



GEM5000 Gas Analyser

Operating Manual

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1.0 Manual guidelines












1.1 Document history

Issued By	Issue Date	Change Control ID	Issue No.	Reason for Change
LA	JAN 2012	OMGEM5KN	1.01	New Instructions.

1.2 Hazard warnings and safety symbols

 Warning	<p>Information in this manual that may affect the safety of users and others is preceded by the warning symbol.</p> <p>Caution - Failure to follow the correct information may result in physical injury which in some cases could be fatal. If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.</p>
--	--

General product label symbols are listed as follows:

	CE conformity-The CE-marking is the manufacturer's statement to the EU authorities that the product complies with all relevant CE-marking Directives.		If the CSA mark appears with the indicator "US" or "NRTL" it means that the product is certified for the U.S. market, to the applicable U.S. standards.
	VDE mark is a symbol for electrical, mechanical, thermal, toxic, radiological and other hazards.		Separate collection, handling and disposal for waste electrical and electronic equipment and its components.
	Electric shock warning.		Refer to operators manual.
	Double insulated construction - does not require an Earth.		Specific marking of explosion protection (ATEX only).
II 2G	Equipment group and category. G = gases; the type of explosive atmosphere.		IECEx licenced mark (IECEx only).
	Fuse.		Equipment for indoor use only.

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 GEM5000 landfill gas analyser. The GEM5000 has additional functionality to the GA5000 gas analyser. The GA5000 measures gas concentrations only, whereas the GEM5000 measures flow and gas concentrations. The GEM5000 measures flow and calculates the calorific values of the gas as well as being a useful tool for balancing the gas field. The GEM5000 gas analyser may be used to monitor, calculate, adjust and record the flow at each monitoring point.


This instrument may also be used in GA5000 mode of operation if required. The operator may change the analyser between a gas extraction monitor (a GEM5000 gas analyser) or a landfill gas analyser (a GA5000 gas analyser). The mode of operation can be changed from the 'Special Action' menu. Please refer to section '8.0 – Taking Readings' for further instruction.

The 5000 series of gas analysers complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- 1) This device may not cause harmful interference.
- 2) This device must accept any interference received, including interference that may cause undesired operation.

2.1 Safety instructions

 Warning	<p>The 5000 series of gas analysers can be used for measuring gases from landfill sites and other sources as described in this manual.</p> <p>The operator may be exposed to harmful gases during the use of the instrument. Inhaling these gases may be harmful to health and in some cases may be fatal.</p> <p>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.</p> <p>Hazardous gas can also be expelled from the instrument when purging with clean air.</p>
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 **Note:** Gas analysers are a sensitive piece of scientific equipment, and should be treated as such. If the equipment is used in a manner not specified by the manufacturer, the protection provided by the instrument may be impaired.

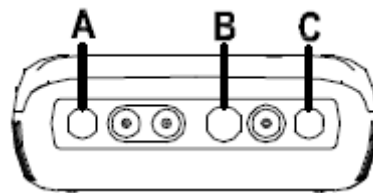
2.2 Instructions for safe use**For ATEX and IECEx the 5000 series of gas analysers are certified to Hazardous Area Classification**** II 2G Ex ib IIA T1 Gb (Ta = -10°C to +50°C)**

It is vital instructions are followed closely. It is the responsibility of the operator to determine the protection concept and classification required for a particular application.

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

The following instructions apply to equipment covered by certificate numbers SIRA 11ATEX2197X and IECEx Directive SIR 11.0089X:

- 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 -10°C to +50°C and should not be used outside this range.
- The equipment must not be used in an atmosphere of greater than 21% oxygen.
- Repair of this equipment shall be carried out in accordance with the applicable code of practice.
- When used in a hazardous area only use GF5.2 temperature probe (SIRA 11ATEX2197X and IECEx SIR11.0089X). For connector C, the GF5.4 anemometer (BVS 04ATEXE194) for use with ATEX only. The analyser should not be connected to any other devices in the hazardous area including the GF-USB lead (connector A) or GF3.9 battery charger (connector B) supplied with the analyser.



Do not charge, recharge or open in a potentially explosive atmosphere.
In hazardous area only use "Temperature Probe GF5.2" in Connector B.
Connector C (Uo=10V, Io=5mA, Po=50mW, Ci=0, Li=0, Co=100uF, Lo=1000mH),
Connector B (Uo=5V, Io=6mA, Po=7mW, Ci=0, Li=0, Co=100uF, Lo=1000mH)

MAXIMUM NON-HAZARDOUS SUPPLIES:

Connector A - Um=6V Connector B - Um=10.1V

- 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 relative pressure range is +/-500 mbar. Note, however, that the input pressure should not exceed +/- 500 mbar relative to atmospheric pressure and the output pressure should not exceed +/- 100 mbar relative to atmospheric pressure.

For CSA (Canada) the 5000 series of gas analysers are certified to Hazardous Area Classification

CLASS 2258 03 - PROCESS CONTROL EQUIPMENT - Intrinsically Safe and Non-Incendive Systems - For Hazardous Locations



Ex ib IIA:

Model GA 5000, GEM 5000 and BIOGAS 5000 Methane Detectors; portable, battery powered with non-field-replaceable Battery Pack P/N 20087; intrinsically safe and providing intrinsically safe circuits ("[ib]" for Zone 1) to Model GF5.2 Temperature Probe (Connector B) and with entity output parameters as tabulated below; Temperature Code T1; $-10\text{ }^{\circ}\text{C} \leq T_{amb.} \leq +50\text{ }^{\circ}\text{C}$.

Connector	Entity Parameters						
	Uo (V)	Io (mA)	Po (mW)	Co (uF)	Lo (mH)	Ci (uF)	Li (mH)
B	5.0	6	7	100	1000	0	0
C	10.0	5	50	100	1000	0	0

⚡ Note: This device has been investigated for electrical safety features only.

For CSA (USA) the 5000 series of gas analysers are certified to Hazardous Area Classification

CLASS 2258 83 - PROCESS CONTROL EQUIPMENT - Intrinsically Safe and Non-Incendive Systems - For Hazardous Locations - CERTIFIED TO U.S. STANDARDS



AEx ib IIA:

Model GA 5000, GEM 5000 and BIOGAS 5000 Methane Detectors; portable, battery powered with non-field-replaceable Battery Pack P/N 20087; intrinsically safe and providing intrinsically safe circuits ("[ib]" for Zone 1) to Model GF5.2 Temperature Probe (Connector B) and with entity output parameters as tabulated below; Temperature Code T1; $-10\text{ }^{\circ}\text{C} \leq T_{amb.} \leq +50\text{ }^{\circ}\text{C}$.

Connector	Entity Parameters						
	Uo (V)	Io (mA)	Po (mW)	Co (uF)	Lo (mH)	Ci (uF)	Li (mH)
B	5.0	6	7	100	1000	0	0
C	10.0	5	50	100	1000	0	0

⚡ Note: This device has been investigated for electrical safety features only.

2.3 MCERTS (applied for)

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.

The GEM5000 instrument is MCERTS certified only if:

- The MCERTS logo appears on the screen after initial power on.
- ⌘ Note: MCERTS - Cross sensitivity tests using hydrogen sulphide were not carried out on this instrument. Therefore, users should be aware if H₂S is present on sites, as there may be an interferential effect.

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 5000 series of gas analysers have been certified to Version 3.1 of the 'Performance Standards for Portable Emission Monitoring Systems'.

2.4 Declaration of conformity

Products	<ul style="list-style-type: none"> • GA5000 - Landfill Gas Analyser • GEM5000 - Landfill Gas Analyser and Extraction Monitor • BIOGAS 5000 - Anaerobic Digester Gas Analyser
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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
SIRA certificate number	SIRA 11ATEX2197X

Standards applied	EN60079-0 :2006 EN60079-0 :2009 EN60079-11 :2007
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IECEX

Certification body	SIRA Certification Service
Notified body number	0518
Address	Rake Lane, Eccleston, Chester, CH4 9JN
IECEX certificate number	SIR 11.0089X
Standards applied	IEC60079-0 :2004 Ed4 IEC60079-0 :2007 Ed5 IEC60079-11 :2006 Ed5

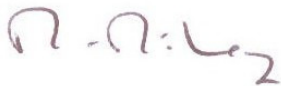
CSA (Canada and USA)

Certification body	CSA International
Address	178 Rexdale Boulevard, Toronto, ON, Canada M9W 1R3
CSA Certificate number	CSA 11 2445306
Standards applied	C22.2 No. 0-10 - General Requirements – Canadian Electrical Code, Part II CAN/CSA-C22.2 No. 60079-0:07 - Electrical apparatus for explosive gas atmospheres - Part 0: General Requirements CAN/CSA-C22.2 No. 60079-1:07 - Electrical apparatus for explosive gas atmospheres - Part 1: Flameproof enclosures "d" CAN/CSA-E60079-11:02 - Electrical apparatus for explosive gas atmospheres - Part 11: Intrinsic Safety "i" ANSI/UL 60079-0:09 - Electrical Apparatus for Explosive Gas Atmospheres - Part 0: General Requirements ANSI/UL 60079-1:09 - Electrical Apparatus for Explosive Gas Atmospheres - Part 1: Flameproof Enclosures "d" ANSI/UL 60079-11:09 - Electrical apparatus for Explosive Gas Atmospheres - Part 11: Intrinsic Safety "i"

EMC Directive 2004/108/EC

EN 301 489 Pt 1 (V1.9.1 – 2011-04)	Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements
EN 301 489 Pt 17 (V2.1.1 – 2009-05)	Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment; Part 17: Specific conditions for Broadband Data Transmission Systems EMC for broadband data transmission systems
EN 301 489 Pt 19 (V1.2.1 – 2002-11)	Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 19: Specific conditions for Receive Only Mobile Earth Stations (ROMES) operating in the 1,5 GHz band providing data communications EMC for Receive Only Mobile Earth Stations (ROMES)
BS EN 61000-3-2: 2006 + A2:2009	Electromagnetic compatibility (EMC). Limits. Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)
BS EN 61000-3-3: 2008	Electromagnetic compatibility (EMC). Limits. Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection

Signed:



Dr. Roger Riley
NPI Director and Authorised Person

3.0 The GEM5000 gas analyser

3.1 The GEM5000



GEM5000 gas analyser

The GEM5000 gas analyser is designed to monitor landfill gas extraction systems.

Benefits:

- Allows balancing of gas extraction site.
- Maximise power generation from site.
- Field proven.
- Standardises monitoring routines.
- Easy transfer of data.
- GPS for compliance.

Features:

- ATEX certified.
- MCERTS approved.
- H₂ compensated CO.
- Calculates flow (m³/hr) and calorific value (kW or BTU).
- Technician log-in.
- Event log.
- Two instruments in one (GA and GEM mode).
- Measures static and differential pressure.
- Simultaneous display of gases.
- Storage of changes in set-up of gas field.

Applications:

- Gas extraction fields.
- Flare monitoring.
- Landfill sites.

3.2 GEM5000 standard product**Reference:**

- A Hard carry case
- B In-line water trap tubing & filter
- C Gas analyser instrument
- D Operating manual CD
- E Mains battery charger and adaptors:
- UK
 - Europe
 - US
 - Australia
- F H₂S filter (optional – if the compensated CO cell is fitted)

4.0 GEM5000 optional products and accessories

4.1 Optional products

The GEM5000 gas analyser 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 Pitot tube (optional)

The GEM5000 gas analyser enables the use of a pitot tube to aid accurate flow measurement. The pitot tube is used for gas extraction systems and the pressure readings are taken in mbar. High gas flow is calculated in the analyser in m³/hr (metres cubed per hour).

4.1.2 Orifice plate (optional)

Geotech (UK) Limited recommends the use of orifice plates as good practice when using the GEM5000 gas analyser, enabling repeatability in flow measurement via a fixed method. Orifice plates are a specialised product and configuration and Geotech (UK) Limited does not currently manufacture or sell spare parts for this product. Please refer to a specialist supplier if the use of Orifice plates is required.

4.1.3 Temperature probe (optional)

The GEM5000 gas analyser has the facility to automatically display and record the borehole temperature via an optional temperature probe.

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

✍ Note: Temperature probes with an Ex label are part of the GEM5000 Ex certification SIRA 11ATEX2197X and IECEx SIR11.0089X, and therefore certified for use under the same conditions as the analyser.

4.1.4 Anemometer (optional)

The GEM5000 gas analyser has the 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. An anemometer probe adds flow measurements to the professional reporting ability of the GEM5000 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 m³/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 part of the analyser Ex certification BVS 04ATEXE194 for use with ATEX only and is therefore certified for use in a potentially explosive atmosphere. To use the m³/hr option the firmware software within the analyser must be set at the time of manufacture.

4.1.5 H₂S filter (optional)

The GEM5000 gas analyser has the capability to use an H₂S filter and is required as standard if the compensated CO cell is fitted and configured at the time the instrument is manufactured. H₂S gas can have a cross-gas effect on the CO reading. By using a filter, the H₂S 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 H₂S might have on other gases. Do not use the filter on all boreholes.

4.1.6 Gas analyser manager – GAM (optional)

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

Features:

- Organisation and transfer of borehole 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.
- First time set-up wizard.
- Enable flow measurements for GEM5000 gas analysers.

4.1.7 GPS (optional)

An optional GPS feature is available for the GEM5000 gas analyser. It enables the site engineer to automatically locate borehole IDs using GPS satellite signal from predefined borehole IDs uploaded from Gas Analyser Manager or set on the analyser when out in the field prior to taking a reading. The GPS reading data is stored for each measurement reading providing an audit trail confirming that a reading was taken.

4.1.8 Bluetooth dongle (optional)

An optional Bluetooth feature enables the operator to set and utilise Bluetooth technology. This may be useful when downloading gas readings from the analyser to the PC instead of connecting the analyser to a PC via a USB lead. Bluetooth may also be used to transfer Site IDs to other 5000 series gas analysers if required. Bluetooth is activated by plugging the dongle into a pc USB port and switching on the Bluetooth option feature in the settings on the analyser.

4.2 Instrument accessory products

Optional accessory and replacement parts must ONLY be purchased for the GEM5000 gas analyser direct from Geotech (UK) Limited or your agent. Please contact sales@geotech.co.uk for further details on pricing and how to order.



Ref	Description	Order Code
A	Hard carry case	GF2.5
B	Hard carry case backpack (hard carry case not included)	GF2.6
C	Soft carry case	GF5.1
D	Battery charger and adaptors	GF3.9
E	Anemometer (ATEX certified)	GF5.4
F	H ₂ S/Hydrocarbon filters H ₂ S/Hydrocarbon filters (pack of 5)	GF6.4 GF6.5
G	Temperature probe (ATEX certified)	GF5.2
H	Pitot tube kit	PITOT
I	In-line water trap filter & tubing	GF1.8
J	Water trap with barbed filters (pack of 10) Water trap with barbed filters (pack of 30)	GA4.9 GA4.9(30)
K	Gas ports connectors (pack of 10)	MC10
L	Sampling tube 5m length flexible PVC tubing (3/16" id)	GA2.3
M	Spare window for the soft carry case	GF5.3
N	Gas Analyser Manager (GAM) USB lead Bluetooth dongle	GAM GFUSB BLUEDON
O	Check gas regulator and tubing for calibration gas. Calibration gas canister. Please contact sales@geotech.co.uk for gas canister concentrations	GA6.8

5.0 GEM5000 instrument features

5.1 Physical characteristics of the instrument panel

Front view:



Reference:

- A Main Gas Read Screen
- B Soft-keys
- C Backlight Key
- D Menu Key
- E Key 2 – Page Up
- F Key 4 – Scroll Left
- G Pump Key
- H LED Light
- I On/Off Key
- J Assistance Key
- K Key 6 – Scroll Right
- L Key 8 – Page Down
- M Enter Key
- N General Keys

Back view:

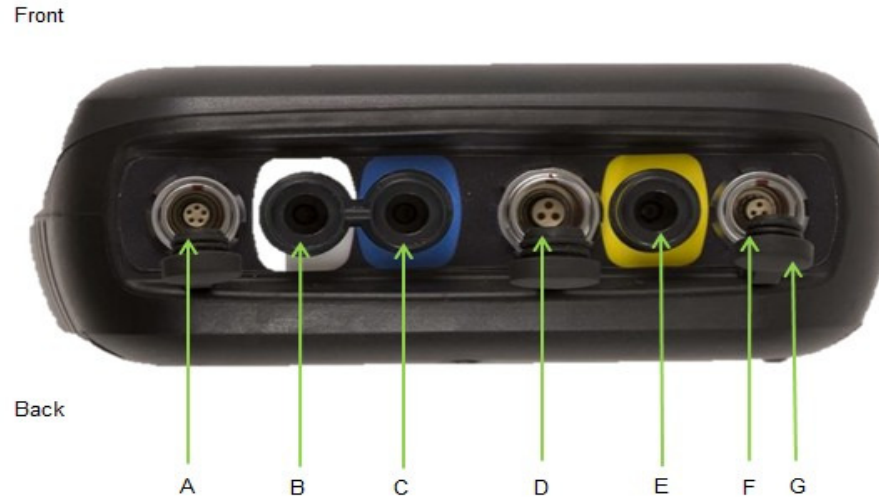


Reference:

- O Model Number
- P Serial Number
- Q Part Number
- R Certification Number
- S Recalibration Due

5.2 Analyser features and keys

Ref	Feature	Function
A	Main Read Screen	Start and end screen when using the instrument.
B	Soft-keys	The function of the three 'soft-keys' on the front of the instrument panel is determined by menu options taken. Functions vary from screen to screen.
C	Backlight Key	Enables the operator to backlight the analyser display panel.
D	Menu Key	Press the 'Menu' key to view and maintain User, Device and Operation settings.
E	Page Up Key	Also 'Key 2'. Press scroll up to view further information on the instrument screen.
F	Scroll Left Key	Also 'Key 4'. Enables the operator to scroll left to display more information.
G	Pump Key	Press the 'Pump' key to start or stop the pump.
H	LED Light	LED power light is visible on the front of the analyser when the instrument is powered on.
I	On/Off Key	Press the 'On/Off' key briefly to switch the instrument on and off.
J	Assistance Key	Press the 'Assistance' key to view help text relevant to the analyser screen you are currently displaying.
K	Scroll Right Key	Also 'Key 6'. Press scroll right to view further information on the instrument screen.
L	Page Down Key	Also 'Key 8'. Enables the operator to scroll down to display more information.
M	Enter Key	The 'Enter' key accepts/confirms choices made by the operator. Also required to confirm numeric data entry.
N	General Keys	Keys 0, 1, 2, 3, 4, 5, 6, 7, 8, 9
O	Model Number	Instrument model type identification.
P	Serial Number	Unique identification for the instrument. Verification of the serial number will be required if Technical Support assistance is needed.
Q	Part Number	Manufacturer part number.
R	Certification Number	Displays instrument certification information.
S	Recalibration Due	The date displayed is the date the instrument is due to be calibrated.

5.3 Instrument connection points**Top view:**

Ref:	Connection Point:	Function:
A	Connector A	Attach the USB lead for PC-to-analyser connectivity.
B	Inlet Port & Static Pressure Port (White port)	Attach the sample tube to take a gas sample. Also used to measure the static pressure.
C	Differential Pressure Port (Blue port)	Attach the sample tube to measure differential pressure.
D	Connector B	Attach the temperature probe and also used to attach the mains charger to the analyser for charging.
E	Gas Outlet Port (Yellow port)	The gas outlet port is the point at which the sample gas is expelled. Tubing may also be attached to the port.
F	Connector C	Attach the anemometer.
G	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 the 'On/Off' key. The Geotech (UK) Limited logo will display followed by the instrument warm up.
- 2) Following the instrument warm up, the 'Date and Time' screen is displayed prompting the technician to set the date and time and required format.
- 3) When complete select the soft-key to 'Exit' and the 'Power On Self-test' screen is displayed followed by instrument status. Instrument status displays the instruments service due date, serial number, options, service scheme and software version. Text will also display stating 'Self-test complete'.
- 4) Select the soft-key 'Next' to move onto the next screen and the 'Technician Login' screen is displayed.
- 5) Use the cursor keys to move through the list of ID's. Select either the required 'Technician ID' from the list followed by the soft-key 'Accept', or select 'Default' followed by the soft-key 'Accept' to continue to the 'Main Gas Read Screen'.

✍ Note: The selected technician ID is displayed at the top left corner of the Main Gas Read Screen.

6.1.1 Power on self-test

When switched on, the read-out will perform a pre-determined self-test sequence. During this time many of the analyser's functions are tested, including:

- General operation
- Gas flow measurement
- Calibration
- Backlight 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
- The currently enabled sales option











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

6.2 Switching the analyser off

- 1) To switch off the analyser, press and hold the 'On/Off' key, at which point a clean air purge will be carried out and the instrument will then switch off.
- 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 Instrument status icons

The following icons may be displayed on the instrument screen:

Icon	Description	Icon	Description
	Battery charge state Gives the operator an estimation of the battery charge state. For example 100% gives about 8 hours use in the field and 50% would mean that there is approximately 4 hours battery life remaining.		Battery charge state Indicates less than 1 hour of charge remaining.
	Pump status This icon is displayed along with a counter showing the pump run-time. This counts down where the operator has specified the pump run-time; if not it counts up; the icon turns red when stalled.		Pump stalled This icon is displayed when the pump stalls. The instrument's gas inlet (or outlet) may be blocked. This warning is most commonly caused by a water-logged or dirty sample filter. Change the sample filter and check for obvious blockages in the sample tubes. Alternatively, a small amount of adjustment can be made to the low flow detection point to compensate for minor changes in the performance of the pump fitted to the instrument.
	GPS signal strength This icon shows the signal strength the analyser's GPS module is able to provide. Full, okay and fair strength respectively.		GPS failure The GPS was unable to get a line of sight lock on enough satellites. Or, it may be that it hasn't had time to get a lock.
	This indicates when Bluetooth has been enabled. The colour changes from grey to blue when connected.		USB connected to PC (flickers when transferring data)
	Analyser Health Check (tba)		Language This icon indicates the currently selected operating language. This can be changed via the main menu.

6.4 Instrument LED power states

When the instrument is powered on a LED power light is visible on the front of the analyser, located above the 'On/Off' key. The following LED power light states are as follows:

Steady yellow	Unit turning on. This will extinguish when software has loaded correctly.
Flashing (rapid)	Unit is powering off.
Flashing (slow)	Power off is being delayed for purge/shutdown handling.
Flashing yellow	Unit is turning off due to power button being pressed.
Flashing red	Unit is turning off due to critically low battery.

✍ Note: Pressing and holding the power button for ~20s resets the analyser.

6.5 Changing between parameters

By default, the instrument displays the 'Main Gas Read Screen' (for gas measurement). The instrument will return to this screen after power on or when returning from the menus. The 'Scroll' keys can be used to switch to another measurement screen.

6.6 Entering data

During normal operation the operator may be prompted to enter data or information via the keypad, i.e. entering an ID code or setting an alarm level.

When entering data into the instrument all fields are fixed format and are populated from the left.

Text:

Entering text uses similar multi-tap functionality as a mobile phone. Key the numeric/alpha key pad the required number of times to select the appropriate letter. To key numeric data continue to press the numeric/alpha key until the required number is displayed.

Numeric data:

To enter a new date 09/11/11 the operator would type in 091111 using the numeric keypad in the following sequence:-

```
* 0_/_/_/___  
* 09/_/_/___  
* 09/1_/_/___  
* 09/11/_/___  
* 09/11/1_/_  
* 09/11/11
```

Press the 'Enter' key to confirm/accept data keyed.

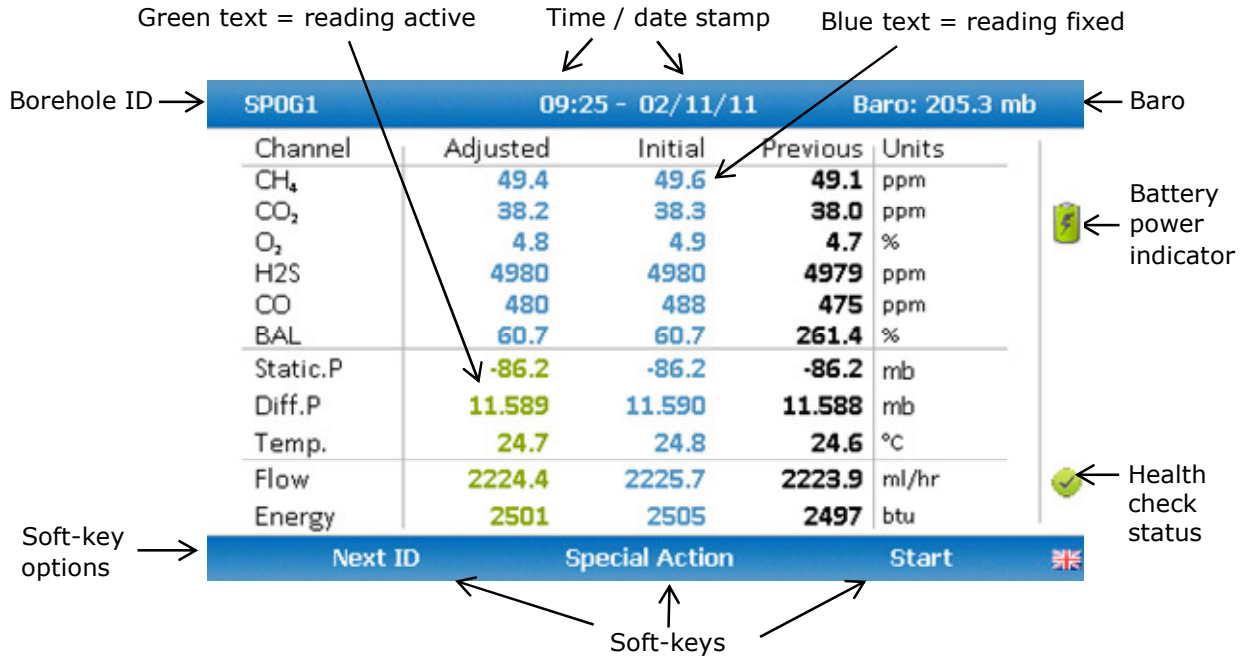
Any mistakes can be corrected using the soft-key 'Delete' which will delete the last digit typed. Alternatively, the sequence can be retyped before the 'Enter' key is pressed and the existing numbers will be pushed off the screen.

✍ Note: The instrument will not allow invalid data to be entered; this should be deleted and re-entered.

6.7 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.



6.8 Storage


The analyser should not be exposed to extreme temperature. For example, 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 and protect the analyser with either the soft carry case or store in the hard carry case provided with the instrument.

The instrument should be discharged and fully charged at least once every four weeks, regardless of indicated charge state.

6.9 Battery/charging

The battery used in the 5000 series of gas analysers is nickel metal hydride and manufactured as a 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.

Note: To reach optimum charge, it is recommended that the instrument is switched OFF when being charged. To charge, the analyser must be switched OFF before attaching the charger. Switching the analyser on or off during charging will cancel the current charge.

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

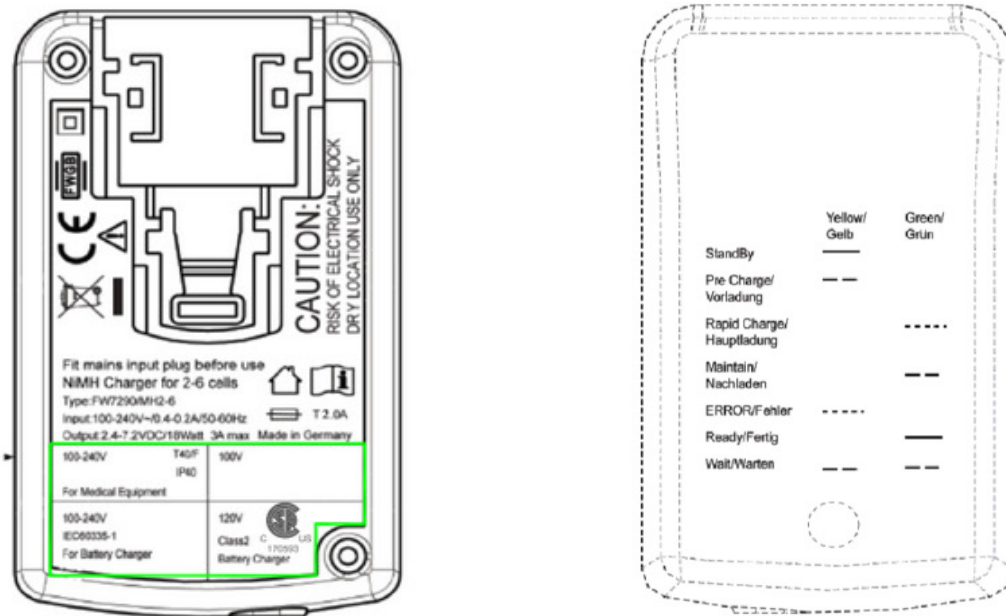
The battery charger is intelligent and will indicate when the unit is charging and charged.

The charger should only be disconnected when fully charged is indicated.

The instrument must be charged **ONLY** using the battery charger supplied with the instrument. The battery charger supplied is intended for indoor use only. Please ensure adequate ventilation whilst charging.

⚡ Note: Connect the charger to the mains attaching the appropriate adaptor. Contact Geotech (UK) Limited for further information

Power supply front and back drawing:



Charger: Input voltage: 100-240V AC +/- 10%
 Input frequency: 50-60Hz +/- 10%
 Input current: 0.4A@100VAC .. 0.2A@240VAC

Output voltage: 10.1VDC max
 Output current: 1.5A max

⚡ Note: This charger has been internally restricted to 1.5A

A full charge will take approximately **3-4 hours**. Typically, a fully charged battery will last 7-8 hours. A quick 30 minute charge can be used to give approximately one hours use in the field but may shorten the battery life. The battery charge status will be indicated on the charger plug. The temperature can dramatically affect the battery life; please take this into account when estimating battery life. It is recommended that the unit is switched-off whilst charging to give a complete and consistent charge.

6.10 Cleaning instructions

Do NOT use any cleaning agents to clean the analyser or battery charger as they may have an adverse effect on the safe use of these devices.

6.11 Memory


The analyser's memory is stored in a readings and configuration database.

⚡ 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. To clear the memory, please refer to the Gas Analyser Manager (GAM) operating manual.

6.12 Warning and error codes

When switched on the instrument will perform a predetermined self-test sequence taking approximately ten seconds. During this time many of the instrument's working parameters and settings are checked. If any operational parameters are out of specification or if the pre-programmed recommended calibration/service date has passed, errors or warnings may be displayed.

 Note: For further information please refer to section '10.0 Problem Solving'.

7.0 Operator settings

7.1 Menu key



The 'Menu' key 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 and information stored in the instrument.

- 1) Select the 'Menu' key on the front of the analyser and the following screen is displayed:



Device Settings

- 2) Press the relevant numeric key on the analyser keypad to select the required option.
- 3) To exit this menu, select the soft-key 'Exit' on the front of the analyser and the operator is returned to Main Gas Read Screen.

7.2 Device settings

7.2.1 Date and time



Date and Time

This option enables the operator to set the instrument date and time or to receive and update the settings automatically from satellite signal.

- 1) Select the 'Menu' key on the front of the analyser to display the 'Device Settings' menu followed by 'Key 1 – Date and Time' and the following screen is displayed:



- 2) Select 'Key 1 – Set Date' and key in the required date. Type the date using the numeric keypad. Press the soft-key 'Date Format' to toggle and select the required date format i.e. dd/mm/yy. Press the 'Enter' key to confirm and update the date setting.
- 3) Select 'Key 2 – Set Time' and key in the required time (hh:mm). Type the time using the numeric keypad and press the 'Enter' key to confirm the update.
- 4) The operator may also change the default time zone. Selecting the 'Key 4 Scroll-left' or 'Key 6 – Scroll right' to move through the different time zones. Press the 'Enter' key to confirm your default setting.
- 5) Select 'Key 3' to toggle between 'Manual Update' and 'Automatic Update' in order to choose how the date and time is set if updating from satellite signal.

Manual Used to manually obtain and update the date and time from the satellite signal when requested. Select soft-key 'Set now' to set date and time from satellite when available.

Automatic Used to automatically update the date and time received from the satellite signal when available. This option is only available when the GPS option is fitted to the analyser at the time of manufacture.

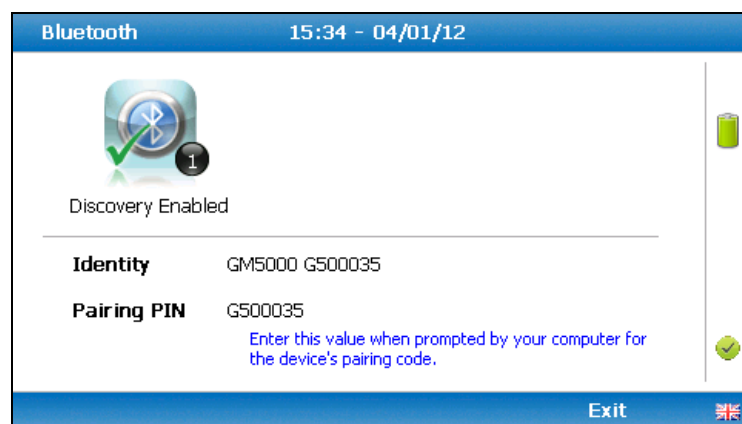
- 6) Select the soft-key 'Exit' to exit and return to the 'Device Settings' menu.

7.2.2 Bluetooth



This option enables the operator to utilise Bluetooth technology. This may be useful when downloading gas readings from the analyser to the PC instead of connecting the analyser to a PC via a USB lead. Bluetooth may also be used to transfer Site IDs to other 5000 series gas analysers if required.

- 1) Select the 'Menu' key on the front of the analyser to display the 'Device Settings' menu.
- 2) Select 'Key 2 – Bluetooth' and the following screen is displayed:



Bluetooth options

- 3) Enter the 'Pairing PIN' value when prompted by your computer for the device's pairing code.
- 4) Select soft-key 'Exit' to exit the screen and return to the 'Device Settings' menu.

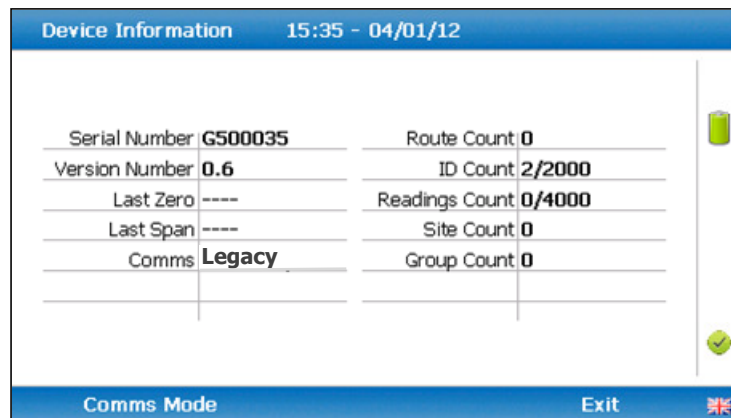
7.2.3 Device information



Device Information

This option displays default instrument information and settings such as serial number, service due date, last zero calibration date and last span calibration date.

- 1) Select the 'Menu' key on the front of the analyser to display the 'Device Settings' menu.
- 2) Select 'Key 3 – Device Information' and the following screen is displayed:



Device information

- 3) The information displayed on this screen is informational only and cannot be edited by the operator. The operator may be asked serial number, service due date and version number information when contacting Geotech (UK) Limited.
 - ✍ Note: The comms setting 'Legacy' mode is for use with GAM \geq v1.5. GA5K mode is reserved for future applications – DO NOT USE.
- 4) Select soft-key 'Exit' to exit the screen and return to the 'Device Settings' menu.

7.2.4 Diagnostics



Diagnostics

This option enables the Geotech Technical Support Team to identify and resolve issues with the instrument and settings. If required, the operator may be asked to confirm the diagnostics displayed.

- 1) Select the 'Menu' key on the front of the analyser to display the 'Device Settings' menu.
- 2) Select 'Key 4 – Diagnostics' and the following screen is displayed:

Diagnostics		15:19 - 05/01/12				G500046
Channel	ADC	Filt	Lin	Linz	Status	
Ref	(N/A)	10138	10134	+10134	+10134	✓
CH ₄	(%)	-1	9944	0.2	0.2	✓
CO ₂	(%)	5343	5343	2.6	2.6	✓
O ₂	(%)	43511	43507	13.7	13.7	✓
S4Cell	()					✗
CO	(ppm)	32836	32836	0	0	✓
H ₂	(ppm)	32833	32833	0	****	✓
H ₂ S	(ppm)	32866	32859	3	3	✓
PID	()					✗

Next Previous Exit

Diagnostics

- 3) Select soft-key 'Next' to display the next screen, 'Previous' to return to the previous screen, or select soft-key 'Exit' to exit this screen and return to the 'Device Settings' menu.

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

7.2.5 Navigation (optional)



Navigation is On

This option enables the operator to switch the 'GPS Navigation' functionality on or off. (This is optional and dependent upon purchasing the navigation option).

- 1) Select the 'Menu' key and the 'Device Settings' menu is displayed.
- 2) Select 'Key 5 – Navigation On' to switch on the GPS navigation functionality or 'Key 5 – Navigation Off' to switch the GPS navigation functionality off.



Navigation is On



Navigation is Off

✍ Note: For further information please refer to section '8.0 – Taking Readings'.

7.3 User settings

To access the 'User settings' menu, select the 'Menu' key on the front of the analyser to display the 'Device Settings' menu followed by the soft-key to display 'User Settings' menu. The following menu is displayed:



User settings menu

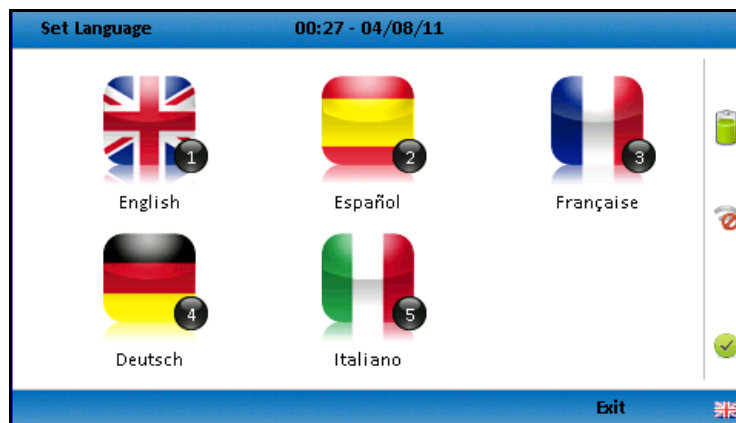
To exit the user settings menu select the soft-key 'Exit'.

7.3.1 Operating language



This option enables the operator to specify the operating language displayed for the instrument.

- 1) Select 'Key 1 – Operating Language' and the following screen is displayed:



Set language

- 2) Set the required language for the gas analyser by selecting the appropriate function key. Choose from:

Key 1 English

Key 2 Spanish

Key 3	French
Key 4	German
Key 5	Italian

- 3) To exit this option, select the soft-key 'Exit' and the operator is returned to the 'User Settings' menu.

7.3.2 Units of measurement



Units of Measurement

This option enables the operator to specify the default units of measurement for the instrument.

- 1) Select 'Key 2 – Units of Measurement' and the following screen is displayed:



Units of measurement menu

- 2) To set the required units of measurement toggle and choose from the following:

Key 1	Temperature	°C °F
Key 2	Flow	scfm m3/hr
Key 3	Measurement	Inches Millimetres
Key 4	Pressure	mb "H2O
Key 5	Balance	Balance Residual N2
Key 6	Energy	BTU/h kW

- 3) Select soft-key 'Exit' to exit this screen and return to the 'User Settings' menu.

7.3.3 Select by route/group (requires GAM)



Select by Route

This option enables the operator to display the borehole IDs by group or by specific route which have been uploaded from Gas Analyser Manager (GAM) software to the instrument.

- 1) Select 'Key 3 – Select by Route' or toggle 'Key 3 – Select by Group'.



Select by Route



Select by Group

- 2) Select soft-key 'Exit' to exit this screen and return to the 'User Settings' menu.

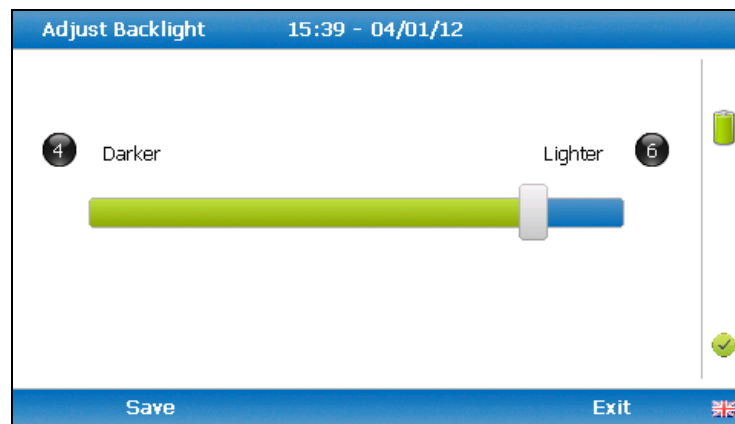
7.3.4 Adjust backlight



Adjust Backlight

This option enables the operator to adjust the backlight (brightness). Setting this to a darker setting will help preserve the battery power.

- 1) Select 'Key 4 – Adjust Backlight' and the following screen is displayed:



Adjust backlight

- 2) Manual adjustment of the instrument backlight is available via this option and can be carried out with use of 'Key 4 - Scroll left' (<) darker and 'Key 6 - Scroll right' (>) lighter.
- 3) Select the soft-key 'Save' to store the setting or select soft-key 'Exit' to exit the screen without saving the change.
- 4) The operator will return to the 'User settings' menu.

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

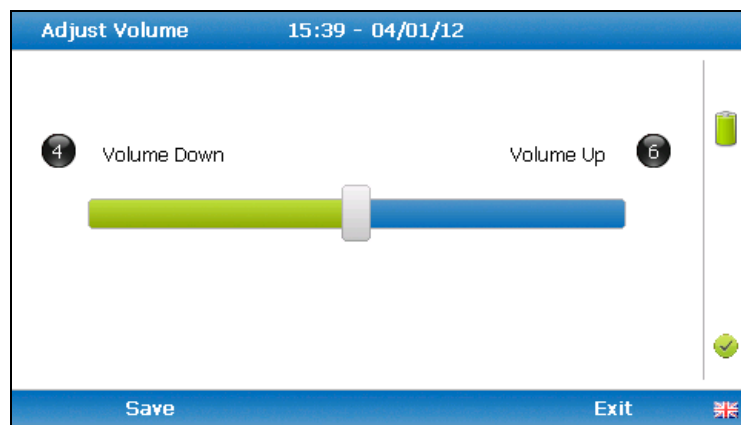
7.3.5 Adjust volume



Adjust Volume

This option enables the operator to adjust the volume for the internal speaker, for example the alarm tone. A lower setting will help preserve the battery power.

- 1) Select the 'Menu' button on the front of the analyser to display the 'Device Settings' menu. Press the soft-key to display 'User Settings'.
- 2) Select 'Key 5 – Adjust Volume' and the following screen is displayed:



Adjust volume

- 3) Manual adjustment of the volume is available via this option and can be carried out with use of 'Key 4 - Scroll left' (<) volume down and 'Key 6 - Scroll right' (>) volume up.
- 4) Select the soft-key 'Save' to store the setting or select soft-key 'Exit' to exit the screen without saving the change.
- 5) The operator will return to the 'User settings' menu.

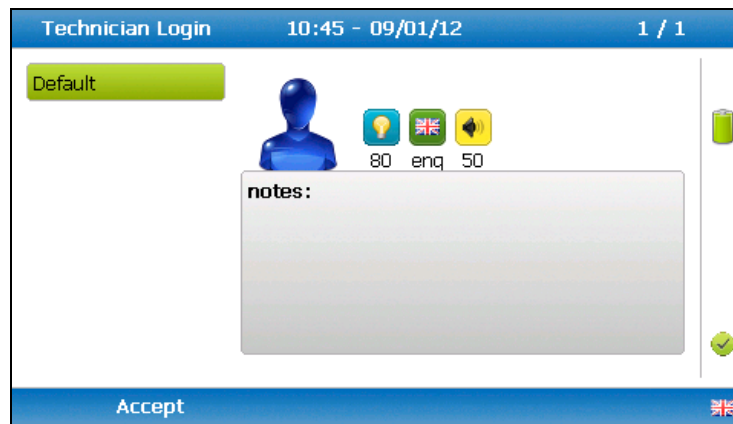
7.3.6 Technician login



Technician Login


This option enables the operator to select or change a pre-defined technician login and all subsequent readings will be tagged with this Technician Login ID. The technician ID must already have been created using the Gas Analyser Manager (GAM) software and uploaded to the instrument.

- 1) Select the 'Menu' button on the front of the analyser to display the 'Device Settings' menu. Press the soft key to display 'User Settings'.
- 2) Select 'Key 6 – Technician login' and the following screen is displayed:



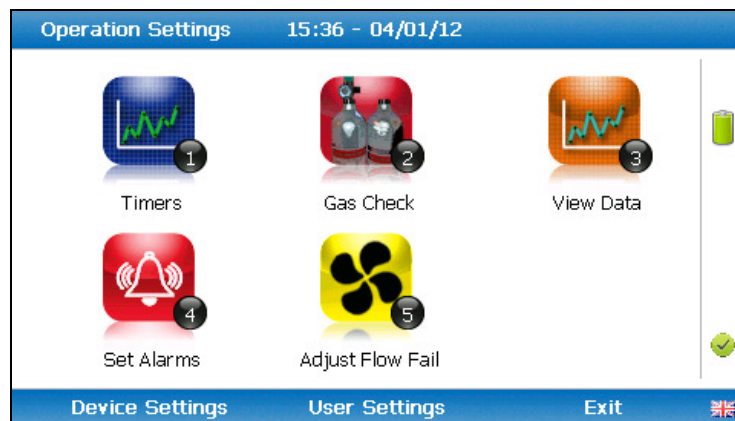
Technician login

- 3) Use the cursor keys to move throughout the list of IDs displayed; select the 'Enter' key to select choice of ID, default if no IDs are listed or soft-key 'Skip' to skip the selection.
- 4) The operator will return to the 'User settings' menu.

 Note: If no technicians are loaded via GAM this section is skipped during start up and the 'Technician ID' icon is removed from the menu.

7.4 Operation settings

To access the 'Operation settings' menu, select the 'Menu' key on the front of the analyser to display the 'Device Settings' menu followed by the soft-key to display the 'Operation Settings' menu. The following menu is displayed:



Operation settings menu

7.4.1 Timers




The timers function enables the operator to set standard purge times and set auto-power off if the unit is untouched for the period of time specified.

- 1) Select 'Key 1 - Timers' and the following screen is displayed:



Timers

- 1) Select 'Key 1' to edit the purge time. 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 030 then press the 'Enter' key to accept.
- 2) Select 'Key 2' to edit the auto power off time. Enter the 'Auto power off' in minutes; the instrument will automatically power off to preserve the battery life after the specified time if no activity has occurred on the instrument. Press the 'Enter' key to accept.
- 3) Select the soft-key 'Exit' key to exit the screen and return to the 'Operation settings' menu.

 Note: Setting the purge time and auto power off functions to zero, disables the option. It is not recommended to reduce the purge time to below 30 seconds.

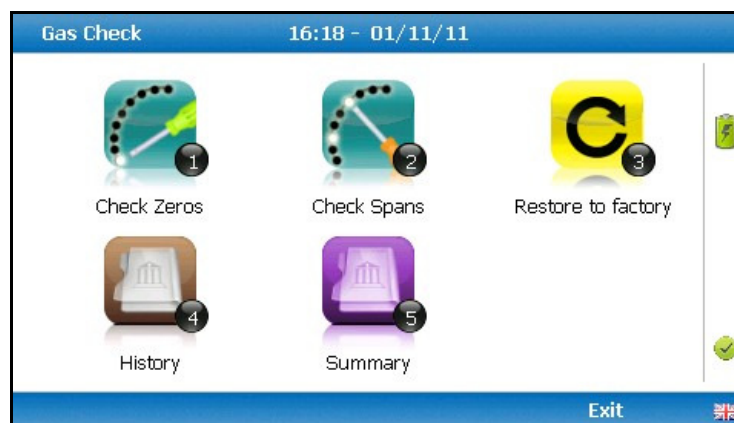
7.4.2 Gas Check



Gas Check

This option displays the 'Gas Check' menu and enables the operator to zero and span the gas channels on the instrument. Historical/previous gas checks data can also be viewed and factory settings can be restored.

- 1) Select the 'Menu' button on the front of the analyser to display the 'Device Settings' menu. Press the soft key to display 'Operation Settings'.
- 2) Select 'Key 2 - Gas Check' and the following menu is displayed:



Gas Check

- 3) For more information about the Gas Check Menu please refer to section 9.0 – Calibration.
- 4) Select soft-key 'Exit' to exit operation settings and return to the main screen.

7.4.3 View data



This option enables the operator to view the readings collected and stored on the instrument. Readings may be downloaded to the optional Gas Analyser Manager (GAM) software if further analysis is required.

- 1) Select the 'Menu' button on the front of the analyser to display the 'Device Settings' menu. Press the soft-key to display 'Operation Settings'.
- 2) Select 'Key 3 – View Data' and the following screen is displayed:

View Data		10:49 - 09/01/12		3 / 3	
ID: EEEE		06/01/12 11:36:37			
CH ₄	(%)	23.1	PEAKCH4	(%)	23.1
CO ₂	(%)	0.1	PEAKCO2	(%)	0.1
O ₂	(%)	17.0	MIINO2	(%)	17.0
CO	(ppm)	0	SysP	(mb)	0.00
H ₂	(ppm)	----	Baro	(mb)	982
H ₂ S	(ppm)	2	Temp	(°C)	----
Bal	(%)	59.7	Anemo	(m/s)	----
			Flow	(m ³ /h)	----

Filter Delete Exit

View data

- 3) Toggle through the reading by selecting 'Key 4 – Scroll left' and 'Key 6 – Scroll right' on the analyser. Select 'Key 2 – Page up' and 'Key 8 – Page down' to page through the auxiliary channels listed.
- 4) Select the soft-key 'Filter' to filter the data by sample point ID, or specify before or after date. Press the soft-key 'Exit' to exit the filter menu and return to the 'View Data' screen.

Filter			12:35 - 09/01/12	
Sample Point ID	After Date	Before Date		
ANAW001	00/00/00	00/00/00		

Delete ABC

Filter data

- 5) Select the soft-key 'Delete' followed by the appropriate soft-key to delete a single reading or all filtered readings. Press soft-key 'Cancel' to cancel the deletion request.
- 6) Select the soft-key 'Exit' to exit the view data screen.

7.4.4 Set alarms



This option enables the operator to define the conditions for which an alarm will be triggered. These conditions apply to the general operation of the instrument and are not ID specific. A summary of the alarm settings can be found in 'Key 3 - Summary'.

- 1) Select the 'Menu' button on the front of the analyser to display the 'Device Settings' menu. Press the soft key to display 'Operation Settings'.
- 2) Select 'Key 4 - Set Alarms' and the following menu is displayed:



Set alarms

- 3) Select 'Key 2' to select the gas for which you wish to set an alarm trigger followed by 'Key 1' to change the trigger condition of an alarm.
- 4) To manually adjust the alarm set press (<) 'Key 4 - Scroll left' or (>) 'Key 6 - Scroll right' and enter the trigger value.
- 5) To disable all alarm settings select the soft-key 'Disable All'.
- 6) Select the 'Enter' key to store the setting or select soft-key 'Exit' to exit the screen without saving the change.
- 7) A summary of the alarm settings can be displayed using 'Key 3 - Summary'. Select soft-key 'Exit' to exit alarms summary and the operator returns to the 'Operation Settings' menu.

7.4.5 Adjust flow fail



Adjust Flow Fail


This option enables the operator to adjust the flow fail tolerance of the instrument, i.e. the operator can adjust the sensitivity for when the pump will stop operating on the presence of a blockage or low flow.

- 1) Select the 'Menu' button on the front of the analyser to display the 'Device Settings' menu. Press the soft-key to display 'Operation Settings'.
- 2) Select 'Key 5 – Adjust Flow Fail' and the following screen is displayed:



Adjust flow fail

- 3) Manual adjustment of the flow fail is available via this option and can be carried out with use of 'Key 4 – Scroll left' (<) less sensitive and 'Key 6 – Scroll right' (>) more sensitive.
- 4) Select the soft-key 'Save' to store the setting or select soft-key 'Exit' to exit the screen without saving the change.
- 5) The operator will return to the 'Operation settings' menu.

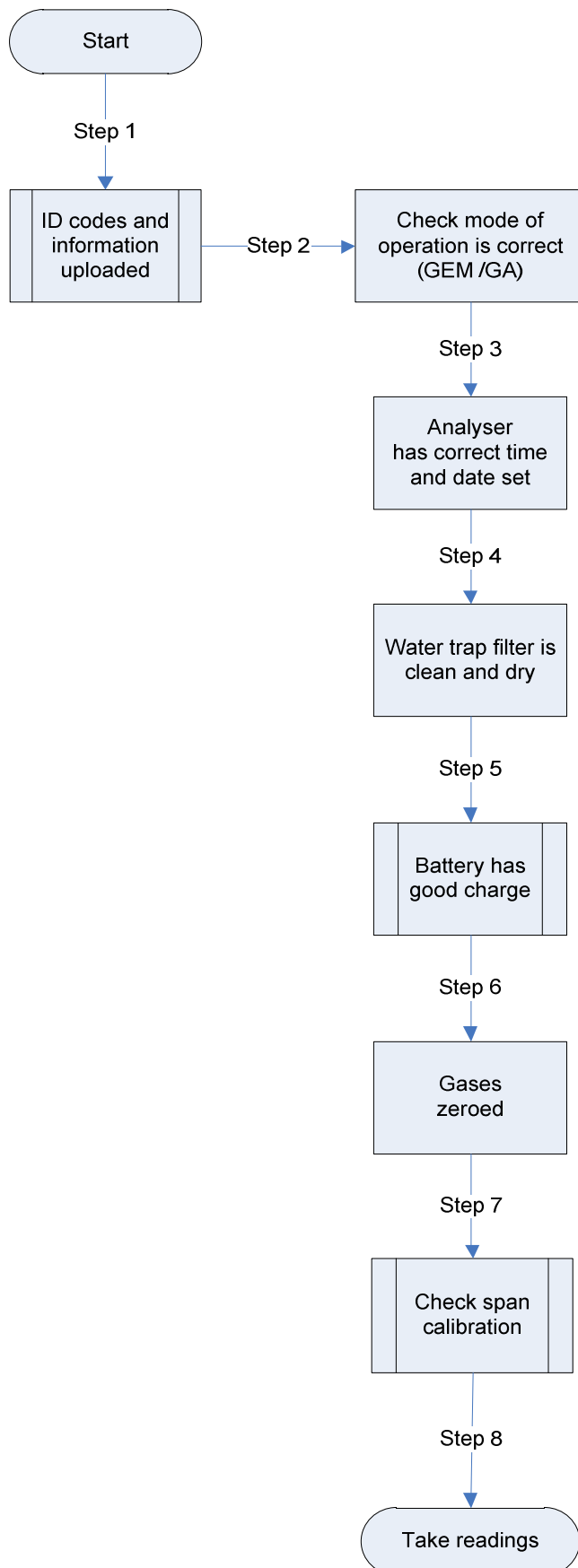
 Note: The default setting displays the bar in the centre. BEFORE altering this setting, please contact Technical Support at Geotech (UK) Limited on +44(0)1926 338111 or email technical@geotech.co.uk

7.5 Exit menu

- 1) Press the 'Menu' button on the front of the analyser to exit settings.

8.0 Taking readings

8.1 Preliminary checks before taking readings (best practice)



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

- Step 1** If using GAM - all necessary ID codes and information have been uploaded from GAM to the analyser.
- Step 2** Check the 'Mode of Operation' is correct. Choose either GEM5000 for gas extraction monitoring analyser or GA5000 for landfill gas analyser. Change using 'Special Actions'.
- Step 3** The instrument has the correct time and date set.
- Step 4** The water trap filter is fitted and is clean and dry.
- Step 5** The battery has a good charge (minimum 25% charge, even if only a few readings are required).
- Step 6** The channels CH₄, H₂S and CO have been zeroed, without gas concentration present.
- Step 7** If necessary check the span calibration with a known concentration calibration gas.
- Step 8** Take readings.

<p>Warning</p>	<p>Inhaling hydrogen sulphide gas (H₂S) or other harmful gases can cause death. It is the responsibility of the user to ensure that he/she is adequately trained in the safety aspects of using H₂S and other harmful gases. 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.</p>
-----------------------	--

Good practice

- Travel to site with the gas analyser 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 gas analyser against anything hot (e.g. gas extraction pipe, car body or in an unattended car during the summer) as this will cause a temperature increase in the gas analyser and may cause erroneous readings.
- When moving around a site, protect the gas analyser from strong direct sunlight and heavy rain.
- Always use the water trap! If the water trap becomes flooded, change the filter and ensure all tubes are clear of moisture before re-use.

Note: If the exhaust of a 5000 series gas analyser is connected to a pressurised system then this results in a flow of gas out of the inlet flow port.

8.2 Update site data

Prior to taking the readings at a particular site, the site data should be updated. This is accessed via the 'Special Action' menu. The answers to these questions are then stored and appended to each reading stored thereafter, until the site data is updated for another site. If using Gas Analyser Manager (GAM) software this data will be uploaded to GAM along with the reading data.


8.3 Special action

This menu enables the operator to perform the additional following functions out of sequence if so desired.

- 1) From the 'Main Gas Read Screen' select the soft-key 'Special Action' and the following menu is displayed:



Special action menu

 **Note:** The list of special action options displayed on the special action menu is dependent upon device type and sequence.

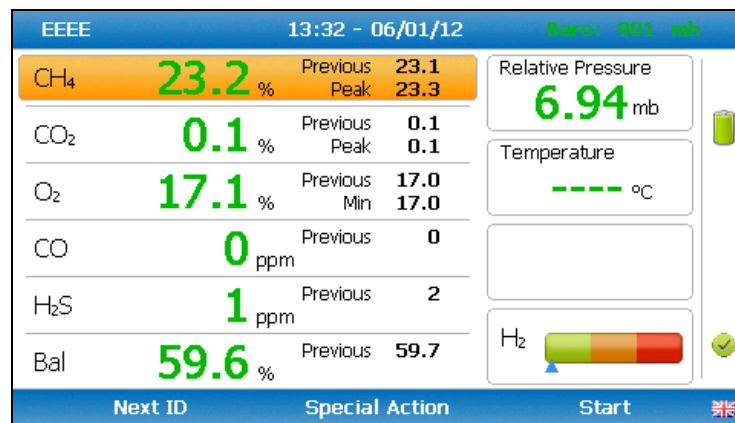
The following actions may be available:

Action	Function
Restart Process	This action enables the operator to restart the current process again from the beginning. The operator will return the Main Gas Read Screen.
Site Questions	This action enables the operator to update site questions prior to taking a reading.
ID Questions	This action enables the operator to update ID questions specific to sample points prior to taking a reading.
System Pressure	GEM mode - This action enables the operator to measure relative pressure when taking a reading.
Enter Temperature	GA mode – This action enables the operator to enter the temperature manually.
Filter H2S	This action enables the operator to filter from the analyser.
Flow	This action enables the operator to take a flow reading at any time.


2) Select the soft-key 'Exit' to exit this menu and return to the 'Main Gas Read Screen'.

8.4 GEM analyser in GA mode

The operator may toggle between GEM (a gas extraction monitor) and GA (a landfill gas analyser) mode of operation if required. From the 'Special Action' menu, select the middle soft-key to toggle between GEM and GA Mode.



GEM analyser in GA mode - main gas read screen

 **Note:** For operating instructions on how to use the GA5000 mode of operation, please refer to the GA5000 gas analyser operating manual.

8.5 The gas flow measurement screen

The GEM5000 gas analyser enables gas and flow measurements to be recorded by using:

- A flow device i.e. a PITOT tube, Orifice plate, Accu-Flo or anemometer.
- A temperature probe.

The GEM5000 instrument has the extra functionality to measure the calculated calorific value of the gas. The site engineer uses the information recorded by the analyser to make adjustments to the gas flow for specific boreholes. The initial and adjusted flow rates are recorded.

8.6 How to use an anemometer (optional)



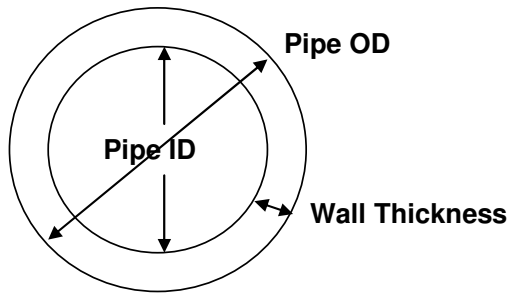
The GEM5000 gas analyser has the facility to attach an anemometer device enabling the site engineer to measure the flow of gas within an extraction system. The anemometer can be set to display two values; m/s (meters per second) and m³/hr (metres cubed per hour).

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) software. 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 with a new ID on the analyser. Select soft-key 'Next ID' from the Main Gas Read screen, followed by soft-key 'Add' and add a new borehole location.

In order to use the anemometer it is important to know the internal diameter (ID) of the pipe if you want to calculate the flow in m³/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:

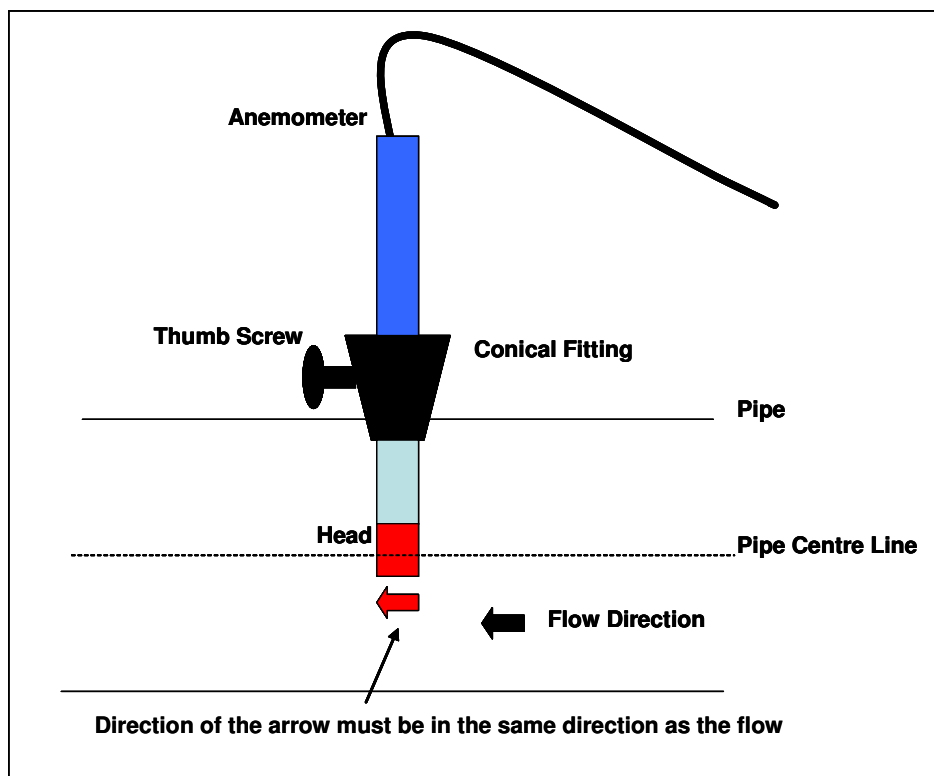
If you do not have any suitable monitoring points you will need to drill (tap of $\frac{3}{4}$ " BSP pipe thread) a hole in the piping of between 25mm and 30mm in diameter to seat the conical fitting on the anemometer (which is roughly between 20mm to 34mm). When not in use the hole can be re-sealed with a $\frac{3}{4}$ " BSP male 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 gas flow.

✍ Note: Use the thumb screw to help align the direction of the probe into the gas stream.

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 C' (refer to section 5.3 – Instrument connection points).
- 2) Place the anemometer into the pipe (sample point) ready to take the reading.
- 3) To take a flow measurement when using an anemometer, follow the instructions displayed on the analyser. When the reading has stabilised press the 'Enter' key to store the reading.

Anemometer cleaning instructions:**General handling tips:**

- Protect the probes against severe vibration.
- Do not kink the connector cable (risk of cable breakage).
- Never allow hard objects to contact rotating impellers.
- Always carry out probe cleaning according to the cleaning instructions.
- Never immerse probes in solvent.
- Never blow probes through with compressed air.
- Allow hot probes to cool slowly, never cool by plunging them in cold water etc.

Cleaning instructions:

- Instrument and probe must be switched off or disconnected prior to cleaning.

Vane probes:

- As the probes are highly sensitive measuring instruments, they must be cleaned with great care.
- Fibres or other foreign bodies can be carefully removed with fine tweezers. When doing so, take care not to bend or otherwise damage the vanes or the spindle.
- The adjustment of the bearing screws must never be changed. This can result in an erroneous measurement.
- Never allow hard objects to contact rotating impellers.
- Cleaning agents that extract the plasticizer from the plastic are never to be used for plastic probes (practically all solvents).

Cleaning the probes – best practice:

✍ Note: Use soapy water.

Cleaning example:

- 1) Carefully, swish the top part of the impeller back and forth in clean soapy water for approximately 10 minutes. Then swish the top part of the impeller back and forth in clean soapy water. If soapy water is used as a cleaning agent it is advisable to wash out the soap solution thoroughly with distilled water.
- 2) After cleaning the probe, rub it dry with a clean, dry cloth.

8.7 How to use a pitot tube (optional)


The GEM5000 gas analyser enables the site engineer to take gas measurements using a pitot tube. The pitot tube is used for gas extraction systems and the pressure readings are taken in mbar. Gas flow is calculated in the analyser in m³/hr (metres cubed per hour).



Example of a pitot tube

Fitting a pitot tube to the analyser:

- 1) It is important to seat the pitot tube into the monitoring point with the tip facing into the gas flow. The pitot tube should also be housed half way down the monitoring pipe. (Please refer to the anemometer instructions, which detail how to calculate the pipe diameter correctly).
- 2) Make sure that the sample tubing attached to the pitot tube fits correctly.
- 3) Attach the sample tube from the top connection of the pitot tube to the 'blue port' (the differential port) on the analyser making sure that the gas port connector secure into place.
- 4) Attach the sample tube from the side of the pitot tube to the 'white port' (inlet port/static pressure port) on the analyser making sure that the gas port connector secures into place.
- 5) House the pitot gland correctly onto the monitoring point.
- 6) When taking a gas reading and flow measurement follow the instruction as displayed on the front of the instrument.

 **Note:** Please refer to the following section for a diagram showing how to fit the tubing to the pitot tube.

8.8 How to use an H₂S filter (optional)

8.8.1 Cross gas effects on chemical cells

Measurements of CO are important in landfill management. The GEM5000 analyser incorporates an improved CO measurement.

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 GEM5000 analyser uses a technique that is hydrogen compensated. Hydrogen compensation is achievable up to a level of around 2000ppm. Above this level the CO reading will not be compensated for.

In order to assist the operator the GEM5000 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 H₂S filter.

CO measurement

The CO measurement is sensitive to hydrogen sulphide. The presence of hydrogen sulphide can cause the CO reading to elevate (not to be the true value due to the interfering gas). 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 H₂S filter only needs to be used when you are trying to remove of any possible cross gas effects H₂S might have on other gas channels. Do not use the filter on all boreholes.

When using the H₂S filter you will need to increase the gas sample and clean air purge run-time, as using an H₂S filter decreases the response time of the analyser.

✍ Note: There is an internal H₂S filter incorporated in the chemical cell that removes the H₂S; however this has a limited life span.

The electrochemical cells used to measure H₂S 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.

GEM5000

		Interfering Gas				
		CO	H ₂ S	SO ₂	NO ₂	H ₂
Chemical Cell	CO (H ₂ compensated)	100	0 / ~300*	0	0	<1
	CO	100	<4 / ~300*	0	-20 to +5	<60
	H ₂ S	<4	100	20	<-25	<0.2

*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.

8.8.2 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 elevated (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 H₂S filter as it can reduce higher order hydrocarbons. When using the H₂S filter you will need to increase the gas sample and clean air purge run-time, as using an H₂S 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 CO₂, CO, H₂S, NO₂, SO₂ or H₂, unlike many other types of oxygen cell.

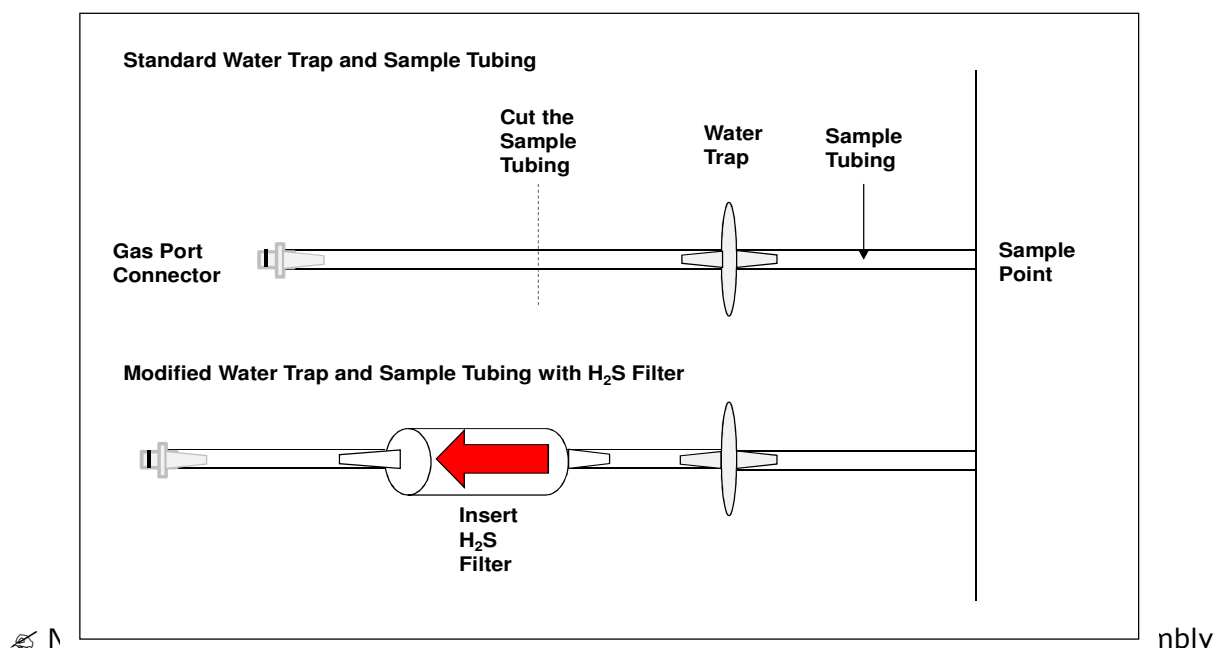
The infrared sensors will not be 'poisoned' by other hydrocarbons and will revert to normal operation as soon as the gas sample has been 'purged'.

H₂S filter:



Instructions for use:

The following diagram shows how to modify the standard water trap and sample tubing to fit the H₂S filter.

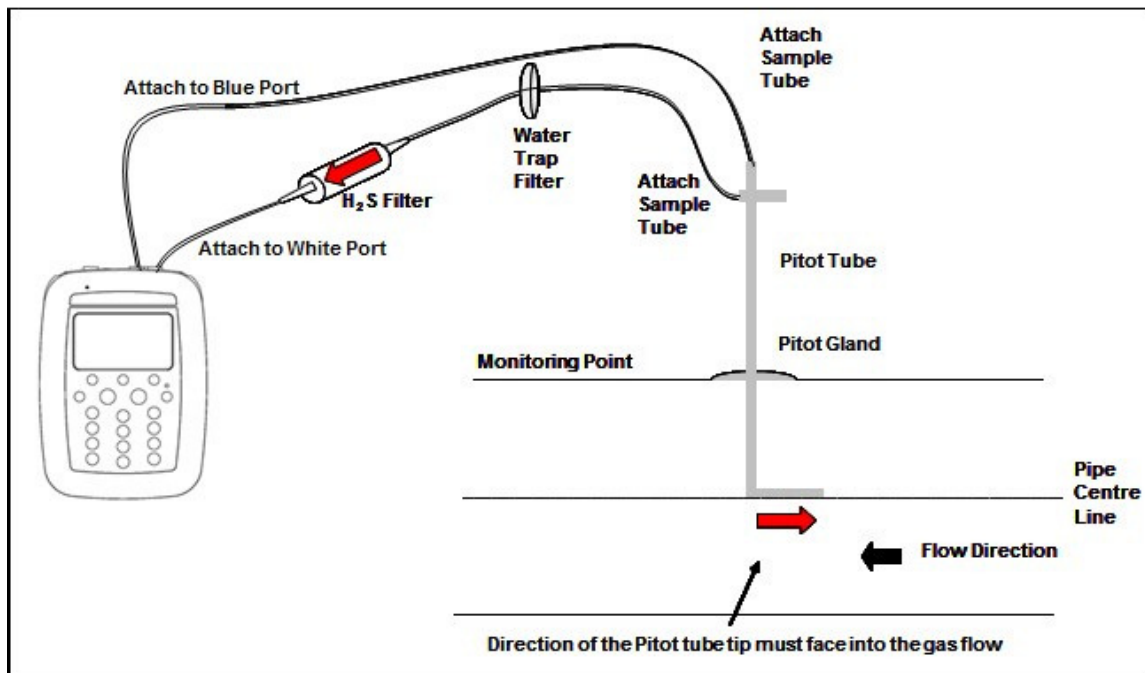


in addition to the modified water trap with a H₂S filter in order to take readings with and without a filter.

- 1) Once the H₂S filter is fitted follow the instructions as detailed on the front of the gas analyser displayed when taking readings using a H₂S filter.

✍ Note: This is only for analysers fitted with the CO compensated cell.

Fitting a pitot tube to a sample point when using an H₂S filter:



- 2) Make sure the water trap filter is fitted as close as possible to the pitot tube. This will help protect and trap moisture before it reaches the H₂S filter. Make sure that the water trap filter is clean and dry.
- 3) Attach the sample tubing into the analyser.
- 4) To take flow readings using a pitot tube, please follow the instructions displayed on the front of the instrument. The user will be prompted to complete each step and should follow the instructions on screen.

✍ Note: It is important to fit the pitot tube central and parallel with the pipe.

8.9 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. The GEM5000 gas analyser uses the temperature of the gas to give more accurate flow measurement readings as part of the instrument calculation.



GEM5000 & temperature probe

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 B' (refer to section 5.3 – Instrument connections points).
- 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) Follow the instructions on the front of the instrument when taking your gas and measurement reading.
- 6) At the point in which the operator presses 'Enter' to store the gas reading the temperature is recorded.

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

8.10 How to identify a borehole using the GPS feature (optional)

An optional GPS feature is available for the GEM5000 gas analyser. It enables the site engineer to automatically locate borehole IDs using GPS satellite signal from predefined borehole IDs uploaded from Gas Analyser Manager. The GPS reading data is stored for each measurement reading.

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.

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) In order to use the navigation function if configured, you must switch 'Navigation - On' on the analyser. Select the 'Menu' key followed by 'Key 5' to toggle navigation to on. Select the 'Menu' key to exit and return to the 'Main Gas Read Screen'.
- 3) Select the soft-key 'Next ID', then select a borehole ID from the list displayed and press the 'Enter' key to continue.

<p>Warning</p>	<p>Before entering the GPS Navigation Screen for the first time the following health and safety message will be displayed.</p> <p>"Please be aware of the terrain when using this screen. You are responsible for your own safety whilst walking on-site!"</p>
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- 4) After reading the user warning message, select the soft-key 'Dismiss'. Use the tracking display to locate the borehole

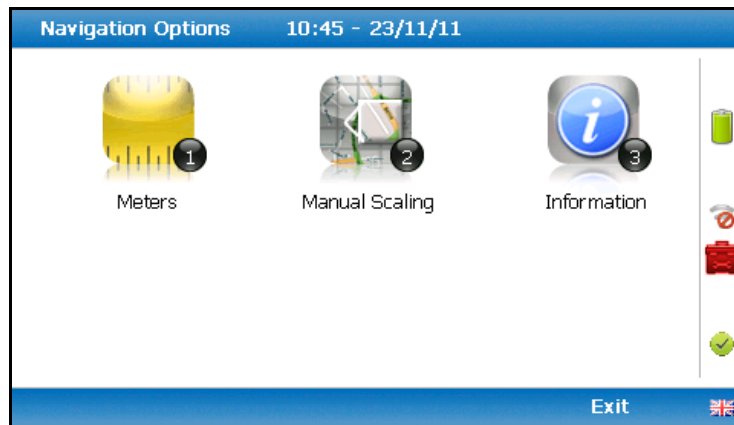
Note: There is often a wait time frame of between 30 seconds to two minutes whilst getting a satellite signal. Be aware that heavy rain, trees overhead etc. will give a bad fix.

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



Navigation

- 6) If required select soft-key 'Options' to go to the 'Navigation Options' menu and the following screen is displayed:



Navigation options

Key 1	Key 1 to toggle between 'Meters', 'Feet' or 'Yards' to define the unit of measurement.
Key 2	Key 2 to toggle between 'Manual Scaling' and 'Automatic Scaling' to locate a sample point using a satellite signal.
Key 3	Key 3 to display sample point information:
Bearing:	Direction.
UTC time:	'Universal Time Code' received from the satellite and displays GMT.
Latitude:	Latitude displays as degrees, minutes, seconds and decimal seconds. The equator is 0.
Longitude:	E (East) or W (West) displays the longitude as degrees, minutes, seconds and decimal seconds. The Greenwich meridian defines the zero point.
Altitude:	Altitude displays in meters, feet or yards.
Satellite:	This is the number of satellites that the system can select. Four satellites will give reasonable position accuracy; eight or more satellites will increase accuracy.
Horizontal:	Estimate of horizontal error on the indicated position. The location is accurate to horizontal error 1.6m.
Vertical:	Estimate of vertical error on the indicated position.
HDOP:	'Horizontal Dilution of Precision' which measures the accuracy of the indicated position.

GPS signal strength:



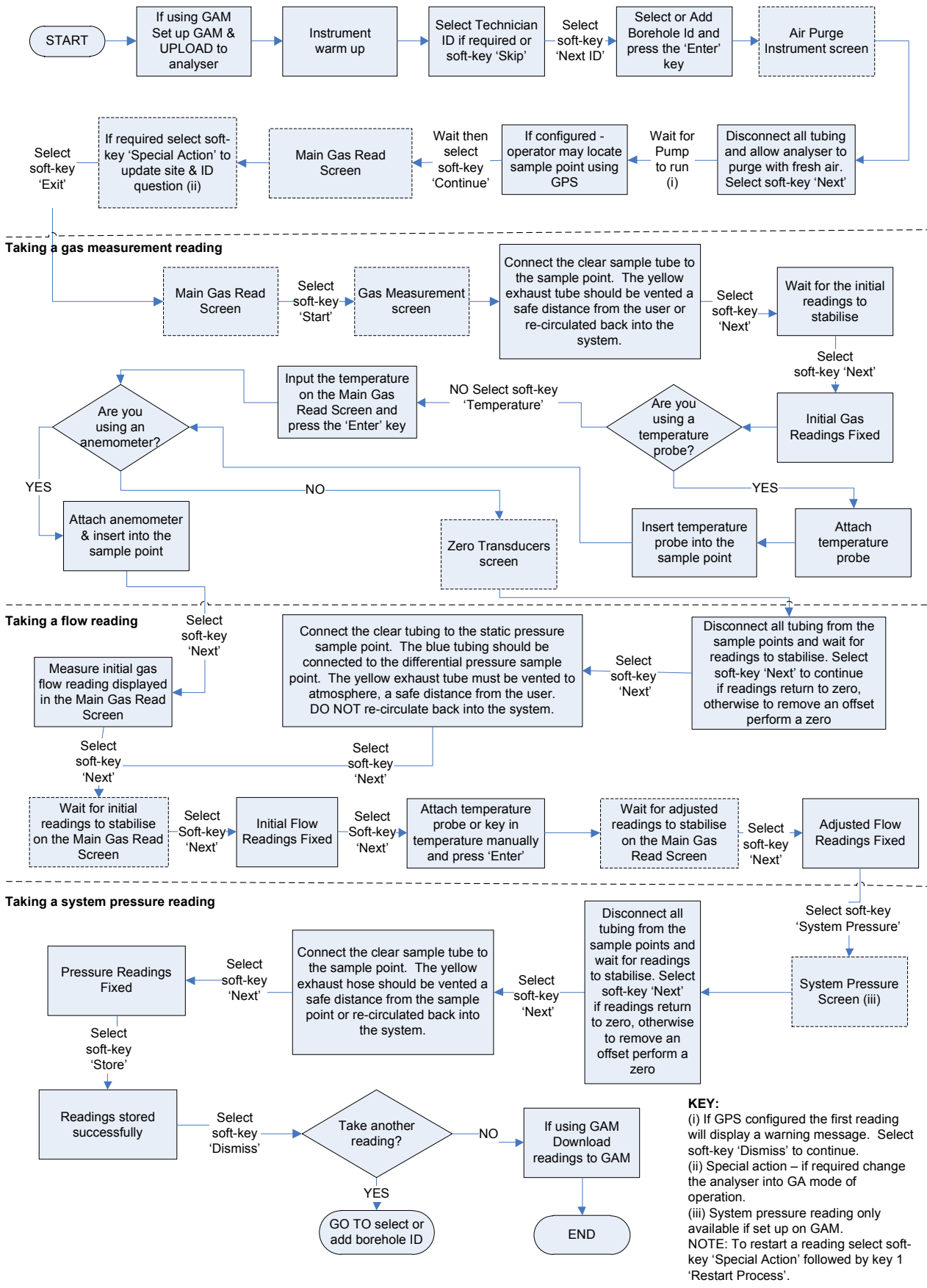
This icon shows the signal strength the analyser's GPS module is able to provide. Full, okay and fair strength respectively.



GPS failure - the GPS was unable to get a line of sight lock on enough satellites. Or, it may be that it hasn't had time to get a lock.

- 7) Select soft-key 'Continue' and the operator is returned to the 'Main Gas Read Screen'.

8.11 Taking gas and flow measurement



KEY:
 (i) If GPS configured the first reading will display a warning message. Select soft-key 'Dismiss' to continue.
 (ii) Special action – if required change the analyser into GA mode of operation.
 (iii) System pressure reading only available if set up on GAM.
 NOTE: To restart a reading select soft-key 'Special Action' followed by key 1 'Restart Process'.

9.0 Calibration

9.1 Calibration introduction

The GEM5000 gas analyser is 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.

CH₄, CO₂ and O₂ can be measured by GEM5000 gas analyser 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 GEM5000 instrument can have a H₂ compensated CO channel. This option requires that H₂ 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 gases present.

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

9.2 Frequency of calibration – best practice

The GEM5000 gas analysers can be checked against a known concentration of gas, to give confidence that the analyser is operating as expected at the time and conditions in which it is being used.

It is recommended that the instrument is regularly serviced and calibrated by Geotech in accordance with the due date on the instrument.

When defining the frequency of user calibration, the following are factors to be considered:

- The frequency of use of the analyser. (daily?/monthly?)
- The level of confidence and accuracy required for readings to be taken.
- Historical user calibration data.
- Site specific requirements or conditions.
- Historical understanding of expected readings on site.

Zeroing of the gas analyser should be undertaken at the start of each day's monitoring.

Use historical data to drive your frequency of calibration.

If there is no historical data a good starting point for a daily monitoring round is performing a calibration once every week or every other week.

The results of the calibrations will need to be recorded to monitor over time whether the frequency of calibration needs to be increased or decreased relative to the confidence required.

The confidence required will be driven by the site specific / user requirements.

When undertaking the monitoring with an understanding of the history of the gas levels of that site, a calibration check could be triggered if the readings measured are different to what is expected.

✍ Note: For assistance please contact Technical Support at Geotech (UK) Limited on +44(0)1926 338111

9.3 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 (H₂ compensated) both CO 100ppm and H₂ 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 targets for gas cells are dependent on the gas/range and type of cell fitted. Contact Technical Support for assistance.

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	<p>Calibration gases can be dangerous.</p> <p>For each gas used the appropriate material safety data sheet must be read and understood before proceeding.</p>
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9.4 Calibration set-up

⚠ Warning	Do NOT attach the gas supply to the gas analyser before putting the analyser into the 'Gas Check' screen. Select 'Check Spans' from the 'Operation Settings' menu.
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The regulator supplied with the calibration kit has been configured to deliver a fixed flow.

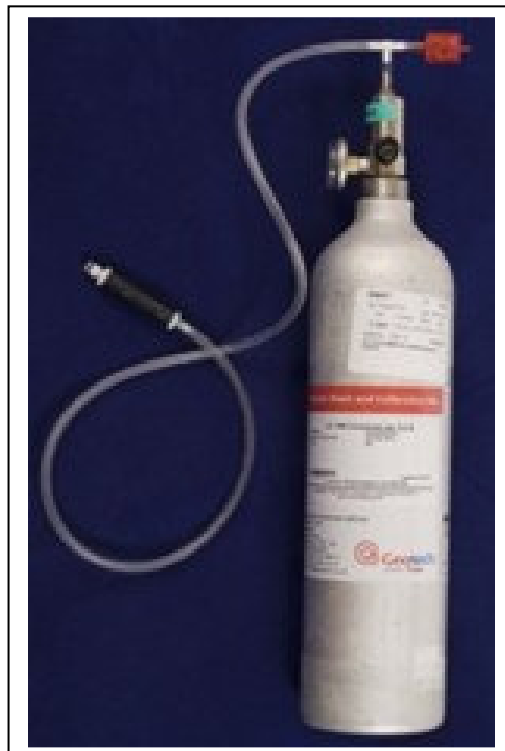
As the regulator's flow is factory set, it only requires a few turns to open, no adjustment is necessary.

⚠ Warning	<p>Exhaust port</p> <p>When the gas analyser is being calibrated, there are two possible exits for the gas, via the usual manner out of the exhaust (yellow) port of the analyser or in cases of over-pressurisation the 1/16" port on the red pressure relief valve located on the regulator.</p> <p>It is recommended that both ports have exhaust tubing attached.</p> <p>The exhaust tubing must emerge in a well-ventilated area. Ensure there are no leaks in the tubing and connections.</p> <p>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.</p>
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⚠ Note: There is also potential for gas to expel from the internal flow (blue) port of the gas analyser (applies to the GA5000 only).

9.5 Calibration equipment

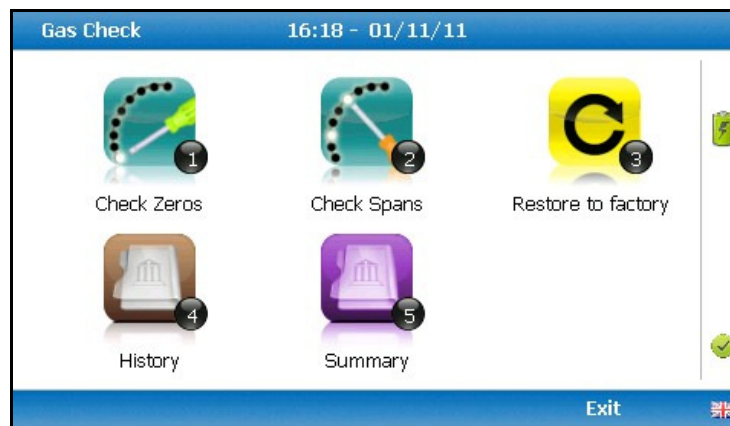
The diagram below displays the regulator and tubing equipment for user calibration:



- Certified calibration gas in 110 litre gas canisters are 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 pre-set for flow and pressure rates that are factory set.

9.6 Gas analyser

For the GEM5000 gas analyser the calibration options can be found by selecting the 'Menu' key followed by soft-key 'Operation Settings'. Select 'Key 2 – Gas Check' then follow the instructions on the analyser screen by selecting 'Key 2 – Check Spans'.



