

11 – Installation Report

Client:	Tohoku University C/O: Taiyo Nippon Sanso Corp		
Quotation Number:	19214	Date:	29/08/2025
Job Number:	IN1377	Date:	21/01/2026

Contact:	Prof. Yosuke Yamada		
Date of Visit:	22 nd – 26 th June 2026	No. of Days:	5
Engineer:	David Harris		

Details of visit:

Arrived on site and inspected instrument.

HS2022, Aqua + VerSA, & IsoEarth+ had been installed by local engineers prior to Sercon engineer's arrival. HT-EA setup on desk top, but installation of unit and heating element had not begun.

Due to the number of USB ports required, and restrictions on the number of available USB ports on the PC, a USB hub was provided by Taiyo Nippon Sanso Corp. Hub installed and USB comms routed into PC. All comms with all units established – All OK.

HS2022

eMagnet moved as required to optimise peak shape and stability.

System leak check – All OK.

Flows and Ref Gas crimps adjusted as required – All OK.

Isolation valve from Aqua prep unit transferred correct location to allow HT-EA to be connected to Flow meter within 2022. Software updated in all projects.

All readbacks respond as expected – All OK.

Emissions reading back high in standby mode, but within normal levels when sample tuning files loaded. This is a common occurrence. Standby settings altered to optimise filament conditions – All OK.

Initially system setup to HD mode. Optimised HD tuning and eMagnet current as required – All OK.

HD ref gas tested for peak shape, 2/1 stability and HD precision (n=5, 5 second ref gas pulses). Results good – All OK.

eMagnet current set to high mass mode for testing of N₂, CO, CO₂, and SO₂ tuning. eMagnet responds as normal – All OK.

Optimised CO₂ and CO tuning via CO₂ Ref Gas.

Tested for 2/1 & 3/1 peak shapes, 2/1 & 3/1 stability, ¹³C (CO₂) & ¹⁸O (CO) precision (n=5, 5 second ref gas pulses).

¹³C (CO₂) Linearity check performed (n=6, 1,2,4,6,8,10 sec Ref Gas pulses).

CO₂ stability from cylinder source displayed wave instability pattern. Test repeated via trapped combusted sample in trapping loop. No instability seen – Investigated fault, no issues found within Sercon systems or back line plumbing. This implies that there is an issue coming from the CO₂ cylinder. Local engineer to investigate issue at later date.

N₂ Ref gas not available at time of Sercon engineer's visit. Tuning optimisation, 2/1 peak shape & 2/1 stability checks performed via IsoEarth prep trapping loop. All tests pass – All OK.

SO₂ tuning optimisation, 2/1 peak shape & 2/1 stability checks performed via IsoEarth prep trapping loop. All tests pass – All OK.

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Ref Gas spec testing results...

N₂ Peak Shape (2/1) = Pass
N₂ trapping loop Stability (2/1) = Pass

Ref Gas ¹⁵N Precision (n=5) = N/A

SO₂ Peak Shape (2/1) = Pass
SO₂ trapping loop Stability (2/1) = Pass

Ref Gas ³⁴S Precision (n=5) = N/A

CO₂ Peak Shape (2/1) = Pass
CO₂ trapping loop Stability (2/1) = Pass

Ref Gas ¹³C Precision (n=5) = 0.014% S.D.
Ref Gas ¹³C Linearity (n=6) = 0.050% S.D.

CO Peak Shape (3/1) = Pass
CO ref gas Stability (3/1) = Pass

Ref Gas ¹⁸O Precision (n=5) = 0.262% S.D.

HD Peak Shape (2/1) = Pass
HD ref gas Stability (2/1) = Pass

Ref Gas HD Precision (n=5) = 0.205% S.D.

HS2022 system fully installed.

HT-EA & Liquid Autosampler

Installed HT furnace element – All OK.

Installed HT-EA high sensitivity reaction tube & H₂O/CO₂ trap – All OK. Demonstrated to local engineer how prepare and install reaction tubes.

Established He flows to HT-EA. Set He crimp on outer flow of alumina reaction tube. Flow modified during testing for optimum results. For sampling; Flow approx. 80ml/min at 28psi pressure.

Powered on HTEA furnace – All OK.

Established comms between HT-EA & PC – All OK.

Furnace responds and heats with no issues – All OK.

Installed liquid autosampler to HT-EA – All OK.

Established comms from Liquid Autosampler to PC & software. Ran through auto positioning setup procedure – All OK.

Supplied training to local engineer on liquid autosampler software and general usage.

