

Go Direct[®] Weather

(Order Code GDX-WTHR)



Use Go Direct Weather to monitor a wide variety of environmental factors. Go Direct Weather is a wireless handheld sensor that measures ambient temperature, humidity, wind speed, wind chill, dew point, barometric pressure, and more.

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 Weather
- Micro USB Cable

Compatible Software

See www.vernier.com/manuals/gdx-wthr for a list of software compatible with Go Direct Weather.

Getting Started

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

www.vernier.com/start/gdx-wthr

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.
5. If using Graphical Analysis, click or tap Sensor Data Collection. If using LabQuest, choose Wireless Device Setup > Go Direct from the Sensors menu.

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 www.vernier.com/start/gdx-wthr

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

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-wthr

LabQuest 2 or LabQuest 3.

Charging the Sensor

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

You can also charge up to eight Go Direct Weather Sensors using our Go Direct Charge Station, sold separately (order code: GDX-CRG). An LED on each Go Direct Weather 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.
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-wthr

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.

Identifying the Sensor

When two or more sensors are connected, the sensors can be identified by tapping or clicking Identify in Sensor Information.

Using the Product

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

The sensor shows best performance when operated within recommended normal temperature and humidity range of 5–60°C and 20–80% RH, respectively. Long-term exposure to conditions outside normal range, especially at high humidity, may temporarily offset the relative humidity reading.

Channels

Go Direct Weather has the following measurement channels:

- Wind Speed
- Wind Direction
- Wind Chill
- Temperature
- Heat Index
- Dew Point
- Relative Humidity
- Absolute Humidity
- Station Pressure
- Barometric Pressure
- Altitude

Wind Speed

This channel reports wind speed. The sensor uses an impeller-type anemometer with the axis of rotation parallel to the direction of the wind. The motion of a magnet in the impeller produces a signal proportional to wind speed. The reading is positive regardless of the direction of motion of the impeller.

Wind Direction (accessory required)

This channel reports the direction of the wind. The Go Direct Weather Vane accessory (order code WTHR-VANE) is required and mounting on a tripod is recommended. Once attached, your Go Direct Weather will rotate such that the wind will pass from the back of the sensor to the front. The direction from which the wind is coming will be reported in 10° increments, with 360° representing north and 90° representing east.

For the sensor to indicate true north at your location, the magnetic declination must be set. Magnetic declination is the angular difference between true north and the direction to which a magnetic compass points. This varies by location and changes over time. Your current magnetic declination can be determined by consulting any number of online calculators. It will consist of a numeric angular value and identified as either East or West. If your declination is identified as East, enter the value in the app as a positive number. If it is identified as West, enter it as a negative number.

For example, Vernier's main office is near Portland, Oregon. At the time of this writing, its magnetic declination is 15° East. Therefore, the declination should be entered as 15. Portland, Maine, on the other hand has a declination of 15° West. Therefore, this would be entered as –15.

Follow these steps to set the magnetic declination for your location:

1. Connect your Go Direct Weather.
 - In Graphical Analysis app, click or tap on the sensor icon in the bottom right corner of the application window. Click or tap the “i” next to the sensor ID to launch the device information dialog.
 - On LabQuest, tap the Wind Direction meter, tap Go Direct, and select Device Details...
2. Select Advanced at the bottom of the window.
3. Enter the declination value for your location as a positive value for East and a negative value for West.
4. Click or tap Save in Graphical Analysis or Apply on LabQuest. The declination value is stored in the sensor and is applied each time the sensor is used.

Wind Chill

This channel reports the wind chill. Wind chill is a calculation that measures how the wind and temperature impact the rate of heat loss from exposed skin. Wind chill is defined only for ambient temperatures below 50°F and wind speed greater than 3 mph. The reading is calculated based on an equation from the National Weather Service where WC is the wind chill, T is temperature in °F and W is wind speed in mph.

$$WC = 35.74 + (0.6215 \cdot T) - (35.75 \cdot W^{0.16}) + (0.4275 \cdot T \cdot W^{0.16})$$

Temperature

This channel measures ambient temperature.

Heat Index

This channel reports the heat index. The heat index measures the effect temperature and humidity have on how the human body perceives the temperature, also known as apparent temperature. The National Weather Service calculates the heat index value based on the Rothfusz regression. This analysis is dependent on the range of the temperature in °F and relative humidity in percent. Adjustments are made to the regression based on where these values lie. A simplified formula is used unless the heat index value is greater than 80°F; if it is higher, then the full regression equation is used.

Dew Point

This channel reports the dew point. The dew point is the temperature to which a given parcel of air must be cooled, at constant barometric pressure, for water vapor to condense into water. The equation below is used to calculate the value where t_d is dew point temperature in °C, t actual temperature in °C, and RH actual relative humidity in %

$$t_d = 243.12^{\circ}\text{C} \bullet \frac{\ln\left(\frac{\text{RH}}{100\%}\right) + \frac{17.62 \bullet t}{243.12^{\circ}\text{C} + t}}{17.62 - \left[\ln\left(\frac{\text{RH}}{100\%}\right) + \frac{17.62 \bullet t}{243.12^{\circ}\text{C} + t}\right]}$$

Relative Humidity

This channel measures the relative humidity of the air. Relative humidity is a ratio of the actual amount of water vapor in the air to the potential fully saturated air. It is dependent on temperature and pressure.

Absolute Humidity

This channel reports the absolute humidity. The absolute humidity is the mass of water vapor in a particular volume of dry air. The equation below is used to calculate the value where d_v is absolute humidity in g/m^3 , t actual temperature in °C, and RH the actual relative humidity in %.

$$d_v = 216.7 \bullet \left[\frac{\frac{\text{RH}}{100\%} \bullet 6.112 \text{hPa} \bullet \exp\left(\frac{17.62 \bullet t}{243.12^{\circ}\text{C} + t}\right)}{273.15 + t} \right]$$

Station Pressure

This channel reports the station pressure at the current location. Station pressure is the absolute pressure at any given point without any adjustment. It is the pressure exerted by the atmosphere due to gravity at that given location.

Barometric Pressure

This channel reports barometric pressure. Barometric pressure is the station pressure adjusted to mean sea level. To accurately read barometric pressure, you must enter your elevation into the calibration for the channel.

Station and barometric pressure are equal at sea level. The equation below is used to calculate the value where p_o is pressure at sea-level in mbar, A is altitude, and p absolute pressure in mbar.

$$p_o = \frac{p}{\left(\frac{A}{44330} - 1\right)^{5.255}}$$

Altitude

This channel reports altitude based on the pressure at your location in meters. The equation below is used to calculate the value where A is altitude, p absolute pressure in mbar, and p_o pressure at sea-level in mbar.

$$A = 44330 \bullet \left(1 - \left(\frac{p}{p_o}\right)^{\frac{1}{5.255}}\right)$$

Videos

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

Calibrating the Sensor

Wind Direction

This channel has been factory calibrated but users might find readings to be incorrect due to interference from nearby metal objects. If that is the case, then the channel should be calibrated to offset for this interference. To do a calibration

1. Place the Go Direct Weather in the Weather Vane (not included).
2. Launch the app, connect the sensor, and turn on the Wind Direction channel, if not already enabled.
3. Click or tap the Wind Direction meter and choose Calibrate.
4. Click or tap Calibrate Now and slowly rotate the sensor 10 times or stop when the calibration process ends automatically.
5. Click or tap Done or OK.

Barometric Pressure

To accurately report barometric pressure, this channel needs to know your current elevation. This only needs to be done once if you are not changing elevations. Each time you move to a different elevation, this channel will need to be adjusted with a calibration. To enter your current elevation

1. Launch the app, connect the sensor, and turn on the Barometric Pressure channel, if not already enabled.
2. Click or tap the Barometric Pressure meter and choose Calibrate.
3. Enter your elevation in meters. Click or tap Keep.
4. Click or tap Apply.

Altitude

This channel needs to be initially calibrated to your current altitude.

1. Launch the app, connect the sensor, and turn on the Altitude channel, if not already enabled.

2. Click or tap the Altitude meter and choose Calibrate.
3. Enter your altitude in meters. Click or tap Keep.
4. Click or tap Apply.

All other channels on this sensor are factory calibrated and cannot be calibrated by the user.

Specifications

Wind speed range	0–30 m/s
Temperature range	–40 to 120°C
Temperature accuracy	±0.2°C
Humidity range	0–100%
Humidity accuracy	±2%
Absolute pressure range	260–1260 mbar
Absolute pressure accuracy	±0.2 mbar
Maximum sampling rate	2 sample/s
USB specification	2.0
Wireless specification	Bluetooth 4.2
Maximum wireless range	30 m (unobstructed)
Battery	650 mAh Li-Poly
Battery life (single full charge)	~24 hours
Battery life (long term)	~500 full charge cycles (several years depending on usage)

Care and Maintenance

Battery Information

Go Direct Weather contains a small lithium-ion battery. 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-650).

Storage and Maintenance

To store Go Direct Weather 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

Important: Go Direct Weather is water resistant but not waterproof. It 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.

Troubleshooting

For troubleshooting and FAQs, see www.vernier.com/til/4730

Repair Information

If you have watched the related product video(s), followed the troubleshooting steps, and are still having trouble with your Go Direct Weather, 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
USB-C to Micro USB Cable	CB-USB-C-MICRO
Go Direct 650 mAh Replacement Battery	GDX-BAT-650
Go Direct Weather Vane	WTHR-VANE

Warranty

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

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 :

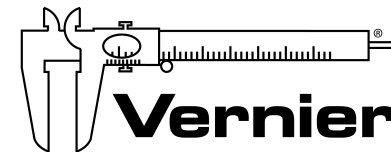
- (1) l'appareil ne doit pas produire de brouillage, et
- (2) l'appareil doit accepter tout interférence radioélectrique, même si cela résulte à un brouillage susceptible d'en compromettre le fonctionnement.

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 émis (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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