



## Automated Soil CO<sub>2</sub> Exchange System

### Long-term unattended operation

The ACE Station can automatically expose the soil being analysed to ambient conditions between measurement cycles. At user-set time intervals, the chamber automatically covers the soil to carry out soil flux measurements, then re-exposes the soil once these measurements are completed.

Each ACE Station comprises an anodised aluminum soil chamber, heat reduction parasol, pivoting arm, and control console which displays and records measurements. Each Station can operate fully independently for single point measurements. Data storage is on easily exchangeable CompactFlash cards.



### Integral CO<sub>2</sub> analyser inside soil chamber

- Fast CO<sub>2</sub> response time**
- Avoids gas hang-ups or water vapour drop out**
- Power efficient**
- Easy to install**
- Field rugged**

A highly accurate CO<sub>2</sub> infrared gas analyser is housed directly in each soil chamber. There are therefore no complex gas circuits to set up between an analyser and a separate soil chamber.

The close proximity of the analyser ensures accurate, straightforward and robust field measurements. The fastest possible response time to CO<sub>2</sub> changes is assured. Any potential gas "hang ups" or water vapour drop out in long lengths of tubing is avoided. Experimental set up is much simpler and the system is much more field robust. The ACE Station is also very power efficient as gas is not pumped from the chamber to an analyser that could be several meters of tubing away.

### Flux, moisture and temperature data

Up to 6 soil temperature sensors and up to 4 soil moisture sensors may also be directly connected to each ACE Station.

### Open and Closed operational modes

ACE Stations are available in either a closed system or an open system configuration.

**Closed Mode:** A measurement is made once the chamber is sealed. CO<sub>2</sub> inside the large 2.6L chamber will then increase due to soil activity. The rate of soil flux is determined from the increase in CO<sub>2</sub> concentration after a user-defined time interval. These measurements are simple and fast.

**Open Mode:** When the chamber seals, ambient air is passed through the smaller 1.0L chamber at a controlled rate. Soil flux or rate of change is then determined at equilibrated conditions within the chamber. These measurements, although slower, are regarded as more accurate by many researchers as they are less influenced by changes within the enclosed chamber or variations in the soil structure.

### Transparent Chamber

For applications where there is small vegetation growing on the soil surface, transparent versions of both the open and closed chambers are available for measuring net CO<sub>2</sub> exchange within the chamber area.



# ACE Network

Although an ACE Station can function fully independently for single point measurements, typically a number of Stations are used in combination, as a network, at an experimental field site.

Up to 30 ACE Stations can be connected together in an ACE Network via an ACE Master control unit. This Master control unit will supply power to and collect data from all Stations and control all Stations within the experiment. The Master control unit is housed in a waterproof, steel enclosure that features a graphic display, CompactFlash card drive, 30 ACE Station docking ports and 2 battery ports.



**Up to 30 ACE Station experiment**

**200m diameter experimental area**

**Easy to set up and program**

**No connecting gas tubing**

**Power efficient**

1	22.7	7	22.5	13	n/a	19	10.6	26	u/r
2	14.6	8	23.0	14	14.7	20	n/a	27	33.5
3	14.4	9	24.1	15	14.8	21	o/r	28	33.2
4	55.3	10	23.3	16	55.2	22	11.2	29	12.7
5	22.9	11	23.2	17	25.2	23	12.4	30	55.6
6	22.8	12	23.0	18	24.7	24	33.6	31	44.3
						25	44.2	32	u/r

Ok

Record	1	dt	01:06:06	tm	13:07
Cref	430	Cmeas	474	ΔC	44
U	230	NCER	17.0	T1	23.4

1st - last    prev    next    more



## Technical Specification

### ACE Station

Measurement of CO<sub>2</sub>: Standard range nominally 40.0 mmols m<sup>-3</sup> (0-896ppm at standard temperature and pressure)  
0.05mmols m<sup>-3</sup> resolution (1ppm).  
Infrared gas analyser housed directly adjacent to soil chamber.  
Differential open or closed system.

Measurement of PAR: 0 - 3000μmols m<sup>-2</sup> sec<sup>-1</sup>. Silicon photocell

Measurement of soil temperature: 6 selectable inputs for thermistors

Measurement of soil moisture: 4 selectable inputs for commercially available sensors.

Flow control to chamber: 200ml - 5L min<sup>-1</sup>

Flow control accuracy: +/- 3% of f.s.d.

Display: 240 x 64 dot matrix LCD.

Programming: Each ACE station has a user-friendly interface driven by only 5 keys

Recorded data: Removable CompactFlash cards

Internal battery: 12V standby 1.0Ah battery back up (Networked Station only)

Power supply: External battery, solar panel or wind turbine. One 40Ah car battery provides power for ca.28 days of continuous use

RS232 output: User selectable rates of up to 19200 baud

Electrical connections: Robust, waterproof 3 pin and 5 pin RS232

Dimensions: 82 x 33 x 13 cm

Closed chamber volume: 2.6L

Open chamber volume: 1.0L

Soil collar diameter: 23cm

Weight: 9.0 kg

### Master Control Unit

Construction: Steel electrically sealed enclosure

Electrical Connections: 30 ACE Station docking ports

Display: Graphic 240 x 64 dot matrix LCD

Programming: User-friendly interface driven by only 5 keys

Recorded data: Dual Compact Flash card drive

RS232 output: User selectable rates of up to 19200 baud

Power connection: 100 - 240 VAC

Dimensions: 40 x 40 x 20 cm

Weight: 12.0 kg