THE SERCON GROUP

GC-CP

GAS CHROMATOGRAPH COMBUSTION/ PYROLYSIS INTERFACE

sercon
The *Stable* Isotope Company

GC-CP GAS CHROMATOGRAPH COMBUSTION/PYROLYSIS INTERFACE

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

The GC-CP interface is a gas chromatograph and gas conversion continuous flow interface for compound specific sample analysis.

When combined with the 20-22's novel 120° high dispersion ion optics, the interface provides the capability of measuring $^{2}H/H$, $^{13}C/^{12}C$, $^{15}N/^{14}N$ and $^{18}O/^{16}O$ ratios in compounds separated by GC. The GC-CP interface is fully integrated with the Agilent 7890 gas chromatograph as standard, but the GC-CP can be incorporated into any manufacturer's GC system to ensure onsite compatibility with all customers' chosen GC provider.

The whole design is intended to preserve chromatography during the gas conversion process, ensuring that sample peaks are well resolved when they reach the stable isotope analyser.

In combustion mode, for ^{13}C or ^{15}N analysis peaks eluting from the capillary GC enter the combustion tube and are converted over and oxidative surface (at 800°C) to CO_2, N_2, NO_x and H_2O. An elemental copper stage reduces NOx, a hydrophilic membrane dryer removes water vapour the sample can be analysed as CO_2.

During analysis for ^{15}N a simple liquid nitrogen trap removes CO_2 (to prevent CO formation in the mass spectrometer ion source). A further GC plot column can be used to separates CO_2 from N_2 (allowing dual isotope analysis).

In pyrolysis mode, peaks eluting from the capillary GC enter the pyrolysis tube (held at temperatures up to 1400°C). The pyrolysis products, CO, N_2, and H_2 are purified by chemical processes. A hydrophilic membrane dryer guards against any water vapour production if the pyrolysis chemicals become exhausted. A post reaction Poraplot-Q or Molsieve 5a open tubular column may be used to separate analyte gases from minor bi-products of thermal decomposition dependant on configuration.

- Full integration with Agilent's high performance 7890 gas chromatograph and autosampler. Full compatibility with other GC systems.
- Versatility of analysis through design - user can choose to work in combustion or pyrolysis modes through having the facility to operate at temperatures up to 1400°C.
- Thermally stable gas train - while the gas control side is composed of high quality stainless steel diaphragm regulators, the reaction oven is almost entirely composed of fused silica lines to ensure that joints remain sealed during temperature gradients in the GC oven.
- Integral post-reaction gas chromatograph for separation of analyte gases prior to entering the stable isotope analyser.
- Helium interface flow prior to the reaction phase which preserves chromatography through the interface and provides the additional pressure required to drive the reaction gases through post reaction GC stage.
- Dynamic water removal by low dead-volume hydrophilic membrane.
- Reoxidation of the combustion chemicals is easily achieved by using the built in oxygen regeneration line connected to the helium interface flow, avoiding the need for extra valves and 'back flushing'.
- Dynamic water removal by low dead-volume hydrophilic membrane.
- Reoxidation of the combustion chemicals is easily achieved by using the built in oxygen regeneration line connected to the helium interface flow, avoiding the need for extra valves and 'back flushing'.

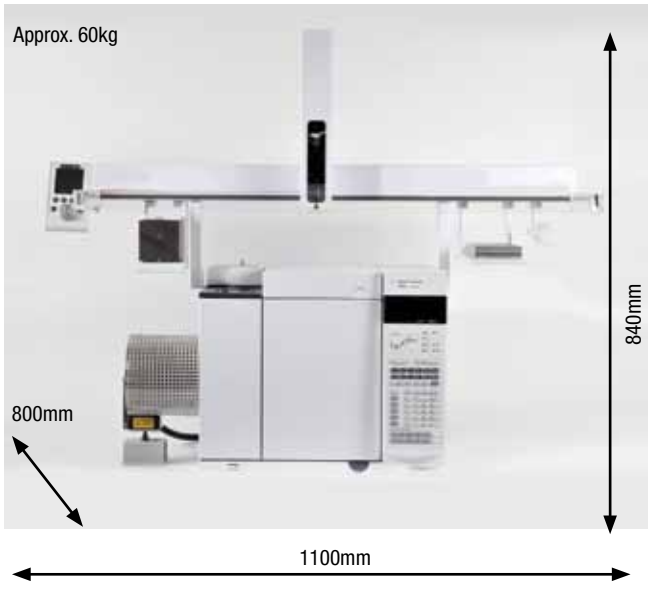
- Stand-alone multipurpose 1000°C furnace option (usually used in nitrogen mode for reducing NO_x).

- 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. Unique isotope ratio calculation method which removes the interference of changing backgrounds caused by column bleed. Unique data reduction technique that allows 'intra peak' H_3^+ subtraction when measuring hydrogen isotopes. Inter-file import/export facility from instrument PC to laboratory server or internet (allows rapid updating of software or transfer to common spreadsheet packages). System uses Sercon Callisto which is Windows 7 based.

The GC-CP interface is a bench-top preparation module ready to be connected to the continuous flow interface of our 20-22 or GEO 20-22 series of isotope ratio mass spectrometers.

Gas	Ref Gas (‰ vs ref)	Norm. on-column (‰ vs ref)	Small on-column (‰ vs ref)
CO_2 (^{13}C)	0.1*	0.2 (100 ng)	0.5 (10 ng)
CO(^{18}O)	0.1*	0.4 (160 ng) 0.4 (1 nl H2O)	-
N_2	0.1*	0.5 (100 NG)	1.5 (14 ng)
H_2	1.5*	4.0 (250 ng) 3.0 (5 nl H2O)	-
* Major beam of 10 nano amps			



Specification	GC-CP
GC-CP INTERFACE	
Reaction Furnace	Close fitting conversion reactor with the facility to maintain a temperature of up to 1400°C ± 5°C. Designed to simultaneously house two ceramic high temperature capillary reaction tubes. Chromatography is preserved throughout the interface by the addition of a make up gas prior to the furnace tube. Connections to the furnace tube are made by fittings using graphitised vespule ferrules.
Conversion Efficiency	500 ng of Vanillin 'on-column' is converted to H_2 with an efficiency of ≥ 99.5%.
Water Removal	Hydrophilic membrane in a counter current of dry helium. Membrane with 0.61 mm ID housed in a 1/8" stainless steel shell.
Liquid N2 Trap	Simple dewar and fused silica loop for trapping CO_2 (e.g. when analysing nitrogen isotopes by combustion/reduction.
Post Reaction GC	A Poraplot-Q or Molsieve 5a open tubular column to separate analyte gases from minor biproducts of thermal decomposition depending on configuration.
Gas Control	High quality stainless steel diaphragm regulators. A software controlled flow diverter valve selects the GC effluent to go to the interface or to the FID. Facility to divert solvent away from interface and target components of the chromatogram.
Reference System	Isotope ratios are calibrated in 2 ways: a) an internal standard that travels through the whole system so that it is directly comparable to the 'peaks' in the chromatogram. b) by using the reference gas injection system fitted to the mass spectrometer ion source.
Software	System uses Sercon Callisto which is Windows 7 based. The software is divided into 2 modules that run under Windows®. The first module takes care of system operation (source control, IRMS & FID data collection, peak scanning, flow diversion control). The 2nd module handles data processing and reporting (isotope ratio reduction, 'intra peak' H_3^+ calibration, peak detection, internal standard assignment).
External Precision	SD for 5 injections of samples at natural abundance. For comprehensive specifications of each interface see separate precision data sheet for the 20-22. Figures in brackets represent nanograms of element on-column.

Power and Gas Requirements	
Power	100-240 VAC
Helium	99.999%
Oxygen	99.998%

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