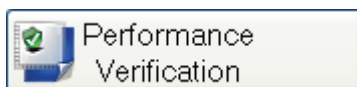
Use **Performance Verification** to set up and run tests to check the performance of the instrument. Click here for information on running the tests. Test results are displayed in reports that are saved automatically and can be opened later (see My Data).

PV Test Descriptions

Test	Description
Wavelength Accuracy (Hg lamp)	Locates the peaks from the external Mercury Lamp Calibration accessory and displays their measured and allowed range of wavelengths. A mercury lamp has strong, fundamental lines throughout the UV-visible range. These emission lines are a property of the lamp and serve as a fundamental wavelength standard that does not require calibration. The wavelengths and tolerance values cannot be changed. Use an empty cell holder and install the mercury lamp accessory properly in the instrument.
Wavelength Reproducibility (Hg lamp)	Measures the ability of the spectrophotometer to return to an identical wavelength in a repeatable manner. The test uses the external mercury lamp, which has a strong, fundamental line near 546 nm. This emission line is an intrinsic property of the lamp and serves as a fundamental wavelength standard that does not require calibration. The wavelength and tolerance values cannot be changed. Use an empty cell holder and install the Mercury Lamp Calibration accessory properly in the instrument.
Wavelength Accuracy (Xe lamp)	Locates the peak near 542 nm of the internal xenon lamp and displays the measured and allowed range of wavelengths. A xenon lamp has strong, fundamental lines throughout the UV-visible range. These are an intrinsic property of the lamp and serve as a fundamental wavelength standard that does not require calibration. The wavelength and tolerance values cannot be changed. Use an empty cell holder.
Wavelength Reproducibility (Xe lamp)	Measures the ability of the spectrophotometer to return to an identical wavelength in a repeatable manner. The test uses the internal xenon lamp, which has a strong, fundamental emission line near 542 nm. This line is a property of the lamp and serves as a fundamental wavelength standard that does not require calibration. The wavelength and tolerance values cannot be changed. Use an empty cell holder.

Test	Description
Wavelength Accuracy (Holmium oxide liquid)	Locates the peaks of a holmium oxide standard and displays their measured and allowed range of wavelengths. A holmium oxide solution prepared in dilute perchloric acid has well defined absorption peaks throughout the UV-visible range. These peaks are a property of the material and serve as a wavelength standard. The wavelengths and tolerance values are cannot be changed.
Wavelength Reproducibility (Holmium oxide liquid)	Measures the ability of the spectrophotometer to return to an identical wavelength in a repeatable manner using a holmium oxide standard. A holmium oxide solution prepared in dilute perchloric acid has well defined absorption peaks throughout the UV-visible range. These peaks are a property of the material and serve as a wavelength standard. The wavelengths and tolerance values are cannot be changed.
Photometric Accuracy (Customized)	Automates the comparison of measured absorbance (or %T) of photometric accuracy standards with their certified values. Use Photometric Accuracy standards calibrated to known absorbance values at specified wavelengths. If a custom standard is being used instead of a CVC, enter its wavelength, absorbance and tolerance values in the boxes to the right.
Resolution (Toluene/Hexane)	Measures the ability of the spectrophotometer to resolve adjacent features in a spectrum. Use a 0.02% (v/v) solution of toluene in hexane and a hexane blank. The wavelengths and tolerance values cannot be changed.
Stray Light (KCl, 198 nm), Stray Light (KI, 220 nm), Stray Light (NaI, 220 nm), and Stray Light (NaNO2, 340 nm)	Compare measured stray light at the indicated wavelength with the allowed range of values. Use the Stray Light standard designed to measure stray light at the indicated wavelength.
Photometric Noise: 0A (260 nm), Photometric Noise: 1A (260 nm), and Photometric Noise: 2A (260 nm)	Measure the amount of noise at 260 nm. For Photometric Noise: 0A (260 nm), use an empty cell holder. For the latter two tests, use a 1A and 2A metal-on-quartz filters suitable for the UV region for these tests.
Baseline Flatness (Abs, 800-200 nm)	Measures the flatness of a baseline scan over the region 800 nm to 200 nm with smoothing applied to the data. Use an empty cell holder.
Photometric Drift	Measures the absorbance drift of the instrument over a one-hour period. Use an empty cell holder and let the instrument warm up fully before initiating this test.

Related Topics

Overview of PV

Running PV Tests

Running PV Tests

❖ **To run PV tests**

1. Click **Performance Verification** in the right pane in Home.

> **Note** Select the **Classic** group in Home if Performance Verification is not available for the current group.

The available tests appear in the right pane.

> **Note** The CVC performance tests appear only when a CVC is properly installed and a valid calibration file has been loaded. See Calibrated Validation Carousel (CVC) for instructions. The available tests depend on the type of CVC installed.

> **Note** Tests that require the Mercury Lamp Calibration accessory can be selected only after the accessory has been properly connected and installed in the instrument.

2. Select the tests to run.

To select or deselect all the listed tests, double-click **Run** above the column of check boxes.

3. For selected tests that require it, enter information such as wavelength, value and tolerance in the provided boxes.

Heed the following precaution if using an accessory:

> **CAUTION** Avoid pinch hazard. Keep hands and objects clear of the accessory during operation.

Languages

> **ATTENTION** Évitez tout risque de pincement. Gardez vos mains, ainsi que tout objet, à l'écart de l'accessoire pendant l'initialisation.

VORSICHT Quetschungen sind zu vermeiden. Hände und Objekte sind während der Initialisierung vom Zubehör fern zu halten.

CAUTELA Evitare il rischio di pizzicamento. Tenere mani e oggetti lontano dall'accessorio durante l'inizializzazione.

PRECAUCIÓN Evite riesgos de atrapamiento. Mantenga manos y objetos lejos del alcance del accesorio durante la inicialización.

4. Click **Run**.

5. Follow the instructions that appear.

To end the tests before they are finished, click **Stop**. Alternatively, click **Cancel** when a prompt appears during a test.

The test results appear in a window from which they can be printed or copied. A signature block appears at the end.

Completed PV reports are saved automatically and appear on the PV Reports tab in My Data. See My Data for instructions for viewing results later.

6. Click **Close**.

Related Topics

Overview of PV

PV Test Descriptions

INSIGHT Security Software

Optional INSIGHT Security software adds features for digitally signing files and verifying digital signatures, as explained in this Help system.

INSIGHT Security software, together with Thermo Security Administration software, also lets the system administrator set system policies and control user access to INSIGHT software features. See Access Control and System Policies for complete information.

 This icon at the bottom of the INSIGHT window indicates that the current workbook is signed.

 This icon indicates that current workbook has not been signed since it was last changed.

 This icon indicates that current workbook has not been saved (or signed).

To see information about the signature status of the current workbook, click any of these icons.

If INSIGHT Security software is installed…

- The root directory for template groups shown on the Preference tab in Options is set using Thermo Security Administration.

- A Sign button appears in the Performance Verification report window. Use it to sign the displayed report.

Related Topics

Signing a File

Verifying a Signature

Signing a File

If INSIGHT Security software is installed, use the following procedures to digitally sign workbook and template files. The visible portion of a digital signature consists of a user name, a date and a stated reason for signing. A digital signature also contains encrypted information used to detect whether the file has changed since it was signed.

❖ **To sign the open workbook**

1. Choose **Security** (menu) **> Sign > Active Workbook**.

2. Enter a password.

3. Select a signature reason (if permitted).

4. Choose **OK**.

   A verification message appears.

5. Choose **OK**.

❖ **To sign a saved workbook**

1. Choose **Security** (menu) **> Sign > Workbook File**.

2. Locate and select the desired file and then click **Open**.

3. Enter a password.

4. Select a signature reason (if permitted).

5. Choose **OK**.

   A verification message appears.

6. Choose **OK**.

❖ **To sign a saved template**

1. Choose **Security** (menu) **> Sign > Template File**.

2. Locate and select the desired file and then click **Open**.

3. Enter a password.

4. Select a signature reason (if permitted).

5. Choose **OK**.

   A verification message appears.

6. Choose **OK**.

Related Topics

INSIGHT Security Software

Verifying a Signature

Verifying a Signature

If INSIGHT Security software is installed, use the following procedures to verify digital signatures for workbook and template files.

❖ **To verify the signature for a workbook**

1. Choose **Security** (menu) **> Verify Signature > Workbook File**.

2. Locate and select the desired file and then click **Open**.

   A verification message appears.

3. Choose **OK**.

❖ **To verify the signature for a template**

1. Choose **Security** (menu) **> Verify Signature > Template File**.

2. Locate and select the desired file and then click **Open**.

   A verification message appears.

3. Choose **OK**.

Related Topics

INSIGHT Security Software

Signing a File

Access Control and System Policies

The Access Control features and System Policies described below are available in Security Administration for INSIGHT software when INSIGHT Security software is installed.

Use the Access Control features to set the rights of individual users or groups of users to use the protected features of INSIGHT software (the features included in the security database). A protected feature will be available only if the logged-in user has the right to use it.

See "Controlling access to client application features" in the "Using Security Administration" chapter of the *Security Administration User's Guide* for instructions for using the Access Control features. See "Setting system policies for the client application" in that chapter for instructions for using the System Policies features.

After specifying access control and setting the policies, save the settings in the security database. See "Saving your security policy settings" in the "Using Security Administration" chapter of the *Security Administration User's Guide* for details.

Feature	Description
Ability to tun INSIGHT	Specifies which users can run INSIGHT software. (See "Controlling access to client application features" in the "Using Security Administration" chapter of the *Security Administration User's Guide* for general instructions.) If a user has not been granted the ability to run the software, an error message appears when the user attempts to start it.
Ability to delete workbooks	Specifies which users can delete workbook files with the Delete button in My Data.
Ability to delete PV reports	Specifies which users can delete Performance Verification reports with the Delete button in My Data.
Ability to delete templates	Specifies which users can delete template files with the Delete button in My Data.
Ability to delete Scan samples	Specifies which users can delete Scan sample data files from the current workbook by right-clicking a sample in the results table in Measure Scan and choosing Remove.
Ability to edit templates	Specifies which users can set parameters in Settings.
Ability to configure reports	Specifies which users can change settings in Reports.
Ability to perform PV tests	Specifies which users can run Performance Verification tests.
Ability to perform wavelength calibration	Specifies which users can use the Wavelength Calibration buttons on the Calibrations tab in System Settings.
Ability to calibrate Sipper	Specifies which users can use the Sipper Calibrate button on the Calibrations tab in System Settings.
Ability to calibrate Linear Cell Changer	Specifies which users can use the Linear Cell Changer Calibrate button on the Calibrations tab in System Settings.
Ability to update CVC calibration	Specifies which users can use the Load CVC Calibration button in Performance Verification.
Ability to select CVC tests to perform in PV	Specifies which users can select listed tests for the CVC in Performance Verification.
Math menu	Specifies which users can use the commands in the Math menu.
Analyze menu	Specifies which users can use the commands in the Analyze menu.
Ability to set Rate parameters	Specifies which users can set parameters in Settings for the Rate application.

Feature	Description
Options tabs	Specifies which users can change settings on the tabs in Options.
System Settings tabs	Specifies which users can change settings on the tabs in System Settings.
Authenticate on startup	Requires users in the specified policy groups to enter a valid name and password when starting INSIGHT software.
Prevent overwriting of files	Ensures that existing files are not overwritten when users in the specified policy groups save workbook or template files. If a user for whom this policy is selected attempts to save a file using the same file name as an existing file, a message says the file cannot be overwritten. The user can choose OK to close the message and then save the file using a different file name. If a user saves a file while this policy is selected, the file will be set to read-only in its properties. In the future, users will not be able to overwrite this file, even when this policy is not selected.
Prevent delete, rename and right-click in file dialog boxes	Prevents users in the specified policy groups from performing these operations in file dialog boxes: • Deleting a file by selecting it and pressing the Delete key on the keyboard. • Renaming a file by selecting its name (by slowly clicking the name twice) and typing a new name. • Displaying a shortcut menu by right-clicking a file. Normally a menu displayed this way lets the user perform operations such as copying, deleting or renaming the file. This policy can be used in conjunction with the Prevent changing directories when saving files policy (see below) to achieve the desired type of control over file operations for each user.
Prevent printing unsaved data	Prevents users in the specified policy groups from printing spectral data that has not been saved.
Prevent changing directories when saving files	Prevents users in the specified policy groups from changing directories ("browsing") when saving files.

Feature	Description
Prevent signature reason entry when signing files	Prevents users in the specified policy groups from entering a custom signature meaning when signing a file. When this policy is selected, only the standard signature meanings are available for the affected users. When this policy is not selected, the prompt requesting a signature lets the user type a meaning in the Reason For Signature text box.
Require signature when saving workbook files	Requires users in the specified policy groups to provide a digital signature when saving workbooks with Save Workbook or Save As Workbook in the File menu. If this policy is not selected, users in the specified policy group must use Security (menu) > Sign > Active Workbook or Workbook File to sign a workbook after it has been saved.
Require signature when saving template files	Requires users in the specified policy groups to provide a digital signature when saving templates with Save Workbook Settings as Template in the File menu. If this policy is not selected, users in the specified policy group must use Security (menu) > Sign > Template File to sign a workbook after it has been saved.
Require signature when saving PV results	Requires users in the specified policy groups to provide a digital signature when saving Performance Verification results.
Directory for workbooks	Designates for each policy group a directory for saving workbooks with Save Workbook or Save As Workbook in the File menu.
Directory for templates	Designates for each policy group a directory for saving templates with Save Workbook Settings as Template in the File menu.

Feature	Description
Directory for PV reports	Designates for each policy group a directory for automatically saving Performance Verification reports.
Allow access only to listed button groups (blank field allows access to all groups)	Specifies the INSIGHT software user groups that are available to users in the specified policy group. Selecting a user group in Home displays the application buttons for that group. See Applications Tab for more information. Type the desired user groups in the text box in the Description box, with a comma and a space between them; for example: `Classic, Quality Control` In this example, these users would have access to the applications for the Classic group (Fixed, Scan, Quant, Rate, Bio Applications and Performance Verification) and the applications for the Quality Control group. Leave the text box blank to give users in the specified policy group access to all applications.

Assigning Signature Meanings

Use the Signature Meanings features of Security Administration to specify the meanings that will be available for electronic signatures supplied by specified users. For example, the Signature Meanings features can be set so that only a particular user—for instance, the lab manager—is allowed to sign a file with the "Approval" meaning.

> **Note** Users can be allowed to enter custom signature meanings. See "Prevent signature reason entry when signing files" in Access Control and System Policies.

The default list of signature meanings appears when the Signature Meanings icon for "INSIGHT" is clicked in the navigation pane the first time Security Administration is run. If changes have been made to the list, the available meanings in INSIGHT software may be different. See "Assigning signature meanings" in the "Using Security Administration" chapter of the *Security Administration User's Guide* for general instructions for using the Signature Meanings features to change the available meanings or to specify which users can select each meaning when signing a file.

Use the signature meanings in the default list as follows.

Signature Meaning	Description
Authorship - signifies ownership	Indicates that the user signing the file is the person who created it.
Approval - the record is approved for use	Indicates that the user signing the file has approved it for use.
Reviewed - record contents have been reviewed	Indicates that the user signing the file has reviewed it.
Revision - the record has been revised	Indicates that the user signing the file has changed it.

Index

Numerics

G

H

X

Y

Z