GA2000 Range Gas Analysers

Operating Manual

GA2000 PLUS MC080126/00

Geotechnical Instruments (UK) Ltd
Sovereign House
Queensway
Leamington Spa
Warwickshire
CV31 3JR
England
Tel: +44 (0)1926 338111
Fax: +44 (0)1926 338110
Email: sales@geotech.co.uk
Website: www.geotech.co.uk

This page is intentionally left blank.

Table of Contents

This page is intentionally left blank.

1.0 Manual Guidelines

1.1 Document History

Issued By	Issue Date	Change Control ID	Issue No.	Reason for Change
LA	Oct 2009	OMGAUK	1.35	New Instructions (GPS)
LA	Nov 2009	OMGAUK	1.36	New Instructions (H_2S filter)
LA	Nov 2009	OMGAUK	1.37	Update Instructions (MCERTS)

1.2 Safety Symbol

Information in this manual that may affect the safety of users and others is preceded by the following symbol:

⚠ Warning

Failure to follow this information may result in physical injury which in some cases could be fatal.

1.3 Notes

Important/useful information and instructions are shown clearly throughout the manual in a note format.

For example:

✍ Note: For further information please contact Technical Support at Geotech (UK) Limited on +44(0)1926 338111 or email technical@geotech.co.uk

2.0 Introduction

This manual explains how to use the GA2000 range of landfill gas analysers for the following model types below:

- GA2000
- GA2000 Plus

There are a number of versions of the GA2000 analyser, and several options. Where a section in the manual applies only to some of the versions, this is indicated in the section heading.

✍ Note: Gas analysers are a sensitive piece of scientific equipment, and should be treated as such.

2.1 Safety Instructions

⚠ **Warning**	The GA2000 range of gas analysers can be used for measuring gases from landfill sites and other sources as described in this manual. Inhaling these gases may be harmful to health and in some cases may be fatal. It is the responsibility of the user to ensure that he/she is adequately trained in the safety aspects of the gases being used and appropriate procedures are followed. In particular, where hazardous gases are being used the gas exhausted from the analyser must be piped to an area where it is safe to discharge the gas. Hazardous gas can also be expelled from the instrument when purging with clean air.

2.2 Instructions for Safe Use – English Language

(Reference European ATEX Directive 94/9/EC, Annex II, 1.0.6.)

The following instructions apply to equipment covered by certificate numbers Sira 06ATEX2202X:

- The equipment may be used with flammable gases and vapours with apparatus group IIA and temperature class T1.
- The equipment is only certified for use in ambient temperatures in the range 0ºC to +40ºC and should not be used outside this range.
- Installation shall be carried out in accordance with the applicable code of practice by suitably trained personnel.
- Repair of this equipment shall be carried out in accordance with the applicable code of practice.
- The manufacturer will specify those materials which are important to the type of protection.

- When the GA2000 or GA2000 Plus methane detector is in the hazardous area it shall only be externally attached via 'Connector D' (the half moon) to devices that are marked with the certificate number Sira 06ATEX2202X.
- If the equipment is likely to come into contact with aggressive substances, e.g. acidic liquids or gases that may attack metals, or solvents that may affect polymeric materials, then it is the responsibility of the user to take suitable precautions, e.g. regular checks as part of routine inspections or establishing from the material's data sheet that it is resistant to specific chemicals that prevent it from being adversely affected, thus ensuring that the type of protection is not compromised.

The GA2000/GA2000 Plus Gas Analyser has been certified to Hazardous Area Classification

II2G Ex ib d IIA T1 Gb (Ta = 0ºC to +40ºC)

It is vital the instructions in this manual are followed closely.

It is the responsibility of the operator to determine the protection concept and classification required for a particular application.

2.3 MCERTS

MCERTS is the UK Environment Agency's Monitoring Certification Scheme. The scheme provides a framework within which environmental measurements can be made in accordance with the Agency's quality requirements. The scheme covers a range of monitoring, sampling and inspection activities.

This certification does not apply to the GA2000 version. The GA2000 Plus version of this instrument is MCERTS certified only if:

- The MCERTS logo appears on the screen after initial power on.
- The internal analyser Firmware software version is 3.02 or later.

✍ Note: MCERTS - Cross sensitivity tests using hydrogen sulphide were not carried out on this instrument. Therefore, users should be aware if H_2S is present on sites, there may be an interferent effect.

The GA2000 Plus has been certified to version 1 of the 'Performance Standards for Portable Emission Monitoring Systems'.

✍ Note: Please refer to the Glossary of Terms for further information on MCERTS.

2.4 CIRIA

The CIRIA guideline 'Assessing the risks posed by hazardous ground gases to buildings' proposes that gas concentrations and flow rates should be monitored.

As an example methodology, they suggest using a gas analyser to first measure flow and pressure and afterwards to measure gas concentration.

Versions of the GA2000 range with internal analyser Firmware software version 3.02 and above have the ability to take measurements according to the CIRIA guidelines, while still allowing other users to take the measurements as before.

3.0 The GA2000 Range Gas Analysers

3.1 The GA2000

The industry standard GA2000 is designed to meet landfill monitoring protocols set by Government legislation. Utilised with dedicated software the GA2000 becomes an extremely powerful detection, monitoring and change indicator tool.

Features:

- ATEX certified
- 5 gases standard
- Peak CH_4 recording
- Simultaneous display of all gases
- Storage of site and ID questions
- Field proven
- Standardises monitoring routines
- Easy transfer of data
- Optional Internal Flow
- Optional Event Log
- Data storage 2000 readings and 1000 IDs
- 0-500ppm H_2S reading
- Technician Log-in

Main Application:

- Landfill sites
- Brownfield
- Site investigation

3.2 The GA2000 Plus

The GA2000 Plus utilises new technology to give more reliable readings for carbon monoxide (CO), helping to determine the presence of fires on landfill. It incorporates all the existing technology and features of the industry standard GA2000.

Features:

- MCERTS certified
- ATEX certified
- 6 gas capability
- H_2 compensated CO reading
- Peak CH_4 and CO_2
- Minimum O_2
- Reliable CO reading
- Optional Internal Flow
- Optional Event Log
- Data storage 2000 readings and 1000 IDs
- 0-500ppm H_2S reading
- Technician Log-in

Main Application:

- Landfill sites
- Brownfield
- Site investigation

3.3 Instrument Components – Standard Product

GA2000 Plus

Reference:

A	Gas Analyser Instrument (Diagram shows GA2000 Plus)
B	GA2000 Range Operating Manual
C	In-line Water Trap Housing (tubing & filter)
D	Temperature Probe (Optional)
E	Gas Pod (Optional)
F	H_2S Filter (Optional)
G	Mains Battery Charger Adaptors: Europe US Australia

4.0 GA2000 Range Optional Products and Accessories

4.1 Optional Products

The GA2000 range has a number of optional products for purchase which enhance the usability and enable further analysis of data and reading information.

✍ Note: For more information on the features listed in this section please contact Sales at Geotech (UK) Limited on +44(0)1926 338111 or email Sales@geotech.co.uk.

4.1.1 Temperature Probe (Optional)

The GA2000 range has the facility to automatically display and record the borehole temperature via an optional temperature probe.

When a temperature probe is fitted the temperature will be displayed in the 'Main Gas Read Screen' and recorded with all other data.

✍ Note: Temperature probes with an EEx label are part of the GA2000/GA2000 Plus Ex certification and therefore certified for use under the same conditions as the analyser.

4.1.2 Anemometer (Optional)

The GA2000 range has the optional facility to automatically display and record high flow via an optional anemometer probe. It is designed to plug into the instrument and instantly provide a flow indication. It adds flow measurements to the professional reporting ability of the GA2000 range along with gas concentrations, pressure and temperature.

The anemometer has a simple connection, a narrow diameter measurement head (11mm), a wide temperature operating range (up to 80°C) and indicates flows up to 40 m/sec.

When an anemometer probe is fitted to the analyser the flow will be displayed in the 'Main Gas Read Screen' and recorded with all other data.

Flow can be measured in either m/s (gas velocity) or m^3/hr (volume flow rate). In order to calculate the volume flow rate the pipe diameter will need to be entered into the instrument, either manually or via the Gas Analyser Manager software.

✍ Note: The anemometer probe is NOT part of the analyser Ex certification and is therefore NOT certified for use in a potentially explosive atmosphere. To use the m^3/hr option the firmware software within the analyser must be set at the time of manufacture.

4.1.3 External Gas Pod (Optional)

The GA2000 range has a range of gas pod attachments enabling the site engineer to safely monitor additional gases. The interchangeable electro-chemical sensors allow the user to enhance the capabilities of the analyser. The lightweight and strong aluminium pod construction ensures optimum performance.

The ATEX gas pod is ATEX certified for use in zone 1, is simple to plug in and is available for H_2S, CO, SO_2, H_2 and HCN. The GA2000 can read external gas pods provided it does

not have the two internal cells fitted. The GA2000 Plus has the facility to read any external gas pod in addition to its internal chemical cells.

When a gas pod is fitted to the analyser the gas type and reading will be displayed in the 'Main Gas Read Screen' and recorded with all other data.

✍ Note: When using an external pod with the same gas type as an internal cell the external cell always overrides the internal. The same value will be displayed and stored.

4.1.4 H_2S Filter (Optional)

The GA2000 range has the capability to use a H_2S filter. The H_2S gas can have a cross-gas effect on the CO reading. By using a filter the H_2S is removed from the gas sample, therefore providing a more accurate CO reading.

The filter only needs to be used when you are trying to get rid of any possible cross gas effects H_2S might have on other gases. Do not use the filter on all boreholes.

4.1.5 Internal Flow (Optional)

The GA2000 range has the capability to measure the gas flow from a borehole without the need for an additional flow pod. The user is automatically prompted to take this measurement during the normal reading sequence. This function can be selected as 'On' or 'Off' for each ID using Gas Analyser Manager. If it is off the user will not be prompted to measure the flow.

4.1.6 Gas Analyser Manager – GAM (Optional)

Gas Analyser Manager (GAM) enables the user to maximise the operation of the gas analyser. It enables direct communication with the unit, it features a simple upload and downloads facility and is fully compatible with the latest Microsoft™ operating systems.

Features:

- Organisation and transfer of IDs and readings to and from the gas analyser.
- Configuration of the gas analyser.
- Flexible grouping of the IDs.
- Structured organisation of transferred data.
- Automatic detection of instrument type and available options.
- Secure data mode to prevent tampering.
- Email and FTP of downloaded readings.
- First time set-up wizard.
- Facility to import existing Datafield Comms data.

4.1.6.1 Event Log (Optional)

The GA2000 range incorporates the facility to log significant events performed on the analyser via the 'Event Log'. This can be used as an aid to monitoring the use of the instrument and used as a diagnostic tool if there is a problem with the instrument.

The log can hold approximately 1000 events. Applicable events are stored in the event log automatically. No user intervention is required. If the log becomes nearly full, a

warning will be given on the start up screen. If the log becomes full then no further events will be stored.

The log can be downloaded, viewed and cleared by using the Gas Analyser Manager.

The log is also cleared when the analyser is cold started.

✍ Note: The event log cannot be viewed on the analyser screen and is only available using Gas Analyser Manager (GAM). Please contact the Sales Team at Geotech (UK) Limited for more information.

The result is displayed as a table, giving target, factory and actual gas values. A typical list of the events that are logged is included in 'Section 13 - Event Log' of this operating manual.

4.1.6.2 GPS (Optional)

The GPS facility is available on all models of the GA2000 range. This facility enables the site engineer to find boreholes automatically via satellite positioning where borehole IDs have previously been uploaded from GAM to the instrument. It also provides proof that site borehole readings have been taken within the vicinity. The GPS data is stored for each borehole ID and later downloaded back to GAM for analysis.

✍ Note: Instruments manufactured after 05/02/2007.

4.1.6.3 Technician Log-in (Optional)

This facility allows the operating technician (site engineer) to log-in when the analyser is switched on and to tag all subsequent readings with a four character technician ID. The technician selects their ID/name from a pre-loaded list before proceeding to the reading screen.

The list of IDs and names is created and uploaded into the instrument using Gas Analyser Manager. Once IDs have been created using GAM, the user can create a new four digit ID from the keypad by selecting 'Key 5' at the technician log-in screen.

4.2 Instrument Accessory Products

Optional accessory and replacement parts may be purchased for the GA2000 range from Geotechnical Instruments (UK) Limited direct. Please refer to the website www.geotech.co.uk for further details on pricing and how to order.

Ref	Description	Mfr Order Code
A	In-line Water Trap Housing (complete with tubing & filter)	GAA1.8
B	In-line Water Trap Housing (housing & filter only)	GAA1.6
C	Water Trap Filters (pack of 10) Water Trap Filters (pack of 30)	GA4.2 GA4.2(30)
D	Male Quick Coupling with Hose Barb (pack of 10)	MC10
E	Sampling Tube 5m	GA2.3
F	Inlet Port Filters (pack of 10) Inlet Port Filters (pack of 30)	GA4.1 GA4.1(30)
G	H_2S Filters (pack of 5)	GA6.5
H	Regulator and Tubing for Calibration Gas Calibration Gas Canister : 58 litre 5% CH_4 5% CO_2 6% O_2 balance N_2 58 litre 50 ppm H_2S balance N_2 58 litre 5% CH_4 10% CO_2 balance N_2 58 litre 100 ppm CO balance N_2 58 litre 60% CH_4 40% CO_2	G1.1 GA3.2-58 GA3.4B-58 GA3.3-58 GA3.4-58 GA4.3B-58
I	Battery Charger	GA3.9/S
J	USB Lead	USBLEAD1
K	Soft Carry Case	GA5.1
L	Gas Pod (various gas ranges available – please refer to website)	
M	Hard Carry Case	GA2.5
N	ATEX Certified Temperature Probe	GA5.2
O	Anemometer	GA5.4
P	Gas Analyser Manager (GAM)	GAM

5.0 GA2000 Range Instrument Features

5.1 Physical Characteristics of the Instrument Panel

Front View:

Reference:

A	Main Gas Read Screen
B	Key 2 – Scroll Up
C	Key 4 – Scroll Left
D	Key 8 – Scroll Down
E	Key 0 - Backlight
F	On/Off Key
G	Key 6 – Scroll Right
H	Enter Key
I	General Option Keys
J	Pump/Backspace/ Delete Key
K	Analyser Model

Back View:

Reference:

L	Inlet Port Filter
M	Inlet Port Filter Cover
N	Serial Number
O	Product Option Number

5.2 Panel Key Functions

Front Panel:

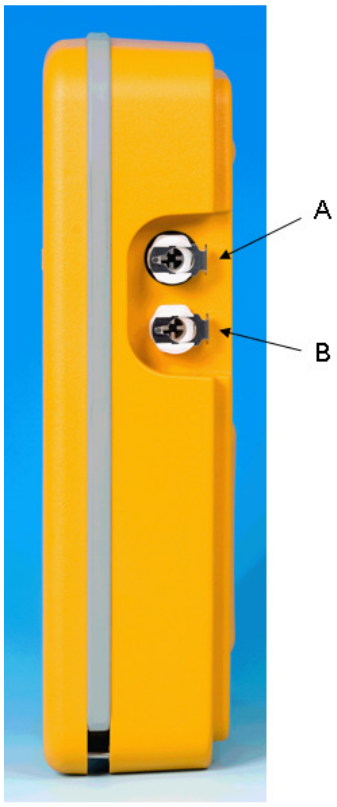
	Keys	Function
A	Main Read Screen	Start and end screen when using the instrument.
B	Scroll Up Key	Also 'Key 2'. Press scroll up to view further information on the instrument read screen.
C	Scroll Left Key	Also 'Key 4'. Enables the operator to scroll left to display more information.
D	Scroll Down Key	Also 'Key 8'. Enables the operator to scroll down to display more information.
E	Backlight	Also 'Key 0'. Enables the operator to backlight the analyser display panel. Also, the 'Keypad Lock' feature enables if pressed and held for 2 seconds.
F	On/Off Key	Press the 'On/Off' key briefly to switch the instrument on and off.
G	Scroll Right Key	Also 'Key 6'. Press scroll right to view further information on the instrument read screen.
H	Enter Key	The 'Enter' key accepts/confirms choices made by the operator to various functions and operations. Also required to confirm numeric data entry.
I	General Option Keys	Keys 1, 2, 3, 4, 5, 6, 7, 8, 9
J	Pump Key	Press the 'Pump' key to start or stop the pump. Also backspace and delete.
K	Analyser Model	Label displays model type of analyser, i.e. GA2000 or GA2000 Plus.

Back Panel:

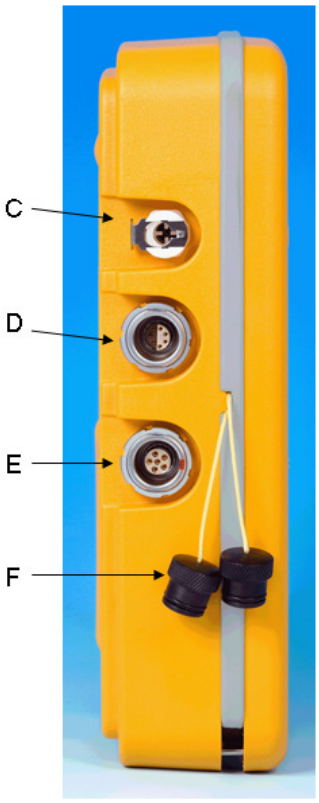
L	Inlet Port Filter	The inlet port filter acts as a particulate filter.
M	Inlet Port Filter Cover	Houses and protects the inlet port filter. Use a 50p coin to undo the cover when changing the filter. Be careful not to overtighten when replacing the cover.
N	Serial Number	Unique identification for the instrument. Verification of the serial number will be required if Technical Support assistance is needed.
O	Product Option Number	Records analyser internal configuration at the time of manufacture.

5.3 Instrument Connection Points

Right Side View:



Left Side View:



Right Side View:

A	Inlet Port	Attach the sample tube to this port to take a gas sample.
B	Flow Measurement Port	Attach the sample tube to this port to take a flow measurement.

Left Side View:

C	Gas Outlet Port	The gas outlet port is the point at which the sample gas is expelled. Tubing may also be attached to the port.
D	Connector D (Half Moon)	Communications port used to attach the USB lead for PC-to-analyser connectivity. Also used to attach the temperature probe and gas pod.
E	Connector E	Used to attach the mains charger to the analyser for charging and also used to attach an anemometer.
F	Dust Caps	Dust caps used to protect the connector points of the instrument.

6.0 General Operational Instructions

6.1 Switching the Instrument On

1) To switch on the analyser, press and hold down the 'On/Off' key. A long beep will be emitted followed by the Geotech (UK) Limited logo display.

2) The 'power on self-test' will then commence. Refer to the message 'Self-test mode, please wait ….' at the bottom of the analyser read screen.

3) Following the self-test, the 'Service Information' and reminder screen will be displayed.

4) Select the 'Enter' key to take you to the 'Main Gas Read Screen'.

✍ Note: If the 'Event Log' feature is enabled - select the 'Enter' key to take you to the technician log-in screen (optional) which is then followed by the 'Main Gas Read Screen'.

6.2 Switching the Analyser Off

1) To switch off the analyser, press and hold down the 'On/Off' key for approximately 1.5 seconds, at which point a clean air purge will be carried out.

2) If for any reason the analyser 'locks up' and will not switch off in this manner, press and hold the 'On/Off' key for 15 seconds; this will force the instrument to switch off.

6.3 Warm-up Self-test

When switched on the read-out will perform a pre-determined self-test sequence taking approximately 30-40 seconds depending on the types of chemical cells fitted.

During this time many of the analyser's functions are tested, including:

- General operation
- Pump function
- Gas flow measurement
- Calibration
- Backlight function
- Solenoid function
- Battery charge level

During the self-test the following information is also displayed:

- Manufacturer's service due date
- The last gas check date
- Software version programmed
- Date format
- Serial number
- Operating language
- Baud rate
- The currently enabled sales option

✍ Note: The warm-up should only be done with the analyser sampling fresh air.

6.4 Keypad Lock

Keypad lock avoids accidental key presses when carrying the analyser.

1) To lock the keypad, press and hold the 'Backlight' key for two seconds.

✍ Note: A message stating that the keypad is locked will be displayed at the bottom of the analyser read screen.

2) To unlock the keypad, press and hold the 'Backlight' key again.

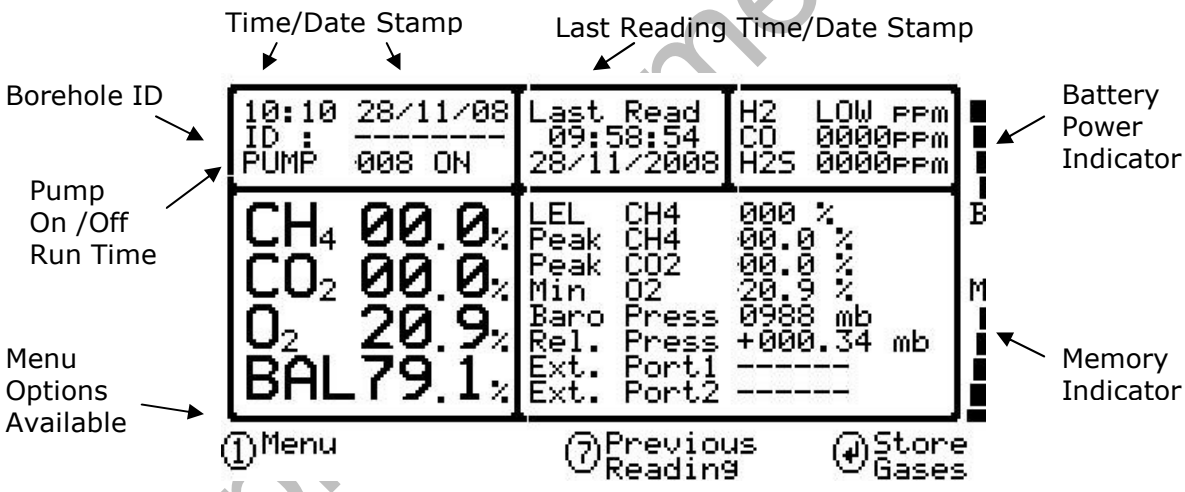
6.5 Instrument Main Gas Read Screen

The 'Main Gas Read Screen' is considered to be the normal operating screen and all operations are carried out from this starting point.

The actual data shown on this display will depend on the version of the instrument and the options that have been selected. In general, all of the main readings will be shown.

The instrument will only connect to the Gas Analyser Manager whilst in this screen.

Example - GA2000 Plus:



✍ Note: H_2 low ppm, peak CH_4 and peak CO_2 parameters will not be included on the 'Main Gas Read Screen' display for the GA2000 model.

6.6 Cold Start

A cold start should only be carried out to correct an instrument if no other course of action has proved successful, as this function will clear the instrument memory entirely, reset all factory settings and reset the internal time and date to a default setting.

✍ Note: This function should only be used as a last resort. For gas calibration error messages ensure a factory setting and user calibration have been carried out first.

6.6.1 Perform a Cold Start

✍ Note Please contact Technical Support at Geotech (UK) Limited on +44(0)1926 338111 before performing this operation.

1) Turn the analyser on and during the self-test continue to hold the 'Enter' key until such time as the self-test has been completed.

2) Upon completion of the self-test a 'Passcode Entry Screen' will be displayed.

3) At this point release the 'Enter' key.

4) Enter the code '12345' and press the 'Enter' key to confirm.

5) After the passcode entry has been accepted the instrument's serial number will be displayed along with the hours of operation and two options:

   - 1-Cold Start
   - 0-Exit

6) Only select 'option 1' if a cold start is to be carried out.

7) After selection, 'Key 1' will require pressing again to confirm this operation.

8) The cold start menu will be displayed again; press 'Key 0' to continue with normal operation.

6.7 Storage

The analyser should not be exposed to extremes of temperature. Do not keep the analyser in a hot car. When not in use analysers should be kept in a clean, dry and warm environment, such as an office.

The read-out should be discharged and fully charged at least once every four weeks, regardless of indicated charge state. The discharge function may be carried out with the use of the 'Data Logging' function.

6.8 Battery/Charging

The battery used in the GA2000 range is nickel metal hydride and manufactured as an encapsulated pack from six individual cells. This type of battery is not so susceptible to the top-up charging 'memory effects' as nickel cadmium batteries, although it is not recommended that the unit is given small top-up charges.

The charger should only be disconnected when charged is indicated.

⚠ **Warning**	The battery charger is NOT covered by the Ex certification. The battery must be charged only in a safe area.

The battery charger is intelligent and will indicate when the unit is charging and charged.

✍ Note: A full charge should take approximately two hours. Five bars indicate battery full. If 'B' flashes very little charge is left and the instrument will switch off.

6.9 Memory

The analyser's memory is volatile, although it is retained by a battery back-up system.

The memory is not to be used as a permanent storage medium and any data should be transferred to a more permanent storage medium as soon as possible.

✍ Note: The analyser should never be stored for prolonged periods with valuable data in its memory. It is advisable to download all readings to GAM at the end of each day's monitoring.

Although unlikely, sudden shocks, high levels of electromagnetic interference or static discharge may cause memory corruption or loss. If this occurs the memory should be cleared and the calibration reset to factory settings before further use.

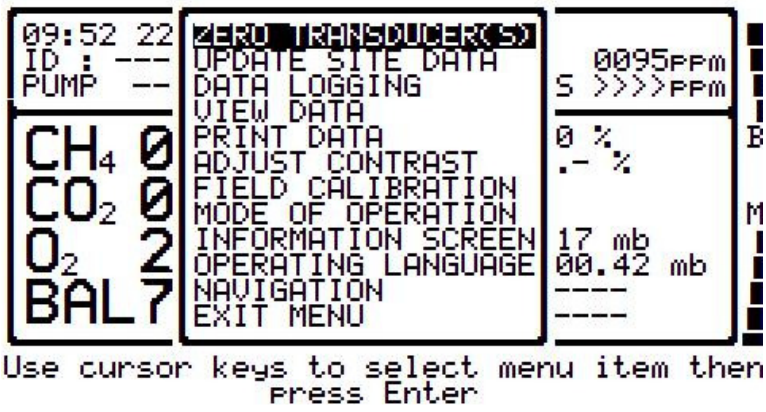
To clear the memory, please refer to the Gas Analyser Manager operating manual.

✍ Note: Five bars indicate maximum memory available to store readings (2000 records). When the memory is full, download the readings to GAM.

6.10 Main Menu

The 'Main' menu enables the operator to select options to set up specific parameters and perform operational tasks prior to sample readings being taken or to view data/information stored in the instrument.

1) Select 'Key 1' to display the 'Main' menu and the following screen is displayed:



2) Select 'Key 8 – Scroll Down'/'Key 2 - Scroll Up' to move through the options available.

3) To exit this menu, select 'Key 8 - Scroll Down' until 'Exit Menu' is highlighted and press the 'Enter' key.

6.10.1 Zero Transducer(s)

This option allows the relative pressure transducer to be user zeroed. The following section outlines the best practice for zeroing transducers. Upon selection the current relative pressure reading is displayed.

1) From the 'Main' menu select 'Key 8 - Scroll Down' to highlight 'Zero Transducer(s)' and press the 'Enter' key.

The following screen is displayed:

2) The zero transducer operation will be carried out when the 'Enter' key is pressed.

6.10.2 Update Site Data

Update site data enables the user to answer pre-defined questions (defined via GAM) relating to the site, environment etc, e.g. prevailing conditions.

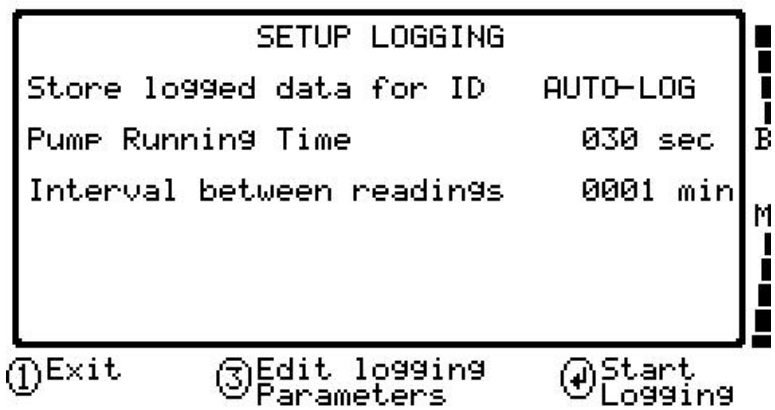
✍ Note: This feature is optional and only available using Gas Analyser Manager (GAM). Please contact Geotech (UK) Limited for more information. If GAM is not available or set up then a message will display stating 'No questions defined' and the user is returned to the 'Main Gas Read Screen'.

6.10.3 Data Logging

Data logging enables the user to leave the analyser unattended to take samples at a predetermined time. The reading interval and pump run-time may be edited prior to commencing the logging cycle.

1) From the 'Main' menu select 'Key 8 - Scroll Down' to highlight 'Data Logging' and press the 'Enter' key.

The following screen is displayed:



2) Select 'Key 3' to edit logging parameters.

3) Enter the 'Pump Running Time' in seconds; this is the length of time you wish to run the pump to draw the sample, e.g. key in 30 then press the 'Enter' key to accept.

4) Enter the 'Interval between readings' in minutes; this is the time that you wish to leave between each reading, e.g. 60 for a reading every hour.

5) Select the 'Enter' key when complete to accept and update the changes.

6) Select the 'Enter' key to start logging.

Once the logging function has been activated the analyser will carry out a 30 second warm-up countdown (displayed bottom right) and begin the first sample. After each sample the unit will shut down to conserve power if the time between the pump ending and the next sample is greater than 30 seconds.

When the analyser is switched on during a logging cycle the Geotech logo will be displayed for a few seconds and the 'Main Gas Read Screen' will be displayed. This will initiate a 30 second countdown to the next sample being taken, unless the logging function is stopped.

If for any reason during a logging cycle the inlet port were to become blocked, the analyser will sense this as a flow fail during the 'pump on' time and will automatically retry until such time as a reading can be obtained. Therefore care must be taken when positioning the sample tubing to ensure water/moisture ingress does not occur.

7) Select 'Key 1' to stop logging if required.

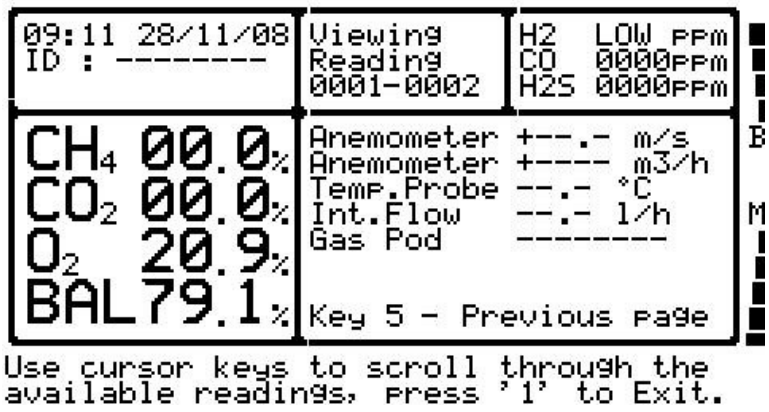
6.10.4 View Data

This option enables the user to view the readings collected and stored on the instrument.

1) From the 'Main' menu select 'Key 8' – Scroll Down' to highlight 'View Data' and press the 'Enter' key.

2) Use cursor keys to scroll through the available readings, select 'Key 1' to exit.

3) Select 'Key 5' to scroll to the next page to view different data for the same borehole ID.



4) Select 'Key 1' to exit.

6.10.5 Print Data

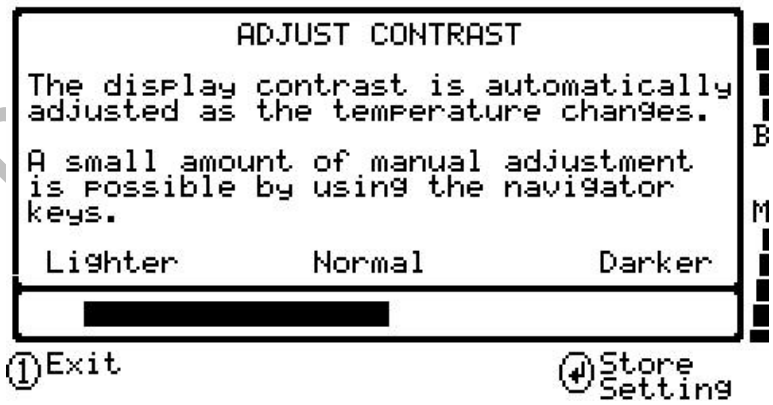
This option is no longer available for the GA2000 range. For further information please contact Sales at Geotech (UK) Limited on +44(0)1926 338111 or email sales@geotech.co.uk.

6.10.6 Adjust Contrast

The GA2000 range of instruments automatically adjusts the screen contrast to maintain a normal viewing contrast according to the current read-out temperature.

1) From the 'Main' menu select 'Key 8 – Scroll Down' to highlight 'Adjust Contrast' and press the 'Enter' key.

2) Manual adjustment of the contrast is available via this option and can be carried out with use of 'Key 4 - Arrow Left' (<) and 'Key 6 - Arrow Right' (>).



3) Select the 'Enter' key to store the setting.

✍ Note: The manually set contrast setting is retained when the read-out is switched off and may require resetting when next switched on.

6.10.7 Field Calibration

This feature enables the user to use a known standard of calibration gas to check the calibration of the instrument and to recalibrate.

✍ Note: For more information please refer to 'Section 8 – Calibration' of this operating manual.

6.10.8 Mode of Operation

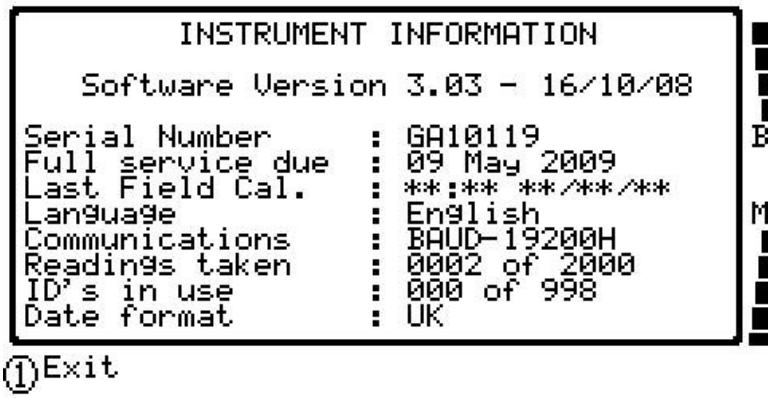
This feature is only available for the GEM range of analysers and therefore is not applicable to the GA2000 range.

6.10.9 Information Screen

This screen displays default instrument information and settings.

1) From the 'Main' menu select 'Key 8 – Scroll Down' to highlight 'Information Screen' and press the 'Enter' key.

   The following instrument information is displayed:



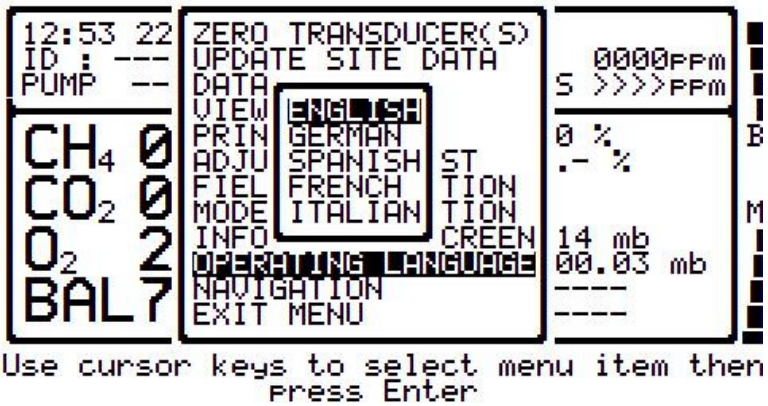
2) Select 'Key 1' to exit.

6.10.10 Operating Language

This option displays the operating language for the gas analyser.

1) From the 'Main' menu select 'Key 8 – Scroll Down' to highlight 'Operating Language' and press the 'Enter' key.

2) Choose from English, German, Spanish, French and Italian.



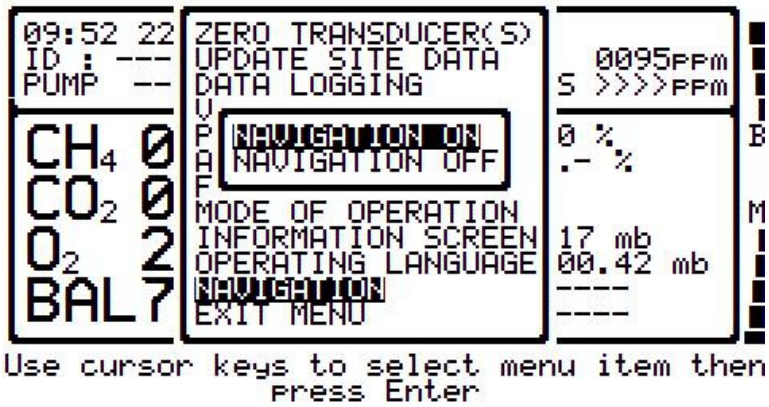
3) Use the scroll keys to highlight your language choice.

4) Press the 'Enter' key to confirm.

6.10.11 Navigation

This option enables the user to switch on and off the 'GPS Navigation' screen.

1) From the 'Main' menu select 'Key 8 – Scroll Down' to highlight 'Navigation' and press the 'Enter' key.



2) Select 'Key 8 – Scroll Down' to highlight 'Navigation On' or 'Navigation Off' and press the 'Enter' key to confirm.

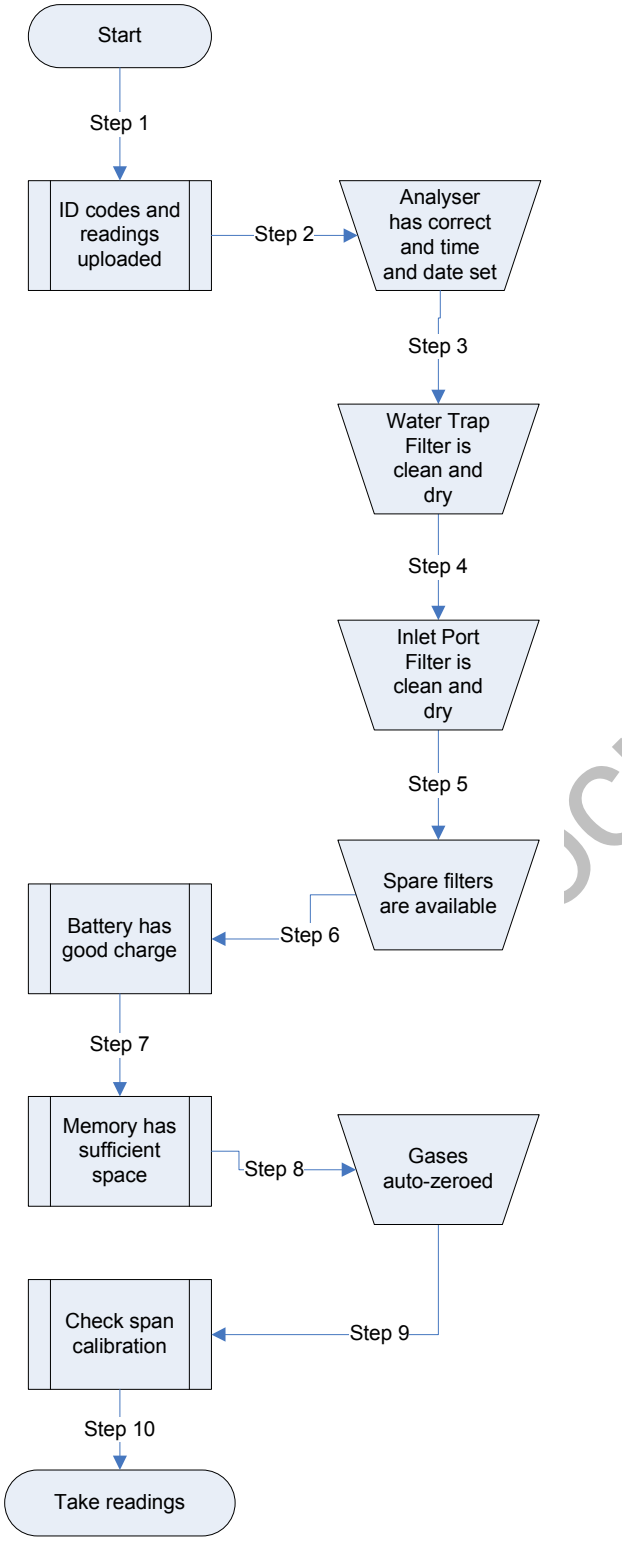
6.10.12 Exit Menu

1) Use the scroll keys to highlight 'Exit Menu'.

2) Press the 'Enter' key to confirm.

7.0 Taking Readings

7.1 Preliminary Checks Before Taking Readings (Best Practice)



GA2000 Range – Preliminary Checks

Prior to use, it is good practice to ensure that:

Step 1 All necessary ID codes and readings have been uploaded from GAM to the analyser.

Step 2 The instrument has the correct time and date set.

Step 3 The water trap filter is fitted and is clean and dry.

Step 4 The inlet port micro-fibre filter is fitted and is clean and dry.

Step 5 Spare filters are available in case of accidental water blockage or contamination.

Step 6 The battery has a good charge (minimum 25% charge, even if only a few readings are required).

Step 7 The memory has sufficient space available.

Step 8 The gases CH_4, H_2S and CO readings have been auto-zeroed, without gas concentration present.

Step 9 If necessary check the span calibration with a known concentration calibration gas.

Step 10 Take readings.

✍ Note: If you have the options internal flow or a gas pod you should zero them before use.

⚠ **Warning**	Inhaling hydrogen sulphide gas can cause death. It is the responsibility of the user to ensure that he/she is adequately trained in the safety aspects of using H_2S. In particular, where hazardous gases are being used the gas exhausted from the analyser must be piped to an area where it is safe to discharge the gas. Hazardous gas can also be expelled from the instrument when purging with clean air.

Good Practice

- Travel to site with the read-out in the vehicle's interior - not in the boot, where it may be subjected to extremes of temperature and possible shock damage. Do not place the read-out against anything hot (e.g. gas extraction pipe, car body or in an unattended car during the summer) as this will cause a temperature wave through the read-out and may cause erroneous readings.

- When moving around a site, protect the read-out from strong direct sunlight and heavy rain. Strong direct sunlight will quite quickly raise the temperature of the read-out beyond its operating range; the LCD display will appear almost black and the contrast setting cannot alter the contrast.

- Always use the water trap! If the water trap becomes flooded, change the filter and ensure all tubes are clear before re-use.

7.2 Update Site Data

Prior to taking the readings at a particular site the site data should be updated (if using GAM). This is accessed via the 'Main' menu. This function removes the need for the site conditions to be recorded manually.

A series of up to five questions can be pre-programmed with the use of Gas Analyser Manager and answered at this time. The answers to these questions are stored and appended to each reading stored thereafter, until the site data is updated for another site.

7.3 How to Use an H_2S Filter (Optional)

7.3.1 Cross Gas Effects on Chemical Cells

Measurements of CO are important in landfill management. The Plus version of the analyser incorporates an improved CO measurement.

Normal measurements of CO can be affected by two other gases that can be found in landfill gas – hydrogen and hydrogen sulphide.

To reduce the effect of hydrogen, the Plus version of the instrument uses a technique that is hydrogen compensated. Hydrogen compensation is achievable up to a level of around 1% hydrogen. Above this level the CO reading can be incorrect.

In order to assist the operator the Plus instrument also indicates the level of hydrogen present as low, medium or high. If a high hydrogen reading is present then the CO reading may be affected.

The effect of hydrogen sulphide is eliminated by the use of a filter.

CO measurement

The CO measurement is sensitive to hydrogen sulphide. The presence of hydrogen sulphide can cause the CO reading to be too high. If the presence of hydrogen sulphide is suspected to be causing false CO readings, then it is recommended that the external hydrogen sulphide filter is used whilst obtaining the CO measurement.

The filter only needs to be used when you are trying to get rid of any possible cross gas effects H_2S might have on other gases. Do not use the filter on all boreholes.

When using the H_2S filter you will need to increase the gas sample and clean air purge run-time, as using an H_2S filter increases the response time of the analyser.

✍ Note: There is an internal H_2S filter incorporated in the chemical cell that removes the H_2S; however this has a limited life span.

GA2000 Plus

The GA2000 Plus allows the user to take a CO reading with the H_2S filter in place, and then take a H_2S reading without the filter.

The electrochemical cells used to measure H_2S and CO do suffer from cross-gas effects. Such effects are not accurately specified. However, the following table may be useful as a guide; it represents how many ppm would be read by a cell if 100 ppm of the interfering gas were applied, with no other cross-contaminates being present in the sample.

GA2000 Plus

		Interfering Gas Applied				
		CO	**H_2S**	**SO_2**	**NO_2**	**H_2**
Chemical Cell	**CO**	100	0 / ~300*	0	0	1
	H_2S	<0.5	100	~20	~-20	~0.1

*after internal filter depleted.

GA2000

		Interfering Gas Applied				
		CO	**H_2S**	**SO_2**	**NO_2**	**H_2**
Chemical Cell	**CO**	100	<3/~300*	0	<-20	<40
	H_2S	<0.5	100	~20	~-20	~0.1

*after internal filter depleted.

✍ Note: Other gases could cause cross-gas effects. If you suspect a cross sensitivity problem please contact the Technical Support Team at Geotech (UK) Limited on +44(0)1926 338111.

7.3.2 Cross Gas Effects on Methane, Carbon Dioxide and Oxygen

Methane is measured using dual beam infrared absorption. Analysers are calibrated using certified methane mixtures and will give correct readings provided there are no other hydrocarbon gases present within the sample (e.g. ethane, propane, butane, etc). If there are other hydrocarbons present, the methane reading will be higher (never lower) than the actual methane concentration being monitored.

The extent to which the methane reading is affected depends upon the concentration of the methane in the sample and the concentration of the other hydrocarbons. The effect is totally non-linear and difficult to predict.

✍ Note: The effect can be reduced by using an H_2S filter as it can reduce higher order hydrocarbons. When using the H_2S filter you will need to increase the gas sample and clean air purge run-time, as using an H_2S filter increases the response time of the analyser.

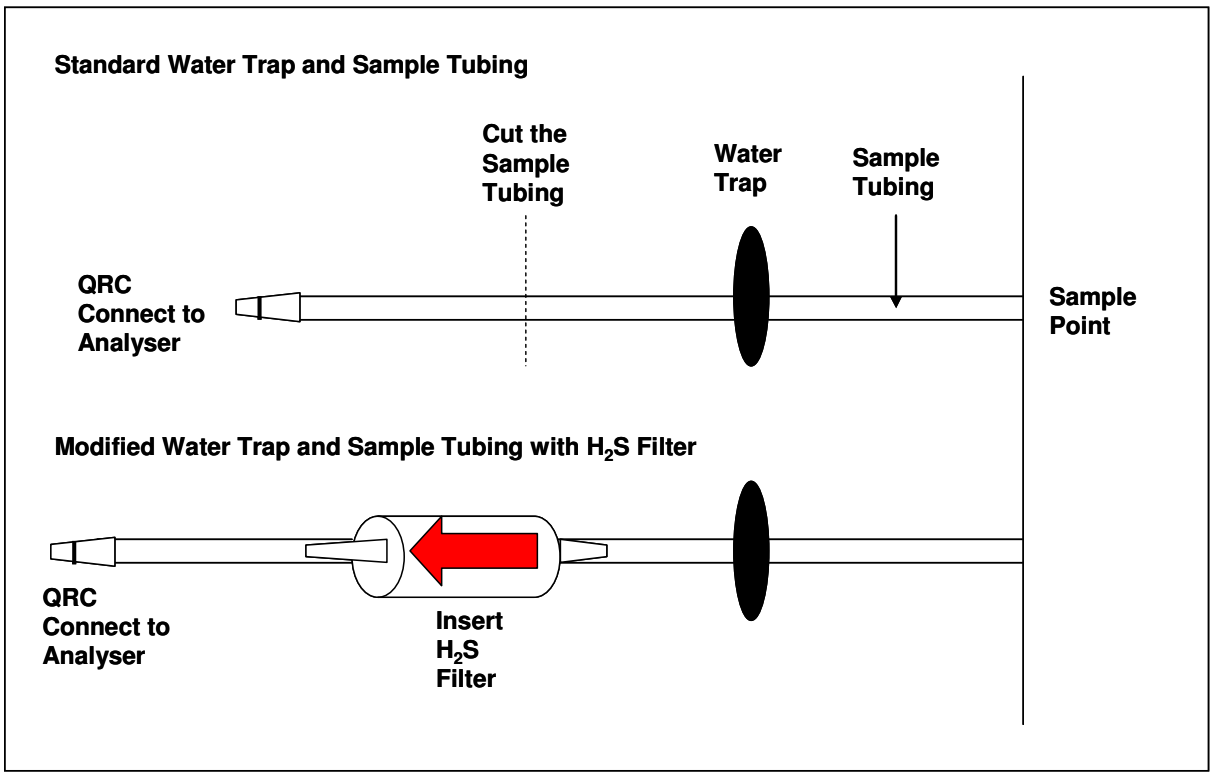
Carbon dioxide is measured by infrared absorption at a wavelength specific to carbon dioxide. Therefore, the carbon dioxide reading will not be affected by any other gases usually found on landfill sites.

The oxygen sensor is a galvanic cell type and suffers virtually no influence from CO_2, CO, H_2S, NO_2, SO_2 or H_2, unlike many other types of oxygen cell.

The infrared sensors will not be 'poisoned' by other hydrocarbons and will revert to normal operation as soon as the gas sample has been 'purged'.

Instructions for Use:

The following diagram shows how to modify the standard water trap and sample tubing to fit the H_2S filter.

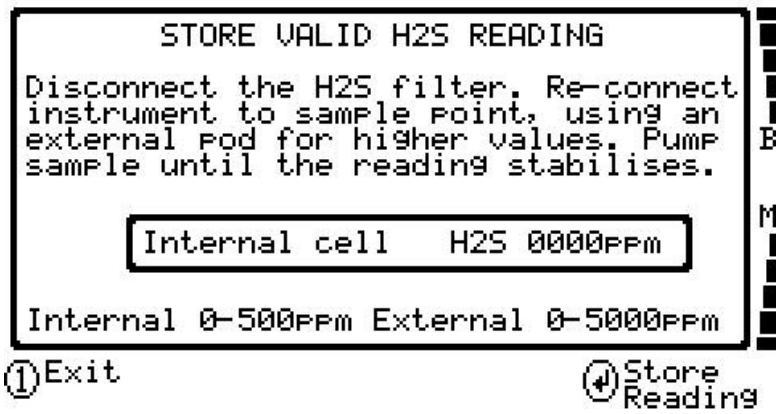


✍ Note: When onsite the site engineer must have an unmodified water trap assembly in addition to the modified water trap with a H_2S filter in order to take readings with and without a filter.

1) Once the H_2S filter is fitted refer to the process diagrams for 'Taking Gas and Flow Measurements' for details of taking readings using a H_2S filter.

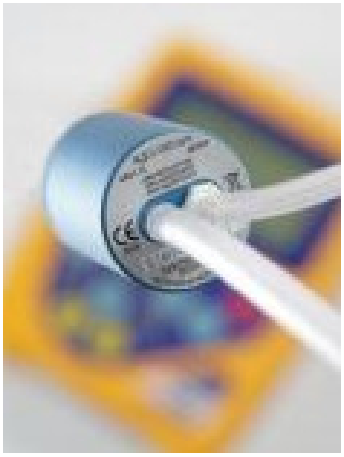
2) The analyser can be set up to prompt the site engineer when to remove the H_2S filter and take a valid H_2S reading.

✍ Note: This is only for the GA2000 Plus.



7.4 How to Use a Gas Pod (Optional)

The gas pod enables the site engineer to measure additional gases which are not measured as standard by the analyser i.e. SO_2 (sulphur dioxide) or extended ranges of gases i.e. 0-5000ppm H_2S.



This device may be used with the GA2000 (3 gas analyser) and the GA2000 Plus.

✍ Note: The analyser must be switched off before attaching or removing the gas pod. The gas pod must be attached before any readings are taken.

Instructions for Use:

1) Switch off the analyser and attach the gas pod to 'Connector D' (half moon).

2) Attach the short tubing from the gas pod to the 'Gas Outlet Port'.

3) At the point in which the user presses 'Enter' to store the gas readings the additional gas is recorded.

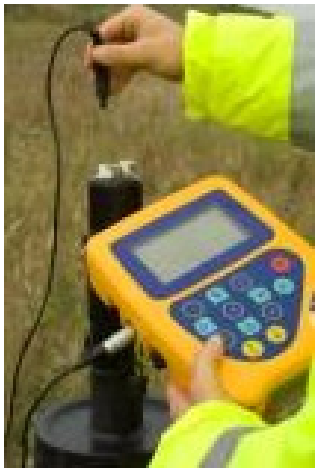
4) From the 'Main Gas Read Screen' the Ext. Port 1 field displays the gas pod reading.

5) Gas pod readings can be analysed further when downloaded to Gas Analyser Manager.

✍ Note: If the analyser has an internal cell fitted that measures the same gas the gas pod reading takes preference over the internal cell reading. For further information please refer to the process diagrams for 'Taking Gas and Flow Measurements'.

7.5 How to Use a Temperature Probe (Optional)

The temperature probe enables the site engineer to measure the temperature of the gas within a sample point. If a temperature reading is taken then the data is stored along with the other gas readings.



Instructions for Use:

1) The temperature probe reading is taken along with the gas measurement reading.

2) The analyser must be at the 'Main Gas Read Screen'.

3) Attach the temperature probe to 'Connector D' (half moon).

4) Insert the temperature probe into the sample point (borehole) at the same time as you attach the sample tube to the sample point (two sample points are required for the borehole).

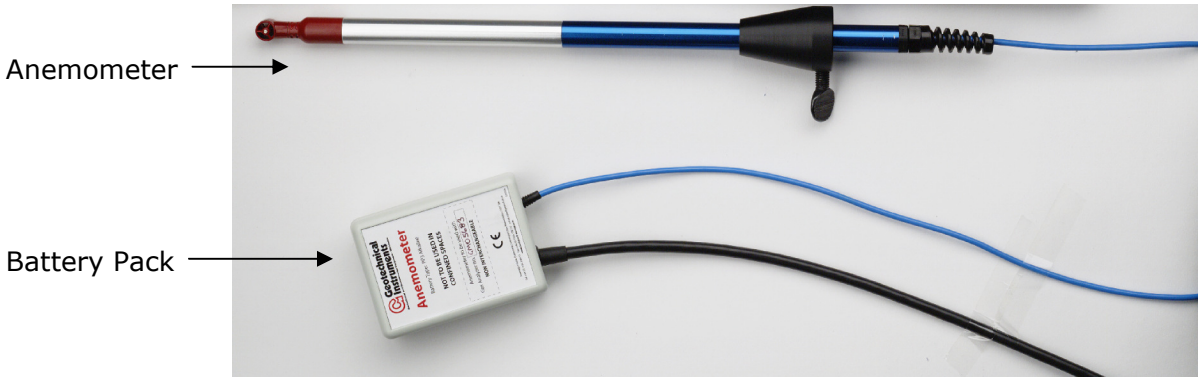
5) For further information refer to the process diagrams for 'Taking Gas and Flow Measurements'.

6) At the point in which the user presses 'Enter' to store the gas readings the temperature is recorded.

7) From the 'Main Gas Read Screen' the Ext. Port 1 field displays the temperature probe reading.

✍ Note: Temperature probe readings can be analysed further when downloaded to Gas Analyser Manager.

7.6 How to Use an Anemometer (Optional)



The GA2000 range has the facility to attach an anemometer device enabling the site engineer to measure the flow of gas within an extraction system. The anemometer can be set to display two values m/s (meters per second) and m^3/hr (metres cubed per hour).

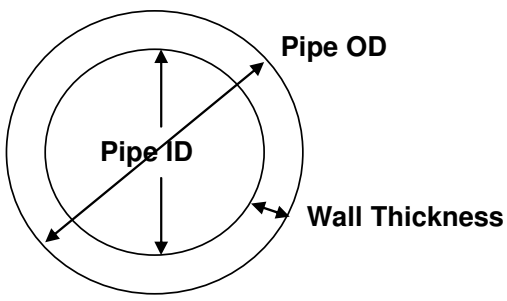
It is best practice to take the gas reading first before taking the flow reading with the anemometer attached.

If using a 'borehole ID' the internal pipe diameter can be predetermined in the optional Gas Analyser Manager (GAM). Once set, the site engineer cannot edit the pipe diameter setting.

If the site engineer is not using a borehole ID or the pipe diameter is not set in GAM the operator will be prompted to enter a pipe diameter.

In order to use the anemometer it is important to know the internal diameter (ID) of the pipe if you want to understand the flow in m^3/hr (metres cubed per hour). This must be the internal diameter not the outer diameter (OD) i.e. pipe outer diameter minus twice the pipe wall thickness.

For Example:



The anemometer is run by a 9v battery. If the anemometer is not being detected by the analyser check the battery.

✍ Note: Please ensure that the anemometer battery pack is kept dry. For protection against wet, damp conditions, it is recommended that the battery pack is placed in the soft carry case back pocket.

If you do not have any suitable monitoring points you will need to drill a hole in the piping of between 25mm and 30mm in diameter to seat the conical fitting on the anemometer (which is roughly between 20mm to 34mm). When not in use the hole can be filled with a bung.

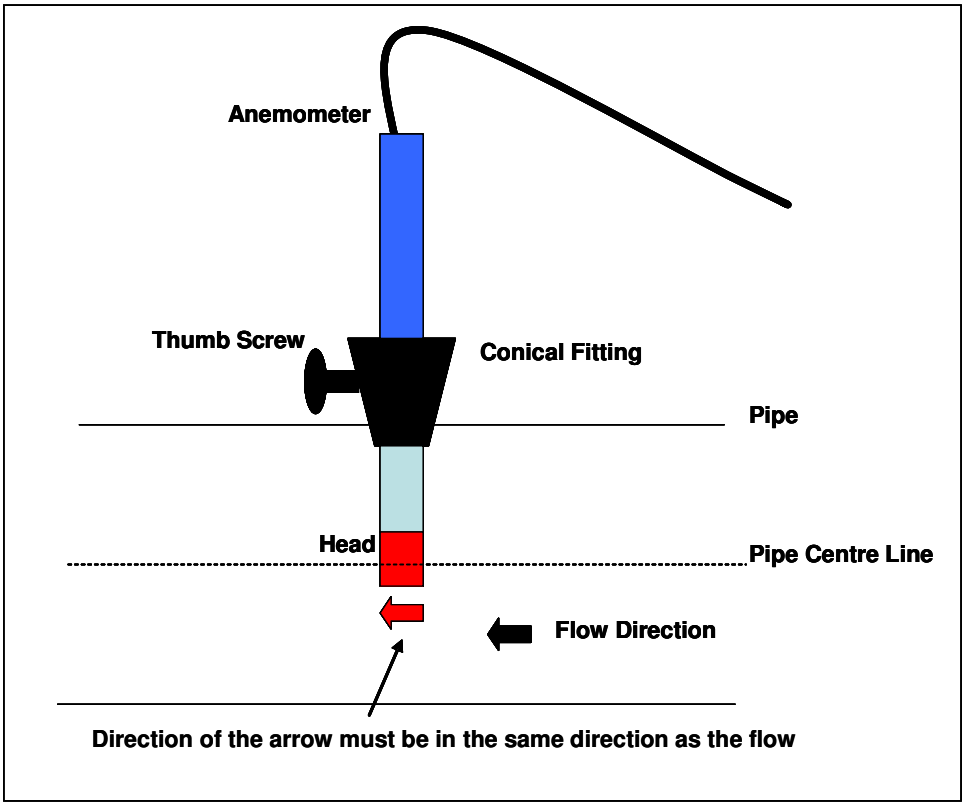
✍ Note: When the anemometer is not in use the conical fitting should be placed over the probe to protect it.

The anemometer must fit centrally (the conical fitting must be set on the probe to half the pipe ID before insertion). The arrow on the tip of the probe must point in the direction of the flow.

✍ Note: Use the thumb screw to align the direction of the probe.

Flow readings are most accurate when there is laminar flow (not turbulent). Turbulence can be caused by a change in pipe direction or restriction. Ideally, upstream you want at least 20 times the pipe ID along the length of the pipe without restriction or bend. Downstream, you want at least five times the pipe ID along the length of the pipe i.e. for a 100mm ID you need 2000mm of clear pipe upstream, 500mm downstream.

Example to Show Anemometer Fitting into the Sample Point:



Instructions for Use:

1) Attach the anemometer to 'Connector E'.

2) Place the anemometer into the borehole ready to take the reading.

3) For further detail please refer to the process diagrams for 'Taking Gas and Flow Measurements'. Go to the 'Flow Measurement' screen and the 'Read Anemometer' screen is displayed.

4) When the reading has stabilised press the 'Enter' key to store the reading.

7.7 How to use the Internal Flow (Optional)

The internal flow is an optional feature and must be specified at the time of manufacture or the analyser can be upgraded at service.

The GA2000 range has the capability to measure the gas flow from a borehole without the need for an additional flow pod.

This function can be selected as 'on' or 'off' for each ID using Gas Analyser Manager. If it is off the user will not be prompted to measure the flow. However, if Gas Analyser Manager is not being used flow measurement is automatically measured.

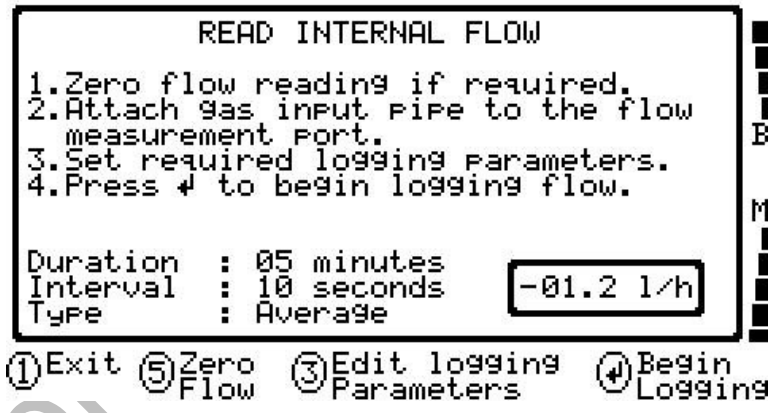
If the analyser is fitted with the internal flow feature, upon switching on the instrument the display will list 'Options FP 'during the power on test. The internal flow option works on a principle of a pressure drop across a known restrictor.

Instructions for Use:

1) Attach the sample tube to the 'Flow Measurement Port' (bottom right hand port).

2) The user is automatically prompted to take this measurement during the normal reading sequence.

3) Refer to the process diagrams for 'Taking Gas and Flow Measurements'.



4) The following parameters can be changed by selecting 'Key 3' followed by the 'Enter' key to confirm.

Type:	
Average	The average of the readings taken over the duration.
Peak	The highest value recorded over the duration.
Snapshot	The reading recorded at the point at which the 'Enter' key is pressed.
	Use 'Key 2 – Scroll Up' to select type.
Interval	The time between the readings taken for an average or peak. Enter the value in second.
Duration	The overall time that an average or peak reading can be taken. Enter the value in minutes.

7.7.1 Zero Flow:

Over time the user will experience a small amount of drift which can be corrected by the 'Zero Flow' function.

1) Disconnect all pipes.

2) Select 'Key 5' from the 'Read Internal Flow' screen and a confirmation message will display.

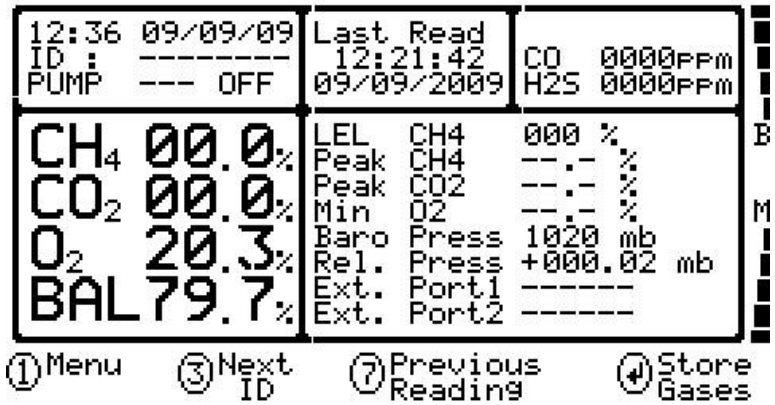
   ✍ Note: This should ideally be done at the start of each days monitoring and when drift is observed.

7.8 How to Use the GPS Feature (Optional)

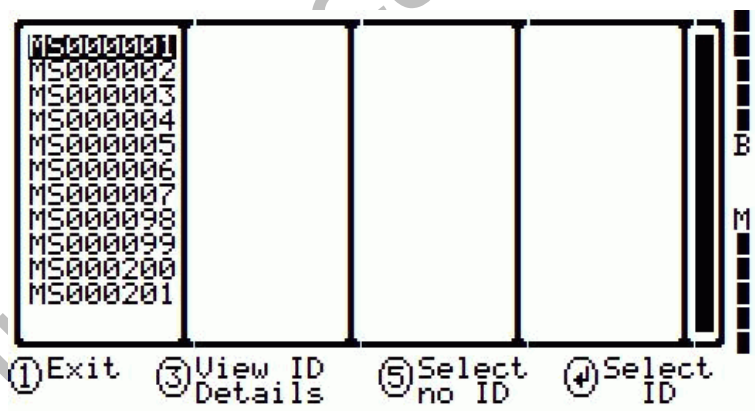
The GPS feature is available on all models of the GA2000 range. It enables the site engineer to automatically locate borehole IDs via GPS satellite signal from predefined borehole ID's uploaded from Gas Analyser Manager. The GPS reading data is stored for each measurement reading.

Screen Navigation:

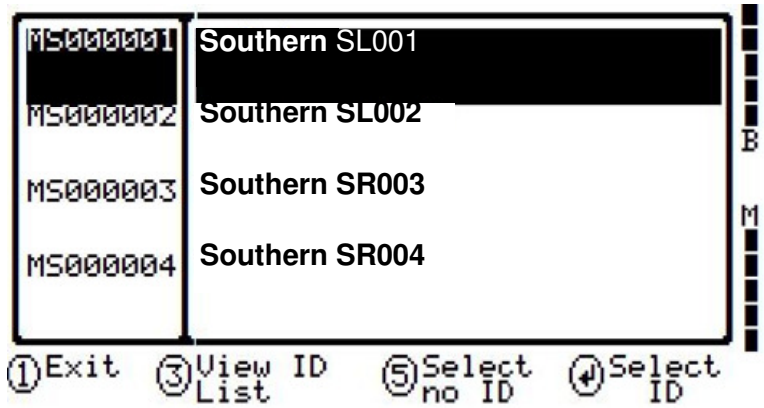
1) Switch on the analyser and wait for the self-test warm-up to complete and the analyser will display the 'Main Gas Read Screen'.



2) 'Key 3' Next ID to select a borehole ID already set up and uploaded from GAM. If no IDs have been uploaded from GAM 'Key 3' to go to the 'GPS Screen'.

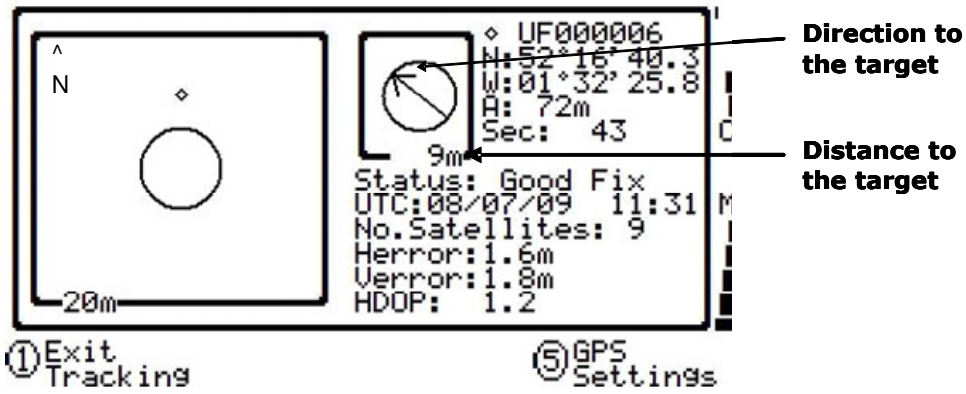


3) 'Key 3' to view a detailed list of borehole IDs showing locations uploaded from GAM. Select the ID and press 'Enter' to confirm.



4) If no ID is required 'Key 5' to 'Select no ID' and then 'Key 1' to exit tracking.

5) Once the operator selects a borehole ID the 'GPS Navigation' screen is displayed.



N: Latitude displays as degrees, minutes, seconds and decimal seconds. The equator is 0.

E or W: E (East) or W (West) displays the longitude as degrees, minutes, seconds and decimal seconds. The Greenwich meridian defines the zero point.

A: Altitude displays in meters or feet.

Sec: This is a seconds counter which will reset after 59.

Status: Status indicates the status of the satellite fix:

No Satellites	No satellites can be detected.
No Fix	The GPS chip cannot see sufficient satellites to obtain a fix.
Bad Fix	The GPS chip can get a fix, but will not produce a very reliable position.
Good Fix	A good fix has been obtained.

UTC: 'Universal Time Code' received from the satellite and displays GMT.

No. Satellites: This is the number of satellites that the system can see in the sky. Four satellites will give reasonable position accuracy, eight or more is better.

Herror: Estimate of horizontal error on the indicated position. The location is accurate to horizontal error 1.6m.

Verror: Estimate of vertical error on the indicated position.

HDOP: 'Horizontal Dilution of Precision' which measures the accuracy of the indicated position:

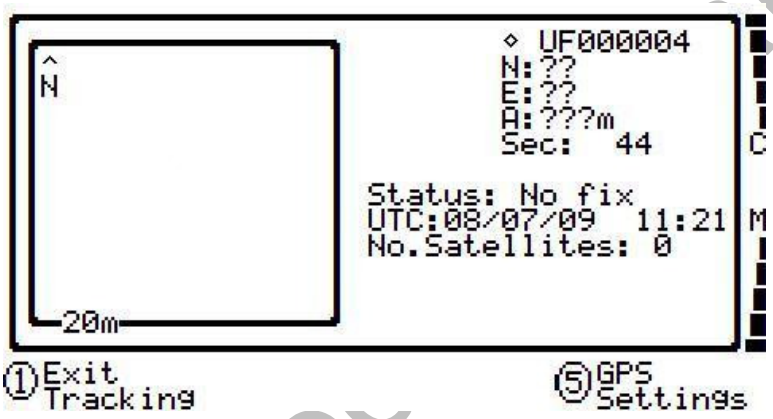
1	Ideal
Between 1-2	Excellent
Between 2-5	Good
Between 5-10	Moderate
Between 10-20	Fair

6) Use the tracking display to locate the borehole.

⚠ **Warning**	Before entering the GPS Navigation Screen for the first time the following health and safety message will be displayed. "Please be aware of the terrain when using this screen. You are responsible for your own safety whilst walking on-site!"

✍ Note: There is often a wait time frame of between 30 seconds to two minutes whilst getting a satellite signal. Be aware that heavy rain, trees overhead etc. will give a bad fix.

7) If no signal can be found the following screen is displayed:

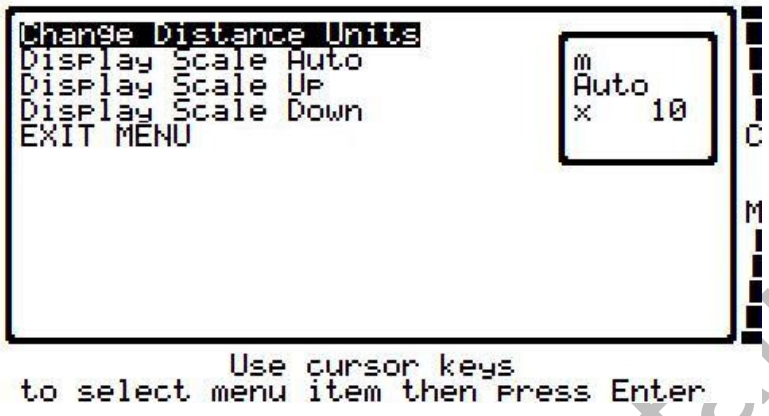


8) 'Key 1' to exit tracking.

✍ Note: Borehole IDs may be uploaded from GAM with or without location information. If location details are not uploaded the location longitude and latitude coordinates can be stored when the borehole is located and downloaded to GAM with the reading measurements. For further information please refer to the Gas Analyser Manager operating manual.

Changing the GPS Settings:

1) 'Key 5' from the GPS Navigation Screen to change GPS settings and the following screen is displayed:

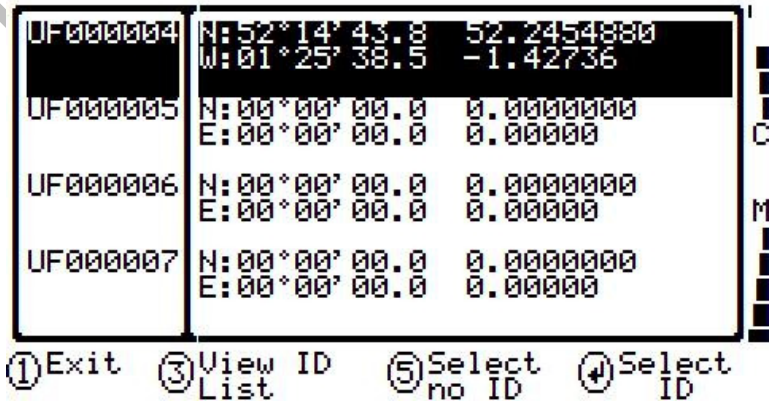


Change Distance Units	Distance measurement in metres or feet.
Display Scale Auto	Auto is the default setting for rescaling the navigation screen.
Display Scale Up	Rescale the navigation screen up by value specified.
Display Scale Down	Rescale the navigation screen down by the specified value.

2) Change the settings if required and press the 'Enter' key to confirm.

Display Borehole Coordinate Details:

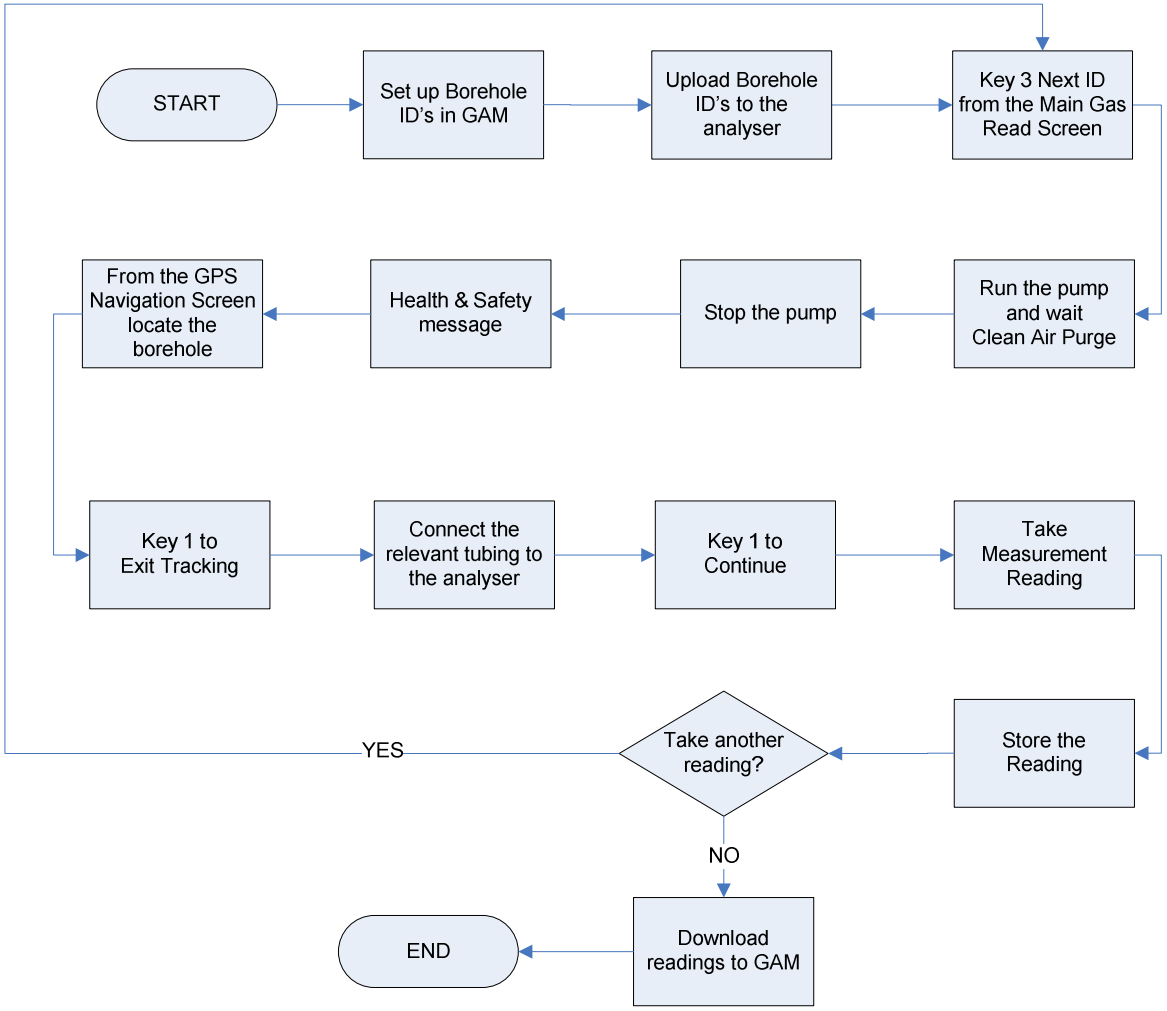
1) From the borehole selection screen 'Key 6' to view a detailed list of borehole IDs showing location longitude and latitude coordinates uploaded from GAM. Highlight the ID and press 'Enter' to confirm to select.



✍ Note: 'Key 6' is a hidden feature on the analyser.

7.8.1 GA2000 Range GPS Feature – Best Practice

The following process outlines the recommended best practice when taking readings using the GPS feature.



✍ Note: For more information on taking gas and flow measurement readings, please refer to the process diagrams for 'Taking Gas and Flow Measurements'.

7.9 Taking Gas and Flow Measurement Processes - Best Practice

Using CIRIA Guidelines for Taking Measurements:

Select 'Key 4' from the initial reading screen. This will freeze the pressure readings and go straight to the measure flow option.

✍ Note: The 'Key 4' option will not be indicated as a choice on the analyser screen.

After measuring flow the user is returned to the 'Main Gas Read Screen' where the measurement of the gas concentrations can begin.

The sequence would be:

1) Store pressure readings.
2) Measure flow.
3) Store gas readings .
4) Store H_2S if appropriate.
5) Answer questions if appropriate.

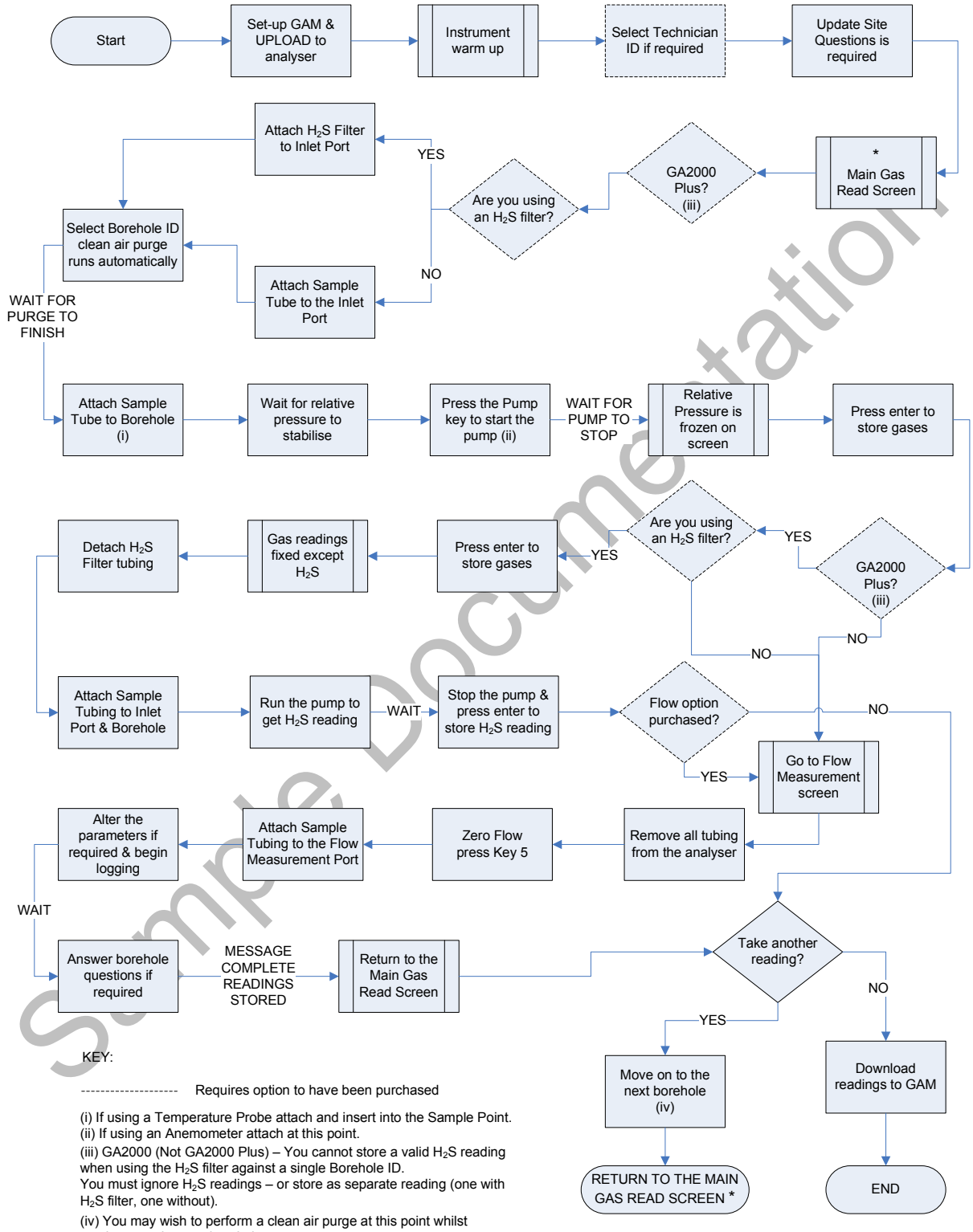
✍ Note: This option requires the user to attach the sample tube to the inlet port, then to the flow port, and then to the inlet port again.

