

11 – Installation Report

Client:	GEO-data Logging GmbH (Garbsen site)		
Quotation Number:	19232	Date:	03/07/2025
Job Number:	IN1366	Date:	07/07/2025

Contact:	Heinrich Kreipe		
Date of Visit:	6 th – 10 th Oct 2025	No. of Days:	5
Engineer:	David Harris		

Details of visit:

This is the first report for a two site upgrade. This part of the installation was carried out at the Geo-data Garbsen site

Arrived on site, inspected delivery. All items sent – All OK.

Customer powered down old unit and vented for upgrade to take place, system was fully operational prior to upgrade.

Setup is of bespoke design. No FID or FID split required. No Nafion in use, customer uses frozen CO₂ water trap.

2020 has no Ref Gas injection assembly, customer had been manually swapping in/out CO₂/O₂ on T-junction input in SS line (post-GC column, pre-reaction column).

System uses short packed SS GC column, not standard fused silica GC column.

This system will be used on gas samples only, not solvent liquid phase samples, as such the FID flow switch is not required.

Upgrade

Removed all non-required components from 2022, including turbo pumps and PCBs.

Removed all old external cables, replaced for new – All OK

New PSU fitted to unit– All OK. Engineer's boot stock had unfortunately been delayed at the airport. Used old copper gaskets to fit to system. New copper gaskets to be supplied to customer when boot stock delivered from airport – All OK.

Fitted new wiring and new external cables – All OK.

Set up new PC and Monitor. Established comms between new System Controller unit and Orchid unit. Comms respond as normal – All OK.

Issue with pump on/off control switch. On/off does not function. If relay override are activated pumps (rotary & turbo pumps) operate. Investigate issue. Power board will not function to activate turbos, no lights on PCB. Rewired power board, lights now active but still no functionality. Power board damaged. Rewired pump switch to new PSI. Pump switch now operates are normal – All OK. Removed damaged power board from 2020 as no longer in use – All OK.

All MS valves respond as expected – All OK. (Only one valve in use on 2020, V3 for isolation valve).

System pumps down with no issues. Vac pressure of 1.0^{e-08} mBar achieved over night – All OK.

All System Controller function as normal. Voltages to Ion Source stable – All OK.

Filament fires with no issue. Emissions low. Approx. 105µA with trap @50µA – All OK.

Installed new eMag power supply and wired into existing eMag – All OK.

Emag readback low compared to setting. Opened up SysCon and adjusted eMag variable resistor setup. Emag readback now match closely to set point – All OK.

Set up Orchid on desktop. Comms OK. All valves respond as expected – All OK

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Plumbed Helium carrier gas into Orchid, no leaks found – All OK
 Installed new furnace unit with external power supply. Furnace heats as expected to desired set points – All OK.
 All parts for the Garbsen site installed successfully.

System/method setup

The system is to have a non-standard setup due to the requirements of the Hewlett Packard 5890 series II GC oven and lack of classic Ref Gas assembly.

For tuning purposes Ref Gas (CO₂, N₂, or H₂) would normally be supplied via Ref Gas Assembly. This is not possible on this MS2020. The MS2020 also has no trapping loop capabilities. The only line in to the Ion Source is via the GC sample line in.

The customer also requires an O₂ line in to oxidise the reaction tube.

Customer was using a wide reaction tube prior to upgrade. This was connected with SS tubing. Standard reaction tube to be used from this point onwards. This will require fused silica tubing to operate.

Removed SS tubing from old setup. Fitted silica tubing from GC oven exit line to furnace.

Used double ferrule connection to add silica line in from “makeup” flow outlet from Orchid unit.

Split line in to oxygen port on Orchid inlet. Customer found tap valves to isolate/enable flow control of desired gases. One side set as 100% O₂ gas (to be used for reaction tube conditioning), the other as CO₂ gas for tuning purposes and stability traces.

