

SRS series



Portable soil respiration systems



SRS1000
Ultra compact soil
flux system



SRS2000
Intelligent portable
soil flux system

Soil respiration is of interest to scientists in a variety of field research disciplines including:

- Carbon Balance
- Microbial Ecology
- Soil Biomass
- Bioremediation
- Pesticide Impact
- Eddy Covariance

Field soil flux experimentation

Soil respiration can be defined as the net CO₂ production and O₂ consumption of a soil. The amount of gas exchange taking place is frequently used as an indicator of microbial soil activity. Because micro-organisms are the driving force for many biochemical processes (decomposition, humification etc.) their activity in the soil is sometimes used to characterise the “health” of that soil.

In practice soil respiration is produced by many organisms within the soil including roots, bacteria, fungi, protozoa, fungi and animals. The rate of soil respiration, or flux, can be influenced by many parameters including organic matter content, soil moisture and soil temperature.

Interest in the relationship between soil respiration and environmental parameters has increased in recent years as global warming and increasing atmospheric CO₂ levels have risen up the international political agenda.

Field research requires portability and performance

To enable researchers to conduct sophisticated short-term soil flux experimentation, ADC BioScientific has developed two truly portable soil flux systems that offer researchers superior performance for a variety of applications.

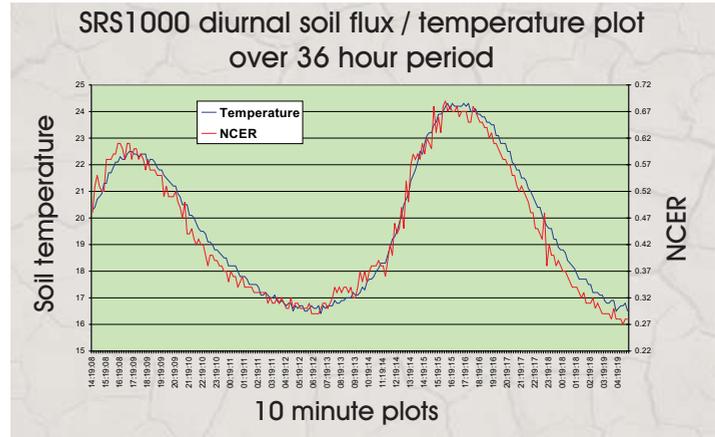
Both the SRS1000 and SRS2000 consist of a console programming unit and a soil respiration chamber and work in an “open system” mode.

The ADC SRS1000 and SRS2000 systems are the smart way of measuring short-term soil respiration.

Fast response and stable IRGA

Both the SRS1000 and SRS2000 feature a highly accurate CO₂ infra red gas analyser (IRGA) housed directly adjacent to the soil chamber, ensuring the fastest possible responses to gas exchanges from the soil.

The IRGA has an operating range of 0-2000ppm CO₂, with a resolution of 1ppm. The IRGA has been designed to have minimal drift and excellent measurement stability. All measurements are automatically compensated for changes in atmospheric pressure and temperature.



* The graph shows the stability of CO₂ measurements during a 36 hour diurnal soil flux / temperature plot

High quality soil chamber design



Both the SRS1000 and SRS2000 feature a high quality soil respiration chamber, specifically designed for short-term soil flux measurements. The chamber consists of a lower stainless steel collar and an upper measurement compartment. There are sensors for measuring PAR and soil temperature. Great care has been taken in the design to ensure that no unwanted influences affect the soil flux data:

- **No Pressure gradients:** Pressure variations in some soil chamber designs can lead to a suppressing or enhancing of CO₂ exchanges. Incorporation of a novel pressure release valve ensures that there is no such difference between the chamber head space and outside atmospheric pressure
- **Insensitive to wind:** Independent evaluations have proved there to be no change in measurement data when air is forced over the chamber at varying speeds and in different directions.
- **Stainless steel soil collar:** The collar is inserted into the soil to ensure the optimal positioning of the chamber, regardless of soil condition or type. There is minimal disturbance to the soil during placement. This collar may be left in the soil for long-term comparative studies. Collars are available separately for multiple site studies.

Truly portable and easy to use

Both the SRS1000 and SRS2000 are truly field portable and easy to use. They are battery operated, incorporating the latest in low power consumption technology allowing full operation for up to 16 hours from a single charge.

Full functionality, flow control and data logging are all contained within the compact console. Experimental programming and operation is achieved with just five keys to drive a series of simple menus. All soil respiration data and calculations are clearly presented on a large high definition liquid crystal display.

Both the SRS1000 and the SRS2000 feature unlimited data storage. All data, calculations and experimental protocols are stored on easily exchangeable PC cards. This popular feature, already incorporated into other ADC gas exchange instrumentation, allows separate PC cards to be used for individual users or for specific experimental applications.

Experimental data may be downloaded via the RS232 port or transferred directly from the PC card to a computer.



Soil flux data presented includes:

C'ref	NCER
C'an	Wflux
Delta'C	Ce
e'ref	T (soil)
e'an	Tch
Delta'e	PAR

SRS1000 Ultra compact soil flux system

Accurate soil flux data in ambient conditions



- Highly portable
- Highly accurate CO₂ IRGA
- Optimised soil chamber
 - No pressure gradients
 - Insensitive to wind currents
- Easy to use

The SRS1000 is an ideal choice for characterising diurnal respiration patterns.

Weighing only 2Kg the SRS1000 is a highly portable soil flux system making it suitable for even the remotest field site. Battery operated, it will work continuously for up to 10 hours from a single charge. The automated on-board logging provides enough space for weeks of soil respiration data.

The open system design, with ambient air flowing through the chamber, ensures that the soil is not subjected to a build up in CO₂ concentration above the soil, that could inhibit respiration.

SRS2000 Intelligent portable soil flux system

Sophisticated short-term soil flux experimentation

- Truly portable
- Highly accurate CO₂ IRGA
- Optimised soil chamber
 - No pressure gradients
 - Insensitive to wind currents
- Automatic CO₂ / H₂O control
- Graphic display

The SRS2000 features all the benefits of the SRS1000 with additional facilities for more sophisticated soil flux experimentation.

This includes the same highly accurate and stable fast response CO₂ IRGA and the same specially designed soil chamber.

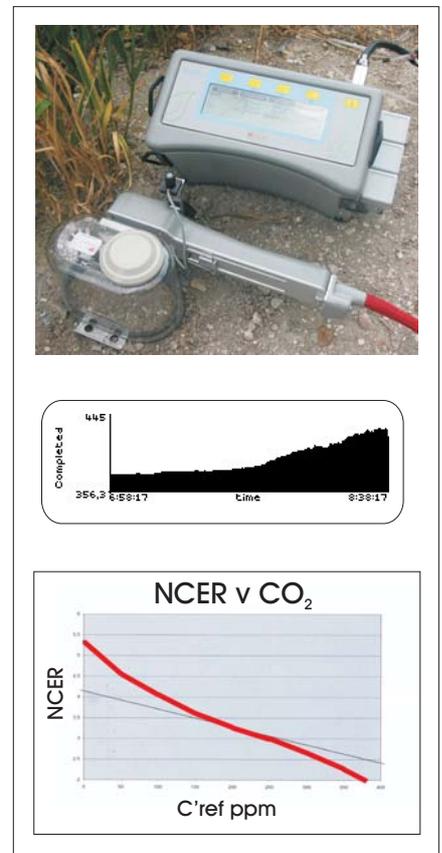
For enhanced experiments, both CO₂ and H₂O can be automatically controlled within the SRS2000 soil chamber, allowing soil flux to be determined at different CO₂ concentrations and to help prevent condensation.

CO₂ and H₂O can both be controlled independently at a single concentration or automatically at sequential levels.

A graph display allows the easy monitoring of soil flux trends and the real time plotting of experimental curves.

Despite these additional features the SRS2000 weighs only 4Kg and will operate continuously for up to 16 hours from a single charge.

* The graph shows a typical S-shape curve when plotting NCER (net CO₂ exchange rate) against rising CO₂ concentrations in the soil respiration chamber, proving that soil flux rates can be affected by diffusion gradients.



Versatile research instrument



Both the SRS1000 and SRS2000 are highly versatile gas exchange systems. A variety of easily interchangeable plant leaf chambers are available which quickly convert the SRS1000 or the SRS2000 into the most portable research photosynthesis systems ever.

Full photosynthetic data and calculations are displayed and recorded.

In addition to the control of CO₂ and H₂O, the SRS2000 plant leaf chamber heads also offer the full and automatic control of PAR and temperature.

These multi-purpose gas exchange systems are the solution to endless applications and offer outstanding value for money for any multi-disciplined research facility.

SRS series technical specifications

		SRS1000 and SRS2000
Gas exchange:	CO ₂ :	0-2000ppm, 1ppm resolution Infrared gas analyser. 0.1% of reading repeatability @ 350ppm. Temperature effect <0.05% of f.s.d. per °C
	H ₂ O:	0-75mbar, 0.1mbar resolution two fast response water vapour sensors 0.5% repeatability
Other sensors:	Chamber temperature:	0°C to 50°C, precision 1.5%. Precision thermistor.
	Soil temperature:	0°C to 50°C, precision 1.5%. Precision thermistor.
	PAR:	0-3000umols m ⁻² sec ⁻¹ . Silicon photocell
CO₂ control:		SRS2000 only: 0-2000ppm using CO ₂ sparklet bulbs. Automatic single point and sequential level programming.
H₂O control:		SRS2000 only: 0-100% non condensing using conditioning chemicals. Automatic single point and sequential level programming.
Flow rate to chamber:		100-500ml min ⁻¹
Display:		SRS1000: 240 x 64 dot matrix LCD SRS2000: Graphic display 240 x 64 dot matrix LCD
Warm up time:		5 minutes @ 20°C
Recorded data:		Removable RAM cards typically stores 8,000 sets of data on a 512K byte card. Up to 1MB cards supported.
Battery:		SRS1000: 2.6Ah lead acid 12V battery. 10 hour life SRS2000: 6.8Ah lead acid 12V battery. Up to 16 hour life
Battery charger:		90-260V, 50/60 Hz
RS232 output:		SRS1000: User selected up to 19200 baud for printers or PC connection SRS2000: User selected up to 38400 baud for printers or PC connection
Operating temperature range:		5°C to 45°C
Dimensions:	Chamber volume:	1L
	Console (HxWxD):	SRS1000: 230 x 110 x 140mm SRS2000: 230 x 110 x 170mm
	Soil chamber (HxWxD):	11 x 85 x 145 mm (ellipse)
Weight:	Console::	SRS1000: 2.4Kg SRS2000: 4.4Kg
	Soil chamber:	190gms

