

COMMERCIAL INVOICE

Date: 13/09/2024

Customer PO-0000010898

Reference:

Shipper / Exporter:

Sercon Limited
Unit 3B Crewe Trade Park
Gateway
Crewe
CW1 6JT
UK

Delivery Address:

Amherst College
Geology Dept
11 Barrett Hill Dr.
Amherst, MA 01002
USA

Contact: Joanne O'Connor
Tel: +44 (0) 1270 580008
Invoice 18128 IN1340
Reference:

Contact Name: Diane Hutton
Cust Tel Number: +1 413 5422233

Country of Export: UK
Country of Manufacture: UK
Country of Destination: US United States

Shipping Marks /

Box 1 @ 100x88x107cms GW: 126kg Box 2 @
66x69x36cms GW: 15kg

UK Commodity Code: 90273000

Quantity	Product Code	Product Description	Amount \$
		Proposal for IsoEArth Elemental Analyser	
1	10202/11	iso-EArth	46,800.00
1	WARR2	2 year warranty	0.00
1	DAP	DELIVERED AT PLACE	3,000.00

SerCon Limited
Unit 3B Crewe Trade Park
Gateway, Crewe. CW1 6JT U.K.
Tel: +44 (0) 1270 580008

None of the goods contained in this consignment
are restricted by IATA or shipping regulations

Total Invoice
Value: \$ 49,800.00

Signed *J O'Connor*

Order Date 29/05/2024
Order Ref. 18128
Cust. Ref. PO-0000010898
Account Ref. AMH001

Order Acknowledgement

Invoice address

Amherst College
PO Box 5000
Amherst
MA 01002-5000
USA

Delivery address

Amherst College
Geology Dept
11 Barrett Hill Dr.
Amherst, MA 01002
USA

VAT No.

Contact: Diane Hutton
Tel: +1 413 5422233

Quantity Ordered	Product Code	Product Description	Unit Price \$	Net Price \$
Proposal for IsoEarth Elemental Analyser				
1	10202/11	iso-Earth High performance elemental analyser including TCD. Flexible system can be configured for CN or S analysis. Includes autosampler for solids. 70501-3 - Includes sample preparation kit - micro spatula, mirror, forceps, sample tray and syringe 70501-1 - Includes start up consumables kit for C and N combustion Requires Traping Loop for S	51,800.000	51,800.00
1	INST	Installation and start up training at Customer's site	11,928.000	11,928.00
1	WARR2	2 year warranty	0.000	0.00
1	DAP	DELIVERED AT PLACE Excluding any local duties and taxes that may apply.	3,000.000	3,000.00
	DISCOUNT			-5,000.00

Total Net Amount \$ 61,728.00
Total VAT Amount \$ 0.00
Order Total \$ 61,728.00

11 – Installation Report

Client:	Amherst College, PO Box 5000, Amherst, USA		
Quotation Number:	18766	Date:	15.1.2025
Job Number:	IN1340	Date:	15.1.2025

Contact:	Prof. David S Jones		
Date of Visit:	24-28.03.2025	No. of Days:5	
Engineer:	Robert Kameny		

Details of visit:

Day1

- Final optimisation of the gas lines in the lab (correct gas arrangements, leak check)
- Currently, most of the lines plumbed in the copper, technical support staff will re-do the lines with the stainless steel for neatness purposes
- Mass spec comms back on, pumps on
- Left unit pumping down overnight
- Changed filament

Day2

- IRMS initial tuning optimisation
- Good Ref gas specs
- CO2 ref gas lin. achieved: 0.04‰ std
- CO2 ref gas prec. achieved 0.02‰ std
- N2 ref gas lin. achieved: 0.07‰ std
- N2 ref gas prec. achieved :0.02‰ std

Day 3

- Severe difficulty with the random readbacks on the MFCs (both for HE and O2)
- Numerous leak checks (pass)
- Good pressure tests
- Both MFC`s set up the gas flows correctly
- Fix: Uploaded newer version of the software
- Reaction tubes set up and conditioning (std NC set up)

Day 4

- Tune optimisation for the EA
- Used dual beet mix 400/100 and 250/100
- Blanks: empty sampler is coming through around 5e-10 in average
- Best specs
- Beet mix 400/100 n=5 achieved : 15N 0.06‰ std, 13C 0.17‰ std
- Beet mix 250/100 n=6 achieved: 15N 0.06‰ std, 13C 0.94‰ std
- (suspected issue with the used sample)

11 – Installation Report

Client:	Amherst College, PO Box 5000, Amherst, USA		
Quotation Number:	18766	Date:	15.1.2025
Job Number:	IN1340	Date:	15.1.2025

Day 5

- Further investigation into the Carbon linearity
- Good CO₂ ref gas spec: achieved 0.04‰ std
- EA, used acetanilide range from 27ug-235ug for 13C, achieved a good spec of 0.11‰ std
- 2.8ug- 34ug for 15N, achieved a good spec of 0.09‰ std
- Quick re- cap and additional training pm
- Unit Handed released to service
- uCarbs back on line
- Good flows
- Used breath in 6ml vials for validation n=5 samples
- Good spec around 0.2‰ std

Recommendations:

- n/a

Faults and Shortages:

- n/a

Follow up:

- n/a

Engineer: Robert Kameny

Date: 10.04.2025

Signed:



Quotation

To: Amherst College
220 South Pleasant Street
Science Centre
Room A014
01002
Massachusetts

VAT No.

Quotation Date: 24/04/2024
Quotation Reference: 18128
Customer Ref:
Account Ref. AMH001
Quotation Validity: 07/06/2024

Quantity	Product Code	Product Description	Unit Price \$	Discount \$	Net Price \$
Proposal for IsoEarth Elemental Analyser					
1	10202/11	iso-EArth High performance elemental analyser including TCD. Flexible system can be configured for CN or S analysis. Includes autosampler for solids. 70501-3 - Includes sample preparation kit - micro spatula, mirror, forceps, sample tray and syringe 70501-1 - Includes start up consumables kit for C and N combustion Requires Traping Loop for S	51,800.000	0.00	51,800.00
1	INST	Installation and start up training at Customer's site	11,928.000	0.00	11,928.00
1	WARR2	2 year warranty	0.000	0.00	0.00
1	DAP	DELIVERED AT PLACE Excluding any local duties and taxes that may apply.	3,000.000	0.00	3,000.00

* The price quoted does not include any local taxes or duties
See separate document for terms and conditions

This quotation is issued in USD Dollar
Total Net Amount \$ 61,728.00
Total VAT Amount \$ 0.00
Order Total \$ 61,728.00

Payment Details:-
50% with order, 40% on delivery and 10% installation
Payment is required within 30 DAYS of invoice date by bank transfer.
All bank transfer charges are the responsibility of the customer.

Sercon Bank Details:-
National Westminster Bank, 36 High Street,
Nantwich, Cheshire CW5 5GA U.K.

Sterling: IBAN: GB74NWBK54101736755133
Euro: IBAN: GB14NWBK60721013806831
US Dollar: IBAN: GB94NWBK60730113806556
BIC: NWBKGB2LXXX

Amherst College
PO Box 5000
Amherst, MA 01002-5000
United States of America



Purchase Order

Purchase Order Number	PO-0000010898
Purchase Order Date	05/17/2024
Due Date	
Payment Terms	Due Upon Receipt
Payment Type	Check
Buyer	Ralph Johnson
Phone Number	+1 (413) 5425981
Email	rjohnson@amherst.edu

Supplier
Sercon Limited Unit 3b Crewe Trade Park Crewe Cheshire CW1 6JT United Kingdom

Comments
Quote: 18128

Ship-To
Amherst College 11 Barrett Hill Drive Amherst, MA 01002 United States of America Diane Hutton +1 (413) 5422233 (Landline)

Bill To
Amherst College PO Box 5000 Amherst, MA 01002-5000 United States of America Ralph Johnson +1 (413) 5425981 (Landline)

Currency	Total Lines Amount	Total Tax Amount	Total PO Amount
USD	61,728.00	0.00	61,728.00

A handwritten signature in blue ink, appearing to read "M. Hutton", is positioned above a horizontal line.

Purchase Order Number	PO-0000010898
Purchase Order Date	05/17/2024
Due Date	
Payment Terms	Due Upon Receipt
Payment Type	Check
Buyer	Ralph Johnson
Phone Number	+1 (413) 5425981
Email	rjohnson@amherst.edu

Service Lines						
Line Number	Item Name	Description	Start Date	End Date	Due Date	Line Amount
1		Proposal for IsoEarth Elemental Analyser 10202/11 iso-Earth High performance elemental analyser including TCD. Flexible system can be configured for CN or S analysis. Includes autosampler for solids. 70501-3 - Includes sample preparation kit - micro spatula, mirror, forceps, sample tray and syringe 70501-1 - Includes start up consumables kit for C and N combustion Requires Trapping Loop for S \$51,800.000 1 INST Installation and start up training at Customer's site \$11,928.00 1 WARR2 2 year warranty \$0.00 1 DAP DELIVERED AT PLACE Excluding any local duties and taxes that may apply. \$3,000.000	05/14/2024	05/14/2026		61,728.00

Messages
1. TAX EXEMPTION: Amherst College is tax exempt. A copy of Massachusetts Tax Exemption Certificate is available upon request. Amherst College is not liable for taxes, customs or assessments in connection with the purchase and/or delivery of goods ordered, except as expressly set forth on the Purchase Order.
2. ADDITIONAL TERMS: Additional terms, if any, will be set forth on Schedule A to be attached to this Purchase Order and made a part thereof.
3. COMPLETE AGREEMENT: This Order WHEN USED FOR PURCHASE OF MATERIALS AND GOODS WITH NO LABOR OR SERVICE PERFORMED ON CAMPUS, and any supplemental sheets and riders annexed hereto by Amherst College contains the complete and entire Agreement between the parties and replaces and supersedes any prior or contemporaneous communicants, representations, or Agreements, whether oral or written, with respect to such subject matter. In the event of a conflict between the terms and conditions of this Purchase Order, as preprinted herein on this form, and any differing terms and conditions entered by Amherst College upon the face of this Order or within any attachment, the latter shall prevail. This Order WHEN USED FOR LABOR OR SERVICE PERFORMED ON CAMPUS, is a companion document to the AMHERST COLLEGE CONTRACTOR AGREEMENT For Small-Scale Maintenance, Renovation and Construction Projects which has previously been agreed to by the Seller (Contractor) and Amherst College and which identifies additional Terms and Conditions governing the performance of the Work.
4. ACCEPTANCE: This Purchase Order is an Order to purchase goods and/or services as set forth. Any of the following acts by Seller shall constitute acceptance of this Order. Signing and returning a copy of this Order, delivery of any of the goods ordered, commencement of performance or written or verbal acknowledgement expressly accepting the terms set forth. Any additional or different term or condition on Seller's acknowledgement form, or otherwise communicated by Seller in accepting this, shall be deemed to be a material alteration of the Order and is hereby objected to by Amherst College. Any Such term or condition shall be totally inapplicable to this order unless Amherst College specifically agrees in writing. Acceptance of the goods and services covered by this order will not constitute acceptance by Amherst College of Seller's terms and conditions to the extent this order is in any way deemed to be an acceptance of a quotation or other offer by Seller. Any acceptance is expressly conditional upon the consent of the Seller to the terms and conditions of this order.
5. ASSIGNMENT: Seller shall not assign, subcontract, or sublet the order, or any part of it, without the prior written consent of Amherst College. Such consent shall not relieve Seller of any obligations under this order.
6. PATENT, TRADEMARK, AND COPYRIGHT INFRINGEMENT: Seller agrees to defend, at its expense, all claims, demands and actions which may be asserted against Amherst College, its successors, assigns and customers (whether direct or indirect) for alleged patent, trademark and copyright infringement resulting from the use or resale of goods covered by the Purchase Order and to indemnify and hold Amherst College harmless against all costs, expenses, legal fees and judgments related to such claims, demands and actions.
7. DELIVERIES: Time is of the essence in this Contract. Failure to deliver within the time specified shall entitle Amherst College in addition to any other rights or remedies, to cancel this order and purchase goods elsewhere, in which event the Seller shall be responsible for any increase in costs. Payment or acceptance of any items after delivery date shall not constitute waiver of Amherst College's right to cancel this order with respect to subsequent deliveries. Amherst College

Purchase Order Number	PO-0000010898
Purchase Order Date	05/17/2024
Due Date	
Payment Terms	Due Upon Receipt
Payment Type	Check
Buyer	Ralph Johnson
Phone Number	+1 (413) 5425981
Email	rjohnson@amherst.edu

reserves the right to reasonable testing and inspection prior to payment or acceptance. Failure of Amherst College to inspect and accept or reject goods, materials or articles shall not relieve Seller from liability for tender or delivery of nonconforming goods nor constitute a waiver of any of Amherst College's rights or remedies for breach of contract. Amherst College reserves the right to reject any or all times not conforming with the specifications noted within this Purchase Order, in any respect, whether material or not.

