

DESCRIPTION

The P4300 Thermo Scientific Evolution 220 Spectrophotometer (Evo220) is a device used to measure the optical absorbance of optically transparent samples in the spectrums of visible or ultraviolet light (UV/VIS). Within the DoseControl dosimetry system, the instrument integrates with the DoseControl software that controls the instrument parameters and user workflow for the application in which it is used.

APPLICATION

The Evo220 is used for the measurement of optical absorbance of dosimeters using a single wavelength in the spectrum, and uses specialized hardware in the sample compartment (sold separately from GEX) to orient the sample to light which passes through the sample to ensure accurate and repeatable measurements. Specialized hardware from GEX exists for the GEX B3 radiochromic film dosimeters, FWT-60, and Red and Amber Perspex dosimeters. The instrument could also be used for measurement of any dosimeter that is analyzed in the UV/VIS spectrums if proper holders are designed and implemented.

SPECIFICATIONS
Physical Specifications:

Product Dimensions	Packaging Dimensions	Product Weight
62.2 cm (L) x 48.6 cm (W) x 27.9 cm (H)	80.0 cm x 59.7 cm x 41.9 cm / 31.5" x 23.5" x 16.5"	20.0 kg / 44 lbs.

Note - For a complete list of specifications see the brochures and information from Thermo Scientific.

Material	Molded plastic
Color	Grey or White
Printing	Thermo Scientific logo plate on front
Electrical Supply	100–240 V, 50–60 Hz, selected automatically; 150 W maximum
Optical Design	Double-beam with sample and reference cuvette positions; Czerny-Turner Monochromator
Spectral Bandwidth(s)	Variable: 1 nm; 2 nm; 2nm – “Micro”; 7nm – “Fiber”; 15nm – “Materials”
Light Source	Xenon flash lamp, 3-year warranty (5 years’ typical lifetime)
Wavelength	Range: 190 –1100 nm Accuracy: ±0.8 nm (full range 190 to 1100 nm) ±0.5 nm (546.11 nm mercury line) Repeatability: ≤0.1 nm (546.11 nm mercury line, SD of 10 measurements)
Photometric	Range: >3.5 A Display Range: -0.3 to 4.0 A Accuracy – Instrument: 0.5 A: ±0.004 A 1A: ±0.006 A 2A: ±0.010 A Noise: 0A: "0.00015 A 1A: "0.00050 A 2A: "0.00080 A 260 nm, 1.0 nm SBW, RMS Drift (Stability): <0.0005 A/hr 500 nm, 1.0 nm SBW, 1 hour on prior
Baseline Flatness	±0.0010 A 200–800 nm, 1.0 nm SBW, smoothing
Keypad	Sealed Membrane
Local Control Option	Display: Touchscreen LCD panel; 800 x 480; 17.8 cm (7 in) diagonal Operating System: Microsoft Windows XP embedded

Included Components:

- Aluminum insert plate with cuvette holder
- USB thumb drive
- Power cord
- USB interface cord

Packaging:

Unit is shipped in a cardboard box with a form-fitting protective foam clamshell.

Storage:

Store the instrument in a cool and dry location.

PRODUCT PHOTO



ACCESSORIES

GEX Part No.	Description	Purpose
P4220	Thermo Spectronic Standards Set	Photometric accuracy, wavelength accuracy verification
P4310	Thermo Mercury Lamp Accessory	Wavelength accuracy verification and calibration tool
P4320	Thermo Scientific CVC Carousel	Automated instrument performance verification
P4330	Evo220 Dosimeter Holder Baseplate	The GEX baseplate for dosimeter holders and accessories
P4332	Evo 220 DoseStix Dosimeter Holder	Dosimeter positioning for GEX DoseStix style dosimeters
P4334	Evo 220 WINDose Dosimeter Holder	Dosimeter positioning for 1cm ² radiochromic film dosimeters
P4336	Evo 220 PMMA Dosimeter Holder	Dosimeter positioning for Red and Amber Perspex PMMA dosimeters
P4350	Laser Micrometer	Integrated micrometer for thickness measurement of PMMA dosimeter
P4355	Custom Gage blocks	For calibrating the P4350 Laser Micrometer
P4360	MS-2 Barcode Scanner	MS-2 model scanner and mounting post for integrated barcode reading
P4370	MS-3 Barcode Scanner	MS-3 model scanner and mounting post for integrated barcode reading
P4380	Matrix 120 Barcode Scanner	Matrix 120 scanner and mounting post for integrated barcode reading

INSTALLATION

Opening the Shipping Box:

- Keep shipping cartons upright at all times. Damages due to improper moving techniques are not covered by the warranty.
- **CAUTION!** Whenever the spectrophotometer has been stored or shipped, immediate exposure to room air can cause condensation damage. Move the shipping cartons to the installation location at least 24 hours before installation. This allows the instrument to equilibrate at room temperature before the shipping cartons are opened and protective packaging is removed.

Operating Environment:

- Instrument was designed for use under the following conditions:

Temperature Range*	5°C to 35°C (41°F to 95°F)
Relative Humidity	<20% to 80% noncondensing
Altitude	0m to 200m

*Operating the instrument outside of this temperature range may cause permanent damage.

- Instrument performance should be verified when operating outside of these ranges. GEX has verified instrument performance at an altitude of approximately 1610m.
- The instrument should be positioned on a surface that is level and free of vibration. Consider all GLP's (Good Laboratory Practices) concerning cleanliness of the area.

Power:

- Connect the power cord and then connect the instrument to the computer using the USB interface cord. Use conditioned power whenever possible by connecting via a surge suppression and/or battery backup intermediary.
- A switch is located in the back, and a "Power" button on the front panel of the instrument. Flip the switch and the instrument will power on. The switch may remain in the 'on' position. The power button (soft key) on the front panel is buttons is used to turn the power off and back on. Simply hold the "Power" button for a few seconds to turn off/on.

Connectivity:

The driver necessary for connection to the Evolution 220 from the PC is installed with the Thermo Insight software. The PC control version that GEX sells and recommends can only be operated using the Thermo Insight and GEX DoseControl software applications.

Thermo Insight Software Installation:

Before connecting the instrument to the PC, insert the supplied Thermo USB drive and install the Thermo Insight on the PC. Follow the on-screen prompts as necessary. The process is generally simple, and the user should refer to the *Thermo Scientific Evolution 200 Series User Guide* for additional details.

GEX DoseControl Software Installation:

Refer to *GEX Doc# 100-266 DoseControl Software User Guide* for details.

Dosimeter Holder System:

Install the holder system according to *GEX Doc# 100-156, Evolution 220 Dosimeter Holder System*.

Integrated Barcode Readers / Laser Micrometer:

Refer to the Accessories list above and the GEX Product Specifications and Usage document for the specific device to be integrated.

QUALIFICATION

See *GEX Doc# 100-267 - Implementation Guide for DoseControl Dosimetry Systems* for detailed information on IQ, OQ, and PQ for this instrument as part of a complete dosimetry system.

NOTE: An IQ/OQ Protocol is available from GEX. On-site installation, IQ/OQ, and training on the GENESYS 30 and DoseControl system are also available. Contact GEX customer service for more information.

For more information on qualification services, please email a request to cs@gexcorp.com or visit the company website to submit a request online at <http://www.gexcorp.com/support.html>.

CALIBRATION / PERFORMANCE VERIFICATION

Calibration:

A Calibration Certificate is not provided by Thermo Fisher Scientific. The Evolution 220 is tested at the factory, but ultimately is the user's responsibility to verify the instrument performance after installation at the user's site.

Performance Verification:

See *GEX Doc# 100-271 – Evolution 220 Performance Verification* for complete details.

The term 'Performance Verification' replaces the older term 'Calibration Verification' but the intent is the same; to determine if the instrument is performing within the manufacturer specifications. The user may conduct Performance Verification (P.V.) using a wide variety of available options including:

Thermo Scientific and GEX recommended P.V. methods including but not limited to:

- 'Onboard' verification options via the Thermo Insight software, and those using the Xenon Lamp as a reference.
- Verification using the *GEX Part# P4320 Calibration Verification Carousel (CVC)*.
- Verification using the *GEX Part# P4310 Thermo Mercury Lamp Accessory* (note: wavelength accuracy only).
- Verification using the *GEX Part# P4220 Thermo Spectronic Standards Set*.
- User determined verification in compliance with GLP or equivalent using standards and methods not dictated by Thermo Scientific or GEX.

USAGE

Sample Compartment Lid:

The user may keep the sample compartment lid open, and the front panel removed and open during measurements. The lid should be closed when not in use or during any Performance Verification (P.V) testing.

Startup Procedure:

1. Ensure the instrument's sample chamber is empty.
2. Power 'ON' the spectrophotometer (refer to the 'Power' section above).
3. The unit will perform a series of self-checks that will take about three (3) minutes.
4. The blue light on next to the power button on the onboard keypad will flash until the unit is ready, and then it will be solid blue.
5. There is no waiting period after startup required before measurements can begin. The Xenon lamp is a cold technology that does not require a traditional "warm-up" period.
6. The instrument should be rebooted at least once per week so that the self-checks noted in step 3 can be performed.

With GEX DoseControl Software:

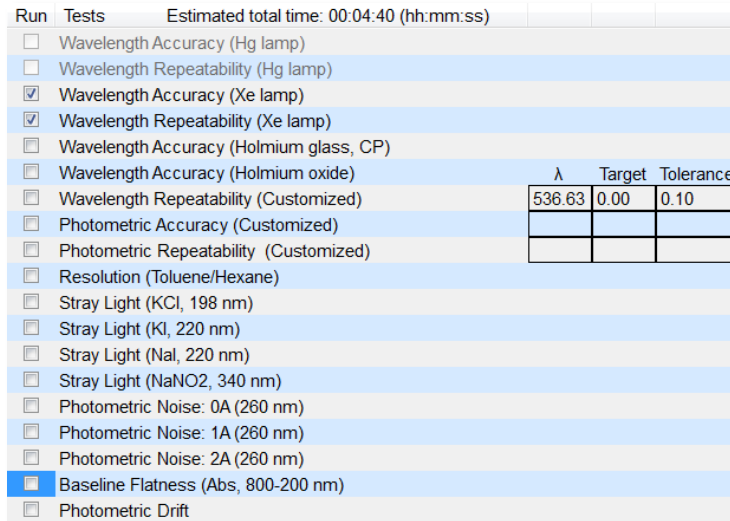
The instrument is typically used as part of the DoseControl System, and is completely controlled and interfaced with the DoseControl Software (except when using Thermo performance verification tools, such as a CVC, which must utilize the Thermo Insight software). Refer to *GEX Doc# 100-266 DoseControl Software User Guide* for details.

With Thermo Insight Software:

Procedure - Xenon Lamp Performance Verification

Performance Verification of the Wavelength Accuracy and Repeatability may be performed using the internal Xenon lamp in the Evo 220.

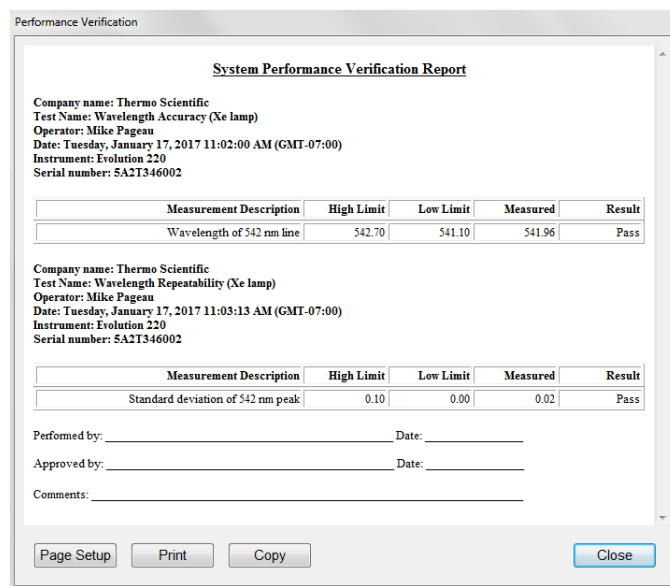
1. With the Evo220 sample chamber empty, select 'Performance Verification' from the Insight 2 Software's home screen. From the list of available tests, unselect all but 'Xe lamp' accuracy and repeatability.



2. Select 'Run' in the upper-left of the screen (or F6 on your keyboard) to begin the tests. Select 'OK' when prompted to clear the sample compartment.

NOTE: A few prompts appear indicating to clear the sample compartment before proceeding. Select 'OK' at each prompt to continue the tests.

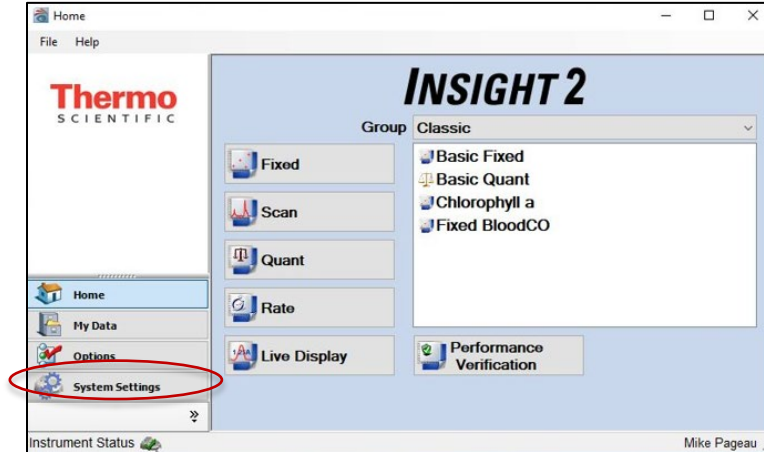
3. After the Performance Verification completes, a Test Report is generated and displayed. See image below:



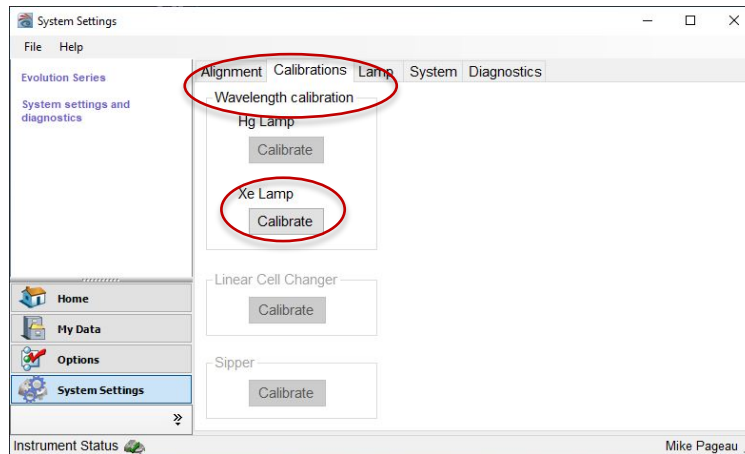
4. If all tests pass, no further actions are required. If any tests fail, the Evo220 will need to be calibrated using the Xenon lamp. See below for further instruction.

Procedure - Xenon Lamp Calibration:

1. From the Insight 2 Software's home screen, select the 'System Settings' button from the lower-left of the screen.



2. Select the 'Calibrations' tab at the top of the next screen.



3. Under 'Xe Lamp', select the button labeled 'Calibrate'.
4. When prompted, press 'OK' to begin calibration. The process will take about 5 minutes to complete.
NOTE: No message will appear after the calibration completes.
5. After calibration, repeat Xenon Lamp Performance Verification. See section above for detail.

CARE & MAINTENANCE

Cleaning:

The instrument's exterior and the sample compartment should be periodically cleaned as part of a Preventative Maintenance program along with the dosimeter holder system. An instrument that is maintained and cared for will perform better and have a longer life. Complete cleaning instructions which include the proper materials can be found in the *Thermo Scientific Evolution 200 Series User Guide*.

Instructions for cleaning the dosimeter holder system are located in *GEX Doc# 100-156, Evolution 220 Dosimeter Holder System*.

Manufacturer Service:

If the device requires service for any reason, there are two options:

1. Depot Service:

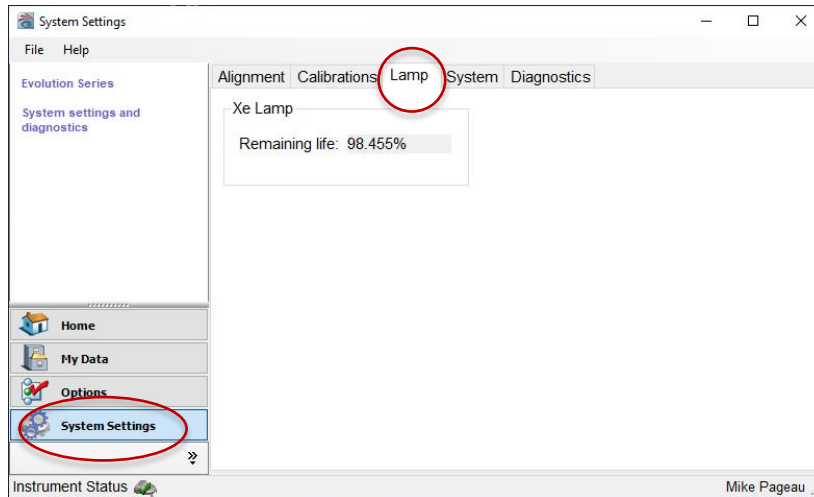
For customers in the USA and Canada, the GENESYS 30 needs to be sent to Thermo Scientific in Madison, WI, U.S.A. for repair or other services. Contact GEX Customer Service at cs@gexc corp.com or your local Thermo Scientific representative for details.

2. On-site Service:

On-site service may be available in some countries. Contact GEX Customer Service at cs@gexc corp.com or your local Thermo Scientific representative for details.

Lamp Life Status:

To view status information regarding the xenon lamp, use the “System Settings” button on the Home Screen in the Thermo Insight Software to display the “Lamp” tab in the right pane.



Lamp Replacement:

The Xenon Flash Lamp has a three (3) year warranty (5 years is the typical lifespan). The lamp must be replaced by an authorized Thermo Service Technician at the customer site, or the user may send the instrument back to Thermo for lamp replacement using their Depot Services. To minimize risks related to shipping instruments, replacement on-site is recommended whenever possible. Contact GEX Customer Service or Thermo for more information.

PRECAUTIONS

Please refer to the Thermo Scientific Site and Safety User Guide for additional information and the full listing of precautions.

NOTICE: *Immediate exposure to room (ambient) air can cause condensation damage whenever the spectrophotometer has been stored or shipped. Move the shipping cartons to the installation location at least 24 hours before installation.* This allows the instrument to equilibrate with the room temperature before the shipping cartons are opened and protective packaging is removed.

- Keep the top cover closed and front panel attached when not in use.
- Minimize exposure of the spectrophotometer to airborne contaminants like smoke, dust, oil vapor, or chemical fumes.
- The user should not attempt to repair or otherwise service the Evolution 220; doing so may void the warranty. Only the manufacturer and its authorized agents and subsidiaries can perform service.

WARRANTY/GUARANTEE

Warranty:

Please refer to the Thermo Scientific Evolution 220 Warranty Information.

Guarantee:

1 year GEX satisfaction guarantee. Product may be returned within one year from the date of delivery for any customer dissatisfaction.

RELATED DOCUMENTS

- Thermo Scientific Evolution 200 Series User Guide
- GEX Doc #100-157, P4310 Mercury Lamp Accessory – Product Specification and Usage (PSU)
- GEX Doc #100-158, P4320 Calibration Validation Carousel (CVC) – Product Specification and Usage (PSU)
- GEX Doc #100-159, Evolution 220 Dosimeter Holder System – Product Specification and Usage (PSU)
- GEX Doc #100-164, P4350/P4355 MX2 Laser Micrometer and Gage Blocks– Product Specification and Usage (PSU)
- GEX Doc #100-166, P4360 MS-2 Integrated Barcode Scanner – Product Specification and Usage (PSU)
- GEX Doc #100-266, DoseControl Software User Guide
- GEX Doc #100-267, DoseControl Dosimetry System Implementation Guide
- GEX Doc #100-269, Spectrophotometer Performance Verification Form
- GEX Doc #100-271, Evolution 220 Performance Verification Procedure
- GEX Doc #100-280, IQOQ Plan and Protocol for DoseControl System

REVISION HISTORY

DATE	CHANGE DESCRIPTION	REVISION
09/27/16	Initial release.	A
01/18/17	Added performance verification and other usage information.	B
05/23/19	Standardized layout and information with 100-167, GENESYS 30 Spectrophotometer. Added many references to related documents. Moved performance verification and all related items to 100-157, 100-158, and 100-271. Revised almost all sections for language and simplicity. ECO 70444.	C

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