

11 – Installation Report

Client:	University of Aberdeen		
Quotation Number:	17432	Date:	29/04/26
Job Number:	IN1382	Date:	01/06/26

Contact:	Nicole Cochrane		
Date of Visit:	27 th – 31 st July 2026	No. of Days:	5
Engineer:	David Harris		

Details of visit:

Engineer arrived on site and inspected instruments. Site has 20-20, GSL & TGII units. Also Gilson autosampler.

All units have been powered off for over a year due to turbo pump failure. User had attached He flows and opened lines for a period of weeks prior to visit. N₂ Ref gas & O₂ installed at time of arrival. CO₂ Ref Gas not yet fitted.

2020 had previously been upgraded to new electronics with System Controller in 2018.

Upgrade is to coincide with service visit on system.

Engineer inspected Pump + Prep PCB Upgrade delivery – All OK. No damage noted.

Comms established between 2020 & PC – All OK. Callisto v20027 in use.

20-20

Old pumps removed from 2020. Power supply had already been removed from unit by user. Relay coils also removed.

Refitted original relay coils as found by unit.

New Edwards turbo pumps fitted with new copper gaskets and screws– All OK.

Installed new power supply to pumps – All OK

Carried out service work on 20-20. Removed Ion Source. No damaged noted on Ion Source – All OK.

Removed old filament and replaced for new. Demonstrated to user how to change filament and check for continuity across connections– All OK.

User had recently changed oil in rotary pump, but pump was over filled. Drained oil to correct levels to stop pump over pressurising during usage. Note: flexi tubing contained a large amount of oil residue. Cleaned with paper towels. Replaced T-junction fitting for new – All OK.

Pumps active – All OK.

Turbo pump speed indicates no leaks on fittings (Speed >90K rpm) – All OK.

Instrument pumps down with no issues. Pump time is slow at first, which is to be expected for an instrument which has been out of commission for a long period – All OK.

Vac pressure of 5.8e-08 mBar achieved after 2 days of pump down.

Vac pressure of 1.0e-08 mBar achieved by day 5 of visit.

Back ground monitored during pump down shows reduction in background material every day. By day 5 low background levels achieved – All OK.

Conditioned new filament with no issues. Demonstrated to user how to condition filament – All OK.

Emissions approx. 140µA with Trap @ 50µA - All OK.

CO₂ Ref Gas installed by lab tech and leak checked – All OK. Lines allowed to purge via gas box overnight.

New N₂ cylinder also installed for testing and leak checked– All OK.

Head amp zero-ed – All OK.

All valves function. No mechanical issues noted.

Analyser side Edwards Vac gauge not responding. Part not required for use of instrument.

TGII prep system not pumped into Ion Source. Removed old configuration and connected TGII to 2020 using new 6thou SS piping from Isolation valve to MS. This was to cut out decommissioned trapping loop assembly plumbing. 6thou line re-crimped for TGII use – All OK.

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TGII uses manual control Isolation valve.

Ref gas carrier flow adjusted (as closed) to approx. 20ml/min. All Isolation valves inlet crimps reset as required. Ref Gas crimps adjusted as required – All OK.

Engineer carried standard testing and checks on Ref Gases. System retuned as required for N₂, CO₂, N₂O. Magnet move needed to improve peak shape and linearity.

Demonstrated to user best tuning practices. See Spec results for details of results.

GSL

Removed old Prep PCB and associated wiring – All OK.

Fitted new Prep PCB and rewired system – All OK.

Previously GSL had been connected to System Controller valve bank for control of all valves. This mean manually swapping over ribbon cable when moving from TGII use to GSL use. This is no longer required. Fitted GSL valve control to new Prep PCB & best node to standard config (S node).

Adjusted all node settings within Callisto to recognise new PCB – All OK. Comms established from new prep PCB to all valves. All valves function – All OK.

Removed old ribbon cable from System Controller. TGII will now permanently use System Controller valve bank for valve events. Adjusted all methods to recognise new PCB setup – All OK.

Auto event sequences all function with full comms – All OK.

Comms established with furnaces/GC oven and flow meters all via Callisto (Old Prep Monitor no longer required). Demonstrated to user how to set temps and adjust Pressure if required.

Large O₂ present on oxygen side of plumbing with GSL unit. Issue investigated and fixed. Oxygen pressure now hold over night at 25psi – All OK.

Leak noted in carousel autosampler. This is probably due to wear & tear of autosampler. Blank samples not affected by leak. Autosampler OK to use but engineer would recommend replacement at future date.

User did not have new consumable material available for combustion tube. Old tubes used until new pre-made tubes deliver arrives. User to install and fit after visit occurs.

User installed new water trap & -CO₂ trap. Trap tubes are of old type. Engineer advises customer to upgrade tube type assembly if required for ease of use.

