SERVICE REPORT

Job Number:	SE0729 Quote:	Sage:	
Customer:	Terra Analitic, Alba Iulia, Romania		
Contact:	Cristina Montana Puscas		
Instrument:	HS2022, CryoFlex, LSX-213 G2+ laser		
Date of Visit:	20-22 Oct 2026	Days:	3
Engineer:	David Harris		

Reason for Visit:

Upgrade of CryoFlex to CO setup

Service Contract?	**Yes** / ~~No~~	Expires:	31 OCT 2026
Warranty?	~~Yes~~ / No	Expires:	N/A
Tick as Applicable:	~~Call Out / Routine Service / Warranty / Emergency /~~ Contract Visit		

Details of Visit:

Engineer arrived on site and inspected all instruments. Systems are in good working order following several modifications to plumbing – All OK.

Prior to engineer's visit, customer had requested that standard PM service work not be carrier out due to the MS system being in good working order. Instead it was requested that the CryoFlex prep unit be upgraded to be capable to analyse CO to enable ^{18}O & ^{13}C simultaneous analysis.

Customer to provide new GC column (mol sieve 15M) and new Mol sieve trapping loop (V14 cryo loop).

Engineer carried out initial testing of MS performance via ref gas testing. System first tested as found and then retested after tuning/magnet move optimisation.

Precision test; n=5, 5 second ref gas pulses. Ref = 5 sec pulse

Linearity test; n=5, 1, 2, 4, 6, 8, 10 sec ref gas pulses. Ref = 5 sec pulse.

Pre-Tests

CO_2 2/1 Peak Shape = OK, sloping

CO_2 2/1 Stability = OK

CO_2 3/1 Peak Shape = Sloping

CO_2 3/1 Stability = OK

CO_2 Ref Gas ^{13}C Precision =0.017‰ S.D.

CO_2 Ref Gas ^{13}C Linearity =0.082‰ S.D.

CO_2 Ref Gas ^{18}O Precision =0.042‰ S.D.

CO_2 Ref Gas ^{18}O Linearity =0.202‰ S.D.

$CO_{(from\ CO2)}$ 2/1 Peak Shape = Sloping

$CO_{(from\ CO2)}$ 2/1 Stability = OK

$CO_{(from\ CO2)}$ 3/1 Peak Shape = Sloping

$CO_{(from\ CO2)}$ 3/1 Stability = noisy

$CO_{(from\ CO2)}$ Ref Gas ^{13}C Precision =0.145‰ S.D.

$CO_{(from\ CO2)}$ Ref Gas ^{18}O Precision =0.646‰ S.D.

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Peak shape poor, but results generally good. System has not been tuned fully for CO due to previously being a CO_2 only instrument. Magnet required moving to set CO 2/1 & 3/1 peak shape.

Post tuning & magnet move Tests

CO_2 2/1 Peak Shape = OK

CO_2 2/1 Stability = OK

CO_2 3/1 Peak Shape = OK

CO_2 3/1 Stability = OK

CO_2 Ref Gas ^{13}C Precision =0.018‰ S.D.

CO_2 Ref Gas ^{13}C Linearity =0.095‰ S.D.

CO_2 Ref Gas ^{18}O Precision =0.017‰ S.D.

CO_2 Ref Gas ^{18}O Linearity =0.053‰ S.D.

CO (from CO2) 2/1 Peak Shape = OK

CO (from CO2) 2/1 Stability = OK

CO (from CO2) 3/1 Peak Shape = OK

CO (from CO2) 3/1 Stability = OK

CO (from CO2) Ref Gas ^{13}C Precision =0.032‰ S.D.

CO (from CO2) Ref Gas ^{18}O Precision =0.363‰ S.D.

3/1 ratio stability displayed slight noise due to low sensitivity during pre-testing. With magnet move & re-tune sensitivity improved. Slight noise still displayed. Engineer Investigated Head Amp assembly. Connections loose on beam 3 collector. Reseat connection, Stability trace improved – All OK.

Engineer removed old GC column and sealed in/out connections. New (Rt-Mol Sieve 5A PLOT, 15M 0.53mmID 50µm df) GC column installed.

Flows established through GC column set initially to approx. 10ml/min. Then down to approx. 7.0ml/min for final testing.

GC column leak checked – All OK. N_2 background levels coming from GC column good (approx. 0.035nA major beam height, trap @600µA).

GC column baked out over night at 130°C and set back to 30°C for testing of lasered samples – All OK.

Customer built new U shaped CO trapping loop containing 1cm of Mol Sieve 5A 80/100 Mesh contained with Quartz wool.

Engineer removed old empty CryoLoop at V14 and replaced for new component. Initially loop too short and did not fall into LN_2 when levels were low. Loop extended with 30thou tubing to correct size – All OK.

Customer made quartz wool filter in 1/8th tubing. This is to capture any material/dust/etc which may enter the lines. Initial testing resulted to high pressure within Teledyne EPC/MFC controller, resulting in automatic shut down (shut off triggers at 20psi). Filter part remade with allowed pressure to stabilise at approx. 18.5psi. with flow at 20ml/min. Other users of this application report that the filter will require changing for new on a weekly basis.

Initial testing of laser samples yielded no CO peaks. Events found to give too great a timer period for trapping CO_2 sample. CO_2 flushing away with wait time of 300 seconds. Wait period trimmed down to 100 seconds to match events in Helsinki setup up. CO (& N_2) sample peak now present. See below for events table

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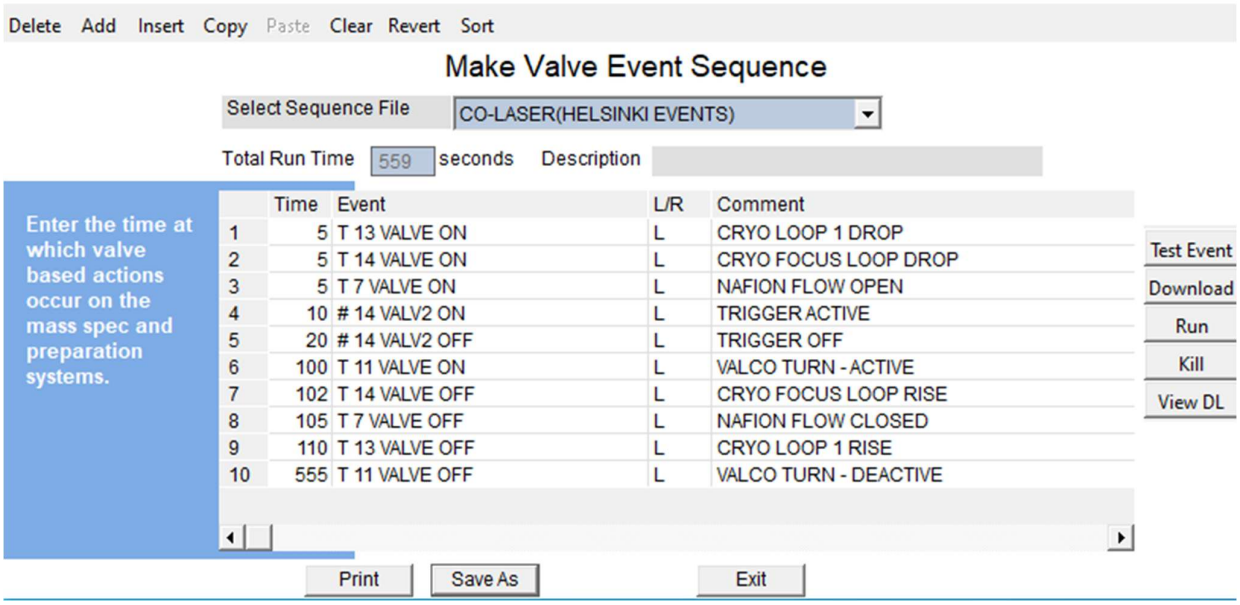

Connecting pipe work had been replaced by customer from stainless steel to peak tubing with plastic fittings into 6-way Valco inlets. Issues with plastic fittings leaking/blocking the line. After leak checking connections no sample peaks present. Peek tubing replaced with stainless steel pipework & standard metal connectors. Sample peaks now present during testing.

Blank peaks good with no laser ablation. N_2 blanks approx. 7.7nA. major beam height. Trap @600µA (Peak height dropping with extended flushing of system). CO blank approx. 0.16nA major beam height. Trap @600µA.

Customer tested different laser ablation settings and the difference between cellulose and wood samples.

Higher energy (laser output 70%) did give slightly more sample yield, but 50% also gave high CO yield.

Final laser output settings during testing as below.
Laser Output: 50.0%
Fluence (J/cm^2): 10.20
Rep Rate: 20
Shot Count: N/A
Dwell Time (s): N/A
Z Depth: N/A
Iteration Count: 1
Spot Size 100µm Circle
Scan Speed: 30 µm/Sec
Spot Spacing: N/A

CryoFlex modification complete.

Customer to continue testing and batch work. Events to be optimised as required with testing.

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Recommendations:
• Continue testing of samples and report back to Sercon with batch data where possible.

Follow Up:
N/A

Parts Used:	***Stock Number:***	***Quantity:***	***Charge:***
Service Kit + Edwards 15 Oil	SC9001	1	Included in service
		Total:	N/A

Engineer:	David Harris	Date:	23 Oct 2026
Signed:			
Customer:		Date:	29 Oct 2026
Signed:			

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NOTES:

N/A

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