SRS *T* series

ADC BioScientific Ltd.

Soil Respiration Systems for the field

SRS1000 *T* and SRS2000 *T*

Soil respiration systems designed for field portability
Determine Net Carbon Exchange Rate
Instant, touch screen data entry
Measure water vapour flux
Colour, real time graphing
360º screen visibility
GPS

Designed for field use

Portable and reliable

Both the SRS1000 *T* and SRS2000 *T* can be comfortably carried either in the hard shell case, or whilst wearing on a shoulder/waist strap. Designed for prolonged, reliable operation in harsh field conditions, both systems maintain optimal performance even in highly humid and dusty climates.

Reliable battery life

Powered by a 12V rechargeable battery and incorporating the latest in low power consumption components, the SRS1000 *T* will function continuously for up to 10 hours on a single charge, whilst SRS2000 *T* will operate for up to 16 hours on a full charge.

GPS to pinpoint your data

Both systems are fitted with a GPS unit to record the exact position of every measurement taken when outdoors. Latitude, longitude and altitude data are all recorded, displated on a GPS menu screen, and integrated into the data file for review upon download of data.

Expert measurement technique

Since 1969, ADC have been world leaders in the design and manufacture of infrared gas analysers (IRGAs). We have consistently advocated the **open mode** of analysis, whereby a constant flow of air and ambient pressure are maintained throughout the sample chamber.

The SRS1000 *T* and SRS2000 *T* carry out an **automatic zero** with every operational cycle, ensuring long-term measurement stability. In both systems, an expertly crafted, single **IRGA** is positioned directly adjacent to the soil chamber. This ensures accurate, fast and stable CO_2 flux analysis.

Gas flow rates to the specialised soil chamber are controlled from the SRS1000 *T* or SRS2000 *T* console, at an optimum range of 68 to 340m^{-2} sec^{-1}.

High quality sensors

The soil chamber encloses two, laser-trimmed humidity sensors to provide exceptionally accurate W*flux* data, and high calibre sensors to measure light above the soil (Q) and soil temperature.

Chamber climate control with SRS2000 *T*

- Elevation of CO_2 within the chamber up to 2000ppm
- Control of CO_2 'below ambient' within the chamber
- Humidity control, i.e. wetting chamber inlet air using iron sulfate (within the detachable column)

Taking measurements

Install the soil collar(s) and allow surrounding soil to settle for around 12 hours, ideally overnight.

Lock the upper soil chamber in place and set up your SRS on site.

By viewing the display, allow gas readings to stablise. Easily adjust chamber climate factors as relevant.

Record a measurement using either the record button, the record key on the display, or set automatic, timed logging, to a named data file.

Measurements are now safely stored.

1000s of measurements can be stored on the SD card and transferred to your PC.

Remove the upper chamber and leave the collar in place if you wish to return to this site, or move on to another, pre-installed collar.

Discover the Applications

Spatial and Temporal Soil CO_2 flux

Our soil respiration systems facilitate both spatial and temporal studies over a field site, or multiple sites.

Soil respiration measurement

Both systems are fitted with a high quality, robust soil chamber, comprising an upper compartment and a detachable, lower collar. A pressure release valve in the upper compartment ensures accurate field soil flux measurements, by minimising any potential pressure gradients and by being insensitive to wind.
The chamber volume is 1L.

Additional soil collars allow researchers to rapidly perform multiple soil flux measurements over a large site. Each collar is used to define a separate analysis area. These stainless steel collars can be left in the soil, enabling temporal studies to be performed.

Both systems are auto-configured to measure, display, calculate and record soil respiration parameters:

Water vapour flux ^{W}flux is calculated in m mol s^{-1} m^{-2}

Soil respiration Ce is calculated as the net molar flow of CO_2 in/out of soil (µmol s^{-1})

The Ce per unit area is used in the calculation of NCER (µmol s^{-1} m^{-2})

Adaptors for Soil Chambers

Adaptors are available for 6” / 160mm (left) and 4”/ 110mm (top right) to fit the soil collar directly onto PVC piping. Additional collars for deeper soils (lower right) are also available to fit soil collars. A sealing base is also available to contain samples within any depth of chamber.

NEW: Versatile Chamber

Two-part chamber allowing maximum light through to the sample area. The versatile chamber can be used over soil and/or small, whole photosynthetic organisms. This chamber has been used for the measurement of microalgal gas exchange in the Antarctic (Davey, M.P. Cambridge University, UK). Plants can also be grown in the sealed pot, or the lower collar can be embedded into growth

Soil Temperature Probe

A soil temperature probe is supplied with both systems.
The probe can be positioned by hand, once connected to the chamber handle.
A direct read-out of “Tsoil” as measured by the probe, is then available.
This parameter can be plotted against NCER or Ce in real time on the colour graphic display.

Selected SRS *T* series publications

1. Maldonado, J., González-Morales, S., & Janusauskaite, D. (2023). **The Allelopathic Activity of Aqueous Extracts of Helianthus annuus L., Grown in Boreal Conditions, on Germination, Development, and Physiological Indices of Pisum sativum L**. *Plants 2023, Vol. 12, Page 1920*, *12*(9), 1920. https://doi.org/10.3390/PLANTS12091920
2. Radzikowska-Kujawska, D., Sawinska, Z., Grzanka, M., Kowalczewski, P. Ł., Sobiech, Ł., Świtek, S., Skrzypczak, G., Drożdżyńska, A., Ślachciński, M., & Nowicki, M. (2023). **Hermetia illucens frass improves the physiological state of basil (Ocimum basilicum L.) and its nutritional value under drought**. *PLoS ONE*, *18*(1 January). https://doi.org/10.1371/journal.pone.0280037
3. Lang, R., Blagodatsky, S., Xu, J., & Cadisch, G. (2017). **Seasonal differences in soil respiration and methane uptake in rubber plantation and rainforest**. *Agriculture, Ecosystems and Environment*, *240*, 314–328. https://doi.org/10.1016/j.agee.2017.02.032
4. Jongen, M., Lecomte, X., Unger, S., Fangueiro, D., & Pereira, J. S. (2013). **Precipitation variability does not affect soil respiration and nitrogen dynamics in the understorey of a Mediterranean oak woodland.** *Plant and Soil*, *372*(1–2), 235–251. https://doi.org/10.1007/S11104-013-1728-7/FIGURES/8
5. Feiziene, D., Feiza, V., Kadziene, G., Vaideliene, A., Povilaitis, V., & Deveikyte, I. (2012). **CO_2 fluxes and drivers as affected by soil type, tillage and fertilization.** *Acta Agriculturae Scandinavica, Section B - Soil & Plant Science*, *62*(4), 311–328. https://doi.org/10.1080/09064710.2011.614272
6. Janusauskaite, D., Feiziene, D., & Feiza, V. (2017). **Nitrogen-induced variations in leaf gas exchange of spring triticale under field conditions**. *Acta Physiologiae Plantarum*, *39*(9), 1–12. https://doi.org/10.1007/S11738-017-2495-5/FIGURES/2
7. Kirsch, J. L., Fischer, D. G., Kazakova, A. N., Biswas, A., Kelm, R. E., Carlson, D. W., & LeRoy, C. J. (2011). **Diversity-Carbon Flux Relationships in a Northwest Forest**. *Diversity*, *4*(1), 33–58. https://doi.org/10.3390/d4010033

Online resources

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For the investigation of plant, soil and atmospheric interactions, ADC BioScientific Ltd. expertly produce a wide range of portable, user-friendly and cost-effective devices, from photosynthesis to soil respiration systems.

We are committed to enabling carbon cycle research worldwide through quality instrumentation and local, technical support.

ADC BioScientific Ltd. also supply: Portable Photosynthesis Systems, Leaf Area Meters, Chlorophyll Content Meters, Advanced Fluorometers, Automated Soil CO_2 Exchange Systems and Field Gas Analysers.

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SRS Technical Specifications

Gas Exchange CO_2:	SRS1000 ***T*** 0-2000ppm SRS2000 ***T*** 0-3000ppm 1ppm resolution Infrared gas analysis; differential open system, auto zero, automatic atmospheric pressure and temperature compensation
H_2O:	0-75mbar, 0.1mbar resolution Two laser-trimmed, fast response water vapour sensors
PAR:	0-3000µmol m^{-2} sec^{-1} Silicon photocell
Soil Temperature:	-5°C to 50°C Manually positioned soil thermistor probe
Automated environmental control SRS2000 ***T*** **only:**	Internal LC*pro* ***T*** menu driven software. Automatic and independent control of environmental conditions within the leaf chamber. For automatic response curves, sequential control levels and dwell times may be set.
CO_2:	Up to 2000ppm CO_2 by integral elevated CO_2 supply system
H_2O:	Above and below ambient (dependent on ambient conditions), by on-board self-indicating conditioning chemicals
Flow rate to soil chamber:	68 to 340µmol m^{-2} sec^{-1}
Gas connections:	3mm barbed
Warm up time:	5 minutes @ 20°C
Display:	Colour WQVGA touch sensitive LCD
Recorded Data:	Removable SD cards. 32Gb supported.
Battery:	
SRS1000 ***T*** :	2.8Ah 12V lead acid battery Up to 10 hours between charges
SRS2000 ***T*** :	7.5Ah 12V Lithium-ion battery Up to 16 hours between charges
Battery Charger:	Universal input voltage 13.8V output
Electrical Outputs: USB connection:	Mini-B Function as a mass storage device
RS232 output:	9 Pin "D" type User-selectable rates of up to 230400 baud for computer or printer connection
Operating temperature range:	5°C to 45°C
Dimensions W X D X H of console:	SRS1000 ***T*** 125 x 140 x 240mm SRS2000 ***T*** 230 x 110 x 170mm
Weight of Console:	SRS1000 ***T*** 2.4kg SRS2000 ***T*** 4.1kg
Soil Chamber Construction:	Stainless steel collar, cast Acrylic upper
Volume:	1L
Diameter:	130mm
Height:	Collar 75mm, Upper chamber 70mm
Weight:	Collar 325g, Upper chamber 320g

ADC BioScientific Ltd. retain the right to change any specification as part of their continual product development.