He flows established through system. Blockage removed from He line in water trap location. Pressure set to 25psi. He carrier flow set to approx. 60ml/min for sample usage.

N₂ low when isolation valves open, indicating no leak on system or contaminated cylinders – All OK.

Baked out GC column at 130°C over night. – All OK. GC oven set to 75°C for analysis. Separation between N₂ and CO₂ good – All OK.

Due to distance from Gas box to MS samples as taking a prolonged amount of time to travel before detection. This is not an issue, time/sample adjusted as required within method setup.

Test samples run. Chromatography peak good – All OK.

Spec samples run for precision and linearity. See GSL results for more details.

TGII + Gilson Autosampler

TGII unit had been out of commission for several years prior to engineer's visit.

Unit used System Controller valve bank to control all valves. All valves function ok with no issue.

No leaks found on system – All OK.

Loops drop and rise with no issues – All OK.

Prep Monitor not functioning. Unable to see flows or Pressure readbacks for unit. Manually measure flows and adjusted pressure to matched standard flow setup.

Adjusted crimps as required to achieve a standing flow of approx. 20ml/min through loops carrier pathway and approx. 60ml/min when flushing exetainers.

GC flows set as indicated on notes above manual GC flow control within TGII unit (GC1 = 3ml/min, GC2 = 1.5ml/min).

GC columns baked out at 150°C overnight – No leaks detected after cool down to room temp – All OK.

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Gilson autosampler jammed initially when attempting to move arm position. This seemed to loosen up with usage. Unable to reach end position of sample rack. Advise user not to use samples on last 4 rows of sample rack for 12ml exetainer. Checked and adjusted XY coordinates are required. Demonstrated to user how to adjust XYZ coordinates if required.

WES needled fitted to Gilson autosampler. This would be used for 3/6ml vial sampler, 12ml EXE needle advised for exetainers and large sample bottles to enable full flush of sample volumes.

CH4 analysis not required on unit. O₂ valve deactivated and furnace bypassed as a results.

Tested unit on air samples in 12ml exetainers for CO₂ and N₂ analysis. Adjusted timings on method events as required to optimise sampling for current flows and pressures. Results good. See Spec results for details.

Adjusted N₂O method as required. Labelled events to help user understand function.

Demonstrated to use usage of TGII and possible fault finding.

User given refresher training on how to use and operate system.

Service/Upgrade installation complete.

Instrument handed over to customer for normal usage.

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Results

20-20 / Gas Box - Ref Gas Specs:

Ref Gas pulses from cylinder used.

5 sec for Precision batches (n=5)

1-8 sec used for Linearity batches (n=5)

5 sec pulse used for Ref Points

CO₂ 2/1 Peak Shape = OK

Ref Gas ¹³C Precision =0.018‰ S.D.

CO₂ 2/1 Stability = OK

Ref Gas ¹³C Linearity =0.024‰ S.D.

CO₂ 3/1 Peak Shape = OK

CO₂ 3/1 Stability = OK

N₂ 2/1 Peak Shape = OK

Ref Gas ¹⁵N Precision =0.040‰ S.D.

N₂ 2/1 Stability = OK

Ref Gas ¹⁵N Linearity =0.067‰ S.D.

GSL - Specs

Precision samples: AS Beet Mix (N 100µg, C 400µg) used for TEST samples (n=5) and Ref points

Linearity samples: AS Beet Mix (N 10-200µg, C25-500µg) used for TEST samples (n=6). AS Beet Mix (N 100µg, C 250µg) used for Ref points.

GSL ¹³C Precision =0.021‰ S.D.

GSL ¹³C Linearity =0.135‰ S.D.

*GSL ¹⁵N Precision =0.188‰ S.D.**

GSL ¹⁵N Linearity =0.383‰ S.D.

* *GSL ¹⁵N Precision =0.032‰ S.D. (1 outlier sample removed, n=4)*

TGII - Specs

All samples & Ref points taken from 12ml Exetainers containing local air. N=5

TGII ¹³C (CO₂ from air) Precision =0.062‰ S.D.

TGII ¹⁸O (CO₂ from air) Precision =0.032‰ S.D.

TGII ¹⁵N (N₂ from air) Precision =0.035‰ S.D.

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Recommendations:

- Engineer advises customer to upgrade tube type assembly if required.
- Leak noted in carousel autosampler. This is probably due to wear & tear of autosampler. Blank samples not affected by leak. Autosampler OK to use but engineer would recommend replacement at future date.
- WES needed fitted to Gilson autosampler. This would be used for 3/6ml vial sampler, 12ml EXE needle advised for exetainers and large sample bottles to enable full flush of sample volumes.

Faults and Shortages:

N/A

Follow up:

N/A

Engineer: David Harris

Date: 31st July 2026

Signed:

