

Vernier Science Education

International
University
Catalog
2024



SCIENCE EDUCATION

For science educators, by science educators



Welcome!

Dear educator,

We hope this catalog finds you well and thriving in your classroom. It has been a roller-coaster year! We are thrilled to share some exciting announcements that signify a new chapter in our journey of supporting educators and promoting STEM literacy.

First, we are embarking on a remarkable transition from being a partner-owned company to a Perpetual Purpose Trust. This strategic move will enable us to sustain our mission indefinitely, ensuring that we continue to assist teachers in creating a STEM-literate society. Our commitment to providing durable products and solutions, offering unwavering quality and service, and giving back to the communities we serve and live in remains steadfast. With this change, we know it will remain the same in perpetuity.

This transition was prompted by John Wheeler stepping down from his role as CEO. Although he will no longer be leading the company, he will continue to offer his invaluable guidance and leadership to the organization, supporting our new CEO in maintaining our commitment to your needs and the support of STEM education. Dave and Christine Vernier will also continue to play key roles.

After more than a year of managing the supply chain crisis, we are thrilled to be creating new and exciting tools for teachers again. This year, we are adding new products including Go Direct Salinity, Go Direct Soil Moisture, Go Direct Pyranometer, Go Direct PAR, Go Direct Force Plate, and a Cart Fan.

As always, we are committed to supporting your educational objectives and are excited about the opportunities these new resources bring to your classroom. Thank you for your continued dedication to teaching, and we look forward to continuing to serve your needs in this new chapter of our journey.



John Wheeler
CEO



Dave Vernier
Co-Founder



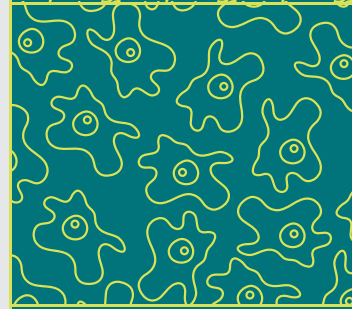
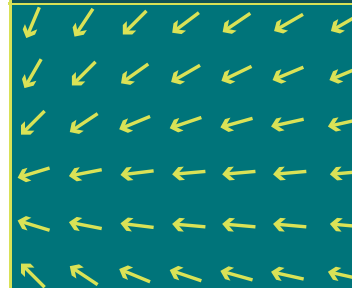
Christine Vernier
Co-Founder

Why Vernier? Endless Possibilities.

Our durable hardware and quality software are designed and priced for hands-on student use whether learning remotely or in the laboratory. We have ready-to-go experiments and resources in a wide variety of subjects.

BIOLOGY • CHEMISTRY • PHYSICS • ENGINEERING
AGRICULTURAL SCIENCE • ENVIRONMENTAL SCIENCE • PHYSIOLOGY

Our sensors and data-collection technology are so versatile that you can use them in nearly any science or engineering course.



What's New at Vernier

NEW

Go Direct Salinity

Easily and precisely measure the total dissolved salt content in an aqueous solution. Measure water with a wide variety of salinities, from brackish water to ocean water, and even hyper-saline environments.

GDX-SAL

vernier.com/gdx-sal



NEW

Go Direct Soil Moisture

This sensor uses capacitance to measure the volumetric water content of soil.

GDX-SM

vernier.com/gdx-sm



NEW

Go Direct PAR

Go Direct® PAR (Photosynthetically Active Radiation) measures photosynthetic light levels in both air and water.

GDX-PAR

vernier.com/gdx-par



NEW

Go Direct Pyranometer

Go Direct Pyranometer measures the power of electromagnetic radiation in watts per square meter. It is sensitive to near infrared, visible, and UV radiation, where 90% of solar energy is concentrated.

GDX-PYR

vernier.com/gdx-pyr



NEW

Go Direct Force Plate

Measure the forces developed during stepping, jumping, and other human-scale actions. Observe change in apparent weight as you ride an elevator, or measure reaction forces as you lean against a wall.

GDX-FP

vernier.com/gdx-fp



NEW

Cart Fan

The Cart Fan is a modular fan you can add to DTS and Go Direct carts that provides a constant force for dynamics investigations. Using one or multiple fans on a single cart, students can investigate constant acceleration, balanced/unbalanced forces, and variable thrust angles.

DTS-CFAN

vernier.com/dts-cfan





Students don't learn effectively by just sitting and listening—they need to be consistently engaged in what they are learning about. As educators, we are always looking for ways to optimize the learning experience for our students, especially in today's increasingly remote environment.

David Craig
Oregon State University

Join these institutions, and hundreds of others,
already using Vernier technology:

- | | | |
|---------------------------------------|------------------------------------|-------------------------------------|
| Arizona State University | McGill University | University of Cambridge |
| Baltimore City Community College | Miami University | University of Chicago |
| Benedictine University | Michigan Technological University | University of Hong Kong |
| California State University—Fullerton | Mississippi State University | University of Kansas |
| Cameron University | National University of Colombia | University of Minnesota—Minneapolis |
| Canisius College | National University of Singapore | University of Nebraska—Lincoln |
| Charles University | Oregon State University | University of Pennsylvania |
| Colorado School of Mines | Princeton University | University of Puerto Rico |
| Cornell University | Queensborough Community College | University of Sydney |
| Cuyahoga Community College | Quinnipiac University | University of Tennessee—Chattanooga |
| Delft University of Technology | Saint Mary's University | University of Toronto |
| Dickinson College | Stanford University | University of Washington |
| ETH Zurich | Stephen F. Austin State University | University of Wisconsin—Madison |
| Georgia Tech | Sungkyunkwan University | Vincennes University |
| Harvard University | TEC Monterrey | Virginia Commonwealth University |
| Haskell Indian Nations University | Texas A&M | Wake Technical Community College |
| Immaculata University | The Ohio State University | West Virginia Wesleyan College |
| Lehigh University | University of Arizona | Yale University |
| Lund University | University of British Columbia | |
| Massachusetts Institute of Technology | University of California—Berkeley | |

Partnerships

LabArchives

We have partnered with LabArchives™ to bring high-quality biology content to instructors through the Lab Builder library. Because all content is structured and standardized, instructors can arrange, customize, and add content to their courses with ease. [Learn more at vernier.com/lab-archives](https://www.vernier.com/lab-archives)

ADInstruments

We have partnered with ADInstruments to provide state-of-the-art, customizable biology content using ADInstruments' platform, Lt. This platform supports real-time data collection and analysis with many Vernier sensors and includes instructional videos, quizzes, and classroom management tools. [Learn more at vernier.com/adinstruments](https://www.vernier.com/adinstruments)

Biology

Why Vernier?

Vernier biology solutions help students form a deep understanding of key scientific concepts. Whether you are introducing your students to enzymes or exploring primary productivity, our probeware and ready-to-go experiments are the right fit for your laboratory.

Quality

Durable hardware for lab and field use

Affordable

Designed for education and education budgets

Versatile

Supports a variety of devices and experiments



“

Your great products and superb support of them have been a major part of my labs and are very much appreciated.

*David Willey
University of Pittsburgh*

[vernier.com/biology](https://www.vernier.com/biology)

A Guide to Vernier Data Collection

We're here to support you as an educator as you incorporate data-collection technology into your instruction. See how our products provide you with affordable laboratory solutions designed for student success.

Our Guarantee: Most of our products are protected by a 5-year limited warranty. And after 5 years? We'll make every attempt to repair your equipment.

What You Need to Get Started with Go Direct Sensors

Go Direct Sensor

These versatile sensors connect to your device via Bluetooth® wireless technology or USB.

Device

Go Direct® sensors connect to a wide variety of commonly used devices, including Chromebooks, computers, tablets, smartphones, and LabQuest® 3.

Software

Vernier Graphical Analysis® Pro
Vernier Spectral Analysis®

Lab Book

Our popular, award-winning lab books provide hundreds of well-tested, customizable experiments. Our lab books come with a generous site license—purchase once and share files across your department.

What You Need to Get Started with LabQuest 3

Sensor

Go Direct Sensor

These versatile sensors connect to LabQuest 3 via Bluetooth wireless technology or USB.

Go Direct spectrometers connect only via USB.

LabQuest Sensor

LabQuest sensors connect directly to LabQuest 3 sensor ports (BTA/BTD).

LabQuest 3

LabQuest 3 serves as a standalone data-collection platform that works with all Vernier sensors.

Software

LabQuest App

Lab Book

Our popular, award-winning lab books provide hundreds of well-tested, customizable experiments. Our lab books come with a generous site license—purchase once and share files across your department.

Software

Vernier Spectral Analysis

Spectral Analysis supports our family of spectrometers on computers, Chromebooks, and compatible mobile devices. Use it to generate full spectra, create standard curves, and conduct kinetics experiments.

Vernier Graphical Analysis Pro

Our award-winning app enables advanced data analysis, provides opportunities to reinforce and extend learning, and includes features that support hybrid teaching models.

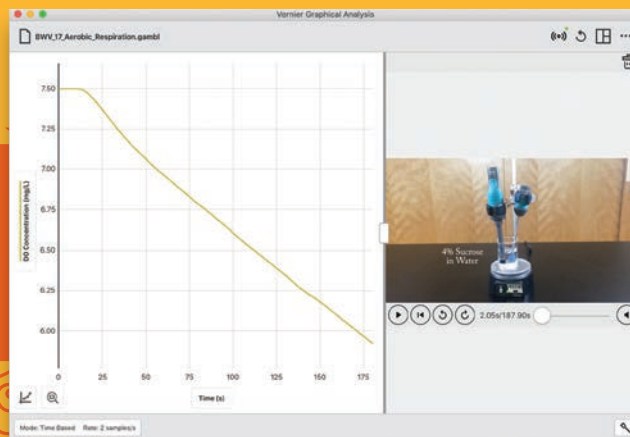
LabQuest App

LabQuest 3 has built-in software that gives your students real-time graphing capabilities in a handheld device. It's powerful, yet beautifully simple.

Free Trial for Educators

Try out Graphical Analysis Pro for free for 30 days. Access the sample experiments and enhanced analysis tools to use with your students. **Get a free trial and learn about site license options at vernier.com/graphical-analysis**

We continue to add new new features and expand on existing ones; check out the built-in **What's New** list to see what has been added.



LabQuest 3



LabQuest 3 is a powerful, advanced, easy-to-navigate, and versatile data-logging solution for STEM students.

LabQuest 3 is a standalone data-collection platform that students can use to collect, analyze, and interact with data efficiently. With its touch-screen abilities, students can navigate the platform with ease, and because of its wireless capabilities, students can collect data anywhere.

LABQ3

vernier.com/labq3

LabQuest App

LabQuest 3 has built-in software that gives your students real-time graphing capabilities in a handheld device. It's powerful, yet beautifully simple.

Why Vernier?

Our durable hardware and quality software are designed for hands-on student use. Give your students the opportunity to gain practical, relevant data-collection and analysis experience that they can use wherever they go next.

General Biology

Go Direct CO₂ Gas

This sensor measures gaseous carbon dioxide concentration levels, air temperature, and relative humidity. With built-in temperature compensation and humidity protection, this sensor is ideal for measuring fermentation, respiration, and photosynthesis rates.

GDX-CO2

vernier.com/gdx-co2

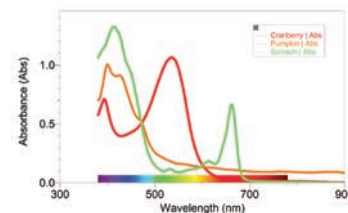


Go Direct SpectroVis Plus

Use Go Direct SpectroVis® Plus to collect a full-wavelength spectrum (absorbance, percent transmittance, fluorescence, or intensity), study absorbance vs. concentration (create standard curves), or monitor enzyme activity (enzyme kinetics).

GDX-SVISPL

vernier.com/gdx-svispl



Vernier Spectral Analysis

FREE DOWNLOAD

Learn more on page 7.

Go Direct Tris-Compatible Flat pH

Use this sensor to measure the pH of solutions. It features a sealed, gel-filled, double-junction electrode, making it compatible with Tris buffers and solutions containing proteins or sulfides.

GDX-FPH

vernier.com/gdx-fph



Go Direct Optical Dissolved Oxygen

Use this sensor to measure dissolved oxygen, water temperature, and atmospheric pressure. It's ideal for experiments in biology, ecology, and environmental science.

GDX-ODO

vernier.com/gdx-odo



Biology with Vernier

This book includes 31 experiments for fundamental concepts in biology. The instructor information section included for each experiment contains reagent preparation information, sample data, and tips for successful completion.

Topics

- Cell respiration
- Membrane diffusion
- Osmosis
- Photosynthesis and transpiration
- Human physiology



Printed book + download

BWV

Download only

BWV-E

vernier.com/bwv

Investigating Biology through Inquiry

This book includes 22 investigations for many fundamental concepts in biology. Each investigation includes a preliminary activity, instructor information, sample researchable questions, and sample data.

Topics

- Cell and molecular biology
- Organismal biology
- Ecology
- Evolution

vernier.com/bio-i



Printed book + download

BIO-I

Download only

BIO-I-E

Biology Go Direct Starter Package

Learn more at

vernier.com/gdp-bio-st

This package includes four sensors that work with Vernier Graphical Analysis Pro and LabQuest 3.

- Go Direct Temperature
- Go Wireless® Heart Rate
- Go Direct Gas Pressure
- Go Direct CO₂ Gas

GDP-BIO-ST



Human Physiology

Go Direct EKG

Use Go Direct® EKG to record electrical activity of the heart or skeletal muscles.

GDX-EKG vernier.com/gdx-ekg



Go Direct Hand Dynamometer

Measure grip and pinch strength, and perform muscle fatigue studies.

GDX-HD vernier.com/gdx-hd



Go Direct Respiration Belt

Use this sensor to measure human respiration rate and study breathing patterns.

GDX-RB
vernier.com/gdx-rb



Go Direct Spirometer

This multi-channel sensor can be used to measure tidal volume, vital capacity, flow rate, air pressure, and respiration rate.

GDX-SPR
vernier.com/gdx-spr



Go Direct O₂ Gas

Use this sensor to measure gaseous oxygen concentration levels and air temperature.

GDX-O2
vernier.com/gdx-o2



Go Direct Blood Pressure

This affordable, non-invasive sensor is designed to easily measure human blood pressure.

GDX-BP vernier.com/gdx-bp



Human Physiology Experiments: Volume 1

This book contains 14 experiments that encourage students to investigate the physiology of the cardiac, muscular, respiratory, vascular, and nervous systems using Go Direct sensors.

vernier.com/hsb-hp

This lab book provides instructions for data collection with Vernier Graphical Analysis® and Go Direct sensors only.



Printed book + download
HSB-HP

Download only
HSB-HP-E

Human Physiology Experiments: Volume 2

An expansion of our *Human Physiology Experiments: Volume 1* lab book, the setup for these experiments is minimal—students are collecting data within minutes.

vernier.com/alb-hp2

This lab book provides instructions for data collection with Vernier Graphical Analysis and Go Direct sensors only.



Printed book + download
ALB-HP2

Download only
ALB-HP2-E

Human Physiology Go Direct Standard Package

This package includes 11 sensors that work with Vernier Graphical Analysis Pro and LabQuest® 3.

- Go Direct EKG
- Go Direct Force and Acceleration
- Go Direct Surface Temperature
- Go Direct Hand Dynamometer
- Go Direct Respiration Belt
- Go Direct O₂ Gas
- Go Direct Blood Pressure
- Go Direct Spirometer
- Go Wireless® Heart Rate
- Reflex Hammer Accessory Kit
- BioChamber 250

GDP-HP-DX

Learn more at
vernier.com/gdp-hp-dx

Starter package also available



Spectrometers

Go Direct SpectroVis Plus

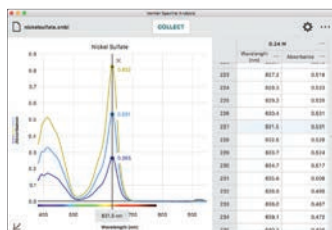
Use Go Direct SpectroVis® Plus to collect a full-wavelength spectrum (absorbance, percent transmittance, fluorescence, or intensity*), study absorbance vs. concentration (create standard curves), or monitor enzymatic activity (enzyme kinetics).

GDX-SVISPL

vernier.com/gdx-svispl



* Fiber optic cable purchased separately.



Go Direct UV-VIS Spectrophotometer

The Go Direct UV-VIS Spectrophotometer connects to your device via Bluetooth® wireless technology or USB to generate full spectra, Beer's law data, and kinetic traces of ultraviolet and visible-absorbing samples such as aspirin, DNA, proteins, and NADH.

GDX-SPEC-UV

vernier.com/gdx-spec-uv



Go Direct Fluorescence/UV-VIS Spectrophotometer

This spectrophotometer measures the fluorescence and absorbance spectra of samples such as quinine sulfate, fluorescein, chlorophyll, and fluorescent proteins, all while connecting to your device via Bluetooth wireless technology or USB.

GDX-SPEC-FUV

vernier.com/gdx-spec-fuv



Vernier Spectral Analysis

Our free Vernier Spectral Analysis® app makes it easy to incorporate spectroscopy into your general biology and biotechnology experiments. Using the app, students can collect a full spectrum and explore topics such as plant pigments, enzyme kinetics, and Beer's law (standard curves).

FREE DOWNLOAD vernier.com/spectral-analysis

Go Direct Tris-Compatible Flat pH

This pH sensor features a sealed, gel-filled, double-junction electrode, making it compatible with Tris buffers and solutions containing proteins or sulfides.

GDX-FPH

vernier.com/gdx-fph



BlueView Transilluminator

BlueView™ Transilluminator uses super-bright blue LEDs to illuminate electrophoresis gels stained with fluorescent dyes (e.g., SYBR® Safe). This combination is a safer alternative to ethidium bromide and a UV transilluminator.

BLUE-VIEW

vernier.com/blue-view



Go Direct Temperature

This rugged probe measures the temperature of a variety of substances including air, soil, and water.

Range: -40 to 125°C

GDX-TMP

vernier.com/gdx-tmp



Go Direct Conductivity

Use this sensor to measure total dissolved solids (TDS) in aquatic samples or the salinity of soil samples.

GDX-CON

vernier.com/gdx-con



Vernier and Bio-Rad

Bio-Rad® combines high-quality supplies, equipment, and curricula with outstanding customer service and technical support—things we believe are important to teachers. Vernier and Bio-Rad enhance classroom experiences with joint experiments and curricula for biotechnology.

Download free sample experiments at vernier.com/bio-rad-kits

Environmental Science

Go Direct Optical Dissolved Oxygen

Use this sensor to measure dissolved oxygen, water temperature, and atmospheric pressure. It is ideal for experiments in environmental science.

GDX-ODO

vernier.com/gdx-odo



Go Direct Conductivity

Use this sensor to measure total dissolved solids (TDS) in aquatic samples or the salinity of soil samples.

GDX-CON

vernier.com/gdx-con



Go Direct Nitrate Ion-Selective Electrode

Use this sensor to measure nitrate concentration in water samples from water sources throughout your watershed.

GDX-N03

vernier.com/gdx-no3



Go Direct Tris-Compatible Flat pH

The flat glass shape of this pH sensor is more durable and easier to clean than the traditional pH bulb shape, making it the best choice for environmental science.

GDX-FPH

vernier.com/gdx-fph



NEW

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Easily and precisely measure the total dissolved salt content in an aqueous solution. Measure water with a wide variety of salinities, from brackish water to ocean water, and even hyper-saline environments.

GDX-SAL

vernier.com/gdx-sal



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GDX-SM

vernier.com/gdx-sm



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GDX-PYR

vernier.com/gdx-pyr



NEW

Go Direct PAR

Go Direct PAR (Photosynthetically Active Radiation) measures photosynthetic light levels in both air and water.

GDX-PAR

vernier.com/gdx-par



Go Direct Weather System

Easily monitor a wide variety of environmental factors with just one sensor. Go Direct Weather System includes an affordable, wireless handheld sensor that measures ambient temperature, humidity, wind speed, wind chill, dew point, barometric pressure, and more. The included Go Direct Weather Vane accessory is required to report wind direction. Mounting Go Direct Weather System on a tripod is recommended (tripod not included).

GDX-WTVA

vernier.com/gdx-wtva



Go Direct Sensor Clamp

Prevent accidental drops during field investigations with the Go Direct Sensor Clamp.

GDX-CLAMP

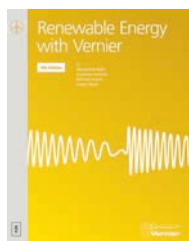
vernier.com/gdx-clamp



Renewable Energy with Vernier

The *Renewable Energy with Vernier* lab book features 26 experiments in wind and solar energy. The book contains a combination of explorations, classic experiments, inquiry investigations, engineering projects, and more.

vernier.com/rev



Printed book + download
REV

Download only
REV-E

Investigating Environmental Science through Inquiry

This book contains 34 inquiry-based environmental science investigations.* Topics include Earth systems and resources, the living world, global change and population, energy resources and consumption, and pollution.

vernier.com/esi



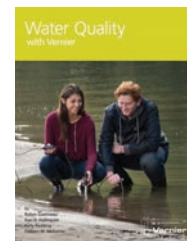
Printed book + download
ESI

Download only
ESI-E

Water Quality with Vernier

With the 18 tests in *Water Quality with Vernier*,* students investigate the water quality of a body of water by testing pH, total dissolved solids, dissolved oxygen, BOD, and more.

vernier.com/wqv



Printed book + download
WQV

Download only
WQV-E

Biology Products

Go Direct Sensors

Product	Order Code
Go Direct® Blood Pressure	GDX-BP
Go Direct CO ₂ Gas	GDX-CO2
Go Direct Colorimeter	GDX-COL
Go Direct Conductivity	GDX-CON
Go Direct EKG	GDX-EKG
Go Direct Ethanol Vapor	GDX-ETOH
Go Direct Energy	GDX-NRG
Go Direct Force and Acceleration	GDX-FOR
Go Direct Gas Pressure	GDX-GP
Go Direct Hand Dynamometer	GDX-HD
Heart Rate Monitors	
Go Wireless Exercise Heart Rate	GW-EHR
Go Wireless® Heart Rate	GW-HR
Ion-Selective Electrodes	
Go Direct Ammonium Ion-Selective Electrode	GDX-NH4
Go Direct Nitrate Ion-Selective Electrode	GDX-N03
Go Direct Light and Color	GDX-LC
Go Direct O ₂ Gas	GDX-O2
Go Direct Optical Dissolved Oxygen	GDX-ODO
NEW Go Direct PAR	GDX-PAR
pH Sensors	
Go Direct pH	GDX-PH
Go Direct Tris-Compatible Flat pH	GDX-FPH
NEW Go Direct Pyranometer	GDX-PYR
Go Direct Respiration Belt	GDX-RB
NEW Go Direct Salinity	GDX-SAL
NEW Go Direct Soil Moisture	GDX-SM
Spectrophotometers	
Go Direct SpectroVis® Plus	GDX-SVISPL
Go Direct Fluorescence/ UV-VIS Spectrophotometer	GDX-SPEC-FUV
Go Direct UV-VIS Spectrophotometer	GDX-SPEC-UV
Go Direct Spirometer	GDX-SPR
Temperature Probes	
Go Direct Surface Temperature	GDX-ST
Go Direct Temperature	GDX-TMP
Go Direct Wide-Range Temperature	GDX-WRT
Go Direct Weather	GDX-WTHR
Go Direct Weather System	GDX-WTVA

LabQuest Sensors

Product	Order Code
PAR Sensor	PAR-BTA
Relative Humidity Sensor	RH-BTA
Salinity Sensor	SAL-BTA
Soil Moisture Sensor	SMS-BTA
Turbidity Sensor	TRB-BTA

Accessories and Lab Equipment

Product	Order Code
BioChamber 250	BC-250
BioChamber 2000	BC-2000
BlueView Transilluminator	BLUE-VIEW
Disposable Bacteria Filters (pkg. of 10)	SPR-FIL10
Disposable Mouthpieces (pkg. of 30)	SPR-MP30
EKG Electrodes (pkg. of 100)	ELEC
Go Direct Charge Station	GDX-CRG
Go Direct Sensor Clamp	GDX-CLAMP
Nose Clip (pkg. of 10)	SPR-NOSE10
OHAUS® Balances	vernier.com/ohaus
Primary Productivity Kit	PPK
Reflex Hammer Accessory Kit	RFX-ACC
Stir Station	STIR
Water Depth Sampler	WDS
Water Quality Bottles	WQ-BOT

Lab Books*

Product	Order Code
<i>Biology with Vernier</i>	BWV
<i>Investigating Biology through Inquiry</i>	BIO-I
<i>Advanced Biology with Vernier</i> (LabQuest® sensors only)	BIO-A
<i>Human Physiology Experiments: Volume 1</i> (Go Direct sensors only)	HSB-HP
<i>Human Physiology Experiments: Volume 2</i> (Go Direct sensors only)	ALB-HP2
<i>Investigating Environmental Science through Inquiry</i> (LabQuest sensors only)	ESI
<i>Renewable Energy with Vernier</i>	REV
<i>Water Quality with Vernier</i> (LabQuest sensors only)	WQV

* Includes printed book and download; also available as a download only

See all our products for biology at [vernier.com/biology](https://www.vernier.com/biology)

Chemistry

Why Vernier?

When you teach with Vernier, you're teaching with a complete chemistry solution. From titrations to spectroscopy, our sensors and instrumentation are backed by powerful analytical software, university-level experiments, and unparalleled support.

Quality

Durable hardware for lab and field use

Affordable

Designed for education and education budgets

Versatile

Supports a variety of devices and experiments



The use of these technologies helps to build students' proficiency using instrumentation while providing them with hands-on experience that will better prepare them for careers in the chemistry field.

*Seth Barrett, PhD
Muskingham University*

[vernier.com/chemistry](https://www.vernier.com/chemistry)

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Software

Vernier Graphical Analysis® Pro
Vernier Spectral Analysis®
Vernier Instrumental Analysis®

Lab Book

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Vernier Spectral Analysis

Vernier Spectral Analysis supports our family of spectrometers. Use it to generate full spectra, conduct Beer's law investigations, and investigate kinetics.

Vernier Instrumental Analysis

Vernier Instrumental Analysis is used for more advanced instrumentation such as Go Direct Mini GC™, Go Direct Polarimeter, and Go Direct Cyclic Voltammetry System.

LabQuest App

LabQuest 3 has built-in software that gives your students real-time graphing capabilities in a handheld device.

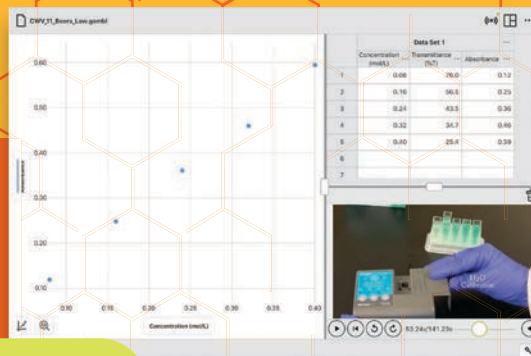
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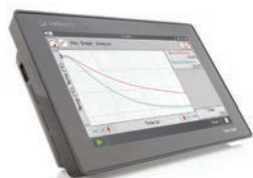
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LABQ3 vernier.com/labq3

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General Chemistry

Go Direct Temperature

Use this rugged temperature probe for investigating endothermic and exothermic reactions, determining the physical properties of water, and investigating intermolecular forces.

Range: -40 to 125°C

GDX-TMP

vernier.com/gdx-tmp



Go Direct pH

Go Direct pH is an important and versatile sensor for your laboratory. Conduct acid-base titrations, monitor pH changes during chemical reactions, and investigate buffers. The wireless connection makes it easier to do field-based studies such as testing the pH of surface water.

GDX-PH

vernier.com/gdx-ph



Go Direct Gas Pressure

Explore gas laws and the Clausius-Clapeyron equation with this sensor that measures the absolute pressure of a gas.

Range: 0 to 400 kPa

GDX-GP

vernier.com/gdx-gp



Go Direct SpectroVis® Plus

With a range of 380 to 950 nm, students can use this spectrophotometer to easily collect a full-wavelength spectrum, study absorbance vs. concentration, or monitor rates of reaction.

Collect and analyze data using Vernier Spectral Analysis or LabQuest App.

GDX-SVISPL

vernier.com/gdx-svispl



Go Direct Drop Counter

As an alternative to using a buret, the drop counter precisely records the number of drops of titrant added during a titration and then automatically converts it to volume.

GDX-DC

vernier.com/gdx-dc



Stir Station

This combination stir plate/ring stand can be used with AC power (included) or four C batteries (not included).

STIR

vernier.com/stir



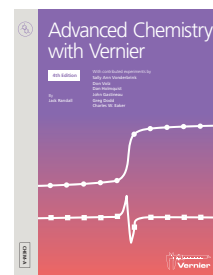
Advanced Chemistry with Vernier

This book contains 35 ready-to-use student experiments that support general chemistry. Instructor notes with sample data are also included.

Topics

- Gas laws
- Titrations
- Spectroscopy
- Electrochemistry

vernier.com/chem-a



Printed book + download
CHEM-A

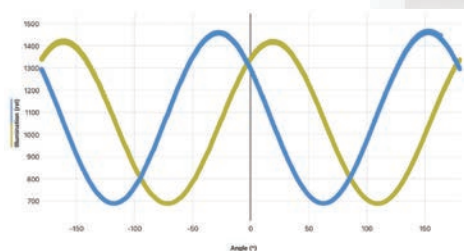
Download only
CHEM-A-E

Go Direct Polarimeter

The concept of chirality can be difficult for students to visualize. Go Direct® Polarimeter provides a visual representation of this concept by measuring the optical rotation of optical isomers such as sugars, amino acids, and proteins.

GDX-POL

Free experiment downloads available at vernier.com/gdx-pol



Comparing the optical rotations of fructose and sucrose

Free Software

Vernier Instrumental Analysis

See page 15.

Go Direct Fluorescence/UV-VIS Spectrophotometer

This spectrophotometer measures the fluorescence and absorbance spectra of samples such as quinine sulfate, fluorescein, chlorophyll, and fluorescent proteins, all while connecting to your device via Bluetooth® wireless technology or USB.

GDX-SPEC-FUV

Free experiment downloads available at vernier.com/gdx-spec-fuv

Wavelength Range

- 220 to 850 nm

Light Sources

- Visible: LED-boosted tungsten
- UV: Deuterium
- Fluorescence: Exchangeable LEDs for excitation at 375 nm, 450 nm, and 525 nm (additional wavelengths sold separately)



Go Direct Tris-Compatible Flat pH

Go Direct Tris-Compatible Flat pH is a double-junction electrode for measuring pH in Tris buffers and solutions containing proteins or sulfides. The flat glass shape makes it easy to clean and useful for measuring the pH of semisolids such as soil slurries and certain foods.

GDX-FPH

vernier.com/gdx-fph

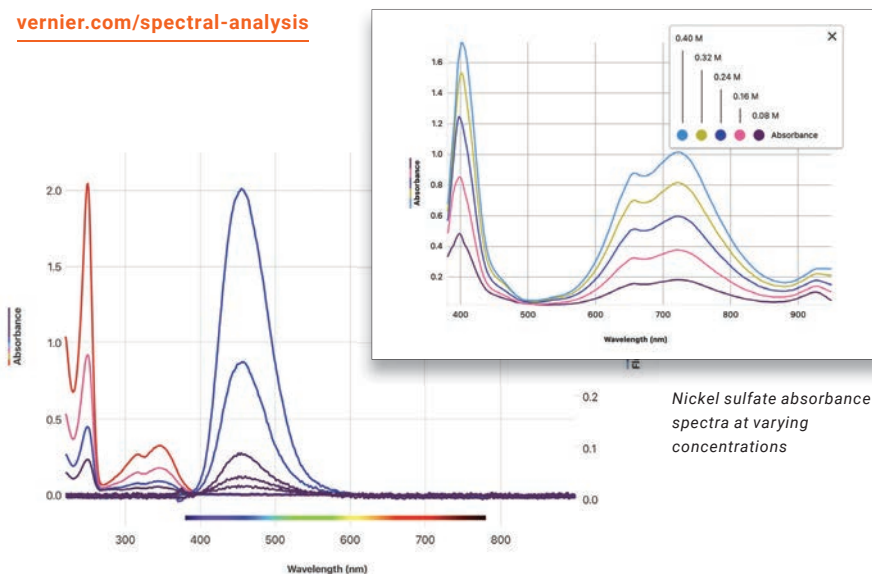


Vernier Spectral Analysis

Our free Vernier Spectral Analysis® app makes it easy to incorporate spectroscopy into your chemistry experiments. Using the app, students can collect a full spectrum and explore topics such as Beer's law, kinetics, and fluorescence.

The user-friendly software includes analysis features such as curve fitting and data interpolation.

vernier.com/spectral-analysis



Quinine Sulfate spectra at varying concentrations; absorbance (left) and Fluorescence with excitation at 375 nm (right)

Nickel sulfate absorbance spectra at varying concentrations

Go Direct Melt Station

Go Direct Melt Station accurately measures melting temperatures of a solid (up to 260°C), and real-time graphing provides a unique perspective of the melting process.

GDX-MLT

vernier.com/gdx-mlt



Go Direct UV-VIS Spectrophotometer

The Go Direct UV-VIS Spectrophotometer connects to your device via Bluetooth wireless technology or USB to generate full spectra, Beer's law data, and kinetic traces of ultraviolet and visible-absorbing samples such as aspirin, DNA, proteins, and NADH.

GDX-SPEC-UV

vernier.com/gdx-spec-uv

Wavelength Range

- 220 to 850 nm

Light Sources

- Visible: LED-boosted tungsten
- UV: Deuterium



Go Direct Wide-Range Temperature

Go Direct Wide-Range Temperature is designed to be used as you would use a thermometer for experiments such as the recrystallization of benzoic acid, simple and fractional distillations, determination of boiling points, the synthesis and analysis of aspirin and other organic compounds, and more.

Range: -20 to 330°C

GDX-WRT

vernier.com/gdx-wrt



Free Software

Vernier Spectral Analysis

See page 14.

Go Direct Mini GC

With the easy-to-use Go Direct Mini GC™ and the free Vernier Instrumental Analysis® app, students can separate, analyze, and identify substances contained in a volatile liquid or gaseous sample. This portable gas chromatograph detects polar and nonpolar compounds allowing for a wide range of experiments. Sample experiments include fractional distillation and Fischer esterification.

GDX-GC

vernier.com/gdx-gc



Organic Chemistry with Vernier

Organic Chemistry with Vernier contains 26 experiments that represent a broad range of topics and techniques taught in most university organic chemistry lab courses. The experiments in this book build upon prior knowledge, laboratory techniques, and skills that students learn in general chemistry courses.

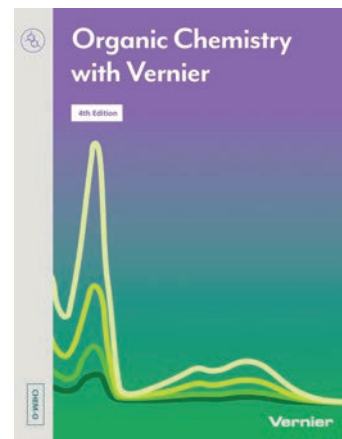
Topics

- Distillation
- Chromatography
- Synthesis
- Polarimetry

vernier.com/chem-o

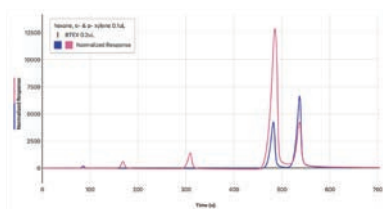
Printed book + download
CHEM-0

Download only
CHEM-0-E



Vernier Instrumental Analysis

With our free Vernier Instrumental Analysis app, students can collect and analyze data from our Go Direct Mini GC, Go Direct Polarimeter, and Go Direct Cyclic Voltammetry System (page 16) using computers, Chromebooks, or compatible mobile devices.



Comparing chromatograms of a BTEX mixture with hexane and xylene isomers

vernier.com/instrumental-analysis

Analytical and Physical Chemistry

Go Direct Cyclic Voltammetry System

Give your students hands-on experience with electrochemically active reactions using this affordable potentiostat and disposable screen-printed electrodes.

Easily incorporate electrochemistry into your curriculum using our e-book, *Electrochemistry Experiments with the Go Direct Cyclic Voltammetry System*, available for free with your purchase.

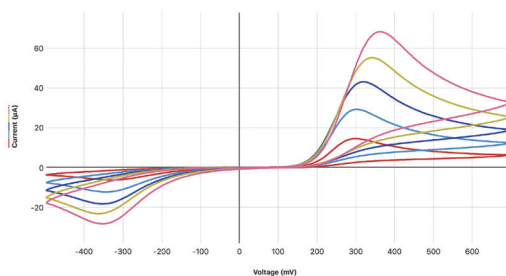
GDX-CVS

Free experiment downloads available at vernier.com/gdx-cvs

Free Software

Vernier Instrumental Analysis®

See page 15.



Cyclic voltammograms of acetaminophen standard solutions

Go Direct Polarimeter

The concept of chirality can be difficult for students to visualize. Go Direct® Polarimeter provides a visual representation of this concept by measuring the optical rotation of optical isomers such as sugars, amino acids, and proteins.

GDX-POL

Free experiment downloads available at vernier.com/gdx-pol



Go Direct UV-VIS Spectrophotometer

An easy-to-use and accurate instrument ideal for measuring the absorbance spectra of various chemical and biochemical compounds, the Go Direct UV-VIS Spectrophotometer connects to your device via Bluetooth® wireless technology or USB.

GDX-SPEC-UV

Wavelength Range

- 220 to 850 nm

Light Sources

- Visible: LED-booster tungsten
- UV: Deuterium

Free experiment downloads available at vernier.com/gdx-spec-uv

Recommended Accessory

Vernier Spectrophotometer Optical Fiber

Analyze emissions spectra of gas discharge tubes or flame tests with this optical fiber.

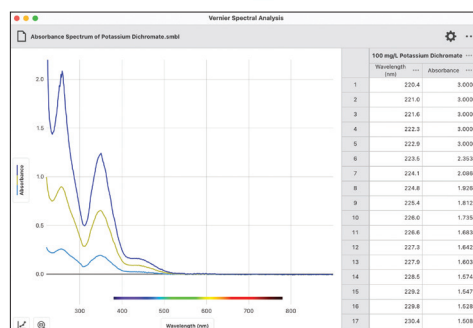
VSP-FIBER

vernier.com/vsp-fiber

Free Software

Vernier Spectral Analysis®

See page 14.



Examining the absorbance spectra of three concentrations of potassium dichromate solutions using the Go Direct UV-VIS Spectrophotometer and Spectral Analysis

Go Direct pH

Use this general-purpose pH sensor to monitor the pH of aqueous solutions.

GDX-PH

vernier.com/gdx-ph



IMPROVED Go Direct Wide-Range Pressure

Using robust metal fittings and a leakproof seal, Go Direct Wide-Range Pressure measures absolute pressures up to 690 kPa (100 psi). Connect it to your system to measure changes in liquid, gas, or vapor pressure.

GDX-WRPL

vernier.com/gdx-wrpl



Go Direct Fluorescence/UV-VIS Spectrophotometer

The Go Direct Fluorescence/UV-VIS Spectrophotometer measures the fluorescence and absorbance spectra of various samples. It easily connects to your device via Bluetooth wireless technology or USB to conduct Beer's law experiments, measure a Stokes shift, or measure quantum yields.

GDX-SPEC-FUV

Wavelength Range

- 220 to 850 nm

Light Sources

- Visible: LED-boosted tungsten
- UV: Deuterium
- Fluorescence: Exchangeable LEDs for excitation at 375 nm, 450 nm, and 525 nm (additional wavelengths sold separately)

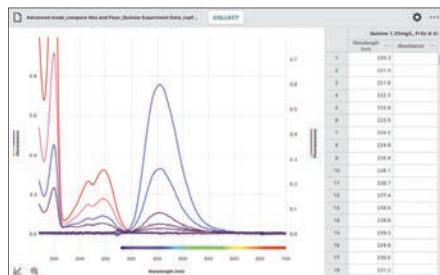
Free experiment downloads available at vernier.com/gdx-spec-fuv



Free Software

Vernier Spectral Analysis

See page 14.



Absorbance and fluorescence spectra of quinine sulfate at varying concentrations

Vernier Flash Photolysis Spectrometer

The Vernier Flash Photolysis Spectrometer is perfect for students to explore the fundamental principles of photochemical reactions. This spectrometer now includes 13 detection filters for measuring the absorption and emission changes of a photoexcited sample with microsecond resolution. Excitation filters (2) are also included.

VSP-FP

Wavelength Range

- 450 to 750 nm

Light Sources

- Xenon flashlamp (pump) white LED (probe)
- 13 exchangeable filters for detection wavelength
- 2 exchangeable colored glass filters for excitation wavelength

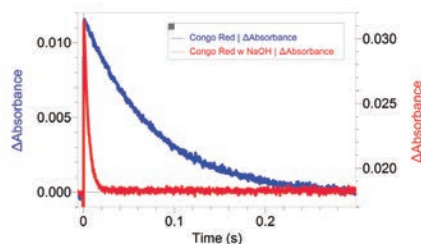
Free experiment downloads available at vernier.com/vsp-fp



Free Software

Collect data with the free, all-inclusive Flash Photolysis Spectrometer Software.*

*Available for Windows® only



Fast photocatalysis of Congo Red

Go Direct Visible Spectrophotometer

The Go Direct Visible Spectrophotometer is a robust and accurate portable visible light spectrophotometer that connects easily to your device via Bluetooth wireless technology or USB to conduct Beer's law experiments, kinetic or equilibrium studies of absorbance, or emission spectrum analysis.

GDX-SPEC-VIS

Wavelength Range

- 380 to 950 nm

Light Sources

- Visible: LED-boosted tungsten

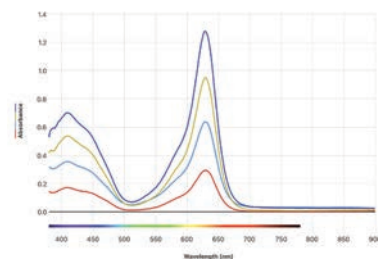
vernier.com/gdx-spec-vis



Free Software

Vernier Spectral Analysis

See page 14.