8. SHIP TO: To insure that delivery is made to the correct location, please address all shipments as noted on the face of this Purchase Order. All correspondence, packages, and invoices must indicate the Purchase Order number, department's name and delivery address as indicated on this Purchase Order.

9. WARRANTY: In addition to its standard warranty, Seller warrants that all goods supplied:

- a. Shall be free and clear of all liens and encumbrances, good and merchantable title here to being in the Seller.
- b. Upon receipt by Seller of payment, good and merchantable title shall be vested in Amherst College.
- c. Shall be free from any defects in design, material or workmanship and of good and merchantable quality.
- d. Shall conform to Amherst College's specifications of the approved sample as the case may be fit for the known purposes for which purchased and that Seller will not substitute anything without Amherst College's written consent.
- e. The warranties shall survive inspection, delivery and payment.

10. CHANGE ORDERS: No changes in this Purchase Order's terms or conditions or attachments are allowed, without Amherst College's prior written approval.

11. CANCELLATION: Amherst College shall have the right to cancel this Order without cause, and its liability for such cancellations shall be limited to Seller's actual cost for work and materials applicable solely to this Order which has been expended when Seller receives notice of cancellation. Amherst College may, at its option, cancel this Order without liability to Seller (except for conforming shipment Amherst College previously accepted), in the event Seller ceases to exist, becomes insolvent, the subject of bankruptcy or insolvency proceedings or shall commit a material breach in the performance of any obligation hereunder.

12. COMPLIANCE WITH LAWS: The Equal Opportunity Clause in Section 202 of Executive Order #11246, as amended, relative to equal employment opportunity and the implementing rules and regulations of the Office of Federal Contract Compliance are incorporated herein by specific reference. Seller warrants that the product sold or service rendered to Amherst College shall conform to the standards and/or regulations promulgated by the U. S. Department of Labor under the Occupational Safety and Health Act of 1970 (29 U.S.C. 651.PL91-956). In the event the product sold does not conform to the OSHA standards and/or regulations, Amherst College may return the product for correction or replacement at Seller's option and at Seller's expense. Services performed by the Seller which do not conform to OSHA standards and/or regulations must be corrected by Seller at Seller's expense or by Amherst College at Seller's expense in the event Seller fails to make the appropriate correction within a reasonable time.

13. MSDS: Seller shall provide to Amherst College at or before the time of initial shipment, a completed Material Safety Data Sheet (OSHA form 20 or equivalent) for any chemical substances sold here as required by any and all applicable federal, state or local law, ordinance, rule or regulation. Such shall contain all the information necessary to comply with the Federal Hazard Communications Standard (29CFR 1910.1200) and all applicable state regulations. Contractors must comply with the OSHA Hazard Communications Standard and complete the Contractor Agreement before beginning the work.

14. INDEMNIFICATION AGAINST CLAIMS: Seller agrees to protect, defend, indemnify and hold Amherst College harmless from all claims, losses, damages, and expenses, which may be asserted against or be incurred by Amherst College whether direct or indirect, foreseeable or unforeseeable, including, but not limited to, those resulting from injuries to any person or damage to any property, caused in any manner by any act or failure to act of Seller in connection with the furnishing of the goods or services covered by this Purchase Order, or because of any imperfection or defect in said goods or services, or based upon any claim of product liability of strict liability in tort, or because of the failure of such goods or services to be in accordance with the description of such goods or services as may appear in any proposal, catalog, analytical information report or other technical bulletin as is furnished or utilized by Amherst College, or because of the failure of such goods or services to be produced or provided in compliance with the requirements of this Purchase Order.

15. INSURANCE: Unless otherwise directed in writing, in the event the Seller is to perform labor on Amherst College campus, Seller shall first take out and maintain the following minimum insurance at its expense for the duration for this Contract:

- "a. Workers' Compensation: Statutory
- b. Employer's Liability: \$1,000,000 each occurrence
- c. Comprehensive General Liability*
- Bodily Injury/Property Damage Combined Single Limit (CSL)
Occurrence: \$1,000,000
Products/Completed Ops occurrence/aggregate: \$1,000,000
Personal & Adv. Injury: \$1,000,000
- d. Auto Liability
Combined Single Limit: \$1,000,000
(Including hired and non-owned autos)
- e. Excess Liability: \$1,000,000

"

* Comprehensive General Liability is required for Seller's providing only materials and goods but no labor service on campus.

