Go Direct® Turbidity
(Order Code GDX-TRB)

Go Direct Turbidity is used to determine the turbidity of a freshwater or saltwater samples. Turbidity is a measure of water's lack of clarity and is an important indicator of water quality. Water with high turbidity is cloudy, while water with low turbidity is clear. The cloudiness is produced by light reflecting off particles in the water; therefore, the more particles in the water, the higher the turbidity.

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 Turbidity Sensor
- Micro USB Cable
- 3.5 mL polystyrene cuvettes (15)
- plastic cuvette lids (15)

Compatible Software
See **www.vernier.com/manuals/gdx-trb** for a list of software compatible with Go Direct Turbidity Sensor

Quick Start: Vernier Graphical Analysis® and Bluetooth®
1. Charge your sensor for at least 2 hours before first use.
2. Turn on your sensor. The LED will blink red.
3. Launch Graphical Analysis, then click **Sensor Data Collection**.
4. Select your sensor from the list. The sensor ID is located on the sensor label near the bar code. **Note**: If you don't see a list of available sensors, click **WIRELESS**. After selecting your sensor, click **Pair**.
5. Click **DONE**. You are now ready to collect data.

Using other Vernier data-collection apps or connecting via USB?
Visit **www.vernier.com/start-go-direct**

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

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

Providing Power

Turning on the sensor	Press button once. Red LED indicator flashes when 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 stops flashing when sleeping.

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

www.vernier.com/start/gdx-trb

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 Quick Start section of this user manual

1. Allow the sensor to warm up for at least one minute.
2. Slide the lid of the sensor open to reveal the cuvette slot.
3. Fill a cuvette with sample water and place a cap on the cuvette.
4. Gently invert the sample water to mix any particles that are suspended in the sample or that may have settled to the bottom. **Important**: Do not shake the sample. Shaking will introduce tiny air bubbles that will affect the reading.
5. Wipe the outside of the cuvette with a soft, lint-free cloth or tissue.
6. Insert the cuvette into the cuvette slot and slide the lid closed.
7. Monitor the turbidity value. **Note**: Particles in the water will settle over time and show a slow downward drift in turbidity readings. Take your readings soon after placing the cuvette in the senso

Calibration

The sensor is factory calibrated. For most experiments, calibrating the Turbidity Sensor is not required. If desired, the sensor can be calibrated using a known standard.

To calibrate the sensor in Graphical Analysis, complete the following steps.

1. Click or tap the sensor meter to view sensor options.
2. Select Calibrate and follow the applicable prompts on the Calibrate Sensor screen.

In order to calibrate Go Direct Turbidity, you need a known calibration solution and a blank (distilled water). A calibration solution set is available from Vernier (GDX-TRB-CAL) that includes a 100 NTU and 800 NTU standard.

Once you have calibrated a Go Direct sensor, the calibration is automatically stored to the sensor and will be used each time you connect to your device. You can always choose to restore factory defaults if you feel the custom calibration is invalid.

To restore factory defaults in Graphical Analysis, complete the following steps.

1. Click or tap the live readouts meter and choose Calibrate.
2. Click or tap Reset Calibration.
3. A window will appear warning you that you are about to reset the calibration. Choose Reset Calibration.

For additional calibration information, see **www.vernier.com/til/4011**

Specifications

Range	0–1000 NTU
LED Wavelength	850 nm
Resolution	0.1 NTU

Care and Maintenance

Battery Information

Go Direct Turbidity Sensor 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-300).

Storage and Maintenance

To store Go Direct Turbidity Sensor 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

Go Direct Turbidity Sensor 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

Infrared light is directed at a cuvette containing the sample water. This light is scattered in all directions off the particles in the water. A detector, consisting of a photodiode, is placed at a 90° angle to the light source. The amount of light being

scattered directly into the detector is measured in volts and translated into turbidity units. This style of turbidity sensor is called a nephelometer.

Troubleshooting

Here are some tips for best data-collection practices:

- After filling a cuvette with liquid, seal the cuvette with a cap to prevent spills.
- Gently invert the sample before measuring to evenly distribute particles without introducing air bubbles.
- For best results, use one cuvette to make all your measurements for a given experiment.

Repair Information

If you have followed the troubleshooting steps and are still having trouble with your Go Direct Turbidity Sensor, 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

Accessory	Order Code
Go Direct Charge Station	GDX-CRG
Cuvette Rack	CUV-RACK
Go Direct Turbidity Calibration Standard	GDX-TRB-CAL
Plastic Cuvettes (Visible, 4-Sided Clear)	CUV-4S

Replacement	Order Code
Micro USB cable	CB-USB-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-trb**

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.

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 disfonctionnement du dispositif.

Afin de réduire les interférences radio potentielles pour les autres utilisateurs, le type d’antenne et son gain doivent être choisie 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 jumelés 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.

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