Tips When Taking a Measurement:

- A prompt is displayed to ensure all tubes are disconnected, as a clean air purge will automatically be carried out at this point to ensure the previous sample is purged from the analyser.
- The Borehole ID number selected and the run-time are displayed in the upper left corner of the 'Main Gas Read Screen'.
- When attaching fittings to the connector ports ensure that they click in to place.
- As soon as a connection is made the relative pressure reading will be displayed.
- The pump will run for a pre-programmed time and a countdown timer will be displayed. The pump may be stopped and started at any time. Whilst the pump is running the analyser continuously monitors the peak readings.
- Pre-programmed questions may require numeric, alphanumeric, selectable comment or exclusive comment.
- For 'No ID' readings the ID code information will be stored as ' ---------'.
- The following information will be stored for each reading:
  ID Code
  Current time/date
  Technician ID code
  Site Data (if entered)
  All gas readings and balance
  Approximate hydrogen levels (Plus)
  Peak CH_4
  Peak CO_2 and Minimum O_2 (Plus)
  LEL CH_4
  Barometric pressure
  Relative pressure
  Borehole specific questions and comments
  Temperature (optional)
  External gas pod (optional)
  Anemometer (optional)

7.9.1 Taking Gas Measurement First with Borehole ID

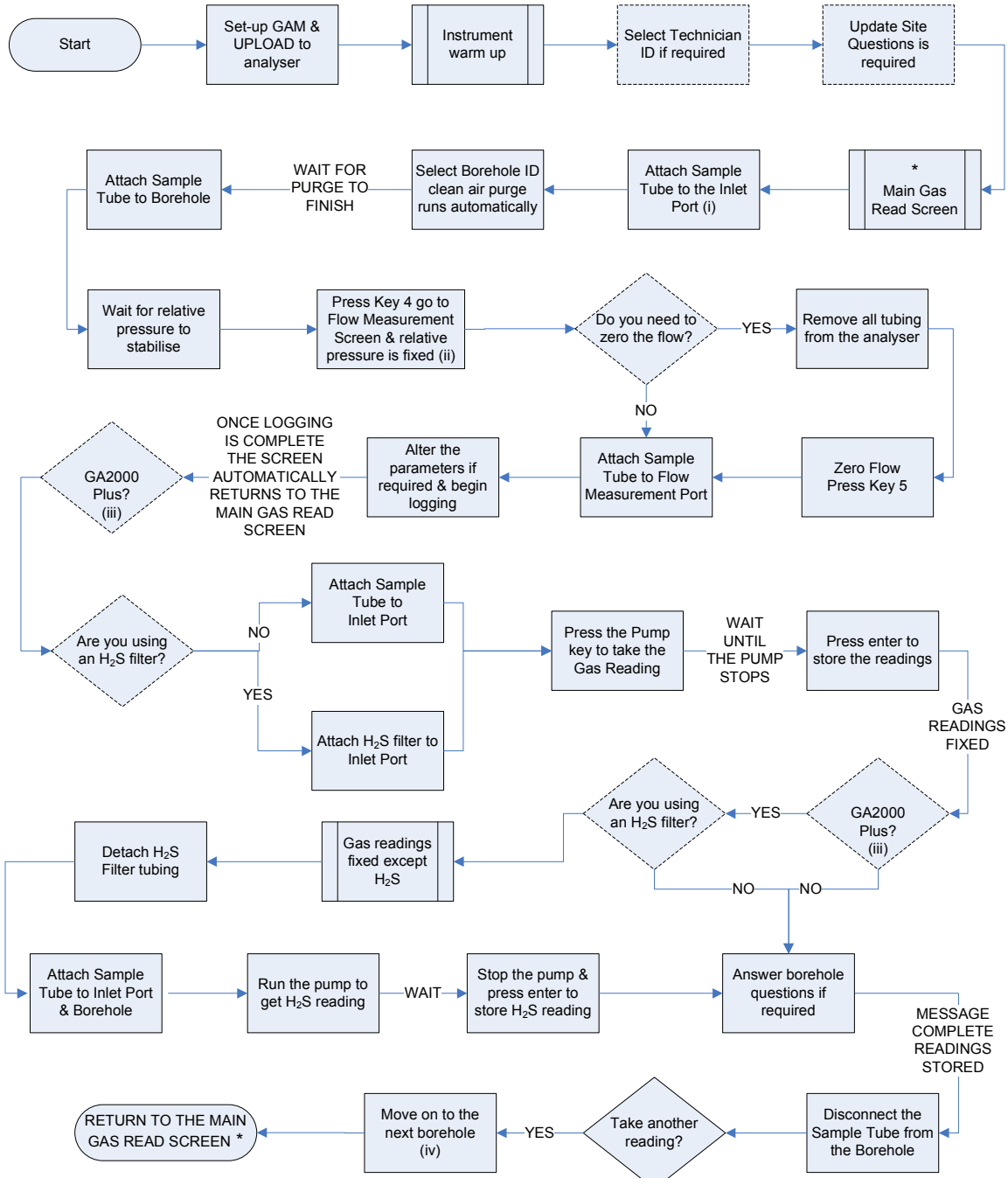
GAS MEASUREMENT FIRST WITH BOREHOLE ID
(GA2000 & GA2000 Plus - Best Practice)



(i) If using a Temperature Probe attach and insert into the Sample Point.
(ii) If using an Anemometer attach at this point.
(iii) GA2000 (Not GA2000 Plus) – You cannot store a valid H_2S reading when using the H_2S filter against a single Borehole ID.
You must ignore H_2S readings – or store as separate reading (one with H_2S filter, one without).
(iv) You may wish to perform a clean air purge at this point whilst moving onto the next borehole.

7.9.2 Taking Low Flow Measurement First with Borehole ID

LOW FLOW MEASUREMENT FIRST WITH BOREHOLE ID
(GA2000 & GA2000 Plus - Best Practice)



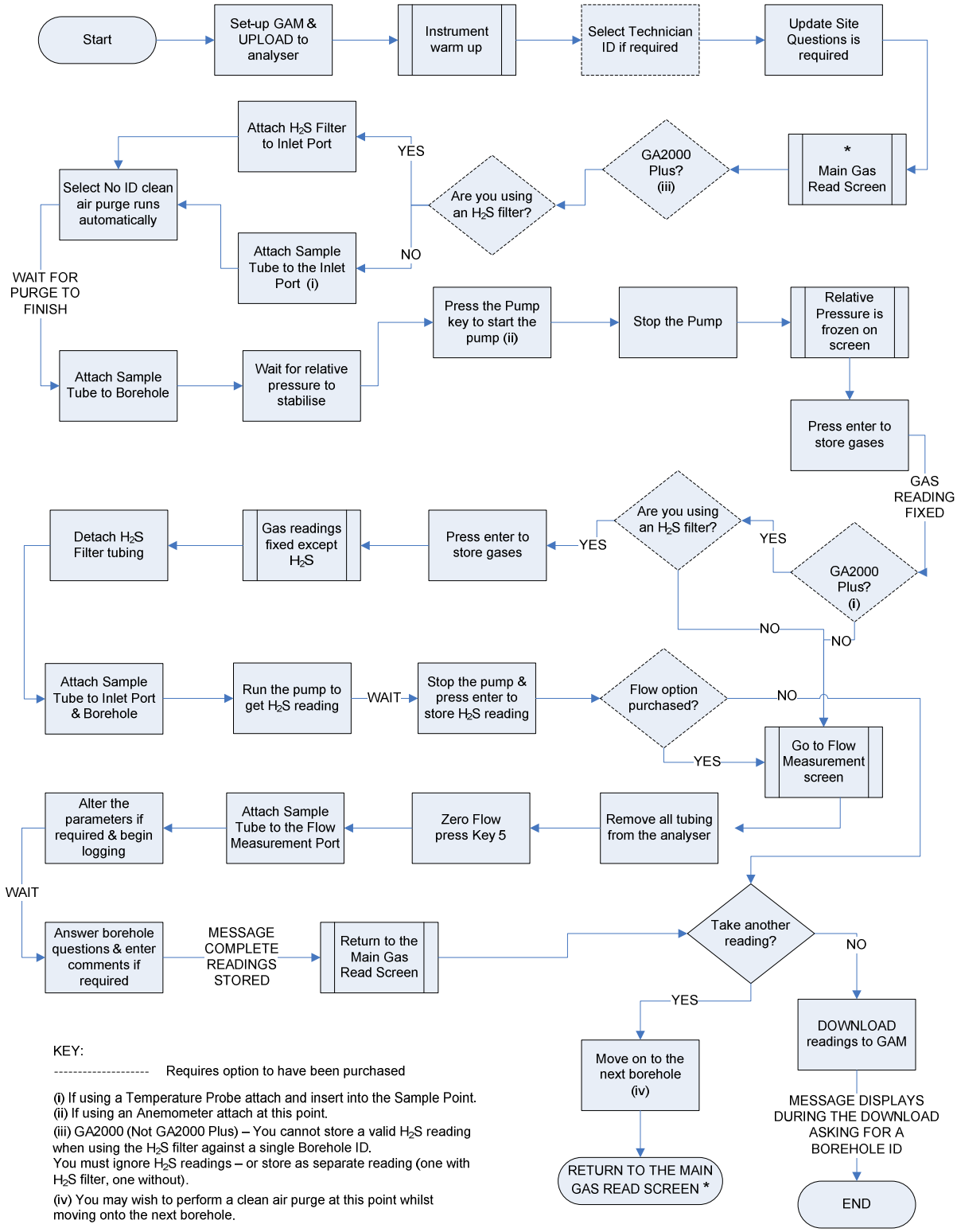
KEY:

---------- Requires option to have been purchased

(i) If using a Temperature Probe attach and insert into the Sample Point.
(ii) If using an Anemometer attach at this point.
(iii) GA2000 (Not GA2000 Plus) – You cannot store a valid H_2S reading when using the H_2S filter against a single Borehole ID.
You must ignore H_2S readings – or store as separate reading (one with H_2S filter, one without).
(iv) You may wish to perform a clean air purge at this point whilst moving onto the next borehole.

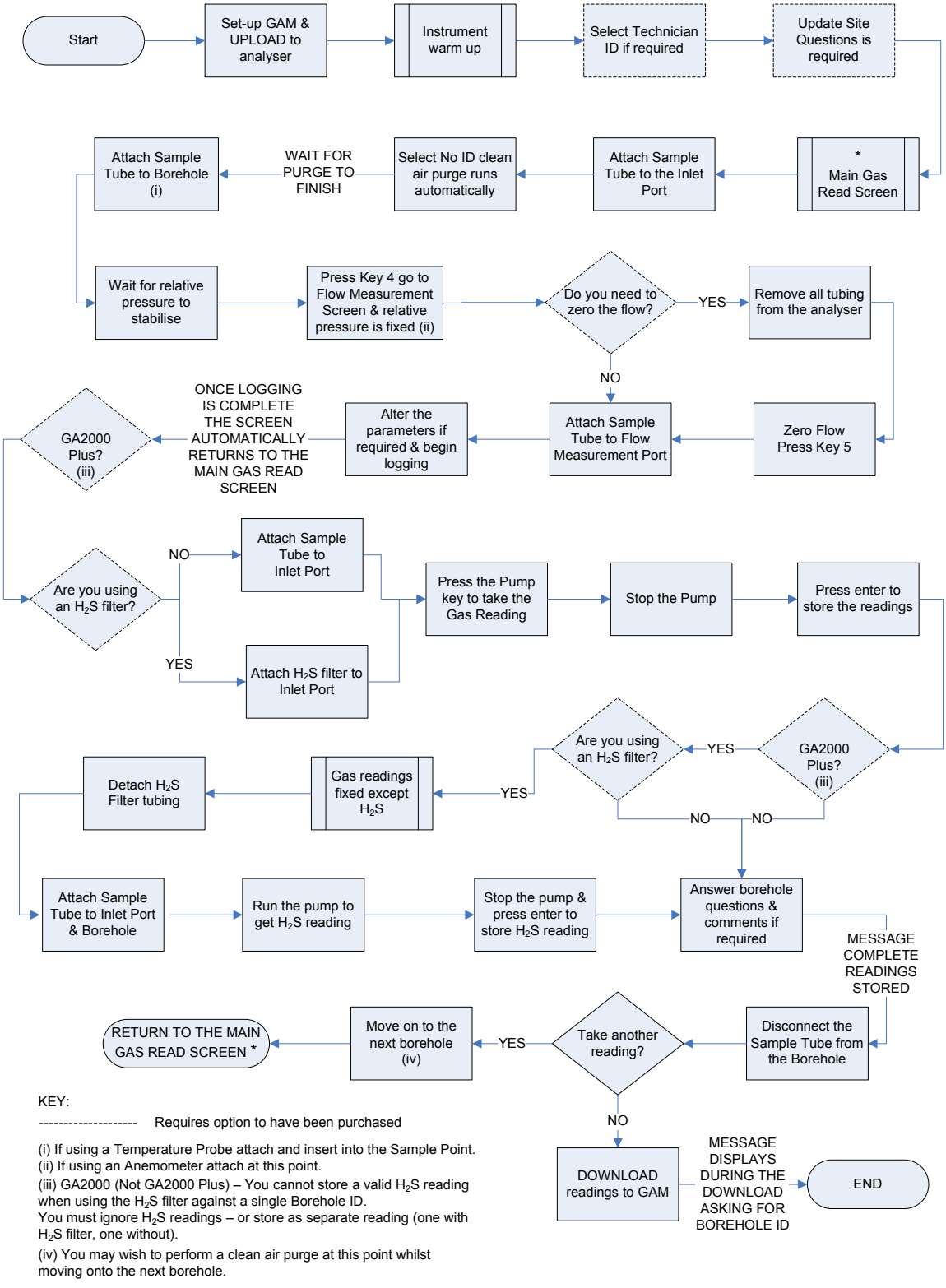
7.9.3 Taking Gas Measurement First with No Borehole ID

GAS MEASUREMENT FIRST WITH NO BOREHOLE ID
(GA2000 & GA2000 Plus - Best Practice)



7.9.4 Taking Low Flow Measurement First with No Borehole ID

FLOW MEASUREMENT FIRST WITH NO BOREHOLE ID
(GA2000 & GA2000 Plus - Best Practice)



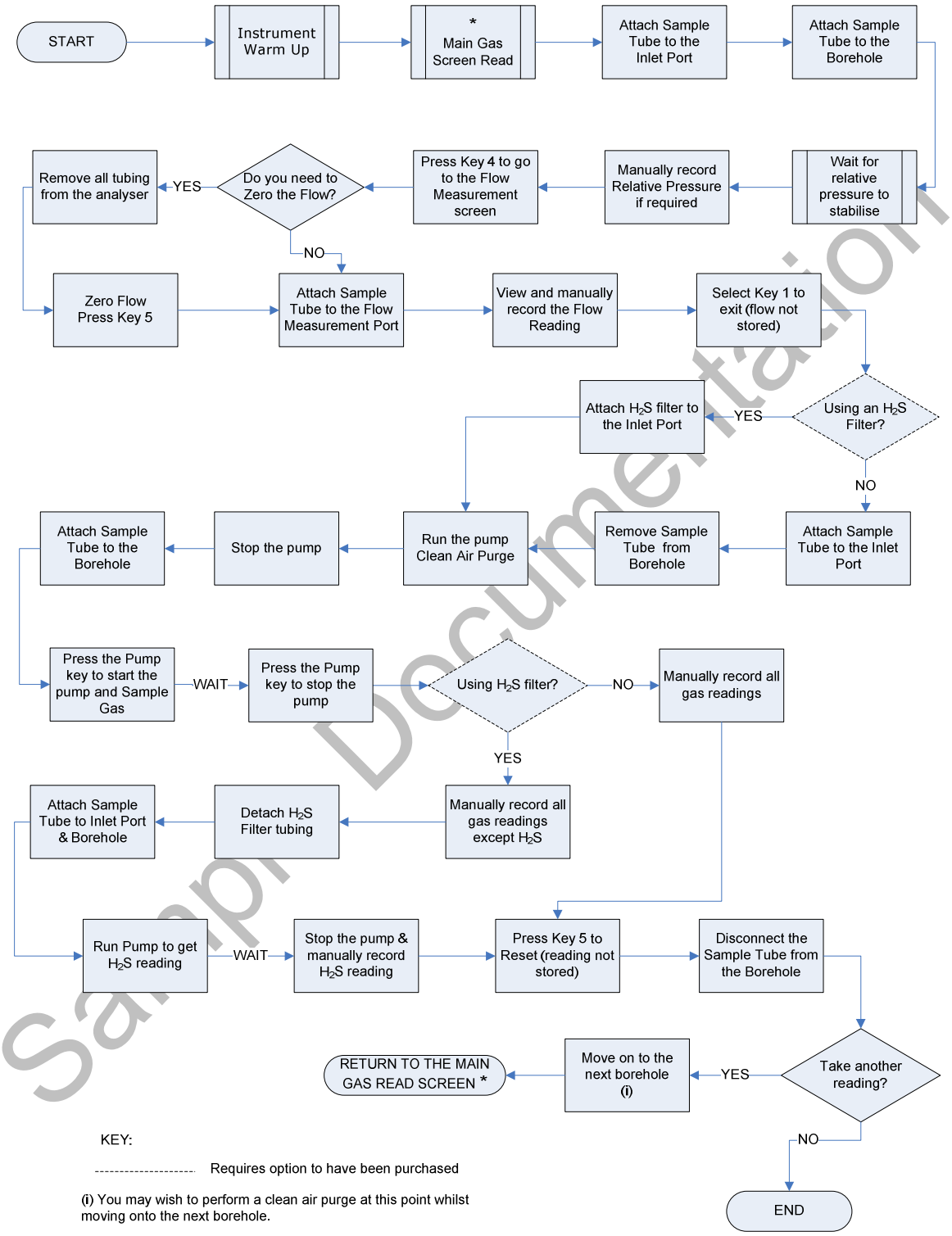
KEY:

---------- Requires option to have been purchased

(i) If using a Temperature Probe attach and insert into the Sample Point.
(ii) If using an Anemometer attach at this point.
(iii) GA2000 (Not GA2000 Plus) – You cannot store a valid H_2S reading when using the H_2S filter against a single Borehole ID.
You must ignore H_2S readings – or store as separate reading (one with H_2S filter, one without).
(iv) You may wish to perform a clean air purge at this point whilst moving onto the next borehole.

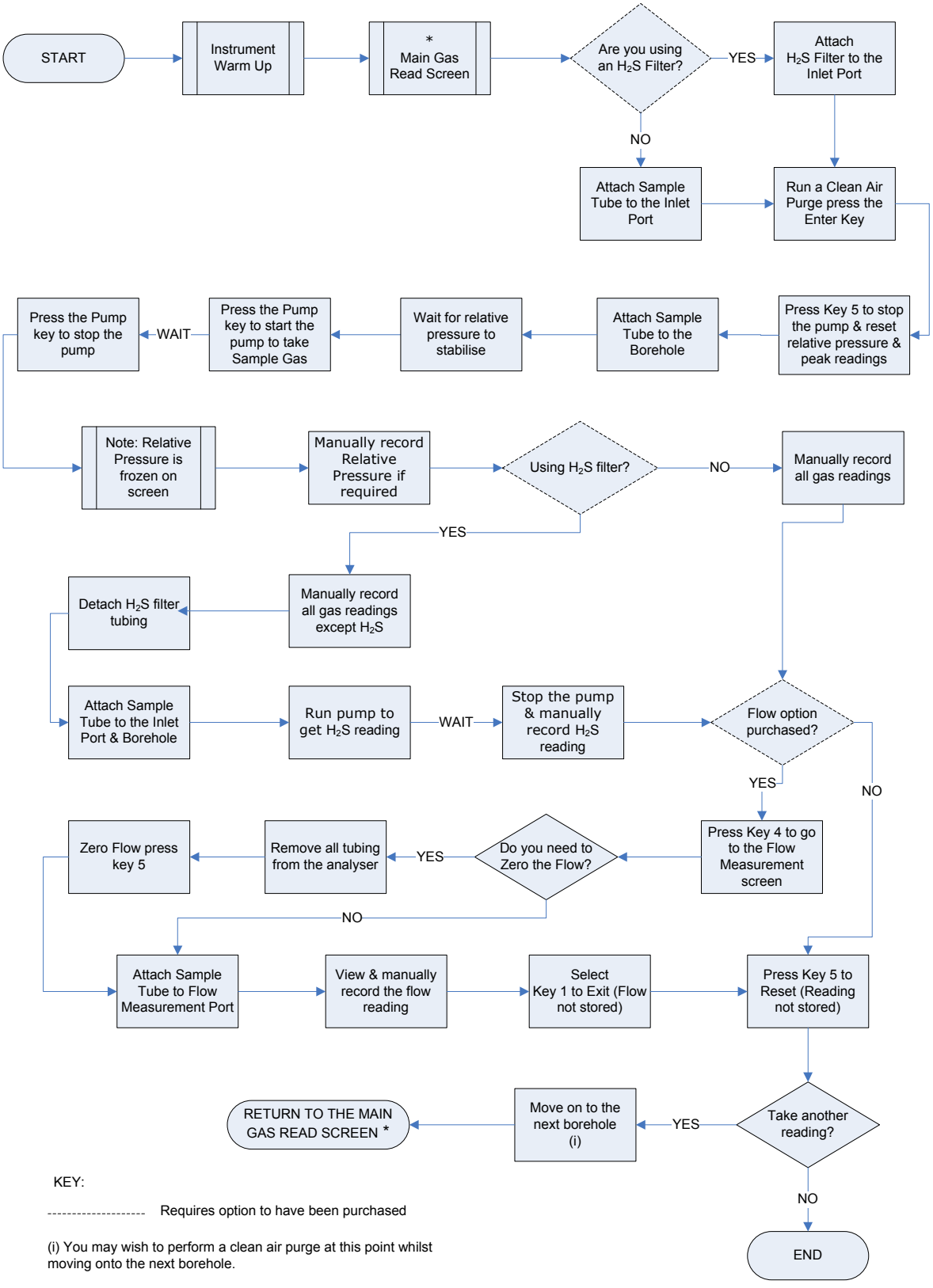
7.9.5 Taking Low Flow Measurement First Then Gas Measurement

FLOW MEASUREMENT FIRST THEN GAS MEASUREMENT
(GA2000 & GA2000 Plus Manual Record - Best Practice)



7.9.6 Taking Gas Measurement First Then Low Flow Measurement

GAS MEASUREMENT FIRST THEN LOW FLOW MEASUREMENT
(GA2000 & GA2000 Plus Manual Record - Best Practice)



8.0 Calibration

8.1 Calibration Introduction

The GA2000 range of gas analysers are carefully calibrated at manufacture and when returned for service. However, it is sometimes desirable to be able to carry out a calibration process between services.

This section outlines the correct procedures to enable the site engineer to field calibrate the gas analyser.

✍ Note: This does not replace the factory service and calibration. If this calibration is completed incorrectly it may decrease the accuracy of the gas analyser.

CH_4, CO_2 and O_2 can be measured by all GA2000 range analysers as standard; these channels can be user calibrated. The analysers have other gas channel options that are specified at manufacture; these too can be calibrated. This section will describe in detail how to calibrate the three standard gas channels plus the CO channel.

The GA2000 Plus has a H_2 compensated CO channel. This option requires that H_2 is used in the calibration process and is also set out within this section.

For the other gas channel options contact Geotech (UK) Limited for advice.

Two important terms that are used within this section are 'Zero' and 'Span'.

Zero: The point at which the gas analyser is calibrated when there is none of the target gas present.

Span: The point at which the gas analyser is calibrated when a known quantity of the target gas is present.

8.2 Calibration Gases

User calibration of a gas analyser will greatly improve the data accuracy in the range of the calibration gases used. This may cause less accurate readings of concentrations outside this calibrated range. Users should select the correct calibration gas for the expected gas levels on their particular application.

- To improve calibration at lower levels requires the use of gas mixtures 1 and 2.
- To improve higher levels use gas mixture 3.
- For standard CO only 100ppm CO gas is needed.
- For CO (H_2 compensated) (GA2000 Plus only) both CO 100ppm and H_2 1000ppm gases are needed.

The following table indicates the different gas mixture canisters used for calibration:

Calibration gas	**CH_4**	**CO_2**	**O_2**
Mixture 1	5%	5%	6%
Mixture 2	5%	10%	0%
Mixture 3	60%	40%	0%

Calibration gas for CO	CO 100ppm
Calibration gas for H_2 compensated CO	H_2 1000ppm

These are for general use but other gas concentrations can be used.

✍ Note: The above gases and most other gas concentrations can be supplied by Geotech (UK) Limited. For further information please contact Sales on +44(0)1926 338111 or email sales@geotech.co.uk.

⚠ **Warning**	Calibration gases can be dangerous. For each gas used the appropriate material safety data sheet must be read and understood before proceeding.

8.3 Calibration Set-Up

The regulator supplied with the calibration kit has been configured to deliver a fixed flow.

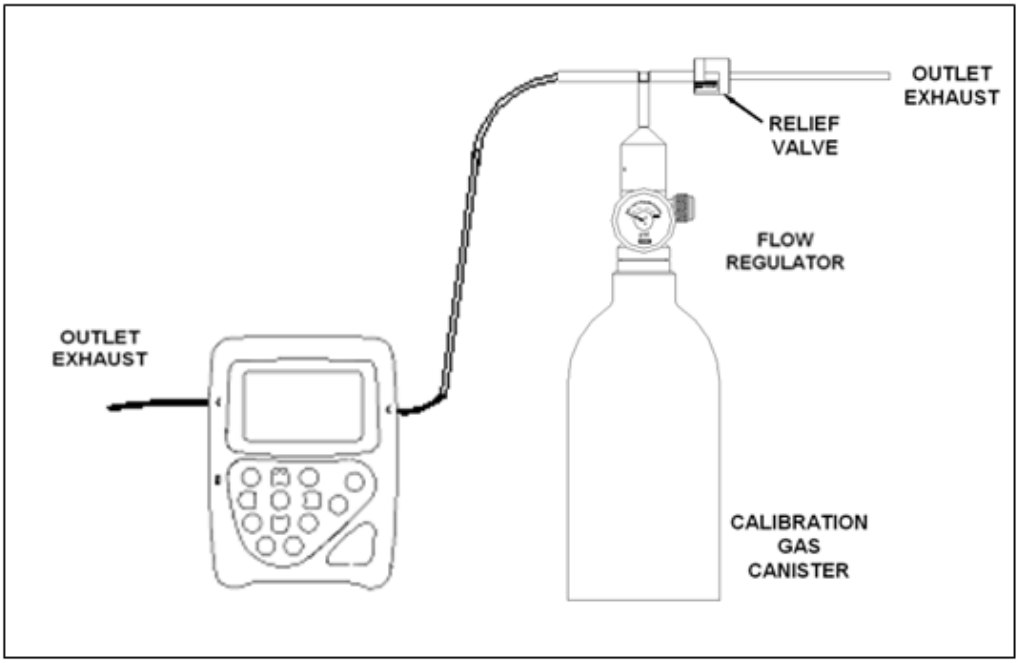
Important	Do NOT attach the gas supply to the gas analyser before putting it into the 'Field Calibration Screen' by selecting 'Field Calibration' from the 'Main' menu.

As the regulator's flow is factory set, it only requires a few turns to open, but no adjustment is necessary.

⚠ **Warning**	**Exhaust port** When the gas analyser is being calibrated, there are two possible exits for the gas, via the usual manner out of the exhaust port of the analyser or in cases of over-pressurisation the 1/16″ port on the pressure relief valve. It is recommended that both ports have exhaust tubing attached. The exhaust tubing must emerge in a well-ventilated area. Ensure there are no leaks in the tubing and connections. The calibration of the gas analyser should be carried out in a safe area with all necessary precautions taken when using potentially dangerous, explosive or toxic gases.

8.4 Calibration Equipment

The diagram below displays the regulator and tubing equipment for user calibration:



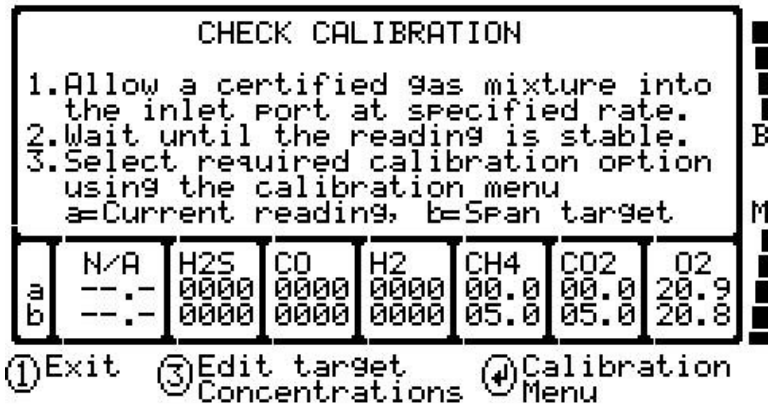
- Certified calibration gas in 58 litre gas canisters is supplied with the Geotech calibration kit. Please refer to the Geotech website www.geotech.co.uk for further information.

- The regulator supplied with the calibration kit is recommended as flow and pressure rates are factory set.

8.5 Gas Analyser

For the GA2000 range of gas analysers the calibration options can be found in the 'Main' menu under 'Field Calibration'.

The first screen displayed is 'Check Calibration' which provides the option of checking the gas channels against known calibration gases before proceeding to re-calibration.



Readings on the line 'a' are the current gas measurements of the unit. The figures

displayed in line ‘b’ are the span calibration gas levels that will need to be set to the concentration of the calibration gas.

✍ Note: Certain gas channels may not be active and will be shown as ‘N/A’.

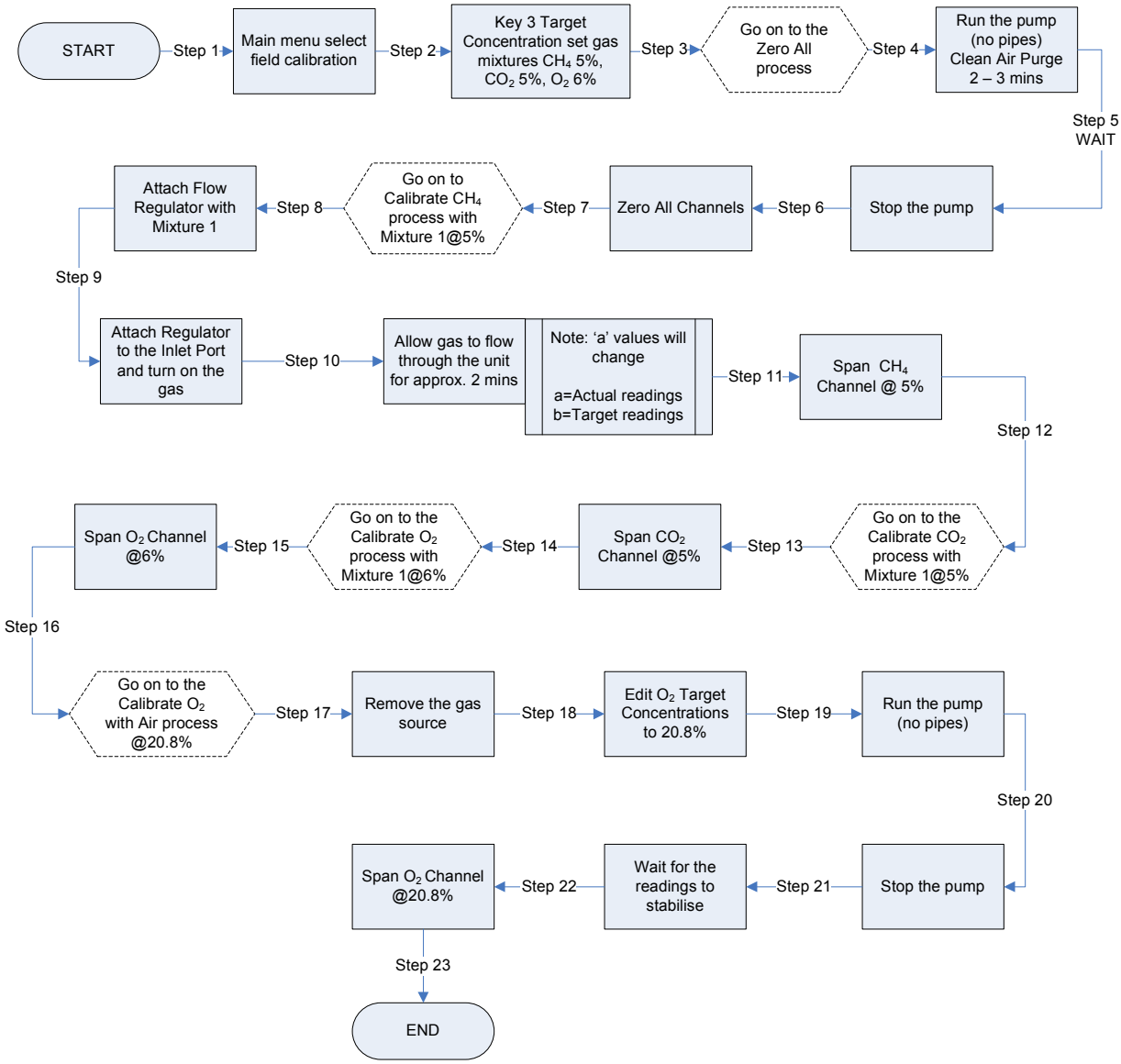
Ensure the unit is stabilised at its working temperature before performing any of the calibration operations.

8.6 Calibration Mixture Processes – Best Practice

The following process diagrams outline the calibration steps for each of the gas mixtures.

8.6.1 Low Level Calibration - Mixture 1

Mixture 1 - CH_4 5%, CO_2 5%, O_2 6%
(Air CH_4 0%, O_2 20.8%)



Instructions for Use - Mixture 1:

When using the gas mixture 1 to perform a full user calibration of the gas analyser it is advisable to follow this sequence of operations.

It is probably easiest at this point to set the span values of the different gases that will be used to calibrate the instrument. The span value is the concentration of the calibration gas.

Step 1 From the 'Main Gas Read Screen' select 'Menu'.

Select 'Key 1' from the menu and use 'Key 8 - Scroll Down' to select 'Field Calibration'.

From the 'CHECK CALIBRATION' screen select 'Key 3' to edit target concentrations.

Scroll and press the 'Enter' key to select required gas channel.

Enter the appropriate value for the highlighted channel then press the 'Enter' key.

Step 2 When using gas mixture 1 set CH_4 at 5%, CO_2 at 5% and O_2 at 6%.

Press the 'Enter' key.

Step 3 **Go on to the Zero All Channels Process**
In addition to the calibration process the gas analyser should have the methane and any auxiliary channel zeroed prior to taking readings at the start of the monitoring session. For this zeroing operation none of the calibration equipment is required. Remove gas source if attached.

Ensure this operation is performed in clean fresh air.

Step 4 Press ⏻ and allow the pump to run for approximately two minutes or until reading stabilises; this purges the unit of gas.

Step 5 Press ⏻ to switch off the pump.

Step 6 **Zero All Channels**
From the 'Check Calibration' screen:

Press ↵ to select 'Calibration Menu'.
Press ↵ to select 'Zero Channels'.
Press ↵ to select 'Zero ALL'.
'USER ZERO COMPLETE' should be displayed.

Alternatively, the option 'ZERO CH4' is available from the 'ZERO CHANNELS' menu. Selecting this option will zero all of the channels except CO_2 and O_2. Repeat for other channels if required (except O_2)

Step 7 **Go on to the Calibrate CH_4 Channel Process with Mixture 1**
Always ensure that the CH_4 channel has been zeroed before performing the methane calibration operation.

Step 8 Attach the flow regulator with gas mixture 1

Step 9 Attach the regulator to the inlet port and turn on gas.

Do not run the pump.

Step 10 Allow the gas to flow through the unit for approximately two minutes or until reading stabilises.

Step 11 **Calibrate CH_4 Channel Process @5%**
Always ensure that the CH_4 channel has been zeroed before performing the methane calibration operation, see above.

From the 'Check Calibration' screen:

The calibration gas is already flowing through the gas analyser; the Methane reading should be approximately 5% and stable. Do not run the pump.

Press ↵ to enter the 'Calibration Menu'.
Scroll 2 8 to 'Span Channel(s)'.
Press ↵ to select 'Span Channel(s)'.
Scroll 2 8 to 'Span CH_4 @ 05.0%' (the value set previously).
Press ↵ to select 'Span CH_4 @ 05.0%'.
'CALIBRATION COMPLETE' should be displayed.

Step 12 **Go on to the Calibrate CO_2 Process with Mixture 1@5%**

Step 13 **Calibrate CO_2 Channel Process with Mixture 1**
The carbon dioxide channel can also be calibrated while the same gas mixture 1 is flowing through the unit. *The carbon dioxide channel cannot be zeroed.*

From the 'Check Calibration' screen:

Press ↵ to enter the 'Calibration Menu'.
Scroll 2 8 to 'Span Channel(s)'.
Press ↵ to select 'Span Channel(s)'.
Scroll 2 8 to 'Span CO_2 @ 5%' (the value set previously).
Press ↵ to select 'Span CO_2 @ 5%'.
'CALIBRATION COMPLETE' should be displayed.

Step 14 **Go on to Calibrate O_2 Process with Mixture 1@6%**
From the 'Check Calibration' screen:

Press ↵ to enter the 'Calibration Menu'.
Scroll 2 8 to 'Span Channel(s)'.
Press ↵ to select 'Span Channel(s)'.
Scroll 2 8 to 'Span O_2 @ 6%' (the value set previously).
Press ↵ to select 'Span O_2 @ 6%' .
'CALIBRATION COMPLETE' should be displayed.

Step 15 **Go on to the Calibrate O_2 with Air Process @20.8%**

Step 16 **Calibrate O_2 with Air Process @20.8%**
Calibration equipment is not required to perform this operation.

Step 17 Remove gas source if attached.

Step 18 From the 'Check Calibration' screen:

Press ③ to edit target concentrations.
Scroll using ② ⑧ and press ↵ to select O_2 channel.
Enter 20.8% (air) then press ↵.

Step 19 Press ⊛ to switch on pump.

Allow the pump to run for approximately two minutes or until reading stabilises; this purges the unit of gas.

Step 20 Press ⊛ to switch off pump.

Step 21 Wait for the reading to stabilise.

Step 22 **Span O_2 Channel @20.8%**
Press ↵ to enter 'Calibration Menu'.
Scroll ② ⑧ to 'Span Channel(s)'.
Press ↵ to select 'Span Channel(s)'.
Scroll ② ⑧ to 'Span O_2 @ 20.8%' (the value set previously).
Press ↵ to select 'Span O_2 @ 20.8%'.
'CALIBRATION COMPLETE' should be displayed.

Step 23 END

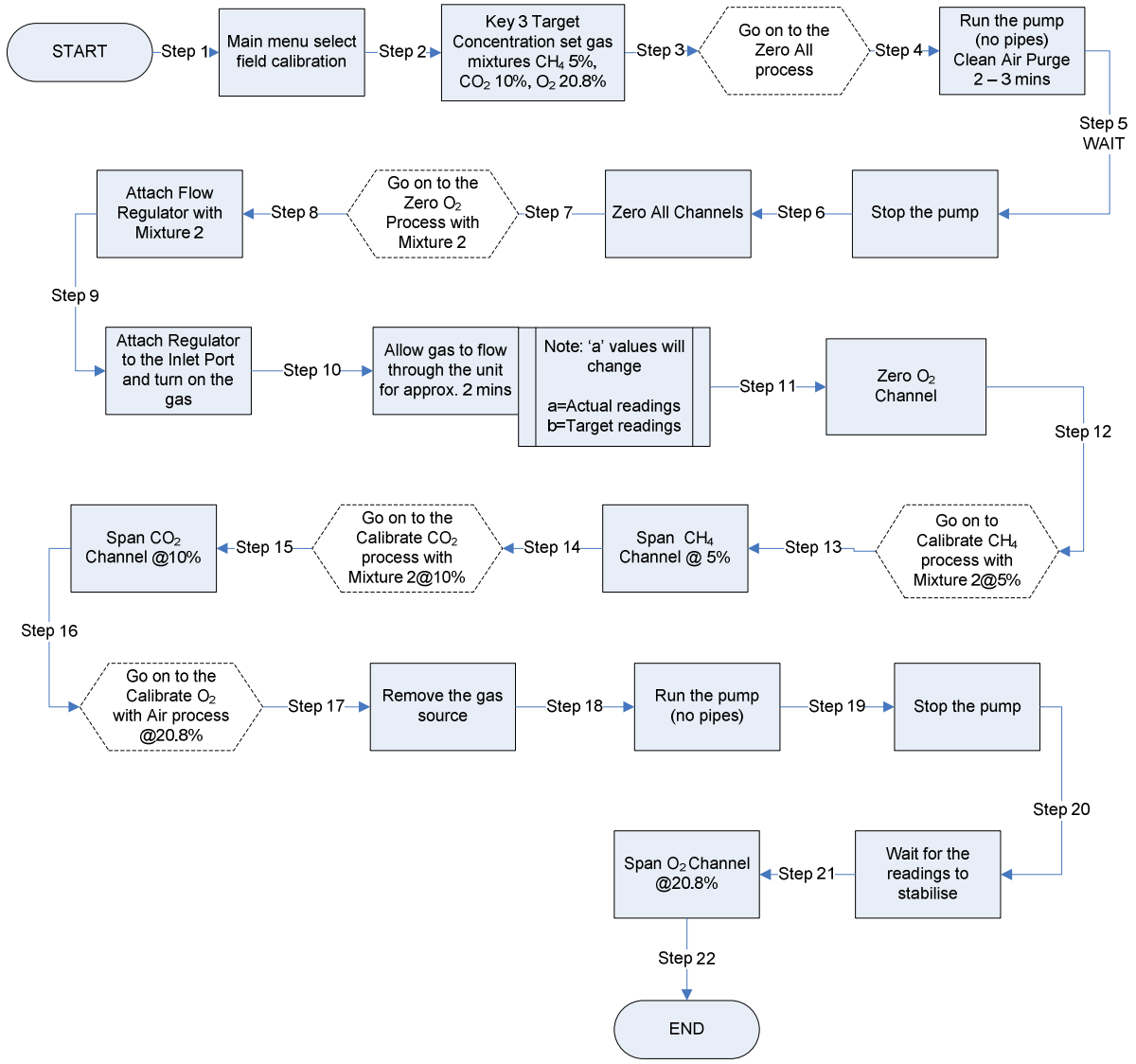
8.6.1.1 Span Multi Gas

The 'Span Multi Gas' option must only be used when the calibration gas being used is a combination of CH_4, CO_2 and O_2 i.e. Mixture 1.

✍ Note: Selecting the 'Span Multi Gas' option when using mixture 2 (or similar) will result in a calibration failure.

8.6.2 Low Level Calibration - Mixture 2

Mixture 2 - CH_4 5%, CO_2 10%, O_2 0%
(Air CH_4 0%, O_2 20.8%)



Instructions for Use - Mixture 2:

When using the gas mixture 2 to perform a full user calibration of the gas analyser it is advisable to follow this sequence of operations.

It is probably easiest at this point to set the span values of the different gases that will be used to calibrate the instrument. The span value is the concentration of the calibration gas.

Step 1 From the 'Main Gas Read Screen' select 'Menu'.

Select 'Key 1' from the menu and use 'Key 8 - Scroll Down' and select 'Field Calibration'.

From the 'CHECK CALIBRATION' screen select 'Key 3' to edit target concentrations.

Scroll and press the 'Enter' key to select required gas channel.

Enter the appropriate value for the highlighted channel then press the 'Enter' key.

Step 2 When using gas mixture 2 set CH_4 at 5%, CO_2 at 10% and O_2 at 20.8% (air).

Press the 'Enter' key.

Step 3 **Go on to Zero All Channels Process**
In addition to the calibration process the gas analyser should have the methane and any auxiliary channel zeroed prior to taking readings at the start of the monitoring session. For this zeroing operation none of the calibration equipment is required. Remove gas source if attached.

Ensure this operation is performed in clean fresh air.

Step 4 Press ⏻ and allow the pump to run for approximately two minutes or until reading stabilises; this purges the unit of gas.

Step 5 Press ⏻ to switch off the pump.

Step 6 **Zero All Channels**
From the 'Check Calibration' screen:

Press ↵ to select 'Calibration Menu'.
Press ↵ to select 'Zero Channels'.
Press ↵ to select 'Zero ALL'.
'USER ZERO COMPLETE' should be displayed.

Alternatively, the option 'ZERO CH4' is available from the 'ZERO CHANNELS' menu. Selecting this option will zero all of the channels except CO_2 and O_2. Repeat for other channels if required (except O_2)

Step 7 **Go on to Zero O_2 Channel Process with Mixture 2**
Unlike zeroing the methane or auxiliary channels, the oxygen channel

can not be zeroed with air, but mixture 2 can be used. The methane and carbon dioxide can be calibrated with gas mixture 2 at the same time.

Step 8 Attach the flow regulator with gas mixture 2.

Step 9 Attach the regulator to the inlet port and turn on gas.

Do not run the pump.

Step 10 Allow the gas to flow through the unit for approximately two minutes or until reading stabilises.

Step 11 From the 'Check Calibration' screen:

Press ↵ to select 'Calibration Menu'.
Press ↵ to select 'Zero Channels'.
Scroll 2 8 to 'Zero O_2'.
Press ↵ to select 'Zero O_2'.
'USER ZERO COMPLETE' should be displayed.

When the oxygen channel has been zeroed, the methane and carbon dioxide channels can be calibrated with the same gas mixture flowing through the unit.

Step 12 **Go on to the Calibrate CH_4 Process with Mixture 2@5%**
Always ensure that the CH_4 channel has been zeroed before performing the methane calibration operation, see above.

Step 13 From the 'Check Calibration' screen:

The calibration gas is already flowing through the gas analyser; the methane reading should be approximately 5% and stable. Do not run the pump.

Press ↵ to enter the 'Calibration Menu'.
Scroll 2 8 to 'Span Channel(s)'.
Press ↵ to select 'Span Channel(s)'.
Scroll 2 8 to 'Span CH_4 @ 05.0%' (the value set previously).
Press ↵ to select 'Span CH_4 @ 05.0%'.
'CALIBRATION COMPLETE' should be displayed.

Step 14 **Go on to the Calibrate CO_2 Channel Process with Mixture 2 @10%**
The carbon dioxide channel can also be calibrated while the same gas mixture 2 is flowing through the unit. *The carbon dioxide channel cannot be zeroed.*

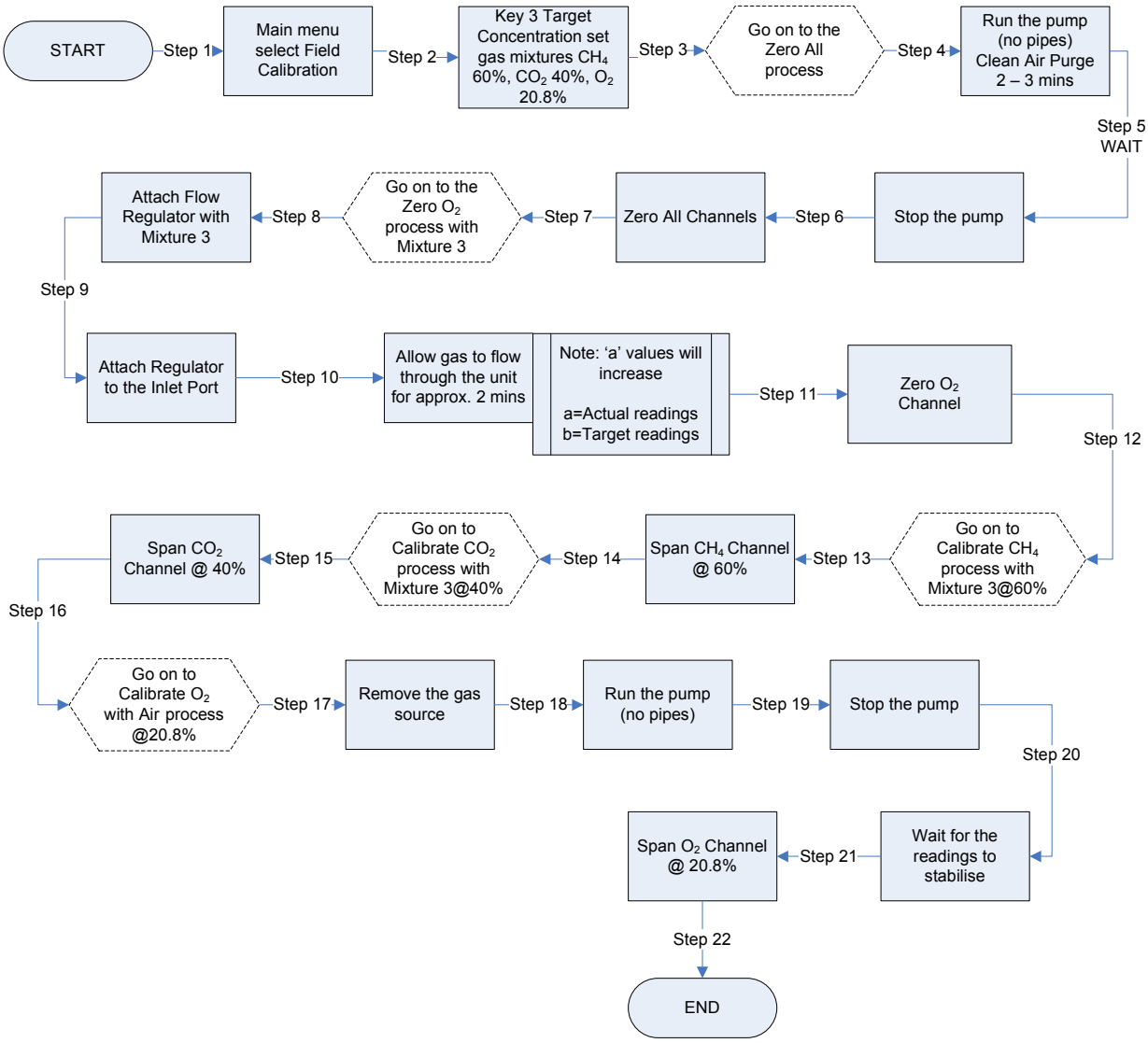
Step 15 From the 'Check Calibration' screen:

Press ↵ to enter the 'Calibration Menu'.
Scroll 2 8 to 'Span Channel(s)'.
Press ↵ to select 'Span Channel(s)'.
Scroll 2 8 to 'Span CO_2 @ 10%' (the value set previously).
Press ↵ to select 'Span CO_2 @ 10%'.
'CALIBRATION COMPLETE' should be displayed.

Step 16	**Go on to the Calibrate O_2 with Air Process with Mixture 1@20.8%** Calibration equipment is not required to perform this operation.
Step 17	Remove gas source if attached.
Step 18	Press ⑤ to switch on pump. Allow the pump to run for approximately two minutes or until reading stabilises; this purges the unit of gas.
Step 19	Press ⑤ to switch off pump.
Step 20	Wait for the reading to stabilise.
Step 21	**Span O_2 Channel @20.8%** Press ↵ to enter 'Calibration Menu'. Scroll 2 8 to 'Span Channel(s)'. Press ↵ to select 'Span Channel(s)'. Scroll 2 8 to 'Span O_2 @ 20.8%' (the value set previously). Press ↵ to select 'Span O_2 @ 20.8%'. 'CALIBRATION COMPLETE' should be displayed.
Step 22	END

8.6.3 High Level Calibration - Mixture 3

Mixture 3 - CH_4 60% CO_2 40% O_2 0%
(Air CH_4 0%, O_2 20.8%)



Instructions for Use - Mixture 3:

If the analyser were required to be calibrated with better accuracy 60% CH_4 40% CO_2, gas mixture 3 would be recommended and it is advisable to follow this sequence of operations.

It is probably easiest at this point to set the span values of the different gases that will be used to calibrate the instrument. The span value is the concentration of the calibration gas.

Step 1 From the 'Main Gas Read Screen' select 'Menu'.

Select 'Key 1' from the menu and use 'Key 8 - Scroll Down' to select 'Field Calibration'.

From the 'CHECK CALIBRATION' screen select 'Key 3' to edit target concentrations.

Scroll and press the 'Enter' key to select required gas channel.

Enter the appropriate value for the highlighted channel then press the 'Enter' key.

Step 2 When using gas mixture 3 set CH_4 at 60%, CO_2 at 40% and O_2 at 20.8% (air).

Press the 'Enter' key.

Step 3 **Go on to the Zero All Channels Process**
In addition to the calibration process the gas analyser should have the methane and any auxiliary channel zeroed prior to taking readings at the start of the monitoring session. For this zeroing operation none of the calibration equipment is required. Remove gas source if attached.

Ensure this operation is performed in clean fresh air.

Step 4 Press ⊛ to switch on pump.

Allow the pump to run for approximately two minutes or until reading stabilises; this purges the unit of gas.

Step 5 Stop the pump.

Step 6 **Zero All Channels**
From the 'Check Calibration' screen:
Press ⊛ to switch off the pump.
Press ↵ to select 'Calibration Menu'.
Press ↵ to select 'Zero Channel(s)'.
Press ↵ to select 'Zero All'.
'USER ZERO COMPLETE' should be displayed.

Alternatively, the option 'Zero CH_4' is available from the 'Zero Channel(s)' menu. Selecting this option will zero all of the channels except O_2. Repeat for other channels if required (except O_2).

Step 7 **Go on to the Zero O_2 Process with Mixture 3**
Unlike zeroing the methane or auxiliary channels, the oxygen channel can not be zeroed with air, mixture 3 must be used. The methane and carbon dioxide can be calibrated with gas mixture 3 at the same time.

Step 8 Attach the flow regulator with Mixture 3

Step 9 Attach the flow regulator to the inlet port.
Do not run the pump.

Step 10 Allow the gas to flow through the unit for approximately two minutes or until reading stabilises.

Step 11 From the 'Check Calibration' screen:

Press ↵ to select 'Calibration Menu'.
Press ↵ to select 'Zero Channel(s).
Scroll 2 8 to 'Zero O_2'.
Press ↵ to select 'Zero O_2
'USER ZERO COMPLETE.' should be displayed.

When the oxygen channel has been zeroed, the methane and carbon dioxide channels can be calibrated with the same gas mixture flowing through the unit.

Step 12 **Go on to the Calibrate CH_4 Process with Mixture 3@60%**
Always ensure that the CH_4 channel has been zeroed before performing the Methane calibration operation.

Step 13 From the 'Check Calibration' screen:

The calibration gas is already flowing through the gas analyser; the Methane reading should be approximately 60% and stable. Do not run the pump.

Press ↵ to enter the 'Calibration Menu'.
Scroll 2 8 to 'Span Channel(s)'.
Press ↵ to select 'Span Channel(s)'.
Scroll 2 8 to 'Span CH_4 @ 60.0%' (the value set previously).
Press ↵ to select 'Span CH_4 @ 60.0%'
'CALIBRATION COMPLETE' should be displayed.

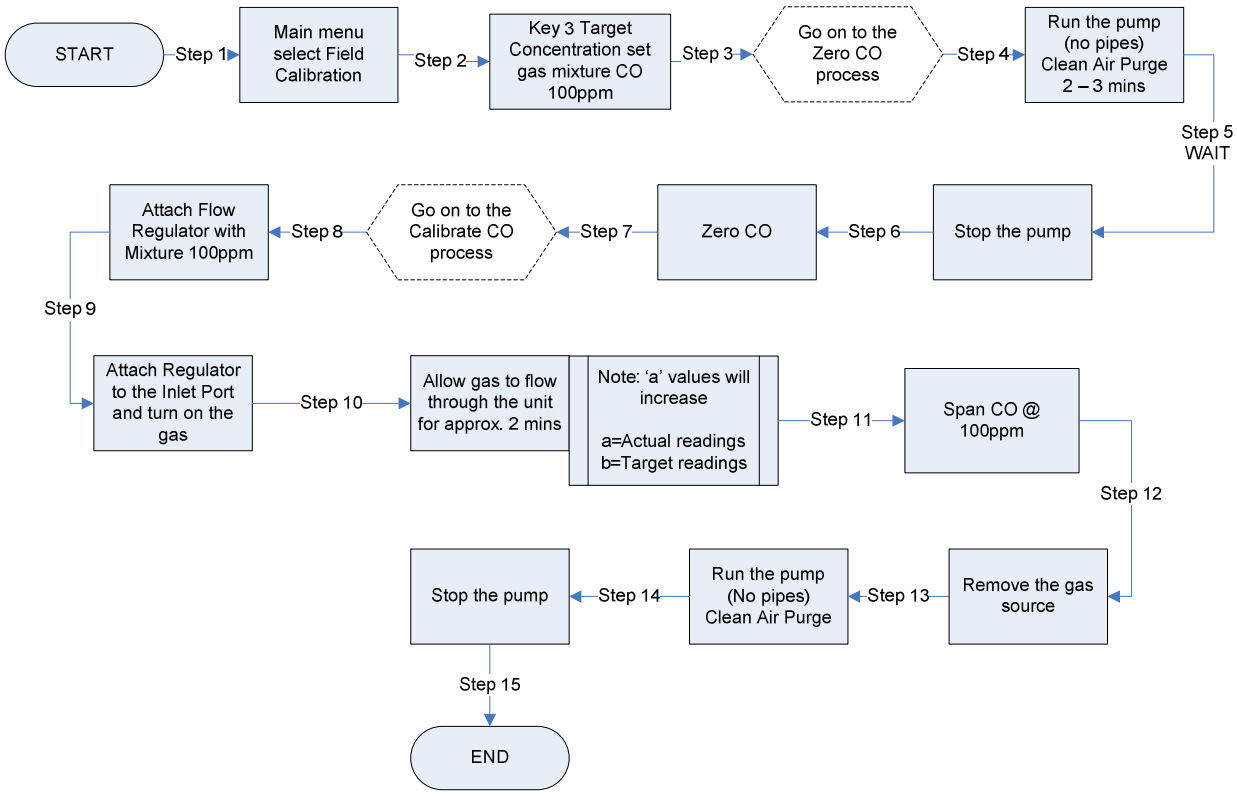
Step 14 **Go on to Calibrate CO_2 Process with Mixture 3 @40%**
The carbon dioxide channel can also be calibrated while the same gas mixture 3 is flowing through the unit. The carbon dioxide channel cannot be zeroed.

Step 15 From the 'Check Calibration' screen:
Press ↵ to enter the 'Calibration Menu'.
Scroll 2 8 to 'Span Channel(s)'.
Press ↵ to select 'Span Channel(s)'.
Scroll 2 8 to 'Span CO_2 @ 40%' (the value set previously).
Press ↵ to select 'Span CO_2 @ 40%'.
'CALIBRATION COMPLETE' should be displayed.
The 'Span Multi Gas' option cannot be used with this gas.

Step 16	**Go on to the Calibrate O_2 with Air Process @20.8%** Calibration equipment is not required to perform this operation.
Step 17	Remove gas source if attached.
Step 18	Press ⊛ to switch on pump. Allow the pump to run for approximately two minutes or until reading stabilises; this purges the unit of gas.
Step 19	Press ⊛ to switch off pump.
Step 20	From the 'Check Calibration' screen: Allow the reading to stabilise; this should be approximately 20.8%.
Step 21	Press ↵ to enter 'Calibration Menu'. Scroll 2 8 to 'Span Channel(s)'. Press ↵ to select 'Span Channel(s)'. Scroll 2 8 to 'Span O_2 @ 20.8%' (the value set previously). Press ↵ to select 'Span O_2 @ 20.8%'. 'CALIBRATION COMPLETE' should be displayed.
Step 22	END

8.6.4 Calibration of CO – Mixture 100ppm

(GA2000)



Instructions for Use – Mixture 100ppm:

It is probably easiest at this point to set the span values of the different gases that will be used to calibrate the instrument. The span value is the concentration of the calibration gas.