The public liability insurance specified in section c above shall include coverage for the Seller's contractual liability under INDEMNITY with limits not less than those set forth above. Every Contract of insurance providing the coverage required herein shall contain the following clause: "No reduction, cancellation or expiration of this policy shall become effective until ten (10) days after written notice is actually received by Amherst College". Seller shall not perform any work on Amherst College's campus until all required insurance has been obtained and original certificated confirming coverage and which show Amherst College as an additional insured under the policies have been furnished to the Amherst College Purchasing Office. In addition to the description of operations the certificate must specify: "The Trustees of Amherst College, and any present or former trustee, administrator, employee, volunteer worked or agent is added as additional insured to the above captioned policies as their interest may appear."

16. DISPUTES: Any dispute arising under this Order not disposed of by agreement shall be decided in a court of competent jurisdiction in the Commonwealth of Massachusetts. Pending settlement of final decision of any dispute, Seller shall proceed diligently with the performance of this Order in accordance with Amherst College's direction.

17. CONFIDENTIAL INFORMATION AND ADVERTISING: Without the prior consent of Amherst College, Seller shall neither disclose to any person outside of its employ, nor use for purposes other than performance of its obligations under this contract, any information pertaining to Amherst College or Amherst College's affairs, including all drawings, blueprints, descriptions, specifications and the contents of this Purchase Order. Without obtaining the prior written consent of Amherst College, Seller shall not in any manner whatsoever disclose, advertise or publish the fact that Seller has furnished or contracted to furnish to Amherst

Amherst College
PO Box 5000
Amherst, MA 01002-5000
United States of America

Purchase Order

Purchase Order Number	PO-0000010898
Purchase Order Date	05/17/2024
Due Date	
Payment Terms	Due Upon Receipt
Payment Type	Check
Buyer	Ralph Johnson
Phone Number	+1 (413) 5425981
Email	rjohnson@amherst.edu

College the material and/or services ordered hereunder. This prohibition includes, but is not limited to, the publication of Amherst College's name on a customer list and/or the verbal act of naming Amherst College on a customer list and/or the verbal act of naming Amherst College as one of your customers.



Invoice to:

Amherst College
PO Box 5000
Amherst
MA 01002-5000
USA

VAT Reg No: US

Customer Order No. PO-0000010898

Invoice

Invoice No. 18128b

Invoice/Tax Date 13/09/2024

Due Date 13/09/2024

Account No. AMH001

Instrument No. IN1340

Quantity	Product Code	Product Description	Net Amount \$	VAT Rate %	VAT Amount \$
		Proposal for IsoEArth Elemental Analyser			
1	10202/11	iso-EArth			
1	INST	Installation and start up training at Customer's site			
1	WARR2	2 year warranty			
1	DAP	DELIVERED AT PLACE			
		Total amount of order: 61,728.00			
		40% payable on delivery:	24,691.20	0.00	0.00
		10% payable on installation:	6,172.80	0.00	0.00

Delivery address:

Diane Hutton
Amherst College
Geology Dept
11 Barrett Hill Dr.
Amherst, MA 01002
USA,

This invoice is issued in: USD Dollar

Total Net Amount	\$	30,864.00
Total VAT Amount	\$	0.00
Invoice Total	\$	30,864.00

Payment Details:-

Payment is required within 30 DAYS of invoice date by bank transfer.
All bank transfer charges are the responsibility of the customer.

Sercon Bank Details:-

National Westminster Bank, 36 High Street,
Nantwich, Cheshire CW5 5GA U.K.

IBAN: GB94NWBK60730113806556
SWIFT/BIC: NWBKGB2LXXX

12 – Installation Acceptance and Warranty Certificate

Client:	Amherst College, PO Box 5000, Amherst, USA		
Quotation Number:	18766	Date:	15.1.2025
Job Number:	IN1340	Date:	15.1.2025

Contact:	Prof. David S Jones
System:	HS 2022-Iso Earth-Aqua uCarbs
Software:	Calisto CF50.0.
Engineer:	Robert Kameny
Installation Date:	24-28.3.2025

Warranty commences:	28.3.2025
Warranty Expires:	27.3.2027

Customer Acceptance:

 Name: David Jones

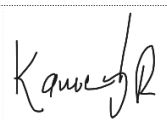
 Signature: 

 Date: 11 April 2025

Engineer's Signature:

On behalf of Sercon Limited

 Name: Robert Kameny

 Signature: 

 Date: 10.04.2025

Notes:



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2. Introduction

This pre-installation guide is issued to help users prepare a site for the installation of Sercon instruments prior to the arrival of the installation engineer on site. The guide gives details of the system's bench space, electrical, environmental and gas requirements. Observing the site requirements will avoid delays during installation.