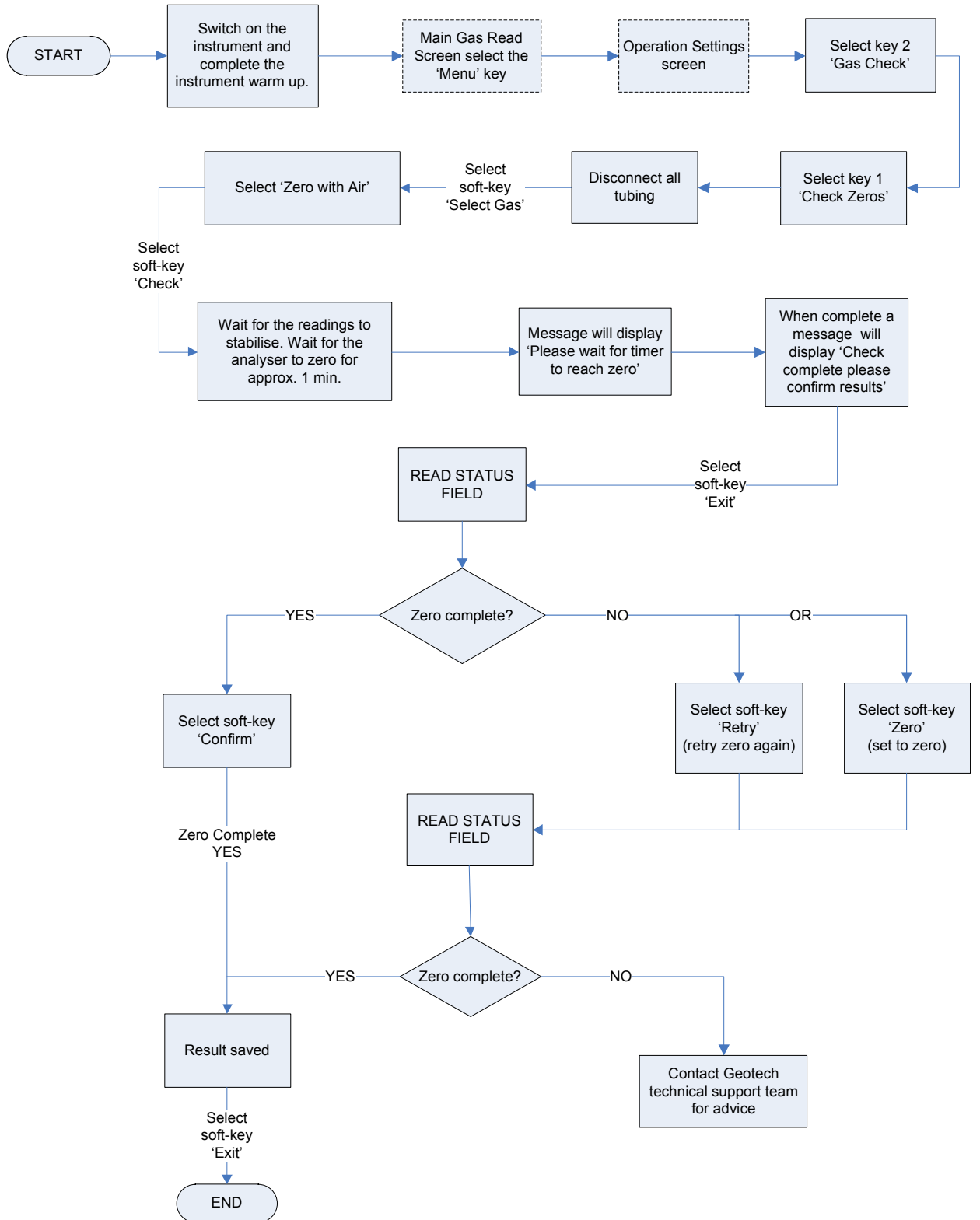
Gas Check

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

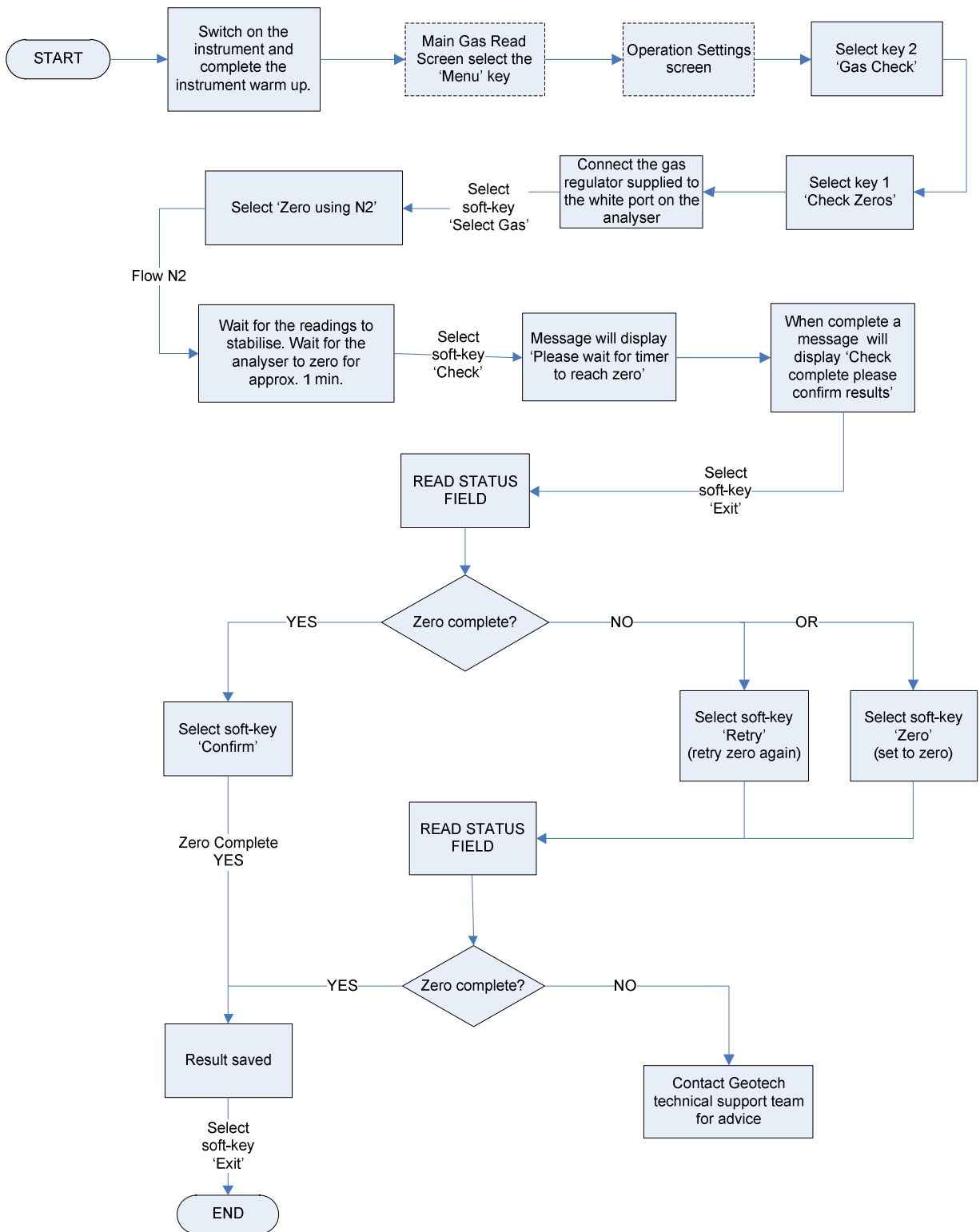
9.7 Calibration processes – best practice

The following process diagrams outline the calibration steps.

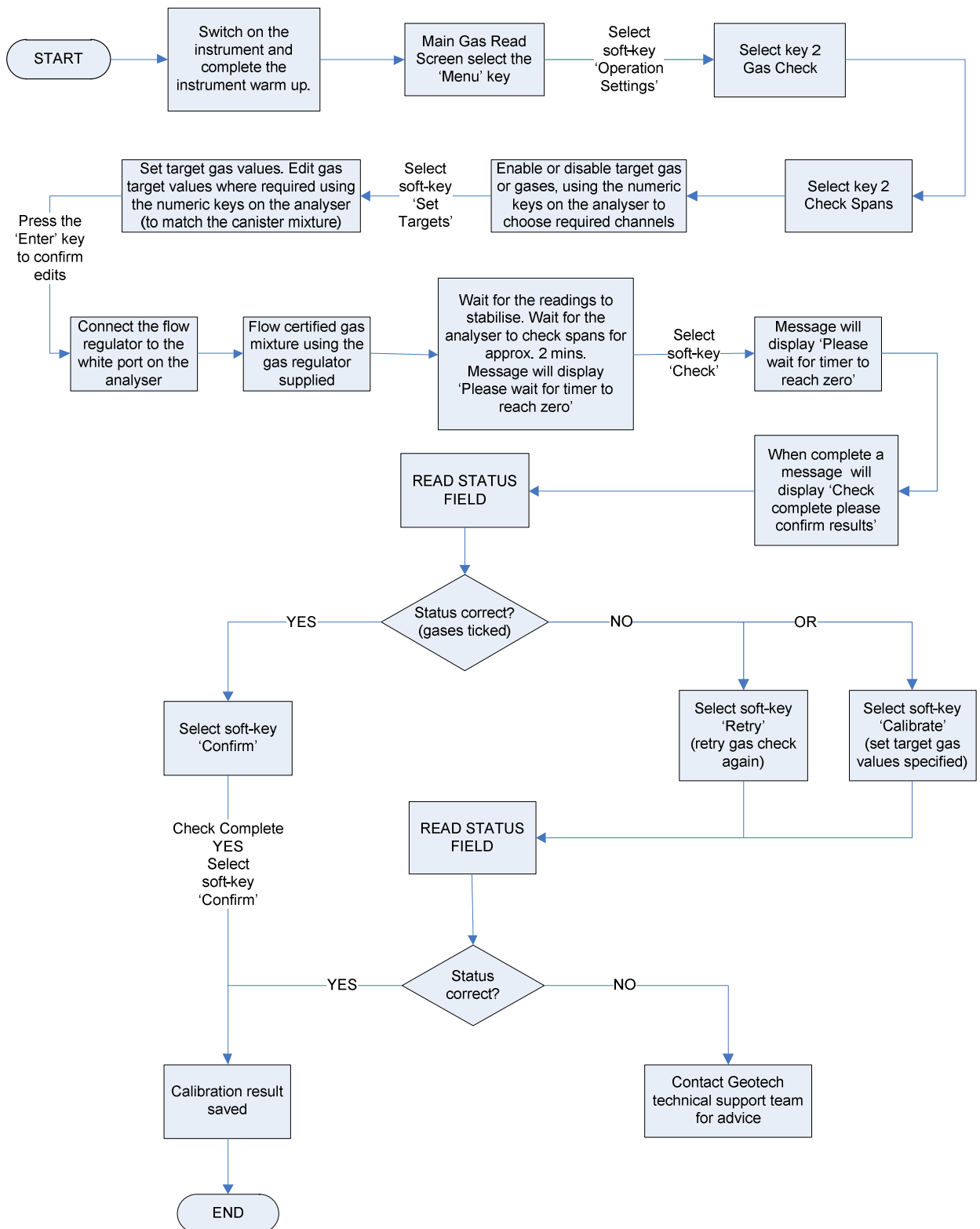
9.7.1 Check zeros – zero using air



9.7.2 Check zeros – zero using N₂



9.7.3 Calibration (Check Spans) – mixtures 1, 2 & 3



9.8 Restore to factory

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

- 1) Select the 'Menu' key.
- 2) Select soft-key 'Operation Settings'.
- 3) Select 'Key 2 - Gas Check'.
- 4) Select 'Key 3 - Restore to factory' followed by the soft-key 'Confirm' or 'Cancel'.
- 5) A validation message is displayed 'Reset user calibration?' Press the soft-key 'Confirm' to continue with the factory settings or soft-key 'Cancel' to cancel the operation and return to the Gas Check menu.

9.9 Calibration history

The GEM5000 gas analyser has the facility to log user calibrations in an 'Event Log' which is accessible to the user via the optional product Gas Analyser Manager (GAM). This can be used as an aid to ensuring that gas measurements are valid and accurate. Both good and failed calibration results are recorded for each channel calibrated.

- 1) Select the 'Menu' key.
- 2) Select soft-key 'Operation Settings'.
- 3) Select 'Key 2 - Gas Check'.
- 4) Select 'Key 4 - History'.
- 5) The operator may view the calibration data stored. Use the soft-key 'Filter' to add a sort filter to the history enquiry.

9.10 Calibration summary

The GEM5000 gas analyser has the facility to log the history of user calibrations.

- 1) Select the 'Menu' key.
- 2) Select soft-key 'Operation Settings'.
- 3) Select 'Key 2 - Gas Check'.
- 4) Select 'Key 5 - Summary'.
- 5) The operator may view the calibration data history stored by ID, technician, timestamp, type and calibration result. Use the soft-key 'Exit' to exit and return to the 'Gas Check' menu.

10.0 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.

10.1 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, CH₄ out of calibration, CO₂ 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.

11.0 Event log

The GEM5000 gas analyser 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.

Events are stored in the event log automatically. No user intervention is required. If the log becomes almost 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 Gas Analyser Manager.

 Note: The event log cannot be viewed on the analyser screen and is only available using Gas Analyser Manager (GAM). For more information, please contact the Sales Team at Geotech (UK) Limited on +44(0)1926 338111 or email sales@geotech.co.uk.

The result is displayed as a table, giving target, factory and actual gas values. A typical list of the events that are logged is listed in the example below:


Sample Events:

Event ID	Description	Event Data
1	Cold Start	0=Manual, 1=RS232
2	Manufacturers Calibration	
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
19	Failed User zero CH4	Reading
20	Failed User span CH4	Target Value, Gas 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
228	GPS module fitted option changed	1=Enabled, 0=Disabled
229	GPS module compass calibrated	1=Started, 0=Stopped

12.0 Service

The GEM5000 gas analyser should be regularly serviced to ensure correct and accurate operation. Geotech (UK) Limited recommends a service and recalibration every **6 months**.

The GEM5000 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 GEM5000 is serviced by unqualified engineers the ATEX certification may be invalidated and the instrument may be unsafe for use in a potentially explosive atmosphere.
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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, moisture 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.
Sample tubing	Always ensure that sample tubes are not contaminated or damaged.
Gas port connectors	Periodically check that the O-rings on the gas port 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 gas port connector should be replaced.
H ₂ S filter material	When the filter material changes colour to a <i>light grey</i> colour the filter should be replaced.

13.0 Warranty policy


This instrument is guaranteed, to the original end user purchaser, against defect in materials and workmanship for a period of **3 years** from the date of the shipment to the user.

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

The decision to repair or replace will be determined by Geotech (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.

CERTIFICATION OF CALIBRATION
UKAS ACCREDITED CALIBRATION LABORATORY NO. 4533

Certificate Number
G500034_2/8327
Page 2 of 2 Pages

Non-UKAS Accredited results:

Barometer (mb)	
Reference	Reading
1004mb	1006mb

End of Certificate

Sample

15.0 Important notice to all customers**WEEE COMPLIANT**

The wheeled 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 WEEE/NYN680

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 Appendices – safety instructions

16.1 Instructions for safe use – Italian language

Istruzioni per la sicurezza

 Avvertenza	<p>Gli analizzatori di gas serie 5000 possono essere utilizzati per misurare i gas provenienti da discariche o da altre fonti, come descritto in questo manuale.</p> <p>L'operatore può essere esposto a gas nocivi durante l'utilizzo dello strumento. L'inalazione di questi gas può danneggiare la salute e in alcuni casi essere letale.</p> <p>Spetta all'utente controllare di essere sufficientemente informato sugli aspetti riguardanti la sicurezza dei gas utilizzati e di seguire le procedure appropriate. In particolare nel caso di gas pericolosi, quelli scaricati dall'analizzatore devono essere convogliati in un'area in cui lo scaricatore operazione possa essere effettuata in condizioni di sicurezza.</p> <p>È possibile che lo strumento scarichi gas pericolosi anche durante lo spurgo quando viene utilizzato per spurgare con aria pulita.</p>
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☞ Nota: gli analizzatori di gas sono apparecchi scientifici delicati e vanno trattati come tali. Utilizzando l'apparecchio in modo diverso da quanto specificato dalla casa produttrice, l'apparecchio stesso potrebbe non fornire più la protezione prevista.

Gli analizzatori di gas serie 5000 sono conformi alla Parte 15 delle norme FCC. L'utilizzo è soggetto alle seguenti due condizioni:

- 1) il dispositivo non deve causare interferenze dannose
- 2) il dispositivo deve accettare le interferenze che riceve, anche se possono causare effetti indesiderati per il suo funzionamento.

Gli analizzatori di gas della serie 5000 sono certificati con riferimento alla classificazione delle aree pericolose secondo ATEX e IECEx.

 **II 2G Ex ib IIA T1 Gb (Ta = da -10°C a +50°C)**

È essenziale seguire scrupolosamente le istruzioni. Spetta all'operatore definire il concetto di protezione e la classificazione richiesta per una data applicazione.

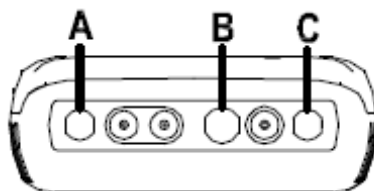
Istruzioni per l'uso in sicurezza - Italiano

(Riferimento alla Direttiva europea ATEX 94/9/CEC, Allegato II, 1.0.6.)

Le seguenti istruzioni si applicano agli apparecchi coperti dai certificati SIRA 11ATEX2197X e SIR 11.0089X della Direttiva IECEx:

- Gli apparecchi possono essere utilizzati con gas e vapori infiammabili di gruppo IIA e temperature di classe T1.
- Gli apparecchi sono certificati solo per l'uso a temperatura ambiente compresa tra -10°C e +50°C e non vanno utilizzati al di fuori di questo intervallo.

- Gli apparecchi non vanno utilizzati in un'atmosfera che contenga più del 21% di ossigeno.
- Le riparazioni di questi apparecchi vanno effettuate in conformità al codice professionale rilevante.
- In aree pericolose, utilizzare solo la sonda di temperatura GF5.2 (SIRA 11ATEX2197X e IECEx SIR11.0089X). Per il connettore C, l'anemometro GF5.4 (BVS 04ATEXE194) da usare esclusivamente con apparecchi ATEX. Nella zona pericolosa, l'analizzatore non va collegato ad altri dispositivi in dotazione, come il cavo GF-USB (per il connettore A) o il caricabatteria GF3.9 (per il connettore B).



**Non caricare, ricaricare o aprire in un'atmosfera potenzialmente esplosiva.
In aree pericolose, utilizzare solo la "sonda di temperatura GF5.2" con il connettore B.**

**Connettore C ($U_o=10V, I_o=5mA, P_o=50mW, C_i=0, L_i=0, C_o=100\mu F, L_o=1000mH$),
Connettore B ($U_o=5V, I_o=6mA, P_o=7mW, C_i=0, L_i=0, C_o=100\mu F, L_o=1000mH$)**

**ALIMENTAZIONI MASSIME NON PERICOLOSE:
Connettore A - $U_m=6V$ Connettore B - $U_m=10,1V$**

- Se esiste la possibilità che l'apparecchio potrebbe venire in contatto con sostanze aggressive, ad esempio liquidi acidi o gas che possono attaccare i metalli o solventi che possono agire su materiali polimerici, spetta all'utente adottare le precauzioni necessarie, ad es. controlli regolari come da programma o verifica della resistenza a sostanze chimiche specifiche consultando la scheda tecnica, per evitare effetti negativi e non compromettere il tipo di protezione di cui è dotato l'apparecchio.
- L'intervallo di pressione relativa è di +/-500 mbar. Si noti tuttavia che la pressione in entrata non deve superare +/- 500 mbar relativamente alla pressione atmosferica e la pressione in uscita non deve superare +/- 100 mbar relativamente alla pressione atmosferica.

Gli analizzatori di gas della serie 5000 sono certificati con riferimento alla classificazione delle aree pericolose secondo CSA (Canada)

CLASSE 2258 03 - APPARECCHIATURE DI CONTROLLO DEI PROCESSI - Sistemi intrinsecamente sicuri e ignifughi - Per luoghi pericolosi.



Ex ib IIA

Rilevatori di metano Modello GA 5000, GEM 5000 e BIOGAS 5000; portatili, a batteria, con pacco batterie non sostituibile sul campo, cod. parte 20087; intrinsecamente sicuri, per circuiti intrinsecamente sicuri ("ib" per Zona 1) fino alla sonda di temperatura Modello GF5.2 (Connettore B) e con parametri di entità in uscita come indicato nella tabella sottostante; Codice temperatura T1; $-10\text{ }^{\circ}\text{C} \leq T_{amb.} \leq +50\text{ }^{\circ}\text{C}$.

Connettore	Parametri entità						
	Uo (V)	Io (mA)	Po (mW)	Co (uF)	Lo (mH)	Ci (uF)	Li (mH)
B	5,0	6	7	100	1000	0	0
C	10,0	5	50	100	1000	0	0

⚠ Nota: questo dispositivo è stato controllato solo per quanto riguarda le caratteristiche di sicurezza elettrica.

Gli analizzatori di gas della serie 5000 sono certificati con riferimento alla classificazione delle aree pericolose secondo CSA (USA)

CLASSE 2258 83 - APPARECCHIATURE DI CONTROLLO DEI PROCESSI - Sistemi intrinsecamente sicuri e ignifughi - Per luoghi pericolosi - CERTIFICATE PER USA NORME



AEx ib IIA

Rilevatori di metano Modello GA 5000, GEM 5000 e BIOGAS 5000; portatili, a batteria, con pacco batterie non sostituibile sul campo, cod. parte 20087; intrinsecamente sicuri, per circuiti intrinsecamente sicuri ("ib" per Zona 1) fino alla sonda di temperatura Modello GF5.2 (Connettore B) e con parametri di entità in uscita come indicato nella tabella sottostante; Codice temperatura T1; $-10\text{ }^{\circ}\text{C} \leq T_{\text{amb.}} \leq +50\text{ }^{\circ}\text{C}$.

Connettore	Parametri entità						
	Uo (V)	Io (mA)	Po (mW)	Co (uF)	Lo (mH)	Ci (uF)	Li (mH)
B	5,0	6	7	100	1000	0	0
C	10,0	5	50	100	1000	0	0

⚠ Nota: questo dispositivo è stato controllato solo per quanto riguarda le caratteristiche di sicurezza elettrica.

MCERTS

MCERTS sta per Monitoring Certification Scheme, il programma di certificazione della Environment Agency, l'ente istituzione britannico per la protezione ambientale. Il programma offre uno schema in base al quale effettuare le misurazioni ambientali rispettando i requisiti qualitativi dell'Environment Agency e comprende varie attività di monitoraggio, campionatura e ispezione.

Lo strumento GEM5000 ha la certificazione MCERTS solo se:

- Dopo l'accensione iniziale, sullo schermo compare il logo MCERTS.

⚠ Nota: MCERTS - Su questo strumento non si sono effettuati test di sensibilità incrociata con l'utilizzo di idrogeno solforato. Pertanto gli utenti devono accertare la presenza di H₂S, che potrebbe avere un effetto interferenziale.

MCERTS promuove fiducia nel monitoraggio dei dati e offre al settore una struttura sperimentata per scegliere sistemi e servizi di monitoraggio che soddisfino i requisiti dell'Environment Agency.

L'Environment Agency ha istituito il Monitoring Certification Scheme (MCERTS) per conseguire misurazioni ambientali qualitativamente valide. Il programma MCERTS offre la


Prassi ottimali

- Nel recarsi al luogo di utilizzo, collocare l'analizzatore di gas nell'abitacolo del veicolo, non nel bagagliaio, dove potrebbe essere soggetto a estremi di temperatura e danneggiarsi per eventuali urti. Non appoggiare l'analizzatore di gas contro superfici calde (ad es. tubo di aspirazione del gas, carrozzeria di un'autovettura o interno di un'autovettura incustodita in estate), perché ciò fa aumentare la temperatura dell'analizzatore di gas e può falsare le letture.
- Negli spostamenti nell'area di utilizzo dell'analizzatore di gas, proteggerlo dalla luce diretta del sole e dagli scrosci di pioggia.

Usare sempre il sifone per lo scarico della condensa!. Se il sifone si allaga, cambiare il filtro e controllare che tutti i tubi siano liberi dalla condensa prima di riutilizzarlo


☞ Nota: se lo scarico di un analizzatore di gas serie GA5000 è collegato ad un sistema pressurizzato, ciò fa uscire un flusso di gas dall'entrata.

Taratura

 Avvertenza	<p>I gas di taratura possono essere pericolosi.</p> <p>Per ciascun gas da utilizzare, leggere preventivamente la relativa scheda tecnica di sicurezza, accertandosi di comprenderne il contenuto.</p>
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Il regolatore fornito col kit di taratura è stato configurato per permettere l'erogazione di un flusso fisso.

Dato che il flusso del regolatore è impostato in fabbrica, può essere aperto con una semplice rotazione, senza effettuare regolazioni.

 Avvertenza	<p>Luce di scarico</p> <p>Durante la taratura dell'analizzatore, vi sono due possibili uscite per il gas: come di norma dalla luce di scarico (gialla) dell'analizzatore o, in caso di sovrappressione, dalla luce di 1/16" della valvola limitatrice di pressione rossa situata sul regolatore.</p> <p>Si raccomanda che entrambe le luci siano dotate di tubi di scarico, che devono sboccare in un'area ben ventilata. Controllare che i tubi e i raccordi non presentino perdite.</p> <p>La taratura dell'analizzatore di gas va eseguita in un'area idonea, adottando tutte le precauzioni necessarie per l'utilizzo di gas potenzialmente pericolosi, esplosivi o tossici.</p>
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☞ Nota: è possibile anche che il gas esca dall'uscita del flusso interno (blu) dell'analizzatore di gas (vale solo per GA5000).

Manutenzione

Gli analizzatori di gas della serie 5000 devono essere sottoposti a regolare controllo di manutenzione per accertare che il funzionamento sia corretto e preciso. Geotech (UK)

Limited raccomanda che la manutenzione e la taratura siano effettuate ogni 6 mesi.

Gli analizzatori di gas della serie 5000 hanno la certificazione ATEX per l'utilizzo in aree potenzialmente esplosive. In quanto tali, la loro manutenzione deve essere affidata esclusivamente a tecnici qualificati. La mancata osservanza di questa regola invalida la garanzia ed eventualmente anche la certificazione ATEX.

 Avvertenza	Se la manutenzione dell'analizzatore di gas viene effettuata da tecnici non qualificati, la certificazione ATEX può venirne compromessa, pregiudicando così l'utilizzo in condizioni di sicurezza dello strumento in un'atmosfera potenzialmente esplosiva.
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Parti riparabili dall'utente:

Non vi sono parti riparabili dall'utente all'interno dello strumento.

