

# LCi

## *The Ultra Compact Photosynthesis Measurement System*

- ~ *Ultra compact*
- ~ *Weighs only 2kg*
- ~ *Miniaturised IRGA in leaf chamber*
- ~ *Affordable research instrument*
- ~ *Interchangeable chamber heads*
- ~ *Unlimited data storage*



### ULTRA COMPACT AND RUGGED

*The LCi is our smallest, lightest and most user friendly Portable Photosynthesis Measurement System ever. It allows access to field sites previously unconsidered using a conventional IRGA system.*

*Featuring ADC's new miniaturised infrared gas analyser, the LCi is less than half the weight and size of most traditional systems. Full functionality, flow control and data logging are all contained within the ultra compact LCi console.*

*Powered by a small 12V rechargeable battery and incorporating the latest in low power consumption technology, the LCi will operate fully for up to 10 hours from a single charge. In the field, the LCi can be used with the conventional ADC shoulder strap or worn on a belt.*

*Designed for harsh field conditions, the LCi maintains optimal experimental performance even in high humidity or dusty environments.*

*Weighs only 2kg  
New miniaturised CO<sub>2</sub> IRGA  
10 hour battery operation*

## ADC EXPERIENCE, INNOVATION AND QUALITY

For 30 years ADC's name has been synonymous with photosynthesis measurements. Since the introduction of the first gas exchange systems, ADC has been at the forefront of instrumentation developments designed to make your research ever more sophisticated, using more user-friendly and portable equipment.

ADC is committed to quality: Quality of product and quality of service.

From design to delivery, ensuring optimal performance and reliability is of paramount importance to our team of experienced engineers. Once in the field you are supported by our network of over 30 customer support centres world-wide.

As an independent company dedicated solely to the requirements and aspirations of plant science researchers, ADC BioScientific now introduces the future of ultra portable photosynthesis measurement instrumentation: the LCi



*Complete photosynthesis &  
transpiration data*  
*Quality research instrument*

## MINIATURISED IRGA IN LEAF CHAMBER

For two decades ADC has set the standards in the design of portable differential CO<sub>2</sub> Infrared gas analysers. Drawing on the experience of supplying well over 1,000 such systems, ADC has now developed a miniaturised format of this proven IRGA. The Mini-IRGA, housed inside the new LCi plant leaf chamber, provides accurate, fast and reliable gas exchange performance for classic photosynthetic experimentation.

Operating in a flow through or 'open system' mode, the LCi has an absolute and differential operating range of 0-2000ppm CO<sub>2</sub>. Resolving to 1ppm CO<sub>2</sub> combined with minimal drift, all CO<sub>2</sub> measurements are automatically compensated for atmospheric pressure and temperature.

To provide the user with full photosynthetic data, the LCi Plant Leaf Chamber encloses a number of quality environmental sensors. Two laser trimmed water vapour sensors provide reliable transpiration data. High calibre sensors for Photosynthetic Active Radiation, chamber and leaf temperature are also incorporated.

To counteract fluctuations in ambient CO<sub>2</sub> concentrations, the LCi features the new internal buffer, which for many applications removes the need to use a large external volume.

System flow rates are controllable in the range of 150-500 ml/min.



*Ultra compact*  
*Differential open system*

## USER FRIENDLY - IN OPERATION AND MAINTENANCE

The LCi has been designed to be the most user friendly portable gas exchange system ever developed. It is not only highly portable but ergonomically conceived to be easy to operate and maintain. The LCi, therefore, is not only a powerful research tool but it is also the ideal photosynthesis teaching instrument.

Experimental programming and operation of the LCi is effortless. Complete functionality is achieved with just five fast keys driving a series of simple menus. All photosynthesis data and calculations are clearly presented on a large high definition liquid crystal display.

Display parameters include:

- Ambient CO<sub>2</sub> and Water vapour
- Differential CO<sub>2</sub> and Water vapour
- Chamber and leaf temperatures
- Flow rate
- Atmospheric pressure
- Photosynthetic active radiation
- Photosynthesis rate
- Substomatal CO<sub>2</sub>
- Transpiration rate
- Stomatal conductance
- Battery status



The LCi has been developed with the field researcher in mind. Quick and easy access to user serviceable parts, such as battery, fuses, chemical columns, filters and sensors means that the LCi can be maintained in even the most remote of field locations.

*Developed for the field researcher  
Fast key operation*

## INTERCHANGEABLE CHAMBER HEADS

The LCi plant leaf chamber features interchangeable heads. These are easily and quickly exchanged in the field with only a small coin being required. Broad, Narrow and Conifer heads are available.

Boundary layer resistances and concentration gradients are minimised irrespective of which head is in use. Chamber materials have been carefully chosen to ensure that there is minimal interaction with CO<sub>2</sub> or Water vapour.

The LCi plant leaf chamber is simple to operate with a thumb triggered opening mechanism. All areas of the chamber are easily accessed for cleaning.

*Exchangeable PC cards  
Variety of interchangeable heads*

## UNLIMITED DATA STORAGE

The LCi features unlimited data storage. All photosynthesis data and calculations are stored on easily exchangeable PC (PCMCIA) cards. This popular feature, already incorporated in other ADC gas exchange instrumentation, allows separate PC cards to be used for individual users or for specific experimental applications.

Data recording can be initiated direct from the control console or via a remote button on the Plant Leaf Chamber.

Experimental data may be downloaded via the RS232 port or transferred directly from the PC card to a computer. The ASCII data format is compatible with major spreadsheet packages.



## Technical Specification

### Measurement range and technique:

**CO<sub>2</sub>:** 0 - 2000ppm, 1ppm resolution.  
Infrared gas analysis, differential open system, auto zero, automatic atmospheric pressure and temperature compensation

**H<sub>2</sub>O:** 0 - 75mbar. 0.1mbar resolution.  
Two laser trimmed fast response water vapour sensors

**PAR:** 0 - 3000  $\mu\text{mols m}^{-2} \text{sec}^{-1}$   
Silicon photocell

**Chamber temperature:** 0°C to 50°C  
Precision thermistor  
+/- 0.2°C accuracy

**Direct leaf temperature:** 0°C to 50°C  
Energy balance / Microchip thermistor

### Gas exchange:

**Repeatability:** CO<sub>2</sub> : 0.1% of reading @ 350ppm  
H<sub>2</sub>O : 0.5% RH

**Linearity:** CO<sub>2</sub> : 0.5% of reading  
H<sub>2</sub>O : 0.5% RH

**Temperature effect on span:** CO<sub>2</sub> : <0.05% of f.s.d. per °C

**Flow rate on PLC:** 100ml to 500ml min<sup>-1</sup>

**Flow rate accuracy:** +/- 2% of f.s.d.

**Display:** 240 x 64 dot matrix super twist LCD

**Warm up time:** 5 minutes @ 20°C

**Recorded data:** Removable RAM cards typically store 2,000 sets of data on a 128K Byte card. Cards are PCMCIA type 1 and up to 1M Byte cards are supported

**Battery:** 2.6 AH lead acid 12V battery. Life up to 10 hours

**Battery charger:** 100 to 120V or 200 to 240V (user selectable) 50/60 Hz

**Analogue output:** Single 0 - 5V on user selected parameters

**RS232 output:** User selected rates of up to 19200 baud for printer or computer connection

### Electrical connections:

**Power + analogue out:** 5 Pin Din

**RS232:** 9 Pin 'D' type

**Aux:** Mini coax

**Leaf chamber:** 15 Pin high density 'D' type  
3mm barbed

### Gas connections:

**Power requirements:** 0.3A @ 12V DC

**Operating temperature:** 5°C to 45°C

**Dimensions**  
**H x W x D (overall):** Console: 240 x 125 x 140mm  
Plant Leaf Chamber: 300 x 80 x 75mm

**Weight (typical):** Console: 2.4kg  
Plant Leaf Chamber: 0.6kg

