Sercon Ltd, Europa House, Coppicemere Drive,
Crewe, Cheshire CW1 6GZ, UK
Tel: +44 (0)1270 580008
Company Registration No. 4290072 Vat No. 771 1100 74

11 – Installation Report

Client:	Fukuoka University C/O: Taiyo Nippon Sanso		
Quotation Number:	18227	Date:	28/07/2025
Job Number:	IN1373	Date:	16/10/2025

Contact:	Prof. Kentaro Kawanaka		
Date of Visit:	15-19 June 2026	No. of Days:	5
Engineer:	David Harris		

Details of visit:

Arrived on site and inspected instrument.
HS2022, Aqua, VerSA, had been installed by local engineers. However there are reports of lost comm events occurring during long run test batches.
Orchid & GC unit + Furnace had also been setup on desktop by local engineers, but not fully installed.

Systems look to be in good condition, however space is limited. This will be an issue if the rear, or side of the units need to be opened. Advise user to consider moving instrument to a better location.
All comms and software respond as normal. However emissions are reading at 0nA with trap set to 50uA.

All gas flows closed when engineer arrived. Advise user to keep gasses on and flowing at all time to avoid damaging system (including GC columns).
Instrument set up in low mass mode for initial testing.
Hydrogen generator being used as HD ref gas. This is not standard procedure for Sercon instruments. Engineer cannot vouch for purity of HD gas if not from cylinder source. Unknown issues may arise with flush gas & stability tastings.
Initial testing with HD Ref Gas did show poor stability, but that improved once hydrogen generator had stabilised.

Investigate cause of comms lost events. Engineer suspects cause is due to flash-over within Ion Source.
HS2022 vented & Ion Source removed for inspection. Small metal fibres found between HT body and focus plates. Fibres removed – All OK. Adjustments made to positioning of IR connections – All OK.
Removed old filament due to condition. Replaced for new filament – All OK.
Pumped down instrument – All OK. Instrument is quick to pump down 8.6^{e-08} mBar vac pressure obtained within a 4 hours. – All OK.
Filament conditioned with no issues – All OK.
Emissions still reading at 0nA with trap set to 50uA. Emissions display normal values when tuning is loaded.

Engineer updated GC-CP software as required. (alterations to bit map, method, etc)
Local engineer has setup his own method for Aqua gas analysis. This method is not the standard procedure. It does not account for flushing the air/trapped HD gas from the needle before & after aliquot sampling. The flushing events are required to stop contamination of sample material. Engineer setup correct method for testing. To reduce the change of a flashover, prep isolation valve timed to close during flush peak. Only sample to be sent to MS.
Set up test method for autosampler to run 200 samples to rule out software/VerSA issues as the cause of comms loss (2 sec/sample runtime). Task performed while filament was outgassing with isolation valve closed. All 200 samples ran with no issue. Repeated test overnight with normal HD aliquot method loaded, but isolation valve still closed (320sec/sample). All 200 injections completed with no comms loss – All OK.

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HD tuned as required post filament swap. HD ref gas peak shape, stability check & precision batch (n=5, Ref gas pulse of 5 seconds) give good results once reprocessed. (N.B reprocessing is always required for HD analysis. See manual for more details). – All OK.
User requested that long test batch be put on. Initial batch of 200 samples flushed and setup for analysis. But due to time constrains sample numbers reduced to 175 samples. All samples ran with no issues – All OK.
Engineer advises against long batch usage due to climate control levels within lab. Humidity is high and temp within room unstable. This will cause extra drift on magnet which could yield poor data.

Set up GC-CP for Hydrogen mode.
Tested precision using HD Ref gas. Reprocessed via GC software. Results good.
During ^{13}C mode, tested precision and linearity using CO_2 Ref gas Reprocessed via GC software. Results good.- All OK
Demonstrated to local engineer how to use GC software – All OK.
Customer is using GC oven which has not been recommended by Sercon. As a results there are issues with flow/ pressure control and dimensions for fitting parts in standard locations.
Demonstrated to local engineers and users how to make HD pyrolysis tube & ^{13}C combustion tube.
Furnace heated to high temp with no issues – All OK.
Demonstrated how to correctly heat GC furnace. (1500$^{\circ C}$ for pyrolysis of samples, 600$^{\circ C}$ for combustion tube conditioning, 860$^{\circ C}$ for combustion of samples) – All OK
Unfortunately several tubes broken during practice fittings by local engineers due to the lack of space and larger size of GC oven walls compared to standard units. As a result GC plumbing configuration modified to allow fused silica to come out of the GC oven before furnace tube attachment. This could compromise chromatography due to heat loss.
The furnace has been placed across 2 tables which are not even in high. This also causes matching issues for location of components, resulting in damaged tubes and connections.

Nafion drier fitted to pathway way. Sweep He flow set to 15ml/min – All OK.
N.B. If the Nafion is left with an He flow it will dry out and become damaged.

Issue with lighting FID due to manual pressure control settings on GC oven. Local GC engineer called to assist with setup. FID now lights – All OK.
Issues with start/stop wiring + FID signal + autosampler comms. Local engineer called to assist with issue.
Manual injection carried out for method testing setup purposes.
FID only testing confirms that signal is being received from Alkane mix in hexane samples.
Adjustments to flows required to prevent break out between FID & furnace directional split of sample pathway. Sample solvent is confirmed to divert to FID, while Alkane compounds can be directed to furnace – All OK.
Explained to local engineer the process of gas balancing involved within the application method.

Simultaneous autosampler trigger, comms, and FID signal to Callisto issues resolved. Automatic sampling achieved.
Adjusted method events as required for both HD & ^{13}C analysis.

Customer reports that they will be changing the GC column for their own analysis at a later date with the support of local engineers.

Installation of instruments complete.

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Instruments handed over to customers for usage.

Results from Testing…

HS2022

CO_2 Peak Shape (2/1) = Pass
CO_2 Stability (2/1) = Pass
CO_2 Stability (3/1) = Pass

Ref Gas ^{13}C Precision (n=5) = 0.028‰ S.D.
Ref Gas ^{13}C Linearity (n=6) = 0.478‰ S.D.

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

Ref Gas HD Precision (n=5) = 0.115‰ S.D.

Aqua

HD flush & sample injection from exetainer (n=220) = Pass
Dry Vial HD Precision (n=5) = 0.115‰ S.D.

GC-CP

FID only mode = Pass
Break out between FID & MS = Pass
13C Mode; Alkane Mix (n=3) in hexane, separation = Pass
HD Mode; Alkane Mix (n=3) in hexane, separation = Pass

(GC-CP mode) Ref Gas ^{13}C Precision (peaks =5) = 0.020‰ S.D.
(GC-CP mode) Ref Gas ^{13}C Linearity (peaks =5) = 0.057‰ S.D.
(GC-CP mode) Ref Gas ^{13}C Precision (peaks =5, n=3) = 0.024‰ S.D.

(GC-CP mode) Ref Gas HD Precision (n=5) = 0.115‰ S.D.

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Recommendations:

- Advise user to consider moving instrument to a better location.
- Advise user to keep gasses on and flowing at all time to avoid damaging system (including GC columns).
- Advised improved climate control of laboratory for optimised usage of instrument.

Faults and Shortages:

N/A

Follow up:

N/A

Engineer: David Harris Date: 19th June 2026

Signed: