LI-6800

Portable Photosynthesis System

Advancements in Gas Exchange and Fluorescence Research

Advancements Designed for You

The culmination of years of innovation, the LI-6800 Portable Photosynthesis System is part of a new era of photosynthesis learning and discovery. The sensor head design gives you automated control over all your leaf's environmental conditions—temperature, CO_2 concentration, humidity, light, and flow rate—for unprecedented measurements of plant physiology. The new plumbing in the sensor head, along with tighter tolerances on gas analyzers and the CO_2 mixer, are all part of Rapid Sensing™ Technology. These advancements unlock new research possibilities for you.

Fast Survey Measurements

Achieves stability in as little as 45 seconds for the fastest survey measurements of any portable photosynthesis system—without sacrificing data accuracy or precision.

Rapid Response Curves

With the patented air flow division inside the sensor head, a rapid exchange of air from the leaf chamber to the gas analyzers makes new techniques like the RACiR™ Method possible.

One Measurement, Many Parameters

The LI-6800 records many parameters simultaneously—like assimilation, stomatal conductance, and intercellular CO_2 concentration—giving you datasets with a more complete picture of your plant's physiology.

The Ultimate Experience

Rugged and dependable, the LI-6800 is ready to collect data wherever your research takes you.

Interchangeable leaf aperture inserts provide different measurable leaf area options.

Sensor head achieves an ideal balance of light weight and high performance.

User-cleanable optics and simple maintenance procedures minimize downtime and maintenance costs.

On-screen messages alert you to issues with the selected control ranges and measurements—so you can collect consistent, high-quality data.

Large touchscreen shows plots in real time and tracks the progress of each measurement.

Bluestem™ Software lets you remotely control the console, making teaching and training easy.

Survey Measurements at a Fast Pace

The goal of survey measurements is to characterize a population by sampling a lot of leaves in a short period of time. Maximizing sample size means taking less time per leaf—without sacrificing data quality.

With the LI-6800, you get accurate measurements with high repeatability—fast. Rapid Sensing™ Technology allows for fully automated, highly responsive control of the leaf environment. The leaf chamber achieves stability in as little as 45 seconds, so you can get more measurements in less time.

Field Proven

The LI-6800 can complete a survey measurement in under a minute, with batteries that last all day. One 8-gram cartridge can provide up to 8 hours of continuous CO_2 conditioning. Comfort in the field is essential, which is why we made the LI-6800 lightweight with a balanced sensor head and a supporting console harness.

"The response time is amazing, it's easy to download data, and the batteries are lighter and last longer. The LI-6800 starts up and is ready to go, whether in the field or lab."

– Dr. Jason Kilgore, Washington & Jefferson College

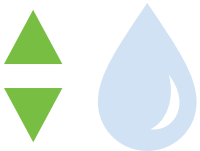
Full Control at Your Fingertips

Flow Control Over a Larger Leaf Area

The instrument precisely measures and controls air flow for the system over a range of up to 2.5 liters per minute (0-2 liters per minute through the sample chamber), giving you unprecedented control over chamber conditions. With this wide range of flow control and improved mixing, you can make measurements on a larger leaf area. A chamber with a larger leaf area allows for a higher signal-to-noise ratio for a given flux, giving you greater confidence in the data.

CO_2 Control for Advanced A-C_i Curves

The LI-6800 automatically controls CO_2 concentrations in the air stream by removing ambient CO_2 with a scrubbing chemical and adding it from a CO_2 source. The instrument quickly locks in and holds CO_2 concentrations at any setpoint between 0 and 2000 µmol mol^{-1} with an incredibly fast response time from the CO_2 mixer. This powerful CO_2 control makes advanced techniques like the RACiR™ Method available to you.



Water Vapor Control for Greater Stability

The instrument rapidly adjusts to the humidity setting you specify and precisely controls water vapor over the course of a measurement. The automatic humidity control maintains a constant vapor pressure deficit (VPD) between the leaf and chamber air to eliminate stomatal response to VPD.

Temperature Control for Repeatability

A Peltier cooler controls temperature of the leaf, air, or the heat exchanger according to your settings. Temperature quickly reaches the chosen setpoint, and is held steady from the moment it stabilizes to the end of a measurement, over a range of ±10 °C from ambient. A constant temperature reduces variability in replicate measurements, increasing precision.

Rapid A-C_i Response Method

Advancements to the sensor head from Rapid Sensing Technology made the Rapid A-C_i Response (RACiR™) Method possible. Unlike any other portable photosynthesis system, the patented air flow division is inside the sensor head, immediately before the flow meter, leaf chamber, and gas analyzers. The proximity of the flow split to the gas analyzers means short time delays between changing the concentration of CO_2 and measuring it. This lets you make measurements under rapidly changing CO_2 concentrations, to quickly generate CO_2 response curves.

Traditional CO_2 response curves measure assimilation (A) and calculate intercellular CO_2 (C_i) at a series of steady-state CO_2 concentrations. It can take 30-40 minutes to make measurements for each response curve. With RACiR, non-steady-state measurements are taken while ramping the concentration of CO_2 reference very quickly. This means you can generate CO_2 response curve data in less time and with many more data points (which may reduce error for parameter estimation). Under ideal field conditions, you could screen about 70 plants in an 8-hour field day with a single LI-6800 system.[1]

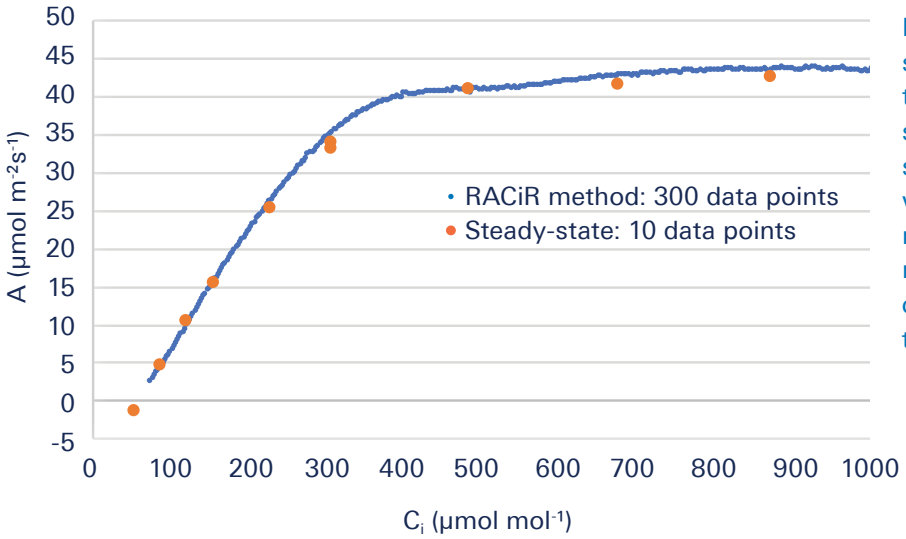


Figure 1. Comparison of a steady-state response curve (orange) and the RACiR Method (blue) on a single sunflower leaf (*Helianthus spp.*). The steady-state curve took 25 minutes, while the RACiR Method took 10 minutes at a ramp rate of 100 µmol mol^{-1}. In ideal conditions, a RACiR curve for parameter estimation can take as little as 5 minutes.

	$V_{c,max}$	J_{max}	V_{TPU}
Steady-state	123.5 ± 3.1	219.8 ± 9.9	14.1 ± 0.7
RACiR	121.5 ± 5.8	234.4 ± 20.8	13.6 ± 1

Table 1. Estimates (mean ± SE) of $V_{c,max}$, J_{max} and V_{TPU} that compare steady-state and RACiR methods on field-grown sunflower leaves (n=3). Error bars overlap between both methods for all three parameters.

1. Stinziano JR, Morgan PB, Lynch DJ, Saathoff AJ, McDermitt DK, and Hanson DT. (2017) The rapid A-C_i response: photosynthesis in the phenomic era. Plant, Cell & Environment, 40:1256-1262. doi: 10.1111/pce.12911.

Combined Gas Exchange and Fluorescence

Gas exchange measurements are useful to characterize leaf-level CO_2 and H_2O flux, stomatal conductance, and more, but this is only part of the story.

Chlorophyll *a* fluorescence measurements provide additional information about photosynthetic processes, including the light-driven electron transfer rate (ETR) and non-photochemical quenching (NPQ). NPQ protects leaves from the harmful effects of excess light absorption.

Measuring chlorophyll *a* fluorescence and gas exchange simultaneously provides a more complete picture of the coupled energy-producing and energy-consuming reactions of photosynthesis. The ratio between Φ_{PSII} from fluorescence and Φ_{CO2} from gas exchange (Figure 2) is a measure of how efficiently a plant uses absorbed light energy to assimilate CO_2. Having this knowledge opens the door to understanding how environmental stresses, like drought or heat, can disrupt this coordination.

Combined gas exchange and chlorophyll *a* fluorescence measurements provide clarity of leaf-level mechanisms, like estimating mesophyll conductance, the role of alternative electron sinks, or regulating NPQ to improve yield.[2] Whether you work in a lab, greenhouse, or field, the LI-6800 can help you answer far-reaching questions related to food production, ecosystem health, and the impacts of changing environments.

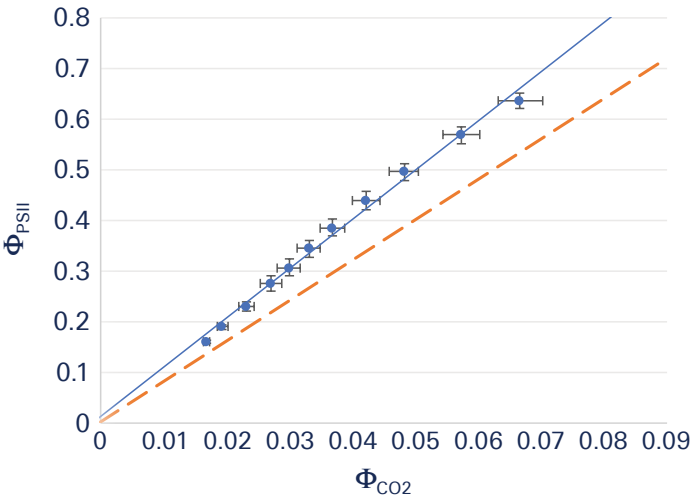


Figure 2. The ratio between Φ_{PSII} and Φ_{CO2} (i.e., the slope) approximates a plant's efficiency of using absorbed photons to assimilate CO_2. Φ_{CO2} is the ratio of gross CO_2 assimilation to absorbed photons. Φ_{PSII} is the proportion of absorbed light used to produce energy. A ratio of 8 photons per CO_2 fixed (orange) in C3 plants is the theoretical minimum.[3] These measurements show a ratio of 9.7 photons per CO_2 assimilated (blue). So, tobacco* was relatively efficient at converting light energy into chemical energy. Combined measurements can reveal if a specific strain assimilates CO_2 efficiently—without confounding variables.

2. Kromdijk J, Glowacka K, Leonelli L, Gabilly ST, Iwai M, Niyogi KK, and Long SP. (2016) Improving photosynthesis and crop productivity by accelerating recovery from photoprotection. Science. 354 (6314): 857-861.

3. Edwards GE, and Baker NR. (1993) Can CO_2 assimilation in maize leaves be predicted accurately from chlorophyll fluorescence analysis? Photosynthesis Research. 37: 89-102.

* Experimental conditions: Measured on non-stressed tobacco (*Nicotiana spp.*) plants grown in greenhouse conditions under 0.5% O_2 (which suppresses photorespiration).

Induction Kinetics

Induction kinetics (OJIP) curves serve as a means of rapidly assessing exquisite photophysical details of a key pigment-binding protein complex, PSII, in which photosynthesis is initiated. The different transitions of an induction curve (termed "OJIP transient") can be used to measure environmental stress in plants.

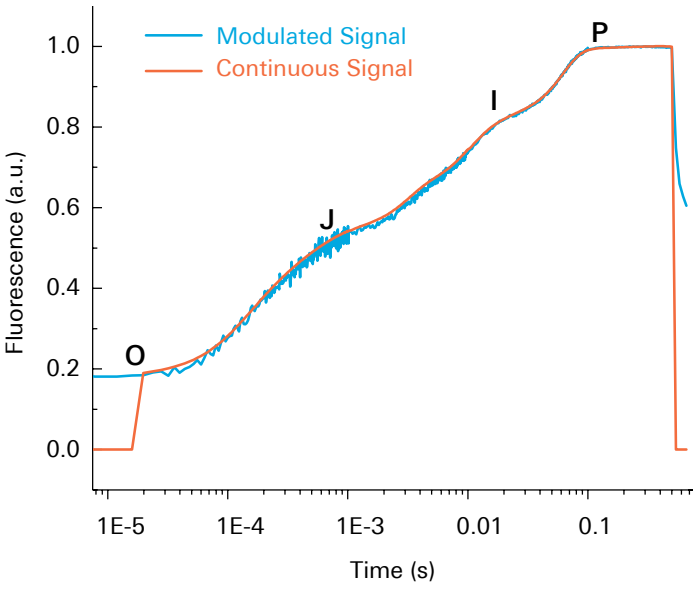


Figure 3. Fluorescence induction (OJIP) transient plotted on a logarithmic time scale, measured on a dark-adapted leaf. The transitions at J and I provide information on reduction of molecules involved in electron transport from PSII.

The LI-6800 fluorometer is unique in that it can measure both modulated and continuous fluorescence during induction, and it is the only portable photosynthesis system with a fluorometer capable of supporting important functions such as induction kinetics combined with gas exchange measurements over the same leaf area.

The photophysical reactions underlying an OJIP transient occur over a range of time scales. To characterize OJIP kinetics, fluorescence measurements must be made on time scales ranging from microseconds to milliseconds. The LI-6800 fluorometer can acquire modulated and continuous fluorescence signals ranging from 4 microseconds to hundreds of milliseconds.

Unique to the LI-6800 is the ability to measure induction kinetics at any saturation pulse intensity. It also does not rely on fixed time points. The actual data are fit to determine the OJIP inflection points.

Light Sources

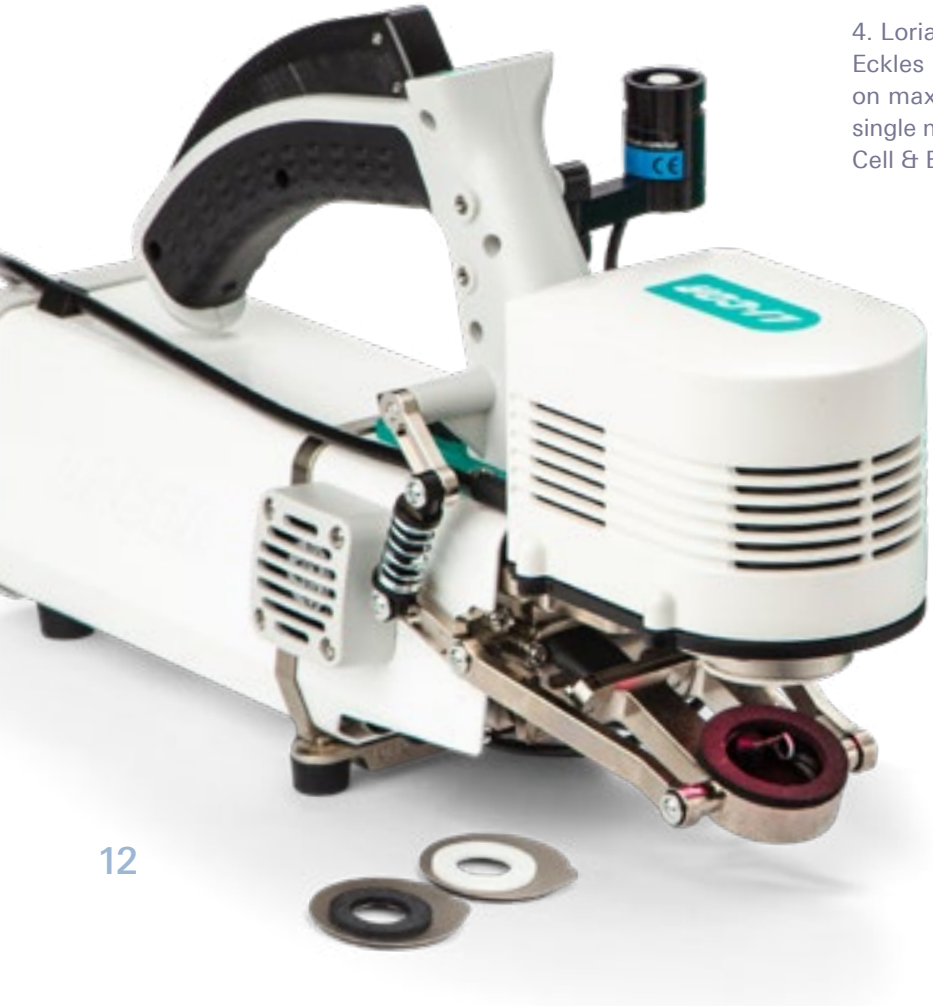
Light Source for Combined Gas Exchange and Fluorescence

Use Multiphase Flash™ Fluorescence to accurately estimate maximum fluorescence yield (Fm') in leaves that are difficult to light saturate. An accurate estimate of Fm' is important to compute many other parameters, including nonphotochemical quenching (NPQ), quantum efficiency (qE), and the electron transport rate (ETR).[4]

The Multiphase Flash Fluorometer is the most powerful fluorometer available in a combined gas exchange and fluorescence system. Choose a 6-cm² or 2-cm² leaf area by swapping apertures.

The fluorometer provides uniform illumination intensities up to 2500 µmol $m^{-2}s^{-1}$. Variation in light intensities is less than 10% of the mean over 90% of the leaf area. This high uniformity translates to more uniform leaf biochemical status, minimizing artifacts that can cause errors.

The LI-6800 fluorometer can also modulate the measuring light at frequencies up to 250,000 times per second using pulse amplitude modulation (PAM). This high frequency modulation provides the ability to fully characterize the fluorescence induction transient (OJIP) of a leaf with high resolution.



4. Loriaux SD, Avenson TJ, Welles JM, McDermitt DK, Eckles RD, Riensche B, and Genty B. (2013) Closing in on maximum yield of chlorophyll fluorescence using a single multiphase flash of sub-saturating intensity. Plant, Cell & Environment, 36:10. doi: 10.1111/pce.12115.

Light Sources for Gas Exchange Chambers

You can independently control red and blue light emitting diodes (LEDs) on the Small Light Source, and red, blue, green, and white LEDs on the Large Light Source. The LEDs operate with low power consumption and have little effect on leaf temperature. An integrated silicon photodiode measures PAR output from the LEDs, providing real-time feedback to control leaf chamber illumination.

You can add a light source below the plant—in addition to the light source above the plant—to evenly illuminate the entire sample area. This also helps light both sides of thick plant material like cacti.

The Small Light Source is compatible with the Clear-top Leaf Chamber. The Large Light Source is compatible with the Large Leaf and Needle Chamber, Small Plant Chamber, and Bryophyte Chamber.

Expand Your Research Possibilities

From large sunflower leaves to small grasses, you have options for measuring leaves of different morphology. By swapping chambers you unlock near endless potential from one instrument.

Clear-top Chamber

P/N: 6800-12A | Works with the Small Light Source

Uses ambient light for gas exchange measurements. Options include 3×3, 2×3, or 1×3 cm, using interchangeable apertures. Can be used with two Small Light Sources to illuminate both sides of the leaf.

Large Leaf and Needle Chamber

P/N: 6800-13 | Works with the Large Light Source

Ideal for leaves and needles big enough to cover most or all of the 36-cm² area leaf aperture. Can be used with two Large Light Sources to illuminate both sides of the leaf or sprig.

Soil CO_2 Flux Chamber

P/N: 6800-09

Used to measure the rate of diffusion of CO_2 from the soil surface. This 20 cm diameter chamber uses technology from the patented LI-COR soil solution, the global standard in soil chamber technology.

Small Plant Chamber

P/N: 6800-17 | Works with the Large Light Source

Enables measurements of whole *Arabidopsis thaliana* plants, other small rosettes, or short canopies such as turf grass, in 65 mm (2.5 inch) diameter pots or 38 mm (1.5 inch) diameter Cone-Tainers™.

Bryophyte Chamber

P/N: 6800-24 | Works with the Large Light Source

Used to measure CO_2 and H_2O gas exchange from mosses, hornworts, liverworts, and lichens.

Insect Respiration Chamber

P/N: 6800-89

Measures CO_2 respiration from insects, very small animals, seeds, or small fruits.

Custom Chamber Adapter

P/N: 6800-19

Choose your own application. Construct a chamber to meet your needs and mount it to the sensor head.

Software That Works with You

The software included with LI-6800 Portable Photosynthesis System provides valuable functions to get more from your instrument, your research, and the time you invest.

Warmup Tests

Warmup tests ensure the LI-6800 is performing at its best. The LI-6800 warmup tests are almost entirely automated and take only minutes to complete. Once you begin the warmup tests, you're free for other tasks.

Data and Graphing Options

See your data in real time, the way you want to. Select from dozens of parameters to be shown as numerical data or have the data plotted to a live graph. Change environmental conditions and watch the effect immediately.

Flow Control Diagrams

The flow control diagram provides a visually interactive way for you to monitor and adjust all parameters affecting flow through the LI-6800. This allows you to observe the flow path as changes are made to the system. You can also evaluate in real-time the extent of system leaks in your measurement.

Auto Programs

The LI-6800 includes customizable auto programs that allow you to set conditions across a selected range. The instrument automatically controls and changes the conditions and logs data for you. Auto programs make advanced techniques, such as nested environmental controls, possible.

Background Programs

Background programs offer unparalleled experimental flexibility. Design your own automated programs to run in the background alongside other programs. For example, create a program to record ambient conditions, such as light or temperature, over 24-hours. A second program can mirror those conditions in the leaf chamber.

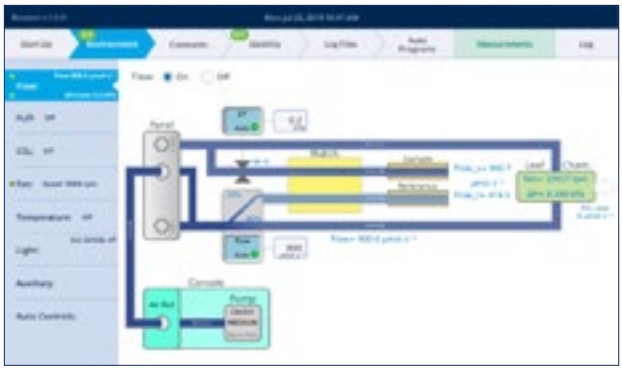
Auxiliary Channels

Auxiliary channels offer exceptional versatility in your research. The LI-6800 can control and accept data from additional peripheral components and sensors. Peripheral devices can be easily programmed in the user interface and can even be included in and controlled by auto programs.

VNC Client Control

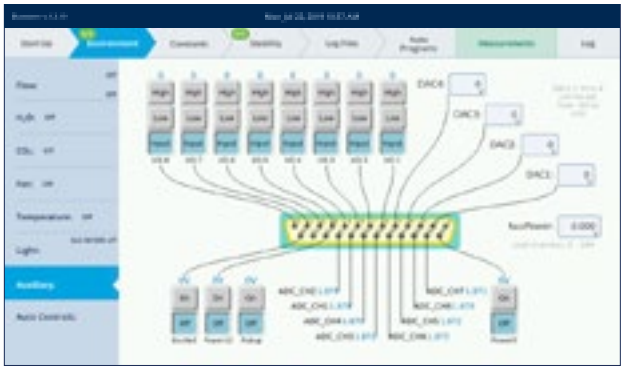
A virtual network computing (VNC) client allows you to remotely control the LI-6800 using a computer, tablet, or smartphone. In the classroom, you can run an experiment and project the display onto a screen to demonstrate, in real-time, the principles you are teaching.

Automated warmup tests are completed in just a few minutes.



Visually monitor and adjust the flow of CO_2 through the system.

Explore new research possibilities by creating your own automated background programs.



Multiple peripheral devices can be controlled through auxiliary channels.

What Makes the LI-6800 Unique?

Analyzer Location

Unlike other photosynthesis systems, the LI-6800 has infrared gas analyzers located in the sensor head. Placing the infrared gas analyzers in the sensor head provides faster and more precise gas concentration control.

Patented Flow Design

The LI-6800 delivers the highest flow rate of any portable photosynthesis system on the market. A high flow rate expands your research options by enabling the use of larger chambers. The patented flow is split between reference and sample at the sensor head.[5] This ensures differences in measurements are the result of the leaf sample, and minimizes diffusional and sorption error.

Rapid A-Ci Response (RACiR) Method

The air flow design and sensor head advancements result in little delay between when CO_2 concentration is altered and when it is recorded. This lets you make measurements under rapidly changing CO_2 concentrations, to quickly generate CO_2 response curves.

5. U.S. Patent Nos.: 8,610,072 / 8,692,202 / 8,910,506 / 9,482,653 / 9,678,050

Induction Kinetics (OJIP) Curves

The LI-6800 fluorometer is unique in that it can measure both modulated and continuous fluorescence during induction. This makes the LI-6800 the only portable photosynthesis system with a fluorometer capable of supporting important functions such as induction kinetics with gas exchange measurements over the same leaf area.

Leak Rate Quantification

The LI-6800 is the only system to incorporate secondary flow measurements after both analyzers to let you evaluate in real-time the extent of system leaks. This gives you a complete picture of system flow and potential leaks.

Modern and Versatile Software

The LI-6800 software was designed to be user friendly while providing valuable functions. Discover new applications, customize your experiments, view and process data, or teach others about the instrument and the science behind it. Both researchers and students can have the confidence to dive in and start using the LI-6800.

Specifications

CO_2 Gas Analyzer

Type: Absolute non-dispersive infrared gas analyzer

Measurement Range: 0 – 3100 µmol mol^{-1}

Precision (signal noise) at 400 µmol mol^{-1}

- RMS with a 4-second signal averaging: ≤0.1 µmol mol^{-1}

Accuracy: Within 1% of reading at 200 µmol mol^{-1} or above, ±2 µmol mol^{-1} at <200 µmol mol^{-1}

Orientation Sensitivity: ≤±1 µmol mol^{-1} variation at 400 µmol mol^{-1} from any orientation

H_2O Gas Analyzer

Type: Absolute non-dispersive infrared gas analyzer

Measurement Range: 0 – 75 mmol mol^{-1}

Bandwidth:

Precision (signal noise) at 10 mmol mol^{-1}

- RMS with 4-second signal averaging: ≤0.01 mmol mol^{-1}

Accuracy: within 1.5% of reading at >5 mmol mol^{-1}; ±0.08 mmol mol^{-1} at <5 mmol mol^{-1}

Temperatures

Operating temperature range: 0 – 50 °C

Storage temperature range: -20 °C – 60 °C

Temperature control range

- Leaf temperature: ±10 °C from ambient with 3×3 cm chamber
- Setpoint resolution: 0.1 °C

Chamber exhaust air temperature and temperature control block

- Type: Thermistor
- Range: -10 – 60 °C
- Accuracy: ±0.15 °C

Leaf temperature sensor

- Type: Type E fine-wire thermocouple
- Sensitivity range: -10 – 60 °C
- Accuracy: <±0.5 °C total; ±0.2 °C cold junction reference; ±0.3 °C thermocouple when within ±10 °C of cold junction temperature

Communication

RJ-45 Ethernet; TCP/IP for networks and computers: 1

Head connections: 2

Accessory connections: 2

Air Flow Rates

Bulk flow rate range: 680 – 1700 µmol s^{-1} at SATP†

Leaf chamber flow rate: 0 – 1400 µmol s^{-1} at SATP†

Pressure

Console pressure sensor

- Operating Range: 50 – 110 kPa
- Accuracy: ±0.4 kPa
- Resolution: 1.5 Pa typical
- Signal noise: ≤0.004 kPa peak-to-peak with 4-second signal averaging

Chamber pressure sensor

- Range: -2 – 2 kPa
- Resolution: <1 Pa typical
- Signal noise: 1 Pa peak-to-peak with 4-second signal averaging
- Setpoint resolution: 1.0 Pa
- Control Range: 0 – 200 Pa (dependent on flow rate through the chamber)

Batteries

Weight: 0.435 kg

Capacity: 6800 mAh

Type: Lithium Ion

Storage: -20 – 60 °C; ≤80% RH

CO_2 Control

CO_2 control range: 0 – >2000 µmol mol^{-1} (with pump set to low; dependent on bulk flow rate)

CO_2 cartridge type: 8 gram

Cartridge lifetime: >8 hours after puncture (dependent on setpoint)

CO_2 Scrubber: Soda lime

H_2O Control

H_2O control range: 0 – 90% RH (non-condensing)

Humidifier substrate: Pall Stuttgarter Masse ceramic substrate (Pall Corporation)

Desiccant: Silica gel (BASF Sorbead® Orange CHAMELEON®)

Light Measurement

Chamber and light source PAR sensors:

- Sensitivity range: 0 – 3000 µmol m^{-2} s^{-1}
- Resolution: <1 µmol m^{-2} s^{-1}
- Calibration accuracy: ±5% of reading; traceable to the U.S. National Institute of Technology (NIST)

External LI-190R PAR Sensor:

- Detector: Silicon photodiode
- Sensitivity: 5 – 10 µA per 1000 µmol s^{-1} m^{-2}
- Calibration accuracy: ±5% of reading; traceable to NIST

Console

Processor: Arm® Cortex® A9 Quad Core running at 1 GHz

Memory: 2 GB RAM; 8 GB Flash memory

Display: Sunlight-readable TFT LCD with capacitive touch screen

- Resolution: 1024 × 600 pixels
- Dimensions: 26 cm diagonally

Size: 18.5 × 27.5 × 21 cm; (L × W × H)

Weight: 6.1 kg

Power requirements: 12 – 18 VDC or 24 VDC

Sensor Head

Size with 3×3 cm chamber: 37 × 11.5 × 21.6 cm (L × W × H)

Weight: 2.15 kg without chamber

Display resolution: 128 × 128 pixels

Display dimensions: 3.15 cm corner-to-corner

Sensor head inputs

- Leaf temperature thermocouple: 2
- LI-190R light sensor: 1

Sensor head light source connections: 1

Small Light Source

Total output range: 0 – >2000 µmol m^{-2} s^{-1} at 25 °C
Blue output range: 0 – >400 µmol m^{-2} s^{-1} at 25 °C
Red output range: 0 – >1600 µmol m^{-2} s^{-1} at 25 °C
Red peak wavelength: 660 nm
Blue peak wavelength: 453 nm
Uniformity:
- ±10% over 90% of the aperture with white top gasket, typically
- ±10% over 77% of the aperture with black gasket, typically

Power consumption at 2000 µmol m^{-2} s^{-1}: <5 W
Operating temperature range: 0 – 50 °C
Size: 6.6 × 5.9 × 5.8 cm (L × W × H)
Weight: 0.21 kg

Large Light Source

Total output range: 0 – >2500 µmol m^{-2} s^{-1} at 25 °C
Blue output range: >2000 µmol m^{-2} s^{-1} at 25 °C
Green output range: >1000 µmol m^{-2} s^{-1} at 25 °C
Red output range: >2400 µmol m^{-2} s^{-1} at 25 °C
White output range: >1500 µmol m^{-2} s^{-1} at 25 °C
Blue peak wavelength: 453 nm
Green peak wavelength: 523 nm
Red peak wavelength: 660 nm
White color temperature: 4000 K
Uniformity: ±10% over 90% of the aperture
Power consumption: 15 W at 2000 µmol m^{-2} s^{-1} equal parts red, green, blue, and white
Operating temperature range: 0 – 50 °C
Size: 11.7 × 11 × 13 cm (L × W × H)
Weight: 0.54 kg

† SATP is defined as Standard Ambient Temperature (25 °C) and Pressure (100 kPa).

Specifications subject to change without notice

Multiphase Flash™ Fluorometer

Modulated light: Software controlled and software selectable frequencies of 1 Hz – 250 kHz
Measuring light peak wavelength: 625 nm
Red actinic and saturating flash peak wavelength: 625 nm
Blue actinic peak wavelength: 475 nm
Far-red peak wavelength: 735 nm
Actinic light output
- 0 – 3000 µmol m^{-2} s^{-1} total at 25 °C
- 0 – 1000 µmol m^{-2} s^{-1} blue at 25 °C
- 0 – 2000 µmol m^{-2} s^{-1} red at 25 °C

Saturation light: Software controlled intensity; 0 – 16,000 µmol m^{-2} s^{-1} at 25 °C
Far-red light: Software controlled intensity; 0 – 20 µmol m^{-2} s^{-1} at 25 °C
Fluorescence signal temperature dependence: -0.25% per °C
Uniformity: <±10% over 92% of the aperture with white top gasket
- <±10% over 90% of the aperture with black top gasket

Power consumption:
- <18 W at 25 °C with 3000 µmol m^{-2} s^{-1} actinic light
- <60 W at 25 °C with 16,000 µmol m^{-2} s^{-1} saturating flash

Leaf area: 6 cm^2 or 2 cm^2; Round apertures
Size: 16.6 × 11.5 × 13.6 cm (L × W × H)
Weight: 0.86 kg

Specs Exclusive to the LI-6800

Analyzers in the Sensor Head

Unique to the LI-6800 are two absolute CO_2 and two absolute H_2O non-dispersive infrared gas analyzers located in the sensor head.

CO_2 Analyzers

CO_2 analyzer precision: Within 0.1 µmol mol^{-1} RMS with 4-second averaging at 400 µmol mol^{-1}

H_2O Analyzers

H_2O analyzer precision: Within 0.01 mmol mol^{-1} RMS with 4-second averaging at 10 mmol mol^{-1}

System

Bulk flow rate range: 680 – 1700 µmol s^{-1} at SATP†

Chamber pressure control: Capable of 0.2 kPa above ambient; user settable

Light source uniformity: ±10% variation over 90% of aperture

Chamber temperature control range: 10 °C above or below ambient

Fluorometer

Modulation frequency: 1 Hz – 250 kHz

Measuring light peak wavelength: 625 nm

Red actinic and saturating flash peak wavelength: 625 nm

Blue actinic peak wavelength: 475 nm

Far-red peak wavelength: 735 nm

Actinic light output:
- 0 – 3000 µmol m^{-2} s^{-1} total at 25 °C
- 0 – 1000 µmol m^{-2} s^{-1} blue at 25 °C
- 0 – 2000 µmol m^{-2} s^{-1} red at 25 °C

Saturation light: 0 – 16,000 µmol m^{-2} s^{-1} at 25 °C

Far-red light: 0 – 20 µmol m^{-2} s^{-1} at 25 °C

Ordering Information

LI-6800F Portable Gas Exchange and Fluorescence System

A complete gas exchange and fluorescence system. This package is ideal for field or lab work that includes fluorescence measurements. Includes:

- Console, sensor head, and cable assembly
- Multiphase Flash™ Fluorometer
- Instrument case
- Accessories case
- Carrying harness
- Tripod and panhead mount
- Lithium ion batteries (3)
- AC to DC power supply (110 to 240 VAC input; 24 VDC output; capable of charging 2 batteries in the console)
- Single-bay battery charger
- Silica gel, soda lime, and Pall Stuttgarter Masse for gas conditioning
- 8-gram CO_2 cartridges (3 boxes of 25)
- Spares kit

LI-6800P Portable Photosynthesis System

A complete gas exchange system. This package is ideal for basic lab or survey measurements with natural or controlled light. Includes:

- Console, sensor head, and cable assembly
- Clear-top leaf chamber and small light source
- Instrument case
- Accessories case
- Carrying harness
- Tripod and panhead mount
- Lithium ion batteries (3)
- AC to DC power supply (110 to 240 VAC input; 24 VDC output; capable of charging 2 batteries in the console)
- Single-bay battery charger
- Silica gel, soda lime, and Pall Stuttgarter Masse for gas conditioning
- 8-gram CO_2 cartridges (3 boxes of 25)
- Spares kit

LI-6800S Portable Photosynthesis System

A complete gas exchange system with components for field and survey measurements. This basic package is ideal for measurements under natural light conditions. Includes:

- Console, sensor head, and cable assembly
- Clear-top leaf chamber
- Instrument case
- Carrying harness
- Tripod and panhead mount
- Lithium ion batteries (3)
- AC to DC power supply (110 to 240 VAC input; 24 VDC output; capable of charging 2 batteries in the console)
- Single-bay battery charger
- Silica gel, soda lime, and Pall Stuttgarter Masse for gas conditioning
- 8-gram CO_2 cartridges (3 boxes of 25)
- Spares kit

Light Sources and Chambers

Description	Part number
Multiphase Flash™ Fluorometer	6800-01A
Small Light Source	6800-02
Clear-top Chamber with Apertures	6800-12A
Large Light Source	6800-03
Small Plant Chamber	6800-17
Bryophyte Chamber	6800-24
Large Leaf and Needle Chamber	6800-13
Custom Chamber Adapter	6800-19
Insect Respiration Chamber	6800-89
Soil CO_2 Flux Chamber	6800-09

Accessories

Part	Description	Part number
Sub-sampling kit	To collect gas samples from the intake or exhaust gas stream	9968-210
CO_2 Tank Adapter Kit	To connect an external CO_2 tank to the CO_2 injector	9968-109
Console Aux Power Cable	For external battery connection to LI-6800	9968-242
Light Source Extension Cable	Used to control a second light source (6800-02 or 6800-03) attached to LI-6800 sensor head	9968-243
One Sided Gasket Kit (6 cm^2)	Hardware kit with custom gasket for one sided leaf gas exchange measurements using the LI-6800	9968-313
Monopod	Monopod for LI-6800 sensor head	609-15792

Training

LI-COR offers photosynthesis training courses, so you can learn from the experts—including scientists who helped design the LI-6800—and get the tips and tricks that will quickly turn you into an experienced user.

Register for free training:
www.licor.com/6800training

See the latest advancements in photosynthesis research

www.licor.com/6800

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The LI-COR board of directors would like to take this opportunity to return thanks to God for His merciful providence in allowing LI-COR to develop and commercialize products, through the collective effort of dedicated employees, that enable the examination of the wonders of His works.

"Trust in the LORD with all your heart and do not lean on your own understanding. In all your ways acknowledge Him, and He will make your paths straight."

– Proverbs 3:5,6

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