Sercon advise of standby He flow of 15-20ml/min with HTEA furnace temp of 1000°C (to protect heating element from oxidising).

System leak checked – All OK.

GC oven temp set to 60°C for analysis.

Altered method, events and timing windows as required for current location & flows – All OK.

HT furnace temp set to 1400°C for testing.

Blank testing yielded low response – Pass.

CO baseline background very low – Pass.

Tested precision batch runs using local tap water for HD and ¹⁸O analysis. (n=5, 1µl sample size).

All tests yield good results – All OK.

United test to run from multiple vial samples – All OK.

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Instrument setup as follows...

He pressure = 28psi.

He flow = 80ml/min

Pyrolysis furnace Temp = 1400°C.

HD (Pyrolysis from liquid sample) Precision = 0.407‰ S.D.

¹⁸O (Pyrolysis from liquid sample) Precision = 0.044‰ S.D.

All specs pass. HT-EA with liquid autosampler fully installed

IsoEarth+

System had had some prior testing carried out by local engineer.

Optimisation required.

New combustion tube installed. Advised user and local engineer of different tube setup depending on NCS or NC analysis modes.

Advised local engineer on setup for dilutor method. This will have to be set up as required by user to accommodate sample sizes.

System failed pressure test. Large leak from disconnected pipe to 6-way Valco valve located as source of issue. New pipework installed. Leak now resolved. Leak test - pass.

Adjusted method events and timings as required – All OK.

Customer located balance for weighing out samples for testing NCS batch analysis. The balance acquired is not accurate enough for sample weighing for IRMS systems. Cystine test samples weighted as accurately as possible, but not up to normal standards for precision testing. (n=5, 0.5/0.6mg cystine sample size). Is will result in a greater variability within data out-put.

Linearity testing performed in NC mode using AS Beet Mix dissolved in water. (n=6, N 10-200µg / C 25-500µg).

Initial testing resulted in issue with autosampler being exposed. Carousel stopped turning. Removed and rebuilt assembly. Carousel now turns correctly, however lower sample plate is misaligned. Engineer modified drop chute to help with alignment. When testing with small capsule sizes some samples did not drop into furnace correctly. Sercon engineer will follow up the issue with Sercon HQ to seek permanent solution.

N₂ blank sample testing good (<0.3nA signal on major beam) – Pass

IsoEarth instrument setup as follows...

He pressure = 25psi.

He flow = 60ml/min

O₂ pressure = 25 psi

O₂ flow = 70ml/min

Combustion furnace Temp = 1000°C.

Equilibration furnace Temp = 860°C.

Reduction furnace Temp = 600°C.

GC oven Temp = 60°C.

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IsoEarth+ batch data results ...

- ¹³C Combustion Precision (Cystine n=5) =0.087‰ S.D.*
- ¹³C Combustion Linearity (AS Beet Mix, N=6) =0.060‰ S.D.*
- ¹⁵N Combustion Precision (Cystine n=5) =0.130‰ S.D.*
- ¹⁵N Combustion Linearity (AS Beet Mix, N=6) =0.096‰ S.D.*
- ³⁴S Combustion Precision (Cystine n=5) =0.066‰ S.D.*

All results pass spec – All OK.

Aqua & VerSA

Software adjustment required to allow for 240 samples to be taken from bespoke VerSA rack set up – All OK.
Aqua unit already installed by local engineer. Further action required on install.
Local engineer reports good results from testing.

Software & PCB Hardware

Updates required to Aqua PCB to alter active node to A due to cross comms issues with IsoEarth+.
Node update required events update. All events altered as required. – All OK.

Bitmaps on all projects updated to allow for bespoke setup of systems – All OK.

N.B. GC oven temp for HT-EA usage needs to be set within IsoEarth+ project. As the GC oven is located within the IsoEarth+ assembly.

Callisto software version updated to 60.0.02 by local engineer prior to visit to accommodate vac gauge readback glitch – Issue resolved.

System installed
Units handed to customer for usage.

Recommendations:

- Continue to liaise with local engineer for training and application help.
- High purity copper needs to be purchased for NCS combustion & equilibration tubes. If the user wants to run in NC mode, standard copper can be used.
- Investigate issue with CO₂ gas from cylinder. Issue presented a pressure fluctuations.

Faults and Shortages:

- Issue with autosampler. Engineer to report issue to Sercon HQ.

Follow up:

N/A

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Engineer:	David Harris	Date:	26 June 2026
Signed:			