thermoscientific

Evolution Series UV-Visible Instruments

Evolution One Series Spectrophotometer

User Guide

269-350500 Revision A • October 2021

ThermoFisher SCIENTIFIC

For technical support, please contact: www.thermofisher.com

For Research Use Only. This instrument or accessory is not a medical device and is not intended to be used for the prevention, diagnosis, treatment or cure of disease.

WARNING Avoid an explosion or fire hazard. This instrument or accessory is not designed for use in an explosive atmosphere.

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Introduction

This document covers the Thermo Scientific™ Evolution™ One series UV-Visible spectrophotometers and accessories

Contents

About the Hardware

Contents

Overview

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

- Evolution One
- Evolution One Plus

All instruments include our Insight Pro software for data collection and analysis. The Insight Pro software provides five 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.
- **Kinetics**, to make time- and temperature-based kinetics measurements.
- **Live Display**, for quick measurements and simplified data collections in **Fixed** or **Scan** mode.

Setting Up the Instrument

The spectrophotometer can be run from a Windows®-compatible computer connected to the instrument (Computer Control). Computer Control instruments must be connected to an external computer with the proper software installed. For instructions to set up a Computer Control spectrophotometer, 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

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 One Series Spectrophotometers	Complete instructions for using and maintaining the instrument.
Accessories	Complete instructions for using accessories with the instrument.

Conventions

This document uses the following conventions:

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

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

NOTICE Follow instructions with this label to avoid damaging the system hardware or losing data.

Note Contains helpful supplementary information.

Tip Provides helpful information that can make a task easier.

Contacting Us

For U.S. Technical Support, please contact:

Thermo Fisher Scientific
5225 Verona Road
Madison, WI 53711-4495 U.S.A.
Telephone: 1 800 532 4752
E-mail: us.techsupport.analyze@thermofisher.com

For International Support, please contact:

Thermo Fisher Scientific
Telephone: +1 608 273 5017
E-mail: support.madison@thermofisher.com

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.

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

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Evolution One Series Spectrophotometers

The Evolution™ One series UV-Visible spectrophotometers includes two models:

- Evolution One
- Evolution One Plus

Contents

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

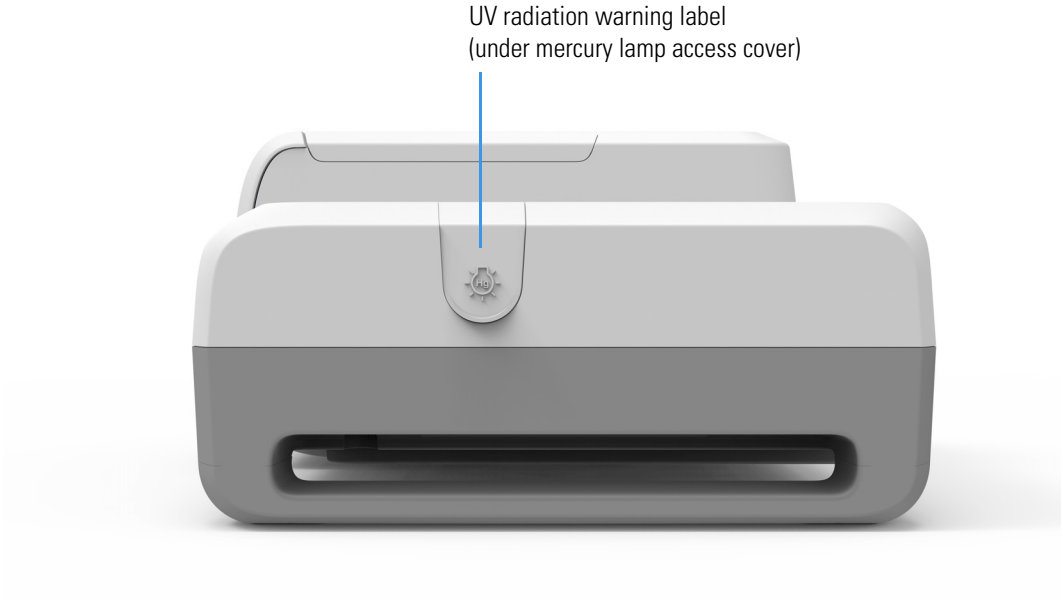
WARNING Do not operate this system without following the safety precautions described in this manual and the documentation that came with your system.

Safety Label Locations

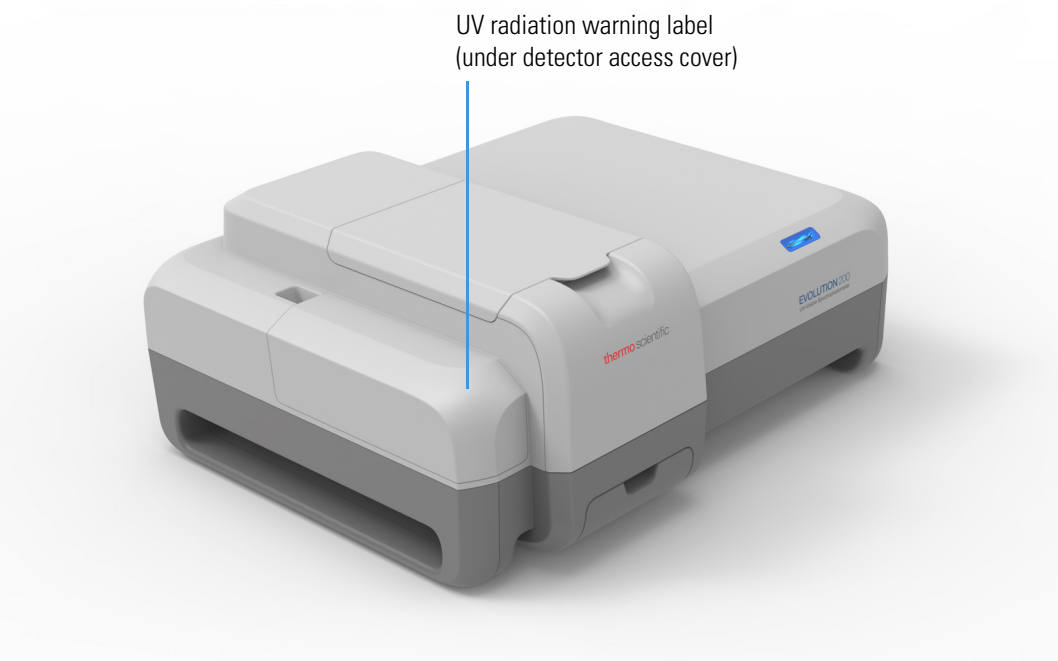
This section shows the locations of safety labels on the spectrophotometer. If there are questions or problems with the safety labels, contact us using the information provided at the beginning of this document.

Back view

Right side view



Left side view



Related Topics

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.

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

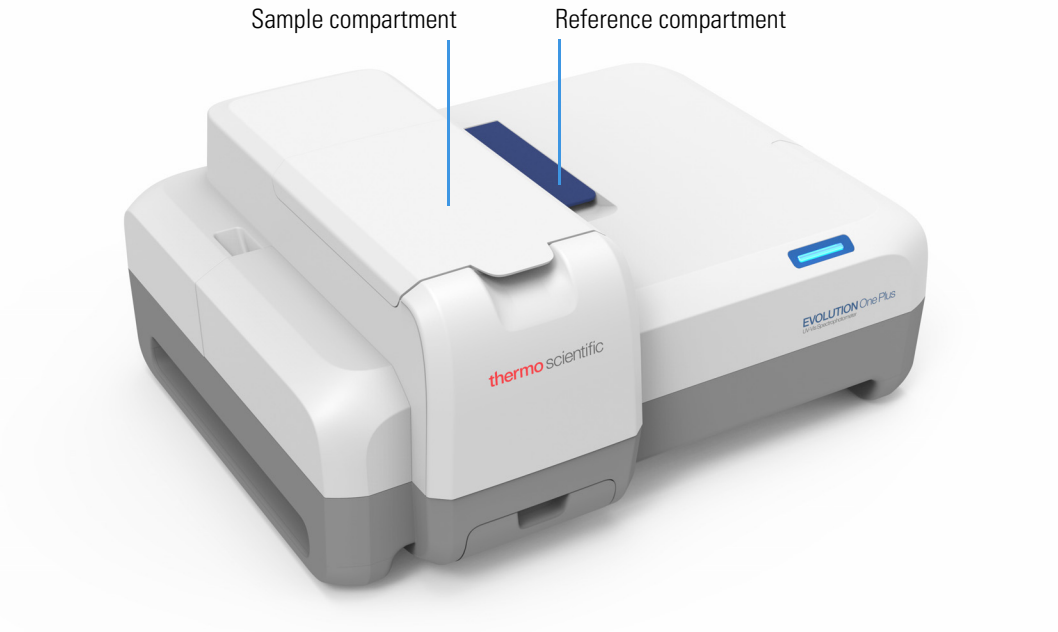
Contents

Spectrophotometer Components

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

Spectrophotometer Z-height

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

Computer Control

Insight Pro Software

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

Computer Control

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

Insight Pro Software

All instruments include our Insight Pro™ software for data collection and analysis. See the *Insight Pro Software User Guide*.

Connectors

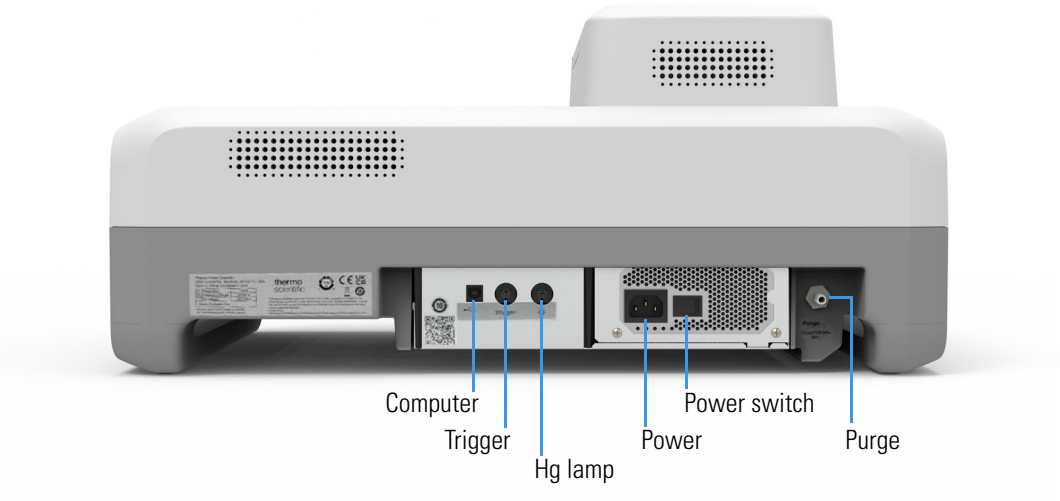
This section shows the locations of the connectors inside and outside the spectrophotometer.

Contents

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 the optional Mercury Lamp accessory.
Power	Connects to main power cord.
Power switch	System power On/Off switch.
Purge	Connects to optional purge source. See Purging the Sample Compartment.
Trigger	Connects to optional accessories that accommodate external trigger input or output. For more information, find the Integrated Fiber Optic Module User Guide in the documentation media. Insight Pro 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 **Settings > Preferences > Triggering**. Insight Pro accepts a contact closure input trigger (equivalent to pressing Run on the instrument keypad).

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.

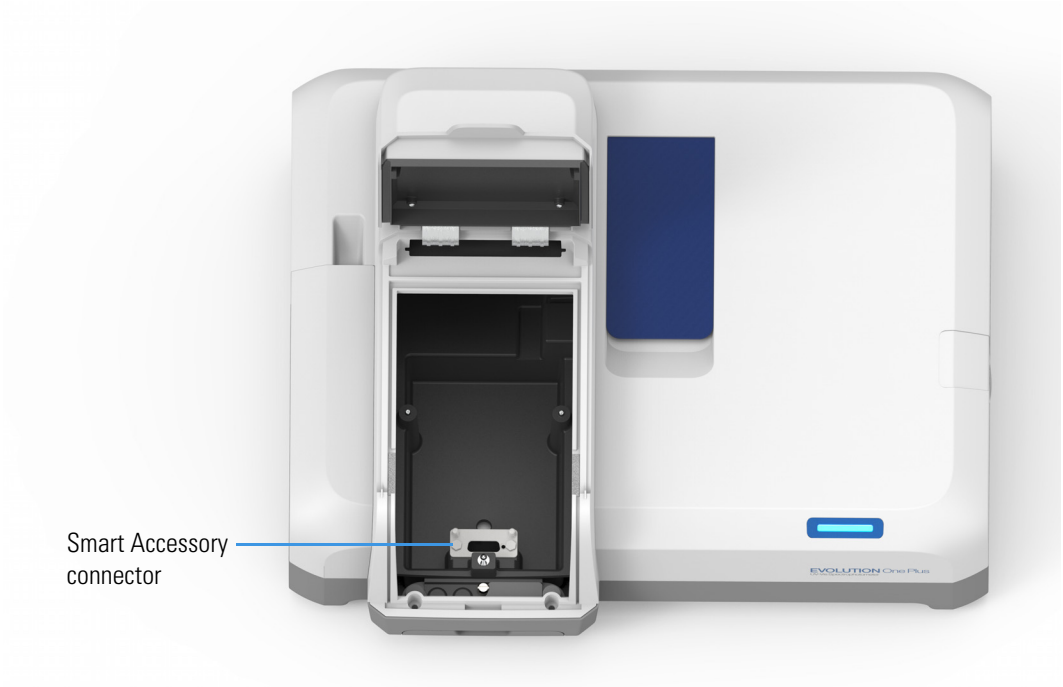
Related Topics

Purging the Sample Compartment

Computer Control Instruments

Inside the Sample Compartment

This illustration identifies the connectors inside the sample compartment.



Related Topics

Installing a Smart Accessory

Removable Panels

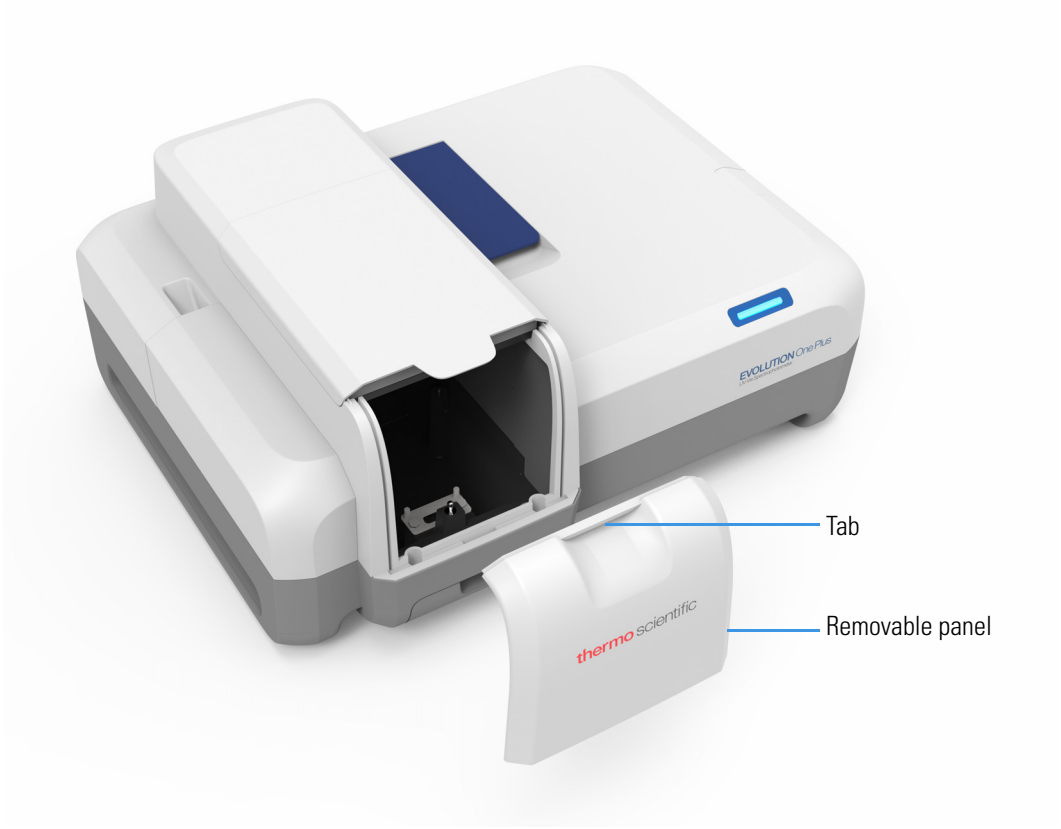
This section covers panels that can be removed to allow access to features on the instrument.

Contents

Sample Compartment Front Panel

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.



Related Topics

Installing a Manual Accessory

Installing a Liquid Thermostatted Accessory

Installing a Smart Accessory

Tubing Access Panel

Open fluid chambers for routing fluid from the instrument to an installed accessory are located inside the sample compartment.

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

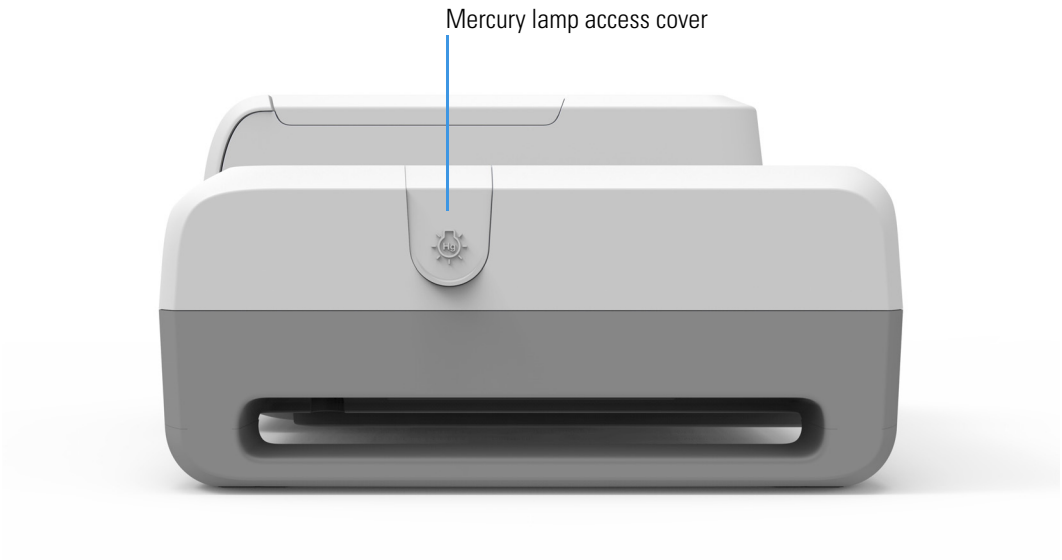
Installing a Liquid Thermostatted Accessory

Mercury Lamp Access Cover

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

Lift the cover to install the optional Mercury Lamp. For more information, refer to the *Mercury Lamp User Guide* in the documentation media.

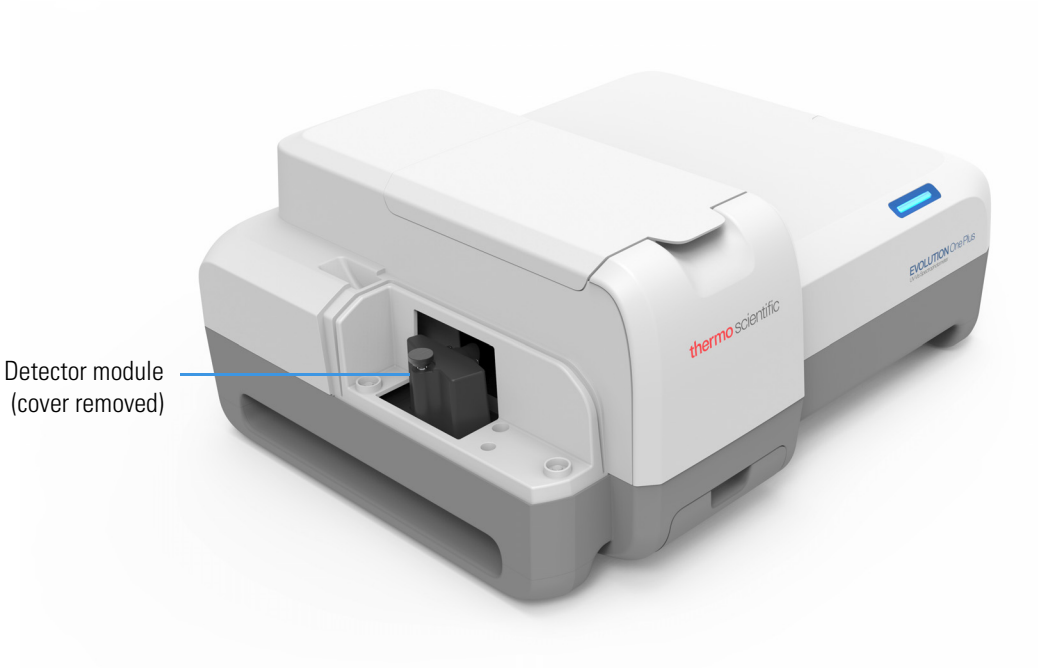
Right side view



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.



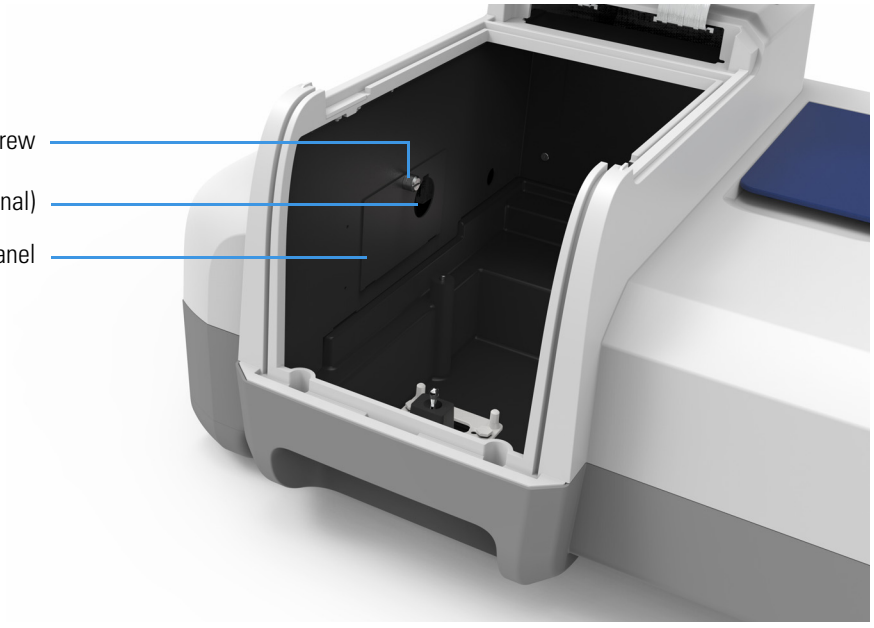
Related Topics

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.



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.

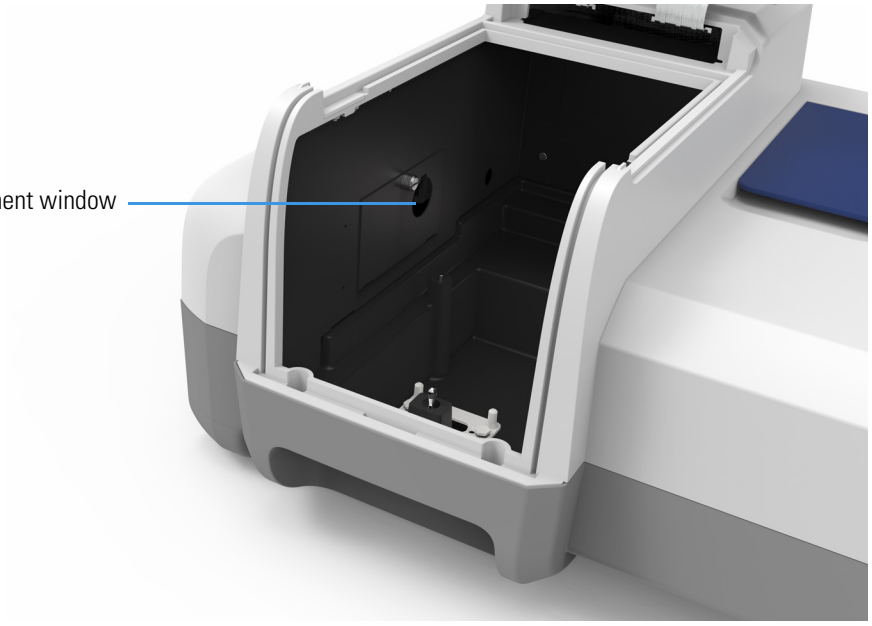
Related Topics

Installing Sample Compartment Windows

Purging the Sample Compartment

Installing Sample Compartment Windows

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



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.

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

Installing and Removing Accessories

Contents

Standard Cell Holders

The instrument includes one sample and one reference cell holder. For a list of optional cell holders and other accessories, click the Evolution One Series Accessories button in the documentation media.

Related Topics

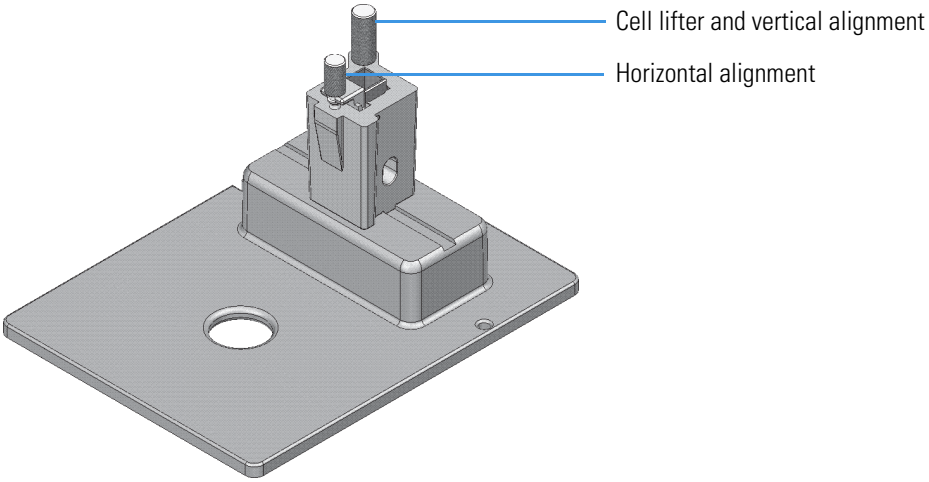
10 mm Rectangular Sample Cell Holder

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.



Related Topics

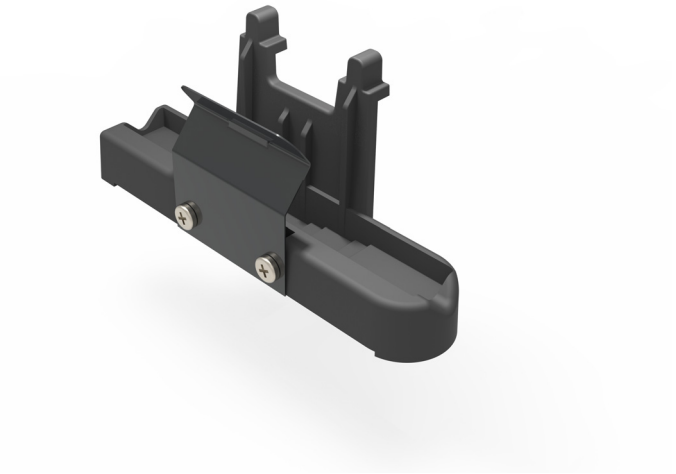
Rectangular Reference Cell Holder

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

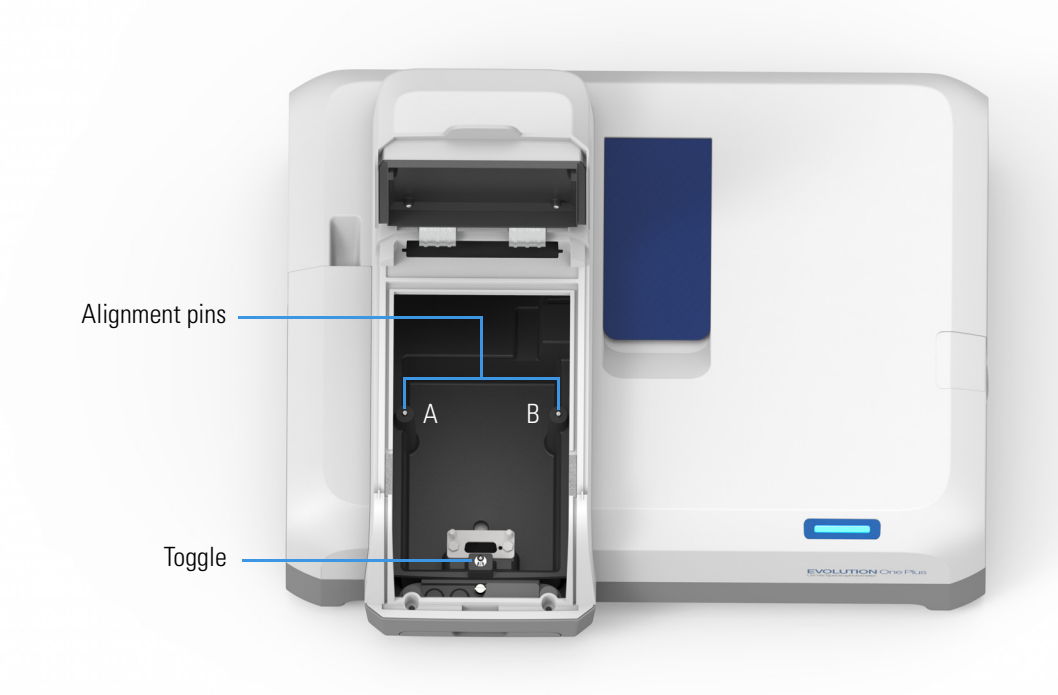
10 mm Rectangular Sample Cell Holder

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 user guide for the accessory.

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

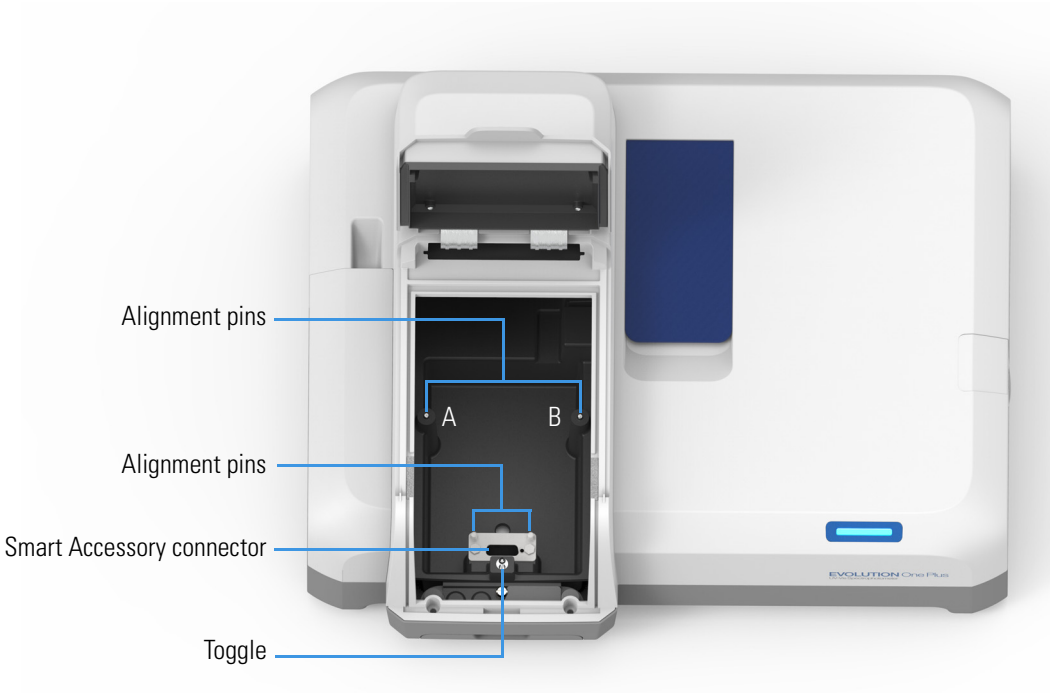
Installing a Smart Accessory

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.

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 user guide for the accessory.

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 temperature controller or fluid recirculator. The accessory connects to the internal fluid chambers on the instrument.

To install a thermostatted accessory

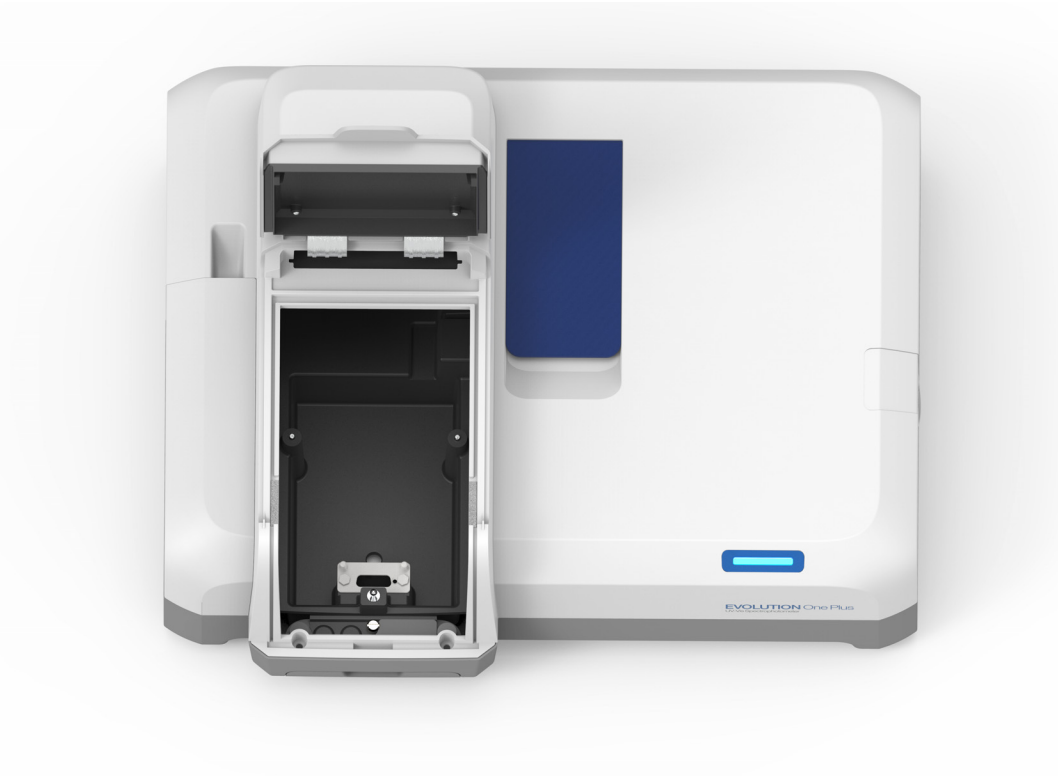
1. Install the accessory.

   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 temperature controller, water supply or recirculator to the internal chambers on the instrument.

If the connectors on the temperature controller, water supply or recirculator are a different size, use a tubing adapter.

4. Use additional tubing and adapters (not included), if necessary, to connect the internal chambers in 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 accessory port.



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

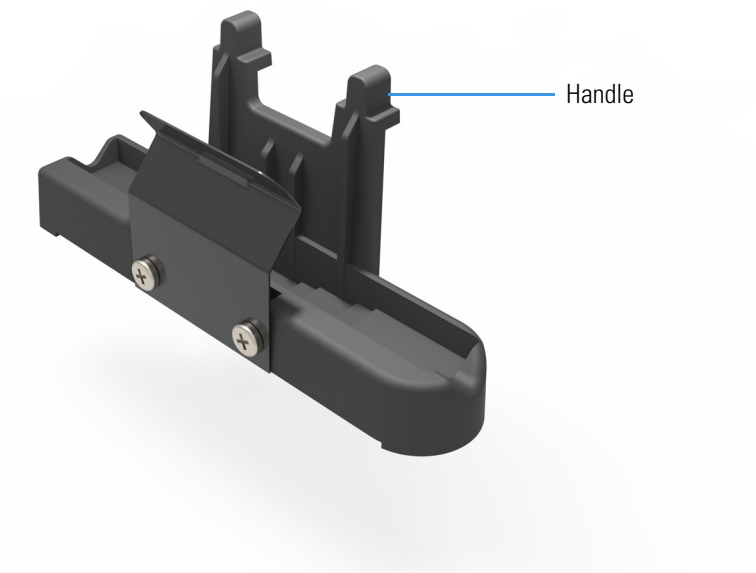
Installing a Manual Accessory

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.



3. Insert the pin in the alignment hole and press the holder in place.
4. Close the reference compartment cover.

For descriptions of the available reference holders, see *Reference Cell Holders* or search for that name in the Insight Pro Help system.

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 spectrophotometer.

Contents

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 Pro software.

Related Topics

Setting up a Computer Control Instrument

Turning off a Computer Control Instrument

Maintenance

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, turn off the spectrophotometer main power switch.

   Wait for the system to initialize. This may take several minutes. The status light pipe stops blinking when initialization is complete.

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

5. Double-click the Insight Pro desktop icon to start the software.

Tip For routine use, leave the power switch on the instrument back panel in the On position and turn on/off the spectrophotometer main power switch.

Related Topics

Turning off a Computer Control Instrument

Maintenance

Turning off a Computer Control Instrument

To turn off the instrument

1. Close Insight Pro software.
2. If necessary, turn off the spectrophotometer main power switch (on the back panel).

Related Topics

Setting up a Computer Control Instrument

Maintenance

Maintenance

Contents

Routine Maintenance

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

Related Topics

Maintenance

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 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

Maintenance

Removing and Installing the Detector Module

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

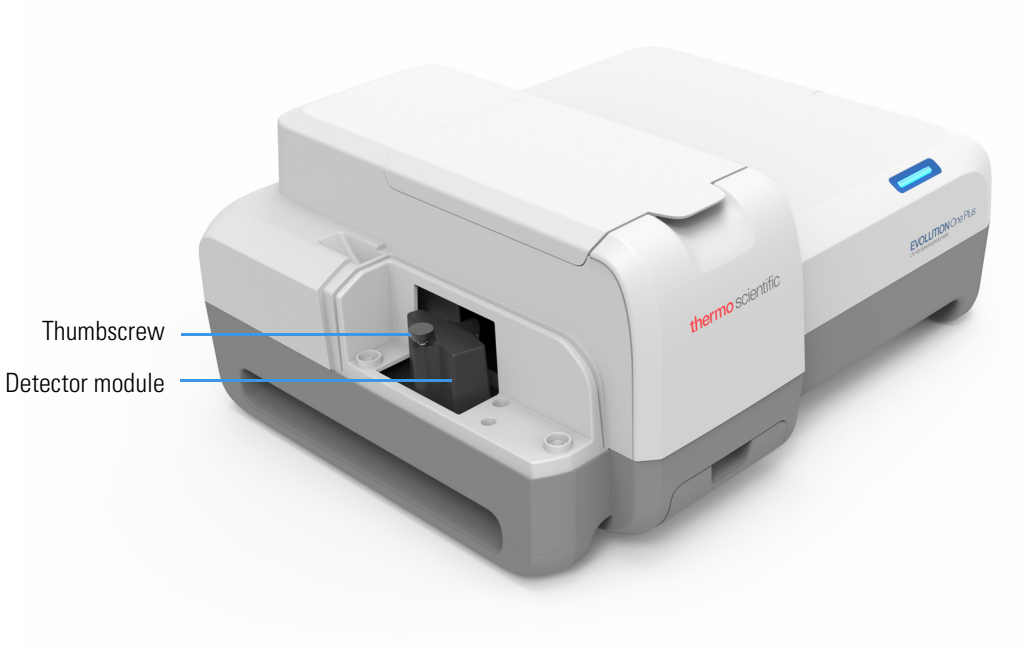
Avoid UV radiation hazard in the detector compartment. Protect eyes and skin from exposure.

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.

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.

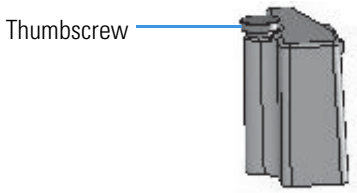
NOTICE Avoid touching the connector pins on the bottom of the detector module.



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

Maintenance

Detector Access Cover

Detector Access Panel

Ordering Parts

To order replacement parts, contact us using the information provided at the beginning of this document.