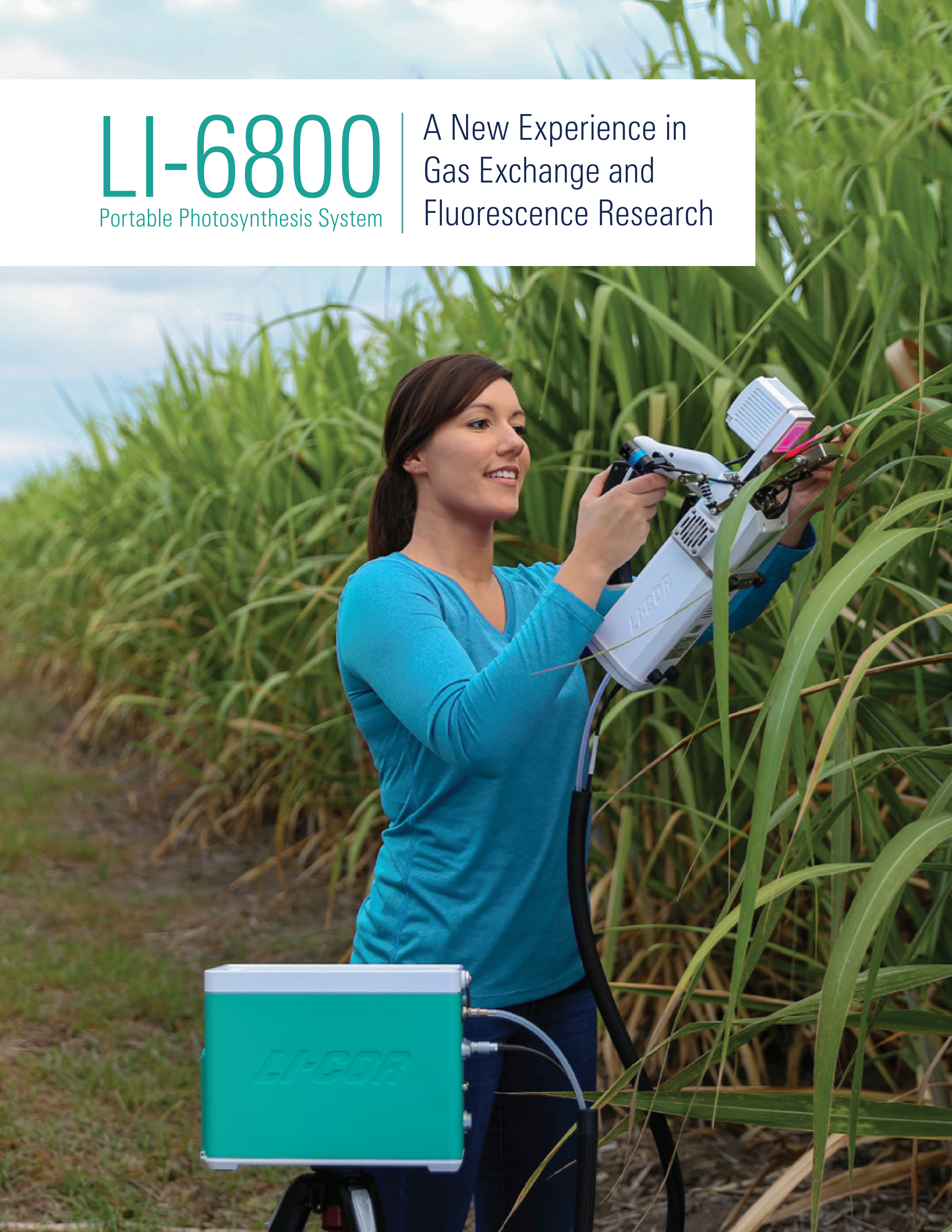
LI-6800

Portable Photosynthesis System

A New Experience in Gas Exchange and Fluorescence Research



Continual Innovation

True to its heritage, the LI-6800 Portable Photosynthesis System is a technological innovation that can unlock the secrets of photosynthesis with gas exchange and chlorophyll fluorescence measurements, creating research opportunities for plant biologists around the world.

The ultimate experience

An intuitive interface—easy to learn and simple to configure—helps you collect the best data possible. The touch screen display shows you what the instrument is doing and notifies you of any issues with the configuration.

The best performance

With novel innovations in every respect—gas analyzers, flow control, valve system, fluorometer, and the way these parts work together—the LI-6800 performs like a world-class orchestra.


LI-COR

The Ultimate Experience

An instrument that makes discovery more fun

1. Guides you to better measurements with a large touchscreen display.
2. Displays informative, full color plots—so you can track the progress of each measurement.
3. On-screen messages alert you to issues with the measurement and control ranges—so you can collect consistent, high quality data.
4. Automated system tests to ensure that the instrument is performing at its best.

An instrument that keeps up with you

5. Capable of survey measurements in less than one minute, with batteries that can last all day.
6. Achieves an ideal balance of light weight and high performance.
7. User-cleanable optics and simple maintenance procedures minimize downtime and maintenance costs.

An instrument that is designed for the world

8. Uses common 8-gram CO_2 cartridges and metric hardware.
9. Rugged and dependable, the LI-6800 is ready to collect data wherever your research takes you.

3
Cooler target less than Td
Constants
2
LI-COR
4
1
8
LI-6800 Portable Photosynthesis System
Match IRGAs
6
FLOW
9
7

The Best Performance

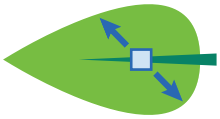
Gas Analysis

Gas analyzers—the core of any gas exchange system—precisely measure CO_2 and H_2O in sample and reference air streams. The small-volume analyzers are located adjacent to the leaf chamber to provide remarkable speed and precision. High-speed temperature measurements of air as it enters the gas analyzers improve the precision of each measurement. Typical CO_2 noise is ≤0.1 µmol mol^{-1} RMS at 400 µmol mol^{-1} with 4-second signal averaging.

High-Speed Mixing Fan

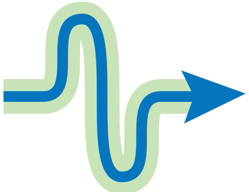
The leaf chamber mixing fan reduces the leaf boundary layer thickness to minimize boundary layer resistance, which closely couples the leaf and chamber conditions. This provides greater certainty in stomatal conductance calculations and fast plant response to changing chamber conditions.

Large Leaf Chamber Aperture



A large leaf chamber aperture means you can measure photosynthesis from a larger leaf area. This provides a bigger difference between sample and reference gas concentrations, higher signal-to-noise ratios, and more precise assimilation measurements.

Low-Diffusion Materials and Coatings



Leaf-level gas exchange measurements are represented by the difference in CO_2 between two gas streams, but diffusion leaks can lead to differences that are not a result of a leaf. Carefully tested materials and coatings, combined with a patented air stream split and valves, minimize diffusion leaks, meaning that gas exchange measurements are more precise and repeatable.

Full Control at Your Fingertips

Flow Control

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), allowing unprecedented control over chamber conditions. A patented system of valves provides rapid adjustments to the airflow when a setting is changed.

CO_2 Control

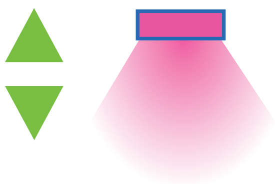
The LI-6800 automatically controls CO_2 concentrations in the air stream by removing CO_2 with a scrubbing chemical and adding it from a CO_2 source. The instrument quickly locks in and holds CO_2 concentrations at any setpoint between 0 and 2000 µmol mol^{-1}. One 8-gram cartridge can provide up to 8 hours of continuous CO_2 conditioning. An optional fitting is available to connect an external CO_2 source to the instrument.

H_2O Control

Automatic humidity control—by adding water vapor to the air stream or removing it—provides relative humidity of 0 to 90%, non-condensing conditions. The instrument can quickly achieve the setpoint in the chamber, which can be H_2O mole fraction, relative humidity, or vapor pressure deficit. This allows measurements to be made under repeatable conditions and enables detailed stomatal conductance studies.

Temperature Control

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



Light Control

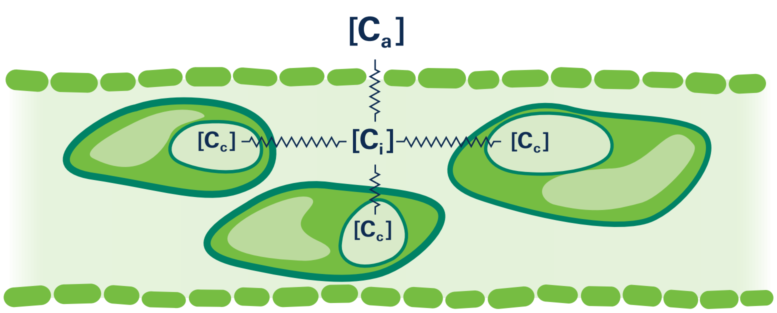
The LI-6800 automatically controls light from the fluorometer or 3×3 cm LED light source. Light sources provide uniform illumination intensities up to 2500 µmol m^{-2} s^{-1}. Variation of less than ±10% of the setpoint over 90% of the chamber aperture provides more accurate assessment of the relationship between light and assimilation rate. Independently controlled red and blue light emitting diodes operate with low power consumption and have only a small influence on the leaf temperature.

Combined Gas Exchange and Fluorescence

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

Measurements of chlorophyll *a* fluorescence with a pulse amplitude modulation fluorometer provide information about the light-driven electron transfer rate (ETR), non-photochemical quenching (NPQ), an assortment of reactions that collectively protect a leaf when it absorbs excessive light energy.

Combined gas exchange and fluorescence measurements provide a more complete understanding of the photosynthetic process. Together, these techniques can be used to assess the pathway of CO_2 diffusion from the intercellular leaf air space to the chloroplast. The diffusive resistance of CO_2 along this pathway is currently the subject of intense research, which is aimed at improving water use efficiency in plants.



CO_2 in ambient air (C_a) moves into the intercellular space (C_i) and then through the mesophyll pathway to the chloroplasts.

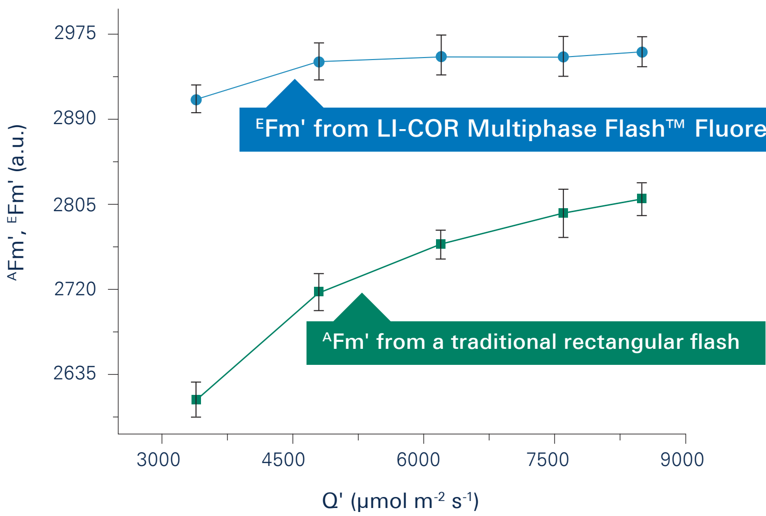
High-intensity Flashes

Estimates of the maximum fluorescence yield (Fm’), when measured in a light-adapted leaf, require light intensities that are never encountered by plants in nature. It requires even higher intensities as NPQ increasingly develops in a leaf, which begins to occur at light intensities well below full sunlight.

The LI-6800 is capable of high-intensity saturation flashes—greater than 16,000 µmol m^{-2} s^{-1}—over a leaf area of 6 cm^2. Over this large area, this is brighter than any other commercial fluorometer, and it enables you to measure Fm’ in difficult-to-saturate leaves.

Multiphase Flash™ Fluorescence to Accurately Estimate Fm'

The LI-6800 can be used to quickly estimate the maximum fluorescence yield at infinite irradiance with a single flash event. Extrapolated maximum fluorescence yield ($^{E}Fm'$) is a more accurate estimate of Fm' than apparent maximum fluorescence yield ($^{A}Fm'$) from traditional rectangular flashes. Erroneous estimates of Fm' can result in errors in estimation of Φ_{PSII} by as much as 15-30%. Since this technique can be used to more accurately estimate 'true' Fm' using moderate flash intensities, plants that are sensitive to photodamage can be studied with less risk of damage from the saturation flash.



Estimates of $^{E}Fm'$ and $^{A}Fm'$ as a function of saturation pulse irradiance (Q') in chamber-grown *Nicotiana tobacum*. Rectangular flashes tend to underestimate true Fm'.

Optimized Signal-to-noise Ratio

The signal-to-noise ratio represents the clarity of data compared with the random background variation. A good signal-to-noise ratio is critical during fluorescence induction curves, when data points are being acquired very rapidly and undergoing minimal averaging.

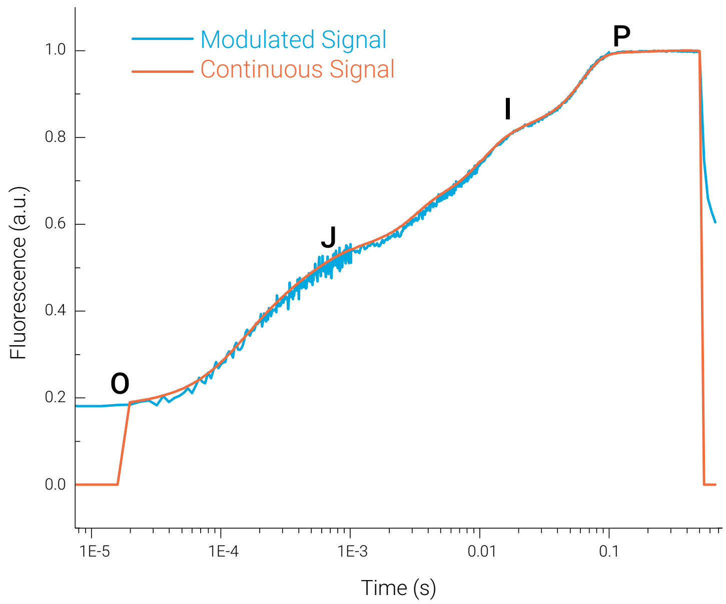
The LI-6800 provides a carefully refined protocol in which modulated light is altered solely by changing the frequency of the modulated pulses, not the pulse amplitude or the pulse width. This prevents the induction of photosynthesis by the measuring light in both dark- and light-adapted leaves, while optimizing the fluorescence signal. In addition, predetermined setpoints optimize the signal-to-noise ratio without violating the PAM chlorophyll *a* fluorescence technique.

High Frequency Fluorometer for Induction Kinetics

The LI-6800 is capable of modulating the measuring light at frequencies up to 250 kHz. This provides the ability to fully characterize the fluorescence induction transient of a leaf with high resolution.

Fluorescence Induction (OJIP) Curve

Fluorescence induction curves are a means to rapidly assess exquisite photophysical details of the pigment-binding protein complex, PSII, in which photosynthesis is initiated. The different transitions of an induction curve (called "OJIP transient") can be used to measure environmental stress in plants. The LI-6800 measures both modulated and continuous fluorescence during induction on time scales ranging from 4 microseconds to hundreds of milliseconds.



Controlled Parameters

The LI-6800 controls environmental conditions in the chamber for the duration of a measurement, which prevents multiple parameters from confounding the plant responses.

CO_2 Response Curves

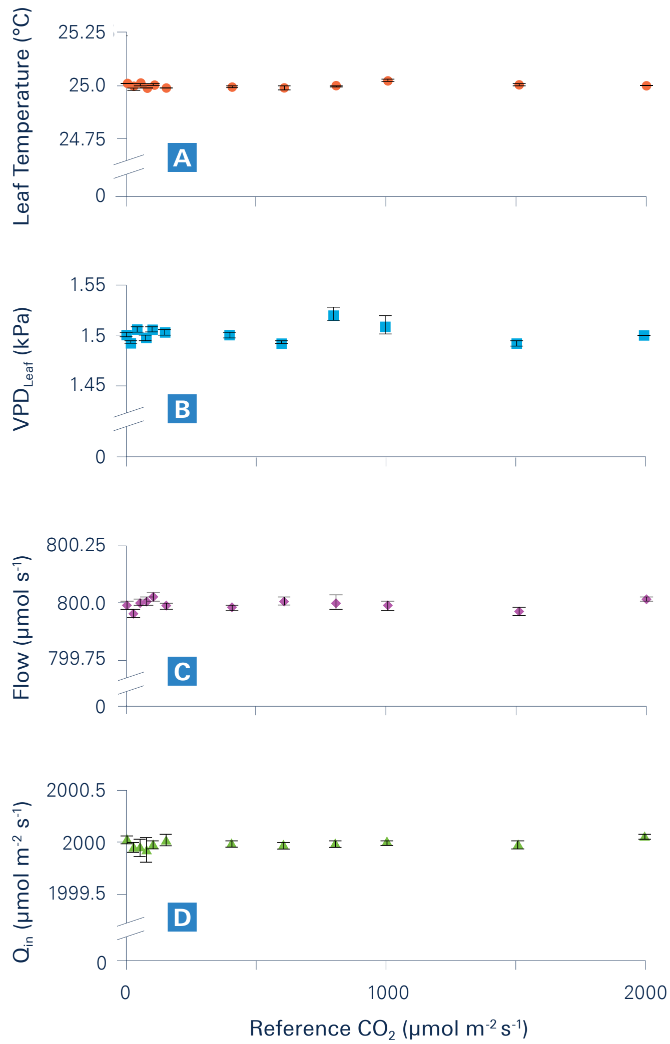
By controlling chamber conditions at the set-points, the photosynthetic response to changes in intercellular CO_2 concentration is not confounded by other independent variables (n = 3; ± standard error of the means).

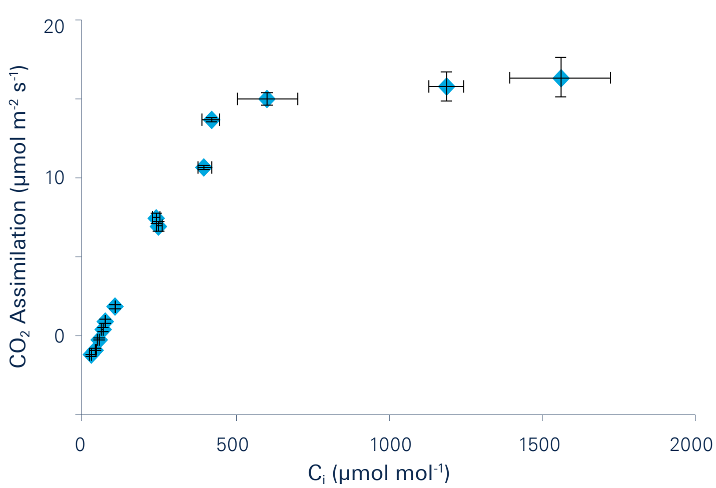
A Automated leaf-level control of temperature holds the biochemistry constant for the entire response, even as transpirational cooling changes with stomatal conductance changes.

B A constant vapor pressure difference (VPD) between the leaf and chamber air minimizes stomatal changes to VPD even as the stomata respond to changing CO_2.

C The flow rate is maintained precisely, decreasing moment-to-moment variation that impacts calculated carbon assimilation rates.

D Leaves are illuminated with constant irradiance, ensuring consistent light-dependent biochemical reaction rates across majority of the enclosed leaf area.

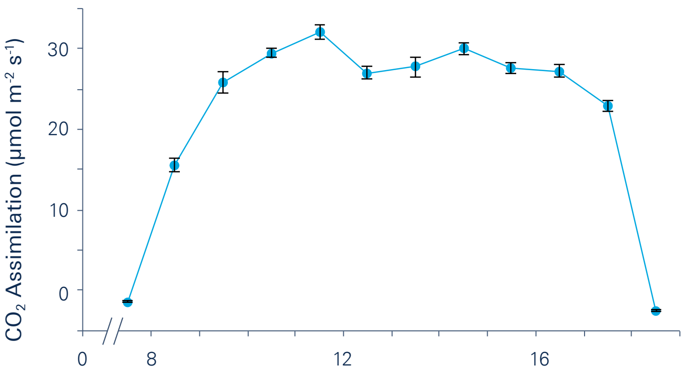




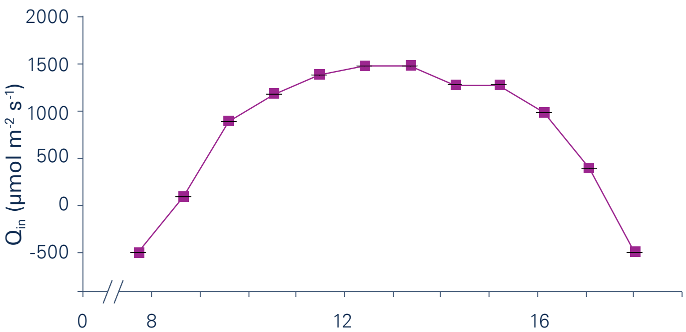
Photosynthetic responses to CO_2 concentration provide information about the biochemical limitations. In C3 species, these data are used to estimate A_{max} (maximum photosynthesis rate), V_{Cmax} (maximum rate of Rubisco carboxylation), J_{max} (maximum rate of electron transport for RuBP regeneration), and triose phosphate utilization (TPU) limitations.

Diurnal Measurements

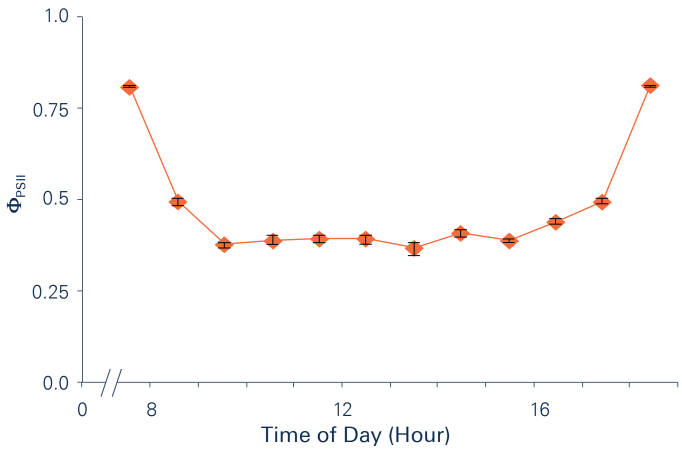
The LI-6800 controls environmental conditions in the chamber to maintain ambient or growth conditions around the sample for diurnal or survey measurements.



Diurnal carbon assimilation for field-grown bok choy (*Brassica rapa*) with a slight depression at midday (n = 24 to 28; ± standard error of the means).



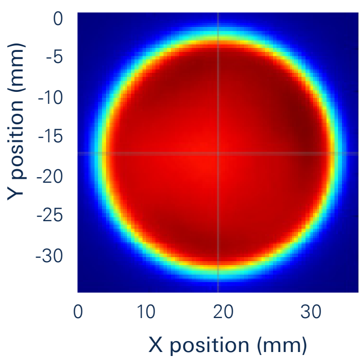
The 6800-02 light source consistently illuminates the leaf with intensities that mirror ambient light levels.

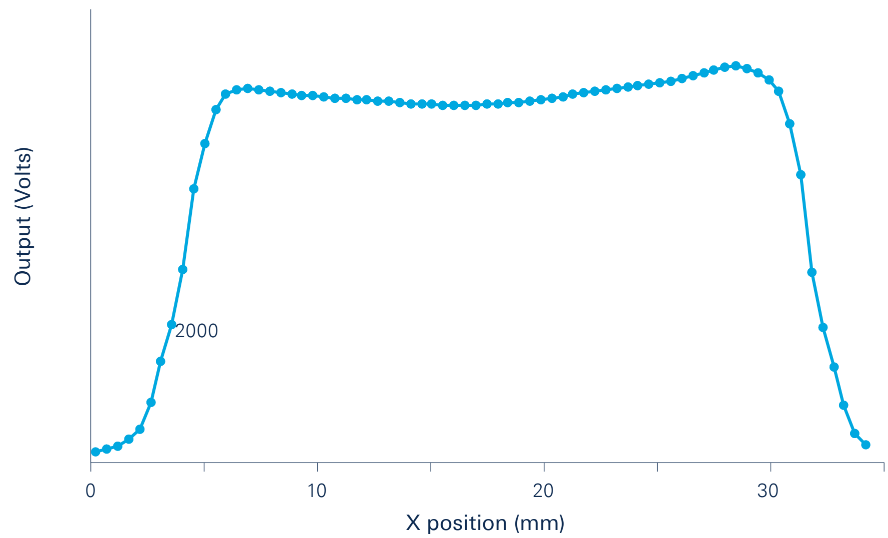


The Φ_{PSII}, measured from chlorophyll fluorescence, reflects the leaf illumination across the day, driving changes in electron transport.

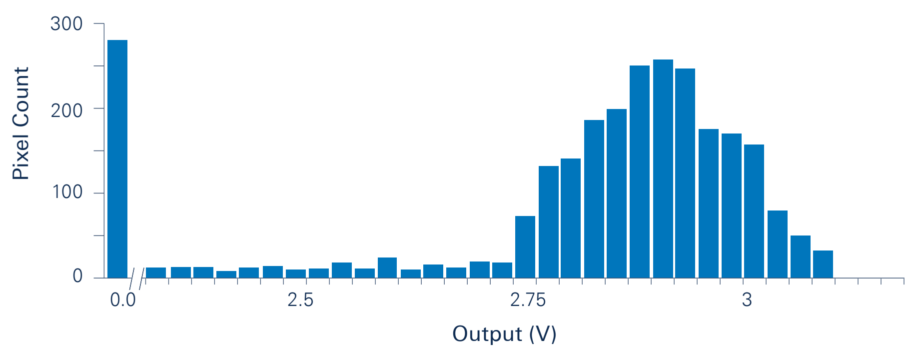
Light Responses in Uniform Illumination

The chamber light sources illuminate the leaf with highly uniform light. Variation is typically less than ±10% over 90% of the aperture, ensuring that photosynthesis is consistent across the entire aperture. The average photosynthetic carbon assimilation reflects the true spot-to-spot flux rate across the enclosed leaf area when the leaf is uniformly illuminated (n = 3; ± standard error from the means).

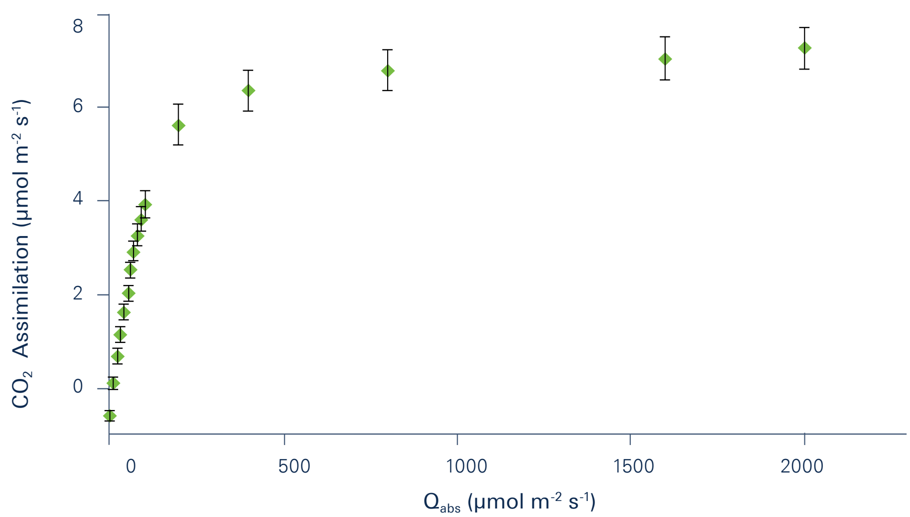




False-color map **(above)** indicating the light intensity distribution from an LI-6800 Multiphase Flash™ Fluorometer. A transect **(top right)** of light intensity across the light field at the midline shows that illumination is highly uniform across the entire aperture.



(middle) Histogram of the heat map, indicating the light uniformity distribution is less than 10% over 90% of the area (counts).



(bottom) Light response of *Nicotiana tabacum*. Error bars are standard error of the means (n = 3).

Quantum Efficiency

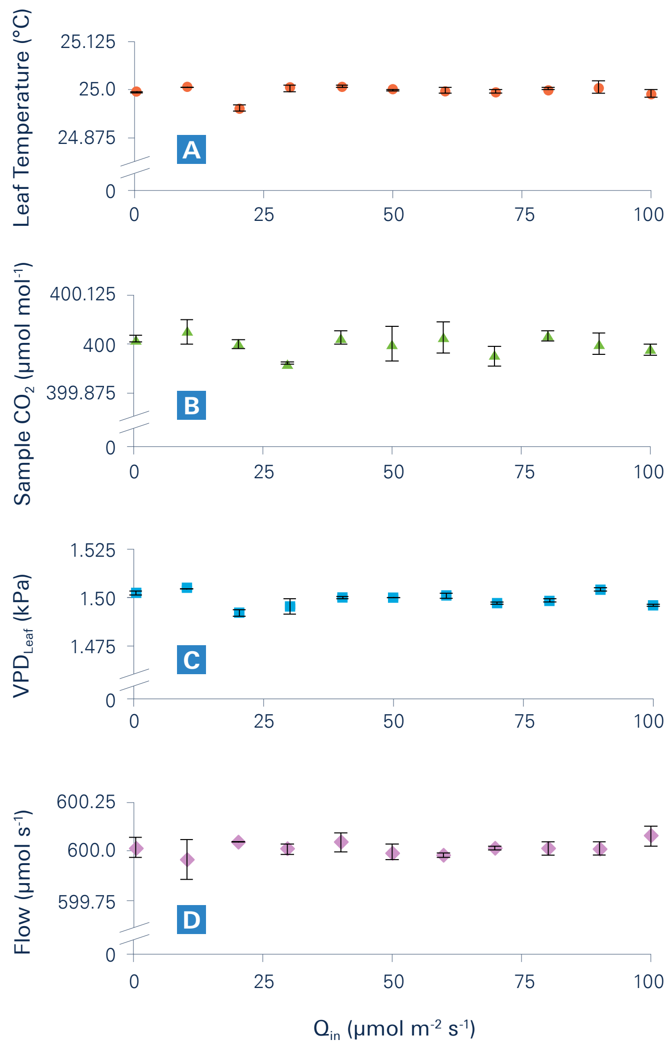
The LI-6800 measures quantum efficiency while preventing confounding parameters from affecting the measurement.

A Leaf temperature is held steady across a range of light intensities (Q_{in}), from 0 to 100 µmol m^{-2} s^{-1}, ensuring that temperature is not a confounding variable.

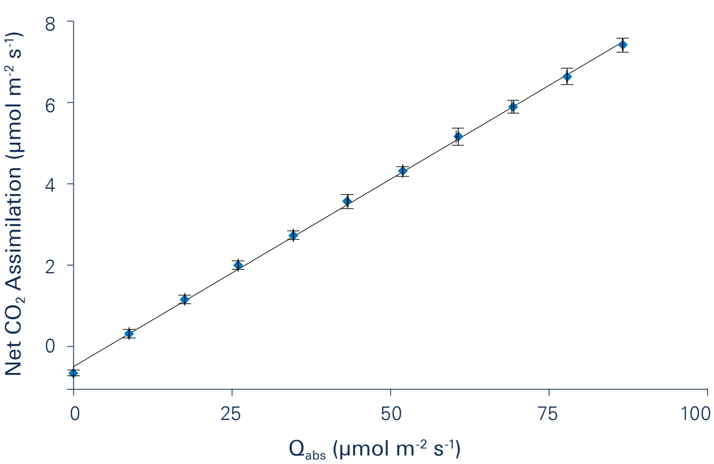
B Precisely controlled CO_2 concentrations in the leaf chamber prevent alterations to the carbon assimilation rate that result from variations in CO_2 concentrations.

C Constant control of leaf vapor pressure difference (VPD) during light-driven changes in stomatal conductance removes the confounding effect of changing H_2O concentration.

D The flow rate is maintained precisely at the setpoint, which prevents flow from adding additional non-biological variation to the calculated carbon assimilation rate.



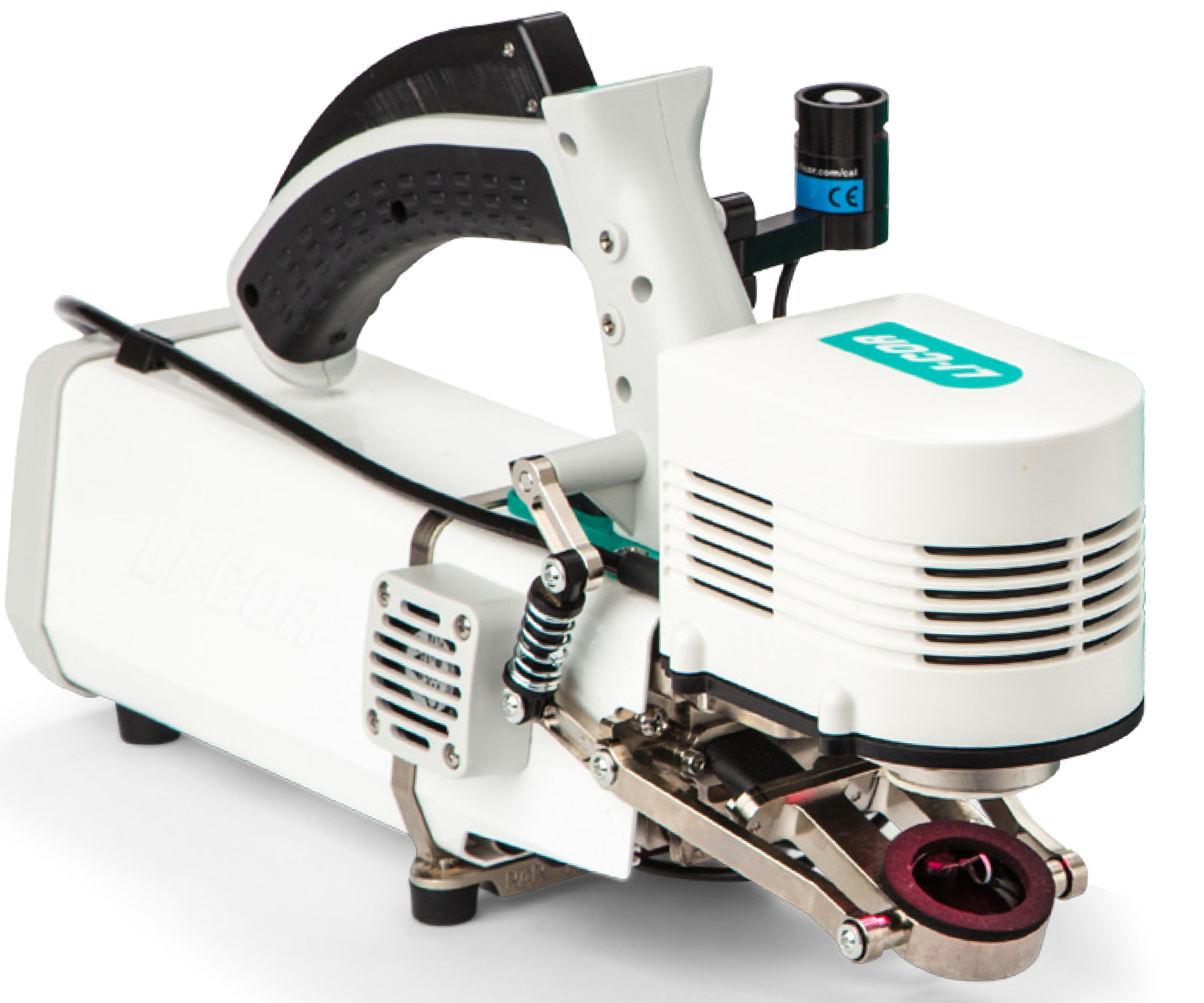
At low light intensities, the carbon assimilation rate is limited by light capture to drive linear electron transport in the light-harvesting complex. The gross carbon assimilation response to absorbed light is a measure of the quantum efficiency of photosynthesis. The quantum efficiency for *Nicotiana tabacum* in non-photorespiratory conditions (0.5% O_2 air) is consistent with theoretical and empirically measured values (n = 2, ± standard error of the means).



Chambers and Light Sources

Multiphase Flash™ Fluorometer

The Multiphase Flash™ Fluorometer (part number 6800-01) is a complete chamber that mounts directly to the LI-6800 sensor head. It is the most powerful fluorometer available in a combined gas exchange and fluorescence system, providing simultaneous gas exchange and fluorescence from the same leaf area. Capable of measuring Fm′, Φ_{PSII}, and ETR in a 1-second measurement over a 6-cm^2 leaf area.



3×3 cm Clear Leaf Chamber

The standard 3×3 cm Clear Leaf Chamber (part number 6800-12) provides 9 cm^2 of one-sided leaf area for assimilation and transpiration measurements. The leaf temperature thermocouple is held securely in the lower chamber, and is gently pressed against the leaf surface. A Gallium Arsenide Phosphide (GaAsP) sensor measures photosynthetically active radiation (PAR) inside the chamber. Coated internal surfaces minimize H_2O sorption. Durable gaskets form a seal around irregular leaf surfaces. The durable, transparent Propafilm™ top allows ambient light to pass through to the leaf surface. Compatible with the 3×3 cm Light Source.

3×3 cm Light Source

The 3×3 cm Light Source (part number 6800-02) mounts directly onto the 3×3 cm Clear Leaf Chamber and provides 0 to 2500 μmol m^{-2} s^{-1} of radiant energy (red and blue) to the leaf surface. An advanced reflector design and careful LED placement provide highly uniform illumination of the leaf surface. An integrated GaAsP sensor measures PAR output in the light source for fast response and control over light. Provides independent control of red and blue light intensities.

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
- Drierite, 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
- 3×3 cm Clear Leaf Chamber and 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
- Drierite, 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
- 3×3 cm Clear Leaf Chamber
- Instrument case
- Carrying harness
- 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
- Drierite, 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	6800-01F
3x3 cm Light Source	6800-02
3x3 cm Clear Leaf Chamber	6800-12
3x3 cm Clear Leaf Chamber and Light Source	6800-02P

Accessories

Part	Description	Part number
Carrying harness	Shoulder and waist straps for carrying the console	9968-221
Tripod	Used for either the console or sensor head	609-15790
Panhead mount	Mounts to tripod or monopod. Securely holds the sensor head. Pivots to a full range of positions	609-15791
Monopod	Single-post podium for the sensor head	609-15792
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

Specifications

Distinguishing Specifications

For brevity, here are some specifications that distinguish the LI-6800.

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

Distinguishing Fluorometer Specifications

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

Full 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}

- 4-second signal averaging
  - RMS: ≤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: Drierite (W.A. Hammond Drierite Company)

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: 800 MHz ARM® Cortex™ A8
Memory: 512 MB 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; (D × 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

3×3 cm Clear Leaf Chamber

Maximum leaf area: 9 cm^2
Size: 11.3 × 11.5 × 5.9 cm (L × W × H)
Weight: 0.3 kg

3×3 cm 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

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; Round aperture
Dimensions: 12.5 × 11.5 × 13.6 cm (L × W × H)
Weight: 0.86 kg

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

Specifications subject to change without notice

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980-16074 Rev.1 05/16

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