V8 on Orchid unit to now control the in flow of O₂ or CO₂ gas, mixed with makeup flow (make up flow = approx. 1.5ml/min). CO₂ gas inlet can be exchanged for N₂ or HD gas if required at a future date.

Nafion and FID flow not required on users setup. Closed lines not in use.

Over all flow (make up + flow via GC column) to MS approx. 5ml/min. Pressure in software set to 3psi for operational use.

Adjusted “OXY” needle valve on Orchid to give approx. 10ml/min of oxygen added to main carrier flow. Pressure set on wall regulator to approx. 50psi (3.5bar) – All OK.

CO₂ pressure needs to be adjusted accordingly to give major beam response of 1.2^{e-8} for optimal tuning condition. It maybe advised for user to install CO₂ and/or O₂ vent valve to help flush gas.

To aim flush of CO₂ from system post-tuning, the He pressure can be increased, this will raise the He flow speed - reduce waiting time. He pressure set to 15psi via software advised to flush system.

Tuned system on CO₂ via V8 input – All OK.

Magnet move required to obtain optimum peak shape – All OK.

Stability good – All OK.

Unable to perform standard Ref Gas specs as unit has no ref gas assembly.

System OK to use for sampling – All OK.

Oxidised reaction tube successfully. Built Oxidation method so function can be run overnight via sample list.

Demonstrated to user how to use “Setup Multiple Batches” option to have delayed start to sample list batches I.E. The reaction tube oxidation can be carried out overnight automatically ready for use immediately the next morning.

Adjusted valve map to reflect in use plumbing setup. Only V8 active from Orchid unit.

Demonstrated to customer how to make up reaction tubes – All OK.

Installed new reaction tube into furnace. Connected to GC column output and water trap assembly.

Lined to Ion Source inlet with existing silica tubing.

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Replaced pig-tail vent for new to give extra length (this reduces the chance of atmosphere being drawn backwards into the MS).

System responds well. Test peaks come through with no issue – All OK.

There is no handshake connection from Sercon system to GC oven (Hewlett Packard 5890). It may be possible to make a cable up to auto-trigger the sample start time with method start via GC oven controls. The user will need to find out if this is possible from the GC oven outputs. A trigger cable can be made by Sercon upon request if needed. If this is required, 'handshake' option via Callisto timing windows (within Method) needs to be activated.

Users to perform manual injection samples with manual starts of Callisto software.

Glitch found in GC-IRMS software. Issue resolved by engineer – All OK.

Test sample carried out with customer samples. Customer happy with results on test samples.

Gave training to customer use of Callisto software and GC-IRMS software.

Gave training on Peak Shape scans, back ground scans and stability scans.

Gave training on method building, sample list generation, and running of batches, also delayed batches.

Due to the bespoke setup of system it is advised that the same engineer (David Harris) return to install the similar setup at the University of Hamburg site for the remained of the upgrade/installation (IN1366). This will aim to carried out in Jan 2026 due to availability of engineer, or if possible beforehand.

Advised user on shutdown of system when required. It is advised to leave the system under vacuum when not in use (e.g. over the Christmas period) as it is better for the pumps to be constantly active. Also, when not in use, for the Ion Source tuning to be left in "Standby" with a filament setting of 50µA.

It is advised to leave the furnace at 600C when not in use. If the furnace is not be used for longer periods it can be cooled down to < room temp.

Advise to use water trap at all times for all sample analysis to remove the chances of moisture entering the Ion Source.

Garbsen site system installed and ready for customer use.

Recommendations:

- Install vent valves to flush CO₂ and O₂ lines into Orchid system.
- He pressure set to 15psi via software advised to flush system.
- Purchase Nafion drier to use as water scrubber (to replace frozen CO₂ method).
- Advise to use water trap at all times for all sample analysis to remove the chances of moisture entering the source

Faults and Shortages:

Copper gaskets. (supplied by engineer via boot stock).

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Follow up:

N/A

Engineer: **David Harris**

Date: **10th October 2025**

Signed:

