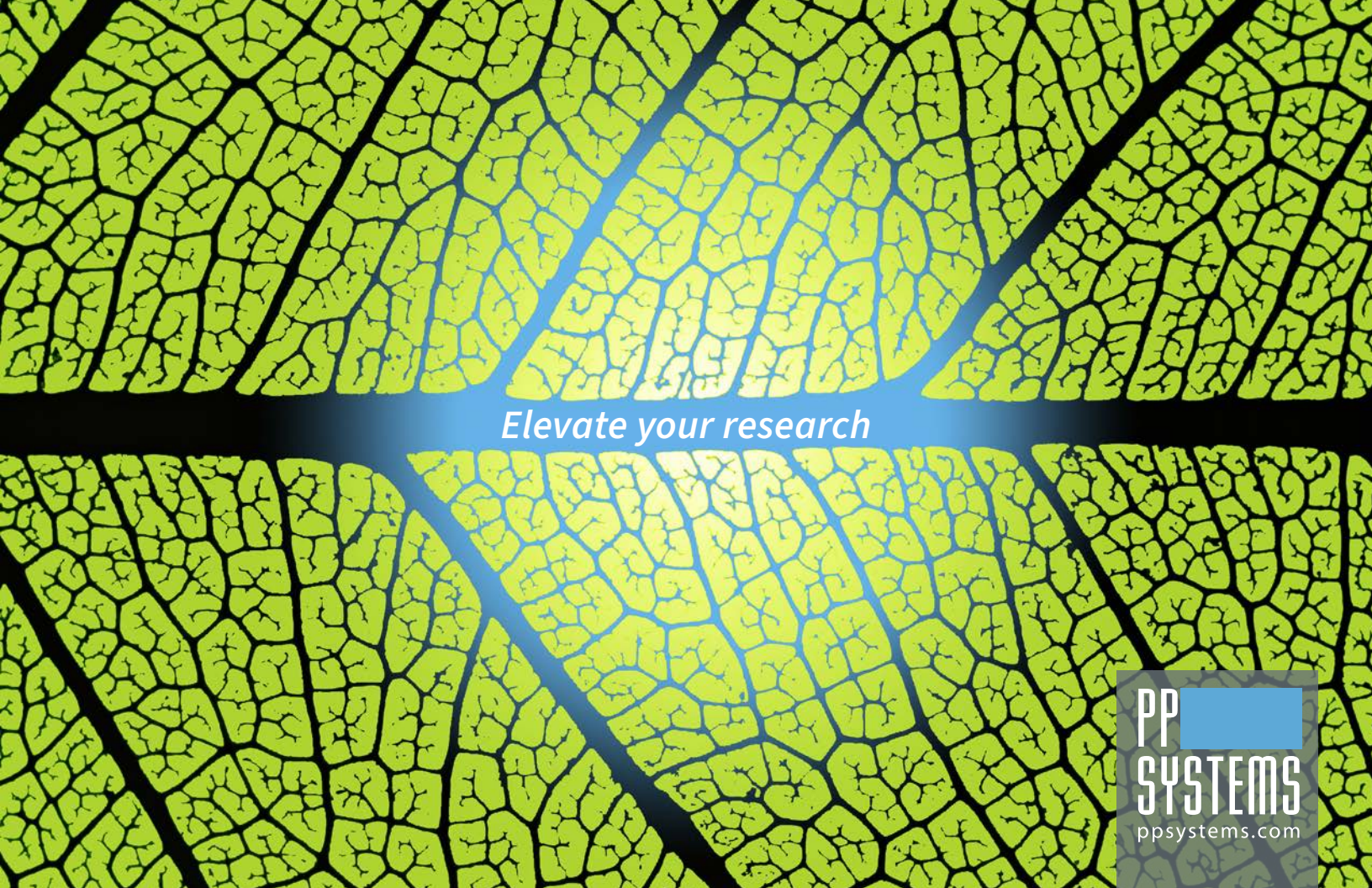

Elevate your research
PP
SYSTEMS
ppsystems.com

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.

