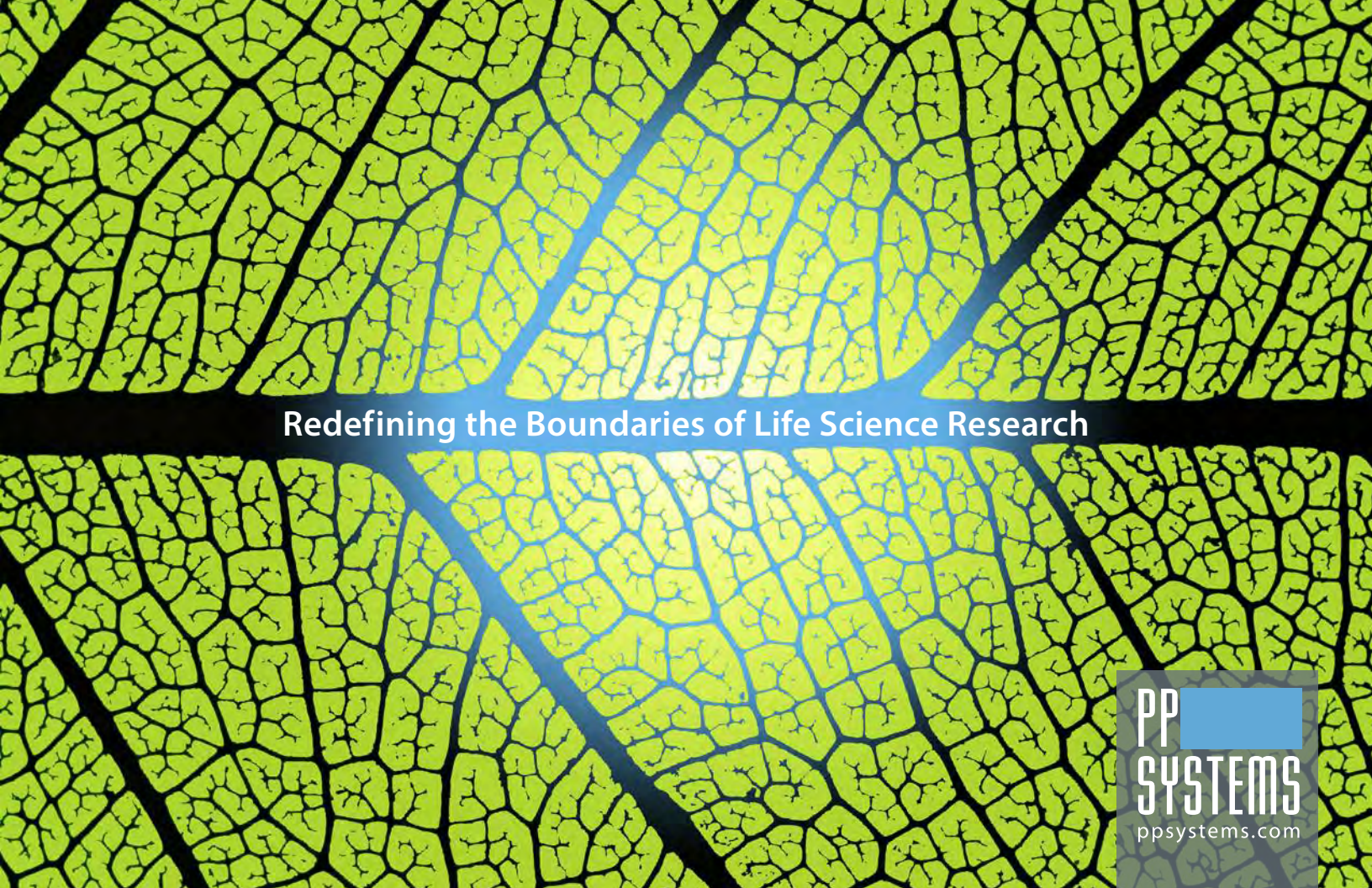

Redefining the Boundaries of Life Science Research
PP SYSTEMS
ppsystems.com

Our mission is not unique.