When all the requirements have been met, please complete and return the pre-installation survey to Sercon and an installation date will be confirmed.

3. Bench space

The table below gives the dimensions and weight of the HS2022, and inlets which may be associated

System	Width	Height	Depth	Weight
HS2022	820 mm	800 mm	610 mm	120 kg
EA	820 mm	800 mm	700 mm	100 kg
PyroEarth	820 mm	800 mm	700 mm	105kg
HT-EA	600 mm	570 mm	700 mm	80kg
GC	580 mm	500 mm	540 mm	50 kg
Orchid	500 mm	600 mm	570 mm	20 kg
Furnace controller	400 mm	400 mm	400 mm	20kg
Cryo Range	820 mm	550 mm	590mm	110 kg
μCarbs	720 mm	800 mm	600mm	100 kg
Aqua	720mm	800 mm	600mm	100 kg

The bench needs to be sturdy to support the weights shown above. Access to the back of the units is required, so please ensure that the benches are not against the walls. A minimum clearance of 50cm is required at the back of unit.

Additional space is required for the PC, monitor and printer.



4. Power Requirements

All mass spectrometers require a clean, stable source of power.

The system should be connected to a separate single-phase, continuous duty, 220-240 VAC, 48-62 Hz power line, with a maximum break of 10 ms. 1500 VA minimum service is required for the system.

110V compatible instruments can also be supplied.

In the case of a differing mains voltage, a transformer must be used.

Summary of power requirements of the HS2022, and inlets which may be associated

System	Power	Power Point
HS2022	0.8 kVA	1
PyroEArth	3.6 kVA	1*
EA	1.5 kVA	1
HT-EA	3.0 kVA	1*
GC	3.0 kVA	1
Orchid	1.0 kVA	1
Furnace controller	0.8 kVA	1
Cryo Range	0.8 kVA	1
μCarbs	2.5 kVA	2
Aqua	2.5 kVA	2

**16A power supply.*



In situations where power breaks may exceed 10 milliseconds, a UPS is required. A UPS also helps to smooth out the power supply if it is not particularly stable. Please contact Sercon for information on suitable UPS units.



5. Environmental Requirements

5.1 Room temperature

The permissible temperature range is 17°C - 30°C.

Approximately 20°C is preferable with temperature variations of less than ± 2 °C/ hour.

5.2 Humidity

The relative humidity must not be lower than 20% and not exceed 70% at any temperature.

The optimum relative humidity level is 40%-60%.

5.3 Air conditioning

We recommend the installation of air conditioning, if the specified limits will be frequently exceeded on account of unfavourable climatic conditions. Direct sunlight on the system should be avoided.

Please ensure that the air-conditioning unit is not blowing across the electromagnet.

6. Gases

The system requires gas cylinder connections with 1/8" compression fittings (Swagelok or similar) and 1/8" diameter GC grade stainless steel or copper tubing for all gases (except the compressed air). The length of the tubing will be entirely dependent upon where your gas bottles are located in the lab. This should ideally be kept to a minimum. Standard 2-stage regulators that are capable of delivering a pressure of at least 3.5 Bar are required.

A 1/8" Swagelok Tee Union is required for splitting the helium (and hydrogen for the GC, if used). Additional Tee unions are needed to split the helium for additional inlets, unless connections are provided on the bench for each one.

Helium

Carrier gas. 99.998% with 10vpm or less of N₂.

A large (10 m³) cylinder should last at least 6 weeks.

Oxygen

Required for combustion and re-oxidising catalysts in some inlets.

99.998% with 0.5 - 5vpm or less of N₂.

A large (10 m³) cylinder should last several years under normal operating conditions.

Reference Gases

The HS2022 mass spectrometer is fitted with a reference gas injector system. Appropriate reference gases should be available for the samples you are interested in - CO₂, N₂, H₂, etc. These should be of high purity – 99.99%. Please check the Gas Requirement Check List at the end of this document

Compressed Air

A compressed air supply of 50 – 60 psi (approx. 3.5 Bar) is needed for pneumatic solenoid operations. This can be from a compressor or gas bottle. Alternatively, the valves can be operated using the helium supply but this will increase helium consumption. The compressed air is connected to the instruments by 1/8" nylon tubing.

