

CERTIFICATION OF CALIBRATION



Date Of Calibration: 21-Jun-2021

Certificate Number: G501280_2/28295

Issued by: QED Environmental Systems Ltd.

Customer: Earth Environmental & Geotechnical Ltd
Holdsworth Mill Business Centre Holdsworth Street Stockport
SK5 6DA UNITED KINGDOM

Description: Gas Analyser

Model: GA5000

Serial Number: G501280

UKAS Accredited results:

Results after adjustment :

Methane (CH ₄)		
Certified Gas (%)	Instrument Reading (%)	Uncertainty (%)
5.0	4.9	0.072
15.0	14.9	0.13
60.0	59.8	0.42

Carbon Dioxide (CO ₂)		
Certified Gas (%)	Instrument Reading (%)	Uncertainty (%)
5.0	4.9	0.074
15.0	14.8	0.13
40.0	40.1	0.29

Oxygen (O ₂)		
Certified Gas (%)	Instrument Reading (%)	Uncertainty (%)
21.1	21.2	0.25

The inwards assessment was carried out 10-Jun-2021.

The maximum adjustment is larger than the specification limit.

Inwards assessment data is available if requested.

All concentrations are molar.

CH₄, CO₂ readings recorded at : 33.0 °C ± 2.5 °C

O₂ readings recorded at : 24.5 °C ± 2.5 °C

Barometric Pressure : 1004 mbar ± 4 mbar

Method of Test : The analyser is calibrated in a temperature controlled chamber using a series of reference gases, in compliance with procedure LP004.

Instrument has passed calibration as the measurement result is within the specification limit. The specification limit takes into account the measurement uncertainty.

The results relate only to the item calibrated

This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

Calibration Instance:112 IGC Instance:112

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QED Environmental Systems Ltd. Cyan Park - Unit 3, Jimmy Hill Way, Coventry, CV2 4QP, UNITED KINGDOM

Registered in England and Wales 1898734

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The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

Calibrations marked 'Non-UKAS Accredited results' on this certificate have been included for completeness.

Non-UKAS accredited results after adjustment:

Barometer (mbar)	
Reference	Instrument Reading
1004	1004

Additional Gas Cells		
Gas	Certified Gas (ppm)	Instrument Reading (ppm)
CO	509	509
H ₂ S	250	250

Internal Flow	
Applied (l/hr)	Instrument Reading (l/hr)
5	5.2
10	10

Date of Issue : 22-Jun-2021

Approved by Signatory

Dawn Hemings

Laboratory Inspection

End of Certificate

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Instrument Service Report

<u>Unit Type:</u> GA5000	<u>Part Number:</u>	<u>Date:</u>	<u>Next Service Due:</u>	<u>Customer Name:</u>
<u>Serial Number:</u> G501280	GA5KB0C0-101	22-Jun-2021	21-Dec-2021	Earth Environmental & Geotechnical Ltd
Actions/Investigation Description	Result	Comments		
Serial Number Check	Yes			
Battery Requires Replacing	Yes	Battery replaced		
Internal Flow Calibrated	Yes			
Full Automatic Calibration	Pass			
Serial Comms Test (USB)	Pass			
Service history of instrument reviewed	Yes			
Inwards gas check data reviewed	Yes			
Instrument turns on	Pass			
Customer specific requirements observed and reported fault(s) acknowledged	N/A			
Backlight operates correctly	Yes			
External visual inspection performed	Pass			
Internal visual inspection performed	Pass			
All screws tightened to correct torque	Yes			
All connectors are secure	Pass			
Check diagnostic channels	Pass			
Case compression test	Pass			

Instrument Service Report

<u>Unit Type:</u> GA5000	<u>Part Number:</u>	<u>Date:</u>	<u>Next Service Due:</u>	<u>Customer Name:</u>
<u>Serial Number:</u> G501280	GA5KB0C0-101	22-Jun-2021	21-Dec-2021	Earth Environmental & Geotechnical Ltd
Actions/Investigation Description	Result	Comments		
Impact and stability test	Pass			
Pressure transducer test(s) as per user operation	Pass			
Final visual inspection on instrument	Pass			
Case assembly closed and screws tightened to correct torque	Yes			
PTFE filters replaced	Yes			
Pump flow greater than 550 ml/min	Pass			
Automated instrument pressure system test (leak test)	Pass			
Pump vacuum greater than -400 mb and flow fails	Pass			
GPS function test	NA			
Temperature probe tested	Pass			
Anemometer tested	Pass			
Chemical gas sensors calibrated – refer to Calibration Certificate	Retest Passed			
Check main PCB and sensor PCB have the latest software	Yes			
Transducers calibrated	Pass			
As Received Chemical Cell Gas Assessment Performed (CAL16)	Yes			
As Received Gas Assessment Performed (CAL01 or CAL02)	Yes			

Instrument Service Report

Unit Type: GA5000 **Part Number:** GA5KB0C0-101 **Date:** 22-Jun-2021 **Next Service Due:** 21-Dec-2021 **Customer Name:** Earth Environmental & Geotechnical Ltd
Serial Number: G501280

Actions/Investigation Description	Result	Comments
Chemical sensor(s) replacement over 2yrs UK and 21mths overseas.	Yes	CO & H2S Cells replaced
O2 sensor replacement over 3yrs UK, 33mths overseas	Pass	

Customer Comments

Returned for full service and calibration

Accessory Test	Result	Comments
Charger	Pass	Charger output is in spec.
Water Trap	Pass	Replaced PTFE filter. Replaced tubing, Replaced hose barb, Tested ok.
Filter - H ² S/VOC	Pass	Pellets ok, Pressure tested ok.
Filter - H ² S/VOC	Pass	Pellets ok, Pressure tested ok.

General Comments/Feedback

Instrument Service Report

<u>Unit Type:</u> GA5000	<u>Part Number:</u> GA5KB0C0-101	<u>Date:</u> 22-Jun-2021	<u>Next Service Due:</u> 21-Dec-2021	<u>Customer Name:</u> Earth Environmental & Geotechnical Ltd
<u>Serial Number:</u> G501280				

Thank you for returning your gas analyser to the QED Service Centre for full service and calibration. We are pleased to inform you that the analyser was received and fully assessed by one of our experienced Service Engineers and no significant faults or issues were observed during the assessment. Our extensive service was carried out, and any necessary components replaced. The analyser has successfully passed all of our rigorous testing and quality checks and has been calibrated using our bespoke, state of the art calibration facility.

For further information about how to get the best use from your instrument please visit our YouTube channel <http://www.youtube.com/GeotechTV> and on our Website <https://qedenv.com>

We have replaced the battery because it is over 2 years old. This is in accordance to the battery cell manufacturer's recommendation.

The CO & H2S electrochemical sensor has been replaced due it being over 2 years old in accordance with the manufacturer's recommendations, and also as a proactive measure based on our experience of the typical lifetime of this type of sensor.

If you require any further assistance with your instrument please email our Technical Support Team at technical@qedenv.co.uk or call us on +44 (0) 333 800 0088 (Monday to Thursday 08.30 - 17.00 & Friday 08.30 - 15.30) UK time zone.

<u>Service Details:</u> Service Scheme	☒	<u>Service Engineer:</u>	<u>Calibration Engineer:</u>	<u>Approved By:</u>	<u>Signature:</u>
Standard Service	☐	Ricky Cottrill	Suk Balrey	Dawn Hemings	