Le parti seguenti possono essere riparate:

Filtro acqua in linea	Va controllato regolarmente per evidenziare eventuali ostruzioni, condensa o danneggiamenti e sostituito se necessario. Lo strumento non va mai usato senza il filtro in linea, per evitare possibili infiltrazioni perché vi entrerebbe l'acqua.
Tubi di campionamento	Controllare sempre che i tubi di campionamento non siano contaminati o danneggiati.
Raccordi del gas	Controllare periodicamente che i gommini O-ring dei raccordi del gas non siano danneggiati. Se danneggiati, gli O-ring lasciano entrare aria nei tubi di campionamento, sfalsando le letture. Se l'O-ring risulta danneggiato, è necessario sostituire tutto il raccordo.
Materiale del filtro H ₂ S	Quando il materiale del filtro cambia colore e diventa <i>grigio chiaro</i> , il filtro va sostituito.

Dichiarazione di conformità – Italiano

Prodotti	<ul style="list-style-type: none"> • GA5000 – Analizzatore di gas per discariche • GEM5000 - Analizzatore di gas e monitor di estrazione per discariche e monitor per l'estrazione • BIOGAS 5000 – Analizzatore di gas per impianti di digestione anaerobica
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Geotechnical Instruments (UK) Limited dichiara che gli articoli sopra descritti sono conformi ai seguenti standard:

Direttiva ATEX 94/9/CE

Organismo di certificazione	SIRA Certification Service Servizio di certificazione SIRA
Numero dell'organismo notificato	0518

Indirizzo	Rake Lane, Eccleston, Chester, CH4 9JN, GB
N° certificazione SIRA	SIRA 11ATEX2197X
Norme applicate	EN60079-0 :2006 EN60079-0 :2009 EN60079-11 :2007

IECEX

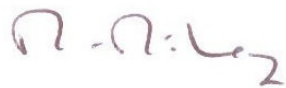
Organismo di certificazione	SIRA Certification Service Servizio di certificazione SIRA
Numero dell'organismo notificato	0518
Indirizzo	Rake Lane, Eccleston, Chester, CH4 9JN, GB
N° certificazione IECEX	SIR 11.0089X
Norme applicate	IEC60079-0 :2004 Ed4 IEC60079-0 :2007 Ed5 IEC60079-11 :2006 Ed5

CSA (Canada e USA)

Organismo di certificazione	CSA International
Indirizzo	178 Rexdale Boulevard, Toronto, ON, Canada M9W 1R3
N° certificazione CSA	CSA 11 2445306
Norme applicate	C22.2 No. 0-10 - Requisiti generali – Codice elettrico canadese, Parte II CAN/CSA-C22.2 No. 60079-0:07 - Apparecchi elettrici per atmosfere con gas esplosivi - Parte 0: Requisiti generali CAN/CSA-C22.2 No. 60079-1:07 - Apparecchi elettrici per atmosfere con gas esplosivi - Parte 1: Custodie a prova di esplosione "d" CAN/CSA-E60079-11:02 - Apparecchi elettrici per atmosfere con gas esplosivi - Parte 11: Sicurezza intrinseca "i" ANSI/UL 60079-0:09 - Apparecchi elettrici per atmosfere con gas esplosivi - Parte 0: Requisiti generali ANSI/UL 60079-1:09 - Apparecchi elettrici per atmosfere con gas esplosivi - Parte 1: Custodie a prova di esplosione "d" ANSI/UL 60079-11:09 - Apparecchi elettrici per atmosfere con gas esplosivi - Parte 11: Sicurezza intrinseca "i"

Direttiva EMC 2004/108/CE


EN 301 489 P. 1 (V1.9.1 – 2011-04)	Compatibilità elettromagnetica e questioni relative allo spettro delle radiofrequenze (ERM) Norma di compatibilità elettromagnetica (EMC) per apparecchiature e servizi radio Parte 1: Prescrizioni tecniche comuni
EN 301 489 P. 17 (V2.1.1 – 2009-05)	Compatibilità elettromagnetica e questioni relative allo spettro delle radiofrequenze (ERM) Norma di compatibilità elettromagnetica (EMC) per apparecchiature radio Parte 17: Condizioni specifiche per sistemi di trasmissione dati su banda larga EMC per sistemi di trasmissione dati su banda larga
EN 301 489 P. 19 (V1.2.1 – 2002-11)	Compatibilità elettromagnetica e questioni relative allo spettro delle radiofrequenze (ERM) Norma di compatibilità elettromagnetica (EMC) per apparecchiature e servizi radio Parte 19: Condizioni specifiche per soli ricevitori di stazioni mobili terrestri (ROMES) operativi nella banda 1,5 GHz che forniscono comunicazioni di dati EMC per soli ricevitori di stazioni mobili terrestri (ROMES)
BS EN 61000-3-2: 2006 + A2:2009	Limiti di compatibilità elettromagnetica (EMC) . Limiti per le emissioni di corrente armonica (apparecchiature con corrente di ingresso ≤ 16 A per fase)
BS EN 61000-3-3: 2008	Limiti di compatibilità elettromagnetica (EMC) . Limitazione delle fluttuazioni di tensione e del flicker in sistemi di alimentazione in bassa tensione per apparecchiature con corrente nominale ≤ 16 A e non soggette ad allacciamento su condizione


Firmato


Dr. Roger Riley

16.2 Instructions for safe use – German language

Sicherheitsvorschriften

<p> Warnhinweise</p>	<p>Die Gasanalysatoren der 5000er Serie können zum Messen der Gase von Deponien und anderen Quellen wie in diesem Handbuch beschrieben verwendet werden.</p> <p>Der Bediener kann bei Verwendung des Geräts schädlichen Gasen ausgesetzt werden. Das Einatmen dieser Gase kann gesundheitsschädlich und in manchen Fällen sogar tödlich sein.</p> <p>Es liegt in der Verantwortung des Benutzers sicherzustellen, dass er/sie angemessen über die Sicherheitsaspekte der eingesetzten Gase geschult ist und geeignete Verfahren befolgt werden. Vor allem beim Einsatz gefährlicher Gase muss das vom Analysator ausströmende Gas in einen Bereich geleitet werden, in dem das Gas sicher abgeführt werden kann.</p> <p>Gefährliches Gas kann ebenso vom Gerät ausgestoßen werden, wenn es mit sauberer Luft gereinigt wird.</p>
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 **Hinweis:** Gasanalysatoren sind empfindliche wissenschaftliche Geräte und sollten entsprechend behandelt werden. Wenn das Gerät anders als vom Hersteller spezifiziert verwendet wird, kann der vom Gerät gebotene Schutz beeinträchtigt werden.

Die Gasanalysatoren der 5000er Serie erfüllen Abschnitt 15 der FCC-Vorschriften. Der Betrieb unterliegt den folgenden zwei Bedingungen:

- 1) Dieses Gerät darf keine schädlichen Funkstörungen verursachen.
- 2) Dieses Gerät muss mögliche empfangene Funkstörungen und dadurch verursachte Funktionsstörungen dulden.

Für ATEX und IECEx sind die Gasanalysatoren der 5000er Serie für den Einsatz in explosionsgefährdeten Bereichen zertifiziert.

 **II 2G EX ib IIA T1 Gb (Ta = -10°C bis +50°C)**

Die Vorschriften müssen unbedingt genau befolgt werden. Es liegt in der Verantwortung des Betreibers, das Schutzkonzept und die erforderliche Schutzklasse für eine bestimmte Anwendung festzulegen.

Vorschriften zur sicheren Verwendung - Deutsch

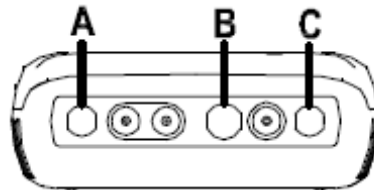
(Siehe Europäische ATEX-Richtlinie 94/9/EC, Anhang II, 1.0.6.)

Die folgenden Vorschriften gelten für Geräte, die in den Zertifikaten Nr. SIRA 11ATEX2197X und IECEx Richtlinie SIR 11.0089X behandelt werden:

- Die Geräte dürfen mit brennbaren Gasen und Dämpfen mit Apparategruppe IIA und Temperaturklasse T1 eingesetzt werden.
- Die Geräte sind nur für den Einsatz bei Umgebungstemperaturen im Bereich von -10 °C bis +50 °C zertifiziert und sollten nicht außerhalb dieses Bereichs eingesetzt werden.
- Die Geräte dürfen nicht in einer Atmosphäre mit mehr als 21 % Sauerstoffgehalt

eingesetzt werden.

- Die Reparatur dieser Geräte darf nur entsprechend der maßgeblichen Anleitung durchgeführt werden.
- Bei Einsatz in einem explosionsgefährdeten Bereich darf nur Temperaturfühler GF5.2 (SIRA 11ATEX2197X und IECExSIR11.0089X) verwendet werden. Anemometer GF5.4 (BVS 04ATEXE194), nur für den Einsatz mit ATEX, in Anschluss C. Der Analysator darf nicht an andere Geräte im explosionsgefährdeten Bereich angeschlossen werden, einschließlich des im Lieferumfang enthaltenen GF-USB-Kabels (Anschluss A) bzw. Ladegeräts GF3.9 (Anschluss B).



In einer explosionsgefährdeten Atmosphäre nicht laden, wieder aufladen oder öffnen.

In einem explosionsgefährdeten Bereich nur „Temperaturfühler GF5.2“ in Anschluss B verwenden.

**Anschluss C ($U_o=10\text{ V}$, $I_o=5\text{ mA}$, $P_o=50\text{ mW}$, $C_i=0$, $L_i=0$, $C_o=100\text{ uF}$, $L_o=1000\text{ mH}$),
Anschluss B ($U_o=5\text{ V}$, $I_o=6\text{ mA}$, $P_o=7\text{ mW}$, $C_i=0$, $L_i=0$, $C_o=100\text{ uF}$, $L_o=1000\text{ mH}$)**

MAXIMALE VERSORGUNG IN NICHT EXPLOSIONSGEFÄHRDETEN BEREICHEN:

Anschluss A - $U_m=6\text{ V}$ Anschluss B - $U_m=10,1\text{ V}$

- Falls die Möglichkeit besteht, dass die Geräte mit aggressiven Substanzen in Berührung kommen, z. B. mit sauren Flüssigkeiten oder Gasen, die Metalle angreifen können, oder mit Lösungsmitteln, die Polymerwerkstoffe schädigen können, liegt es in der Verantwortung des Benutzers, geeignete Sicherheitsvorkehrungen zu treffen, z. B. regelmäßige Kontrollen als Teil der Routineinspektionen oder die Prüfung des Materialdatenblatts darauf, ob das Gerät mit speziellen Chemikalien kompatibel ist, die es vor Schäden schützen, um zu gewährleisten, dass diese Art des Schutzes nicht beeinträchtigt wird.
- Der relative Druckbereich ist +/-500 mbar. Es ist jedoch zu beachten, dass der Eingangsdruck +/- 500 mbar relativ zum Atmosphärendruck nicht überschreiten darf und dass der Ausgangsdruck +/- 100 mbar relativ zum Atmosphärendruck nicht überschreiten darf.

Für CSA (Kanada) sind die Gasanalysatoren der 5000er Serie für den Einsatz in explosionsgefährdeten Bereichen zertifiziert.

KLASSE 2258 03 - PROZESSKONTROLLGERÄT - Eigensichere und nicht zündgefährliche Systeme - Für explosionsgefährdete Standorte



Ex ib IIA:

Methandektoren Modell GA 5000, GEM 5000 und BIOGAS 5000; tragbar, batteriebetrieben mit nicht im Feld austauschbarem Akkupack Teilnr. 20087; eigensicher, bietet eigensichere Kreise („ib“) für Zone 1) für Temperaturfühler Modell GFS.2 (Anschluss B), mit Entitätsausgabenparameter wie unten aufgeführt; Temperaturcode T1; $-10\text{ °C} \leq T_{amb} \leq +50\text{ °C}$.

Anschluss	Entitätsparameter						
	Uo (V)	Io (mA)	Po (mW)	Co (uF)	Lo (mH)	Ci (uF)	Li (mH)
B	5,0	6	7	100	1000	0	0
C	10,0	5	50	100	1000	0	0

⚠ Hinweis: Dieses Gerät wurde nur auf elektrische Sicherheitsfunktionen untersucht.

Für CSA (USA) sind die Gasanalysatoren der 5000er Serie für den Einsatz in explosionsgefährdeten Bereichen zertifiziert.

KLASSE 2258 83 - PROZESSKONTROLLGERÄT - Eigensichere und nicht zündgefährliche Systeme - Für explosionsgefährdete Standorte - NACH US-AMERIKANISCHEN NORMEN ZERTIFIZIERT



AEx ib IIA:

Methandektoren Modell GA 5000, GEM 5000 und BIOGAS 5000; tragbar, batteriebetrieben mit nicht im Feld austauschbarem Akkupack Teilernr. 20087; eigensicher, bietet eigensichere Kreise („[ib]“ für Zone 1) für Temperaturfühler Modell GFS.2 (Anschluss B), mit Entitätsausgabenparameter wie unten aufgeführt; Temperaturcode T1; $-10\text{ °C} \leq T_{amb.} \leq +50\text{ °C}$.

Anschluss	Entitätsparameter						
	Uo (V)	Io (mA)	Po (mW)	Co (uF)	Lo (mH)	Ci (uF)	Li (mH)
B	5,0	6	7	100	1000	0	0
C	10,0	5	50	100	1000	0	0

⚠ Hinweis: Dieses Gerät wurde nur auf elektrische Sicherheitsfunktionen untersucht.

MCERTS

MCERTS ist das Monitoring Certification Scheme (Zertifizierungsprogramm für Überwachungsgeräte) der britischen Umweltagentur. Das Programm bietet einen Rahmen, in dem Umgebungsmessungen gemäß den Qualitätsanforderungen der Agentur durchgeführt werden können. Es umfasst eine Reihe von Überwachungs-, Probenahme- und Prüfaufgaben.

Das Instrument GEM5000 ist nur MCERTS-zertifiziert, falls:

- Das MCERTS-Logo nach dem erstmaligen Einschalten auf dem Bildschirm erscheint.

⚠ Hinweis: MCERTS - Bei diesem Gerät wurden keine Störempfindlichkeitsprüfungen mit Schwefelwasserstoff durchgeführt. Daher sollten Benutzer wissen, ob H₂S vor Ort vorhanden ist, da dies eine Störwirkung zur Folge haben könnte.

MCERTS fördert das öffentliche Vertrauen in Überwachungsdaten und liefert der Industrie einen erprobten Rahmen zur Auswahl von Überwachungssystemen und -dienstleistungen, die die Leistungsanforderungen der Umweltagentur erfüllen.

Die britische Umweltagentur hat MCERTS (Monitoring Certification Scheme) initiiert, um

hochwertige Umweltmessungen bereitzustellen. Das MCERTS Produktzertifizierungsprogramm ermöglicht die Zertifizierung von Produkten gemäß den Leistungsstandards der Umweltagentur basierend auf den entsprechenden CEN-, ISO- und nationalen Normen.

MCERTS-zertifizierte Geräte wurden durch eine unabhängige Stelle geprüft, um zu gewährleisten, dass bestimmte Leistungsanforderungen erfüllt werden. Darüber hinaus wird der Hersteller eines MCERTS-Produkts regelmäßig geprüft, um zu gewährleisten, dass die Leistungsanforderungen der Zertifizierung durchgehend erfüllt werden.

Die Gasanalysatoren der 5000er Serie wurden gemäß Version 3.1 der „Leistungsanforderungen für tragbare Emissionsüberwachungssysteme“ zertifiziert.

Akku und Aufladen

Bei dem Akku, der in den Gasanalysatoren der 5000er Serie verwendet wird, handelt es sich um einen Nickel-Metallhydrid-Akku, der als Akkupack aus sechs einzelnen Zellen hergestellt wird. Dieser Akkutyp ist weniger stark für den Memoryeffekt anfällig als Nickel-Kadmium-Akkus. Trotzdem wird davon abgeraten, das Gerät mit kleinen Ladungen nachzuladen.

Das Ladegerät sollte nur getrennt werden, wenn komplette Ladung angezeigt wird.



Warnhinweise

Das Akkuladegerät ist NICHT in der ATEX-Zertifizierung enthalten. Der Akku darf nur in einem sicheren Bereich aufgeladen werden.

Das Akkuladegerät ist intelligent und zeigt an, wenn die Einheit aufgeladen wird bzw. wenn sie vollständig aufgeladen ist.

Das Gerät darf NUR mit dem mitgelieferten Akkuladegerät aufgeladen werden. Das Akkuladegerät ist nur für den Gebrauch in Innenräumen vorgesehen. Bitte sorgen Sie für ausreichende Belüftung während des Aufladens.

Ladegerät:	Eingangsspannung:	100-240 V AC +/- 10 %
	Eingangsfrequenz:	50-60 Hz +/- 10 %
	Eingangsstromstärke:	0,4 A bei 100 VAC .. 0,2 A bei 240 VAC
	Ausgangsspannung:	Max. 10,1 VDC
	Ausgangsstromstärke:	Max. 1,5 A

☞ Hinweis: Schließen Sie das Ladegerät durch Verbinden des entsprechenden Adapters an das Stromnetz an. Wenden Sie sich für weitere Informationen an den Hersteller.

Reinigungsanweisungen

Verwenden Sie KEINE Reinigungsmittel zum Reinigen des Analysegeräts oder Akkuladegeräts, da sie die sichere Verwendung dieser Geräte beeinträchtigen können.

Good Practice beim Ablesen



Warnhinweise

Das Einatmen von Schwefelwasserstoffgas (H₂S) oder anderer schädlicher Gase kann tödlich sein. Es liegt in der Verantwortung des Benutzers sicherzustellen, dass er/sie angemessen über die Sicherheitsaspekte beim Einsatz von H₂S und anderer schädlicher Gase geschult ist. Vor allem beim

	Einsatz gefährlicher Gase muss das vom Analysator ausströmende Gas in einen Bereich geleitet werden, in dem das Gas sicher abgeführt werden kann. Gefährliches Gas kann ebenso vom Gerät ausgestossen werden, wenn es mit sauberer Luft ausgeblasen wird.
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Good Practice

- Transportieren Sie den Gasanalysator im Inneren des Fahrzeugs an den Einsatzort - nicht auf der Ladefläche, wo er Temperaturschwankungen und möglichen Stößen ausgeliefert ist. Platzieren Sie den Gasanalysator nicht direkt an oder auf etwas Heißem (z. B. Gasleitung, Karosserie oder in einem unbeaufsichtigten Auto während des Sommers), da dies einen Temperaturanstieg im Gasanalysator verursacht und zu fehlerhaften Messwerten führen kann.
- Schützen Sie den Gasanalysator am Einsatzort vor starkem, direktem Sonnenlicht und starkem Regen.

Verwenden Sie stets den Wasserabscheider! Wenn der Wasserabscheider überschwemmt wird, tauschen Sie den Filter aus, und stellen Sie sicher, dass alle Schläuche frei von Feuchtigkeit sind, bevor Sie sie erneut verwenden.


☞ Hinweis: Wenn der Auslass eines Gasanalysators der Serie GA5000 an ein druckbeaufschlagtes System angeschlossen ist, dann führt dies zu einem Gasstrom aus dem Einlassstromanschluss.

Kalibrieren

 Warnhinweise	Eichgase können gefährlich sein. Vor dem Verfahren müssen die Materialsicherheitsdatenblätter aller verwendeten Gase gelesen und verstanden werden.
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Der mit dem Kalibrierset gelieferte Regulator wurde so konfiguriert, dass er einen unveränderlichen Durchfluss liefert.

Da der Durchfluss des Regulators werkseitig eingestellt ist, lässt der Regulator sich mit nur wenigen Drehungen öffnen; eine Einstellung ist nicht erforderlich.

 Warnhinweise	Austrittsöffnung Wenn der Gasanalysator kalibriert wird, gibt es zwei mögliche Ausgänge für das Gas: auf die übliche Art über die Austrittsöffnung (gelb) des Analysators oder bei Überdruck über die 1/16" Öffnung des roten Druckentlastungsventils, das sich am Regler befindet. Für beide Öffnungen wird das Anbringen von Auslassrohrleitungen empfohlen. Die Auslassrohrleitungen müssen in einen gut belüfteten Bereich führen. Stellen Sie sicher, dass es in den Rohrleitungen und an den Verbindungen keine Undichtigkeiten gibt. Das Kalibrieren des Gasanalysators muss in einem
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	sicheren Bereich unter Anwendung aller notwendigen Sicherheitsvorkehrungen durchgeführt werden, wenn möglicherweise gefährliche, explosive oder toxische Gase eingesetzt werden.
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☞ Hinweis: Es besteht außerdem die Möglichkeit, dass Gas aus dem internen Strömungsanschluss (blau) des Gasanalysators ausgestoßen wird (gilt nur für GA5000).

Wartung

Die Gasanalysatoren der 5000er Serie müssen regelmäßig gewartet werden, um den korrekten und genauen Betrieb zu gewährleisten. Geotech (UK) Limited empfiehlt ein Wartungs- und Neukalibrierungsintervall von 6 Monaten.

Die Gasanalysatoren der 5000er Serie sind für den Einsatz in explosionsgefährdeten Bereichen ATEX-zertifiziert. Daher dürfen sie nur von qualifizierten Technikern gewartet werden. Im Falle der Nichtbefolgung erlischt die Garantie, und die ATEX-Zertifizierung kann ihre Gültigkeit verlieren.

 Warnhinweise	Falls der Gasanalysator von unqualifizierten Technikern gewartet wird, kann die ATEX-Zertifizierung ihre Gültigkeit verlieren, und das Gerät ist möglicherweise für den Einsatz in einer explosionsgefährdeten Atmosphäre nicht mehr sicher.
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Teile, die durch den Benutzer gewartet werden können:

Im Gerät gibt es keine Teile, die durch den Benutzer gewartet werden können.

Die folgenden Teile können durch den Benutzer gewartet werden:

Wasserleitungsfilter	Er muss regelmäßig auf Verstopfungen, Feuchtigkeit bzw. Beschädigungen untersucht und, falls erforderlich, ausgetauscht werden. Das Gerät darf nie ohne den Wasserleitungsfilter betrieben werden, da dies dazu führen könnte, dass Wasser in das Gerät eindringt.
Probenrohrleitungen	Stellen Sie stets sicher, dass die Probenrohrleitungen weder verunreinigt noch beschädigt sind.
Gasausgangsanschlüsse	Prüfen Sie periodisch, ob die O-Ringe an den Gasausgangsanschlüssen beschädigt sind. Durch einen beschädigten O-Ring kann Luft in das Messgas eindringen und zu falschen Messwerten führen. Falls der O-Ring beschädigt ist, muss der gesamte Gasausgangsanschluss ausgetauscht werden.
H ₂ S Filtermaterial	Sobald die Farbe des Filtermaterials <i>leicht grau</i> wird, muss der Filter ausgetauscht werden.