For additional inlet-specific gases please see the Gas Requirement Check List at the end of this document

7. Installation and Service

7.1 Instrument Arrival

When the instrument arrives, please make an immediate visual inspection for damage. If any damage is apparent, please take the following steps:

- Note the nature and extent of the damage, including photographs
- Request an inspection and written damage report from a representative of the carrier to signify their concurrence with your observation.
- Contact Sercon and report the damage.

Caution:

Damage discovered 15 days after delivery of the equipment generally cannot be recovered. Such damage will be at the expense of the customer.

If the delivery receipt indicates that material has been received in apparent good order and condition and no exceptions are taken, Sercon will not accept liability for damage

7.2 Moving the equipment

Do not drop or mishandle the shipping containers. The equipment should be left in the shipping crates and, upon delivery, be taken by a forklift or a hydraulic pallet mover to the installation site.

7.3 Installation

When the instrument is on site and ready for installation, please contact Sercon who will arrange for an engineer to install it if arrangements have not already been made.

During the installation, the engineer will train the customer in the fundamentals of mass spectrometer operation and routine maintenance as well as application and software training. To receive maximum benefit from this onsite training opportunity, the instrument operator(s) should be available during the entire installation.

Additional training courses are available at our factory - please contact us for details.

8. Reference Materials

The HS2022 measures stable isotope abundances in your samples and compares them to reference materials of known isotopic composition. We suggest that you obtain a variety of suitable working reference materials, which can then be used to calibrate your instrument.

An effective reference compound is one that closely matches your samples in both elemental composition and isotopic enrichment.

Sercon is a supplier of reference materials. Please see
https://serconlimited.com/sercon_systems/standards/

9. Consumables for Elemental Analyser Systems

New systems are supplied with appropriate start-up kits to allow system specification tests during installation. Further consumable supplies are available from Sercon. Please contact consumables@sercongroup.com or browse our online catalogue at sercon-consumables.com

10. Pre-Installation Survey

To ensure an efficient, trouble-free, installation of your Sercon instrument, could you please complete the attached questionnaire.

Simply answer each of these brief questions to confirm compliance with the pre-installation requirements, and return to service@sercongroup.com

Pre-Installation Checklist

- | | |
|---|-------------------------------------|
| 1. Bench and storage space is sufficient | ☒ |
| 2. Main power 110V or 220-240V | ☒ |
| 3. There are enough electricity plugs for the system | ☒ |
| 4. Room temperature and humidity is adequate | ☒ |
| 5. Gases, regulators & connecting tubing are on site | ☒ |
| 6. All relevant safety precautions are complied with | ☒ |
| 7. Sercon instrument has arrived on site | ☒ |
| 8. Sercon instrument has been inspected for shipping damage | ☒ |
| 9. System moved to installation site | ☒ |

Gas Requirement Check List for Sercon Instruments

Please check you have all of the required gases necessary for analysis using the table for the inlets you have ordered.



Gas	Grade	Use	
HS2022			
Helium	99.998	Carrier	☐
Nitrogen	99.999	Tuning / Stability / ref gas	☐
Carbon dioxide	99.999	Tuning / Stability / ref gas	☐
Hydrogen	99.999	Tuning / Stability / ref gas	☐
PyroEarth			
Helium	99.998	Carrier	☐
Oxygen	99.998	Combustion	☐
Compressed Air		Solenoid Operation	☐
EA			
Helium	99.998	Carrier	☐
Oxygen	99.998	Combustion	☐
Compressed Air		Solenoid Operation	☐
HT-EA			
Helium	99.998	Carrier	☐
Compressed Air		Solenoid Operation	☐
GC-CP			
Helium	99.998	Carrier	☐
Oxygen	99.998	Oxidation of combustion tube	☐
Synthetic Air [Zero Grade]	20% O ₂ / 80% N ₂	Flame Ionization Detector	☐
Hydrogen	99.999	Flame Ionization Detector	☐
Liquid Nitrogen		If N ₂ combustion option selected	☐
Cryo Range			
Helium	99.998	Carrier	☐
Oxygen	99.998	Oxidation of combustion tube	☐
μCarbs***			
Helium	99.998	Carrier	☐
Aqua			
Helium	99.998	Carrier	☐
Carbon dioxide	99.999	Equilibration Gas**	☐
Hydrogen	99.999	Equilibration Gas**	☐

*** Phosphoric acid is required for carbonate / DIC measurements

**Pure H₂ and CO₂ can be used for the equilibration of water samples but may affect the results of smaller water samples (<100μL). 5% gases (i.e. 5% H₂ or CO₂ in helium) are preferable for smaller samples and give more manageable sample sizes in general. The use of 5% gases is recommended but is at the customer's discretion.

