THE **SERCON GROUP**

SL AND GSL ELEMENTAL ANALYSERS

sercon
The *Stable* Isotope Company

SL AND GSL ELEMENTAL ANALYSERS

Sercon are dedicated to the design, manufacture and support of **Isotope Ratio Mass Spectrometers** and their associated **sample preparation systems.**

Backed by a wealth of experience in Isotope Ratio Instrumentation, we provide a full range of services specific to isotope ratio scientists and their applications.

Sercon continues the pioneering efforts of Europa Scientific. We are committed to the continuous development of our instrumentation and support services to ensure that ground breaking research needs are met.

To ensure that all Europa and Sercon instruments remain fully operational and productive, we offer a range of **upgrades** and **system refurbishments** from the Tracermass of the 1980s. All systems can benefit from electronics upgrades, pumping system renewal and ion optics refurbishments. All systems can be brought up to the latest technology.

In order to ensure the best possible performance at all times Sercon recommend an annual **service** of your instrument. Sercon are able to provide rapid on-site response from our team of specialist, experienced engineers. We can provide **remote support** via telephone and email. All of our users receive **training** as part of an installation programme. We can also provide further training on specific applications or tailor your course to your analytical needs.

As well as IRMS, Sercon supply **consumables** and **spares** of the highest quality for all isotope ratio monitoring mass spectrometers and elemental analysers. Our unique approach of providing the highest possible quality at the most competitive prices means that now all users can benefit from our products.

Sercon are the UK distributor for the complete range of **isotopically labelled compounds**. All products are of the highest possible chemical purity and are always supplied with the MSDS and Certificate of Analysis. We can supply products of a full range of enrichments and of a large variety of label positions in any quantity you would require.

Sercon are global representatives **^{18}O labelled water**, both 10 atom % and 98 atom % used for energy expenditure and PET studies. We ensure that we supply water of the highest quality at a competitive price for your requirements.

SL & GSL

The GSL and SL are a combined elemental analyser and gas purification module which produce clean gas samples for a 20-22 or GEO series isotope ratio mass spectrometer. Choosing the GSL or SL module gives the researcher great flexibility in applications.

The GSL or SL module allows samples such as soil, viscous liquids, plant material and organic compounds, to be analysed directly by utilising Dumas combustion for ^{15}N, ^{13}C & ^{34}S or pyrolysis for ^{18}O and D.

During combustion mode, a capsule containing the sample falls into the combustion tube and is converted in the presence of oxygen to CO_2, N_2, NO_x and H_2O. An elemental copper stage reduces NO_x, a $MgClO_4$ trap removes water vapour, a switchable Carbosorb trap can be used to remove CO_2 (for ^{15}N only analyses) and a GC column separates CO_2 from N_2 (allowing dual isotope analysis). Modified packings, water removal by hydrophobic membrane and different GC column allow ^{34}S analysis as SO_2.

During pyrolysis mode, a capsule containing the sample falls into the pyrolysis tube containing glassy carbon grit. The pyrolysis products, CO, N_2, and H_2 are purified by chemical processes. A $MgClO_4$ trap removes water vapour, a Carbosorb trap removes any CO_2 (minor by-product of the reaction) and a GC column separates CO from N_2. The system can be further enhanced with the addition of the HT-EA furnace upgrade for pyrolysis of samples up to 1500°C.

The GSL and SL are bench-top preparation modules ready to be connected to the continuous flow interface of our 20-22 or GEO 20-22 series of isotope ratio mass spectrometers.

The Sercon GSL is a combined elemental analyser and gas purification module designed specifically to produce clean samples for a 20-22 or Geo 20-22 Europa series isotope ratio mass spectrometer. Choosing the GSL module gives the researcher great flexibility in applications.

The Sercon GSL module allows samples such as soil, viscous liquids, plant material and organic compounds to be analysed directly by utilising Dumas combustion for ^{15}N, ^{13}C and ^{34}S or thermal decomposition for ^{18}O and ^{2}H. It also allows for isotopic analysis of gases from septum sealed containers such as CO_2, water equilibrations for ^{18}O and ^{2}H and carbonate samples for ^{13}C and ^{18}O.

