

Go Direct[®] Force Plate

(Order Code GDX-FP)



Designed for much higher forces than the Dual-Range Force Sensor, Go Direct Force Plate can measure the forces developed during stepping, jumping, and other human-scale actions. For example, you can perform the following kinds of experiments:

- Observe the change in normal force during an elevator ride.
- Measure the impulse delivered by the floor during a jump.
- Measure the reaction force as a student leans against a wall.

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 Force Plate
- Micro USB Cable
- One pair of handles
 - Handles can be attached the back side of the force plate. Do not step on the force plate when the handles are attached.

Compatible Software

See www.vernier.com/manuals/gdx-fp for a list of software compatible with Go Direct Force Plate.

Assembly

Attach feet to the four corners of the bottom of the plate. The feet are not required, but make it easier to lift off of surfaces.

Getting Started

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

www.vernier.com/start/gdx-fp

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/ga for Graphical Analysis availability or www.vernier.com/downloads to update LabQuest App.

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/ga for Graphical Analysis availability or www.vernier.com/downloads to update LabQuest App.
2. Connect the sensor to the USB port.

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.
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-fp
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4. This is a multi-channel sensor. To change the channel selections, see www.vernier.com/start/gdx-fp

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

Safety

When using the force plate for Hang time and Jump height, students may get aggressive in their efforts. We recommend creating a platform around the force plate to protect against twisted ankles.

Charging the Sensor

Connect Go Direct Force Plate to the included Micro USB Cable and any USB device for two hours.

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

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

Powering the Sensor

Turning on the sensor	Press button once. Red LED indicator next to Bluetooth icon 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-for

Connecting via Bluetooth

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

Connecting via USB

Connected and charging	Orange LED next to battery icon is solid when 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 battery icon is solid when sensor is connect 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 battery icon is solid when sensor is connected to charger via USB and the unit is charging. Green LED next to Bluetooth icon flashes when sensor is connected via Bluetooth.

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

Zeroing the Sensor

In some situations you may want to zero Go Direct Force Plate, because changing the physical orientation of the sensor will change the reading when no force is applied. After you have set up your experiment, use your data-collection software

to zero the sensor. Also, in the case of experiments involving large impact forces, you may need to zero the reading *after* one impact has taken place.

The Handles

Go Direct Force Plate includes two handles and four screws. You can attach the handles to the back side of the plate using the threaded holes. Do not step on the force plate when the handles are attached.

With handles in place, you can support the unit by hand for pushing on a wall or other large object.

The force plate can also be hung on the wall using the cutout on the back and a sturdy wall attachment. This can be a useful configuration for measuring horizontal reaction forces of a student standing on a ladder, for example.

Channels

Go Direct Force Plate has six sensor channels. The channels are separated into Physics Channels and Physiology Channels. The channel names are

Physics

- Force (N)
- Hang time (s)
- Auxiliary voltage (V)

Physiology

- Force (N)
- Hang time (s)
- Jump Height (m)
- X-axis Balance (relative scale)
- Y-axis Balance (relative scale)

The channel families (physics and physiology) can be selected by clicking on the live readout on the Graph screen. Click on the (i) icon and then select Advanced Options. This selection will persist for the force plate until it is changed again.

Some notes about the channels:

- Hang time produces the time an individual is in the air, assuming they step on the force plate and then jump and land on the plate.
- Jump Height calculates the height of the jump based on the hang time and acceleration due to gravity.
- X-axis and Y-axis Balance are designed to be used together with the graph showing X-axis Balance on the x-axis and Y-axis Balance on the y-axis. We recommend having data plotted as dots vs connected lines. Set both x-axis and y-axis ranges to go from -100 to 100. The pattern provides a relative indication of stability while standing on the force plate. Standard deviation from Statistics provides a quantification of that stability measurement.

Calibrating the Sensor

Optional Calibration Procedure

For most experiments, you do not have to calibrate Go Direct Force Plate. A stored calibration is used when the software is started. Select the desired range of the sensor, and then start the data-collection program.

If you want to improve the calibration, it is easy to recalibrate following the same procedure used in calibrating most Vernier probes—a two-point calibration. One point is your zero, with no force applied to the sensor. Set the force plate on a level surface. Select the calibration option of the program you are using and remove all force from the force plate. Enter **0** (zero) as the first known intensity. Now apply a known force to the plate. The easiest way to do this is to put an object of known weight centered on the plate. For the best results, take care to accurately center the weight on the force plate. The weight should be at least 25% of the range. Enter the weight of the mass (**Note:** 1 kg weighs 9.8 N). Do not exceed the sensor's range setting during the calibration.

Calibrations are usually retained only for the current session. Restarting the software, opening a new file, or choosing New from the File menu will reset the calibration to the default calibration. To retain calibrations across sessions, consult the instructions or help files appropriate to your software. See also www.vernier.com/til/4011/

Specifications

Force range	–350 to +3500 N
Maximum non-damaging force	4500 N (1000 lb) compression
Resolution	1.0 N
Dimensions	31.5 cm x 31.5 cm x 3.5 cm

Care and Maintenance

Battery Information

Go Direct Force Plate 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 Force Plate 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 Force Plate 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

The Go Direct Force Plate has four load cells located in each of the corners. The signals from these load cells are combined into a single signal to determine the force being applied.

The individual readings are also used with the X-axis balance and Y-axis balance channels. The individual load cell readings are combined to provide a relative stability reading for each axis on a scale between 100 and 100.

Troubleshooting

For troubleshooting and FAQs, see www.vernier.com/til/18853

Repair Information

If you have followed the troubleshooting steps and are still having trouble with your Go Direct Force Plate, 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
Force Plate Handles	FP-HAN

Warranty

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

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 interférent-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.



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