Konformitätserklärung - Deutsch

Produkte	<ul style="list-style-type: none"> • GA5000 - Deponiegasanalysator • GEM5000 - Deponiegasanalysator und Extraktionsüberwachungsgerät • BIOGAS 5000 - Gasanalysator für anaerobe Biogasanlage
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Geotechnical Instruments (UK) Limited erklärt, dass das/die oben beschriebene(n) Produkt(e) den folgenden Normen entsprechen:

ATEX-Richtlinie 94/9/EG

Zertifizierungsstelle	SIRA Certification Service
Nummer der benannten Stelle	0518
Adresse	Rake Lane, Eccleston, Chester, CH4 9JN, UK
SIRA Bescheinigungsnummer	SIRA 11ATEX2197X
Angewendete Normen	EN60079-0 :2006 EN60079-0 :2009 EN60079-11 :2007

IECEX

Zertifizierungsstelle	SIRA Certification Service
Nummer der benannten Stelle	0518
Adresse	Rake Lane, Eccleston, Chester, CH4 9JN, UK
IECEX Bescheinigungsnummer	SIR 11.0089X
Angewendete Normen	IEC60079-0 :2004 Ed4 IEC60079-0 :2007 Ed5 IEC60079-11 :2006 Ed5


CSA (Kanada und USA)

Zertifizierungsstelle	CSA International
Adresse	178 Rexdale Boulevard, Toronto, ON, Kanada M9W 1R3
CSA Bescheinigungsnummer	CSA 11 2445306
Angewendete Normen	<p>C22.2 Nr. 0-10 – Allgemeine Anforderungen – Kanadische Elektrorichtlinie, Teil II</p> <p>CAN/CSA-C22.2 Nr. 60079-0:07 - Elektrisches Gerät für explosionsfähige Gasatmosphären - Teil 0: Allgemeine Anforderungen</p> <p>CAN/CSA-C22.2 Nr. 60079-1:07 - Elektrisches Gerät für explosionsfähige Gasatmosphären - Teil 1: Druckfeste Kapselung „d“</p> <p>CAN/CSA-E60079-11:02 - Elektrisches Gerät für explosionsfähige Gasatmosphären - Teil 11: Eigensicherheit „i“</p> <p>ANSI/UL 60079-0:09 - Elektrisches Gerät für explosionsfähige Gasatmosphären - Teil 0: Allgemeine Anforderungen</p> <p>ANSI/UL 60079-1:09 - Elektrisches Gerät für explosionsfähige Gasatmosphären - Teil 1: Druckfeste Kapselung „d“</p> <p>ANSI/UL 60079-11:09 - Elektrisches Gerät für explosionsfähige Gasatmosphären - Teil 11: Eigensicherheit „i“</p>

EMC Richtlinie 2004/108/EG


EN 301 489 Teil 1 (V1.9.1 - 2011-04)	Elektromagnetische Verträglichkeit und Funkspektrumangelegenheiten (ERM); Elektromagnetische Verträglichkeit (EMV) für Funkeinrichtungen und -dienste; Teil 1: Gemeinsame technische Anforderungen
EN 301 489 Teil 17 (V2.1.1 - 2009-05)	Elektromagnetische Verträglichkeit und Funkspektrumangelegenheiten (ERM); Elektromagnetische Verträglichkeit (EMV) für Funkeinrichtungen; Teil 17: Spezifische Bedingungen für Breitband-Datenübertragungssysteme EMV für Breitbandübertragungssysteme
EN 301 489 Teil 19 (V1.2.1. - 2002-11)	Elektromagnetische Verträglichkeit und Funkspektrumangelegenheiten (ERM); Elektromagnetische Verträglichkeit (EMV) für Funkeinrichtungen und -dienste; Teil 19: Spezifische Bedingungen für mobile Empfangs-Erdfunkstellen (ROMES) zur Datenübertragung im 1,5-GHz-Frequenzband EMV für mobile Empfangs-Erdfunkstellen (ROMES)
BS EN 61000-3-2: 2006 + A2:2009	Elektromagnetische Verträglichkeit (EMV). Grenzwerte. Emissionsgrenzwerte für Oberschwingungsstrom (Geräteeingangsstrom ≤ 16 A je Leiter)
BS EN 61000-3-3: 2008	Elektromagnetische Verträglichkeit (EMV). Grenzwerte. Begrenzung von Spannungsänderungen, Spannungsschwankungen und Flimmern in öffentlichen Niederspannungs-Versorgungsnetzen für Geräte mit einem Bemessungsstrom ≤ 16 A je Leiter, die keiner Sonderanschlussbedingung unterliegen.

Unterschrift:



Dr. Roger Riley

16.3 Instructions for safe use – French language**Instructions concernant la sécurité**

 Avertissement	<p>Les analyseurs de gaz de la série 5000 sont conçus pour mesurer les gaz des sites d'enfouissement et d'autres sources, comme le décrit le présent manuel.</p> <p>L'opérateur risque d'être exposé à des gaz nocifs pendant l'utilisation de l'instrument. L'inhalation de ces gaz peut être nuisible à la santé et, dans certains cas, mortelle.</p> <p>Il incombe à l'utilisateur de s'assurer qu'il a reçu une formation adaptée aux aspects de la sécurité des gaz utilisés et de s'assurer du respect des procédures appropriées. En particulier, lors de l'utilisation de gaz dangereux, les gaz en sortie de l'analyseur doivent être évacués dans une zone où ils ne présentent aucun danger.</p> <p>Des gaz dangereux peuvent être également expulsés de l'instrument lors d'une purge à l'air propre.</p>
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☞ Remarque : Les analyseurs de gaz sont des instruments scientifiques sensibles qu'il convient de traiter en conséquence. Toute utilisation du matériel non conforme aux instructions du fabricant risque d'amoinrir la protection assurée par l'instrument.

Les analyseurs de gaz de la série 5000 sont conformes à l'article 15 de la réglementation FCC (Federal Communications Commission - Conseil supérieur de l'audiovisuel américain). Son utilisation est soumise aux deux conditions suivantes :

- 1) Cet appareil ne doit pas provoquer d'interférences nuisibles.
- 2) Cet appareil doit accepter toutes les interférences reçues, y compris celles qui pourraient provoquer un fonctionnement indésirable.

Dans le cadre des certifications ATEX et IECEx, l'analyseur de gaz de la série 5000 est certifié pour la catégorie zone dangereuse.

 **II 2G Ex ib IIA T1 Gb (Ta = -10°C à +50°C)**

Il est absolument indispensable de respecter les instructions contenues dans ce manuel. Il incombe à l'utilisateur de déterminer le type et la classification de protection requise pour une application spécifique.

Instructions pour une utilisation sûre – Français

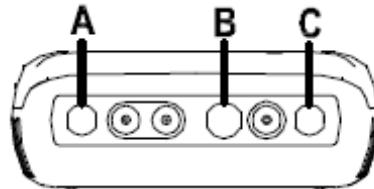
(Référence Directive européenne ATEX 94/9/CE, Annexe II, 1.0.6.)

Les instructions suivantes s'appliquent au matériel couvert par les numéros de certificat SIRA 11ATEX2197X et IECEx Directive SIR 11.0089X :

- Le matériel est utilisable avec des gaz et des vapeurs inflammables et des appareils de groupe IIA et de classe de température T1.
- Le matériel est certifié uniquement pour une utilisation à température ambiante entre -10°C et +50°C et ne doit pas être utilisé en dehors de cette plage.
- Le matériel ne doit pas être utilisé dans une atmosphère contenant plus de 21%

d'oxygène.

- Ce matériel devra être réparé conformément au code de pratique applicable.
- Lors d'une utilisation en zone dangereuse, utiliser exclusivement une sonde de température GF5.2 (SIRA 11ATEX2197X et IECEx SIR11.0089X). Pour le connecteur C, l'anémomètre GF5.4 (BVS 04ATEXE194) ne s'utilise qu'avec les dispositifs certifiés ATEX. L'analyseur ne doit être raccordé à aucun autre dispositif dans la zone dangereuse, ni au câble GF-USB (connecteur A) ni au chargeur de batterie GF3.9 (connecteur B) fourni avec l'analyseur.



Ne pas charger, recharger ni ouvrir en atmosphère potentiellement explosive. Dans une zone dangereuse, utiliser exclusivement la sonde de température GF5.2 branchée dans le connecteur B.

Connecteur C ($U_o=10\text{ V}$, $I_o=5\text{ mA}$, $P_o=50\text{ mW}$, $C_i=0$, $L_i=0$, $C_o=100\text{ uF}$, $L_o=1\ 000\text{ mH}$),

Connecteur B ($U_o=5\text{ V}$, $I_o=6\text{ mA}$, $P_o=7\text{ mW}$, $C_i=0$, $L_i=0$, $C_o=100\text{ uF}$, $L_o=1\ 000\text{ mH}$)

**ALIMENTATIONS MAXIMALES NON DANGEREUSES :
Connecteur A - $U_m=6\text{ V}$ Connecteur B - $U_m=10,1\text{ V}$**

- Si le matériel est amené à être en contact avec des substances corrosives, par exemple des liquides ou des gaz acides susceptibles d'attaquer les métaux, ou des solvants pouvant 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 matériau à des produits chimiques spécifiques, ceci afin de préserver l'intégrité de la protection.
- La plage de pression relative est de +/-500 mbar. Cependant, il convient de noter que la pression d'entrée ne doit pas dépasser +/- 500 mbar par rapport à la pression atmosphérique et la pression de sortie ne doit pas dépasser +/- 100 mbar par rapport à la pression atmosphérique.

Pour CSA (Canada), l'analyseur de gaz de la série 5000 est certifié pour la catégorie zone dangereuse

CLASSE 2258 03 - ÉQUIPEMENT DE CONTRÔLE DES PROCÉDÉS - Appareils à sécurité intrinsèque et appareils non incendiaires pour emplacements dangereux



Ex ib IIA :

Détecteurs de méthane Modèle GA 5000, GEM 5000 et BIOGAS 5000 ; appareils portatifs, avec batterie alimentée par bloc de batterie (numéro de pièce 20087) non remplaçable sur place ; à sécurité intrinsèque et fournissant des circuits à sécurité intrinsèque (« [ib] » pour zone 1) pour sonde de température modèle GF5.2 (connecteur B) et avec paramètres de sortie comme indiqué au tableau ci-dessous ; code de température T1; $-10\text{ °C} \leq T_{amb} \leq +50\text{ °C}$.

Connecteur	Paramètres						
	Uo (V)	Io (mA)	Po (mW)	Co (uF)	Lo (mH)	Ci (uF)	Li (mH)
B	5,0	6	7	100	1 000	0	0
C	10,0	5	50	100	1 000	0	0

⚠ Remarque : Les tests effectués sur cet appareil concernaient uniquement la sécurité électrique.

Pour CSA (États-Unis), l'analyseur de gaz de la série 5000 est certifié pour la catégorie zone dangereuse

CLASSE 2258 83 - ÉQUIPEMENT DE CONTRÔLE DES PROCÉDÉS - Appareils à sécurité intrinsèque et appareils non incendiaires pour emplacements dangereux - CERTIFICATION AUX NORMES AMÉRICAINES (ÉTATS-UNIS)



AEx ib IIA :

Détecteurs de méthane Modèle GA 5000, GEM 5000 et BIOGAS 5000 ; appareils portatifs, avec batterie alimentée par bloc de batterie (numéro de pièce 20087) non remplaçable sur place ; à sécurité intrinsèque et fournissant des circuits à sécurité intrinsèque (« [ib] » pour zone 1) pour sonde de température modèle GF5.2 (connecteur B) et avec paramètres de sortie comme indiqué au tableau ci-dessous ; code de température T1; $-10\text{ °C} \leq T_{amb.} \leq +50\text{ °C}$.

Connecteur	Paramètres						
	Uo (V)	Io (mA)	Po (mW)	Co (uF)	Lo (mH)	Ci (uF)	Li (mH)
B	5,0	6	7	100	1 000	0	0
C	10,0	5	50	100	1 000	0	0

⚠ Remarque : Les tests effectués sur cet appareil concernaient uniquement la sécurité électrique.

MCERTS

MCERTS est le programme de certification de la surveillance, établi par l'agence britannique à l'Environnement. Ce programme forme le cadre dans lequel des mesures environnementales peuvent être effectuées conformément aux exigences de qualité de l'agence. Il couvre un ensemble d'activités de surveillance, d'échantillonnage et d'inspection.

L'instrument GEM5000 n'est certifié MCERTS que si :

- Le logo MCERTS s'affiche à l'écran après la mise sous tension de l'instrument.

⚠ Remarque : MCERTS - Cet instrument n'a pas fait l'objet de tests de sensibilité croisée utilisant le sulfure d'hydrogène. Par conséquent, les utilisateurs doivent être conscients qu'en cas de présence de H₂S sur les sites, il peut y avoir un effet d'interférence.

Le programme MCERTS contribue à renforcer la confiance du public vis-à-vis des données de surveillance et donne à l'industrie des paramètres sûrs pour le choix de systèmes et de services de surveillance répondant aux exigences de performance de l'agence.

L'agence à l'Environnement a établi ce programme MCERTS (Monitoring Certification Scheme) pour fournir des valeurs mesurées environnementales de qualité. La certification MCERTS concerne les produits aux normes de performance de l'agence à l'Environnement, sur la base des normes nationales, CEN et ISO pertinentes.

Les instruments certifiés MCERTS sont testés par un organisme indépendant pour assurer leur conformité à certaines exigences de performance. En outre, le fabricant de produits MCERTS fait l'objet d'audits réguliers pour s'assurer du respect continu des exigences de performance de ses produits aux fins de certification.

Les analyseurs de gaz de la série 5000 ont été certifiés conformément à la version 3.1 des « Normes de performance des systèmes portatifs de surveillance des émissions de substances dans l'atmosphère ».

Batterie et mise en charge

Les analyseurs de gaz de la série 5000 sont dotés d'une batterie au nickel-métal-hydrure, à six cellules individuelles intégrées. Ce type de batterie n'est pas aussi sensible à « l'effet de mémoire » qui affecte les capacités des piles au nickel cadmium. Il est cependant déconseillé de recharger la batterie par à-coups.

Débrancher le chargeur uniquement après indication de pleine charge.



Avertissement

Le chargeur de batterie n'est PAS couvert par la certification Ex. La batterie ne doit être chargée que dans un endroit sûr.

Le chargeur de batterie est intelligent et indique que la batterie est en cours de chargement ou chargée.

La batterie doit être chargée **UNIQUEMENT** à l'aide du chargeur fourni avec l'instrument. Le chargeur de batterie doit être utilisé uniquement à l'intérieur. Veiller à assurer une ventilation adéquate pendant le chargement.

Chargeur :	Tension d'entrée :	100-240 V CA +/- 10 %
	Fréquence d'entrée :	50-60 Hz +/- 10 %
	Courant d'entrée :	0,4 A@100 V CA.. 0,2 A@240 V CA
	Tension de sortie :	10,1 V CC max
	Courant de sortie :	1,5 A max

☞ Remarque : connecter le chargeur à l'alimentation secteur à l'aide de l'adaptateur approprié. Contacter le fabricant pour de plus amples informations.

Instructions de nettoyage

Ne PAS utiliser d'agents nettoyants pour nettoyer l'analyseur ou le chargeur de batterie car ces produits risquent d'avoir un effet préjudiciable sur l'utilisation sûre de ces appareils.

Bonnes pratiques lors des mesures

⚠ Avertissement	L'inhalation de sulfure d'hydrogène (H ₂ S) ou d'autres gaz dangereux peut entraîner la mort. Il incombe à l'utilisateur de s'assurer qu'il a reçu la formation adaptée aux aspects sécurité de l'utilisation de H ₂ S et d'autres gaz dangereux. En particulier, lors de l'utilisation de gaz dangereux, les gaz en sortie de l'analyseur doivent être évacués dans une zone où ils ne présentent aucun danger. Des gaz dangereux peuvent aussi être expulsés de l'instrument lors d'une purge à l'air propre.
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Bonnes pratiques

- Lors d'un déplacement vers un site d'utilisation, transporter l'instrument dans l'habitacle du véhicule, et non pas dans le coffre où il pourrait être soumis à des températures extrêmes, voire à des chocs risquant de l'endommager. Ne pas placer l'analyseur de gaz contre des surfaces chaudes (conduite d'extraction de gaz, carrosserie d'une voiture ou voiture laissée sans surveillance en été, par exemple) car les effets de la chaleur sur l'analyseur risquent d'entraîner des valeurs mesurées incorrectes.
- Lors du déplacement sur site, protéger l'analyseur de gaz de la lumière solaire directe et des fortes intempéries.

Toujours utiliser le piège à eau ! Si le piège à eau déborde, changer le filtre et vérifier que tous les tuyaux ne présentent aucune trace d'humidité avant toute utilisation.

- ☞ Remarque : si l'évacuation d'un analyseur de gaz de la série GA5000 est connectée à un système sous pression, un flux de gaz s'échappera du port de débit d'entrée.

Étalonnage

⚠ Avertissement	Les gaz d'étalonnage peuvent être dangereux. Pour chaque gaz utilisé, il convient de lire et de comprendre la fiche de données de sécurité correspondante avant de poursuivre.
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Le régulateur fourni avec le kit d'étalonnage a été configuré pour assurer un débit fixe.

Le débit du régulateur étant réglé en usine, il ne faut que quelques tours pour l'ouvrir et aucun réglage n'est nécessaire.

⚠ Avertissement	Orifice d'évacuation Lors de l'étalonnage de l'analyseur de gaz, le gaz peut être évacué par deux orifices : par l'orifice d'évacuation normal (jaune) de l'analyseur ou, dans les cas de surpression, par l'orifice de 1/16 de pouce de la soupape de surpression rouge située sur le régulateur. Il est recommandé de raccorder des tuyaux d'évacuation à ces deux orifices.
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	<p>Le tuyau d'évacuation doit laisser les gaz s'échapper dans un endroit bien ventilé. Vérifier que les tuyaux et les raccords ne présentent aucune fuite.</p> <p>L'étalonnage de l'analyseur de gaz doit s'effectuer dans un endroit sûr, en observant toutes les précautions nécessaires en présence de gaz potentiellement dangereux, explosifs ou toxiques.</p>
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⚠ Remarque : le gaz peut être aussi expulsé au niveau du port de débit interne (bleu) de l'analyseur de gaz (applicable uniquement au modèle GA5000).

Entretien

Pour un fonctionnement correct et précis, l'analyseur de gaz de la série 5000 doit faire l'objet d'un entretien régulier. Geotech (UK) Limited recommande un entretien et un réétalonnage tous les 6 mois.

Les analyseurs de gaz de la série 5000 sont certifiés ATEX pour l'utilisation en environnements potentiellement explosifs. En conséquence, leur entretien doit être effectué uniquement par des techniciens qualifiés. Le non-respect de cette exigence entraînera l'annulation de la garantie, voire de la certification ATEX.

 Avertissement	<p>Si l'analyseur de gaz 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 dans un environnement potentiellement explosif.</p>
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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, d'humidité ou de dommages ; le 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.
Tuyau d'échantillonnage	Toujours vérifier que les tuyaux d'échantillonnage ne sont ni contaminés ni endommagés.
Raccords d'orifices de gaz	Contrôler périodiquement les joints toriques des raccords d'orifices de gaz pour s'assurer qu'ils ne sont pas endommagés. Un joint torique endommagé peut laisser passer l'air dans le gaz d'échantillonnage et entraîner des valeurs mesurées incorrectes. Remplacer le raccord complet si le joint torique est endommagé.
Matériau du filtre à H ₂ S	Remplacer le filtre lorsque le matériau du filtre change de couleur et devient <i>gris clair</i> .

Déclaration de conformité – English Language [Français]

Produits	<ul style="list-style-type: none"> • GA5000 - Analyseur de gaz de sites d'enfouissement • GEM5000 - Analyseur de gaz de sites d'enfouissement et moniteur d'extraction • BIOGAS 5000 – Analyseur de gaz de digesteur anaérobie
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Geotechnical Instruments (UK) Ltd déclare que les articles décrits ci-dessus sont conformes aux normes suivantes :

ATEX Directive 94/9/EC

Certification body	SIRA Certification Service [Service de certification SIRA]
Numéro d'organisme notifié	0518
Adresse	Rake Lane, Eccleston, Chester, CH4 9JN, Royaume-Uni
Numéro de certificat SIRA	SIRA 11ATEX2197X
Normes appliquées	EN60079-0 :2006 EN60079-0 :2009 EN60079-11 :2007

IECEX

Organisme de certification	SIRA Certification Service [Service de certification SIRA]
Numéro d'organisme notifié	0518
Adresse	Rake Lane, Eccleston, Chester, CH4 9JN, Royaume-Uni
Numéro de certificat IECEX	SIR 11.0089X
Normes appliquées	IEC60079-0 :2004 Ed4 IEC60079-0 :2007 Ed5 IEC60079-11 :2006 Ed5

CSA (Canada et États-Unis)

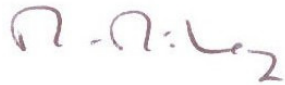
Organisme de certification	CSA International
Adresse	178 Rexdale Boulevard, Toronto, ON, Canada M9W 1R3
Numéro de certificat CSA	CSA 11 2445306
Normes appliquées	<p>C22.2 No. 0-10 - Règles générales - Code canadien de l'électricité, Deuxième partie</p> <p>CAN/CSA-C22.2 No. 60079-0:07 - Matériel électrique pour atmosphères gazeuses explosives - Partie 0 : Règles générales</p> <p>CAN/CSA-C22.2 No. 60079-1:07 - Matériel électrique pour atmosphères gazeuses explosives - Partie 1 : Enceintes antidéflagrantes « d »</p> <p>CAN/CSA-E60079-11:02 - Matériel électrique pour atmosphères gazeuses explosives - Partie 11 : Sécurité intrinsèque « i »</p> <p>ANSI/UL 60079-0:09 - Matériel électrique pour atmosphères gazeuses explosives - Partie 0 : Règles générales</p> <p>ANSI/UL 60079-1:09 - Matériel électrique pour atmosphères gazeuses explosives - Partie 1 : Enceintes antidéflagrantes « d »</p> <p>ANSI/UL 60079-11:09 - Matériel électrique pour atmosphères gazeuses explosives - Partie 11 : Sécurité intrinsèque « i »</p>

Directive CEM 2004/108/CEE

EN 301 489 Partie 1 (V1.9.1 – 2011-04)	Compatibilité électromagnétique et spectre radioélectrique (ERM) ; Norme de compatibilité électromagnétique (CEM) pour les équipements et services radio ; Partie 1: Exigences techniques communes
EN 301 489 Partie 17 (V2.1.1 – 2009-05)	Compatibilité électromagnétique et spectre radioélectrique (ERM) ; Norme de compatibilité électromagnétique (CEM) pour les équipements et services radio ; Partie 17 : Conditions particulières pour Les systèmes de transmission de données à large bande
EN 301 489 Partie 19 (V1.2.1 – 2002-11)	CEM pour les systèmes de transmission de données à large bande Compatibilité électromagnétique et spectre radioélectrique (ERM) ; Norme de compatibilité électromagnétique (CEM) pour les équipements et services radio ;


<p>BS EN 61000-3-2 : 2006 + A2:2009</p> <p>BS EN 61000-3-3 : 2008</p>	<p>Partie 19 : Conditions particulières pour les stations terriennes mobiles fonctionnant seulement en réception (ROMES) dans la bande de fréquences de 1,5 GHz pour la réception de données</p> <p>CEM pour les stations terriennes mobiles fonctionnant seulement en réception (ROMES)</p> <p>Compatibilité électromagnétique (CEM) Limites. Limites pour les émissions de courant harmonique (courant appelé par les appareils ≤ 16 A par phase)</p> <p>Compatibilité électromagnétique (CEM) Limites. Limitation des variations de tension, des fluctuations de tension et de l'oscillation dans les réseaux publics d'alimentation basse tension, pour les matériels ayant un courant assigné ≤ 16 A par phase et non soumis à un raccordement conditionnel</p>
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Signature:



Dr. Roger Riley

16.4 Instructions for safe use – Spanish language**Instrucciones de seguridad**


 Advertencia	<p>La serie 5000 de analizadores de gas puede usarse para medir gases de vertederos y otras fuentes de la forma descrita en este manual.</p> <p>El operario puede estar expuesto a gases perjudiciales durante el uso del instrumento. La inhalación de estos gases puede ser nociva para la salud y, en algunos casos, incluso mortal.</p> <p>El usuario es responsable de garantizar que está debidamente formado en los aspectos de seguridad de los gases utilizados y que se respetan los procedimientos adecuados, especialmente en los lugares en los que se usan gases peligrosos, en los cuales el gas emitido por el analizador debe conducirse por un tubo hasta una zona en la que pueda liberarse con seguridad.</p> <p>El instrumento también puede emitir gases peligrosos si se purga con aire limpio.</p>
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✍ Nota: los analizadores de gas son instrumentos especialmente delicados del equipamiento científico y deben tratarse con especial cuidado. Un uso del equipo no conforme a las especificaciones del fabricante podría afectar al sistema de protección.

