

SERVICE REPORT

Job Number:	IN1277 Service Visit 3 Quote: Sage:		
Customer:	Queens University Belfast		
Contact:	Naomi Pratt		
Instrument:	PyroEarth-HS2022 (10202/14-2022/1277)		
Date of Visit:	02/06/2026		Days: 3
Engineer:	Thomas Iordanidis		
Reason for Visit:			
Service Visit – Customer reported flow issues which seem to have been resolved by a new combustion furnace link			
Service Contract?	Yes / No	Expires:	
Warranty?	Yes / No	Expires:	
Tick as Applicable:	Call Out / Routine Service / Warranty / Emergency / Contract Visit		
Details of Visit:			

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Day 1 (10/02/2026):

- Arrived on site, initial instrument inspection – all OK
- Prior to visit customer was facing issues with the PyroEarth flows – a combustion furnace link was sent out, replaced and seems to have fixed the issues, customer mentioned that they have been running mainly dual specifications and not SO₂
- Customer reported that tubes were recently changed so they will not be changed during the maintenance
- Background scan – all okay
- Started running CO₂ & N₂ reference gas peak shapes, stabilities, precision & linearity specifications – please see results below
- Dropped a beetmix precision sample to trap and check sulphur– good peak shape and stability
- Ran a beetmix dual precision batch – as this is what the customer runs predominantly, SO₂ precision to be ran after service – poor N₂ precision – possibly leak related/contamination, or reduction tube as blue beam observed to be rising at the end of the N₂ window & CO₂ blank present – to be checked after service
- Proceeded to PM Service Instrument
- Removed rotary pump and changed oil for new – old oil in good condition - All OK.
- Removed Source Assy. Removed old filament and replaced for new – old filament in good condition
- Replaced grub screws holding the Focusing Magnets.
- Returned Source Assy to position. Fitted with new copper gasket and new PTFE ferrules.
- Source continuity checked on bench top and flight tube – All OK
- Turned the system and pump on– vacuum started forming nicely with pump speed reaching 92k
- Cooled down reduction furnace and checked tube (copper in good condition) – all okay, tube had dropped out of the top O-ring, bottom fitting O-ring melted-replaced, tube refitted, leak checked and temperature ramped up to 860°C overnight – all okay
- Leak found on the autosampler – tightened down – all okay
- Pressure tested system with full furnace temps (Combustion: 950°C Reduction: 860°C Secondary Reduction: 600°C and GC: 70°C) – 1PSI drop in 300 seconds – all ok
- Filament conditioned with a vacuum of ~1.6 E-7, filament fired ok
- Allowed trap/filament to settle over night - All OK. Emission approx. 105µA with Trap at 50µA.
- GC set to 140°C - baked overnight as CO₂ was seen in blanks – to be investigated
- End of day vacuum ~ 1.6 E-7

Pre-service Specifications:

	C	N	S
Peak Shape	Good	Good	Good
Stability	Good	Good	Good
Ref Gas Precision ‰	0.031	0.086	N/A
Ref Gas Linearity ‰	0.056	0.162	N/A
Combustion Precision ‰	0.168	2.543	N/A

Day 2 (03/06/2026):

- Vacuum on arrival ~1.0E-8 with good standby emissions of 132uA at 50 Trap
- Reduction furnace ramped up temperature to 860°C fine overnight and GC lowered to 70°C to run specifications
- Started checking CO₂ & N₂ reference gas peak shapes, stabilities and precision & linearity specifications – please see results below
- Investigated MFC readback issue, floated a new Helium MFC and tried a new version of the software but no change was seen in the readbacks - leak detected on the helium input to the MFC – tightened down and reads 12ml/min when set to 15ml/min which has been the case since it was installed

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- CO2 blank of 1.5E-10 observed and increasing over time – combustion furnace cooled down, fitted and leak checked new combustion tube and water trap – all okay
- New combustion furnace link was too long as you could see the end entering the bottom fitting of the tube - link shortened and refitted with no leaks and furnace fitting O-ring swapped as it seems to have melted
- Combustion furnace heated up to 900°C instead of 950°C as copper was melting
- CO2 blank after new tubes and bake out 1-2nA – Autosampler was taken apart, many shavings were observed although it was cleaned recently by the customer, changed white PTFE slider and cleaned with acetone, new circlip also fitted as it was missing – all okay
- Pressure test passed, N2 blanks below ~2.0E-10 and CO2 blanks coming down
- Submitted overnight dual N&C batch with 10 blanks at the beginning to be assessed in the morning

Day 3 (04/06/2026):

- CO2 blanks decreased over time, CO2 precision passed however poor N2 precision observed similar to pre-service specifications
- N2 background slightly elevated 1.4-1.6E-10 with a 2/1 similar to CO2 – contamination still present - CO2 blank ~4nA and not coming down, unknown peak present at the beginning of the window
- Purged gases from the back of the system – no change
- It was decided for the autosampler to be taken off and cleaned again with a fresh bottle of acetone and swabs to eliminate contamination from the cleaning reagents. Autosampler O-ring was also swapped – all okay
- Ran a blank with a link fitted unknown peak not present, autosampler refitted peak not present – all okay
- Checked flows at various places of the system – all okay
- SO2 good peak shape and stability
- Put on a few blanks with extended timings – no carryover present – all okay
- Background scan – all okay
- GC left to bake overnight and updated customer regarding next steps – please see recommendations section
- System handed back over to customer

Post-service Specifications:

	C	N	S
Peak Shape	Good	Good	Good
Stability	Good	Good	Good
Ref Gas Precision ‰	0.024	0.039	N/A
Ref Gas Linearity ‰	0.123	0.100	N/A
Combustion Precision ‰	0.050	2.980	N/A

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Recommendations:

Please make sure valve 5 is not being used during analysis as this is an extra valve that is not required

As the contamination levels increased after the bake out of the GC at the end of day 1 it seems like the GC is the main source of the system's contamination as the autosampler was cleaned twice during my visit. The GC was left to bake out on my departure – please check your N2 background, blanks and flows w/c 08/06/2026 and if everything seems okay run a batch of known standards to assess system performance and report back to us if further assistance is required

Keep an eye on the blue beam rising sometimes towards the end of the N2 window as that can be affecting N2 precision

Follow Up:

Please contact us at service@sercongroup.com if you have any future questions or problems with this instrument going forwards.

Parts Used:	Stock Number:	Quantity:	Charge:
Service Kit	SC9001	1	Included in service
Total:			N/A

Engineer: Thomas Iordanidis

Date: 04/06/2026

Signed:



Customer:

Date:

Signed:

NOTES: N/A