Go Direct® Emissions Spectrometer

(Order Code GDX-SPEC-EM)

The Go Direct Emissions Spectrometer is a portable spectrometer designed to measure emissions from a wide variety of light sources.

> **Note:** Vernier products are designed for educational use. Our products are not designed nor are they recommended for any industrial, medical, or commercial process such as life support, patient diagnosis, control of a manufacturing process, or industrial testing of any kind.

What's Included
- Go Direct Emissions Spectrometer
- Mini USB cable
- USB Power Adapter

Compatible Software and Interfaces
See **www.vernier.com/manuals/gdx-spec-em** for a list of interfaces and software compatible with the Go Direct Emissions Spectrometer.

Getting Started
Please see the following link for platform-specific connection information:

www.vernier.com/start/gdx-spec-em

Bluetooth Connection

1. Install Vernier Spectral Analysis® on your computer, Chromebook™, or mobile device. See www.vernier.com/spectral-analysis for Spectral Analysis availability.
2. To power the Bluetooth radio, connect the spectrometer to the USB Power Adapter or to a powered USB hub. The Bluetooth® LED will blink. **Note:** Do not plug the USB into a computer USB port to run with Bluetooth wireless technology.
3. Launch Spectral Analysis.
4. Click or tap Connect a Spectrometer. Select your Go Direct Emissions Spectrometer from the list of Discovered Wireless Devices. Your spectrometer's ID is located near the barcode on the label. The Bluetooth LED on the sensor will now glow blue (no longer flashing).
5. Click or tap Done to enter data-collection mode. You are now ready to continue your experiment.

USB Connection

1. Connect the spectrometer to the USB port.
2. Launch the software. Options include
   - Computer: Spectral Analysis or Logger *Pro* 3
   - Chromebook: Spectral Analysis
   - LabQuest: LabQuest App
   - Mobile Device: Spectral Analysis
3. The software will identify the spectrometer and enter data-collection mode. You are now ready to continue your experiment.

Connecting the Spectrometer
See the following link for up-to-date connection information:

www.vernier.com/start/gdx-spec-em

Connecting via Bluetooth

Ready to connect	Connect the USB to the USB power adapter or to a powered USB hub. Blue LED next to Bluetooth icon flashes when sensor is ready to connect.
Connected	Blue LED next to Bluetooth icon is solid when sensor is connected via Bluetooth wireless technology.

Connecting via USB

Connected	LED next to USB icon is solid green.

Using the Spectrometer with Spectral Analysis
You may use your spectrometer to measure the emission spectrum of a light source such as an LED or a gas discharge tube. To do so, you may wish to purchase an optical fiber assembly (www.vernier.com/vsp-em-fiber) though this is not required.

Connect the sensor following the steps in the Getting Started section of this user manual.

Measure Intensity of Light Emissions
Connect the Optical Fiber to the spectrometer (optional). Intensity is reported in relative units with a range of 0–1. **Note:** The spectrometer is not calibrated for measuring absolute intensity.

1. Launch Spectral Analysis.
2. Connect the spectrometer following the steps in the Getting Started section of this user manual.
3. Select the appropriate Emissions experiment from the listed options and follow the prompts in the app. Intensity is a relative measure with a range of 0–1. **Note:** The Spectrometer is not calibrated for measuring intensity.
4. Aim the tip of the optical fiber at a light source. Start data collection. Click or tap the Stop button to end data collection.

If the spectrum maxes out (flat and wide peaks at a value of 1), increase the distance between the light source and the tip of the optical fiber cable or reduce the integration time (see the Change the Settings in Spectral Analysis section).

To adjust the integration time, click or tap the gear. Set the integration time to a suitable value.

Change the Settings in Spectral Analysis
1. Click or tap the gear to show the Spectrometer Settings dialog.
2. There are three parameters listed in the dialog box:
   - **Integration Time:** This is similar to the shutter speed of a camera. When using the Intensity or Advanced Experiment modes, you can modify this value to decrease or increase the amount of light hitting the detector and the signal spectral output.
   Under some circumstances, you may want to intentionally saturate some peaks in order to display weaker features. For example, in viewing a hydrogen spectrum, you may safely increase the Sample Time (which will saturate the red 656 nm line) in order to see the blue lines near 400 nm.
   - **Wavelength Smoothing:** This is the number of adjacent readings on either side of a given value that is used to calculate an average value.
   - **Temporal Averaging:** This is the number of readings taken at a given wavelength to calculate an average reading.
3. Select the Calibrate button to recalibrate your spectrometer at any time. This is useful in a well-lit area where you may want to subtract a baseline reading.