La serie 5000 de los analizadores de gas cumple las estipulaciones establecidas en la Parte 15 de la normativa de la FCC. El funcionamiento depende de las dos condiciones siguientes:

- 1) El instrumento no debe causar interferencias perjudiciales.
- 2) El instrumento debe admitir cualquier interferencia que pueda recibir, incluidas aquellas que podrían causar un funcionamiento no deseado.

En cuanto a las directivas ATEX e IECEx, la serie 5000 de analizadores de gas ha recibido la certificación de clasificación de área peligrosa

 **II 2G Ex ib IIA T1 Gb (Ta = de -10 °C a +50 °C)**

Es de vital importancia que se sigan rigurosamente las instrucciones. El operario es responsable de determinar la noción de protección y la clasificación necesaria para cada aplicación específica.

Instrucciones de seguridad (español)

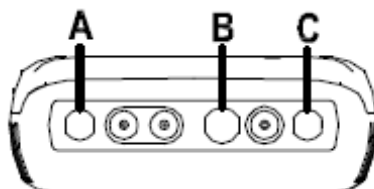
(Directiva europea ATEX de referencia 94/9/CE, anexo II, 1.0.6.)

Las siguientes instrucciones se aplican a los instrumentos cubiertos por los números de certificado SIRA 11ATEX2197X y la norma IECEx SIR 11.0089X:

- El instrumento puede utilizarse con gases y vapores inflamables con el grupo de aparatos IIA y la clase de temperatura T1.
- El instrumento sólo está certificado para su uso a temperatura ambiente, comprendida entre -10 °C y +50 °C, y no debe utilizarse a diferentes temperaturas.
- El instrumento no debe usarse en lugares con una concentración de oxígeno superior

al 21 %.

- La reparación del instrumento ha de realizarse de acuerdo con el código profesional aplicable.
- Si se utiliza en un área peligrosa, utilice solo la sonda de temperatura GF5.2 (SIRA 11ATEX2197X e IECEx SIR11.0089X). En cuanto al conector C, utilice el anemómetro GF5.4 (BVS 04ATEXE194) únicamente con ATEX. En las mencionadas zonas de riesgo, el analizador no debe conectarse a ningún otro aparato en el área peligrosa, incluidos el cable GF-USB (conector A) o el cargador de batería GF3.9 (conector B) suministrados con el propio analizador.



No cargar, recargar o abrir en lugares en los que exista riesgo de explosión. En áreas peligrosas, utilice solo la "sonda de temperatura GF5.2" en el conector B. Conector C ($U_o=10\text{ V}$, $I_o=5\text{ mA}$, $P_o=50\text{ mW}$, $C_i=0$, $L_i=0$, $C_o=100\text{ uF}$, $L_o=1000\text{ mH}$), Conector B ($U_o=5\text{ V}$, $I_o=6\text{ mA}$, $P_o=7\text{ mW}$, $C_i=0$, $L_i=0$, $C_o=100\text{ uF}$, $L_o=1000\text{ mH}$)

**SUMINISTROS MÁXIMOS NO PELIGROSOS:
Conector A - $U_m=6\text{ V}$ Conector B - $U_m=10,1\text{ V}$**

- En caso de riesgo de contacto con sustancias agresivas, p. ej. líquidos o gases ácidos que pueden atacar a los metales o disolventes que pueden afectar a los materiales poliméricos, el usuario es responsable de adoptar las medidas de precaución adecuadas, como las comprobaciones periódicas que sean necesarias como parte de las inspecciones rutinarias o determinar, a partir de la hoja de especificaciones del material, su resistencia a determinados productos químicos que puedan anular sus cualidades de protección, gracias a lo cual se asegura que el tipo de protección no queda comprometido.
- El intervalo de presión relativa es +/- 500 mbar. Tenga en cuenta que, sin embargo, la presión de entrada no debería exceder +/- 500 mbar ni la presión de salida +/- 100 mbar en relación a la presión atmosférica.

Con respecto a la CSA (Canadá), la serie 5000 de analizadores de gas cuenta con la certificación de clasificación de área peligrosa

CLASE 2258 03 - EQUIPO DE CONTROL DE PROCESOS - Sistemas intrínsecamente seguros y no inflamables - Para ubicaciones peligrosas



Ex ib IIA:

Detectores de metano modelos GA 5000, GEM 5000 y BIOGAS 5000; paquete de batería portátil, alimentado por batería no recambiable en el lugar de uso N/P 20087; intrínsecamente seguro y con circuitos intrínsecamente seguros ("[ib]" para zona 1) a la sonda de temperatura (conector B) modelo GF5.2 y con los parámetros de salida de entidad como se indica en la siguiente tabla; código de temperatura T1; temperatura ambiente de -10 °C a +50 °C.≤≤

Conector	Parámetros de entidad						
	Uo (V)	Io (mA)	Po (mW)	Co (uF)	Lo (mH)	Ci (uF)	Li (mH)
B	5,0	6	7	100	1000	0	0
C	10,0	5	50	100	1000	0	0

⚡ Nota: Se ha investigado este instrumento únicamente en relación a las características de seguridad eléctrica.

Con respecto a la CSA (EE. UU.), la serie 5000 de analizadores de gas cuenta con la certificación de clasificación de área peligrosa

CLASE 2258 83 - EQUIPO DE CONTROL DE PROCESOS - Sistemas intrínsecamente seguros y no inflamables - Para ubicaciones peligrosas - CERTIFICADO PARA LA NORMATIVA DE EE. UU.



AEx ib IIA:

Detectores de metano modelos GA 5000, GEM 5000 y BIOGAS 5000; paquete de batería portátil, alimentado por batería no recambiable en el lugar de uso N/P 20087; intrínsecamente seguro y con circuitos intrínsecamente seguros (“[ib]” para zona 1) a la sonda de temperatura (conector B) modelo GF5.2 y con los parámetros de salida de entidad como se indica en la siguiente tabla; código de temperatura T1; temperatura ambiente de -10 °C a +50 °C.≤

Conector	Parámetros de entidad						
	Uo (V)	Io (mA)	Po (mW)	Co (uF)	Lo (mH)	Ci (uF)	Li (mH)
B	5,0	6	7	100	1000	0	0
C	10,0	5	50	100	1000	0	0

⚡ Nota: Se ha investigado este instrumento únicamente en relación a las características de seguridad eléctrica.

MCERTS

MCERTS es el Esquema de certificación de control de la Agencia del Medio Ambiente del Reino Unido. Dicho esquema constituye el marco en el que realizar las mediciones medioambientales de acuerdo con los requisitos de calidad de la Agencia, y engloba toda una serie de actividades de control, recogida de muestras e inspección.

El instrumento GEM5000 cuenta con la certificación de MCERTS solo si:

- Aparece el logotipo de MCERTS en la pantalla al encenderlo.

⚡ Nota: MCERTS - no se han llevado a cabo en este instrumento pruebas de sensibilidad cruzada con sulfuro de hidrógeno. Por lo tanto, el usuario debe tener en cuenta la posibilidad de interferencias en caso de presencia de H₂S.

El MCERTS proporciona fiabilidad y confianza a la supervisión de datos y ofrece a la industria un marco contrastado para la elección de los sistemas de supervisión y servicios conformes con las exigencias de rendimiento de la Agencia del Medio Ambiente.

El objetivo de la creación del Esquema de certificación de control (MCERTS) de la Agencia del Medio Ambiente es realizar controles medioambientales de calidad. El MCERTS ofrece

certificaciones de productos de acuerdo con las normas de rendimiento de la Agencia del Medio Ambiente, tomando como base normas relevantes CEN, ISO y nacionales.

Los instrumentos con la certificación MCERTS han sido evaluados por un organismo independiente con el fin de garantizar el cumplimiento con determinadas exigencias de rendimiento. Además, el fabricante de un producto con certificación MCERTS está sometido a auditorías periódicas que garantizan el constante cumplimiento con las exigencias de rendimiento del certificado.

La serie 5000 de analizadores de gas cuenta con la certificación de la versión 3.1 de las Normas de rendimiento para sistemas portátiles de control de emisiones.

Batería y carga

La batería de la serie 5000 de analizadores de gas es un paquete de hidruro metálico de níquel compuesto por seis células individuales. Este tipo de batería es menos susceptible a los "efectos de memorización" en las cargas máximas que las baterías de níquel-cadmio, si bien no es recomendable cargar la unidad al máximo.

No desconecte el cargador hasta que se indique que el instrumento está totalmente cargado.



Advertencia

NO se aplica la certificación Ex al cargador de la batería.
Cargue siempre la batería en lugares seguros.

El cargador inteligente de la batería indica el estado de carga de la unidad y el fin de la carga.

El instrumento debe cargarse SÓLO con el cargador suministrado con el instrumento. El cargador de batería está concebido para su uso en interior. Asegúrese de que la ventilación es adecuada mientras carga la unidad.

Cargador: Voltaje de entrada: 100-240 V CA +/- 10%
Frecuencia de entrada: 50-60 Hz +/- 10%
Corriente de entrada: 0,4 A a 100 VCA .. 0,2 A a 240 VCA

Tensión de salida: 10,1 VCC máx.
Corriente de salida: 1,5 A máx.

✍ Nota: Conecte el cargador a la red eléctrica con el adaptador apropiado. Para más información, póngase en contacto con el fabricante.

Instrucciones de limpieza

NO utilice agentes limpiadores para limpiar el analizador o el cargador de la batería, ya que podrían tener efectos adversos en el uso seguro de los dispositivos.

Consejos de utilidad para efectuar lecturas



Advertencia

La inhalación de sulfuro de hidrógeno (H₂S) o de otros gases nocivos puede ser mortal. El usuario es responsable de garantizar que está debidamente formado en aspectos de seguridad en cuanto al uso de H₂S y de otros gases nocivos especialmente en los lugares en los que se usan gases peligrosos, en los cuales el gas emitido por el analizador debe conducirse por un tubo hasta una zona en la que pueda liberarse con seguridad. El instrumento también puede emitir gases peligrosos si se purga con aire limpio.


Consejos de utilidad

- En los desplazamientos, el analizador de gas debe llevarse en el interior del vehículo (nunca en el maletero), con objeto de evitar daños por temperaturas extremas o posibles impactos. No coloque el analizador de gas sobre superficies calientes (p. ej., tuberías de extracción de gas, carrocerías o vehículos aparcados a altas temperaturas); el aumento de la temperatura del analizador de gas afectaría a la precisión de las lecturas.
- Cuando se mueva por una zona, proteja el analizador de gas de la luz solar directa y la lluvia intensa.

Utilice siempre el colector de agua. Si rebosa, cambie el filtro y asegúrese de que ningún tubo esté húmedo antes de volver a usarlo.


☞ Nota: Si el escape de un analizador de gas de la serie GA5000 se conecta a un sistema presurizado, el gas se saldrá del orificio de entrada.

Calibrado

 Advertencia	<p>Los gases de calibrado pueden ser peligrosos.</p> <p>Lea atentamente las especificaciones de seguridad de cada gas utilizado antes de proceder al calibrado.</p>
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El regulador suministrado con el juego de calibrado está configurado para proporcionar un caudal fijo.

Dado que el caudal del regulador se ajusta en fábrica, solo hay que girarlo unas vueltas para abrirlo; no es necesario ajustarlo.


 Advertencia	<p>Orificios de escape</p> <p>Durante el calibrado del analizador de gas, existen dos salidas posibles para el gas: por la vía habitual, es decir, el orificio de escape del analizador (amarillo) o, en caso de sobrepresión, el orificio de 1,58 mm de la válvula ^{roja} de alivio de la presión situado en el regulador.</p> <p>Se recomienda conectar tubos de escape en ambos orificios.</p> <p>Los tubos de escape deben llegar a un área con ventilación suficiente. Asegúrese de que no haya fugas en los tubos ni las conexiones.</p> <p>El calibrado del analizador de gas debe realizarse en un área segura con todas las precauciones necesarias en el uso de gases potencialmente peligrosos, explosivos o tóxicos.</p>
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☞ Nota: También es posible que salga gas del orificio de caudal interno (azul) del analizador de gas (solo se aplica al GA5000).

Mantenimiento

Debe realizarse regularmente el mantenimiento de la serie 5000 de analizadores de gas con el fin de garantizar el funcionamiento correcto y preciso. Geotech (UK) Limited recomienda que se lleve a cabo el mantenimiento y el recalibrado cada 6 meses.

La serie 5000 de analizadores de gas cuenta con la certificación ATEX para su uso en lugares con riesgo de explosión. Por lo tanto, únicamente los ingenieros cualificados pueden realizar el mantenimiento. En caso contrario, la garantía quedará anulada y podría invalidar la certificación ATEX.

 Advertencia	Toda operación de mantenimiento del analizador de gas realizada por personal no cualificado puede dar lugar a la invalidación de la certificación ATEX, pudiendo igualmente afectar a la seguridad del uso del instrumento en lugares con riesgo de explosión.
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Mantenimiento realizable por el usuario:

Este instrumento no contiene ninguna pieza o componente interior de cuyo mantenimiento pueda encargarse el usuario.

No obstante, el usuario puede encargarse del mantenimiento de los siguientes elementos:

Filtro de agua en línea	Comprobar periódicamente obstrucciones, humedad o daños y cambiar en caso necesario. No usar el instrumento sin el filtro de agua en línea; de lo contrario, podría penetrar agua en el interior.
Tubo de muestreo	Comprobar que no están contaminados ni dañados.
Conectores de los orificios de gas	Comprobar periódicamente que las juntas tóricas de los conectores de los orificios de gas no están dañadas. Una junta tórica dañada puede dejar pasar el aire en el gas de muestra y afectar a la precisión de las lecturas. En caso de daños en la junta tórica, sustituir todo el conector.
Material filtrante de H ₂ S	Si observa que el material filtrante cambia a un color <i>gris claro</i> , sustituir el filtro.

Declaración de conformidad (español)

Productos	<ul style="list-style-type: none"> • GA5000: analizador de gas para vertederos • GEM5000: analizador de gas para vertederos y monitor de extracción • BIOGAS 5000: analizador de gas para digestores anaerobios
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Geotechnical Instruments (UK) Limited declara la conformidad de los productos descritos con las siguientes normas:

Directiva ATEX 94/9/CE

Organismo de certificación	Servicio de certificación SIRA
Número de organismo notificado	0518
Dirección	Rake Lane, Eccleston (Chester) - CH4 9JN
Número de certificado SIRA	SIRA 11ATEX2197X
Normas aplicadas	EN60079-0 :2006 EN60079-0 :2009 EN60079-11 :2007

IECEX

Organismo de certificación	Servicio de certificación SIRA
Número de organismo notificado	0518
Dirección	Rake Lane, Eccleston (Chester) - CH4 9JN
Número de certificado IECEX	SIR 11.0089X
Normas aplicadas	IEC60079-0 :2004 Ed4 IEC60079-0 :2007 Ed5 IEC60079-11 :2006 Ed5

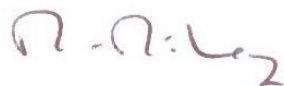
CSA (Canadá y EE. UU.)

Organismo de certificación	CSA International
Dirección	178 Rexdale Boulevard, Toronto, ON, Canadá M9W 1R3
Número de certificado CSA	CSA 11 2445306
Normas aplicadas	<p>C22.2 N° 0-10 - Requisitos generales – Código Eléctrico Canadiense, Parte II</p> <p>CAN/CSA-C22.2 N° 60079-0:07 - Aparatos eléctricos para atmósferas explosivas - Parte 0: Requisitos generales</p> <p>CAN/CSA-C22.2 N° 60079-1:07 - Aparatos eléctricos para atmósferas explosivas - Parte 1: Compartimiento ignífugo "d"</p> <p>CAN/CSA-E60079-11:02 - Aparatos eléctricos para atmósferas explosivas - Parte 11: Seguridad intrínseca "i"</p> <p>ANSI/UL 60079-0:09 - Aparatos eléctricos para atmósferas explosivas - Parte 0: Requisitos generales</p> <p>ANSI/UL 60079-1:09 - Aparatos eléctricos para atmósferas explosivas - Parte 1: Compartimiento ignífugo "d"</p> <p>ANSI/UL 60079-11:09 - Aparatos eléctricos para atmósferas explosivas - Parte 11: Seguridad intrínseca "i"</p>

Directiva CEM 2004/108/CEE

<p>EN 301 489 Pt 1 (V1.9.1 – 2011-04)</p>	<p>Compatibilidad electromagnética y espectro radioeléctrico (ERM); Normativa de compatibilidad electromagnética (CEM) para equipos y servicios de radio; Parte 1: Requisitos técnicos comunes</p>
<p>EN 301 489 Pt 17 (V1.9.1 – 2009-04)</p>	<p>Compatibilidad electromagnética y espectro radioeléctrico (ERM); Normativa de compatibilidad electromagnética (CEM) para equipos de radio; Parte 17: Condiciones específicas para sistemas de transmisión de datos de banda ancha CEM para sistemas de transmisión de datos de banda ancha</p>
<p>EN 301 489 Pt 19 (V1.2.1 – 2002-11)</p>	<p>Compatibilidad electromagnética y espectro radioeléctrico (ERM); Normativa de compatibilidad electromagnética (CEM) para equipos y servicios de radio; Parte 19: Condiciones específicas para estaciones terrenas móviles de solo recepción (ROMES) que funcionan en la banda de 1,5 GHz proporcionando comunicaciones de datos CEM para estaciones terrenas móviles de solo recepción (ROMES)</p>
<p>BS EN 61000-3-2: 2006 + A2:2009</p>	<p>Compatibilidad electromagnética (CEM). Límites. Límites para las emisiones de corriente armónica (equipos con corriente de entrada ≤ 16 A por fase)</p>
<p>BS EN 61000-3-3: 2008</p>	<p>Compatibilidad electromagnética (CEM). Límites. Límites de las variaciones de tensión, fluctuaciones de tensión y flicker en las redes públicas de alimentación de baja tensión para equipos con corriente asignada ≤ 16 A por fase y no sujetos a una conexión adicional.</p>

Firmado:




Dr. Roger Riley

17.0 Glossary of terms

5000 series	The 5000 series refers to the GA5000, GEM5000 and the Biogas5000 gas analysers.
Accu-Flo	A flow device used to aid accurate flow measurement. Accu-Flo is a specialised product and currently Geotech (UK) Limited do not sell this product. For further information contact Landtec directly.
Analyser error messages	<p>Operational errors are prefixed on the analyser by the word ERROR followed by an error code.</p> <p>Refer to the list of standard error codes for more information.</p>
Analyser warning	<p>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, CH₄ out of calibration).</p>
Anemometer probe	Device for measuring velocity of gas in the pipe. The GEM5000 analyser can be set to convert into a flow. See also flow measurement.
ATEX certification	The GEM5000 is ATEX certified to zone 1 & 2 areas above ground not in mines.
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.
Calibration	The gas analyser is carefully calibrated against known standards.
Calibration record	The GEM5000 instrument has the facility to log user calibrations as a validation tool.
CH₄	Methane
Chemical cells	A method of gas detection that works on the basis of a chemical reaction with the target gas.

Clean air purge	Process used to clear out gas from the sample tube and analyser prior to taking a new reading.
CO	Carbon monoxide
CO₂	Carbon dioxide
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	<p>Used as an aid to monitoring the use of the analyser. It can also be used as a diagnostic tool.</p> <p>The event log can be viewed via Gas Analyser Manager. It <u>cannot</u> be viewed on the analyser screen.</p>
Exhaust port	The usual manner for the gas to exit the analyser is via the exhaust port located on the top 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.
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.
Gas Analyser Manager	<p>Also referred to as GAM. PC based software which enables the operator to upload and download information to/from the analyser.</p> <p>Gas Analyser Manager enables operators 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.</p>

	This is optional.
Gas channels	The gases that are analysed by the instrument.
Gas velocity	The positional rate of change of the gas. Measured using the optional anemometer.
General warnings	Displayed throughout the documentation with a warning symbol. Warning information may affect the safety of operators.
H₂	Hydrogen
H₂S	Hydrogen sulphide
H₂S filter	Filter required for removal of H ₂ S. When the filter material changes colour to a light grey colour or if H ₂ S values are displayed, then the filter should be replaced.
Hydro-carbons	Organic compound consisting of only hydrogen and carbon.
In-line water filter	The component used to help protect the instrument from water ingress.
LCD display	Liquid Crystal Display
LEL	Lower Explosive Limit. Lower explosive limit of methane in air. 5% methane in air is the point at which it becomes explosive. 100% LEL equates to 5% methane.
m/s	Meters per second – measurement of gas velocity.
m³/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	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.
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.
NO₂	Nitrogen dioxide
Operating language	The operator can choose the default operating language for the analyser. Choices are English, German, Spanish, French and Italian.
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.
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.
Residual N₂	The calculation for the residual N ₂ used on the latest version of the GEM5000 platform is as follows: $\text{Residual N}_2 = \text{Balance} - (\text{O}_2\% \times 3.76)$ Where, Balance = 100% - (CH ₄ % + CO ₂ % + O ₂ %) and 3.76 is the ratio of O ₂ to N ₂ in ambient air (79/21)
Sample tube	The tube used to obtain a sample of gas from the sample point to the analyser.
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	An alpha-numeric code tagged to each gas reading. Facility only available via 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 optional.
Update site data	Enables the operator to answer pre-defined questions relating to the site, environment etc. These questions are defined via 5GAM software.

Upload	Terminology used for the movement of data from the PC via GAM software application to the analyser.
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.
Warranty	The instrument is under guarantee against defect in materials and workmanship for a period of 3 years from the date of shipment to the operator 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.