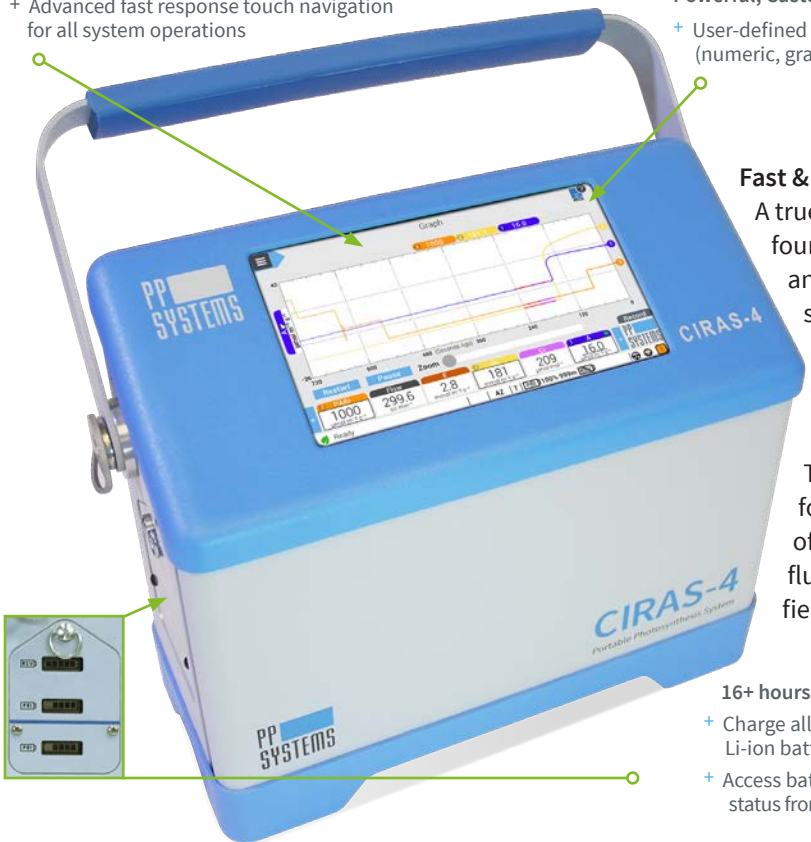
CIRAS-4 The 4th generation portable powerhouse elevating the high-level

High-Contrast Full-Color Sunlight-Readable Touchscreen

+ Advanced fast response touch navigation for all system operations

Powerful, Customizable & Intuitive

+ User-defined presentation of data (numeric, graphical or custom)



Fast & Accurate

A true differential analyzer featuring four independent gas analyzers for CO_2 and H_2O. Its compact size and small system volume ensures the fastest and most accurate measurement of photosynthesis available.

Highly Portable

The first truly portable system for simultaneous measurement of photosynthesis and chlorophyll fluorescence designed for high-level field research.

16+ hours of continuous operation

+ Charge all three high capacity Li-ion batteries simultaneously
+ Access batteries & view power status from console exterior

Non-Contact Infrared Leaf Temperature Sensor

Rulers on Apertures

+ Accurate estimation of leaf area

Peltier Cooler

+ For accurate & stable temperature control

CIRAS-4 Main Console

Weight	4.8 kg (including two battery packs)
Dimensions	28 cm (W) x 14.5 cm (D) x 24 cm (H)

research experience worldwide.

RGBW-FR LED Light Units

Automatically control both light intensity & proportion of light by wavelength

A bank of red, green, blue, white, and far-red LEDs (RGBW-FR) for auto control of both light intensity up to 2500 µmol m^{-2} s^{-1} and proportion of light by wavelength.

Far-red

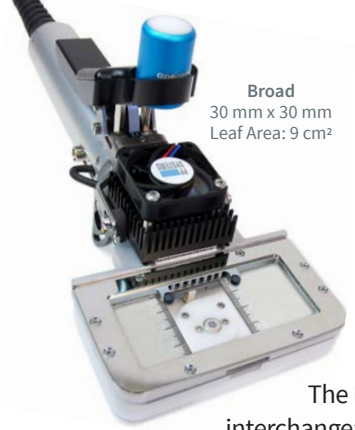
Our light units are the only leaf cuvette light units available that include 4 far-red LEDs to control far-red up to 30% of PAR to more accurately recreate the natural light environment.

PLC4 Universal Leaf Cuvette

Weight 0.7 kg (not including cable)

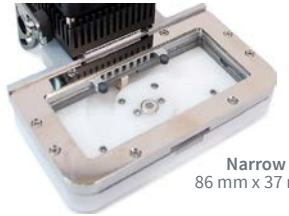
Dimensions 27.5 cm (L) x 3.75 cm (Handle Diameter)
Head: 4.5 cm (L) x 4.5 cm (W) x 2.3 cm (H)

PLC4 Universal Leaf Cuvette



Broad
30 mm x 30 mm
Leaf Area: 9 cm²

Conifer
86 mm x 37 mm



Narrow
86 mm x 37 mm

PLC4 Broad/Narrow/Conifer Leaf Cuvette

The PLC4 Broad/Narrow/Conifer Leaf Cuvette comes with three interchangeable heads for measurement on large, flat broad leaves, narrow leaves, grasses, and conifers.

PLC4 Leaf Cuvettes

25 mm x 7 mm

18 mm Diameter

25 mm x 18 mm

The PLC4 Universal Leaf Cuvette comes standard with three interchangeable head plates making it the go-to cuvette in most situations.

Head plates are secured by magnets — *no tools necessary!*

All PLC4 Cuvettes are available with their own RGBW-FR LED light unit for added versatility.

Additional Accessories

The CIRAS-4 Portable Photosynthesis System is highly customizable externally as well. Expand the CIRAS-4's measurement capabilities to include:

- Chlorophyll fluorescence
- Net canopy CO_2 flux
- Soil CO_2 efflux
- Insect respiration

Prefer to use your own chambers? The CIRAS-4 can act as a stand-alone CO_2 and H_2O differential gas analyzer.

SRC-2 Soil Respiration Chamber

CPY-5 Canopy Assimilation Chamber

Insect Respiration Chamber

Create rapid A/C_i curves in minutes without post processing

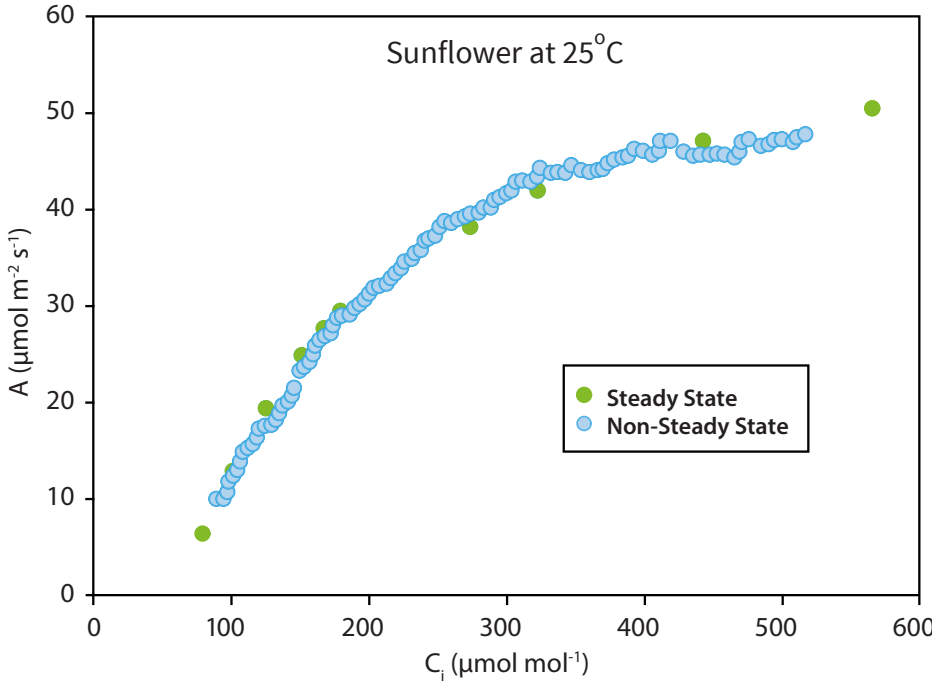
with the CIRAS-4 & our Single-Step CO_2 Ramping ($SSCO_2R^{TM}$) Method.

CIRAS-4 has always been capable of rapidly controlling CO_2 gas concentration while simultaneously and continuously recording data. Now that there is no longer a need to define a response script for a ramp test in the CIRAS-4, the process is faster and more streamlined than ever.

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. The fully automatic process is built into the software, creating an even further simplified set up and rapid A/C_i measurements based on both upward and downward ramps — *more measurements and data points in a much shorter period of time!*

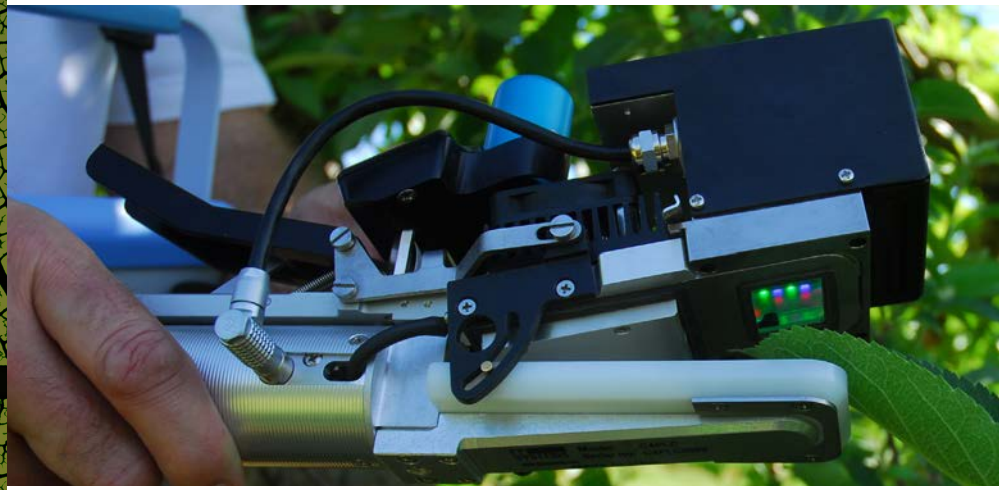
Post Processing

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



Comparison of a non-steady-state A/C_i curve performed in 5 minutes using The $SSCO_2R^{TM}$ Method to a traditional point-by-point steady-state A/C_i curve performed in 25 minutes for Hemerocallis fulva at 22 °C.

CIRAS-4 Simultaneously measure chlorophyll fluorescence & photosynthesis.



The CFM-4 Chlorophyll Fluorescence Module delivers high-saturating pulses up to 10000 µmol m^{-2} s^{-1}. The CIRAS-4 is the only system that features our innovative MultiPulse™ technology—producing a sequence of user-defined, lower-saturating pulse light levels, avoiding the risk of photodamage to the leaf while accurately estimating apparent F_m'.

The CFM-4 provides both dark- and light-adapted chlorophyll fluorescence measurement parameters including photochemical vs. non-photochemical quenching and electron transport rate.

Additional CFM-4 Chlorophyll Fluorescence Module features include:

- Built-in light source and fluorescence detection capability
- Actinic light source
- Pulse-amplitude modulated (PAM) fluorometer
- OJIP fast-induction kinetics
- Multiple leaf apertures
- Automatic control of temperature and light intensity as well as proportion of red, blue, green, white and far-red LEDs.

Applications

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

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

- Fully portable 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. 14 for more.)*