Using the Spectrometer with LabQuest
You may use your spectrometer to measure the emission spectrum of a light source such as an LED or a gas discharge tube. To do so, you may wish to purchase an optical fiber assembly (www.vernier.com/vsp-em-fiber) though this is not required.

Connect the spectrometer to LabQuest via USB.

Measure Intensity of Light Emissions
Connect the Optical Fiber to the spectrometer (optional). Intensity is reported in relative units with a range of 0–1. **Note:** The spectrometer is not calibrated for measuring absolute intensity.

1. Aim the sensor opening or the tip of the optical fiber cable at a light source.
2. Start data collection.
3. Tap the red Stop button to end data collection.

If the spectrum saturates, displaying flat and wide peaks near 1.0, increase the distance between the light source and the sensor or tip of the optical fiber cable. You can also adjust data-collection parameters by tapping Sensors and choosing Data Collection. Reduce the Sample Time until peaks are less than 1.0.

Under some circumstances, you may want to intentionally saturate some peaks in order to display weaker features. For example, in viewing a hydrogen spectrum, you may safely increase the Sample Time (which will saturate the red 656 nm line) in order to see the blue lines near 400 nm.

Using the Spectrometer with Logger *Pro*
You may use your spectrometer to measure the emission spectrum of a light source such as an LED or a gas discharge tube. To do so, you may wish to purchase an optical fiber assembly (www.vernier.com/vsp-em-fiber) though this is not required.

Connect the spectrometer to Logger *Pro* via USB.

Measure Intensity of Light Emissions
Connect the Optical Fiber to the spectrometer (optional). Intensity is reported in relative units with a range of 0–1. **Note:** The spectrometer is not calibrated for measuring absolute intensity.

1. Aim the sensor opening or the tip of the optical fiber cable at a light source.
2. Click ▶ Collect .
3. Click ■ Stop to end data collection.

If the spectrum saturates, displaying flat and wide peaks near 1.0, increase the distance between the light source and the sensor or tip of the optical fiber cable. You can also adjust data-collection parameters by choosing Set Up Sensors ► Spectrometer from the Experiment menu. Reduce the Sample Time until peaks are less than 1.0

Under some circumstances, you may want to intentionally saturate some peaks in order to display weaker features. For example, in viewing a hydrogen spectrum, you may safely increase the Sample Time (which will saturate the red 656 nm line) in order to see the blue lines near 400 nm.

Changing the Settings in Logger *Pro* Spectrometer Dialog Box
The Spectrometer dialog box lists all the settings for the device. To display this box choose Set Up Sensors ► Spectrometer from the Experiment menu.

For most experiments, the default settings work well.

There are four parameters listed in the dialog box.

- **Sample Time:** This is similar to the shutter speed of a camera. Logger *Pro* has a stored sample time. You may need to change the sample time manually.
- **Wavelength Smoothing:** This is the number of adjacent readings on either side of a given value that is used to calculate an average value. Large values will broaden sharp peaks.
- **Samples to Average:** This is the number of scans taken to calculate an average scan. Use a value more than 1 to reduce noise.
- **Wavelength Range:** The range is determined by the type of spectrometer in use.

By clicking on the spectrum icon in this dialog box, you will gain access to two options: Configure Collection… and Go to Support Web Page. You will also see that the calibration is set to Intensity <Computer>. Click on an item to select it.

Overlaying Data on the Same Graph
You may wish to bring data from another Logger *Pro* 3 file into a current file. This is easily done. Using the example of testing the fluorescent lighting in a

classroom for the presence of mercury, follow these steps in Logger *Pro*.

1. Measure the emission spectrum of a fluorescent lamp.
2. Open the File menu and choose Import From ► Logger *Pro* file.
3. From the Experiment folder, open Sample Data ► Physics ► Gas Discharge Spectra ► Mercury.
4. Place your cursor anywhere on the Logger *Pro* graph screen and double-click. In the Graph Options dialog box, click the Options tab.
5. In the Y-axis Columns box, open Run 1 and select the check box next to Intensity. Click Done .

Videos
View videos related to this product at **www.vernier.com/gdx-spec-em**

Specifications

Dimensions	10.1 cm × 7.0 cm × 4.5 cm
Power supply	USB powered
Detector	Linear CCD
Wavelength range	350 nm–900 nm
Wavelength reporting interval	1 nm
Optical resolution*	3 nm
Typical wavelength accuracy†	±2 nm

*as determined by the full width of half maximum of Hydrogen 434 nm peak

†as determined by Hydrogen peaks. For best accuracy use an optical fiber.

Safety
- No user-serviceable parts are in this device. Do not attempt to open or modify this device. Contact Vernier for all repairs and service.
- Handle the device with care. This instrument can be damaged if it is dropped.
- Do not use this instrument if it is damaged in any way. Contact Vernier Technical Support for troubleshooting and technical assistance.
- Do not use this instrument for clinical or diagnostic procedures.

Troubleshooting
Find troubleshooting tips here: **www.vernier.com/til/3157**

Repair Information
- Contact Vernier for all repairs and service.
- No user-serviceable parts are in this device. Do not attempt to open the case of the device. Doing so will create an unsafe operating condition and will void the product warranty.

If you have watched the related product video(s), followed the troubleshooting steps, and are still having trouble with your Go Direct Emissions Spectrometer, contact Vernier Technical Support at support@vernier.com or call 888-837-6437. Support specialists will work with you to determine if the unit needs to be sent in for repair. At that time, a Return Merchandise Authorization (RMA) number will be issued and instructions will be communicated on how to return the unit for repair.

Accessories/ Replacements

Item	Order Code
Vernier Emissions Fiber	VSP-EM-FIBER
Mini USB Cable	CB-USB-MINI

Warranty
Warranty information for this product can be found on the Support tab at **www.vernier.com/gdx-spec-em**

General warranty information can be found at **www.vernier.com/warranty**

Federal Communication Commission Interference Statement
This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

Reorient or relocate the receiving antenna.

Increase the separation between the equipment and receiver.

Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

Consult the dealer or an experienced radio/TV technician for help.

FCC Caution

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) this device may not cause harmful interference and

(2) this device must accept any interference received, including interference that may cause undesired operation

RF Exposure Warning

The equipment complies with RF exposure limits set forth for an uncontrolled environment. The antenna(s) used for this transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. You are cautioned that changes or modifications not expressly approved by the party responsible for compliance could void your authority to operate the equipment.

IC Statement
This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions:

(1) this device may not cause interference, and

(2) this device must accept any interference, including interference that may cause undesired operation of the device.

Industry Canada - Class B This digital apparatus does not exceed the Class B limits for radio noise emissions from digital apparatus as set out in the interference-causing equipment standard entitled "Digital Apparatus," ICES-003 of Industry Canada. Operation is subject to the following two conditions: (1) this device may not cause interference, and

(2) this device must accept any interference, including interference that may cause undesired operation of the device.

To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that permitted for successful communication.

RF exposure warning: The equipment complies with RF exposure limits set forth for an uncontrolled environment. The antenna(s) used for this transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

(1) l'appareil ne doit pas produire de brouillage, et

(2) l'appareil doit accepter tout interférence radioélectrique, même si cela résulte à un brouillage susceptible d'en compromettre le fonctionnement.

Note: This product is a sensitive measurement device. For best results, use the cables that were provided. Keep the device away from electromagnetic noise sources, such as microwaves, monitors, electric motors, and appliances.
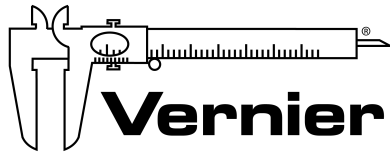
Vernier Software & Technology
13979 SW Millikan Way • Beaverton, OR 97005-2886
Toll Free (888) 837-6437 • (503) 277-2299 • Fax (503) 277-2440
info@vernier.com • www.vernier.com

Rev. 1/20/2022