CERTIFICATION OF CALIBRATION

Date Of Calibration: 08-Nov-2016 **Certificate Number:** G502417_2/17383

4533

ISSUED BY: GEOTECHNICAL INSTRUMENTS (UK) LTD

Customer: **L K Consult Limited**

Unit 29 Eton Business Park Eton HIll Road Radcliffe
Manchester M26 2ZS UNITED KINGDOM

Description: Gas Analyser

Model: GA5000

Serial Number: G502417

UKAS Accredited results:

Results after adjustment :

Methane (CH_4)		
Certified Gas (%)	Instrument Reading (%)	Uncertainty (%)
5.1	5.0	0.41
15.0	15.0	0.64
50.0	49.6	0.94

Carbon Dioxide (CO_2)		
Certified Gas (%)	Instrument Reading (%)	Uncertainty (%)
5.1	4.9	0.43
15.1	14.9	0.70
50.0	50.1	1.1

Oxygen (O_2)		
Certified Gas (%)	Instrument Reading (%)	Uncertainty (%)
21.3	21.4	0.31

The inwards assessment was carried out 04-Nov-2016.
The maximum adjustment is larger than the inwards assessment uncertainty.
Inwards assessment data is available if requested.

All concentrations are molar.

CH_4, CO_2 readings recorded at : 30.9 °C ± 1.5 °C

O2 reading recorded at : 22.2 °C ± 1.5 °C

Barometric Pressure : 1002 mbar ± 3 mbar

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

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.

Geotechnical Instruments (UK) Ltd
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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:

Barometer (mbar)	
Reference	Instrument Reading
1002	1001

Additional Gas Cells		
Gas	Certified Gas (ppm)	Instrument Reading (ppm)
CO	478	478.2
H_2S	259	258.8

Internal Flow	
Applied (l/hr)	Instrument Reading (l/hr)
5.0	5.1
10.0	10.2

Approved by Signatory

Dawn Hemings

Laboratory Inspection

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.

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Instrument Service Report

Unit Type: GA5000	Part Number:	Date:	Next Service Due:	Customer Name:
Serial Number: G502417	GA5KB0C0-301	09-Nov-2016	08-May-2017	L K Consult Limited

Actions/Investigation Description	Result	Comments
Serial Number Check	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	
Instrument has latest software	Yes	
Internal visual inspection performed	Pass	
Chemical sensor(s) replaced	Yes	CO cell replaced
O2 sensor replaced	No	
All screws tightened to correct torque	Yes	
All connectors are secure	Pass	
Check diagnostic channels	Pass	

Instrument Service Report

Unit Type: GA5000	Part Number:	Date:	Next Service Due:	Customer Name:
Serial Number: G502417	GA5KB0C0-301	09-Nov-2016	08-May-2017	L K Consult Limited

Actions/Investigation Description	Result	Comments
Case compression test	Pass	
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	
Response to customer's reported comments	NA	
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	Pass	
Internal flow calibrated - refer to results on Calibration Certificate	Pass	
Temperature probe tested	Pass	
Anemometer tested	Pass	
As Received Chemical Cell Gas Assessment Performed (RIG 8)	Yes	
As Received Gas Assessment Performed (RIG 1 or RIG 2)	Yes	
Chemical gas sensors calibrated – refer to Calibration Certificate	Retest Passed	

Instrument Service Report

Unit Type: GA5000	Part Number:	Date:	Next Service Due:	Customer Name:
Serial Number: G502417	GA5KB0C0-301	09-Nov-2016	08-May-2017	L K Consult Limited

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.
Download Lead	Pass	Data transfer successful.

Service Details:		Service Engineer:	Calibration Engineer:	Approved By:	Signature:
Service Scheme	✓	Abdul Tantoush	Graham Ingles	Dawn Hemings	
Standard Service					