

Lt Biology Labs with Vernier Go Direct® Sensors

Below is a list of the 19 labs included in the Lt Biology Collection, and which Vernier Sensors are required for each lab.

Labs	Required Sensors
Acid Rain	Go Direct® pH Sensor
Aquatic Photosynthesis	Go Direct® Optical Dissolved Oxygen Probe
Biological Membranes	Go Direct® SpectroVis® Plus Spectrophotometer Go Direct® Temperature Probe (<i>Optional</i>)*
Cellular Respiration	Go Direct® CO ₂ Gas Sensor
Diffusion through Membranes	Go Direct® Conductivity Probe Go Direct® Temperature Probe (<i>Optional</i> * <i>Extension</i> **)
Enzyme Action: Testing Catalase Activity	Go Direct® O ₂ (<i>Optional</i>) Gas Sensor Go Direct® Temperature Probe (<i>Optional</i> * <i>Extension</i> **) Go Direct® pH Sensor (<i>Extension</i> **)
Interdependence of Plants and Animals	Go Direct® pH Sensor Go Direct® Optical Dissolved Oxygen Probe
Limitations on Cell Size	Go Direct® Conductivity Probe
Metabolization of Sugars by Yeast	Go Direct® CO ₂ Gas Sensor Go Direct® Temperature Probe (<i>Optional</i> *)
Photosynthesis	Go Direct® SpectroVis® Plus Spectrophotometer
Population Dynamics	Go Direct® SpectroVis® Plus Spectrophotometer Go Direct® Temperature Probe (<i>Optional</i> * <i>Extension</i> **)
The Visible Spectra of Plant Pigment	Go Direct® SpectroVis® Plus Spectrophotometer
Transpiration	Go Direct® Gas Pressure Sensor
Turnip Peroxidase	Go Direct® SpectroVis® Plus Spectrophotometer Go Direct® pH Sensor (<i>Extension</i> **) Go Direct® Temperature Probe (<i>Optional</i> * <i>Extension</i> **)
Animal Behavior	No sensors required
Bacterial Transformation	Go Direct® Temperature Probe (<i>Optional</i> ***)
Genetics of Drosophila	No sensors required
Mitosis and Meiosis	No sensors required
Population Genetics and Evolution	No sensors required

* Sensor is not required for sampling and can be substituted with an analog thermometer.

** *Optional inquiry-based experiments expanding on concepts presented in the lab.*

*** *Requires the Bio-Rad pGLO Bacterial Transformation Kit. Vernier's BlueView Transilluminator is optional.*

Vernier Go Direct® Sensors used in the Lt Biology Collection

Below is a description of each sensor and which labs require it. All Vernier Go Direct sensors connect to a computer by USB, and require a Windows 10 operating system.

Vernier Sensor	Description	Labs using the Sensor
Go Direct® O ₂ Gas Sensor	The Go Direct O ₂ Gas Sensor measures gaseous oxygen concentration levels and air temperature.	<ul style="list-style-type: none"> • Enzyme Action: Testing Catalase Activity
Go Direct® SpectroVis® Plus Spectrophotometer	The Go Direct SpectroVis Plus Spectrophotometer quickly measures a full wavelength spectrum. It is used in the Biology Collection to measure Absorbance vs. Wavelength, and Absorbance vs. Time.	<ul style="list-style-type: none"> • Biological Membranes • Photosynthesis • Population Dynamics • The Visible Spectra of Plant Pigments • Turnip Peroxidase
Go Direct® Conductivity Probe	The Go Direct Conductivity Probe determines the ionic content of an aqueous solution by measuring its electrical conductivity.	<ul style="list-style-type: none"> • Diffusion through Membranes • Limitations on Cell Size
Go Direct® Temperature Probe (Optional)*	The Go Direct Temperature Probe is a rugged, general-purpose sensor that students can use to monitor temperature.	<ul style="list-style-type: none"> • Bacterial Transformation • Biological Membranes • Diffusion through Membranes • Enzyme Action: Testing Catalase Activity • Metabolization of Sugars by Yeast • Turnip Peroxidase • Population Dynamics
Go Direct® Gas Pressure Sensor	The Go Direct Gas Pressure Sensor measures the absolute pressure of a gas.	<ul style="list-style-type: none"> • Transpiration
Go Direct® Optical Dissolved Oxygen Probe	The Go Direct Optical Dissolved Oxygen Probe makes it easy to measure dissolved oxygen concentration, water temperature, and atmospheric pressure.	<ul style="list-style-type: none"> • Aquatic Photosynthesis • Interdependence of Plants and Animals
Go Direct® CO ₂ Gas Sensor	The Go Direct CO ₂ Gas Sensor measures gaseous carbon dioxide concentration levels, air temperature, and relative humidity.	<ul style="list-style-type: none"> • Cellular Respiration • Metabolization of Sugars by Yeast
Go Direct® pH Sensor	The Go Direct pH Sensor is a general-purpose pH sensor used to monitor pH of aqueous solutions.	<ul style="list-style-type: none"> • Acid Rain • Enzyme Action: Testing Catalase Activity (Extension**) • Interdependence of Plants and Animals • Turnip Peroxidase (Extension**)

* Sensor is not required for sampling and can be substituted with an analog thermometer.

** Optional inquiry-based experiments expanding on concepts presented in the lab.

How to purchase Vernier Go Direct® Sensors

Outside of the United States, users of the Lt Biology Collection will need to procure Vernier GoDirect® Sensors through Vernier's website below. Users should add the required sensors to their cart, request a quote, and add "Lt" in the comments section of the quote request form. This will notify their local Vernier distributor to reach out and fulfill the procurement process.

Vernier Website: <https://www.vernier.com/>

Users in the United States are able to purchase an Lt Go Direct® Biology Sensor Package from ADInstruments (LTGDX1001) that includes one of each sensor listed above. Please contact your local ADI representative for more information, including pricing. For purchasing individual Go Direct® sensors users should place orders through the Vernier Website as detailed above.