The unique gas analysis facility of the GSL is provided by an automated sampling needle and the gas chromatograph part of the module. N_2, CO_2 and O_2 can be analysed at atmospheric concentrations while H_2, SO_2, N_2O, CO_2 and NO can be measured at elevated levels e.g. from a head space, water equilibrations, continuous flow carbonate measurements and DIC analyses.

Gas sampling from septum sealed containers by the original continuous flow flushing method. Purge facility on needle to prevent sample carryover. Full automation via a software controlled autosampler that can accommodate 200 x 12 ml septum sealed containers (optional bar code reader).

SIMULTANEOUS NCS

Both systems now have the option to be configured for simultaneous C, N and S. The need for a system capable of producing isotopic data of multiple elements from a single sample is of special interest in environmental applications, samples can be unique, expensive to obtain and difficult to replicate. Elemental analyser isotope ratio mass spectrometry is a destructive sampling technique and as such it can be important to maximise information obtained.

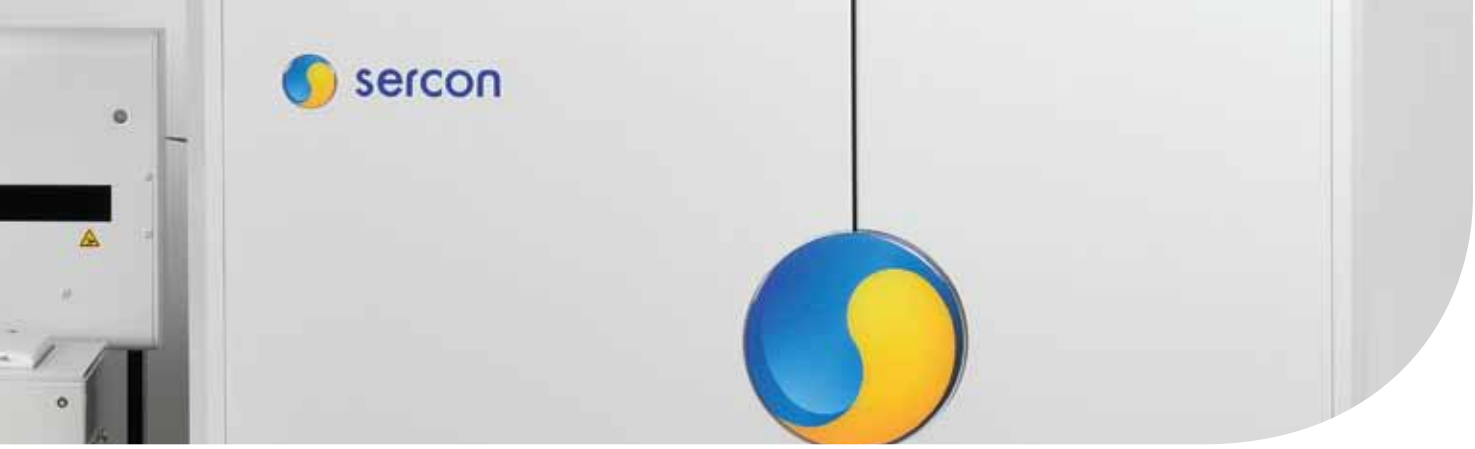
Based upon the paper by Fry (2007), the system was modified to incorporate all the features described, namely altered combustion reagents, a second GC column with a valco valve to permit flow switching.

The source tuning automatically switches to the optimum settings for each gas species and the automatic dilutor can be activated if required. In this way nitrogen, carbon and sulphur can be analysed from a single sample with precisions of around 0.1 per mille readily achievable.

sercon

FEATURES:

- 66 place autosampler for unattended operation. 132 place and large sample version available as options.
- High quality stainless steel diaphragm regulators for gas control, digital flow and pressure sensors, normally closed valves configured to save gas and preserve consumables in the event of a power failure.
- Two long-life furnaces capable of operating to 1100°C i.e. both furnaces can be used for pyrolysis, combustion or reduction applications.
- On-board microprocessor for storage of furnace temperatures and valve status (guards against PC failure or temporary detachment).
- Total software control of the instrument system and data processing. Allows storage of sample analysis protocols to comply with good laboratory practice. Standby mode to preserve consumable life during periods of low use. Inter-file import/export facility from instrument PC to laboratory server or internet (allows rapid updating of software or transfer to common spreadsheet packages). Fully compatible with Windows 7 operating software.
- Original dual isotope analysis of ^{15}N and ^{13}C in a single sample developed by Europa Scientific. Proprietary GC column to achieve baseline separation of N_2 and CO_2 which is essential for this mode of analysis.
- Software controlled oxygen injection to match sample requirements thereby preserving the life of the consumables.
- Re-chargeable water and carbon dioxide chemical traps. CO_2 trap is switched in/out of line by software to avoid leaks on changing analytical mode.



Specification	
Design	Bench top Pyrolysis/Dumas combustion unit with vertical mounted furnaces. Built in pressure and flow sensors, isothermal GC and software controlled variable oxygen input.
Analytical Mode	Samples in capsules are converted to N_2, CO_2, CO, SO_2 and H_2 by combustion or high temperature pyrolysis.
Combustion/Pyrolysis Furnace	Operating range, ambient to 1100°C.
Reduction Furnace	Operating range, ambient to 1100°C.
Column Oven	Operating range, ambient to 250°C (isothermal).
Combustion Packing Standard	Chromium Trioxide, Copper Oxide and Silver wool
Water Removal	Re-chargeable magnesium perchlorate trap.
CO2 Removal	Re-chargeable Carbosorb trap. Software selectable.
Gas Control	High quality stainless steel diaphragm regulators. Gas flow rates controlled by crimps. Software controlled oxygen pulse for efficient and economical combustions. A software controlled flow diverter valve selects the GC effluent to go to the mass spectrometer or to waste. Normally closed solenoid valves to prevent gas wastage during laboratory power cuts.
Referencing	References of known isotopic and elemental composition are placed in the autosampler carousel as for normal samples. Option to use reference gas injection at mass spectrometer.
Sample Range	Solids/Liquids:- 5 to 1000 µg O, 50 to 1000 µg H, 5 to 1000 µg N, 5 to 2000 µg C, 5 to 1000 µg S, (NB. samples down to 0.5 µg can be measured with reduced precision).
Analytical Cycle	4 min per sample (^{15}N only) 7 min per sample (^{15}N and ^{13}C)
Autosampler	66 position pneumatic autosampler that takes (standard) capsules with dimensions up to 12 x 6mm. Software controlled. Extra carousel (to allow up to 132 samples) or large hole version available as options.
Pyrolysis Option	Glassy carbon grit packing. Molecular sieve 5A packed GC column.
Sulphur Option	Tungstic oxide on alumina, copper, vanadium pentoxide, Nafion dryer, Porapak-QS gas chromatograph.

Specification	GSL specs only
Gas Sampling Method	Total or partial flush of septum sealed containers. Needle purge facility.
Sample Range	Solids/Liquids:- 5 to 1000 µg O, 50 to 1000 µg H, 5 to 1000 µg N, 5 to
	2000 µg C, 5 to 1000 µg S, (NB. samples down to 0.5 µg can be measured with reduced precision). Gases: 0.1 to 100% v/v (CO_2, N_2, H_2, O_2, SO_2, NO, N_2O)
Analytical Cycle	4 min per sample (^{15}N only) 7 min per sample (^{15}N and ^{13}C) 4 min per CO_2 gas sample

EXTERNAL PRECISION

All specifications depend on the module being connected to a Sercon 20-22 or GEO 20-22 series isotope ratio mass spectrometer and are for n=5 samples.

Gas	Reference Gas (‰ vs Ref) (10 Nano amps)	Combustion/ Pyrolysis (‰ vs Ref
CO (^{18}O)	0.1	0.5 (100 µg*, n=5)
H_2 (^{2}H)	1.5 3.0 (0.5 ml equilibration)	3.0 (200 µg*, n=5)
N_2 (^{15}N)	0.1 0.1 (12ml of air)	0.2 (100 µg*, n=5) 0.8 (5 µg*, n=5)
CO_2 (^{13}C)	0.1 0.2 (125 ml of 360 ppm) 0.5 (12 ml of 360 ppm) 0.1 (0.1 mg $CaCO_3$)x 0.2 (0.03 mg $CaCO_3$)x	0.1 (100 µg*, n=5) 0.3 (5 µg*, n=5)
CO_2 (^{18}O)	0.1 0.2 (0.1 mg $CaCO_3$)x 0.3 (0.03 mg $CaCO_3$)x 0.1 (0.5 ml equilibration)	NA
SO_2 (^{34}S)	0.1	0.3 (100 µg*, n=5)

* denotes amount of element per capsule

x Reaction of $CaCO_3$ with phosphoric acid in gas container.

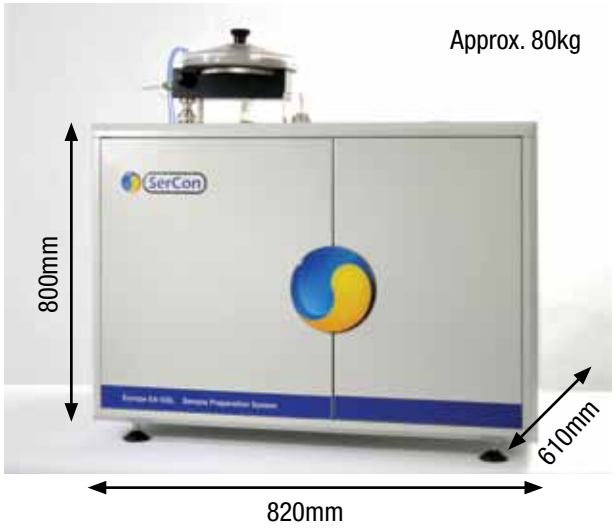
AUTOSAMPLER OPTIONS

ASX7400

ASX7400 XYZ gas autosampler with changeable sample racks for 12, 125 and 250ml septum sealed bottles.

The gas autosampler has been chosen to be the most robust and reliable gas sampler in the marketplace. With over 17 000 similar units installed, you can be confident in its efficacy. Incorporating a bespoke multiple access rack system, with space for up to 240 samples, the sampler may be reloaded at any time. The sample number is limitless so potentially up to 480 samples can be analysed within a 24 hour period.

Using the optional barcode reader, sample and patient codes can be read into the software as the analysis progresses. This sampler is available as an upgrade for all GSL systems to ensure all users can benefit from its versatile performance.



HEATER BLOCK

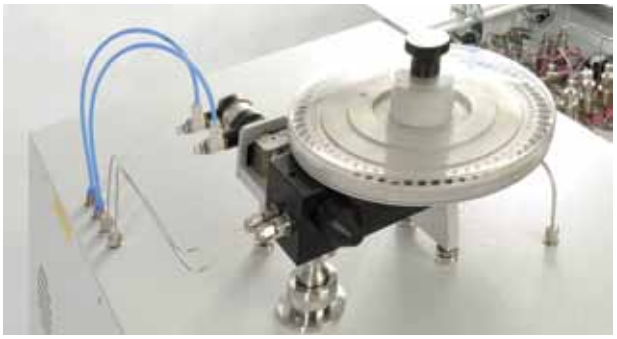
Thermostatically controlled block for ASX7400. Accommodates 2 x 110 5ml containers, designed to operate at 60ºC ± 0.1ºC.

The GSL benefit from our 2x110 heated sample tray which permits up to 220 samples to be analysed. It also enables one batch to be equilibrating whilst the other batch is being analysed and so increases laboratory throughput.

ZERO BLANK AUTOSAMPLER

Sercon produce the most elegant autosamplers using aerospace and race car engineering technologies. All our designs provide zero blank performance and the most reliable sample presentation with a choice of 66 or 132 place carousels.

Available as a closed carousel design when handling hygroscopic samples for ^{18}O and ^{2}H analysis. So all can benefit from our superior designs, our autosamplers are available for the SL, GSL and other elemental analyser units.



Power and Gas Requirements	
Power	100-240 VAC
Helium	99.998%
Oxygen	99.998%
Compressed Air	50psi

www.sercongroup.com

Unit 3B Crewe Trade Park,
Gateway, Crewe,
Cheshire. CW1 6JT UK

t: +44 (0)1270 580008
f: +44 (0)1270 252310
e: sales@sercongroup.com

Like us on Facebook "SerconLimited"

Follow us on Twitter @SerconLimited

Sercon is **ISO 9001:2008** accredited