We share it with those committed to finding solutions for a better world.

The opportunity to support the plant and soil scientific communities in the discovery of those solutions inspires us to constantly innovate...

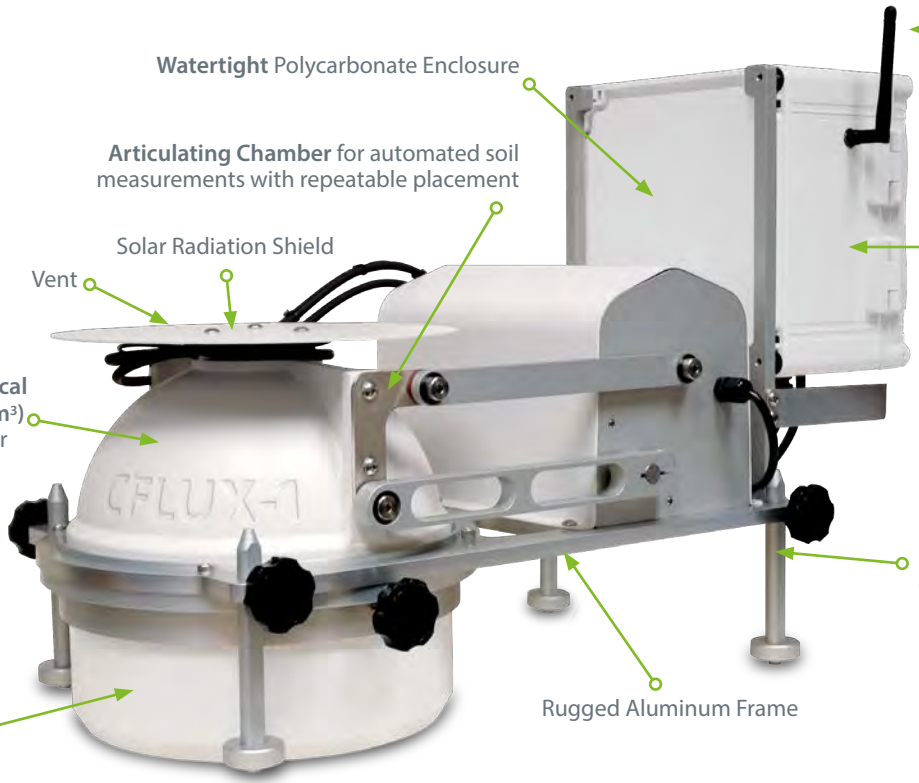
...to continually refine the role of instrumentation as a seamless extension of the thought process of each and every student of science...

...from the students just discovering their passion to the most accomplished pioneer whose life's work has great global impact...

...providing the freedom to focus solely on the valuable work to be done.

CFLUX-1 A dedicated, self-contained automated system for long-term, unattended measurement of soil CO_2 flux.

Ideal for both spatial & temporal analysis.



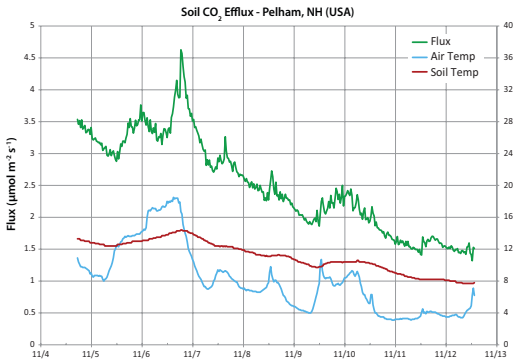
No limit to where systems can be placed in the field.
No need for multiplexing chambers!

- **Built-in CO_2 & H_2O Gas Analyzers**
  Two independent, integral, non-dispersive infrared gas analyzers for CO_2 and H_2O in each system means:
  - > Accurate measurement and fast response times regardless of location
  - > No multiplexing devices are needed
- **Unique Venting System**
  Pressure differences are minimized upon closure and seal
- **Expanded Measurement Range**
  The CFLUX-1 can be calibrated up to 30000 ppm for measurement in high CO_2 environments
- **Soil Moisture & Soil Temperature**
  Optional sensors are available
- **Easy Installation & Setup**
- **Fully Automatic, Programmable & Stand-alone Operation**

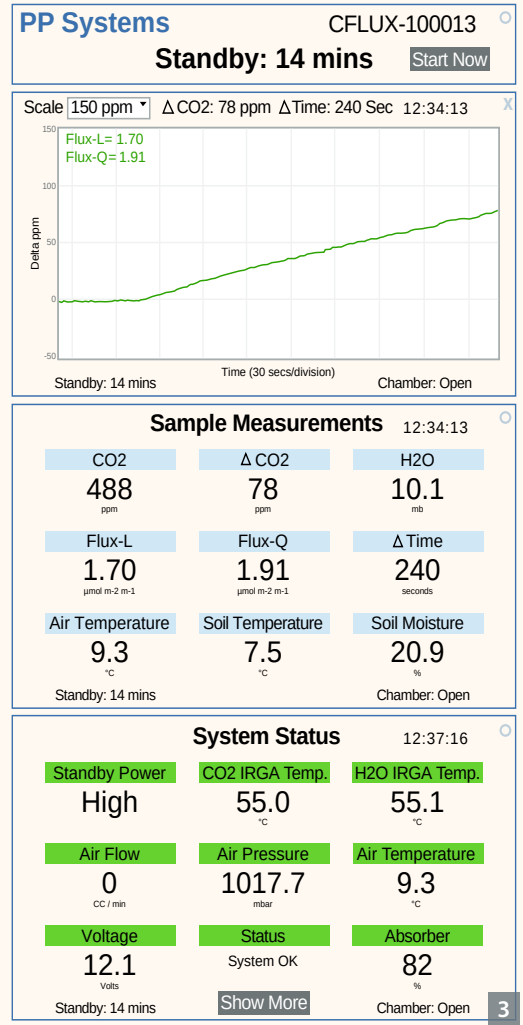
- **Full Data Storage**
  Direct to a USB Flash Drive (memory stick) or external data logger

Software & Data Analysis

- > Easily view sensor data and information via computor or mobile device
- > Flux rates based on linear and quadratic fit are continuously calculated and displayed



Measurements were recorded every 30 minutes for a period of nine consecutive days.



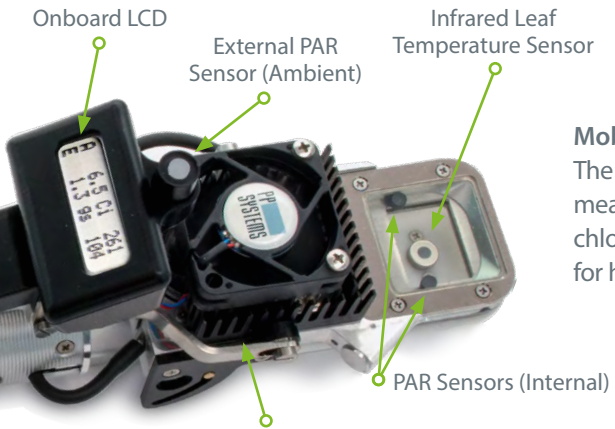
CIRAS-3 Redefining "portability" for high-level field research.

Eliminating the obstacles while elevating the research experience.

Powerful, Customizable & Intuitive
Rely on the defaults or customize your own settings to monitor and display numerical and graphical data.

Fast & Accurate
A true differential analyzer featuring four independent gas analyzers for CO_2 and H_2O. It's compact size and small system volume ensures the most rapid and accurate measurement of photosynthesis available.

Meeting the demands of the serious researcher driving the future of science.



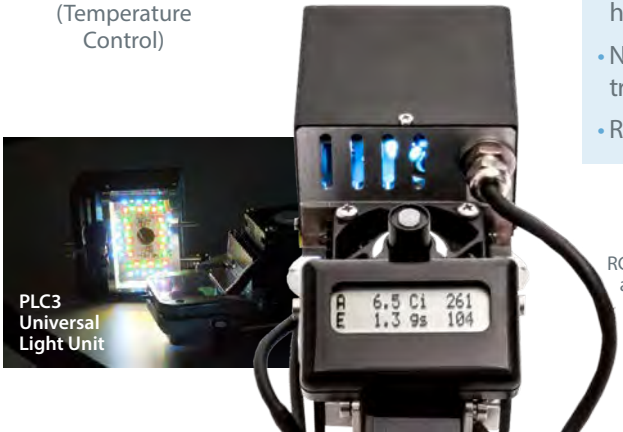
Mobile

The first truly mobile system for simultaneous measurement of photosynthesis and chlorophyll fluorescence — the ideal choice for high-level field research.

True mobility (4.5 kg)

- Less site disturbance
- Easy access to hard-to-reach areas
- No assistance or tripod needed
- Reduced fatigue

RGBW LED Light Unit



RGBW LED Light Units are available for all PLC3 Leaf Cuvettes.

PLC3 Universal Leaf Cuvette
Interchangeable Head Plates

PLC3 Leaf Cuvettes

25 mm x 7 mm | 18 mm Diameter | 25 mm x 18 mm

The PLC3 Universal Leaf Cuvette comes standard with three interchangeable head plates making it the go-to cuvette in most situations.

All PLC3 Cuvettes are available with their own LED light unit for added versatility.

Versatility At Your Fingertips

The CIRAS-3 Portable Photosynthesis System is highly customizable externally as well. Expand the CIRAS-3's measurement capabilities to include:

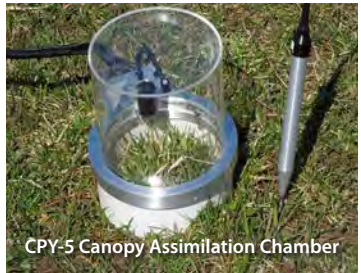
- Chlorophyill fluorescence
- Soil CO_2 efflux
- Net canopy flux

Prefer to use your own chambers? The CIRAS-3 can act as a stand-alone CO_2 and H_2O differential gas analyzer.

Our accessoressories are field-changeable as well — virtually plug and play!

Soil & Canopy Flux Chambers

SRC-2 Soil Respiration Chamber



CPY-5 Canopy Assimilation Chamber

Create rapid A/C_i curves in minutes

with the CIRAS-3 & our high-speed CO_2 ramping technique.

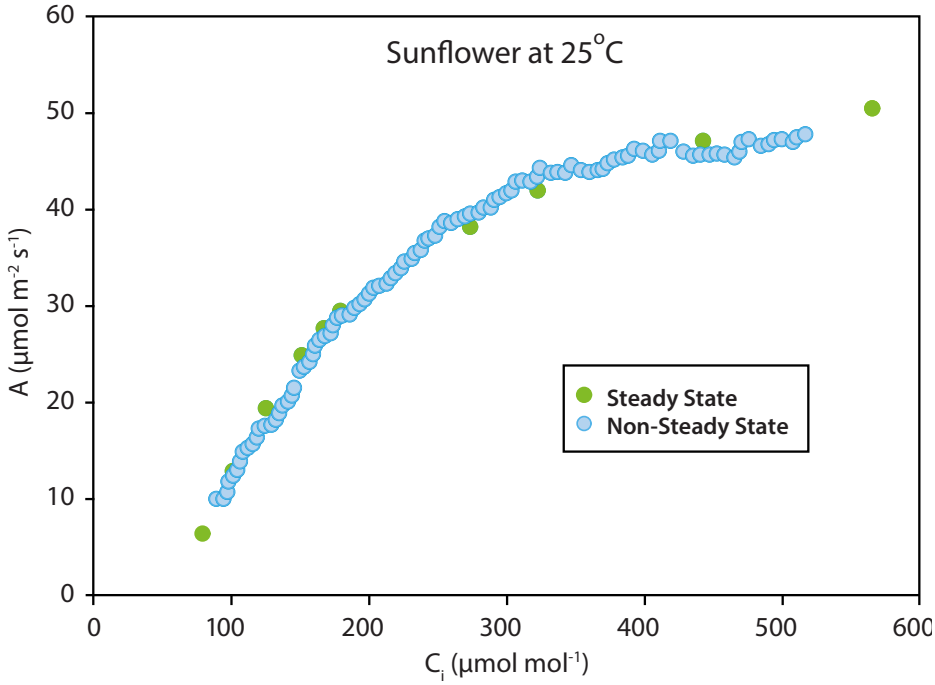
CIRAS-3 has always been capable of rapidly controlling CO_2 gas concentration while simultaneously and continuously recording data.

PP Systems' latest version of our PC-based Scripts Editor makes it simpler to create and execute response scripts for measurement of rapid A/C_i curves.

Generate ultra-fast A/C_i curves in a fraction of the time it takes to perform traditional steady-state measurements with our innovative and programmable high-speed CO_2 ramping technique.

Post Processing

In just a few simple steps in Excel, A/C_i curves can be created and analyzed.



Comparison of Non-Steady State, High-Speed CO_2 Ramping (blue points) to traditional point-by-point Steady State (green points) for a typical C_3 Sunflower.

CIRAS-3 Simultaneously measure chlorophyll fluorescence & photosynthesis.

CFM-3 Chlorophyll Fluorescence Module
Designed exclusively for our PLC3 Universal Leaf Cuvette

Applications

- **Photosynthesis**
- **Chlorophyll Fluorescence**
- **Soil Respiration**
- **Net Canopy CO_2 Flux**
- **CO_2/H_2O Gas Analysis**
- **Insect Respiration**

CFM-3 Chlorophyll Fluorescence Module features include:

- Built-in light source and fluorescence detection capability
- Actinic light source
- Pulse-amplitude modulated (PAM) fluorometer
- Saturating pulses up to 10000 µmol m^{-2} s^{-1}
- MultiPulse™ for estimation of F_m' apparent

CIRAS-3 True mobility without sacrificing performance

- Truly mobile (4.5 kg)
- True differential analyzer
- High-speed CO_2 ramping for rapid A/C_i curves
- Simultaneously measure photosynthesis and chlorophyll fluorescence
- Automated and programmable environmental controls for CO_2, H_2O, temperature and light
- Control proportion of light by wavelength (RGBW)
- Full color 7" transflective display
- Powerful user interface and software
- Customizable programming and data presentation capabilities
- Real-time data
- Unlimited data storage

TARGAS-1 The mobile photosynthesis system for teaching & basic research.

- Fully mobile and lightweight (2.1 kg)
- High-precision, non-dispersive infrared gas analyzers for both CO_2 and H_2O
- Automatic temperature and pressure compensation
- Control of CO_2, H_2O and light
- Large touch display, full sun readability
- Numerical and graphical data presentation
- Built-in air supply unit and sampling pump

Multiple accessories and sensors are available to expand the TARGAS-1's measurement capabilities. *(See pg. 15 for more.)*

The **TARGAS-1**'s high technical specification and user-friendly interface make it an ideal addition to the educational environment as well as the laboratory and field.

Applications

- **Photosynthesis**
- **Soil Respiration**
- **Net Canopy CO_2 Flux**
- **Environmental Monitoring**

EGM-5 Versatility meets mobility — the perfect solution for soil CO_2 efflux & net canopy CO_2 flux.

Accurate • Reliable • Stable

For more than 30 years, our CO_2 infrared gas analyzers have been the standard for a wide variety of disciplines throughout the world.

Our innovative **Auto-Zero** measurement technique ensures the greatest accuracy, reliability and long-term stability that our customers have come to expect throughout the years.

Our powerful **GAS** software offers a user-friendly solution for monitoring, logging and recording environmental sensor data.

We offer a range of environmental probes and sensors for use with our analyzers, further enhancing their already extensive list of applications.

Soil & Canopy Flux Chambers

SRC-2 Soil Respiration Chamber

CPY-5 Canopy Assimilation Chamber

Our chambers are compatible with the EGM-5, CIRAS-3 & TARGAS-1

Expanding measurement capabilities.
Enhancing the process of discovery.

