DESCRIPTION

The P4310 Thermo Mercury Lamp Accessory is a primary, physical standard that never requires calibration that is used to calibrate or verify the performance of the wavelength accuracy of the Thermo Scientific Evolution UV-Vis spectrophotometer. The accessory is operated using Thermo Scientific software that is included with the Evolution UV-Vis spectrophotometer sold separately.

SPECIFICATIONS

Physical Specifications:

Product Dimensions	Packaging Dimensions	Product Weight
12cm (L) x 20cm (W) x 3.8cm (H)	16" x 16" x 9" / 40.6cm x 40.6cm x 22.9cm	4.7 lbs. / 2.13 kg

Material	Molded plastic
Color	Off-white
Printing	Thermo Scientific label plate with Serial number
Electrical Supply / Communication	Pin cable attaches to back of Thermo Evolution spectrophotometer

Included Components:

- Mercury Lamp accessory with integrated cable
- Black plastic, latching storage case with molded foam insert

Recertification/Calibration:

None required or possible. The lamp emits light at specified wavelengths that are a physical standard equivalent to a primary standard.

Packaging:

Unit is shipped in a cardboard box with the storage case containing the unit inside the case.

Storage:

Store the instrument in a cool and dry location.

PRODUCT PHOTOS

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WHEN TO USE THE MERCURY LAMP

1. **Mercury Lamp Calibration:** Calibrate the Evolution spectrophotometer using the Mercury Lamp after the spectrophotometer has failed a performance verification test of any kind. This Wavelength Calibration process is described in *Usage - Section A*.

2. **Wavelength Accuracy Verification:** After calibrating the Evolution, always perform the Wavelength Accuracy Verification test to verify the Mercury Lamp calibration. Perform the Mercury Lamp wavelength accuracy and wavelength repeatability verification tests as described in *Usage - Section B*.

   - *IMPORTANT***:** To perform a complete Performance Verification test of the Evolution spectrophotometer, for both wavelength accuracy and photometric accuracy, reference *GEX Doc #100-271 Evolution Performance Verification Procedure for the Evolution Spectrophotometer.*

BEFORE INSTALLATION AND USAGE

Keep the Mercury Lamp Accessory stored in its storage container when not in use. Do not keep the Mercury Lamp plugged into the Evolution when not in use.

The Mercury Lamp testing requires the compartment doors to be always closed during testing, and to remove all samples and dosimeter holders (see *Figure 2*). The GEX dosimeter holder baseplate can remain in place inside the Evolution compartment. Do not remove the baseplate system (see *Figure 1*).
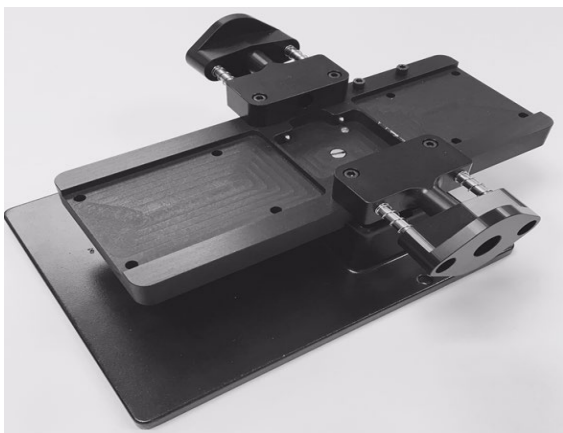

Figure 1: **Holder baseplate system (GEX product P4330) can remain in place inside the Evolution sample compartment.**
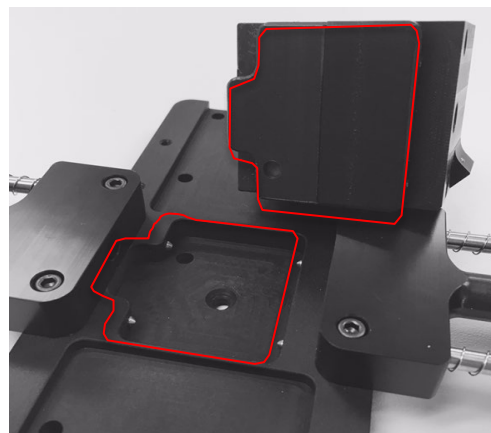

Figure 2: **Dosimeter holders should be removed before using the Mercury Lamp.**

INSTALLATION

1. Open the Thermo Insight software on the PC connected to the Evolution spectrophotometer and verify the instrument successfully connects to the software indicated by the green checkmark on the main screen.

NOTE: Thermo Insight Pro is the newest version released by Thermo in 2021 and is compatible with both the Evolution One Plus model and Evolution 220 model spectrophotometer; Thermo INSIGHT software is the legacy version and is compatible with the Evolution 220 model only.

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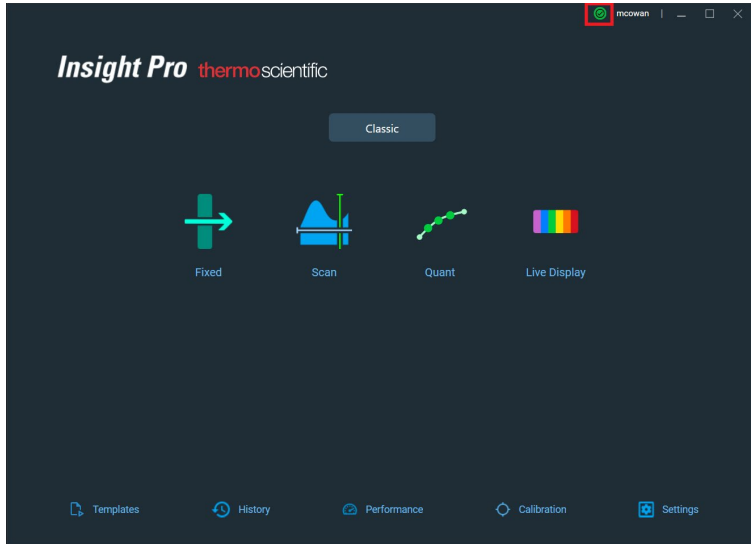
Thermo Insight Pro software: Green status icon in upper right corner of the screen indicates the software is successfully connected to the spectrophotometer.
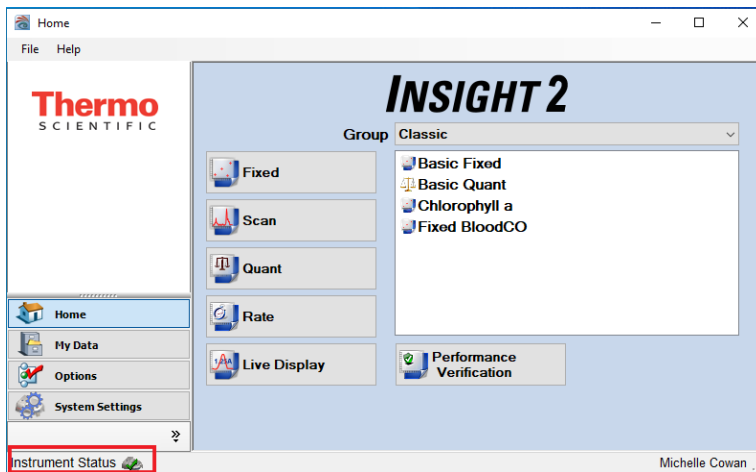
Thermo INSIGHT 2 software: Green status icon in lower left corner of the screen indicates the software is successfully connected to the spectrophotometer.

2. Plug the cable into the Mercury Lamp communications port on the back of the Evolution (see *Figure 3*).

Figure 3: **Mercury Lamp port on the back panel of the Evolution.**

3. Lift the mercury lamp access cover located on the right side of the Evolution and insert the Mercury lamp into the cavity. Press gently until it is secure. The lamp power light will illuminate, indicating that it is connected properly (see *Figure 4*).
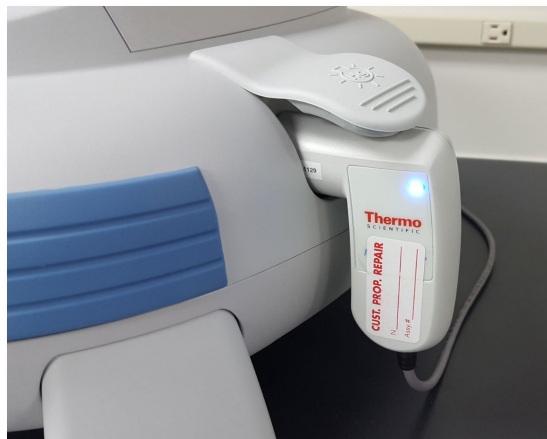
Figure 4: **Mercury Lamp inserted into side cavity of the Evolution. Blue light indicates the lamp is correctly inserted.**

4. Next, follow the instructions below in the *Usage* section to perform the Wavelength Accuracy Calibration (Usage – Section A) or the Performance Verification for Wavelength tests (Usage – Section B). *NOTE:* Refer to the Thermo Scientific published *Mercury Lamp User Guide* for further details.

USAGE

A) Wavelength Accuracy Calibration of the Evolution spectrophotometer using the Mercury Lamp Accessory:

Description: Recalibration using the Mercury Lamp accessory allows the user to recalibrate the Evolution exactly as it was in the factory. The calibration re-measures all relevant emission lines from 250nm to 810nm, then recalculates and replaces the software compensation equation. For complete details, reference the *Thermo Mercury Lamp Accessory Product Specifications.*

The Mercury Lamp calibration procedure should be used if the Evolution spectrophotometer fails wavelength or photometric accuracy performance verification testing. The calibration process will take about 10 minutes to complete.

1. Install the Mercury lamp into the Evolution as described in the 'Installation' section above and verify the blue light is on.

2. Remove any dosimeter holder from the sample compartment. The GEX baseplate and light beam tubes should remain installed.

3. Close the sample compartment lid of the Evolution

4. Open the Thermo Insight software on the PC connected to the Evolution spectrophotometer and verify the instrument successfully connects to the software indicated by the green checkmark on the main screen.

5. Go to the Thermo Insight software Calibration screen and perform the Mercury Lamp calibration. See instructions below for both versions of the Thermo Insight software – Thermo Insight Pro and Thermo INSIGHT.

THERMO INSIGHT PRO SOFTWARE INSTRUCTIONS:

a. In Thermo Insight Pro, click on the "Calibration" button on the lower bar to open the Calibrations screen.
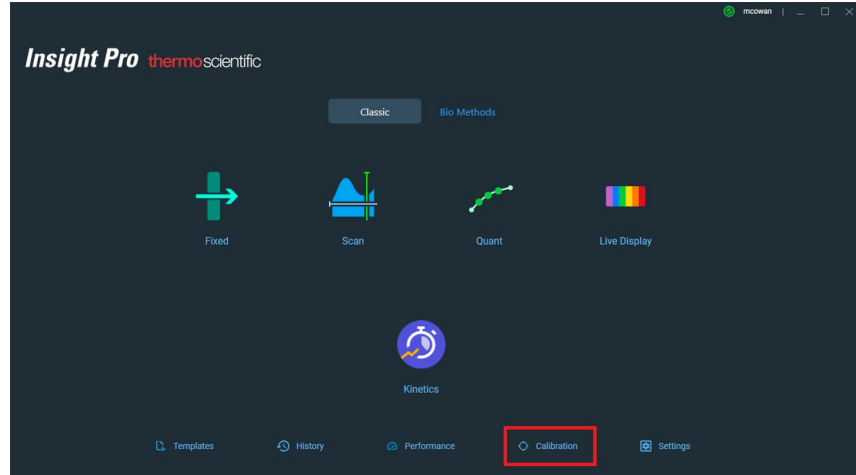
b. On the Calibration screen, click the "Calibrations" button. The Hg Lamp should be the only option available because the Mercury Lamp is installed.
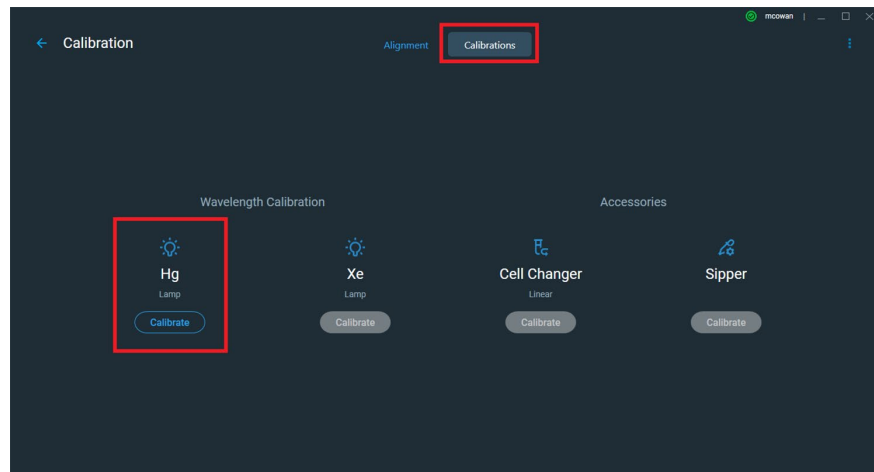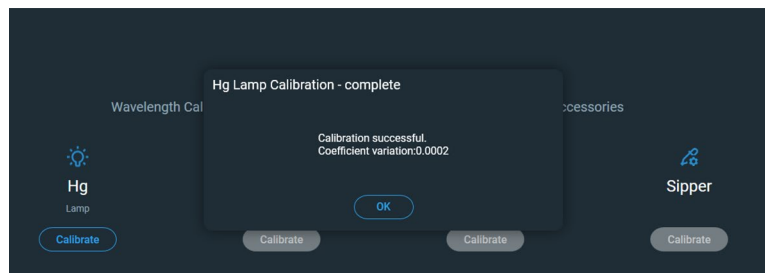

c. To start the calibration, click the "Hg Lamp Calibration" button. A pop-up message will ask you to confirm by clicking "Continue".
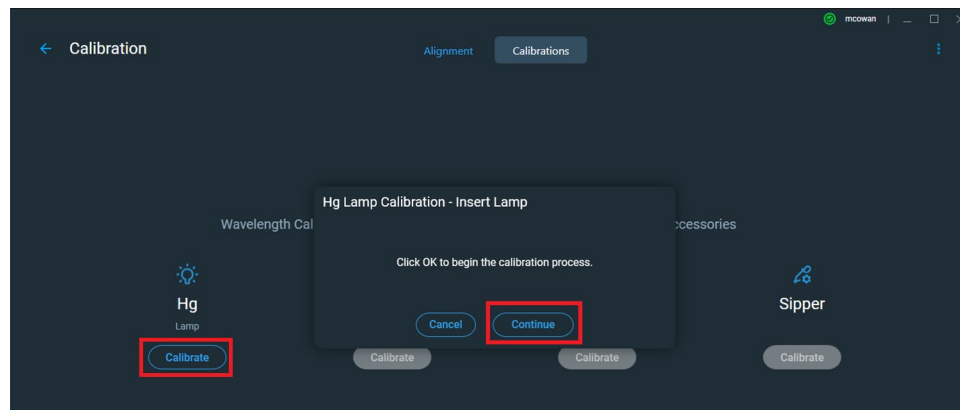
d. A progress bar will appear to display the status of the calibration. Follow the prompts to complete the calibration.
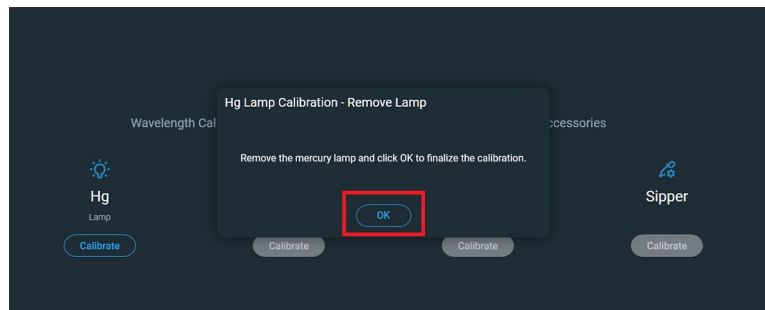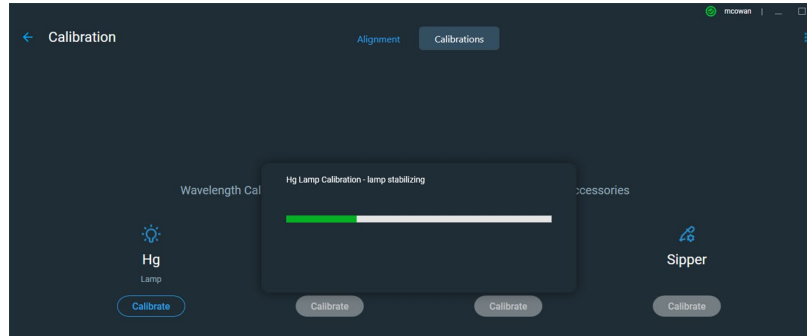
e. When calibration of the wavelength accuracy completes, a message should appear that calibration was successful.

f. After a successful Mercury Lamp calibration, perform the Wavelength Accuracy Verification procedure as described in *Section B* below.

g. Remove Mercury Lamp and place in storage box.

- **IMPORTANT!** Do not leave the Mercury Lamp installed. The Mercury Lamp must be removed and unplugged from the Evolution before performing any further measurements in Thermo Insight or GEX DoseControl dosimetry software.

THERMO INSIGHT 2 SOFTWARE INSTRUCTIONS:

a. In Thermo INSIGHT, select the "System Settings" button from the lower-left of the main screen. Then select the 'Calibrations' tab at the top of the next screen.
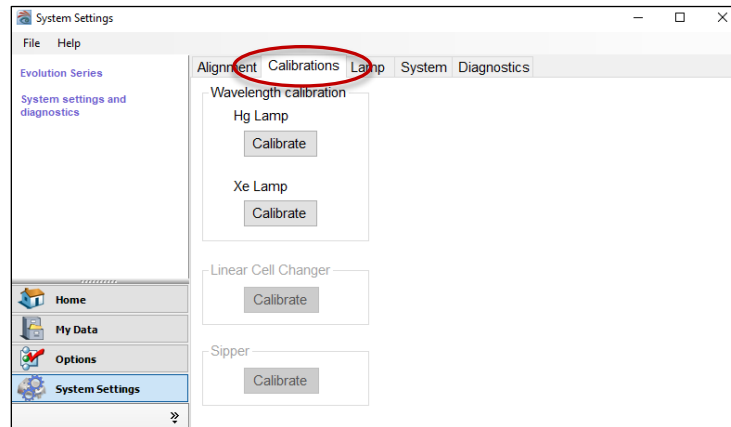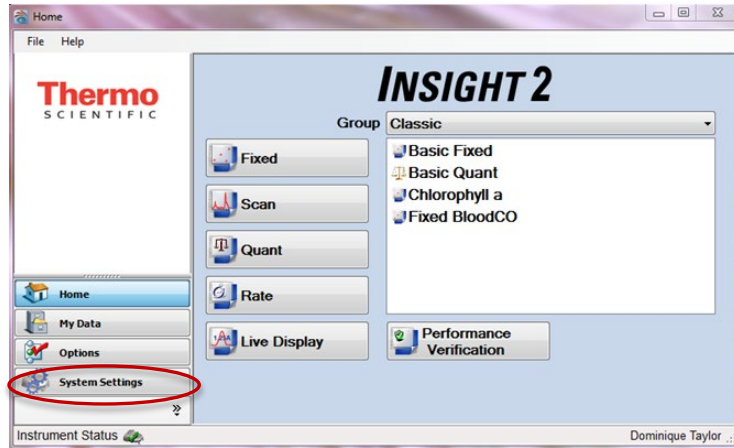
b. Begin the Mercury Lamp calibration test. In Thermo INSIGHT, click the "Hg Lamp" Calibration button to begin the calibration.
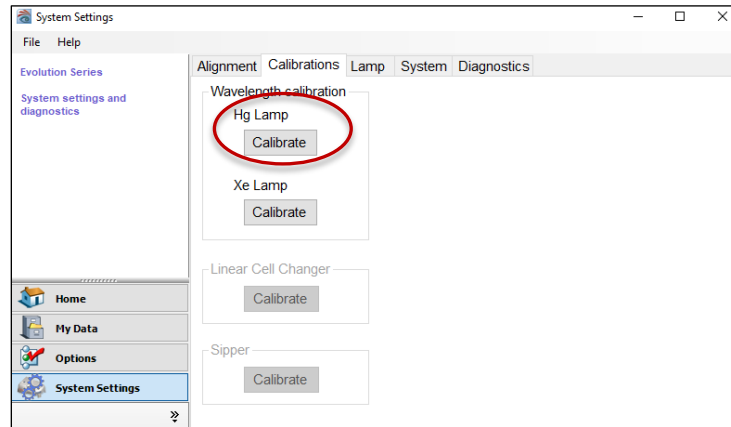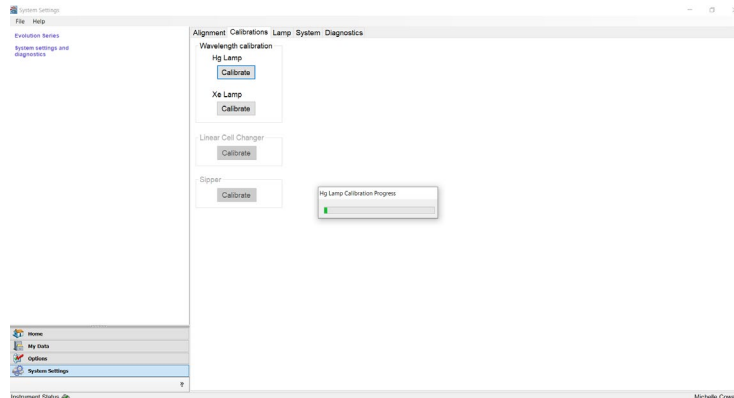
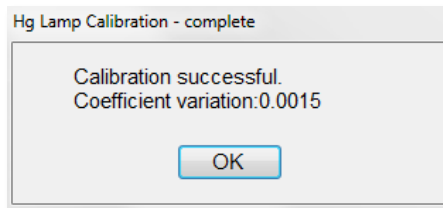

c. Follow the prompts. Press 'OK' to begin calibration.
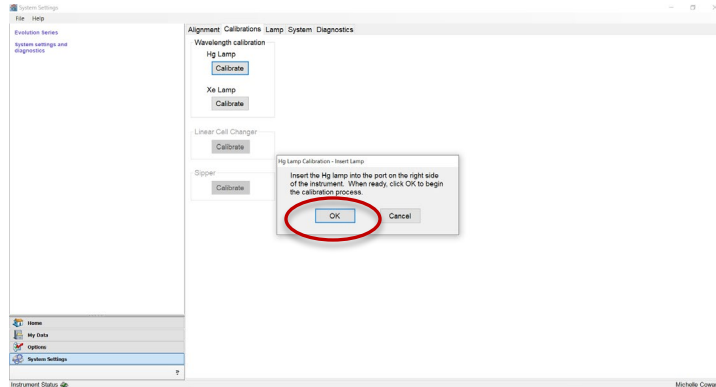
d. The Hg Lamp Calibration process will begin. A popup window will indicate the lamp is stabilizing.
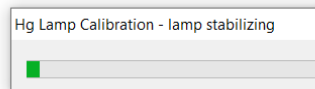
e. The progress of the calibration will be display, which takes around 10 minutes to complete.

f. When calibration of the wavelength accuracy completes, a message should appear that calibration was successful.

g. After a successful calibration, perform the Wavelength Accuracy Verification procedure as described in Section B below.

h. Remove the Mercury Lamp and place in storage box.

- **IMPORTANT!** Do not leave the Mercury Lamp installed. The Mercury Lamp must be removed and unplugged from the Evolution before performing any further measurements in Thermo Insight or GEX DoseControl dosimetry software.

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B) Wavelength Accuracy Verification Testing of the Evolution spectrophotometer using the Mercury Lamp Accessory:

Description: Testing includes verification at five (5) points from 254nm to 872nm, and repeatability testing at the middle point. See steps 5-6 of these instructions regarding a pass or fail result.

1. Install the Mercury lamp into the Evolution as described in the 'Installation' section above and verify the blue light is on.

2. Remove any dosimeter holder from the sample compartment. The GEX baseplate and "light beam tubes" should remain installed.

3. Close the sample compartment lid.

4. Open the Thermo Insight software on the PC connected to the Evolution spectrophotometer and verify the instrument successfully connects to the software.

5. Follow the instructions below to perform the Performance Verification tests for either the Thermo Insight Pro or Thermo INSIGHT version of software.

THERMO INSIGHT PRO SOFTWARE INSTRUCTIONS:

   a.   On the Thermo Insight home screen, select the 'Performance' button.
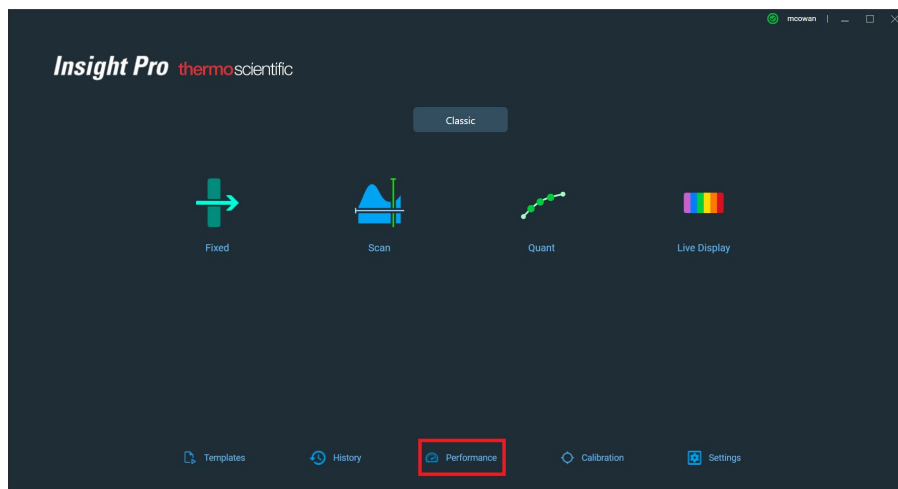
    b.   Select the Wavelength Accuracy (Hg lamp) and Wavelength Repeatability (Hg Lamp) tests and click "Continue". The Spectral bandwidth test at 1nm is optional. The calibration process will begin, and a pop-up message will appear stating the Mercury Lamp is warming up:

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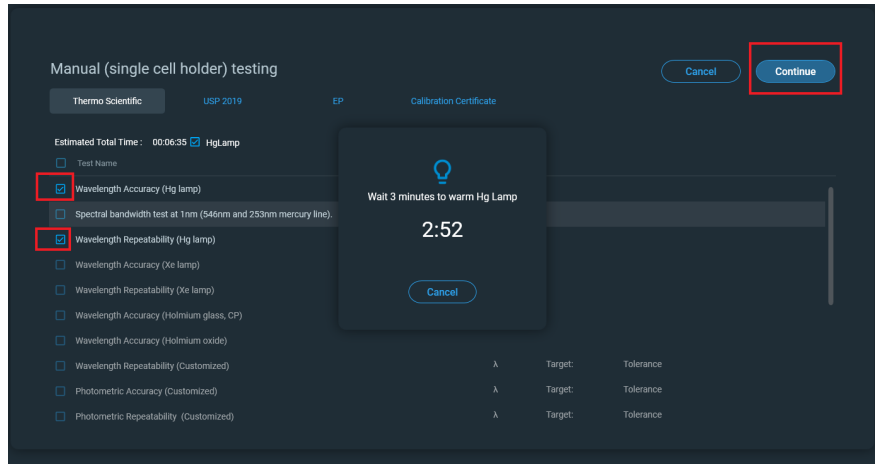
c. When the lamp warm up is complete, follow the prompt and click the "Run" button. The Wavelength Accuracy test will begin and a status bar will appear to display test progress.
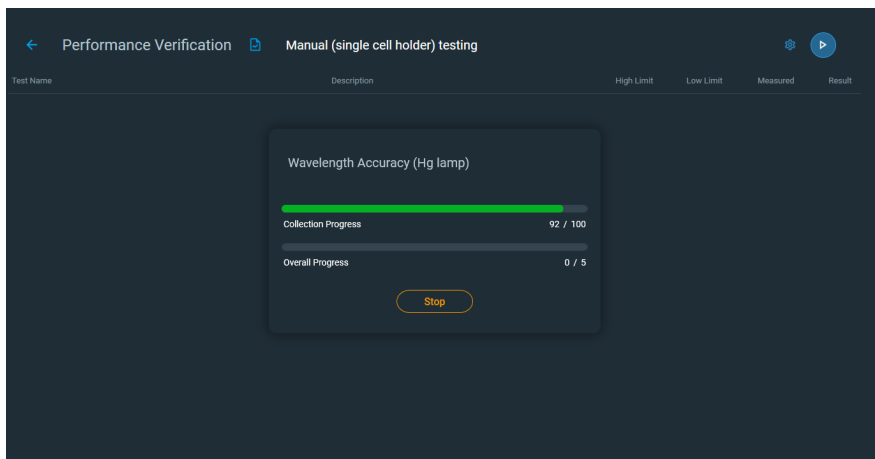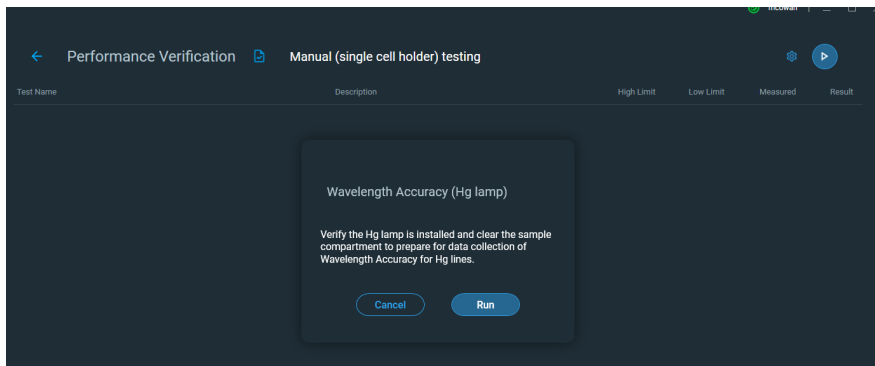
d. When the first test is complete, click the "Run" button to begin the Wavelength Repeatability test. A status bar will appear to display the test progress.
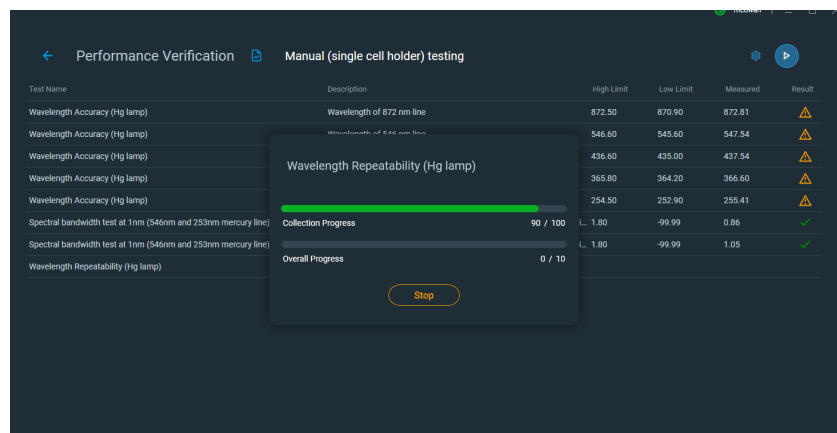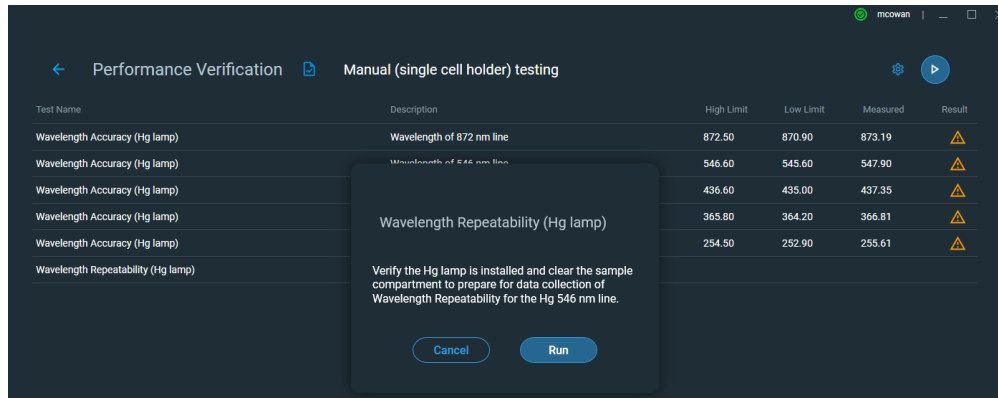
e. When both the tests are complete the results will appear in a list on the screen. The "Results" column will have a green checkmark icon for a test PASS, and an orange alert icon for a test FAIL. **See steps 5-6 of these instructions regarding a pass or fail result.**
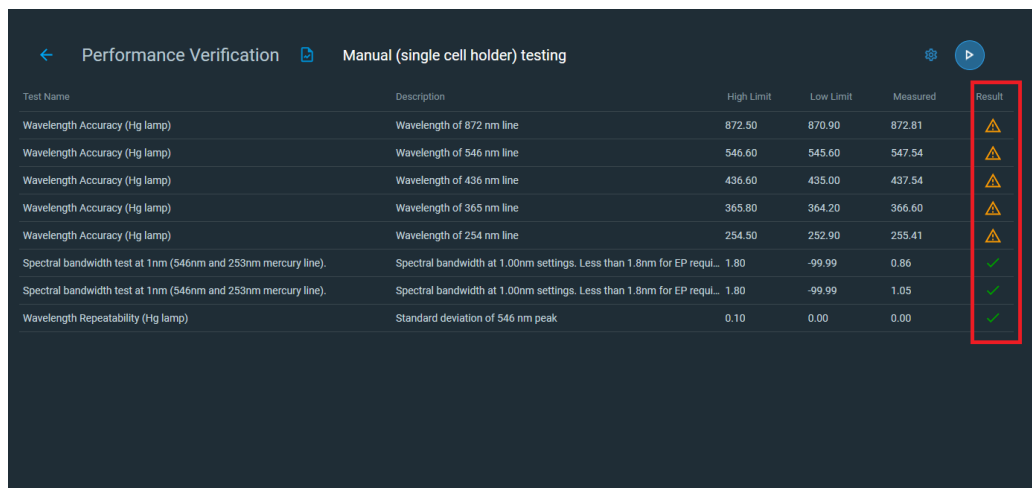
f. To print a PDF report of the Performance Verification test results, **click the document icon** on the top bar.

THERMO INSIGHT 2 SOFTWARE INSTRUCTIONS:
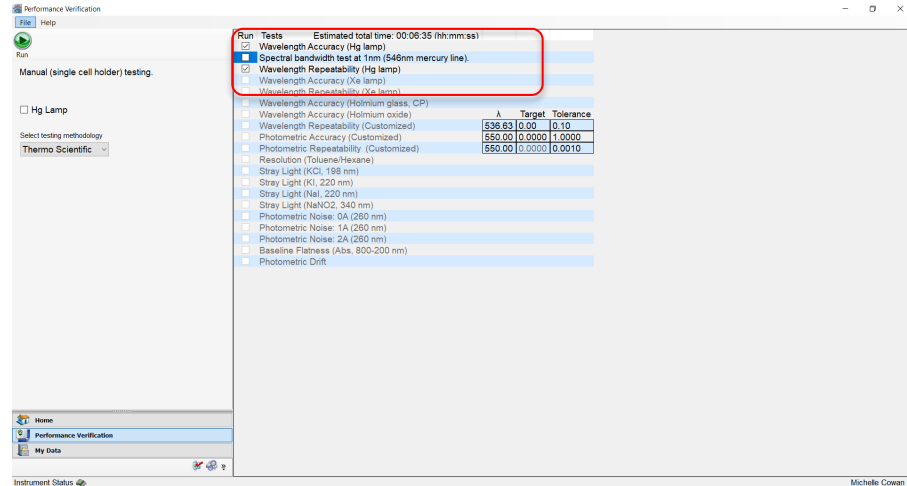
   a.   On the Thermo Insight home screen, select the "Performance Verification" button.
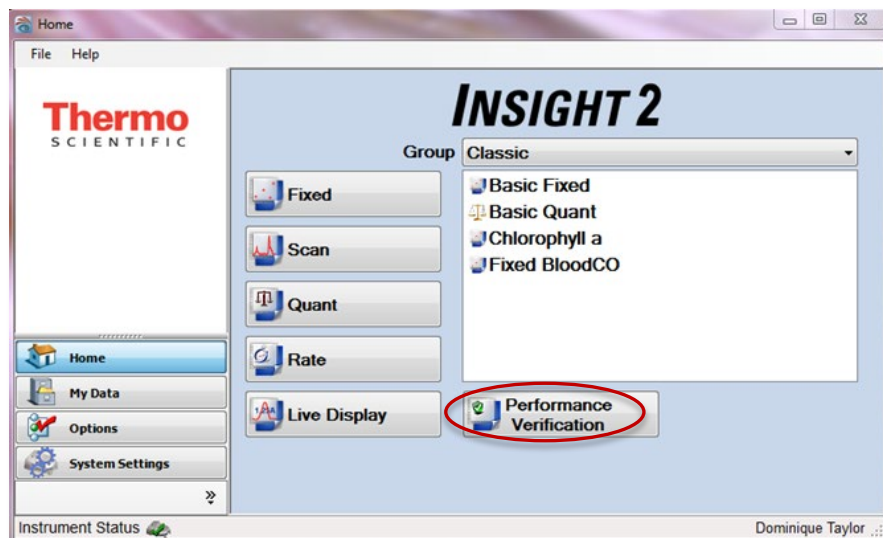
b. On the Performance Verification screen, select the two (2) wavelength test: Wavelength Accuracy (Hg lamp) and Wavelength Repeatability (Hg lamp). Un-check the "Spectral Bandwidth at 1nm test" option.


c. Check the "Hg Lamp" box in the left-hand side of the screen to begin the testing. A message will pop up to indicate the Mercury Lamp is warming up (see image below).
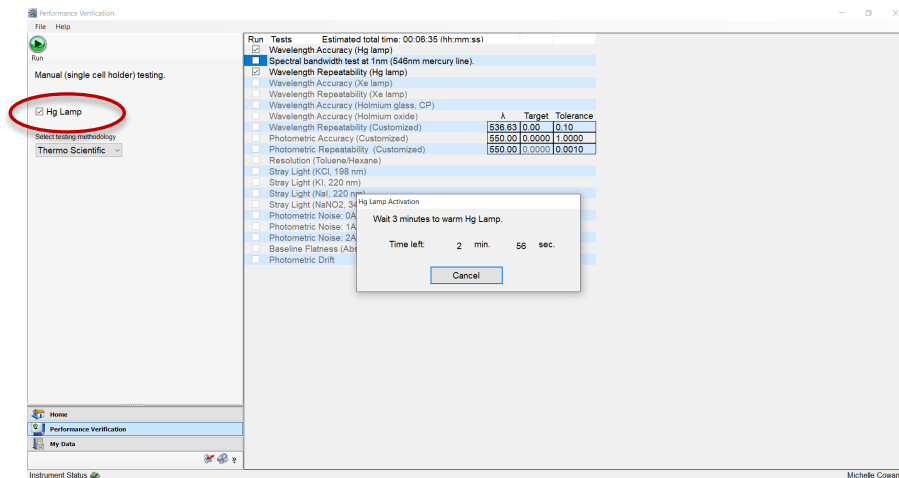
d. Press the 'Run' button in the upper left of the screen, or F6 on your keyboard, to begin the tests. A screen will appear showing a warmup countdown for the Mercury (Hg) lamp.
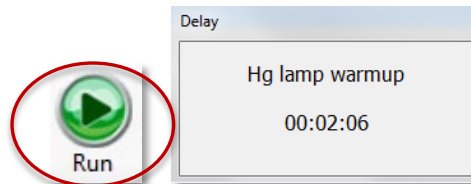
e. After the warmup countdown completes, the Wavelength Accuracy test prompt will ask the user to verify that the Mercury Lamp is installed. Ensure the sample compartment does not have dosimeter sample, dosimeter holder, and that the holder system is not out of place and blocking the beam path. Ensure the doors to the compartment are closed properly. Select 'OK' to continue.

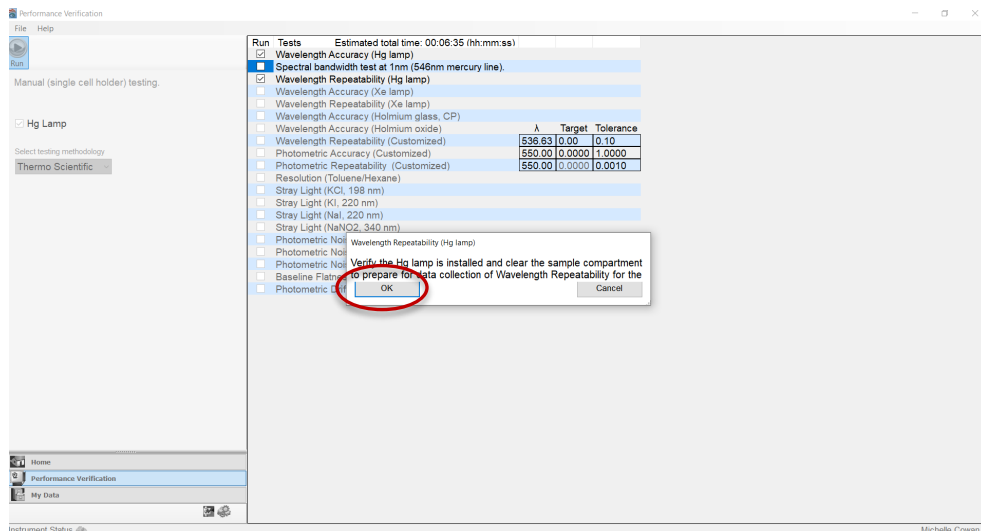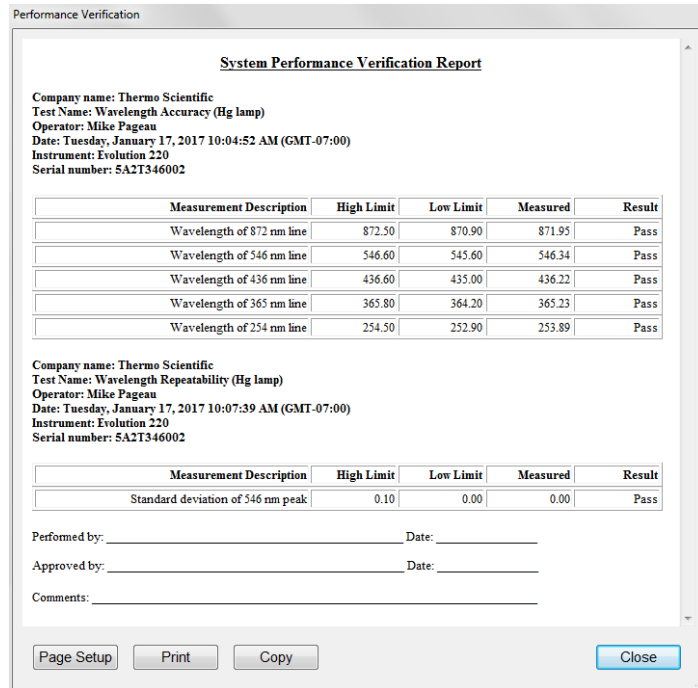GEX CORPORATION
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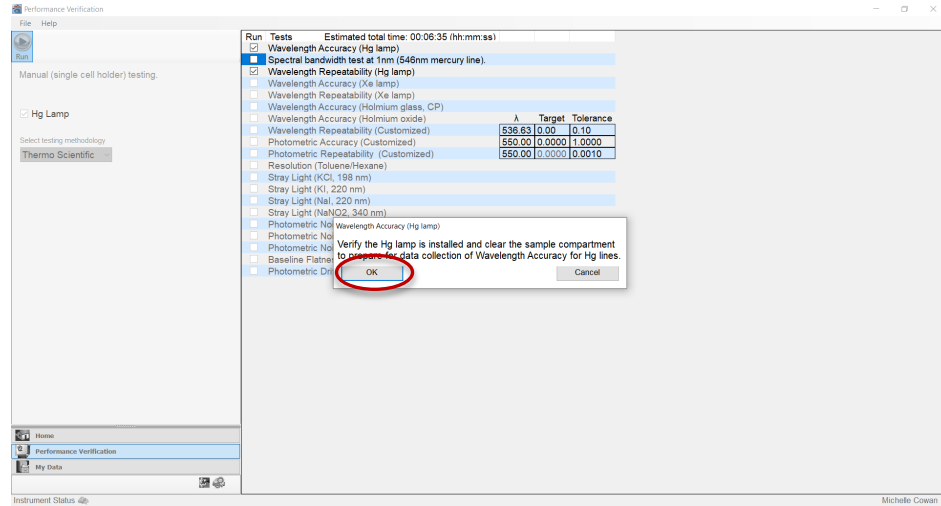
f. The Wavelength Accuracy test will begin, and the progress will be displayed on the screen.
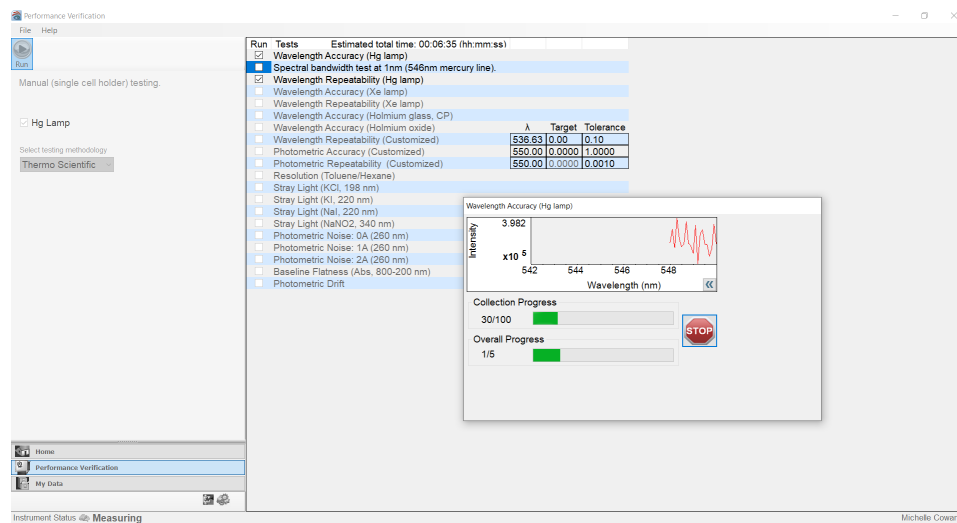
g. Next, a popup window for the Wavelength Repeatability test will prompt the user to confirm the sample compartment is clear. Follow the prompt and click 'OK' to continue.