Pre-Installation Guide HS2022



Pre-Installation Guide HS2022

Contact Name:	Dave Jones	
Customer Name:	Amherst College Geology	
Address:		
11 Barrett Hill Road, Amherst College Geology, Amherst, MA 01002 USA		
Tel No:	+1-413-542-2714	Email: djones@amherst.edu
Fax:		
Date of delivery:	various	
Customer Signature	<i>David Jones</i>	
Date:	27 Feb 2025	

Please return to service@sercongroup.com



Service/ Maintenance email support: service@sercongroup.com

Sales: sales@sercongroup.com

Website: www.sercongroup.com

Telephone: +44 (0) 1270 580 008

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

Tel No : +44 (0)1270 580008

Fax No : +44 (0) 1270 252310



11 – Installation Report

Client:	Amherst College, PO Box 5000, Amherst		
Quotation Number:	18766	Date:	15.1.2025
Job Number:	IN1340	Date:	15.1.2025

Contact:	Prof. David S Jones		
Date of Visit:	06-10.01.2025	No. of Days:	5
Engineer:	Robert Kameny		

Details of visit:

****Installation Notes – January 2025****

****Tasks Ahead:****

- Safely decommission units before transitioning to the new lab
- Smoothly execute the move to the new lab
- Thoughtfully arrange the layout of each unit for optimal functionality
- Conduct comprehensive post-move specifications
- Establish validation specifications for the new EA

****Pre-Decision Insights:****

Upon arrival, we encountered a slight hiccup: the units were powered off, preventing us from conducting pre-move specifications.

A customer report indicated that there were noticeable stability challenges with the 2/1 system following a minor incident where the front panel on the mass spec became dislodged and impacted the HT switch.

The customer's commendable attempt to rectify the HT switch unfortunately led to continued stability issues. With these insights, we decided to relocate all units to the new lab and thoroughly evaluate everything afterward.

****Unit Transfer Overview:****

The transfer went smoothly, with no major events, ensuring a seamless transition to the new site!

****Final Layout Arrangement:****

We had a fruitful discussion with the customer about the layout in the new lab, arriving at a mutually agreeable design to enhance usability.

****Post-Move Specifications:****

In our testing, we discovered that obtaining a consistent peak shape was a challenge. All three beams exhibited erratic behaviours, with poor coincidence even though the magnet was in the right position.

We also observed low sensitivity across all beams, characterized by heavy oscillations.

The HT readback was disappointing, showing -20V relative to the set value.

To address this, we decided to break the vacuum and inspect the filament.

11 – Installation Report

Client:	Amherst College, PO Box 5000,Amherst		
Quotation Number:	18766	Date:	15.1.2025
Job Number:	IN1340	Date:	15.1.2025

Fortunately, we found no structural damage to the filament, ion source, or loose connections—the filament was correctly positioned.

Changed the filament for good measure. After conditioning the new filament at 2.00e-07mBar (with emissions at 150uAmps), we let the unit pump down overnight.

The following day, unfortunately, we observed the same symptoms.

We conducted a thorough check of all connections, including the system controller, head amp, and source cable, but the results remained unchanged.

Testing with a dummy head amp did not improve the situation, leading us to suspect a fault with the system controller.

****Next Steps:****

The HT readback dropped to zero when the HT switch was activated, so we've informed the customer that this issue requires shipping the system controller to Sercon for maintenance.

The new lab's gas plumbing is adequate, and the customer plans to enhance it during their downtime.

The electrical circuit has been upgraded to meet specifications during our visit.

The customer is fully aware of the current status and the necessity for further action before continuing work.

Recommendations:

Consider additional 5 days for successful installation

Faults and Shortages:

Follow up:

Shipping the system controller to Sercon (Prepare a quote for its repair)

Additional on-site support days.

Engineer: Robert Kameny

Signed:



Date: 17.01.2025

Customer: David Jones

Signed:



Date: 71/01/25

11 – Installation Report

Client:	Amherst College, PO Box 5000,Amherst		
Quotation Number:	18766	Date:	15.1.2025
Job Number:	IN1340	Date:	15.1.2025

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