Rugged Transport Case
Highly field-durable & customized to hold the **EGM-5** as well as the **SRC-2 Soil Respiration Chamber** & either the **STP-2 Soil Temperature Probe** or **Hydra-Probe II Soil Moisture & Soil Temperature Probe**

Sample Injection Kit

Environmental Sensors

Quantum Sensor (PAR)

Soil Temperature

Soil Moisture/ Soil Temperature

PAR
Air Temperature

Available EGM-5 integration options:

- H_2O solid state sensor to accurately measure humidity
- O_2 electrochemical sensor for accurate O_2 measurement
- WiFi for remote, real-time monitoring

Applications

- **Ambient air monitoring**
- **Soil CO_2 efflux**
- **Net canopy CO_2 flux**
- **Borehole CO_2 monitoring**
- **Global change studies**
- **Animal/insect respiration**
- **Environmental toxicology**
- **CO_2 sequestration**
- **Volcanology**
- **Forest & agricultural meteorology**
- **pCO_2 measurement**

Unsurpassed accuracy & control for long-term continuous measurement of CO_2.

WMA-5

Fixed Installations

Available WMA-5 options:

- H_2O solid state sensor to accurately measure humidity
- O_2 electrochemical sensor for accurate O_2 measurement
- WiFi for remote, real-time monitoring

SBA-5

OEM Applications

Available SBA-5 options:

- H_2O solid state sensor to accurately measure humidity
- Sampling pump
- Absorber column (for Auto-Zero)
- Anodized aluminum enclosure

The ideal solution for applications demanding a highly accurate CO_2 sensor.

Applications

- **Open top chambers**
- **Greenhouses & nurseries**
- **Plant growth chambers**
- **Environmental control rooms**
- **Incubators**
- **Fruit storage**
- **FACE sites**
- **Breweries**
- **Ambient air monitoring**
- **CO_2 leakage monitoring**
- **Indoor air quality & safety**
- **Industrial monitoring**

CO_2 Gas Analyzer *features by instrument*

	EGM-5	WMA-5	SBA-5
High precision, non-dispersive infrared gas analyzer for CO_2	●	●	●
Accuracy: <1 % of span over calibrated range	●	●	●
CO_2 ranges up to 100000 ppm (10%)	●	●	●
Automatic pressure & temperature compensation	●	●	●
Powerful GAS software	●	●	●
Numeric & graphical data display	●	●	
Data storage	USB	USB	
Power requirements	AC/DC	AC/DC	6-18 VDC
Data outputs	V/D	V/C/D	V/C/D
High-contrast touch display	●	●	
Built-in sampling pump & electronic flow sensor	●	●	Optional
External water trap		●	
Visual & audible warning (high/low CO_2)	●	●	

V=Voltage C=Current (4 - 20 mA) D=Digital

The global standard for CO_2 & H_2O gas analysis for research that commands accuracy, reliability & stability.

CIRAS-3 SC

Single Channel (Absolute)

The **CIRAS-3 SC** has two independent, non-dispersive infrared gas analyzers for CO_2 and H_2O for measurement from a single gas stream.

CIRAS-3 DC

Dual Channel (Differential)

The **CIRAS-3 DC** has four independent, non-dispersive infrared gas analyzers for CO_2 and H_2O for measurement from two gas streams.

Common features

- Built-in Auto-Zero
- Fully compensates for changes in temperature, pressure and foreign gas broadening
- Unlimited data storage
- Built-in sampling pump with mass flow controller
- Powerful, intuitive user interface and software
- Remote display capability
- Internal 7.2V Li-Ion rechargeable battery (optional) for portability