Step 1 From the 'Main Gas Read Screen' select 'Menu'.

Select 'Key 1' from the menu and use 'Key 8 - Scroll Down' to select 'Field Calibration'.

From the 'Check Calibration' screen select 'Key 3' to edit target concentrations.

Scroll and press the 'Enter' key to select required gas channel.

Enter the appropriate value for the highlighted channel then press the 'Enter' key.

Step 2 From the 'Check Calibration' screen:

Press ③ to edit target concentrations.
Scroll using 2 8 and press ↵ to select the CO channel.
Enter the appropriate value for the highlighted channel then press ↵.

When using CO gas mixture, set CO at 100ppm.

Step 3 **Go on to the Zero CO Process**
For this zeroing operation none of the calibration equipment is required. Remove gas source if attached.

Ensure this operation is performed in clean fresh air.

Step 4 Press ⊛ and allow the pump to run for approximately two minutes or until reading stabilises; this purges the unit of gas.

Step 5 Press ⊛ to switch off the pump.

Step 6 **Zero CO Channel**
From the 'Check Calibration' screen:

Press ↵ to select 'Calibration Menu'.
Press ↵ to select 'Zero Channel(s)'.
Scroll 2 8 to 'Zero CO'.
Press ↵ to select 'Zero CO'.
'USER ZERO COMPLETE' should be displayed.

Step 7 **Go on to the Calibrate CO Process**
Always ensure that the CO channel has been zeroed before performing the CO calibration operation.

Step 8 Attach the flow regulator with 100ppm CO mixture.

Step 9 Attach the regulator to the inlet port and turn on the gas.
Do not run the pump.

Step 10 Allow the gas to flow through the unit for approximately two minutes or until reading stabilises.

Step 11 From the 'Check Calibration' screen:

Press ↵ to enter the 'Calibration Menu'.
Scroll 2 8 to 'Span Channel(s)'.
Press ↵ to select 'Span Channel(s)'.
Scroll 2 8 to 'Span CO @ 100ppm' (the value set previously).
Press ↵ to select 'Span CO @ 100ppm'.
'CALIBRATION COMPLETE' should be displayed.

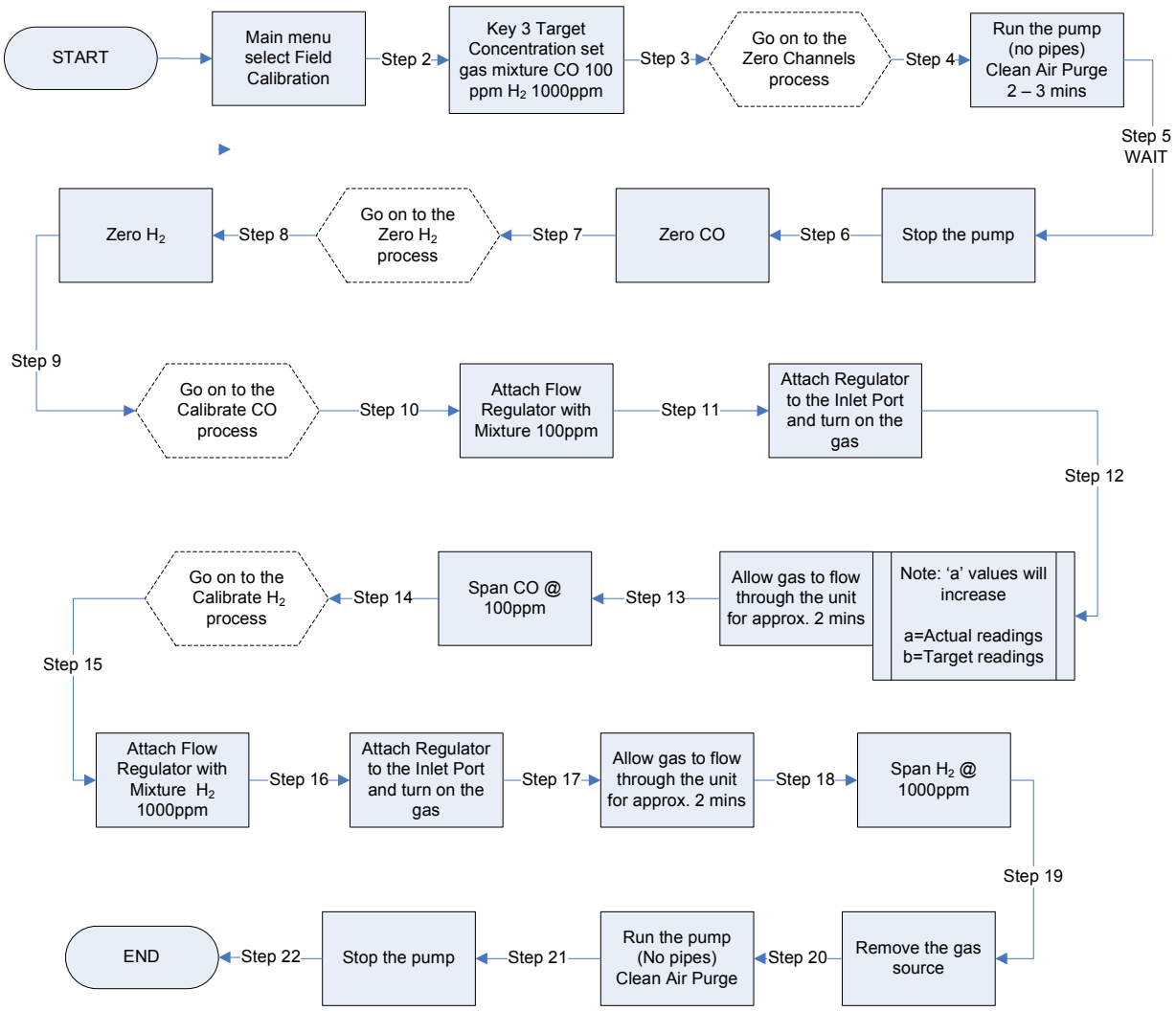
Step 12 Remove the gas source.

Step 13 Press ⊛ and allow the pump to run for one minute; this purges the unit of gas.

Step 14 Stop the pump.

Step 15 END

8.6.5 Calibration of H_2 Compensated CO – Mixture CO 100ppm H_2 1000ppm (GA2000 PLUS)



Instructions for Use – Mixture CO 100ppm H_2 1000ppm:

The H_2 reading is only for compensation purposes and should not be used to take measurements.

To calibrate the H_2 compensated CO channel, both the CO and H_2 need to be zeroed and then spanned separately.

It is probably easiest at this point to set the span values of the different gases that will be used to calibrate the instrument. The span value is the concentration of the calibration gas.

Step 1 From the 'Main Gas Read Screen' select 'Menu'.

Select 'Key 1' from the menu and use 'Key 8 - Scroll Down' to select 'Field Calibration'.

From the 'Check Calibration' screen select 'Key 3' to edit target concentrations.

Scroll and press the 'Enter' key to select required gas channel.

Enter the appropriate value for the highlighted channel then press the 'Enter' key.

Step 2 From the 'Check Calibration' screen:

Press 3 to edit target concentrations.
Scroll using 2 8 and press ↵ to select the required gas channel.
Enter the appropriate value for the highlighted channel then press ↵.
When using CO gas mixture, set CO to 100ppm and H_2 to 1000ppm.
Press ↵

Step 3 **Go on to the Zero Channels Process**

For this zeroing operation none of the calibration equipment is required. Remove gas source if attached.

Ensure this operation is performed in clean fresh air.

Step 4 Press ⊛ and allow the pump to run for approximately two minutes or until reading stabilises; this purges the unit of gas.

Step 5 Press ⊛ to switch off the pump.

Step 6 From the 'Check Calibration' screen:

Press ↵ to select 'Calibration Menu'.
Scroll 2 8 to 'Zero CO'.
Press ↵ to select 'Zero CO'.
'USER ZERO COMPLETE' should be displayed.

Step 7 **Go on to the Zero H_2 Process**

For this zeroing operation none of the calibration equipment is required. Remove gas source if attached.

Ensure this operation is performed in clean fresh air.

Step 8 Press ↵ to select 'Calibration Menu'.
Press ↵ to select 'Zero Channel(s)'.
Scroll 2 8 to 'Zero H_2'.
Press ↵ to select 'Zero H_2'.
'USER ZERO COMPLETE should be displayed.

Step 9 **Go on to the Calibrate CO Process**

Always ensure that the CO channel has been zeroed before performing the CO calibration operation.

Step 10 Attach the flow regulator with 100ppm CO mixture.
Do not run the pump.

Step 11 Attach the regulator to the inlet port.

Step 12 Allow the gas to flow through the unit for approximately two minutes or until reading stabilises.

Step 13 Press ↵ to enter the 'Calibration Menu'.
Scroll 2 8 to 'Span Channel(s)'.
Press ↵ to select 'Span Channel(s)'.
Scroll 2 8 to 'Span CO @ 100ppm' (the value set previously).
Press ↵ to select 'Span CO @ 100ppm'
'CALIBRATION COMPLETE' should be displayed.

Step 14 **Go on to the Calibrate H_2 Process**

Always ensure that the H_2 channel has been zeroed before performing the H_2 calibration operation.

Step 15 Attach the flow regulator with 1000ppm H_2 mixture.
Do not run the pump.

Step 16 Attach the regulator to the inlet port.

Step 17 Allow the gas to flow through the unit for approximately two minutes or until reading stabilises.

Step 18 Press ↵ to enter the 'Calibration Menu'.
Scroll 2 8 to 'Span Channel(s)'.
Press ↵ to select 'Span Channel(s)'.
Scroll 2 8 to Span H_2 @ 1000ppm' (the value set previously).
Press ↵ to select 'Span H_2 @ 1000ppm'.
'CALIBRATION COMPLETE' should be displayed.

Step 19 Remove the gas source.

Step 20 Start the pump and perform a clean air purge.

Step 21 Stop the pump.

Step 22 END

8.7 Confirm Calibration

This feature allows the operator to store the accuracy of the instrument in the event log.

8.7.1 Confirm Multi-Gas

The 'Span Multi-gas' option must only be used when the calibration gas being used is a combination of CH_4, CO_2 and O_2 i.e. Mixture 1.

It is probably easiest at this point to set the span values of the different gases that will be used to confirm the calibration of the instrument. The span value is the concentration of the calibration gas.

Step 1 — Press ③ to edit target concentrations.

Step 2 — From the 'Check Calibration' screen:

Scroll using 2 8 and press ↵ to select required gas channel.
Enter the appropriate value for the highlighted channel then press ↵.
When using gas mixture 1 set CH_4 at 5%, CO_2 at 5% and O_2 at 6%.
Press ↵

Step 3 — Attach the flow regulator with mixture 1.
Do not run the pump.

Step 4 — Attach the regulator to the inlet port and turn the gas on.

Step 5 — Allow the gas to flow through the unit for approximately two minutes or until reading stabilises.

Step 6 — From the 'Check Calibration' screen:

Press ↵ to enter the 'Calibration Menu'.
Scroll 2 8 to 'Confirm Calibration'.
Press ↵ to select 'Confirm Calibration'.
Press ↵ to select 'Confirm Multi Gas'.
Press ① Finished.

This information will then be stored in the event log and can be downloaded and viewed using GAM.

Step 7 — END

8.7.2 Confirm Channels Independently

This option can be used if the gas being used is <u>not</u> a combination of CH_4, CO_2 and O_2 i.e. Mixture 1 or if the confirmation of a single channel is required.

It is probably easiest at this point to set the span values of the different gases that will be used to confirm the calibration of the instrument. The span value is the concentration of the calibration gas.

Step 1	Press ③ to edit target concentrations.
Step 2	From the 'Check Calibration' screen: Scroll using 2 8 and press ↵ to select required gas channel Enter the appropriate value for the highlighted channel then press ↵. Repeat for other channels.
Step 3	Attach the flow regulator with target gas. Do not run the pump.
Step 4	Attach the regulator to the inlet port and turn on at the regulator. Do not run the pump.
Step 5	Allow the gas to flow through the unit for approximately two minutes or until reading stabilises.
Step 6	From the 'Check Calibration' screen: Press ↵ to enter the 'Calibration Menu'. Scroll 2 8 to 'Confirm Calibration'. Press ↵ to select 'Confirm Calibration'. Scroll 2 8 to 'Confirm CH_4 @ 'Target Gas'. Press ↵ to select 'Confirm CH_4 @ 'Target Gas'. Press ① Finished. Repeat for other channels if required. This information will then be stored in the event log and can be downloaded and viewed using GAM (Gas Analyser Manager).
Step 7	END

8.8 Factory Settings

This option will reset the gas analyser to all of its factory programmed settings and will clear ALL the user defined calibration points.

If in any doubt please contact Technical Support at Geotech (UK) Limited on +44(0)1926 338111

From the main 'Check Calibration' screen:

Press ↵ to enter the 'Calibration Menu'.
Scroll 2 8 to 'Factory Settings'.
Press ↵ to select 'Factory Settings'.

Two messages will follow, 'Resetting please wait.' and 'Factory settings restored.'

8.9 Last Field Calibration

This option can be found in the calibration menu of the 'Field Calibration' section. When selected, this option will display the time and date that the last field calibration was perfomed on the insturment.

8.10 Calibration Record

The GA2000 range has the facility to log user calibrations in an 'Event Log' which is accessible to the user via the optional product Gas Analyser Manager. This can be used as an aid to ensuring that gas measurements are valid and accurate.

A 'Confirm Calibration' option will display in the 'Calibration Menu'. When selected a further sub-menu is displayed which allows the user to select which gas to confirm.

The result is displayed as a table giving target, factory and actual gas values. This option is available only for the three main gases. A multi-gas 'Confirm Calibration' option is also available in the sub-menu. This allows the calibration of the CH_4, CO_2 and O_2 channels to be confirmed with a single key press. For each entry the time and date will be stored.

9.0 Problem Solving

This section outlines various warning and error messages which the operator may receive during general operation of the instrument. For further assistance please contact Technical Support at Geotech (UK) Limited on +44(0)1926 338111 or email technical@geotech.co.uk.

9.1 Warning and Error Display

When switched on the instrument will perform a pre-determined self-test sequence taking approximately 15 seconds. During this time many of the instrument's working parameters and settings are checked.

If any operational parameters are out of specification or the pre-programmed recommended calibration/service date has passed, errors or warnings may be displayed.

Use the 'Scroll Up' and 'Scroll Down' keys to move through the list if required.

Only three warnings/errors can be displayed at any time.

To ascertain if more errors have occurred use 'Key 8' – Scroll Down' and 'Key 2' - Scroll Up' through the list.

Warnings Displayed:

All warnings displayed will be prefixed by the word WARNING followed by a relevant description.

There are two types of warning that may be displayed:

1. General warnings that may not affect the instrument's function and those where the self-test has detected a function that is outside the usual programmed operating criteria, e.g. battery charge low, memory nearly full.

2. Operational parameters that could affect the performance of the analyser: Cell out of calibration, CH_4 out of calibration, CO_2 out of calibration.

The most likely reason for the errors is either an incorrect user calibration or sensor failure. If an incorrect user calibration has caused the warning it should be correctable by way of returning the instrument to factory settings, zeroing or carrying out a user calibration as necessary for the relevant function.

Errors Displayed:

All errors displayed will be prefixed by the word ERROR followed by an error code.

The errors detected by the self-test are usually caused by a user calibration being out of specification or possible memory corruption and will affect the instrument's function.

Therefore, these errors should be corrected before use, e.g. 01-User cal data, CH_4 reading out of specification, 02-User cal data, CO_2 reading out of specification, 04-User cal data, Cell 1 reading out of specification.

✍ Note: If any other types of warning or error are displayed it is advisable to contact Geotech (UK) Limited for further information.

Under and Over Range Codes

If a reading is under range (i.e. below zero) it will be displayed with 'less than' chevrons (<<). This can occur if a channel has been incorrectly calibrated.

If a reading is over range (i.e. above the maximum allowed reading) it will be displayed with 'more than' chevrons (>>).

A number displayed as an asterisk (*) indicates an error and a hash (#) indicates where no data is available.

9.2 User Calibration Trouble Shooting

Error	Remedy
User zero failed	A possible reason for this is because the gas analyser is trying to zero to a level which is outside the pre-determined range set when the unit was first calibrated at the factory. To rectify this, first ensure the unit contains absolutely none of the gas which is being zeroed. For all but O_2 (which requires O_2 free gas) and CO_2 run the pump to purge with fresh air and repeat zeroing process. If it will not zero, then refer to the instructions given in the 'Factory Settings' section. If the gas analyser continues to fail in zeroing then the unit must be returned to Geotech (UK) Limited for investigation.
Calibration failed	Check the span is set to the correct value, if not, correct and retry spanning the channel. Repeat the entire procedure, including zeroing the channel and then calibrate the span. Ensure the reading is stable before spanning the channel. This message may also appear if attempting to use the 'Span Multi-Gas' option when not using a gas containing concentrations of CH_4, CO_2 and O_2.

10.0 Service

The GA2000 range analyser should be regularly serviced to ensure correct and accurate operation. Geotech (UK) Limited recommends a service and recalibration every **6 months**.

The GA2000 range is ATEX certified for use in potentially explosive areas. As such it should be serviced only by qualified engineers. Failure to observe this will result in the warranty becoming invalid and could invalidate the ATEX certification.

⚠ **Warning**	If the GA2000/GA2000 Plus analyser is serviced by unqualified engineers the ATEX certification may be invalidated and the instrument may be unsafe for use in a potentially explosive atmosphere.

User serviceable parts:

There are no user serviceable parts inside the instrument.

The following parts can be user serviced:

In-line water filter	This should be regularly inspected for obstructions or damage and changed if needed. The instrument should never be operated without the in-line water filter as this may result in water entering the instrument.
Inlet port filter	The inlet port (particulate) filter is located on the underside of the instrument and is accessed by removing the plastic plug. This can be removed by unscrewing using a suitable sized coin. The filter should be replaced if it is contaminated. Never operate the instrument without the particulate filter. When replacing the plug be sure not to over-tighten it - finger tight is adequate.
Sample tubing	Always ensure that sample tubes are not contaminated or damaged.
QRC connectors	Periodically check that the O-rings on the QRC gas connectors are not damaged. A damaged O-ring can let air into the sample gas and result in incorrect readings. If the O-ring is damaged the complete QRC connector should be replaced.
H_2S filter material	When the filter material changes colour to a *light grey* colour then the filter should be replaced.

11.0 Warranty Policy

This instrument is guaranteed, to the original end user purchaser, against defect in materials and workmanship for a period of **12 months** from the date of the shipment to the user.

During this period Geotechnical Instruments (UK) Limited will repair or replace defective parts on an exchange basis.

The decision to repair or replace will be determined by Geotechnical Instruments (UK) Limited.

To maintain this warranty, the purchaser must perform maintenance and calibration as prescribed in the operating manual.

Normal wear and tear, and parts damaged by abuse, misuse, negligence or accidents are specifically excluded from the warranty.

✍ Note: Please contact Technical Support at Geotech (UK) Limited for further information.

12.0 Technical Specifications

12.1 GA2000 Technical Specification

GA2000
Technical Specification

POWER SUPPLY	
Battery type	Rechargeable Nickel Metal Hydride battery pack containing six 4AH cells (not user replaceable)
Battery life	Typical use 10 hours from fully charged
Battery lifetime	Up to 1000 charge/discharge cycles
Battery charger	Separate intelligent 2A battery charger powered from mains supply (100-240V 4763Hz)
Charge time	Approximately 2 hours from complete discharge
Alternative power	Can be powered externally for fixed in place applications. Contact Geotechnical Instruments (UK) Ltd for further information
Memory backup battery	Lithium Manganese for data retention.

GAS RANGES					
Gases measured	CO2 and CH4	By dual wavelength infrared cell with reference channel			
	O2	By internal electrochemical cell			
	CO	By internal electrochemical cell			
	H2S 0-500ppm	By internal electrochemical cell			
Range	CH4	0 -70% to specification, 0-100% reading			
	CO2	0 -60% to specification, 0-100% reading			
	O2	0 -25%			
	CO	0 -500ppm			
	H2S	0 -500ppm internal			
Typical accuracy	**Gas**	**0-5% vol**	**5-15% vol**	**15%-FS**	**FS**
	CH4	±0.5% (vol)	±1.0% (vol)	±3.0% (vol)	70%
	CO2	±0.5% (vol)	±1.0% (vol)	±3.0% (vol)	60%
	O2	±1.0% (vol)	±1.0% (vol)	±1.0% (vol)	25%
	Gas	**Range**	**0-FS**		
	CO	0 -500ppm	±10.0% FS		
	H2S	0 -500ppm	±10.0% FS		
Response time, T90	CH4 CO2 O2 CO H2S	≤20 seconds ≤20 seconds ≤20 seconds ≤60 seconds ≤60 seconds			
Oxygen cell lifetime	Approximately 3 years in air				
Other Electrochemical cells lifetime	Approximately 2 years in air				

GA2000
Technical Specification

FACILITIES	
Temperature measurement	-10℃ to +75 ºC with optional probe
Temperature accuracy	± 1.0 ºC with optional probe
Flow from borehole	0 -20 L/Hr Internal measurement (option)
Flow from borehole accuracy	± 0.3 L/hr
Visual and audible alarm	User selectable CO2, CH4 and O2 alarm levels*
Communications	Via USB lead to 7 pin Lemo connector*
Relative pressure	± 500 mbar from calibration pressure
Relative pressure accuracy	± 4mbar typically (should be zeroed before reading) to ± 15mbar max
Available Memory	1000 IDs* 2000 Readings 1000 Events*

PUMP	
Flow	350 to 400 ml/min typical flow rate in free air
Flow fail point	50 ml/min approximately – user settable*

ENVIRONMENTAL CONDITIONS	
Operating temperature range	0℃ – 40 ºC
Relative humidity	0 – 95% non condensing
Case seal	IP65
Barometric pressure	± 200mbar from calibration pressure
Barometric pressure accuracy	± 5mbar typically

PHYSICAL	
Weight	2 Kilograms
Size	L 63mm, W 190mm, D 252mm
Case material	ABS
Keys	Membrane panel
Display	Liquid crystal display, 40 x 16 characters Fibre optic woven back-light for low light conditions
Gas sample filters	User replaceable integral fibre filter at inlet port and an external PTFE water trap filter

CERTIFICATION RATING	
ATEX	II 2G Ex ib d IIA T1 Gb (Ta = 0℃ to +40℃)

*- Gas Analyser Manager required

Important Note
This specification is for GA2000 units Serial Numbers 10,000 and above.
The information in this document is correct at the time of generation, we do however, reserve the right to change the specification without prior notice

12.2 GA2000 Plus Technical Specification

GA2000 PLUS
Technical Specification

POWER SUPPLY	
Battery type	Rechargeable Nickel Metal Hydride battery pack containing six 4AH cells (not user replaceable)
Battery life	Typical use 10 hours from fully charged
Battery lifetime	Up to 1000 charge/discharge cycles
Battery charger	Separate intelligent 2A battery charger powered from mains supply (100-240V 4763Hz)
Charge time	Approximately 2 hours from complete discharge
Alternative power	Can be powered externally for fixed in place applications. Contact Geotechnical Instruments (UK) Ltd for further information
Memory backup battery	Lithium Manganese for data retention.

GAS RANGES					
Gases measured	CO2 and CH4	By dual wavelength infrared cell with reference channel			
	O2	By internal electrochemical cell			
	CO (hydrogen compensated)	By internal electrochemical cell			
	H2S 0-500ppm	By internal electrochemical cell			
	H2S 0-5000ppm	By external gas pod (option)			
	NH3 0-1000ppm	By internal electrochemical cell (non standard option)			
	H2 0-1000ppm	By internal electrochemical cell (non standard option)			
	A full range of gas pods can be used as well as the two internal cell positions.				
Range	CH4	0 -70% to specification, 0-100% reading			
	CO2	0 -60% to specification, 0-100% reading			
	O2	0 -25%			
	CO	0 -2000ppm			
	H2S	0 -500ppm internal or 0 -5000ppm external pod			
Typical accuracy	**Gas**	**0-5% vol**	**5-15% vol**	**15%-FS**	**FS**
	CH4	±0.5% (vol)	±1.0% (vol)	±3.0% (vol)	70%
	CO2	±0.5% (vol)	±1.0% (vol)	±3.0% (vol)	60%
	O2	±1.0% (vol)	±1.0% (vol)	±1.0% (vol)	25%
	Gas	**Range**	**0-FS**		
	CO	0 -2000ppm	±10.0% of reading or 15ppm, whichever is greater		
	H2S	0 -500ppm	±10.0% FS		
Response time, T90	CH4 CO2 O2 CO H2S	≤20 seconds ≤20 seconds ≤20 seconds ≤60 seconds ≤60 seconds			
CO measurement	Compensated for interference from hydrogen up to 1% hydrogen. Cross sensitivity approx 1%.				
Oxygen cell lifetime	Approximately 3 years in air				
Other Electrochemical cells lifetime	Approximately 2 years in air				

GA2000 PLUS
Technical Specification

FACILITIES	
Temperature measurement	-10℃ to +75 ºC with optional probe
Temperature accuracy	±1.0 ºC with optional probe
Flow from borehole	0 – 20 L/Hr internal measurement
Flow from borehole accuracy	± 0.3 L/hr
Visual and audible alarm	User selectable CO2, CH4 and O2 alarm levels *
Communications	Via USB lead to 7 pin Lemo connector*
Relative pressure	±500 mbar from calibration pressure
Relative pressure accuracy	±4mbar typically (should be zeroed before reading) to ±15mbar max
Available Memory	1000 IDs* 2000 Readings 1000 Events*

PUMP	
Flow	350 to 400 ml/min typical flow rate in free air
Flow fail point	50ml/min approximately – user settable *

ENVIRONMENTAL CONDITIONS	
Operating temperature range	0℃ – 40 ºC
Relative humidity	0 – 95% non condensing
Case seal	IP65
Barometric pressure	± 200mbar from calibration pressure
Barometric pressure accuracy	± 5mbar typically

PHYSICAL	
Weight	2 Kilograms
Size	L 63mm, W 190mm, D 252mm
Case material	ABS
Keys	Membrane panel
Display	Liquid crystal display, 40 x 16 characters Fibre optic woven back-light for low light conditions
Gas sample filters	User replaceable integral fibre filter at inlet port and an external PTFE water trap filter

CERTIFICATION RATING	
ATEX	II 2G Ex ib d IIA T1 Gb (Ta = 0℃ to +40℃)
MCerts	Sira MC 080126/00 Compatible to instrument serial number 10,000 and above

* Gas Analyser Manager required.

13.0 Event Log

The following events are recorded in the instrument's event log. The event log can only be downloaded using the additional Gas Analyser Manager. Please refer to the GAM operating manual for further details.

