

Go Direct[®] Light and Color

(Order Code GDX-LC)



This light sensor measures light in the visible and ultraviolet electromagnetic spectra. An RGB color sensor detects relative contributions of primary colors in light. Go Direct Light and Color directly connects via Bluetooth wireless technology or wired via USB to your platform. The sensor can be used for the study of visible light intensity, UV light intensity, and color investigations.

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 Light and Color
- Micro USB Cable

Compatible Software

See www.vernier.com/manuals/gdx-lc for a list of software compatible with the Go Direct Light and Color Sensor.

Getting Started

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

www.vernier.com/start/gdx-lc

Bluetooth Connection

1. Install Vernier Graphical Analysis™ on your computer, Chromebook™, or mobile device. If using LabQuest®, make sure LabQuest App is up to date. See www.vernier.com/ga4 for Graphical Analysis availability or www.vernier.com/downloads to update LabQuest App.
2. Charge your sensor for at least 2 hours before first use.
3. Turn on your sensor by pressing the power button once. The Bluetooth® LED will blink red.
4. Launch Graphical Analysis or turn on LabQuest.

USB Connection

1. If using a computer or Chromebook, install Vernier Graphical Analysis. If using LabQuest, make sure LabQuest App is up to date. See www.vernier.com/ga4 for Graphical Analysis availability or www.vernier.com/downloads to update LabQuest App.
2. Connect the sensor to the USB port.
3. Launch Graphical Analysis or turn on LabQuest. You are now ready to collect data.
4. This is a multi-channel sensor. To change the channel selections, see

5. If using Graphical Analysis, click or tap Sensor Data Collection. If using LabQuest, choose Wireless Device Setup > Go Direct from the Sensors menu.
6. Select your Go Direct sensor from the list of Discovered Wireless Devices. Your sensor's ID is located near the barcode on the sensor. The Bluetooth LED will blink green when it is successfully connected.
7. Click or tap Done. You are now ready to collect data.
8. This is a multi-channel sensor. To change the channel selections, see www.vernier.com/start/gdx-lc

www.vernier.com/start/gdx-lc

Note: This sensor does not work with the original LabQuest. It works with LabQuest 2 or LabQuest 3.

Charging the Sensor

Connect the Go Direct Light and Color to the included USB Charging Cable and any USB device for two hours.

You can also charge up to eight Go Direct Light and Color Sensors using our Go Direct Charge Station, sold separately (order code: GDX-CRG). An LED on each Go Direct Light and Color indicates charging status.

Charging	Orange LED next to the battery icon is solid while the sensor is charging.
Fully charged	Green LED next to the battery icon is solid when the sensor is fully charged.

Powering the Sensor

Turning on the sensor	Press button once. Red LED indicator next to the Bluetooth icon flashes when the unit is on. Press button again (after 5 second delay) to turn on/off the white LED.
Putting the sensor in sleep mode	Press and hold button for more than three seconds to put into sleep mode. Red LED indicator next to Bluetooth icon stops flashing when sleeping.

Connecting the Sensor

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

www.vernier.com/start/gdx-lc

Connecting via Bluetooth

Ready to connect	Red LED next to the Bluetooth icon flashes when sensor is awake and ready to connect.
Connected	Green LED next to the Bluetooth icon flashes when sensor is connected via Bluetooth.

Connecting via USB

Connected and charging	Orange LED next to the battery icon is solid when the sensor is connected to Graphical Analysis via USB and the unit is charging. LED next to Bluetooth icon is off.
Connected, fully charged	Green LED next to the battery icon is solid when the sensor is connected to Graphical Analysis via USB and fully charged. LED next to Bluetooth icon is off.
Charging via USB, connected via Bluetooth	Orange LED next to the battery icon is solid when the sensor is charging. Green LED next to the Bluetooth icon flashes.

Using the Product

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

In order to turn on the white LED on the sensor face, wait five seconds after initially turning the sensor on and press the button once. A single press will toggle this LED on and off.

Channels

Click on the sensor icon to select other channels for this sensor, including

- UV
- 615 nm (Red)
- 525 nm (Green)
- 465 nm (Blue)

Videos

View videos related to this product at www.vernier.com/gdx-1c

Specifications

Light intensity range	0 lx to 150,000 lx
Maximum light intensity sampling rate	1,000 samples/s
Resolution	±0.2 lx (when using in less than 10,000 lux); ±5 lx (when using in greater than 10,000 lux)
UV sensitivity range	320 nm to 375 nm
Red, green, blue intensity range	0 to 1,000 (relative scale)
USB specification	USB 2.0 full speed
Wireless specification	Bluetooth v4.2
Maximum wireless range	30 m (unobstructed)
Dimensions	8.8 cm × 6.0 cm × 3.2 cm
Battery	300 mAh Li-Poly Rechargeable
Battery life (single full charge)	~10 hours continuous data collection
Battery life (long term)	~300 full charge cycles (several years depending on usage)

Safety

Avoid pointing the white LED directly at your eye. The light is bright and may cause discomfort.

Care and Maintenance

To ensure longest battery life, turn white LED off when not in use.

Battery Information

The Go Direct Light and Color contains a small lithium-ion battery in the case. The system is designed to consume very little power and not put heavy demands on the battery. Although the battery is warranted for one year, the expected battery life should be several years. Replacement batteries are available from Vernier (order code: GDX-BAT-300).

Storage and Maintenance

To store the Go Direct Light and Color for extended periods of time, put the device in sleep mode by holding the button down for at least three seconds. The red LED will stop flashing to show that the unit is in sleep mode. Over several months, the battery will discharge but will not be damaged. After such storage, charge the device for a few hours, and the unit will be ready to go.

Exposing the battery to temperatures over 35°C (95°F) will reduce its lifespan. If possible, store the device in an area that is not exposed to temperature extremes.

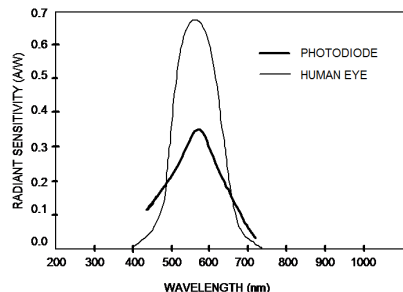
Water Resistance

The Go Direct Light and Color is not water resistant and should never be immersed in water.

If water gets into the device, immediately power the unit down (press and hold the power button for more than three seconds). Disconnect the sensor and charging cable, and remove the battery. Allow the device to dry thoroughly before attempting to use the device again. Do not attempt to dry using an external heat source.

How the Sensor Works

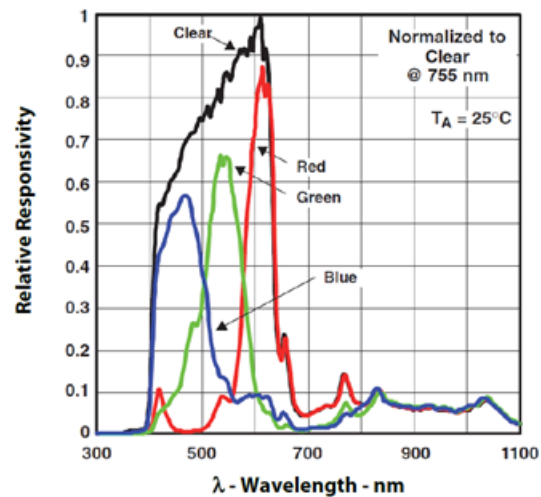
Light Sensor: The sensor uses a silicon photodiode. It produces a voltage that is proportional to light intensity. The spectral response approximates the response of the human eye, as shown in this diagram.



UV Sensor: The sensor uses a photodiode sensitive to UVA light. It incorporates photodiode, amplifiers, and analog/digital circuits into a single chip using a CMOS process. When the UV channel is activated, it is able to detect UV intensity and reports this value as a relative term.

RGB Color Sensor: The color sensor uses a combination of sensors that have a peak response that corresponds roughly to red, green, and blue light. It incorporates photodiodes, amplifiers, and analog/digital circuits into a single chip using CMOS process.

The software analyzes the relative contribution of each primary light color based on a peak response of 615 nm for red, 525 nm for green, and 465 nm for blue. Each of the sensors will register a light intensity (relative units).



Troubleshooting

Press the power button on the sensor to turn it on. (The Bluetooth LED will flash red.) Start the Graphical Analysis app on your device and select the desired sensor from the list of available sensors. If connecting via Bluetooth, the LED will be steady green. Click on the sensor icon and select the desired channel(s) from the list of available sensors. Expose the light aperture to a variety of UV, visible light, or colors and confirm that the sensor reading responds appropriately. Press the power button to toggle the white LED on and off.

View additional FAQ's related to this product at www.vernier.com/gdx-lc

Repair Information

If you have followed the troubleshooting steps and are still having trouble with your Go Direct Light and Color, 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
Micro USB Cable	CB-USB-MICRO
Micro USB-C Cable	CB-USB-C-MICRO
Go Direct 300 mAh Replacement Battery	GDX-BAT-300

Warranty

Warranty information for this product can be found on the Support tab at www.vernier.com/gdx-1c

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

Disposal

When disposing of this electronic product, do not treat it as household waste. Its disposal is subject to regulations that vary by country and region. This item should be given to an applicable collection point for the recycling of electrical and electronic equipment. By ensuring that this product is disposed of correctly, you help prevent potential negative consequences on human health or on the environment. The recycling of materials will help to conserve natural resources. For more detailed information about recycling this product, contact your local city office or your disposal service.

Battery recycling information is available at www.call2recycle.org

Do not puncture or expose the battery to excessive heat or flame.



The symbol, shown here, indicates that this product must not be disposed of in a standard waste container.

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 toute interférence radioélectrique, même si cela résulte à un brouillage susceptible d'en compromettre le fonctionnement.

Cet appareil numérique respecte les limites de bruits radioélectriques applicables aux appareils numériques de Classe B prescrites dans la norme sur le matériel interférant-brouilleur: "Appareils Numériques," NMB-003 édictée par Industrie Canada. L'utilisation est soumise aux deux conditions suivantes:

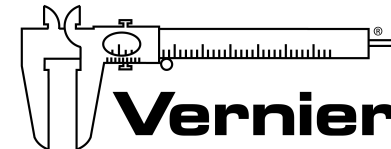
(1) cet appareil ne peut causer d'interférences, et

(2) cet appareil doit accepter toutes interférences, y comprises celles susceptibles de provoquer un dysfonctionnement du dispositif.

Afin de réduire les interférences radio potentielles pour les autres utilisateurs, le type d'antenne et son gain doivent être choisis de telle façon que l'équivalent de puissance isotrope émise (e.i.r.p.) n'est pas plus grand que celui permis pour une communication établie.

Avertissement d'exposition RF: L'équipement est conforme aux limites d'exposition aux RF établies pour un environnement non supervisé. L'antenne (s) utilisée pour ce transmetteur ne doit pas être jumelée ou fonctionner en conjonction avec toute autre antenne ou transmetteur.

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

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