Absorbance spectra for green food coloring at various concentrations

Chemistry Products

Go Direct Sensors

Sensor	Order Code
Go Direct® Colorimeter	GDX-COL
Conductivity Probes	
Go Direct Conductivity	GDX-CON
Go Direct Platinum-Cell Conductivity	GDX-CONPT
Current Probes	
Go Direct Constant Current System	GDX-CCS
Go Direct Current	GDX-CUR
Go Direct Drop Counter	GDX-DC
Go Direct Electrode Amplifier	GDX-EA
Gas Pressure Sensors	
Go Direct Gas Pressure	GDX-GP
Go Direct Wide-Range Pressure	GDX-WRP
Go Direct Wide-Range Pressure	GDX-WRPL
Go Direct Melt Station	GDX-MLT
Go Direct ORP	GDX-ORP
pH Sensors	
Go Direct Glass-Body pH	GDX-GPH
Go Direct pH	GDX-PH
Go Direct Tris-Compatible Flat pH	GDX-FPH
Go Direct Radiation Monitor	GDX-RAD
Temperature Probes	
Go Direct Surface Temperature	GDX-ST
Go Direct Temperature	GDX-TMP
Go Direct Thermocouple	GDX-TC
Go Direct Wide-Range Temperature	GDX-WRT
Go Direct Voltage	GDX-VOLT

LabQuest Sensors

Sensor	Order Code
Colorimeter	COL-BTA
Conductivity Probes	
Conductivity Probe	CON-BTA
Platinum-Cell Conductivity Probe	CONPT-BTA
Current Probes	
Constant Current System	CCS-BTA
Current Probe	DCP-BTA
Drop Counter	VDC-BTD
Electrode Amplifier	EA-BTA
Gas Pressure Sensors	
Gas Pressure Sensor	GPS-BTA
Pressure Sensor 400	PS400-BTA
Instrumentation Amplifier	INA-BTA
Melt Station	MLT-BTA
ORP Sensor	ORP-BTA
pH Sensors	
Glass-Body pH Electrode BNC (requires Electrode Amplifier)	GPH-BNC
pH Sensor	PH-BTA
Tris-Compatible Flat pH Sensor	FPH-BTA
Polarimeter (Chemical)	CHEM-POL
Radiation Monitor	VRM-BTD
Temperature Probes	
Stainless Steel Temperature Probe	TMP-BTA
Surface Temperature Sensor	STS-BTA
Thermocouple	TCA-BTA
Wide-Range Temperature Probe	WRT-BTA
Voltage Probes	
Differential Voltage Probe	DVP-BTA
Voltage Probe	VP-BTA

Instrumentation

Instrument	Order Code
Go Direct Cyclic Voltammetry System	GDX-CVS
Go Direct Mini GC™	GDX-GC
Go Direct Polarimeter	GDX-POL

Spectrometers

Spectrometer	Order Code
Go Direct Emissions Spectrometer	GDX-SPEC-EM
Vernier Flash Photolysis Spectrometer	VSP-FP
Go Direct Fluorescence/UV-VIS Spectrophotometer	GDX-SPEC-FUV
Go Direct SpectroVis® Plus	GDX-SVISPL
Go Direct UV-VIS Spectrophotometer	GDX-SPEC-UV
Go Direct Visible Spectrophotometer	GDX-SPEC-VIS

Lab Equipment

Equipment	Order Code
Electrode Support	ESUP
OHAUS® Balances	vernier.com/ohaus
Stir Station	STIR
Cuvette Rack	CUV-RACK
Go Direct Charge Station	GDX-CRG

Lab Books*

Equipment	Order Code
<i>Advanced Chemistry with Vernier</i>	CHEM-A
<i>Chemistry with Vernier</i>	CWV
<i>Food Chemistry Experiments</i>	HSB-FOOD
NEW <i>Forensic Chemistry Experiments</i>	HSB-FCHEM
<i>Investigating Chemistry through Inquiry</i>	CHEM-I
<i>Organic Chemistry with Vernier</i>	CHEM-O

* Includes printed book and download; also available as a download only

See all our products for university chemistry online at [vernier.com/chemistry](https://www.vernier.com/chemistry)

Physics

Why Vernier?

Vernier started when one educator, Dave Vernier, decided to build solutions to bring physics to life for his students. Today, our complete physics solution is still powered by the desire to inspire students and foster learning and is backed by powerful software and unparalleled support.

Quality

Durable hardware lasts for years of use

Affordable

Designed for education and education budgets

Versatile

Supports a variety of devices and experiments



“

I find your extensive suite of hardware—and your innovative software—extremely helpful in my teaching. Couldn't do it without your stuff!

*Barbara Hughey
Massachusetts Institute of Technology
Cambridge, MA*

[vernier.com/physics](https://www.vernier.com/physics)

A Guide to Vernier Data Collection

We're here to support you as an educator as you incorporate data-collection technology into your instruction. See how our products provide you with affordable laboratory solutions designed for student success.

Our Guarantee: Most of our products are protected by a 5-year limited warranty. And after 5 years? We'll make every attempt to repair your equipment.

What You Need to Get Started with Go Direct Sensors

Go Direct Sensor

These versatile sensors connect to your device via Bluetooth® wireless technology or USB.

Device

Go Direct® sensors connect to a wide variety of commonly used devices, including Chromebooks, computers, smartphones, tablets, and LabQuest® 3.

Software

Vernier Graphical Analysis® Pro
Vernier Spectral Analysis®
Vernier Video Analysis®

Lab Book

Our popular, award-winning lab books provide hundreds of well-tested, customizable experiments. Our lab books come with a generous site license—purchase once and share files across your department.

What You Need to Get Started with LabQuest Sensors

LabQuest Sensor

LabQuest sensors share data with your device via a wired connection (BTA/BTD) to an interface from the LabQuest family.

Interface

An interface sends information from the sensor to the data-collection and analysis software. The LabQuest family includes LabQuest 3, and LabQuest Mini.

Software

Vernier Graphical Analysis Pro
LabQuest App

Lab Book

Our popular, award-winning lab books provide hundreds of well-tested, customizable experiments.

Device

LabQuest sensors connect to computers, Chromebooks, and compatible mobile devices through a LabQuest interface.

Software

Vernier Spectral Analysis

Spectral Analysis supports our family of spectrometers. The user-friendly interface walks students through the data-collection process and includes analysis features such as curve fitting and data interpolation.

Vernier Graphical Analysis Pro

Our award-winning app enables advanced data analysis, provides opportunities to reinforce and extend learning, and includes features that support hybrid teaching models.

Vernier Video Analysis

Students can use their smartphone or tablet in the laboratory or out in the field to record motion. They can then import the video into Video Analysis on any device to mark the object in motion, set the scale, and create graphs of the motion.

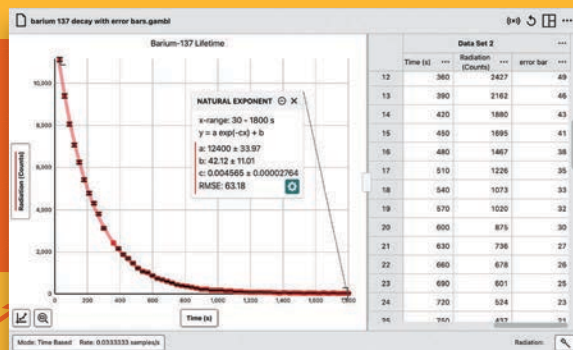
LabQuest App

LabQuest 3 has built-in software that gives your students real-time graphing capabilities in a handheld device.

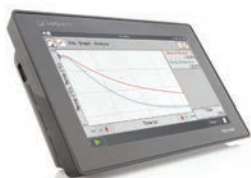
Free Trial for Educators

Try out Graphical Analysis Pro for free for 30 days. Access the sample experiments and enhanced analysis tools to use with your students. Get a free trial and learn about site license options at www.vernier.com/graphical-analysis

We continue to add new new features and expand on existing ones; check out the built-in **What's New** list to see what has been added.



LabQuest 3



LabQuest 3 is a powerful, advanced, easy-to-navigate, and versatile data-logging solution for STEM students.

LabQuest 3 is a standalone data-collection platform that students can use to collect, analyze, and interact with data efficiently. With its touch-screen abilities, students can navigate the platform with ease, and because of its wireless capabilities, students can collect data anywhere.

LABQ3 vernier.com/labq3

LabQuest App

LabQuest 3 has built-in software that gives your students real-time graphing capabilities in a handheld device. It's powerful, yet beautifully simple.

Why Vernier?

Our durable hardware and quality software are designed for hands-on student use. Give your students the opportunity to gain practical, relevant data-collection and analysis experience that they can use wherever they go next.

Mechanics

Dynamics Cart and Track System with Go Direct Sensor Cart

The Dynamics Cart and Track System with Go Direct Sensor Cart includes essential laboratory equipment for teaching dynamics and kinematics. With our Go Direct Sensor Cart, students can explore force, position, velocity, and acceleration directly on their device using Bluetooth wireless technology. There are no wires to create drag, and no additional equipment is required! Each cart features built-in sensors that simplify experiment setup and make this system the best choice for studying dynamics and kinematics.

with 1.2 m Track DTS-GDX
with 2.2 m Track DTS-GDX-LONG

vernier.com/dts-gdx

Additional Cart and Track options are available at vernier.com/dynamics



NEW Cart Fan

The Cart Fan is a modular fan you can add to DTS and Go Direct carts that provides a constant force for dynamics investigations. Using one or multiple fans on a single cart, students can investigate constant acceleration, balanced/unbalanced forces, and variable thrust angles.

DTS-CFAN

vernier.com/dts-cfan



Go Direct Force and Acceleration

Measure forces as small as ± 0.1 N and up to ± 50 N with this sensor that couples a 3-axis accelerometer with a stable and accurate force sensor. It also includes a 3-axis gyroscope for experiments involving rotation.

GDX-FOR

vernier.com/gdx-for



Go Direct Centripetal Force System

Conduct a variety of rotational dynamics investigations with a single experiment setup. This combination easily measures angular velocity, centripetal force, and acceleration without the hassle of wires.

GDX-CFAF

vernier.com/gdx-cfaf



Moment of Inertia Accessory Kit

With the Moment of Inertia Accessory Kit, students can explore inertia in a broader context. The kit expands the capabilities of the Vernier Centripetal Force Apparatus when investigating moments of inertia of different geometries.

CFA-MIK

vernier.com/cfa-mik



Go Direct Motion

Use ultrasound to measure the position, velocity, and acceleration of moving objects.

GDX-MD

vernier.com/gdx-md



Go Direct Force Plate

Measure the forces developed during stepping, jumping, and other human-scale actions. Observe change in apparent weight as you ride an elevator, or measure reaction forces as you lean against a wall.

GDX-FP

vernier.com/gdx-fp



Go Direct Photogate

This double-gate sensor includes two photogates built into the arms of the sensor. It accurately measures velocity and acceleration.

GDX-VPG

vernier.com/gdx-vpg



Waves and Sound

Go Direct Sound

This is really two sensors in one—measure sound level in decibels, or capture and evaluate sound waveforms.

GDX-SND

vernier.com/gdx-snd



Resonance Apparatus

The Resonance Apparatus is used for the classic experiment of determining the speed of sound using the principle of resonance in a tube that is closed at one end.

RES-APP

vernier.com/res-app



Power Amplifier

Use the Power Amplifier as a power supply for DC and AC circuit investigations or to drive devices such as speakers.

PAMP

vernier.com/pamp



Power Amplifier Accessory Speaker

Study mechanical waves on strings and springs.

PAAS-PAMP

vernier.com/paas-pamp



Thermodynamics

Go Direct Gas Pressure

This sensor measures the absolute pressure of a gas.

GDX-GP

vernier.com/gdx-gp



Go Direct Temperature

Go Direct® Temperature is a durable, stainless steel temperature sensor for use in liquids or air.

Range: -40 to 125°C

GDX-TMP

vernier.com/gdx-tmp



Go Direct Surface Temperature

An exposed temperature sensor makes this an ideal choice for situations where low thermal mass and extremely rapid response are needed. Use this sensor in air and water only.

Range: -25 to 125°C

GDX-ST

vernier.com/gdx-st



Electricity and Magnetism

Go Direct Voltage

This sensor combines a wide input voltage range and high precision, making it an excellent choice for investigations of both AC/DC circuits and electromagnetism.

Ranges: ± 20 V and ± 1 V

GDX-VOLT

vernier.com/gdx-volt



Go Direct Current

Measure electric currents in circuits with this versatile sensor.

Ranges: ± 1 A and ± 0.1 A

GDX-CUR

vernier.com/gdx-cur



Go Direct Static Charge

Unlike a traditional electroscope, Go Direct Static Charge offers a means for quantitative measurement and analysis of positive and negative charges of objects that would not be possible in a traditional lab—such as measuring the charge on a balloon.

Range: ± 100 nC

GDX-Q

vernier.com/gdx-q



Go Direct 3-Axis Magnetic Field

Determine the magnitude and direction of a magnetic field at any point in space with this 3-axis sensor.

Ranges: ± 5 mT and ± 130 mT

GDX-3MG

vernier.com/gdx-3mg



Electrostatics Kit

When using the Electrostatics Kit with Go Direct Static Charge, students can conduct a range of experiments in electrostatics.

ESK-CRG

vernier.com/esk-crg



High-Voltage Electrostatics Kit

Use this kit to investigate the distribution of charge on a sphere, transfer of charge on contact between two spheres, and charging by induction.

HVEK-CRG

vernier.com/hvek-crg



Extech® Digital Power Supply

This power supply provides constant current or constant voltage for physics activities that require DC power.

EXPS

vernier.com/exps



Vernier Circuit Board 2

Use this convenient platform to study basic series and parallel circuits as well as RLC circuits. Many components for experimentation are provided, and additional components can be added to expand the capability of this useful board.

VCB2

vernier.com/vcb2



Electrostatic High-Voltage Genecon

A great addition to the High Voltage Electrostatics Kit, the Electrostatic High-Voltage Genecon generates both positive and negative charges and reliably creates charge differences in high humidity.

HVEK-GEN

vernier.com/hvek-gen



Light and Optics

Go Direct Light and Color

This sensor combines visible light, UV, and RGB sensors to measure source emission, transmittance, and reflection of light in the visible light to ultraviolet electromagnetic spectrum.

GDX-LC

vernier.com/gdx-lc



Diffraction Apparatus[‡]

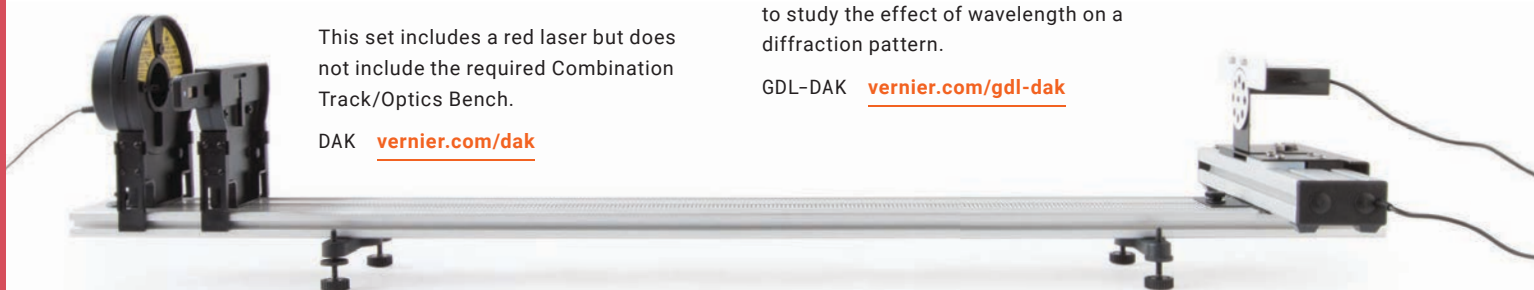
This set includes a red laser but does not include the required Combination Track/Optics Bench.

DAK vernier.com/dak

Green Diffraction Laser (optional)

Add this laser to your Diffraction Apparatus to study the effect of wavelength on a diffraction pattern.

GDL-DAK vernier.com/gdl-dak



Optics Expansion Kit

Use the Optics Expansion Kit[‡] with your dynamics track to conduct optics experiments, such as image formation with lenses and light intensity vs. distance. You can even use the kit to build a basic telescope.

Kit includes

- 3 lenses (100 mm converging lens, 200 mm converging lens, -150 mm diverging lens)
- Screen
- Power supply
- Combination luminous and point light source
- Light sensor holder
- Aperture screen

The Optics Expansion Kit is used in experiments in our *Physics with Vernier* and *Advanced Physics with Vernier—Beyond Mechanics* lab books.

OEK

vernier.com/oek

See website for replacement parts.

* Requires an interface such as LabQuest[®] 3 or LabQuest Mini

[‡] Requires a Combination 1.2 m Track/Optics Bench (TRACK, \$155)

Accessories

Color Mixer Kit[‡]

CM-OEK vernier.com/cm-oek



Mirror Set[‡]

M-OEK vernier.com/m-oek



Polarizer/Analyzer Set[‡]

PAK-OEK9 vernier.com/pak-oek



Go Direct Radiation Monitor

Our radiation monitor detects alpha, beta, gamma, and X-ray radiation. It can be used to explore radiation statistics, measure the rate of nuclear decay, monitor radon progeny, and investigate the effects of shielding. The sensor includes both LED and audible indicators.

GDX-RAD

vernier.com/gdx-rad

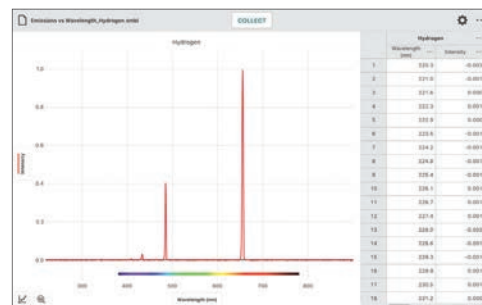


Go Direct Emissions Spectrometer

The Go Direct® Emissions Spectrometer connects to your device via Bluetooth® wireless technology or USB to give precise measurements over a range of 350–900 nm. Use it with or without the Vernier Emissions Fiber (not included) to examine spectra of light bulbs, spectrum tubes, or the sun.

GDX-SPEC-EM

vernier.com/gdx-spec-em



Vernier Spectral Analysis App

Our free Vernier Spectral Analysis® app combined with our Emissions Spectrometer makes it easy to analyze spectra. Students can quickly locate peaks or compare spectra from different sources.

vernier.com/spectral-analysis



Vernier Emissions Fiber

VSP-EM-FIBER

vernier.com/vsp-em-fiber

Spectrum Tube Power Supply

This power supply features an ultra-safe design for electrifying spectrum tubes.

ST-SPS

vernier.com/st-sps



Spectrum Tubes

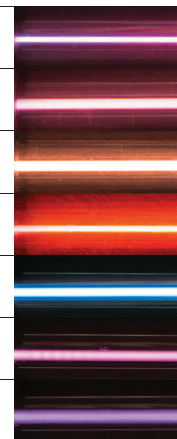
Spectrum Tubes are permanently enclosed in protective plastic carriers, with no exposed high voltage.

Spectrum Tubes carry a warranty of 2 years or 100 hours, whichever comes first (hydrogen tube: 2 years or 40 hours, whichever comes first).

vernier.com/spectrum-tubes

Spectrum Tube Order Code

Spectrum Tube	Order Code
Hydrogen	ST-H
Nitrogen	ST-N
Helium	ST-HE
Neon	ST-NE
Carbon Dioxide	ST-CO2
Air	ST-AIR
Argon	ST-AR



Additional Physics Products

Mechanics

Product	Order Code
Go Direct® Acceleration	GDX-ACC
3-Axis Accelerometer	3D-BTA
25-g Accelerometer	ACC-BTA
Bumper and Launcher Kit	BLK
NEW Cart Fan	DTS-CFAN
Dual-Range Force Sensor	DFS-BTA
Dynamics Cart and Track System	DTS
Dynamics Cart and Track System with Motion Encoder	DTS-EC
Eddy Current Brake	DTS-ECB
Encoder Fan Cart	CART-FEC
Fan Cart	CART-F
Force Plate	FP-BTA
NEW Friction Block	PHY-FRBL
Friction Pad DTS	DTS-PAD
NEW Go Direct Force Plate	GDX-FP
Go Direct Sensor Cart Accessory Kit	GDX-CART-AK
NEW Hanging Mass	PHY-HM250
Independence of Motion	IOM-VPL
Low-g Accelerometer	LGA-BTA
NEW Meter Stick	PHY-METER
Motion Detector	MD-BTD
Photogate	VPG-BTD
Go Direct Projectile Launcher	GDX-PL
Vernier Projectile Launcher	VPL
Projectile Stop	PS-VPL
Pulley Bracket	B-SPA
Go Direct Rotary Motion	GDX-RMS
Rotary Motion Sensor	RMV-BTD
Rotational Motion Accessory Kit	AK-RMV
Time of Flight Pad	TOF-VPL
Ultra Pulley Attachment	SPA

Waves and Sound

Product	Order Code
Microphone	MCA-BTA
Sound Level Sensor	SLS-BTA

Thermodynamics

Product	Order Code
Gas Pressure Sensor	GPS-BTA
Stainless Steel Temperature Probe	TMP-BTA
Surface Temperature Sensor	STS-BTA

Electricity and Magnetism

Product	Order Code
Magnetic Field Sensor	MG-BTA
Power Amplifier	PAMP
Differential Voltage Probe	DVP-BTA
Current Probe	DCP-BTA
Instrumentation Amplifier	INA-BTA
Optional Breadboard Kit for the Vernier Circuit Board 2	VCB2-0BBK
Extech® Digital DC Power Supply	EXPS
Charge Sensor	CRG-BTA
NEW Solenoid	PHY-SN700

Light and Optics

Product	Order Code
Light Sensor	LS-BTA
Polarizer/Analyzer Set for Optics Expansion Kit	PAK-OEK
Combination 1.2 m Track/Optics Bench	TRACK
Combination 2.2 m Track/Optics Bench	TRACK-LONG
Green Diffraction Laser	GDL-DAK

Lab Books

Product	Order Code
<i>Physics with Vernier</i>	PWV*
<i>Advanced Physics with Vernier—Mechanics</i>	PHYS-AM*
<i>Advanced Physics with Vernier—Beyond Mechanics</i>	PHYS-ABM*
<i>Physics Explorations and Projects</i>	PEP*
<i>Vernier Video Analysis: Motion and Sports</i>	HSB-VVAMS-E
<i>Vernier Video Analysis: Conservation Laws and Forces</i>	HSB-VVACLF-E

* Includes printed book and download; also available as a download only

This is just a sample of our physics solutions. To see the full suite of Vernier physics products, please visit [vernier.com/physics](https://www.vernier.com/physics)

Engineering

Why Vernier?

Vernier engineering solutions harness the power of analytical software and the precision of high-quality sensors to help students sharpen their design skills and prepare to enter the workforce. As with all of our solutions, our engineering technology is backed by unparalleled support.

Quality

Durable hardware for lab and field use

Affordable

Designed for education and education budgets

Versatile

Supports a variety of devices and experiments



“ Our projects are about more than just supporting the need for engineering education in local classrooms. Vernier products help deepen our students' learning through experiential, hands-on community engagement.

*Maija A. Benitz, PhD
Assistant Professor of Engineering
Roger Williams University*

[vernier.com/engineering](https://www.vernier.com/engineering)

A Guide to Vernier Data Collection

We're here to support you as an educator as you incorporate data-collection technology into your instruction. See how our products provide you with affordable laboratory solutions designed for student success.

Our Guarantee: Most of our products are protected by a 5-year limited warranty. And after 5 years? We'll make every attempt to repair your equipment.

What You Need to Get Started with Go Direct Sensors

Go Direct® sensors connect directly (no interface required) to your computer, Chromebook™, or compatible mobile device via USB or Bluetooth® wireless technology.

A Go Direct sensor

B Computer, Chromebook, tablet, smartphone

C Software

- Vernier Graphical Analysis® Pro
- National Instruments LabVIEW™
- Python®
- JavaScript™

What You Need to Get Started with LabQuest Sensors

LabQuest® sensors have a cable with a plug that makes it easy to connect to an interface without any additional wiring. Use LabQuest sensors with a Vernier interface, Arduino®, NI ELVIS, NI myDAQ, or your own DAQ hardware. If using a non-Vernier interface, these sensors require a +5.0 volt supply voltage and output a 0 to 5 volt signal. Most sensors have a simple, linear calibration.

A LabQuest sensor

B Interface (LabQuest, DAQ, or Arduino)

C Computer, Chromebook, tablet, smartphone

D Software

- Vernier Graphical Analysis Pro
- National Instruments LabVIEW
- Arduino IDE
- Python

Vernier Graphical Analysis Pro

Our award-winning app enables advanced data analysis, provides opportunities to reinforce and extend learning, and includes features that support hybrid teaching models.

Free Trial for Educators

Try out Graphical Analysis Pro for free for 30 days. Access the sample experiments and enhanced analysis tools to use with your students.

Get a free trial and learn about site license options at [vernier.com/graphical-analysis](https://www.vernier.com/graphical-analysis)

We continue to add new new features and expand on existing ones; check out the built-in **What's New** list to see what has been added.



Why Vernier?

Our durable hardware and quality software are designed for hands-on student use. Give your students the opportunity to gain practical, relevant data-collection and analysis experience that they can use wherever they go next.

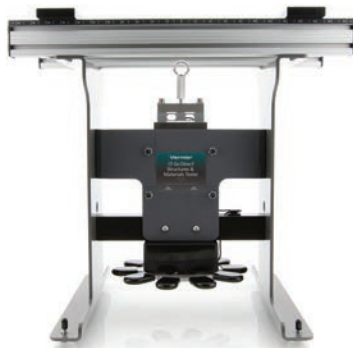
Introduction to Engineering

Go Direct Structures & Materials Tester

Use our Go Direct Structures & Materials Tester to evaluate the strength of model bridges and engineered structures by measuring the applied load. Utilizing both load and displacement sensors, your students can evaluate the properties of materials.

GDX-VSMT

vernier.com/gdx-vsmt



Advanced Wind Experiment Kit

Use this kit as a fast and easy way to introduce the engineering aspects of wind turbine technology. Investigate different blade designs, gear ratios, and generators.

KW-AWX

vernier.com/kw-awx



Vernier Variable Load

Use the Vernier Variable Load in conjunction with Go Direct Energy to provide a range of resistive loads for projects such as engineering wind turbines or investigating solar panels. Students can adjust the potentiometer to provide resistances between 6 and 255 Ω to determine the optimal load on a system.

VES-VL4 vernier.com/ves-vl



Go Direct Energy

Go Direct Energy measures voltage and current as well as displays power and energy output of scale model wind turbines and solar panels, so students can quantitatively evaluate the effects of their design changes. It connects via Bluetooth wireless technology or USB to your device.

GDX-NRG vernier.com/gdx-nrg



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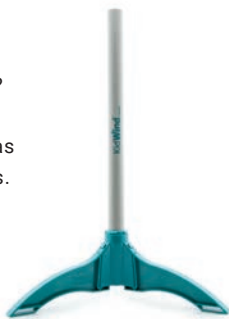
Wind Turbine Design

Tower and Base Set

Do you need a tower for your turbine nacelle? This is the same tower that comes in the Advanced Wind Experiment Kit. The tower has a diameter that fits inside 1-inch PVC fittings.

KW-TBS

vernier.com/kw-tbs



Basic Turbine Building Parts

The Basic Turbine Building Parts kit includes three hubs, a wind turbine generator, and 25 dowels, all in one package.

KW-BTPART

vernier.com/kw-btpart



Wind Turbine Generator with Wires

This is the primary generator for wind turbine experiments because it runs smoothly and provides high power output at a relatively low RPM.

KW-GEN

vernier.com/kw-gen



Hub (3 Pack)

With these 12-hole crimping hubs, made from recycled plastic, students can turn a DC generator into a wind turbine.

KW-WTH3

vernier.com/kw-wth3



Nacelle

Build a complete turbine by making your own tower and base with PVC pipe (from a hardware store) or use the Tower and Base Set. You will also need a generator and a way to affix the turbine blades.

KW-NAC

vernier.com/kw-nac



simpleGEN

Students can use the easy-to-build AC generator of the simpleGEN to explore the basics of electrical generator design.

KW-SGEN

vernier.com/kw-sgen



Gear Set

The small 8-tooth gear fits on 2 mm driveshafts that are found on many DC generators. The gears have a keying feature and can be changed quickly and easily using the included hex locks. The hex locks secure to our 9/64 inch hex driveshaft, which is included in the Drivetrain Set (KW-DS, \$8).

Gear sizes: 64 teeth, 32 teeth, 16 teeth, 8 teeth

KW-GEAR

vernier.com/kw-gear



KidWind Photogate Bracket

The KidWind Photogate Bracket enables the measurement of rotations per minute (RPMs) of a wind turbine with a Vernier photogate.

KW-PGBRAC

vernier.com/kw-pgbrac



Biomedical Engineering with Go Direct Sensors

With wireless options and multiple on-board sensors, Go Direct® sensors are perfect for analyzing and studying physiological functions.

Go Direct EKG

Go Direct EKG has five channels: EKG, heart rate, EMG, EMG rectified, and voltage.

GDX-EKG

vernier.com/gdx-ekg



Go Direct O₂ Gas

This sensor measures gaseous oxygen concentration levels and air temperature.

GDX-O2

vernier.com/gdx-o2



Go Direct Blood Pressure

Go Direct Blood Pressure has seven channels: cuff pressure, mean arterial pressure, systolic pressure, diastolic pressure, pulse rate, oscillations, and envelope.

GDX-BP

vernier.com/gdx-bp



NEW Go Direct Force Plate

Measure the forces developed during stepping, jumping, and other human-scale actions. Observe change in apparent weight as you ride an elevator, or measure reaction forces as you lean against a wall.

GDX-FP

vernier.com/gdx-fp



Go Direct Spirometer

Go Direct Spirometer has six channels: flow rate, volume, adjusted volume, cycle volume, respiration rate, and differential pressure.

GDX-SPR

vernier.com/gdx-spr



Go Direct Surface Temperature

With a range of -25 to 125°C, this sensor is designed for use in situations in which low thermal mass or flexibility is required, such as on human skin.

GDX-ST

vernier.com/gdx-st



Go Direct Hand Dynamometer

Go Direct Hand Dynamometer has seven channels: force, x-axis acceleration, y-axis acceleration, z-axis acceleration, x-axis gyro, y-axis gyro, and z-axis gyro.

GDX-HD

vernier.com/gdx-hd



Go Direct Respiration Belt

Go Direct Respiration Belt has four channels: force, respiration rate, steps, and step rate.

GDX-RB

vernier.com/gdx-rb



Go Direct CO₂ Gas

Go Direct CO₂ Gas has three channels: CO₂ gas, temperature, and relative humidity.

GDX-CO2

vernier.com/gdx-co2



Go Direct Acceleration

This 3-axis acceleration sensor has two acceleration ranges ($\pm 157 \text{ m/s}^2$ and $\pm 1960 \text{ m/s}^2$) plus an altimeter and a 3-axis gyroscope.

GDX-ACC

vernier.com/gdx-acc



Arduino with LabQuest Sensors

Help students build coding skills and foster creative critical thinking by combining Vernier sensors with Arduino.®

Vernier Coding with Arduino—Analog Sensor Package

The package has everything needed for students to use Vernier sensors with Arduino microcontrollers, including the *Vernier Coding Activities with Arduino: Analog Sensors* e-book at no additional cost.

VCA-AS-PKG vernier.com/vca-as-pkg



SparkFun RedBoard with Cable

This Arduino-compatible board makes it easy to take sensor measurements when used with the Vernier Arduino Interface Shield.

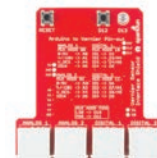
ARD-RED vernier.com/ard-red



Vernier Arduino Interface Shield

Conveniently connect the SparkFun® RedBoard or Arduino Uno to Vernier LabQuest® sensors with the Vernier Arduino Interface Shield.

BT-ARD vernier.com/bt-ard



Gas Pressure Sensor

Use the Gas Pressure Sensor to monitor pressure changes of a gas.

GPS-BTA vernier.com/gps-bta



Surface Temperature Sensor

Measure temperature where low thermal mass or flexibility is required.

Range: -25 to 125°C

STS-BTA vernier.com/sts-bta



Motion Detector

The Motion Detector uses ultrasound to measure the position of objects.

Range: 0.15 to 6 m

Resolution: 1 mm

MD-BTD vernier.com/md-btd



pH Sensor

This is a general-purpose pH sensor.

Range: pH 0 to 14

Accuracy: ±0.2 pH units

PH-BTA vernier.com/ph-bta



Digital Control Unit

Use the digital output lines of an interface to control DC electrical devices.

DCU-BTD vernier.com/dcu-btd



Anemometer

This is an impeller-type anemometer for measuring wind speed.

Range: 0.5 to 30 m/s (1 to 67 mph)

ANM-BTA vernier.com/anm-bta



Read the online guide and see all our products for Arduino at vernier.com/arduino

Sensors and Coding

Students gain a deeper understanding of coding when they see their code interact with sensor data. Our coding solutions give students valuable experience using popular programming languages to affect things beyond the screen.



LabVIEW

Use our free activity book to introduce NI LabVIEW™ programming with Vernier sensors in your classroom.

vernier.com/ni-labview

National Instruments LabVIEW and Vernier

Introduce your students to NI LabVIEW software, a programming language used throughout the engineering disciplines. We have sample LabVIEW programs (VIs) for LabQuest Mini, myDAQ, Go Direct® sensors, and other Vernier hardware.

