

11 – Installation Report

Client:	Athens University C/O: N. Asteriadis S.A.		
Quotation Number:	18310	Date:	26/06/2025
Job Number:	IN1367	Date:	11/07/2025

Contact:	Konstantinos Aliferis, Ioannis Kalampokis		
Date of Visit:	11/05/2026	No. of Days:	5
Engineer:	Thomas Iordanidis		

Details of visit:

Day 1 (11/05/2026):

- Arrived on site
- Instrument was already unpacked and placed on the bench, initial inspection of both the Pyro and the HS2022 to identify possible damage during transport – all okay
- All gas connections were pre-made by ASTERIADIS engineers, MS connections fitted – all okay
- Turned on PC, COMs established everything responds fine
- Unpacked all consumables and instrument parts
- Continuity checked filament – all ok
- Rotary pump fitted okay with good oil level – all ok
- Pumps turned on and reached maximum speed ~93k rapidly and vacuum started settling nicely
- Electromagnet placed over the flight tube and on the present markings, cable connected and set to HD mode due to customer requesting pyrolysis set up as well – pyrolysis specs to be run first
- Vacuum reached 1.5 E-7 relatively quickly and source and HT were switched on as this was an already conditioned filament with good emissions – all OK
- Checked already set flows for pyrolysis – all OK
- Pyrolysis tube, Water & CO₂ trap were made, fitted and leak checked – all okay
- Combustion furnace not heating up, locked out, pyro restarted – all okay
- Ramped the temperature of the combustion furnace to reach 1350°C – temperature reached and maintained successfully left at full flow overnight for the CO to burn off
- Checked peak shapes quickly for CO₂ & N₂ whilst on a good position for HD analysis – low sensitivity
- Leak on the existing CO₂ gas line detected and fixed
- Good sense for C&N after magnet adjustments and left magnet on HD tuning to cool down overnight
- GC box baked overnight at 140°C
- Vacuum at the end of the day ~5.7E-8

Day 2 (12/05/2026):

- Vacuum on arrival ~1.4 E-8 – all okay
- Combustion and GC maintained temperature overnight – all okay
- GC set to 60°C for running pyrolysis specifications
- OK HD Peak Shape with good stability but reference gas precision not passing
- Adjusted tuning as required obtaining a much improved peak shape with good stability

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- Specifications for HD passed for both HD Reference Gas Precision (0.314%) and Pyrolysis run Precision with 4mg of Cystine samples (0.616%)
- Provided Hydrogen related training to customer including Pyrolysis set up, sample pathway, sample preparation, methods/events and reprocessing using Marquardt
- Emag set to 13500 to heat overnight for O2 analysis

Day 3 (13/05/2026):

- Vacuum on arrival ~7.6E-9
- CO background ~2.7 E-10 – all okay
- Good peak shape and stability obtained for CO using the 3/1 ratio from CO2 reference gas
- Ran a precision O2 analysis (0.4mg Cystine) – met specifications of 0.067% S.D., **Pyrolysis passed**
- Provided training to customer for O2 analysis & reference gas tuning
- Combustion furnace cooled down to switch set up to combustion
- In the meanwhile started running reference gas obtaining good peak shapes and stabilities for both CO2 & N2. Ran reference gas precision and linearity for CO2 & N2 – both passed reference gas specifications with a precision of 0.049 (CO2), 0.01 (N2) and linearity of 0.093 (CO2), 0.19 (N2)
- Made combustion, reduction and secondary reduction furnace tubes demonstrating the process to the customer
- All fitted and leak checked, pressure test passed with cool furnaces over 300secs
- Started ramping the temperatures and at around 860°C, a pressure release was heard and when removing the tube it was realised that it had cracked and copper looked solidified
- Blew out combustion furnace link which did not seem to be blocked – all okay
- Cooled down furnace replaced tube but at around 900°C same thing happened again
- Put a link on to eliminate the autosampler but the tube is building up pressure and getting out of position
- Checked flows- crimped down the trickle flow to ~12ml/min as it was set to ~37ml/min and that itself can sometimes cause the build up of back pressure
- Flows look better after the adjustment to be tested in the morning

Day 4 (14/05/2026):

- With adjusted trickle flow when PSI set to 0 a flow of 12ml/min is going into the autosampler and with full 25PSI and 60ml/min full flow at the end of the system is ~70ml/min – all okay
- Empty tube fitted into combustion furnace for testing to not waste customer materials and temperatures ramped up to full temps – back pressure issue not present
- Combustion furnace cooled down and new combustion tube made, fitted and leak checked
- Furnaces ramped up to Combustion: 800°C, Reduction: 860°C, Secondary reduction 600°C and GC 70°C, Lower temperature for combustion furnace selected due to the melting of copper at higher temperatures
- No back pressure issue observed at a temperature of 800°C and flows look okay
- High blanks observed, tightened autosampler screws – no change

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- Stripped autosampler – no obvious issues – wiped – put back together re-fitted
- N2 Blanks ~2.0E-10 prior to batch submission
- NCS Batch left running overnight and monitored through GoToMyPC
- CO2 & S precision passed but N2 did not suggesting this is due to a leak in the system / autosampler as blanks at the start of the batch increased – to be investigated in the morning
- Ran N2 Reference Gas specifications of Precision and Linearity with both passing well

Day 5 (15/05/2026):

- Leak tested autosampler – still leaking on the top screws
- Screws tightened and another batch submitted – still N2 affected by high blanks
- Run blank without autosampler firing which reduced the blank suggesting the autosampler is still the main source of the leak – stripped, cleaned, PTFE slider swapped and it was found that one of the concave discs was in the wrong orientation - fixed
- Pressure test passes with a drop of 1-2PSI over 300 secs, Blanks ~3 E-10 – all okay
- Submitted another batch and N2 precision passed
- Visit concluded with passing all specifications – revisit required see the follow up section for more information

Final Specifications:

Pyrolysis (O2&HD)		
Species	Test	Result (‰ S.D.)
HD	Ref Gas Precision	0.314
HD	Sample Precision	0.616
O2	Sample Precision	0.067
Combustion (CNS)		
CO2	Ref Gas Precision	0.049
CO2	Ref Gas Linearity	0.093
CO2	Sample Precision	0.021
N2	Ref Gas Precision	0.011
N2	Ref Gas Linearity	0.187
N2	Sample Precision	0.123
S	Sample Precision	0.135

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Recommendations:

N/A

Faults and Shortages:

- System Controller reads high emissions only for standby and CO2 tuning files – it was like this during testing and does not affect system performance with good stabilities and results
- Trickle flow adjusted from ~40ml/min to ~12ml/min as it was creating back pressure issues
- Combustion furnace set to 800°C as any higher the copper was melting and blocking the tube – calibration file to be adjusted during next visit
- Autosampler leaking resulting to high blanks and poor N2 precision – it was found that one of the concave discs on the autosampler screws was in the wrong orientation resulting to not a proper seal – PTFE slider also swapped

Follow up:

A revisit will be required to calibrate combustion furnace, optimise system performance and provide CNS customer training – Thomas Iordanidis to attend w/c 25/05/2026 (2-3 days visit)

Engineer: Thomas Iordanidis

Date: 15/05/2026

Signed:

