

# TARGAS-1

## Portable Photosynthesis System



Redefining the Boundaries of Life Science Research

- Photosynthesis
- Soil Respiration
- Canopy Assimilation
- Environmental Monitoring

# TARGAS-1 | Main Console

## CO<sub>2</sub> & H<sub>2</sub>O Gas Analysis

The **TARGAS-1** console is compact, lightweight (2.1 kg) and is packaged in a rugged, aluminum enclosure with a shock absorbing polyurethane base making it extremely robust and reliable under harsh environmental conditions. It incorporates two non-dispersive infrared gas analyzers for CO<sub>2</sub> and H<sub>2</sub>O ensuring accurate measurement and control of both CO<sub>2</sub> and H<sub>2</sub>O. An internal air supply unit provides accurately controlled reference air to the leaf cuvette and another pump draws the sample (analysis) air to the gas analyzer. Both pumps are user controlled and accuracy is ensured by two internal electronic flow sensors.

The **TARGAS-1** is perfectly suited for applications that demand portability and a high degree of accuracy and control with minimal maintenance. The design of the instrument ensures an inherent calibration stability that has been confirmed by many years of experience in gas analysis technology.



Rear Panel

The **TARGAS-1** gas analyzers should not require frequent recalibration, although we do recommend periodic checks to confirm system integrity. Both the CO<sub>2</sub> and H<sub>2</sub>O gas analyzers employ a non-dispersive, infrared measurement technique, coupled with microprocessor-based signal processing, to achieve excellent stability and specificity to CO<sub>2</sub> and H<sub>2</sub>O. Our innovative "Auto-Zero" technology ensures fast warm-up, long term stability, accuracy and analyzer calibration. It also minimizes the effects on span gas sensitivity, sample cell contamination, IR source aging, changes in detector sensitivity and electronics.

All electrical and gas connections, USB interface, power and desiccants are conveniently located on the console rear panel.

# Powerful Battery Technology

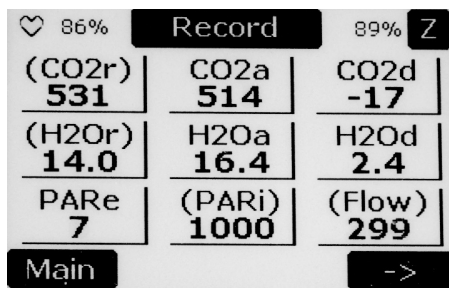
The **TARGAS-1** is supplied with a very efficient, powerful and rechargeable Li-ion battery capable of providing operation in the field for up to 10 hours. The instrument can also be used with an AC power supply (included) for continuous operation from the mains in the laboratory.

# Data Storage

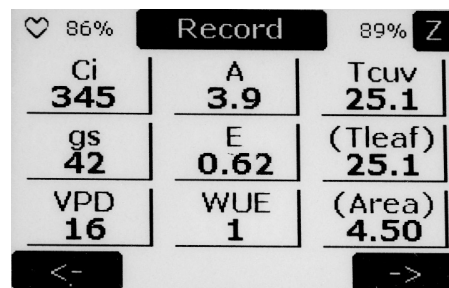
Data storage is virtually unlimited. Data is stored on a USB flash drive (memory stick) for safe storage and easy transfer of data to your PC.

# Touch Display

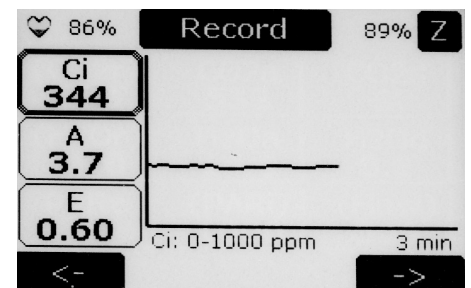
An innovative, large, touch display (EPD) features simple and intuitive system navigation and it offers excellent viewing under high sunlight.



Measured Data



Calculated Data



Graphic Data

# PLC Leaf Cuvette



The **PLC Leaf Cuvette** is extremely versatile and light weight (0.7 kg) making it ideal for measurement on a wide variety of vegetation including broad leaves, narrow leaves, grasses and small needle conifers. It includes sensors for measurement of air temperature and PAR. All leaf cuvette materials are carefully selected to minimize influences such as infrared radiation, water sorption, CO<sub>2</sub> effects and leaks. The leaf gaskets provide an air-tight seal without causing damage to vegetation.

# Light Unit (Optional)

An optional, low power LED based light unit is available for light control if required. It is a useful option for light response curves and for use on cloudy days. The unit clips onto the head of the PLC5 Leaf Cuvette and it can easily be removed for measurement under ambient conditions.

- Type: LED (white)
- Measurement Range: 0 - 2500  $\mu\text{mol m}^{-2} \text{s}^{-1}$



# Chambers for Use with TARGAS-1

## Soil Respiration

Our **SRC-2 Soil Respiration Chamber** can be used with the **TARGAS-1** for easy, accurate and rapid measurement of soil CO<sub>2</sub> efflux. The chamber is constructed out of rugged PVC with stainless steel ring (for sealing) and it includes an internal fan for flushing and mixing the air and an air temperature sensor.

- Dimensions: 150 mm (Height) x 100 mm (Diameter)

Collars (optional) are also available for use with the SRC-2 chamber.

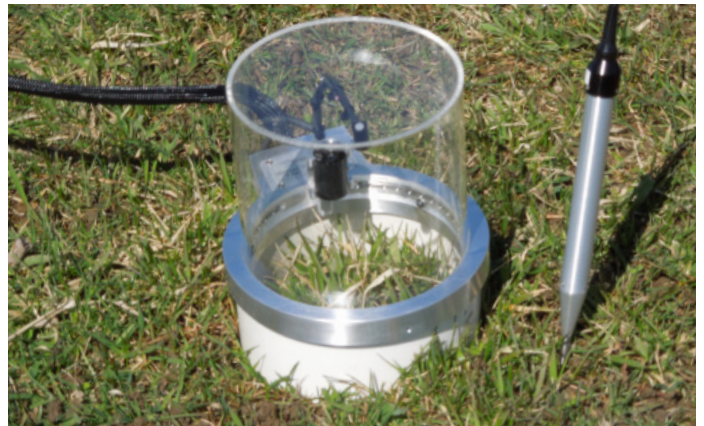


## Canopy Assimilation

Our **CPY-5 Canopy Assimilation Chamber** can be used with the **TARGAS-1** for easy, accurate and rapid measurement of net canopy CO<sub>2</sub> flux on low lying vegetation. The chamber is transparent and it includes a fan for flushing and mixing the air and sensors for measurement of air temperature and PAR.

- Dimensions: 145 mm (Height) x 146 mm (Exposed Diameter)
- Exposed Area: 167 cm<sup>2</sup>

Collars (optional) are also available for use with the CPY-5 chamber.



## Environmental Sensors

### STP-2 Soil Temperature Probe



A rugged, stainless steel probe for accurate measurement of soil temperature. It is commonly used with our SRC-2 Soil Respiration Chamber and CPY-5 Canopy Assimilation Chamber.

#### Soil Temperature Range

- 0 – 50°C

### Full-Spectrum Quantum Sensor



A full-spectrum sensor for accurate measurement of PAR (Photosynthetically Active Radiation) in the lab or in the field under all light sources.

#### PAR Range

- 0 – 3000  $\mu\text{mol m}^{-2} \text{s}^{-1}$

### TRP-3 Temperature/PAR Probe



A single probe for accurate measurement of air temperature and PAR.

#### Temperature Range

- 0 – 50°C

#### PAR Range

- 0 – 3000  $\mu\text{mol m}^{-2} \text{s}^{-1}$

# Technical Specifications

## Main Console

<b>Analysis Method</b>	Two non-dispersive infrared gas analyzers, configured as an absolute absorptiometer with microprocessor control of linearization for both CO <sub>2</sub> and H <sub>2</sub> O. All readings are automatically corrected for temperature, pressure and foreign gas broadening.
<b>CO<sub>2</sub> Range</b>	0 – 10000 µmol mol <sup>-1</sup> Precision: 1 µmol mol <sup>-1</sup>
<b>H<sub>2</sub>O Range</b>	0 – 75 mb
<b>Pressure Compensation Range</b>	80 – 115 kPa
<b>Absolute Accuracy</b>	< 1% of span concentration over the calibrated range but limited by the accuracy of the calibration mixture
<b>Differential Accuracy</b>	+/- 1 umol mol <sup>-1</sup> for CO <sub>2</sub> differential up to 50 µmol mol <sup>-1</sup>
<b>Linearity</b>	< 1% throughout the range
<b>Stability</b>	Auto-Zero at regular intervals corrects for sample cell contamination, source and detector aging and changes in electronics.
<b>Calibration</b>	User programmable calibration (if required)
<b>Warm-up Time</b>	Approximately 15 minutes
<b>Air Supply Unit</b>	Integral pump for supply of reference air to the leaf cuvette Range: 200 - 500 cc/min CO <sub>2</sub> and H <sub>2</sub> O Control: User adjustable from 0 - 100% of ambient. A smoothing volume is recommended for fresh air intake. An internal electronic flow sensor monitors flow rate.
<b>Sampling Pump</b>	Integral pump for sample (Analysis) air Range: 50-200 cc/min An internal electronic flow sensor monitors flow rate.
<b>Sampling Rate</b>	10 Hz. Sample data is averaged and output every 1.0 seconds.
<b>Digital Output</b>	USB
<b>Gas Flow Rate</b>	200-500 cc/min (280-340 cc/min is optimal). An internal electronic flow sensor monitors flow rate.
<b>Terminal Block</b>	10 pin terminal block for system inputs and outputs
<b>Analog Output</b>	0 – 2.5V (CO <sub>2</sub> range selectable)
<b>Digital Output</b>	One mini USB for connection to external PC
<b>Environmental Sensor Inputs</b>	2 inputs available for use with external chambers and environmental sensors
<b>Alarm</b>	Visual and audible alarm/warnings
<b>Data Storage (USB)</b>	USB Flash Drive port for data storage in multiple formats
<b>Mini USB</b>	For connection to external PC
<b>Touch Display</b>	2.7" electronic paper touch display with 264 x 176 pixel resolution
<b>Power</b>	Internal, rechargeable 7.4V, 8.7 Ah Li-Ion battery provides up to 10 hours of continuous use
<b>Power Consumption</b>	Warm up: 15W (12V @ 1.0A) Normal operation: 7.2W (12V @ 0.6A)
<b>Enclosure</b>	Rugged, ergonomic, lightweight aluminum with polyurethane base
<b>Gas Connections</b>	Two quick connect fittings (inlet and exhaust) for use with 1/8" (.125") ID tubing
<b>Operating Temperature</b>	0 – 50°C, non-condensing External filtration is recommended in dirty/dusty environments.
<b>Dimensions</b>	20 cm L x 20 cm H 10 cm W (Enclosure only)
<b>Weight</b>	2.1 kg

## PLC5 Leaf Cuvette

<b>Cuvette Materials</b>	The materials of construction are carefully selected to ensure maximum accuracy and repeatability of gas exchange measurements.
<b>Stirring Fan</b>	High speed fan provides efficient mixing of the air inside the leaf chamber for ensuring rapid measurement and minimal boundary layer resistance.
<b>Cuvette Window</b>	18 mm x 25 mm (4.5 cm <sup>2</sup> )
<b>Air Temperature Sensor</b>	Precision Thermistor Range: 0-50 °C Accuracy: ± 0.3 °C at 25 °C
<b>PAR Sensor (External)</b>	Cosine corrected  Response: 400 - 700 nm Range: 0 - 3000 µmol m <sup>-2</sup> s <sup>-1</sup> Accuracy: 10 µmol m <sup>-2</sup> s <sup>-1</sup>
<b>Dimensions</b>	30 cm L x 3 cm (Handle Diameter)
<b>Weight</b>	0.7 kg

## Light Unit (Optional)

<b>Type</b>	Low power LED light unit (White LEDs) easily mounts to the PLC5 Broad Leaf Cuvette.
<b>Control Range</b>	0 - 2500 µmol m <sup>-2</sup> s <sup>-1</sup>
<b>Dimensions</b>	6 cm (L) x 6 cm (H) x 5 cm (W)
<b>Weight</b>	0.1 kg

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