With LabQuest Sensors



LabQuest Mini

LabQuest Mini is a powerful, affordable, and easy-to-use sensor interface for data acquisition with more than 75 Vernier LabQuest sensors.

LQ-MINI

vernier.com/lq-mini

myDAQ Adapter

The myDAQ Adapter can be used to perform data acquisition with more than 75 Vernier LabQuest sensors and the NI myDAQ interface (sold separately). It is designed for use with NI LabVIEW software.

BT-MDAQ

vernier.com/bt-mdaq



Analog Protoboard Adapter

Use these adapters to connect Vernier LabQuest sensors to a non-Vernier interface, such as NI ELVIS. The connector fits into a standard prototyping board.

BTA-ELV

vernier.com/bta-elv



With Go Direct Sensors

Integrate over 50 wireless sensors into your LabVIEW project to acquire data or control your NI DAQ hardware.

Go Direct Acceleration



GDX-ACC

vernier.com/gdx-acc

Go Direct Motion



GDX-MD

vernier.com/gdx-md

Go Direct Force and Acceleration



GDX-FOR

vernier.com/gdx-for

Go Direct Light and Color



GDX-LC

vernier.com/gdx-lc

Go Direct Rotary Motion



GDX-RMS

vernier.com/gdx-rms

Go Direct Weather



GDX-WTHR

vernier.com/gdx-wthr

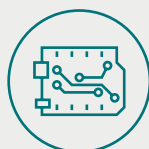
See all our products for NI LabVIEW at vernier.com/ni-labview



Python and VPython

We have created a guide and examples that make it easy to start using Vernier sensors with Python® and VPython.

vernier.com/python



Arduino IDE

Use our starter package to teach the basics of coding Arduino with Vernier sensors.

vernier.com/arduino



JavaScript

Students can use JavaScript™ to integrate Go Direct sensor data into their custom web applications.

vernier.com/javascript

Engineering Products

Wind Turbine Design

Product	Order Code
Advanced Wind Experiment Kit	KW-AWX
Balsa Blade Sheets (10 Sheets)	KW-BBS10
Basic Turbine Building Parts	KW-BTPART
Drivetrain Set	KW-DS
Gear Set	KW-GEAR
Go Direct® Energy	GDX-NRG
Hub (3 Pack)	KW-WTH3
KidWind Photogate Bracket	KW-PGBRAC
Nacelle	KW-NAC
Tower and Base Set	KW-TBS
Vernier Variable Load	VES-VL
Wind Turbine Generator with Wires	KW-GEN

Engineering with Arduino

Product	Order Code
Anemometer	ANM-BTA
Digital Control Unit	DCU-BTD
Gas Pressure Sensor	GPS-BTA
Motion Detector	MD-BTD
pH Sensor	PH-BTA
SparkFun® RedBoard with Cable	ARD-RED
Surface Temperature Sensor	STS-BTA
Vernier Arduino Interface Shield	BT-ARD
<i>Vernier Coding Activities with Arduino: Analog Sensors</i> lab book	VCA-AS-E

LabQuest Sensors

Product	Order Code
Barometer	BAR-BTA
Gas Pressure Sensor	GPS-BTA
Light Sensor	LS-BTA
Magnetic Field Sensor	MG-BTA
Microphone	MCA-BTA
Soil Moisture Sensor	SMS-BTA
Stainless Steel Temperature Probe	TMP-BTA

Learn more about over 80 LabQuest sensors at vernier.com/labquest

Biomedical Engineering

Product	Order Code
Go Direct Acceleration	GDX-ACC
Go Direct Blood Pressure	GDX-BP
Go Direct CO ₂ Gas	GDX-CO2
Go Direct EKG	GDX-EKG
NEW Go Direct Force Plate	GDX-FP
Go Direct Hand Dynamometer	GDX-HD
Go Direct O ₂ Gas	GDX-O2
Go Direct Respiration Belt	GDX-RB
Go Direct Spirometer	GDX-SPR
Go Direct Surface Temperature	GDX-ST

NI LabVIEW and Vernier

Product	Order Code
Analog Protoboard Adapter	BTA-ELV
myDAQ Adapter	BT-MDAQ
LabQuest® Mini	LQ-MINI

Go Direct Sensors

Product	Order Code
Go Direct Acceleration	GDX-ACC
Go Direct Force and Acceleration	GDX-FOR
Go Direct Light and Color	GDX-LC
Go Direct Motion	GDX-MD
Go Direct Rotary Motion	GDX-RMS

Learn more about over 65 Go Direct sensors at vernier.com/go-direct

See all of our engineering products online at vernier.com/engineering

Index

A

ADInstruments 2
Advanced Chemistry with Vernier 13
Advanced Wind Experiment Kit 29
Analog Protoboard Adapter 33
Anemometer 32
Arduino® IDE 33
Arduino Interface Shield 32
Arduino package 32

B

Balances vernier.com/ohaus
BioChamber 250 vernier.com/bc-250
BioChamber 2000 vernier.com/bc-2000
Biology Go Direct Starter Package 5
Biology with Vernier 5
Bio-Rad® 7
BlueView Transilluminator 7

C

Cart Fan Kit 1, 21
Celestron® Digital Microscope Imagers
vernier.com/cs-5mp
Charging stations
 Go Direct vernier.com/gdx-crg
 Go Direct Sensor Cart vernier.com/gdx-cart-crg
 LabQuest 3 vernier.com/lq3-crg
Circuit Board 23
Color Mixer Kit 24

D

Diffraction Apparatus 24
Digital Control Unit 32
Dynamics Cart and Track System with
 Go Direct Sensor Cart 21

E

Electrode amplifiers
 Electrode Amplifier vernier.com/ea-bta
 Go Direct Electrode Amplifier
 vernier.com/gdx-ea
 Ion-Selective Electrode Amplifier
 vernier.com/gdx-isea
Electrostatic High-Voltage Genecon 23
Electrostatics kits
 Electrostatic Kit 23
 High-Voltage Electrostatics Kit 23
ELVIS protoboard adapters
vernier.com/protoboard-adapters
Emissions spectrometer 25
Equipment return 37
Extech® Digital Power Supply 23

G

Gas Chromatograph 15
Gas pressure sensors
 Gas Pressure Sensor 32
 Go Direct Gas Pressure 13, 22
 Go Direct Wide-Range Pressure 16
 Pressure Sensor 400
 vernier.com/ps400-bta
Go Direct Centripetal Force System 21
Go Direct Sensor Clamp 9
Go Direct sensors
 Go Direct 3-Axis Magnetic Field 23
 Go Direct Acceleration 31, 33
 Go Direct Blood Pressure 6, 31
 Go Direct CO₂ Gas 5, 31
 Go Direct Conductivity 7, 8
 Go Direct Current 23
 Go Direct Cyclic Voltammetry System 16

 Go Direct Drop Counter 13
 Go Direct EKG 6, 31
 Go Direct Energy 29
 Go Direct Force and Acceleration 21, 33
 Go Direct Force Plate 1, 21, 31
 Go Direct Gas Pressure 13, 22
 Go Direct Hand Dynamometer 6, 31
 Go Direct Light and Color 24, 33
 Go Direct Melt Station 15
 Go Direct Mini GC 15
 Go Direct Motion 21, 33
 Go Direct Nitrate Ion-Selective Electrode 8
 Go Direct O₂ Gas 6, 31
 Go Direct Optical Dissolved Oxygen 5, 8
 Go Direct ORP vernier.com/gdx-orp
 Go Direct PAR 1, 8
 Go Direct pH 13, 16
 Go Direct Photogate 21
 Go Direct Platinum-Cell Conductivity
 vernier.com/gdx-conpt
 Go Direct Polarimeter 14, 16
 Go Direct Pyranometer 1, 8
 Go Direct Radiation Monitor 25
 Go Direct Respiration Belt 6, 31
 Go Direct Rotary Motion 33
 Go Direct Salinity 1, 8
 Go Direct Soil Moisture 1, 8
 Go Direct Sound 22
 Go Direct Spectrometers 5, 7, 13–17, 25
 Go Direct Spirometer 6, 31
 Go Direct Static Charge 23
 Go Direct Structures & Materials Tester 29
 Go Direct Surface Temperature 22, 31
 Go Direct Temperature 13, 22
 Go Direct Thermocouple vernier.com/gdx-tc
 Go Direct Tris-Compatible Flat pH 5, 7, 8, 14
 Go Direct Voltage 23
 Go Direct Weather Sensor 33
 Go Direct Weather System 9
 Go Direct Wide-Range Pressure 16
 Go Direct Wide-Range Temperature 15
Graphical Analysis Pro app 4, 12, 20, 28
Green Diffraction Laser 24

H

Human Physiology Experiments: Volume 1 6
Human Physiology Experiments: Volume 2 6
Human Physiology Go Direct Standard Package 6

I

Instrumental Analysis app 15
International sales 37
Investigating Biology through Inquiry 5
Investigating Environmental Science through Inquiry 9

J

JavaScript™ 33

L

LabArchives 2
LabQuest 3 4, 12, 20
LabQuest Mini 33
LabQuest Viewer vernier.com/lq-view
LabVIEW™ 32

M

Mirror Set 24
Moment of Inertia Accessory Kit 21
Motion Detector 32
myDAQ Adapter 33

O

Optics Expansion Kit 24
Organic Chemistry with Vernier 15

P

pH Sensor 32
pH Storage Solution vernier.com/ph-ss
Polarimeter 14, 16
Polarizer/Analyzer Set 24
Power Amplifier 22
Power Amplifier Accessory Speaker 22
Primary Productivity Kit vernier.com/ppk
Privacy policy 37
Prop 65 (California) 36
Python® and VPython 33

Q

Qubit Systems sensors vernier.com/qubit

R

Radiation Monitor 25
Renewable Energy with Vernier 9
Resonance Apparatus 22
Returns 37

S

Software licenses 37
SparkFun RedBoard with Cable 32
Spectral Analysis app 7, 14, 25
Spectrometers/Spectrophotometers
 Go Direct Emissions Spectrometer 25
 Go Direct Fluorescence/UV-VIS Spectrophotometer 7, 14, 17
 Go Direct SpectroVis Plus 5, 7, 13
 Go Direct UV-VIS Spectrophotometer 7, 15, 16
 Go Direct Visible Spectrophotometer 17
 Vernier Emissions Fiber 25
 Vernier Flash Photolysis Spectrometer 17
 Vernier Spectrophotometer Optical Fiber 16
Spectrum Tube Power Supply 25
Spectrum Tubes 25
Stir Station 13
Surface Temperature Sensor 32

T

Technical support 37

V

Variable Load 29
Video Analysis app 20
Vernier Circuit Board 2 23

W

Warranty information 37
Water Depth Sampler vernier.com/wds
Water Quality Bottles vernier.com/wq-bot
Water Quality with Vernier 9
Wind turbine design products 30

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Vernier Science Education

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