

SERVICE REPORT

Job Number:	IN1345		
Customer:	LUKE Helsinki		
Contact:	Elina Sahlstedt		
Instrument:	LA-CryoPrep-2-HS2022 (20402/4-2024/1345)		
Date of Visit:	14 Apr 2026	Days:3	
Engineer:	Henry Connell Cooke		
Reason for Visit:			
Emergency Callout to change turbo and rotary pump			
Service Contract?	No		
Warranty?	Yes	Expires:	Jan 2027
Details of Visit:			
Day 1 - Arrived to system off, new rotary pump already installed and new turbo pump still in box - All cables/lines disconnected, top panel removed and flipped in order to change analyser turbo - Old turbo removed, new turbo installed. New turbo did not come with fan or vent valve, so they were added from the old turbo - Top panel lifted back onto the system and screwed back into place. All cables/lines reattached. Isolation valve on top of the system snapped when screwing back in the He line, so new isolation valve added - System switched on and pumped down quickly. Filament switched on after ~3 hours pumping, as the vacuum had reached E-8 - CO2 peak shape and tuning looked good. Precision = 0.04 and Linearity = 0.14 - CO stability looks poor as vacuum still forming. Background scan shows large N2 peak, 7.5E-11 with isolation valve closed, so CO tuning left for day 2			

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Day 2

- Arrived to a vacuum of $1.0\text{E}-8$, and a significantly reduced but still high N_2 peak in background scan, $1.9\text{E}-11$
- CO peak shape looks good, but stability contains steps. Rotary pump ballasted for ~20 minutes, improving stability, but still small steps are present. After a further 40 minutes ballasting steps were still seen in CO, but not in CO_2 , even if trap is upped to 600.
- It was found that 2 very small steps every 5 minutes would appear in the traces, even if the ref gas wasn't on, and only background noise was being measured, suggesting the cause could be electrical
- To test if the steps were electrical, system controller swapped for that of another 2022. Steps were still present in CO stability, and when the source cables were also swapped the steps turned into large jumps and bad instability
- It was found that a CO stability trace when using CO_2 ref gas had much less stepping. Only 2 very small steps every 5 minutes, that could only be seen when very zoomed into the traces. This suggests that the main problem is with the CO ref gas line
- After adjusting the crimp didn't improve the problem, a new CO ref gas line was made from the inlet at the back of the system to the manifold, which was newly crimped down to ~2mL/min
- In removing the old line, a leak was opened up in the He line, on the tee before the needle valve. This leak was quickly tightened and He line purged before reopening ref gas isolation. Background returned to E-11 quickly, but new CO line, and CO_2 line both now had N_2 ratio of 0.007 when testing for CO
- As it had reached end of day, long Laser test ran overnight, and ref gas lines to be fixed on day 3

Day 3

- Laser run overnight had bad results. 2/1 ratio of CO peak gave N_2 results of 0.007, suggesting the ref gas leak had caused high background in flight tube, despite regular background of run being a typical $1-2\text{E}10$
- CO_2 and CO ref gas lines purged and recrimped. 2/1 ratios now 0.011 as expected.
- CO ref gas precision was ran using both CO_2 and CO gases. CO_2 gas gave CO precision of $\text{C}=0.04$ and $\text{O}=0.30$. CO gas gave precision of $\text{C}=0.02$ and $\text{O}=0.10$.
- Laser was setup with the other HS2022 to prove that there are no problems with LA or cryoprep. Five standards gave a precision of $\text{C}=0.14$ and $\text{O}=0.30$
- CO stability reran, and there are still two very small steps over a 10 minute run, that can only be seen with a very close zoom onto the traces, but all other instability has gone
- Laser test ran. CO gave correct 2/1 ratio this time. Precision was $\text{C}=0.13$ and $\text{O}=0.32$ between the last 4 samples. Overall, out of 15 samples (mix of two different standards) only 2 samples gave unexpected results. For C, the affect was not bad, increasing the precision to 0.20, but for O the results were much worse, with an $n=4$ precision of IAEA-C3 standard being 1.38 with one bad sample, or 0.25 as $n=3$. It is possible that the two bad samples happened because one of the small steps in baseline happened during the baseline integration period, but this cannot be confirmed.
- Whilst the headamp is still in question, both other headamps available are of older styles, and unlikely to work consistently with this HS2022. The older style was attempted (from a retired 2020) but the cups were too large and did not connect properly with the collector feedthroughs

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Follow Up:		
Please email me henry.cooke@sercongroup.com or support@sercongroup.com if you have any questions in the future		
Parts Used:	Quantity:	Charge:
Edwards Rotary Pump	1	N/A
Edwards Turbo Pump	1	N/A
Isolation Valve	1	N/A
Total:		N/A (Warranty)
Engineer: Henry Connell Cooke		Date: 16 Apr 26
Signed:		
Customer:		Date:
Signed: <i>Elaine Saultsteale</i>		21 April 2026