Event ID	Description	Event Data
0	Unspecified Event	
1	Cold Start	0=Manual, 1=RS232
2	Manufacturers Calibration	
3	Official Gas Check	
4	Service over-due warning	
5	Return to Factory settings	0=Manual, 1=RS232
6	Successful User zero CH4	Readings before and After
7	Successful User span CH4	Target Value, Readings before and After
8	Successful User zero CO2	Readings before and After
9	Successful User span CO2	Target Value, Readings before and After
10	Successful User zero O2	Readings before and After
11	Successful User span O2	Target Value, Readings before and After
12	Successful User zero CELL1	Readings before and After
13	Successful User span CELL1	Target Value, Readings before and After
14	Successful User zero CELL2	Readings before and After
15	Successful User span CELL2	Target Value, Readings before and After
16	Successful User zero CELL3	Readings before and After
17	Successful User span CELL3	Target Value, Readings before and After
18	Successful User zero internal flow	Readings before and After
19	Failed User zero CH4	Reading
20	Failed User span CH4	Target Value, Gas Reading
21	Failed User zero CO2	Reading
22	Failed User span CO2	Target Value, Gas Reading
23	Failed User zero O2	Reading
24	Failed User span O2	Target Value, Gas Reading
25	Failed User zero CELL1	Reading
26	Failed User span CELL1	Target Value, Gas Reading
27	Failed User zero CELL2	Reading
28	Failed User span CELL2	Target Value, Gas Reading
29	Failed User zero CELL3	Reading
30	Failed User span CELL3	Target Value, Gas Reading
31	Failed User zero internal flow	Reading
32	Confirm CH4 calibration	Target, Factory and Actual Gas Values
33	Confirm CO2 calibration	Target, Factory and Actual Gas Values
34	Confirm O2 calibration	Target, Factory and Actual Gas Values
35	Set Clock via RS232	Time before and after,
36	Clear Memory via RS232	1=Readings, 2=IDs, 3=Comments, 4=Site Questions, 5=All, 6=Event log
37	Readings downloaded from instrument	Mode(GA, GEM),No of readings

38	Readings uploaded to instrument	Mode(GA, GEM),No of readings
39	IDs downloaded from instrument	Mode(GA,GEM),No of readings
40	IDs uploaded to instrument	Mode(GA,GEM),No of readings
41	Technician login	Technician ID
42	Auto-purge	Seconds
43	Power Off Auto Purge	Seconds
44	Warning over-pressurised	Pressure Reading
45	Keyboard locked	1=Locked and 0=Unlocked
46	Mode of operation changed	0=Manual and 1=RS232, 0=GA and 1=GEM
47	Download event log	No. of Events
48	Download technician list	No. of Entries
49	Upload technician list	No. of Entries
50	Download phone directory	No. of Entries
51	Upload phone directory	No. of Entries
52	Download modem initialisation string	
53	Upload modem initialisation string	
54	Tried to store reading with memory full	0=Abort, 1=Overwrite, 2=Unable to overwrite
55	Download comments	
56	Upload comments	
57	Download alarm levels	
58	Upload alarm levels	
59	Download logging parameters	
60	Upload logging parameters	
61	Download site questions	
62	Upload site questions	
64	Modem status reports	
69	Relative pressure zeroed	Readings before and After
70	Static pressure transducer zeroed	Readings before and After
71	Differential pressure transducer zeroed	Readings before and After
72	Update site questions	Number of Questions
73	Data logging mode selected	Pump Run Time, Logging interval
74	Operate via modem selected	
75	View data selected	
76	Print data selected	0=Complete, 1=Aborted, 2=Comms error
77	Adjust contrast	Contrast Offset
78	Gas Alarm triggered	CH4/CO2/O2/Residual N2 0=No Alarm, 1=Triggered
79	Technican Login activated	1=Enabled, 0=Disabled
80	Settings changed	AutoZero,AutoPurge,Show LEL, AutoOff (0=Disabled, 1=Enabled)
81	UoM changed	Pressure Transducer, Barometer, Temperature, GEM Flow, GEM Power, Anemometer, Anemometer Pipe Diameter,
82	User span external gas pod	Target Value, Reading before, Reading after
83	User zero external flow pod	Reading before, Reading after
84	User zero external gas pod	Pod type, Reading before, Reading after
85	User zero anemometer	Reading before, Reading after

100	Low flow warning	Target Value, Gas Reading
101	Battery low warning (<20%)	
102	Reading memory nearly full warning	
103	Variable(s) in RAM out-of-range / corrupt	
104	Clock invalid / corrupt	
105	Service overdue	
106	Secondary sensor reads error at start-up	Channel No.
107	Chemical cell reads error at start-up	Cell Type
108	Primary sensor reads error at start-up	Channel No.
109	Event log [nearly] full	0=Full, 1=Nearly Full
110	GPS module not found	
200	Gain set	Ref Gain, CH4 Gain, CO2 Gain
201	Set default eeprom	
202	Copy dual cell settings to factory settings	
203	Set-up chemical cells	
204	Set-up logo	Logo,mCerts
205	Set-up Instrument type	Type
206	Set date format UK/USA	0=dd/mm/yy, 1=mm/dd/yy
207	Set Power auto-off flag	0=Stay on, 1=Power off after 15m
208	Set H2 warning level	H2 Warning Level
209	Set operating language	0/1=English, 2=German, 3=Spanish, 4=French, 5=Italian
210	Set baud rate	Baud Rate, Handshaking
211	Set last gas check date	Day,Month,Year
212	Set Service date	Day,Month,Year,Service+
213	Set serial number	Char1,Char2,Numeric
214	Recover GA readings	No of readings
215	Recover GEM readings	No of readings
216	Set-up Anemometer	UoM,Pipe Dia,Offset,Slope
217	Enter diagnostics mode	
218	Show expanded character set	
219	Show IDs via service options	
220	Cal. Linear channel via diagnostics	Channel No.
221	Cal. Oxygen via diagnostics	
222	Cal. Temp. Probe via diagnostics	
223	Int. Flow. Manufacturing Option	1=Enabled, 0=Disabled
224	Logging Pack Manufacturing Option	1=Enabled, 0=Disabled
225	A5F CO Cell calibrated	
226	Residual N2/LEL CH4 option	2=Enabled With Alarm, 1=Enabled, 0=Disabled
227	CIRIA flow mode	1=Enabled, 0=Disabled
228	GPS module fitted option changed	1=Enabled, 0=Disabled
229	GPS module compass calibrated	1=Started, 0=Stopped

14.0 Sample Certificate of Calibration

This is a sample certificate of calibration supplied at the time of purchase and updated when the instrument is serviced.

Geotech

A subsidiary of LANDTEC

CERTIFICATE OF CALIBRATION

Certificate number: GA11661_2/3631
Date of check: 14 April 2009
Product: GA2000Plus
Serial number: GA11661

Calibration checked at: 21.1°C to 31.6°C

Primary Gas Channels

Methane (CH4)		Carbon Dioxide (CO2)	
Certified Gas (%)	**Reading (%)**	**Certified Gas (%)**	**Reading (%)**
49.97	49.5	50.03	50.4
15.12	15.3	15.44	15.3
5.00	5.0	4.94	4.7

Oxygen (O2)	
Certified Gas (%)	**Reading (%)**
20.95	21.0

Additional Gas Cells		
Gas	Certified Gas (ppm)	**Reading (ppm)**
H2	999.0	LOW
CO	504.0	505.0
H2S	52.1	52.0

Barometer	
Certified (mb)	**Reading (mb)**
1000	1000

Internal Flow		
Nominal (l/hr)	**Applied (l/hr)**	**Measured (l/hr)**
10.0	10.00	10.15
5.0	5.00	5.05

Approved by: C. MILLAR **(Name)**

(Signature)

All gases are traceable to certified National Standards

As the Manufacturer, we recommend that this unit be Serviced in accordance with the date specified by the analyser. This is to be done ONLY by a Geotechnical Instruments (UK) Ltd approved Service Facility.

Registered in England and Wales: 1898734
Geotechnical Instruments (UK) Ltd
Sovereign House, Queensway, Leamington Spa, Warwickshire, CV31 3JR, England.
Tel: +44 (0)1926 338111 Fax: +44 (0)1926 338110 www.geotech.co.uk

020248/14

15.0 Important Notice to All Customers

WEEE COMPLIANT

The wheelie bin symbol now displayed on equipment supplied by Geotechnical Instruments (UK) Limited signifies that the apparatus must not be disposed of through the normal municipal waste stream but through a registered recycling scheme.

The Waste Electrical and Electronic Equipment directive (WEEE) makes producers responsible from July 1st 2007 in meeting their obligations, with the fundamental aim of reducing the environmental impact of electrical and electronic equipment at the end of its life.

Geotech (UK) Limited is now registered with the Environmental Agency as a producer and has joined a recycling scheme provider who will manage and report on our electrical waste on our behalf.

Our Producer Registration Number is WEE/GB0052TQ

When your instrument is at the end of its life, please contact the Sales team at Geotech (UK) Limited who will advise you on the next step in order to help us meet our obligations.

16.0 Declaration of Conformity – English Language

Products	• GA2000/GA2000 Plus - Landfill Gas Analyser • GEM2000/GEM2000 Plus - Landfill Gas Analyser and Extraction Monitor

Geotechnical Instruments (UK) Limited declares that the item(s) described above are in compliance with the following standards:

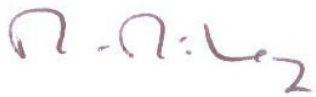
ATEX Directive 94/9/EC

Certification body	SIRA Certification Service
Notified body number	0518
Address	Rake Lane, Eccleston, Chester, CH4 9JN
Certificate number	Sira 06ATEX2202X
Standards applied	EN 60079-0 :2006 EN 60079-1 :2007 EN 60079-11 :2007

EMC Directive 89/336/EEC

EN 61000-6-4:2001	Electromagnetic compatibility (EMC). Generic standards. Emission standard for industrial environments
EN 61000-4-3:2006	Electromagnetic compatibility (EMC). Testing and measurement techniques. Radiated, radio-frequency, electromagnetic field immunity test
EN 61000-4-2:1995	Electromagnetic compatibility (EMC). Testing and measurement techniques. Electrostatic discharge immunity test.
EN 61000-4-6:1996	Electromagnetic compatibility (EMC). Testing and measurement techniques. Immunity to conducted disturbances, induced by radio-frequency fields
EN 50270:1999	Electromagnetic compatibility - Electrical apparatus for the detection and measurement of combustible gases, toxic gases or oxygen. Tests carried out according to ENV 50204:1996 Radiated electromagnetic field from digital radio telephones. Immunity test

Signed:



Dr. Roger Riley
NPI Manager and Authorised Person

17.0 GA2000 Range Glossary of Terms

Analyser error messages	Operational errors are prefixed on the analyser by the word ERROR followed by an error code. Refer to the list of standard error codes for more information.
Analyser warning	Analyser warnings are prefixed by the word WARNING followed by a relevant description. There are two types of warning messages displayed; general warnings that may not necessarily affect the instrument's function, for example, battery power low and operational parameters that could affect the performance of the analyser, for example, CH_4 out of calibration.
Anemometer probe	Device for measuring velocity of gas in the pipe. The GA2000 analyser can be set to convert into a flow. See also flow measurement.
ATEX certification	The GA2000 and the GA2000 Plus are ATEX certified. Sira 06ATEX2202X
Auxiliary channel	This refers to the channels where external devices will be connected or displayed.
Backlight	The analyser has a built-in backlight for low ambient light conditions. This can be toggled on/off using the backlight key.
Barometric pressure	The atmospheric pressure at the given location.
Borehole	Typical location from which a gas sample is obtained.
Borehole flow	The flow of gas at the borehole sample point.
Calibration	The Geotechnical Instruments range of gas analysers is carefully calibrated against known standards.
Calibration record	The GA2000 range has the facility to log user calibrations as a validation tool.
CH_4	Methane
Chemical cells	A method of gas detection that works on the basis of a chemical reaction with the target gas.
CIRIA	The CIRIA guideline 'Assessing the risks posed by hazardous ground gases to buildings' proposes that gas concentrations and flow rates should be monitored.
CL_2	Chlorine

Clean air purge	Process used to clear out gas from the sample tube and analyser prior to taking a new reading.
CO	Carbon Monoxide
CO_2	Carbon Dioxide
Cold start	A cold start should only be carried out to correct an instrument if no other course of action has proved successful. This function will clear the instrument memory completely of any stored data and/or IDs, remove any user calibration settings and reset the internal clock to a default value.
Connector D	(Half moon) GAM communications port, also used for interconnection of the temperature probe and gas pod. Upper connector on left hand side of instrument.
Connector E	(Full moon) Battery charging socket, also used for interconnection of an anemometer probe. Lower connector on left hand side of instrument.
Contrast	The difference between light and dark areas on the display.
Data logging	Enables the user to leave the analyser unattended to take samples at pre-determined intervals. The reading interval and pump run-time may be set prior to commencing the logging cycle.
Download	Terminology used for the movement of data from the analyser to the GAM application on the PC.
Dual beam infrared absorption	Method of gas detection by measuring how much infrared is absorbed by the target gas.
Event log	Used as an aid to monitoring the use of the analyser. It can also be used as a diagnostic tool. The event log can be viewed via the Gas Analyser Manager. It cannot be viewed on the analyser screen. This is an optional feature.
Exhaust port	The usual manner for the gas to exit the analyser is via the exhaust port located on the left hand side of the analyser. This port should have an exhaust tube attached.
Exhaust tube	Clear plastic tubing used to expel gases from

	the exhaust port.
External gas pod	External device used to measure gas. The GA2000 can read an external gas pod providing that it does not have the two internal chemical cells fitted. The GA2000 Plus has the facility to read an external gas pod in addition to the internal chemical cells fitted. This is an optional feature.
Factory settings	Default settings preset at time of manufacture or service.
Firmware	Firmware is the term by which the internal analyser software is known and is not accessible by the client. This firmware is updated to the latest version when the analyser is returned in UK for servicing.
Flow measurement	Flow can be measured by either gas velocity m/s or volume flow rate m^3/hr. This measurement of flow relates to the use of the anemometer and not the internal flow measurement technique.
Flow port	For the measurement of gas flow at the sample point.
GA2000	A 3 or 5 gas analyser for measuring CH_4 CO_2 O_2 (CO H_2S).
GA2000 Plus	A 6 gas analyser for measuring CH_4 CO_2 O_2 CO H_2S and H_2 (Hydrogen compensated cell)
Gas Analyser Manager	Also referred to as GAM. PC based software which enables the user to upload and download information to/from the analyser. Gas Analyser Manager enables users to maximise the operation of their gas analyser. It features a simple upload and download facility and is fully compatible with the latest Microsoft™ operating systems. This is an optional feature.
Gas channels	The gases that are analysed by the instrument.
Gas velocity	The positional rate of change of the gas.
General warnings	Displayed throughout the documentation with a warning symbol. Warning information may affect the safety of users.
H_2	Hydrogen

H_2S	Hydrogen Sulphide
H_2S filter	Filter required for removal of H_2S. When the filter material changes colour to a light grey colour or if H_2S values are displayed, then the filter should be replaced.
Hydro-carbons	Organic compound consisting of only hydrogen and carbon.
Incorrect user calibration	An error made by the user during 'field calibration'. This can be reversed by using the 'factory settings' option.
Inlet port	Port located on the top right hand side of the analyser to which the sample tube is attached.
In-line water filter	The component used to help protect the instrument from water ingress.
Keypad lock	Analyser feature – when set avoids accidental key presses when transporting or carrying the analyser.
LCD display	**L**iquid **C**rystal **D**isplay
m/s	Meters per second – measurement of gas velocity.
m^3/hr	Meters cubed per hour – volumetric flow rate measurement.
Main Gas Read Screen	The main analyser screen for normal operations and all operations are carried out from this screen.
Material data sheet	Document from which information about a certain substance can be obtained.
MCERTS certification	Relevant for the GA2000 Plus model only. MCERTS is the UK Environment Agency's Monitoring Certification Scheme. The scheme provides a framework within which environmental measurements can be made in accordance with the Agency's quality requirements. The scheme covers a range of monitoring, sampling and inspection activities. MCERTS promotes public confidence in monitoring data and provides industry with a proven framework for choosing monitoring systems and services that meet the Environment Agency's performance requirements.

The Environment Agency has established its Monitoring Certification Scheme (MCERTS) to deliver quality environmental measurements. The MCERTS product certification scheme provides for the certification of products according to Environment Agency performance standards, based on relevant CEN, ISO and national standards.

MCERTS certified instruments have been tested by an independent body to ensure that they meet certain performance requirements. In addition the manufacturer of an MCERTS product is regularly audited to ensure that the performance requirements of the certification are being continually met.

The GA2000 Plus has been certified to Version 1 of the 'Performance Standards for Portable Emission Monitoring Systems'.

Memory Location where data and ID information is stored. The analyser memory should not be used as a permanent storage medium. Stored data should be regularly transferred using the GAM download software.

NO_2 Nitrogen dioxide

Operating language The user can choose the default operating language for the analyser. Choices are English, German, Spanish, French and Italian.

O-rings Located on the QRC gas connectors creating a seal at the interface.

Over range codes Over range codes are the symbols displayed to signify an event where the reading obtained is above the full scale of the particular channel. The symbols used for this event are 'greater than' chevrons in the following formats (>>.> or >>>>).

Particulate filter Also referred to as the Inlet Port Filter. The particulate filter is located on the underside of the instrument and is accessed by removing the plastic plug. Its purpose is to stop any particles entering the instrument.

Never operate the instrument without the particulate filter.

When replacing the plug be sure not to over tighten it - finger tight is adequate.

ppm Parts per million

pump	Used to draw the gas sample from the sample point to the analyser. Select the pump key  on the analyser to activate.
QRC connectors	**Q**uick **R**elease **C**oupler
Reading ID	The user definable identification tag allocated to a sample point.
Relative pressure	The pressure at the sample point 'relative' to atmospheric (barometric) pressure.
Relative pressure transducer	The internal component used to measure the relative pressure.
Sample tube	The tube used to obtain a sample of gas from the sample point to the analyser.
Serial port	The port used for PC communications or for the connection of an anemometer.
Span	The point at which the gas analyser is calibrated when a known quantity of the target gas is present.
Span multi gas	Term by which the span calibration of the three main gas channels is known. This option must only be used when the calibration gas being used is a combination of CH_4 CO_2 O_2.
Technician ID	A four digit alpha-numeric code tagged to each gas reading. Facility only available via the Gas Analyser Manager (GAM). This is an optional feature.
Temperature probe	External device used to measure the gas temperature at the sample point. This is an optional feature.
Under range codes	Under range codes are the symbols displayed to signify an event where the reading obtained is below the zero point of the particular channel. The symbols used for this event are 'less than' chevrons in the following formats (<<.< or <<<<).
Update site data	Enables the user to answer pre-defined questions relating to the site, environment etc. These questions are defined via the GAM software.
Upload	Terminology used for the movement of data from the PC GAM software application to the analyser.

User calibration	The facility for performing a 'field calibration'.
Virtual keyboard	Mock keyboard found on the GA2000 analyser. This is used for manual entry of additional comments or observations.
Volume flow rate	The volume of a gas that passes through a given surface per unit of time e.g. m^3/hr
Warm-up self-test	Pre-determined self-test sequence to test the analyser functions which takes place after the analyser is switched on and lasts approximately 30-40 seconds.
Warranty	The instrument is under guarantee against defect in materials and workmanship for a period of 12 months from the date of shipment to the user and is subject to the recommended service and recalibration requirements.
Water trap	Device used to protect the instrument from water or moisture ingress.
Zero	The point at which the gas analyser is calibrated when there is none of the target gas present.
Zero transducers	This option allows the relative pressure transducer to be zeroed.

18.0 Appendices – Safety Instructions

18.1 Instructions for Safe Use – Italian Language

Istruzioni per un uso sicuro

Istruzioni specifiche per le installazioni in aree pericolose

(Vedere la direttiva europea ATEX 94/9/EC, Allegato II, 1.0.6.)

Le seguenti istruzioni valgono per le apparecchiature coperte dai numeri di certificato Sira 06ATEX2202X:

- L'apparecchiatura va usata con gas e vapori infiammabili con il gruppo di macchinari IIA e la classe di temperatura T1
- Questa apparecchiatura è certificata unicamente per l'uso con temperature ambiente comprese nell'intervallo da 0 ºC a +40 ºC e va usata con temperature al di fuori di questo intervallo
- L'installazione va effettuata nel rispetto del codice di pratica applicabile e a cura di personale specializzato
- La riparazione di questa apparecchiatura va eseguita nel rispetto del codice di pratica applicabile.
- Il produttore specificherà quali materiali sono importanti per il tipo di protezione necessario.
- Quando il rilevatore di metano GA2000, GA2000 Plus, GEM2000 o GEM2000 Plus si trova in un'area pericolosa, sarà collegato solo esternamente mediante il connettore A ai dispositivi che sono contrassegnati con il numero di certificati Sira 06ATEX2202X.
- Se si prevede che l'apparecchiatura venga a contatto con sostanze aggressive, ad esempio liquidi o gas acidi che potrebbero attaccare i metalli, oppure solventi che potrebbero agire sui materiali polimerici, è responsabilità dell'utente prendere le dovute precauzioni, come ad esempio effettuare controlli regolari nell'ambito dei controlli di routine o verificando nella documentazione tecnica se essa è resistente a determinati prodotti chimici che evitano che subisca ripercussioni negative, garantendo quindi l'integrità del tipo di protezione.

L'analizzatore di gas GA2000/GA2000 Plus/GEM2000/GEM2000 Plus è stato certificato per la classificazione nell'area pericolosa

II2G Ex ib d IIA T1 Gb (Ta = 0ºC a +40ºC)

È essenziale attenersi scrupolosamente alle istruzioni contenute in questo manuale.

È responsabilità dell'operatore determinare il concetto di protezione e classificazione necessario per una particolare applicazione.

Informazioni di questo manuale relative alla sicurezza

Le informazioni contenute in questo manuale che potrebbero influenzare la sicurezza degli utenti e delle altre persone sono precedute dal seguente simbolo: ⚠ **Avvertenza**.

Il mancato rispetto delle informazioni qui contenute potrebbe determinare lesioni personali che in alcuni casi potrebbe essere fatale.

Informazioni sulla sicurezza

⚠ **Avvertenza**	Il GA2000/GA2000 Plus/GEM2000/GEM2000Plus può essere usato per misurare i gas che fuoriescono dalle discariche e da altre fonti, come descritto in questo manuale. L'inalazione di questi gas potrebbe essere pericolosa per la salute e, in alcuni casi, fatale. È responsabilità dell'utente assicurarsi che sia adeguatamente formato in merito agli aspetti della sicurezza dei gas usati e relativamente alle procedure adeguate cui attenersi. In particolare, quando vengono usati gas pericolosi, il gas esausto che fuoriesce dall'analizzatore va convogliato verso un'area in cui è sicuro scaricarlo. I gas pericolosi possono essere espulsi anche dallo strumento durante la fase di spurgo con aria pulita.

Visualizzazione di avvertenze ed errori

Durante l'auto-test, se un parametro operativi non soddisfa le specifiche della taratura consigliata preprogrammata o se la data prevista per la manutenzione è passata, potrebbero venire visualizzati degli errori o delle avvertenze. Possono essere visualizzate solo tre avvertenze o errori. Per visualizzare se sono stati visualizzati più errori, usare i tasti "∨" e "∧" per scorrere verso il basso o verso l'alto nell'elenco.

Avvertenze visualizzate
Tutte le avvertenze visualizzate vengono precedute dalla parola AVVERTENZA seguita dalla relativa descrizione.

Il motivo più probabile per il verificarsi di errori è una taratura dell'utente errata, oppure un sensore guasto. Se una taratura errata dell'utente ha determinato la visualizzazione di un'avvertenza, il problema potrebbe risolversi ripristinando lo strumento sulle impostazioni di fabbrica, impostandolo su zero o effettuando una calibrazione personalizzata a seconda delle necessità, per la relativa funzione.

Errori visualizzati
Tutti gli errori visualizzati sono preceduti dalla parola ERRORE seguita da un codice di errore. Gli errori rilevati dall'auto-test di solito dipendono dalla taratura dell'utente che non rientra nelle specifiche oppure da un possibile danneggiamento della memoria e influenzeranno le funzioni dello strumento e pertanto vanno corrette prima dell'uso, ad esempio 01-User cal data (dati taratura utente), CH_4 reading out of specification (lettura CH_4 fuori intervallo), 02-User cal data (dati calibrazione utente), CO_2 reading out of specification (lettura CO_2 fuori dalle specifiche), 04-User cal data (dati taratura utente), Cell 1 reading out of specification (lettura Cell 1 fuori dalle specifiche).

Batteria/ricarica

⚠ **Avvertenza**	Il caricabatterie NON è coperto dalla certificazione Ex. La batteria va caricata solo in un'area sicura.

La batteria è all'idruro di nickel metallico ed è costituita da un gruppo incapsulato a sei celle. La ricarica completa dovrebbe durare circa due ore.

Lettura del rilevatore della temperatura

Il rilevatore della temperatura fa parte della certificazione Instrument Ex e pertanto è certificato per l'uso nelle stesse condizioni dell'analizzatore.

Accessori che non possono essere usati in un'atmosfera potenzialmente esplosiva.

I seguenti accessori non vengono trattati dalla valutazione Ex dello strumento e non sono certificati per l'uso in un'atmosfera potenzialmente esplosiva.

Tutti i serbatoi di gas
Rilevatore dell'anemometro
Serbatoio di flusso esterno

Taratura

⚠**Avvertenza**	**Foro di scarico** Quando l'analizzatore del gas viene tarato, ci sono due possibili uscite per il gas, o nel modo consueto mediante il foro di scarico dell'analizzatore, oppure, nei casi di pressurizzazione eccessiva, mediante la porta da 1/16 poll. sulla valvola regolatrice della pressione. È consigliabile che a entrambi i fori abbiano siano collegati i tubi di scarico. Il tubo di scarico deve emergere in un'area ben ventilata. Assicurarsi che non vi siano perdite nelle tubazioni e nei collegamenti. La taratura dell'analizzatore del gas va effettuata in un'area sicura con tutte le necessarie precauzioni da prendere quando si utilizzano gas potenzialmente pericolosi, esplosivi o tossici. *Per ciascun gas utilizzato, prima di procedere è opportuno leggere e comprendere tutta la documentazione tecnica appropriata.*

Manutenzione

L'analizzatore va sottoposto a regolare manutenzione, per garantire un funzionamento corretto e accurato. Geotechnical Instruments consiglia di effettuare la manutenzione e la taratura ogni 6 mesi.

L'analizzatore gode della certificazione ATEX per l'uso nelle aree potenzialmente esplosive. Di conseguenza, va sottoposto a manutenzione esclusivamente da parte di tecnici qualificati. Il mancato rispetto di questa indicazione renderà non valida la garanzia e potrebbe rendere nulla la certificazione ATEX.

⚠ **Avvertenza**	Se l'analizzatore viene sottoposto alla manutenzione da parte di tecnici qualificati, la certificazione ATEX potrebbe venire resa nulla e lo strumento potrebbe essere non sicuro per l'uso in un'atmosfera potenzialmente esplosiva.

Componenti sottoponibili a manutenzione da parte dell'utente

In questo strumento non ci sono componenti sottoponibili a manutenzione.

I seguenti componenti possono essere sottoposti a manutenzione da parte dell'utente.

Filtro dell'acqua in linea	Va regolarmente controllato per verificare la presenza di ostruzioni o danni e, se necessario, sostituito. Lo strumento non viene mai utilizzato senza il filtro dell'acqua in linea, in quanto questo potrebbe far sì che l'acqua penetri nello strumento.
Filtro antiparticolato	Il filtro antiparticolato si trova sul fondo dello strumento e vi si può accedere rimuovendo il tappo di plastica. Se è sporco, il filtro va sostituito. Non usare mai lo strumento senza il filtro antiparticolato. Durante la sostituzione del tappo, fare attenzione a non serrarlo eccessivamente; è sufficiente stringerlo con le dita.
Tubo campione	Assicurarsi sempre che i tubi campione non siano sporchi né danneggiati.
Connettori QRC	Controllare periodicamente che le guarnizioni ad anello dei connettori del gas QRC non siano danneggiate. Una guarnizione ad anello può lasciar entrare l'aria nel gas campione e determinerà delle letture errate dei valori. Se la guarnizione ad anello è danneggiata è necessario sostituire tutto il connettore QRC.
Materiale del filtro H_2S	Quando il materiale del filtro cambia colore passando a un colore *grigio chiaro*, è necessario sostituirlo.

Dichiarazione di conformità EC

Prodotti	• GA2000/GA2000 Plus - Analizzatore gas Landfill • GEM2000/GEM2000 Plus - Analizzatore gas e monitor di estrazione Landfill

Geotechnical Instruments (UK) Limited dichiara che gli elementi sopra descritti sono conformi ai seguenti standard:

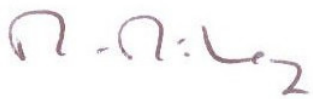
Direttiva ATEX 94/9/EC

Ente certificatore	Assistenza certificazione SIRA
Numero ente notificato	0518
Indirizzo	Rake Lane, Eccleston, Chester, CH4 9JN, Regno Unito
Numero certificato	Sira 06ATEX2202X
Standard applicati	EN 60079-0 :2006 EN 60079-1 :2007 EN 60079-11 :2007

Direttiva EMC 89/336/EEC

EN 61000-6-4:2001
EN 61000-4-3:2006
EN 61000-4-2:1995
EN 61000-4-6:1996
ENV 50204:1996
EN 50270:1999

Firmato



Dr. Roger Riley

18.2 Instructions for Safe Use – German Language

Anweisungen für den sicheren Gebrauch

Anweisungen für Installationen in Gefahrenbereichen

(Referenz: Europäische ATEX-Richtlinie 94/9/EG, Anhang II, 1.0.6)

Die folgenden Anweisungen gelten für Geräte, die durch die Zertifikatsnummern Sira 06ATEX2202X abgedeckt sind:

- Das Gerät kann mit brennbaren Gasen und Dämpfen mit Gerätegruppe IIA und Temperaturklasse T1 verwendet werden
- Das Gerät ist nur zertifiziert für den Einsatz bei Umgebungstemperaturen im Bereich von 0 °C bis +40 °C und sollte außerhalb dieses Bereichs nicht eingesetzt werden
- Die Installation wird in Übereinstimmung mit dem anwendbaren Merkblatt durch entsprechend geschultes Personal vorgenommen
- Die Reparatur dieses Geräts wird in Übereinstimmung mit dem anwendbaren Merkblatt vorgenommen
- Der Hersteller legt die Materialien fest, die für den Schutztyp wichtig sind
- Wenn sich der Methan-Detektor GA2000, GA2000 Plus, GEM2000 oder GEM2000 Plus im Gefahrenbereich befindet, wird er extern nur über Anschluss A mit Geräten verbunden, die mit der Zertifikatsnummer Sira 06ATEX2202X versehen sind.
- Besteht die Wahrscheinlichkeit, dass das Gerät in Kontakt mit aggressiven Stoffen gelangt, z. B. saure Flüssigkeiten oder Gase, die Metalle angreifen können, oder Lösungen, die Polymerstoffe schädigen können, liegt es in der Verantwortung des Benutzers, geeignete Vorkehrungen zu treffen, z. B. regelmäßige Prüfungen als Bestandteil von Routineinspektionen oder Überprüfungen anhand des Materialdatenblatts, dass das Material gegenüber bestimmten Chemikalien beständig ist und nicht beeinträchtigt werden kann. So stellt er sicher, dass der Schutztyp erhalten bleibt.