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h.   The Wavelength Repeatability test progress will be displayed on the screen.

i.   After both the Wavelength Accuracy and Wavelength Repeatability tests have been completed, a final Test Report is generated and displayed (see image below). **See steps 5-6 of these instructions regarding a pass or fail result.**

6.   If all Performance Verification tests pass, no further actions are required.

7.   If any tests fail, the wavelength accuracy of the Evolution will need to be calibrated.

a.   Turn off and re-start the Evolution spectrophotometer.

b.   Then perform a Mercury Lamp Calibration - refer to section *A: Wavelength Accuracy Calibration of the Evolution spectrophotometer using the Mercury Lamp Accessory* of this document for instructions.

c.   After repeated failure of the tests in this *Section B* and having rebooted and attempted calibration using the mercury lamp per section *A: Wavelength Accuracy Calibration* at least 2 times, contact GEX customer service or Thermo Scientific for support and recommendations.

8.   Remove the Mercury Lamp from the Evolution and replace the access cover on the right side of the Evolution.

a.   **IMPORTANT!** Do not leave the Mercury Lamp installed. The Mercury Lamp must be removed and unplugged from the Evolution before performing measurements using Thermo Insight or GEX DoseControl dosimetry software.

9.   Store the Mercury Lamp in the provided case.

CARE & MAINTENANCE

Do not drop the accessory or it may become permanently damaged; it is not warranted against physical damage from careless handling or accidents. Refer to the *Thermo Scientific Mercury Lamp User Guide* for more details.

PRECAUTIONS

Refer to the *Thermo Scientific Mercury Lamp User Guide* for important safety precautions.

WARRANTY

Please refer to the Thermo Scientific product information for warranty information.

RELATED DOCUMENTS

- GEX Doc #100-156 Evolution Spectrophotometer – Product Specifications and Usage (PSU)
- GEX Doc #100-271 Evolution Performance Verification Procedure
- Thermo Scientific Evolution Spectrophotometer User Guide (Performance Verification section)
- Thermo Scientific Mercury Lamp User Guide
- Thermo Mercury Lamp Accessory Product Specifications

REVISION HISTORY

DATE	CHANGE DESCRIPTION	REVISION
05/23/2019	Initial release – content taken from 100-156 Rev. B, then improved clarity and organization.	A
02/18/2021	Updated performance verification testing screenshot for newest Thermo INSIGHT software version. Added screenshots to illustrate test steps. Added when to use Hg lamp section. Added instruction to retain dosimeter holder system baseplate and light beam tubes inside the Evolution 220 spectrophotometer. ECO 70559.	B
12/10/2021	- Revised title from "P4310 Evo220 Mercury Lamp Accessory" to "P4310 Thermo Scientific Mercury Lamp Accessory". - Description section updated language to remove reference of EVO220 for Thermo Scientific Evolution UV-Vis Spectrophotometer. - Added Figure numbers to coincide with images. - 'When to use the Mercury Lamp' section language clarified for the instructions on calibration and wavelength accuracy verification. - Installation section: Included Thermo Insight Pro software usage as an addition to the instructions for older versions of INSIGHT. - Related Docs section: included reference to Thermo Mercury Lamp Accessory Product Specifications. ECO 70593	C

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