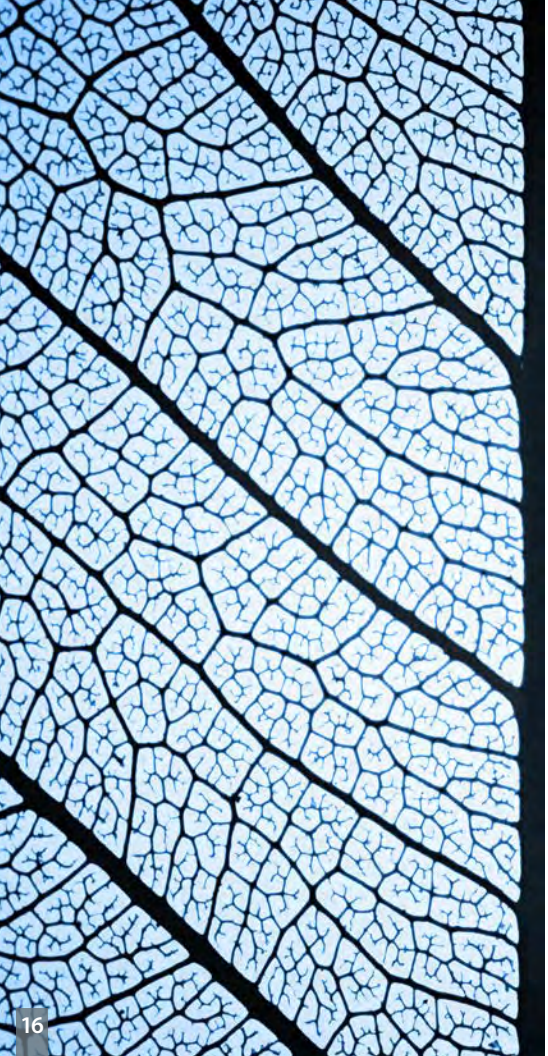
Applications

- **Plant physiology**
- **Soil CO_2 efflux**
- **Net canopy CO_2 flux**
- **Forest & agriculture meteorology**
- **pCO_2 measurement**
- **Atmospheric studies**

Accessory Compatibility *by instrument*

Chambers & Sensors	CIRAS-3*	TARGAS-1	EGM-5	WMA-5	SBA-5
SRC-2 Soil Respiration Chamber	●	●	●		
CPY-5 Canopy Assimilation Chamber	●	●	●		
Insect Respiration Chamber	●				
STP-2 Soil Temperature Probe		●	●		
Quantum Sensor (PAR)		●	●		
TRP-3 Temperature/PAR Probe		●	●		
HydraProbe II (Soil Moisture & Soil Temperature)			●		
Integrated Options					
H_2O Solid State Sensor			●	●	●
O_2 Electrochemical Sensor			●	●	
WiFi			●	●	
Kits					
Sample Injection Kit		●	●		●

* Refers to the CIRAS-3 Portable Photosynthesis System



Your research partner since 1984

PP Systems has proudly designed and manufactured instrumentation to meet the technology needs of plant and soil scientists since 1984. Our extensive experience working closely with scientists to provide the best possible research tools, along with our drive to constantly enhance the research and educational experience, has afforded us the honor of being one of the most highly referenced global standards in more than 100 countries worldwide.

Accurate, Reliable & Revolutionary

Our instruments have long been trusted for their accuracy, reliability and stability.

PP Systems is recognized as a world leader and proven innovator in the design and manufacture of rugged photosynthesis, soil respiration, chlorophyll fluorescence and CO_2/H_2O gas analysis instrumentation for high-level research.

Trusted & Tested Technology

Training

Training is offered free of charge for all customers. Classes are provided throughout the year and can be arranged to fit within your schedule.

Classes are intentionally kept small to afford personalized attention and to ensure that everyone receives the maximum benefit of attending the course. The course is designed for the first time user as well as those who need a refresher course on operation and general maintenance.

Contact PP Systems to learn more about training options or to schedule a training class.

Your Research Partner

We want you to have the best possible experience as well as to fully utilize the instruments you purchase from us.

Customers receive direct technical support from our U.S. headquarters as well as through our extensive network of factory trained distributors.

If you would like to learn more about us, visit our website at **ppsystems.com** where you will find more detailed specifications about each product including data sheets as well as application notes that show how our amazing customers are using our instruments.

You are welcome to call to discuss your research needs with a member of our technical staff @ **+1 978.834.0505**.

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