Der Gasanalysator GA2000/GA2000 Plus/GEM2000/GEM2000 Plus ist zertifiziert anhand der Klassifizierung für Gefahrenbereiche

II2G Ex ib d IIA T1 Gb (Ta = 0ºC a +40ºC)

Es ist unerlässlich, dass die Anweisungen in diesem Handbuch sorgfältig befolgt werden.

Es liegt in der Verantwortung des Bedieners, das Schutzkonzept und die für einen bestimmten Einsatzzweck erforderliche Klassifikation festzulegen.

Sicherheitsrelevante Informationen in diesem Handbuch

Informationen in diesem Handbuch, die die Sicherheit von Benutzern und anderen Personen betreffen, sind durch folgendes Symbol gekennzeichnet: ⚠ **Warnung**.

Eine Nichtbeachtung dieser Information kann zu Personenschäden führen, in manchen Fällen auch mit Todesfolge.

Sicherheitsinformation

⚠ **Warnung**	Der GA2000/GA2000 Plus/GEM2000/GEM2000Plus kann – wie in diesem Handbuch beschrieben – zur Messung der Gasentwicklung an Mülldeponien sowie an anderen Quellen eingesetzt werden. Das Einatmen dieser Gase kann gesundheitsschädlich und in manchen Fällen tödlich sein. Es liegt in der Verantwortung des Benutzers, dafür zu sorgen, dass er hinsichtlich der Sicherheitsaspekte der eingesetzten Gase angemessen geschult wird und dass geeignete Prozeduren eingehalten werden. Im Besonderen müssen dort, wo gesundheitsgefährdende Gase eingesetzt werden, die vom Analysator abgegebenen Gase mit Schläuchen in einen Bereich transportiert werden, wo sie sicher abgelassen werden können. Auch beim Spülen mit sauberer Luft können gesundheitsgefährdende Gase aus dem Instrument entweichen.

Warn- und Fehleranzeige

Wenn während des Selbsttests Betriebsparameter außerhalb des spezifizierten Bereichs liegen oder das vorprogrammierte empfohlene Kalibrierungs-/Wartungsdatum vergangen ist, können Fehler- oder Warnmeldungen angezeigt werden. Es können immer nur drei Warn-/Fehlermeldungen gleichzeitig angezeigt werden. Um festzustellen, ob weitere Meldungen vorhanden sind, blättern Sie mit den Tasten „∨" und „∧" in der Liste nach oben und unten.

Anzeige von Warnmeldungen
Allen angezeigten Warnmeldungen wird das Wort „WARNING" vorangestellt, dem eine relevante Beschreibung folgt.

Der wahrscheinlichste Grund für die Fehlermeldungen ist entweder eine falsche Benutzerkalibrierung oder ein Sensordefekt. Falls eine falsche Benutzerkalibrierung die Warnmeldung verursacht hat, sollte sie dadurch behoben werden können, dass das Instrument je nach Notwendigkeit für die relevante Funktion auf die Werkseinstellungen zurückgesetzt oder genullt wird oder eine Benutzerkalibrierung durchgeführt wird.

Anzeige von Fehlermeldungen
Allen angezeigten Fehlermeldungen wird das Wort „ERROR" vorangestellt, dem ein Fehlercode folgt. Die während der Selbsttests erkannten Fehlermeldungen werden normalerweise dadurch verursacht, dass eine Benutzerkalibrierung außerhalb der Spezifikation liegt, oder durch eine Speicherbeschädigung. Dadurch wird die Funktion des Instruments beeinträchtigt, und der Fehler sollte vor Einsatz des Gerätes behoben werden, z. B. 01 – Benutzerkal.-daten, CH_4-Wert außerhalb der Spezifikation, 02 – Benutzerkal.-daten, CO_2-Wert außerhalb der Spezifikation, 04 – Benutzerkal.-daten, Wert von Zelle 1 außerhalb der Spezifikation.

Akku/Ladevorgang

⚠ **Warnung**	Das Akkuladegerät ist NICHT Ex-zertifiziert. Der Akku darf nur in einem sicheren Bereich aufgeladen werden.

Beim Akku handelt es sich um ein Nickel-Metallhydrid-Modell, in dem sechs Einzelzellen verkapselt sind. Ein vollständiger Ladevorgang sollte etwa zwei Stunden dauern.

Temperaturfühler

Der Temperaturfühler gehört zur Ex-Zertifizierung des Instruments und ist daher für den Einsatz unter denselben Bedingungen wie der Analysator zertifiziert.

Zubehör, das in einem explosionsgefährdeten Bereich nicht eingesetzt werden darf.

Das folgende Zubehör ist von der Ex-Einstufung des Instruments nicht abgedeckt und damit für den Einsatz in einem explosionsgefährdeten Bereich nicht zertifiziert.

Alle Gaskapseln
Anemometer-Fühler
Externer Durchsatzfühler

Kalibrierung

⚠**Warnung**	**Auslassöffnung** Wenn der Gasanalysator kalibriert wird, gibt es für das Gas zwei Auftrittsmöglichkeiten: der übliche Austritt über die Auslassöffnung des Analysators oder bei einer Überdrucksituation die 1/16"-Öffnung am Überdruckventil. Es wird empfohlen, an beiden Öffnungen Auslassschläuche anzubringen. Die Auslassschläuche müssen in einen gut gelüfteten Bereich geführt werden. Überprüfen Sie, dass es an Schläuchen und Verbindungen keine Undichtigkeiten gibt. Die Kalibrierung des Gasanalysators sollte in einem sicheren Bereich stattfinden, und beim Einsatz potenziell gefährlicher, explosiver oder giftiger Gase müssen alle notwendigen Sicherheitsvorkehrungen getroffen werden. *Vor der Durchführung der Arbeiten muss für jedes eingesetzte Gas das entsprechende Materialdatenblatt gelesen und verstanden werden.*

Wartung

Der Analysator sollte zur Wahrung des korrekten und präzisen Betriebs regelmäßig gewartet werden. Geotechnical Instruments empfiehlt alle sechs Monate eine Wartung und Neukalibrierung.

Der Analysator ist für den Einsatz in explosionsgefährdeten Bereichen ATEX-zertifiziert. Deshalb sollte er nur von entsprechend qualifizierten Technikern gewartet werden. Wird dies nicht beachtet, wird seine Garantie hinfällig und seine ATEX-Zertifizierung könnte ungültig werden.

⚠ **Warnung**	Wird der Analysator von nicht entsprechend qualifizierten Technikern gewartet, kann seine ATEX-Zertifizierung ungültig werden und das Instrument ist möglicherweise beim Einsatz in explosionsgefährdeten Bereichen unsicher.

Teile, die vom Benutzer gewartet werden können

Das Instrument enthält keine Teile, die vom Benutzer gewartet werden können.

Die folgenden Teile können vom Benutzer gewartet werden

Zwischengeschalteter Wasserfilter	Er sollte regelmäßig auf Hindernisse oder Beschädigung überprüft und bei Bedarf ausgewechselt werden. Das Instrument sollte niemals ohne den zwischengeschalteten Wasserfilter betrieben werden, da andernfalls Wasser in das Instrument eintreten kann.
Partikelfilter	Der Partikelfilter befindet sich an der Unterseite des Instruments und ist durch Entfernen des Kunststoffstopfens zu erreichen. Der Filter sollte ersetzt werden, wenn er verschmutzt ist. Betreiben Sie das Instrument niemals ohne Partikelfilter. Achten Sie bei dem Wiedereinsetzen des Stopfens darauf, ihn nicht zu fest zu ziehen. Es reicht, wenn er handfest angezogen ist.
Messschläuche	Achten Sie immer darauf, dass Messschläuche nicht verschmutzt oder beschädigt sind.
QRC-Anschlüsse	Überprüfen Sie regelmäßig, dass die O-Ringe an den QRC-Gasanschlüssen nicht beschädigt sind. Ein beschädigter O-Ring kann Luft in das gemessene Gas eintreten lassen, was zu falschen Messwerten führt. Wenn der O-Ring beschädigt ist, sollte der gesamte QRC-Anschluss ausgewechselt werden.
H_2S-Filtermaterial	Wenn sich die Farbe des Filtermaterials zu *hellgrau* ändert, sollte der Filter ersetzt werden.

EG-Konformitätserklärung

Produkte	• GA2000/GA2000 Plus – Gasanalysator für Mülldeponien • GEM2000/GEM2000 Plus – Gasanalysator für Mülldeponien und Extraktionsüberwachungsgerät

Geotechnical Instruments (UK) Limited. erklärt, dass der/die oben genannten Artikel mit den folgenden Normen konform sind:

ATEX-Richtlinie 94/9/EG

Zertifizierungsbehörde	SIRA Certification Service
Nummer der Behörde	0518
Adresse	Rake Lane, Eccleston, Chester, CH4 9JN, Großbritannien
Zertifikatsnummer	Sira 06ATEX2202X
Angewandte Normen	EN 60079-0 :2006 EN 60079-1 :2007 EN 60079-11 :2007

EMV-Richtlinie 89/336/EWG

EN 61000-6-4:2001
EN 61000-4-3:2006
EN 61000-4-2:1995
EN 61000-4-6:1996
ENV 50204:1996
EN 50270:1999

Unterschrift:

Dr. Roger Riley

18.3 Instructions for Safe Use – French Language

Instructions pour une utilisation sûre

Instructions spécifiques pour les installations dans des emplacements dangereux

(Référence Directive européenne ATEX 94/9/CE, Annexe II, 1.0.6.)

Les instructions suivantes s'appliquent au matériel couvert par le numéro de certificat Sira 06ATEX2202X :

- Le matériel est utilisable avec des gaz et des vapeurs inflammables avec des appareils de groupe IIA et classe de température T1
- Le matériel est certifié uniquement pour une utilisation à température ambiante entre 0 ºC et +40 ºC et ne doit pas être utilisé en-dehors de cette plage
- L'installation devra être effectuée conformément au code de pratique applicable et par un personnel qualifié
- Ce matériel devra être réparé conformément au code de pratique applicable
- Le fabricant devra spécifier les matériaux importants pour le type de protection
- Dans l'emplacement dangereux, le détecteur de méthane GA2000, GA2000 Plus, GEM2000, ou GEM2000 Plus ne devra être raccordé extérieurement par le raccord A qu'à des appareils portant la marque de numéro de certificat Sira 06ATEX2202X.
- Si le matériel est amené à être en contact avec des substances agressives, par exemple des liquides ou des gaz acides susceptibles d'attaquer les métaux, ou des solvants susceptibles d'affecter des polymères, il incombe alors à l'utilisateur de prendre des précautions appropriées, par exemple des contrôles réguliers dans le cadre d'inspections systématiques ou des vérifications sur la fiche technique de la résistance du matériel à des produits chimiques spécifiques, ceci afin de préserver l'intégrité de la protection.

L'analyseur de gaz GA2000/GA2000 Plus/GEM2000/GEM2000 Plus a été certifié à la Classification Emplacement dangereux

II2G Ex ib d IIA T1 Gb (Ta = 0ºC a +40ºC)

Il est absolument indispensable de respecter les instructions contenues dans le présent manuel.

Il incombe à l'opérateur de déterminer le type et la classification de protection requise pour une application spécifique.

Informations en matière de sécurité contenues dans le présent manuel

Dans le présent manuel, les informations relatives à la sécurité des utilisateurs et autres personnes sont précédées par le symbole : ⚠ **Avertissement**.

Le non-respect de ces informations peut être à l'origine de blessures corporelles qui, dans certains cas, peuvent être mortelles.

Informations en matière de sécurité

⚠ **Avertissement**	Le GA2000/GA2000 Plus/GEM2000/GEM2000Plus peut être utilisé pour mesurer les gaz émis par les sites d'enfouissement et autres sources, comme décrit dans le présent manuel. L'inhalation de ces gaz peut être dangereuse, voire mortelle dans certains cas. L'utilisateur doit veiller à avoir reçu une formation appropriée en matière de sécurité concernant les gaz utilisés et à observer les procédures appropriées. En particulier, dans le cas de présence de gaz dangereux, le gaz émis par l'analyseur doit être évacué vers un emplacement permettant une évacuation sûre. Il peut y avoir également évacuation de gaz dangereux lors de la purge de l'appareil avec de l'air propre.

Affichage d'avertissements et d'erreurs

Pendant l'essai automatique, il peut y avoir affichage d'erreurs ou d'avertissements en cas de non-conformité des paramètres opérationnels ou de dépassement de la date de l'étalonnage/de l'entretien recommandée préprogrammée. Seulement trois avertissements/erreurs peuvent être affichés simultanément. Pour vérifier s'il y a eu d'autres avertissements/erreurs, utiliser la touche « ∨ » et « ∧ » pour faire défiler la liste.

Affichage d'avertissements
Tous les avertissements affichés seront précédés par le mot « AVERTISSEMENT [WARNING] » suivi d'un texte approprié.

Le plus souvent, les avertissements sont affichés en raison d'un étalonnage incorrect par l'utilisateur, ou d'une défaillance des capteurs. Un étalonnage incorrect peut être rectifié en remettant l'appareil sur les valeurs réglées en usine, en effectuant une remise à zéro ou l'étalonnage requis pour la fonction pertinente.

Affichage d'erreurs
Toutes les erreurs affichées seront précédées par le mot « ERREUR [ERROR] » suivi d'un code d'erreur. En général, les erreurs détectées par l'essai automatique sont dues à un étalonnage non-conforme par l'utilisateur ou quelquefois à la corruption de la mémoire de l'appareil et affecteront le fonctionnement de l'appareil. Les erreurs affichées, par exemple 01-User cal data, CH_4 reading out of specification, 02-User cal data, CO_2 reading out of specification, 04-User cal data, Cell 1 reading out of specification. *[01-Données cal. utilisateur, mesure CH_4 non conforme, 02-Données cal. utilisateur, mesure CO_2 non conforme, 04-Données cal. Utilisateur, Mesure Cellule 1 non-conforme]* devront être rectifiées avant d'utiliser l'appareil.

Batterie/Mise en charge

⚠ **Avertissement**	Le chargeur de la batterie n'est PAS couvert par la certification Ex. La batterie doit être chargée uniquement dans un emplacement sûr.

La batterie est de type Nickel Métal Hydride à six cellules intégrées. La durée de charge complète est d'environ deux heures.

Sonde de mesure de température

La sonde de température est couverte par la certification Ex de l'appareil et est donc certifiée pour une utilisation dans les mêmes conditions que l'analyseur.

Accessoires non utilisables en atmosphères potentiellement explosives

Les accessoires suivants ne sont pas couverts par la certification Ex de l'appareil et ne sont donc pas certifiés pour une utilisation en atmosphères potentiellement explosives.

Sondes de gaz
Sonde d'anémomètre
Sonde de débit

Etalonnage

⚠**Avertissement**	**Orifice d'évacuation** Lors de l'étalonnage de l'analyseur de gaz, le gaz peut être évacué par deux orifices d'évacuation, à savoir par l'orifice d'évacuation de l'analyseur, ou, en cas de surpression, par l'orifice 1/16″ sur la soupape de surpression. Il est recommandé de raccorder des tuyaux d'évacuation aux deux orifices. Le tuyau d'évacuation doit sortir dans un emplacement bien ventilé. Contrôler l'étanchéité des tuyaux et des raccords. L'étalonnage de l'analyseur de gaz doit être effectué dans un emplacement sûr, en observant toutes les précautions nécessaires en présence de gaz potentiellement dangereux, explosifs ou toxiques. *Pour chaque gaz utilisé, lire attentivement la fiche technique appropriée avant d'exécuter la tâche.*

Entretien

Pour un fonctionnement correct et précis, l'analyseur de gaz doit faire l'objet d'un entretien régulier. Geotechnical Instruments recommande un entretien et un réétalonnage tous les 6 mois.

L'analyseur est certifié ATEX pour une utilisation en atmosphères potentiellement explosives. A ce titre, son entretien doit être effectué uniquement par des techniciens qualifiés. Le non-respect de cette prescription entraînera l'annulation de la garantie et risque d'annuler la certification ATEX.

⚠ **Avertissement**	Si l'analyseur fait l'objet d'un entretien par des techniciens non qualifiés la certification ATEX risque d'être annulée et l'appareil peut ne pas être sûr en cas d'utilisation en atmosphères potentiellement explosives.

Composants pouvant faire l'objet d'un entretien par l'utilisateur
L'appareil ne contient aucun composant interne pouvant faire l'objet d'un entretien par l'utilisateur.
Les composants suivants peuvent faire l'objet d'un entretien par l'utilisateur

Filtre à eau en ligne	Contrôler ce filtre régulièrement pour rechercher la présence d'obstructions ou de dommages; remplacer si besoin est. L'appareil ne doit jamais être utilisé sans le filtre à eau en ligne pour prévenir la pénétration d'eau dans l'appareil.
Filtre à particules	Le filtre à particules est situé sur la face inférieure de

	l'appareil ; ôter l'obturateur en plastique pour y accéder. Remplacer tout filtre contaminé. Ne jamais utiliser l'appareil sans le filtre. Veiller à ne pas trop serrer l'obturateur – un serrage à main est suffisant.
Tuyau d'échantillonnage	Toujours s'assurer que les tuyaux d'échantillonnage ne sont ni contaminés ni abîmés.
Raccords rapides	Contrôler périodiquement l'état des joints toriques des raccords de gaz rapides. Un joint torique défectueux peut entraîner la pénétration d'air dans l'échantillon de gaz et des lectures incorrectes. Remplacer le raccord complet si le joint torique est défectueux.
Matériau du filtre H_2S	Remplacer le filtre lorsque la couleur du matériau du filtre devient *gris clair*.

Déclaration de conformité CE

Produits	GA2000/GA2000 Plus – Analyseur de gaz de sites d'enfouissement GEM2000/GEM2000 Plus – Analyseur de gaz de sites d'enfouissement et moniteur d'extraction

Geotechnical Instruments (UK) Limited déclare que l'(es) article(s) décrit(s) ci-dessus est (sont) conforme(s) aux normes suivantes :

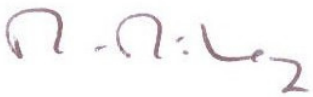
Directive ATEX 94/9/CE

Organisme de certification	SIRA Certification Service *[Service de certification SIRA]*
Numéro d'organisme notifié	0518
Adresse	Rake Lane, Eccleston, Chester, CH4 9JN
Numéro de certificat	Sira 06ATEX2202X
Normes appliquées	EN 60079-0 :2006 EN 60079-1 :2007 EN 60079-11 :2007

Directive CEM 89/336/CEE

EN 61000-6-4:2001
EN 61000-4-3:2006
EN 61000-4-2:1995
EN 61000-4-6:1996
ENV 50204:1996
EN 50270:1999

Signature :



Dr. Roger Riley

18.4 Instructions for Safe Use – Spanish Language

Instrucciones para la utilización segura

Instrucciones Específicas para Instalaciones en Áreas de Peligro

(Directiva Europea de Referencia ATEX 94/9/EC, Anexo II, 1.0.6.)

Las siguientes instrucciones son aplicables para los equipos cubiertos por los certificados Sira Nº 06ATEX2202X:

- El equipo puede utilizarse con vapores y gases inflamables con aparatos del grupo IIA y temperatura clase T1
- El equipo sólo está certificado para utilizarlo a temperatura ambiental entre 0ºC y +40ºC y no debe utilizarse fuera de estos rangos.
- La instalación debe ser efectuada de acuerdo con el código de práctica aplicable y por personal debidamente formado.
- La reparación de este equipo debe ser efectuada de acuerdo con el código de práctica aplicable.
- El fabricante deberá especificar los materiales que son importantes para el tipo de protección.
- Cuando los detectores de metano GA2000, GA2000 Plus, GEM2000, o GEM2000 Plus estén en el área de peligro, sólo se podrán conectar externamente mediante el conector A a dispositivos marcados con el certificado Sira Nº 06ATEX2202X.
- Si existe la posibilidad de que el equipo entre en contacto con sustancias agresivas como por ejemplo gases o líquidos ácidos que puedan atacar a los metales, o disolventes que puedan afectar a los materiales poliméricos, será responsabilidad del usuario tomar las medidas adecuadas, es decir, comprobaciones regulares como parte de las inspecciones de rutina o determinando a partir de las hojas de datos de los materiales, o la resistencia a los productos químicos específicos para asegurar que el tipo de protección no se vea adversamente afectada.

El Analizador de Gas GA2000/GA2000 Plus/GEM2000/GEM2000 Plus ha sido certificado de acuerdo a la Clasificación de Área de Peligro

II2G Ex ib d IIA T1 Gb (Ta = 0ºC a +40ºC)

Es de vital importancia cumplir con las instrucciones de este manual.

Es responsabilidad del operario determinar el concepto de protección y la clasificación necesaria para una aplicación determinada.

Información relacionada con la seguridad en este manual.

En este manual, la información que puede afectar a la seguridad de los usuarios y terceros está precedida por el siguiente símbolo: ⚠ **Advertencia**.

El incumplimiento de esta información podría provocar lesiones físicas que en algunos casos, podrían resultar fatales.

Información de seguridad

⚠ **Advertencia**	Los GA2000/GA2000 Plus/GEM2000/GEM2000Plus pueden utilizarse para medir gases en vertederos y otras fuentes, como se describe en este manual. La inhalación de estos gases puede ser nociva para la salud y en algunos casos puede resultar fatal. Es responsabilidad del usuario asegurar que él/ella esté debidamente formado/a en los aspectos de seguridad de los gases utilizados y de tomar las medidas correspondientes. En particular, al utilizar gases peligrosos, el gas expulsado del analizador debe ser canalizado hacia un área donde la descarga sea segura. El gas peligroso también puede ser expulsado del instrumento al purgar con aire limpio.

Advertencia y visualización de error

Durante la prueba automática, si los parámetros operativos se encuentran fuera de lo especificado o si se ha superado la fecha de revisión/calibración preprogramada recomendada, se pueden visualizar errores o advertencias. Hay tres errores/advertencias que pueden visualizarse en cualquier momento. Para asegurarse de que no se han producido más, utilice las teclas '∨' y '∧' para desplazarse hacia arriba/abajo de la lista.

Advertencias visualizadas
Todas las advertencias visualizadas irán precedidas por la palabra 'ADVERTENCIA' y seguidas por la descripción correspondiente.

La razón más probable de los errores es la calibración de usuario incorrecta o el fallo del sensor. Si la calibración de usuario es incorrecta y ha provocado la advertencia, debe corregirse corrigiendo el instrumento a los ajustes de fábrica, poniéndolo a cero o efectuando una calibración de usuario adecuada para la función correspondiente.

Errores visualizados
Todos los errores visualizados irán precedidos por la palabra 'ERROR' y seguidos por un código de error. Normalmente, los errores detectados por la prueba automática son provocados porque la calibración del usuario es distinta a la especificada o por una posible corrupción de la memoria que afectará al funcionamiento del instrumento y por lo tanto, debe corregirse antes de utilizarlo. Por ejemplo: 01- User datos de cal, CH_4 lectura fuera de lo especificado, 02- User datos de cal, CO_2 lectura fuera de lo especificado, 04- User datos de cal, Cel 1 lectura fuera de lo especificado.

Batería/Carga

⚠ **Advertencia**	El cargador de batería NO está cubierto por el certificado Ex. La batería sólo debe cargarse en un área segura.

La batería es de Hidruro de Níquel-Metal y está fabricada como un paquete encapsulado de seis celdas individuales. Una carga completa debería tardar aproximadamente dos horas.

Lectura de la sonda de temperatura

La sonda de temperatura forma parte de la certificación Ex del instrumento y por lo tanto, está certificada para la utilización en las mismas condiciones que el analizador.

Accesorios que no pueden utilizarse en una atmósfera potencialmente explosiva

Los siguientes accesorios no están cubiertos por la clasificación Ex del instrumento y no están certificados para utilizarse en una atmósfera potencialmente explosiva.

Todos los gas pods
Sonda del anemómetro
Pod de flujo externo

Calibración

⚠ **Advertencia**	**Terminal de escape** Cuando se está calibrando el analizador de gas, hay dos posibles salidas del gas: mediante la forma usual por el terminal de escape del analizador o en los casos de sobrepresión, a través del terminal de 1/16″ de la válvula de seguridad. Es recomendable que en ambos terminales se monten tubos de escape. Los tubos de escape deben emerger hacia un área bien ventilada. Asegúrese de que no hay fugas en los tubos o conexiones. La calibración del analizador de gas debe efectuarse en una zona segura tomando todas las precauciones necesarias cuando se utilizan gases tóxicos, explosivos o potencialmente peligrosos. *Para cada gas utilizado, deben leerse y comprenderse las hojas de datos del material correspondiente antes de proceder.*

Revisión

El analizador debe ser regularmente revisado para asegurar el funcionamiento correcto y preciso. Geotechnical Instruments recomienda una revisión y recalibración cada 6 meses.

El analizador cuenta con un certificado ATEX para su utilización en áreas potencialmente explosivas. Como tal, sólo debe ser revisado por técnicos cualificados. El incumplimiento de esta norma anulará la garantía y podría invalidar la certificación ATEX.

⚠ **Advertencia**	Si el analizador es revisado por técnicos no cualificados, la certificación ATEX podría quedar invalidada y el instrumento podría no ser seguro para su utilización en una atmósfera potencialmente explosiva.

Piezas utilizables por el usuario
No hay piezas utilizables por el usuario dentro del instrumento.
Las siguientes piezas pueden ser revisadas por el usuario

Filtro de agua en línea	Debería comprobarse regularmente que el filtro no presente obstrucciones ni esté dañado y cambiarlo cuando sea necesario. El instrumento no debe utilizarse nunca sin el filtro de agua en línea ya que podría entrar agua en el instrumento.
Filtro de partículas	El filtro de partículas está situado en la parte inferior del instrumento y se accede quitando el tapón de plástico. El filtro debe cambiarse cuando está contaminado. Nunca debe utilizarse el instrumento sin el filtro de partículas. Al

	volver a poner el tapón asegúrese de no apretarlo demasiado, el apriete con los dedos es suficiente.
Tubos para muestras	Asegúrese de que los tubos para muestras no estén contaminados ni dañados.
Conectores QRC	Compruebe periódicamente que las juntas tóricas de los conectores de gas QRC no estén dañadas. Una junta tórica dañada puede permitir la entrada de aire al gas de muestra y provocaría lecturas incorrectas. Si la junta tórica está dañada, debe cambiarse el conector QRC completo.
Material del filtro H_2S	Cuando el material del filtro cambia de color y pasa a *gris claro,* el filtro debe cambiarse.

Declaración de Conformidad CE

Productos	• GA2000/GA2000 Plus – Analizador de gas para vertederos • GEM2000/GEM2000 Plus - Analizador de gas para vertederos y Monitor de Extracción

Geotechnical Instruments (UK) Limited declara que los elementos arriba descritos cumplen con las siguientes normas:

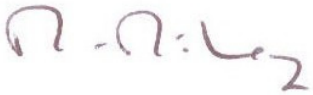
Directiva ATEX 94/9/EC

Organismo de Certificación	Servicio de Certificación SIRA
Nº del Organismo Notificado	0518
Dirección	Rake Lane, Eccleston, Chester, CH4 9JN
Nº de Certificado	Sira 06ATEX2202X
Normas aplicadas	EN 60079-0 :2006 EN 60079-1 :2007 EN 60079-11 :2007

Directiva EMC 89/336/EEC

EN 61000-6-4:2001
EN 61000-4-3:2006
EN 61000-4-2:1995
EN 61000-4-6:1996
ENV 50204:1996
EN 50270:1999

Firmado:



Dr. Roger Riley