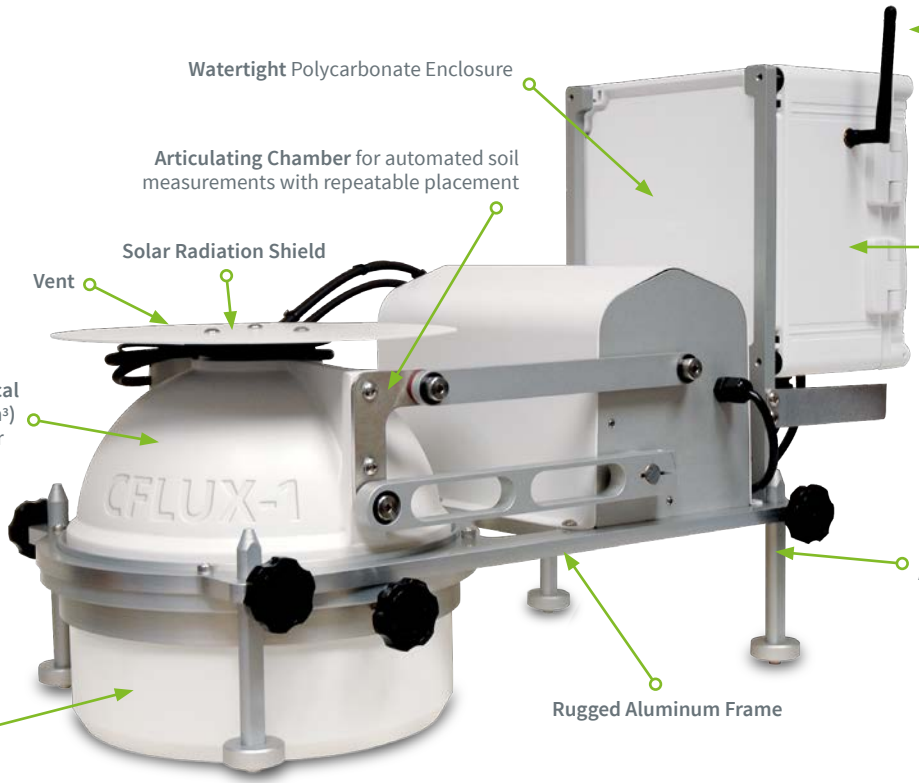
The **TARGAS-1**'s high technical specification and user-friendly interface make it an ideal addition to the educational environment as well as the laboratory and field.

Applications

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

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

Ideal for both spatial & temporal analysis.



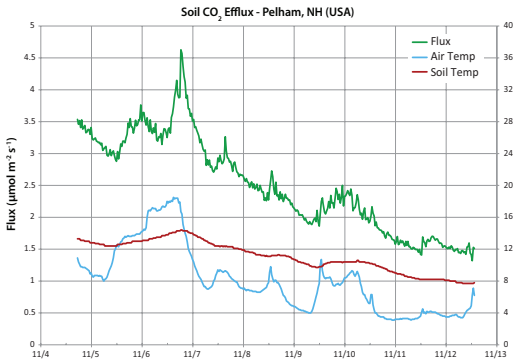
No limit to where systems can be placed in the field.
No need for multiplexing chambers!

- **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)
- **Easy Installation & Setup**
- **Fully Automatic, Programmable & Stand-alone Operation**

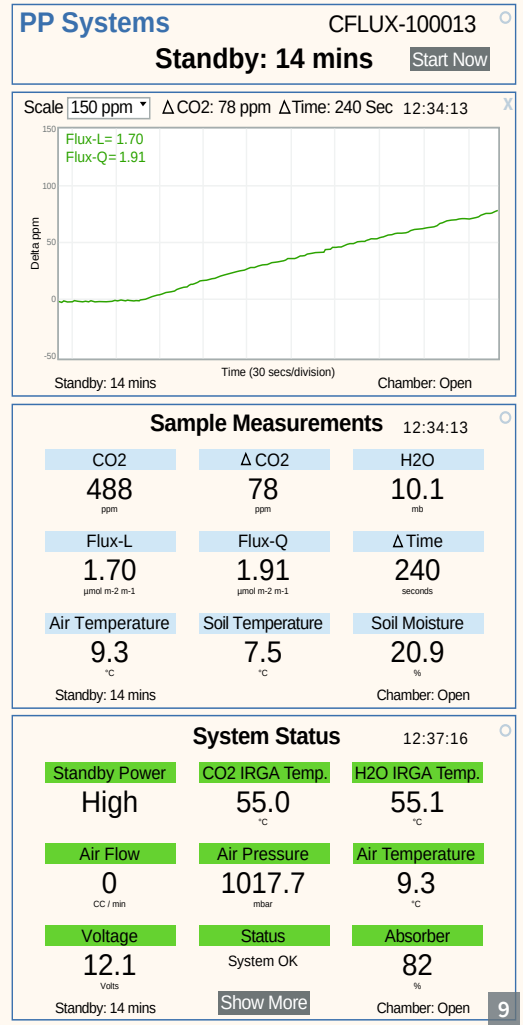
- **Full Data Storage**
  Direct to a USB Flash Drive (memory stick) or external data logger

Software & Data Analysis

- > Easily view sensor data and information via computer 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.



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

Accurate • Reliable • Stable

Since 1984, 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-4, 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 **HydraProbe II Soil Moisture & Soil Temperature Probe**

Sample Injection Kit

Environmental Sensors

Full Spectrum 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

Accessories Lightweight. Field-ready. Plug & play.
Expand the measurement capabilities of your equipment.

Net Canopy CO_2 Flux
CPY-5 Canopy Assimilation Chamber

Soil Moisture & Soil Temperature
Stevens HydraProbe

Insect Respiration
Insect Respiration Chamber

PAR – Full Spectrum
Apogee Full Spectrum Quantum Sensor

Soil CO_2 Efflux
SRC-2 Soil Respiration Chamber

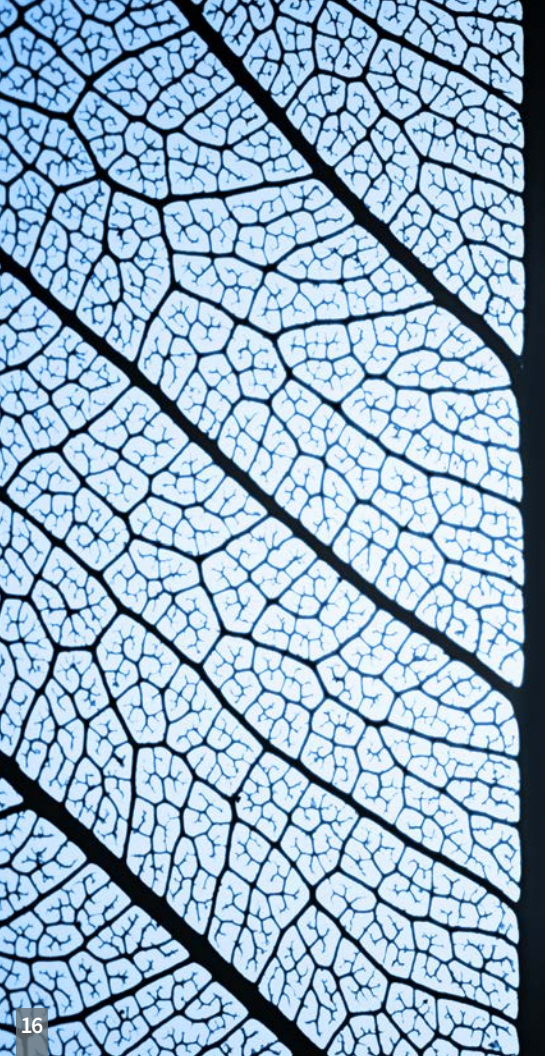
Soil Temperature
STP-2 Soil Temperature Probe

Temperature & PAR
TRP-3 Temperature/PAR Probe

Small Volume Sampling
Sample Injection Kit

Accessory Compatibility *by instrument*

Chambers & Sensors	CIRAS-4	CIRAS-3	TARGAS-1	CFLUX-1	EGM-5	WMA-5	SBA-5
CPY-5 Canopy Assimilation Chamber	●	●	●		●		
HydraProbe (Soil Moisture & Soil Temperature)				●	●		
Insect Respiration Chamber	●	●					
Quantum Sensor (PAR)			●		●		
SRC-2 Soil Respiration Chamber	●	●	●		●		
STP-2 Soil Temperature Probe			●		●		
TRP-3 Temperature/PAR Probe			●		●		
Integrated Options							
H_2O Solid State Sensor					●	●	●
O_2 Electrochemical Sensor					●	●	
WiFi					●	●	
Kits							
Sample Injection Kit			●			●	



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 from 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 at **+1 978.834.0505**.

PP SYSTEMS
ppsystems.com

110 Haverhill Rd, Suite 301
Amesbury, MA 01913
TEL: +1 978.834.0505
FAX: +1 978.834.0545
sales@ppsystems.com