Geotech

G100 RANGE

G100 RANGE
Operating Manual

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MANUAL GUIDELINES

Safety Related Information

> ⚠️ Information in this manual that may affect the safety of users and others will be in a box identical to this one.

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

Hyperlinks

Hyperlinks to other sections of this manual, websites or email addresses are in the following format:

www.geotechuk.com

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 QED on +44(0)333 800 0088 or email technical@qedenv.co.uk.

INTRODUCTION

This manual explains how to use the instrument model types listed below:

- G100 CO2 0-20%

- G110 CO2 0-100%

- G150 CO2 0-10,000ppm

> Note: The instrument is 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 equipment may be impaired.

The G100 range has been developed to incorporate the latest technology and specification requirements, which provide the user with a fast, simple-to-use and accurate analyser. Each model has been specifically designed to meet specific application requirements. Apparatus intended for use in residential, commercial, pharmaceutical and light industrial environments.

The G100 Analyser Range

The analyser has the following features:

- CO_2 0-20% - G100

- CO_2 0-100% - G110

- CO_2 0-10,000ppm – G150

- Options for:

    - O_2 0-100%

    - Dual temperature probes 0-50º C

    - Data storage and download

    - Humidity sensor 0-100%

- Improved accuracy on CO_2 readings

- Quick verification of CO_2

- Time saving with dual temperature probes

- Large data storage and user friendly software and download

- Easy-to-read, large well lit display

- Built-in gas moisture removal

Applications

- IVF/Medical

- Research

- Laboratories

- IAQ

- Brewing

- Atmosphere Control

- Incubators

- Gas mixing

Instrument Components - Standard Product
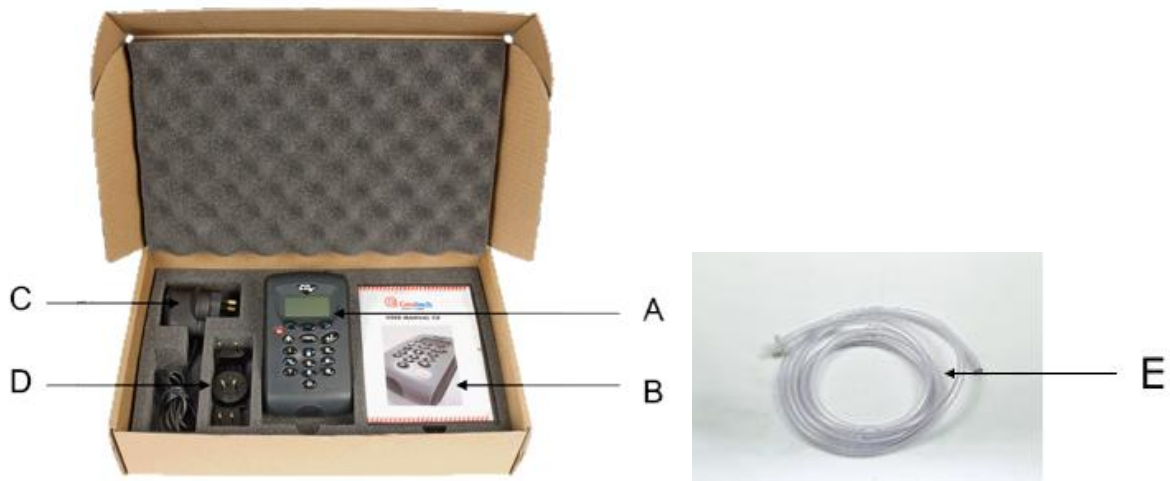
Reference:

A) Analyser
B) Operating manual
C) Mains battery charger

D) Mains Battery Charger Adaptors: (EU, US, AU)
E) Sample tube kit

G100 RANGE OPTIONAL PRODUCTS AND ACCESSORIES

Optional Products

The G100 analyser range has a number of optional products for purchase which enhance the usability and enable further analysis of data and reading information.

Note: For more information on the features listed in this section please contact Sales at QED on +44(0)330 800 0088 or email sales@qedenv.co.uk.

Analyser Data Manager (Optional)

Analyser Data Manager enables the user to maximise the operation of the incubator analyser. Instrument readings and event log data may be downloaded to a PC for further analysis and exported to other applications such as MS Excel. It enables direct communication with the unit, features a simple download facility and is fully compatible with the latest Microsoft operating systems.

Event Log

The G100 instruments incorporate the facility to log significant events via the 'Event Log'. This can be used as an aid to monitoring the use of the instrument. It can also be used as a diagnostic tool if there is a problem with the instrument.

The event log can only be viewed via the optional Analyser Data Manager software. It cannot be viewed on the analyser screen. Applicable events are stored in the event log automatically. No user intervention is required.

The event log can hold approximately 270 events. If the log becomes full then it begins to over-write the older events. This can be identified by the index field which starts from event number 1. The log is cleared when the instrument is reset.

Note: Please refer to section Event Log of this operating manual for further information.

Temperature Probe Reading (Optional)

The G100 range of instruments has the facility to read and display two temperature readings via optional temperature probes. When a temperature probe is fitted to one of the two temperature ports on the top of the instrument, the display will automatically show the current reading and a temperature probe icon will be displayed.

The display can also be changed to show a $T_1 - T_2$ calculation by pressing the appropriate soft-key. The current mode of operation can be identified by normal or inverse status of the soft-key, where inverse indicates that the option is active.

Note: The $T_1 - T_2$ result is not stored as part of the reading.

The operator can also choose to display the reading in either Centigrade or Fahrenheit using the temperature option accessed from the 'Settings' menu.

Humidity Probe Reading (Optional)

The instrument has the optional facility to use a humidity probe (specified at the time of manufacture). This allows the instrument to read and display humidity readings from an optional probe.

When a humidity probe is fitted, the display will change automatically to show the current reading and a humidity probe icon will be displayed. The 'Scroll' keys on the instrument panel are used to

switch between the reading screens.

The humidity kit comprises of:

- Humidity lead

- Humidity sensor

Connection of the Humidity Sensor

Plug the humidity sensor onto the mating connector of the transmitter or connection cable. Make sure that the catches are aligned correctly. Tighten the knurled nut by hand.

> Note: The humidity sensor can take 30 minutes to stabilise and special handling is required for optimum performance and stability. Please refer to the instruction leaflet included with the humidity sensor packaging for the Humidity Standards.

Oxygen Reading (Optional)

The instrument has the optional facility to use an internal oxygen cell (specified at the time of manufacture). This allows the instrument to read and display oxygen readings along with CO_2.

> Note: Oxygen sensor stability; as the sensor is a partial pressure sensor its output will be affected by changes in relative humidity. Although the percentage of O2 in the air is relatively constant, the relative humidity in air is variable. A unit calibrated with dry air could cause the readout to read low by up to 0.5% by volume.

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| Instrument Accessory Products |

Optional accessory and replacement parts may be purchased for the G100 from QED direct. Please refer to the website www.geotechuk.com for further details on pricing and how to order.

Ref	Description	Part Number
A	USB Lead	USBLEAD2
B	Spare Sample Filters (pack of 5)	068296/S
C	Sample Tube Kit	G1.6
D	Hard Carry Case	050227
E	Temperature Probe 100mm Tip	G1.3
F	Temperature Probe 5mm Tip	G1.2
G	Humidity Lead and Sensor	G1.8
H	Moisture Trap (pack of 2)	G1.12
I	Spare Calibration Gas 5% CO_2	CDA7.6
J	Mains Charger including Worldwide Adaptors	073024
K	Soft Carry Case	G1.11
L	Soda Lime Filter Kit	G1.10
M	Analyser Data Manager Software	G1.4
N	Regulator and Tubing for Calibration Gas	G1.1

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INSTRUMENT FEATURES

Physical Characteristics of the Instrument Panel

Front View:

Reference:

A	Main Read Screen
B	Soft-Keys
C	On/Off Key
D	Pump Key
E	Key 4 – Scroll Left
F	Key 8 – Scroll Down
G	Menu Key
H	Enter Key
I	Key 2 – Scroll Up
J	Key 6 – Scroll Right

Back View:

Reference:

K	Moisture Removal Tube
L	Serial Number
M	Instrument Stand

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Panel Key Functions		

Key	Description	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 are determined by menu options taken. Functions vary from screen to screen.
C	On/Off Key	Press the 'On/Off' key briefly to switch the instrument on and off.
D	Pump Key	Press the 'Pump' key to start or stop the pump.
E	Scroll Left Key	Also 'Key 4'. Enables the operator to scroll left to display more information.
F	Scroll Down Key	Also 'Key 8'. Enables the operator to scroll down to display more information.
G	Menu Key	Press the 'Menu' key to go to the 'Main' menu. Enables the operator to pre-set values and settings. Select options from the 'Main' menu to also view data and readings stored or held.
H	Enter Key	The 'Enter' key accepts/confirms choices made by the operator to various functions and operations. Also, required to confirm numeric data entry.
I	Scroll Up Key	Also 'Key 2'. Press scroll up to view further information on the instrument read screen.
J	Scroll Right Key	Also 'Key 6'. Press scroll right to view further information on the instrument read screen.
K	Moisture Removal Tube	Removes the moisture from the sample gas.
L	Serial Number	Unique Identification for the instrument. Verification of the serial number will be required if Technical Support assistance is needed.
M	Instrument Stand	Instrument stand.

> Note: Do NOT attempt to remove the cover off the back of the analyser which houses the moisture removal tube.
>
> Note: Do NOT cover the moisture removal tube with your hand when holding the analyser to take readings.

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Instrument Connection Points

Top View: Side View:

Key	Description	Function
A	Temperature 1	Temperature 1 connector measures temperature – incubator and ambient temperatures.
B	Temperature 2	Temperature 2 connector measures temperature – incubator and ambient temperatures
C	Humidity Probe (Optional)	Humidity probe attachment point
D	Gas Outlet	Gas outlet port used to exhaust the gas
E	Gas Inlet	Gas inlet point used to attach the sample tube and filter in order to take the gas reading
F	USB Port	Used to connect the analyser to a PC via a USB cable to download data
G	Charger Port	Used to attach the main charger to the analyser for charging

(-)—(•)—(+)   5V ⎓ ± 0.5V(max 1000mA)

> Note: Temperature connectors are fitted with black plugs to prevent dust ingress, remove before use. Grip connector cap and pull upwards to release. Refit when not in use.
>
> Note: Depending on the configuration purchased, certain connectors may not be present.

GENERAL OPERATIONAL INSTRUCTIONS

Note: Fully charge the unit before use when the instrument is first received or if the instrument has been in storage for six months or more.

Switching the Instrument On

1) To switch on the instrument, press the 'On/Off' key briefly. There will be a short beep and a slight pause followed by the Geotech logo.

2) The power on self-test will then commence with a short pre-determined self-test sequence.

3) Assuming there are no warnings to display the instrument will continue to the 'Main Read Screen'.

Switching the Instrument Off

1) Purge with fresh air. Run the pump for approximately 30 seconds or until the readings have returned to normal levels.

Note: Before the instrument is switched off a clean air purge should be performed. This ensures that the instrument is free from gas and ready for the next measurement. This final purge is especially important for the oxygen sensor as it may degrade if stored when contaminated with gas.

2) To switch off the instrument, press the 'On/Off' key briefly.

Note: If the 'Auto Off' utilities setting is set to 'Yes', the analyser will switch off automatically after 10 minutes if not in use.

Instrument Main Read Screen

After the analyser has been switched on and the warm-up self-tests completed the analyser will display the 'Main Read Screen'.

G150 Screen Shown:

Battery Power

Temperature Probe

CO_2 9,999 PPM

O_2 20.3 %

Peak   Store   Hold

Pump (On) Indicator

Alarm Set

Soft Keys

Peak - Enables the operator to display the peak reading.

Store - Enables the operator to store the displayed reading for viewing/download later.

Hold - Enables the operator to hold the current reading being taken.

Note: The pump is turned off when a reading is stored.

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Instrument Status Icons

The following icons may be displayed on the instrument read screens:

Icon	Description
▮ ▮ ▯ ▯ ▯ ▯	Battery charge state
▯ (flashing)	< 1 hour remaining
⚡ (flashing)	Battery charging
⚡	Charged
✿	Pump running
✿ (flashing)	Pump stalled (Backlight turns red)
🔔	Alarm set
🔔 (flashing)	Alarm active (Backlight turns red)
🖥	USB connected to PC (flickers when transferring data)
🗐	Logging mode active (flashes when memory nearly full)
☌	Temperature probe(s) connected
☌	Humidity probe connected
⇅ (flashing)	Service due (every 12 months)
⇅	Service overdue
⚡	Fault/repair
⧖	Waiting

> Note: A red backlight is displayed if the pump is stalled or the alarm is activated. For further information, please refer to the Alarms or Flow Fail sections.

Entering Data

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

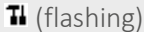When entering data into the instrument all fields are fixed format and are populated from the right. For example, to enter a new time 09:25:00 the user would type in 092500 using the numeric keypad in the following sequence:-

*   : : 0

*   : :09

*   : 0:92

*   :09:25

* 0:92:50

* 09:25:00

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

Any mistakes can be corrected using the soft-key 'Delete' which will delete the last character typed. Alternatively, the sequence can be re-typed 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.

Changing Between Parameters

By default, the instrument displays the 'Main Read Screen' (for gas measurement). This shows the CO_2 reading along with the optional O_2 reading. The instrument will return to this screen after power on or when returning from the menus. Key 2 'Arrow up' can be used to switch to another measurement screen, i.e. temperature or humidity. Continue to press the 'Scroll' key to return to the 'Main Read Screen'.

Memory

The memory should not be used as a permanent storage medium and any important data should be transferred to a more permanent storage medium as soon as possible. The instrument should not be stored for prolonged periods with valuable data in its memory.

Storage

When not in use the instrument should be kept in a clean, dry and warm environment, such as an office. It should be stored flat with the stand folded away which helps prolong the life of the O_2 cell.

> Note: Fully charge the instrument before use if instrument has been stored for six months or more.

Main Menu

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

1) Press the 'Menu' key on the front of the instrument panel and the following screen is displayed:
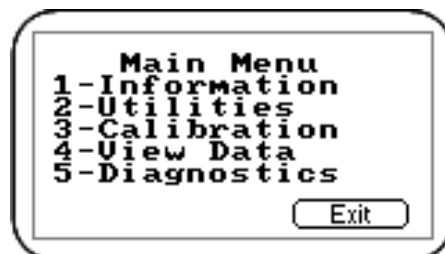
Screen 1 - Main menu

2) Press the soft-key 'Exit' to exit the 'Main' menu.

Information

The 'Information' option enables the operator to display information such as instrument type, serial number, current software version, service due date and the dates of the last factory and user calibrations.

1) From the 'Main Read Screen' press the 'Menu' key on the instrument panel.

2) Press 'Key 1' to display general information about the instrument.
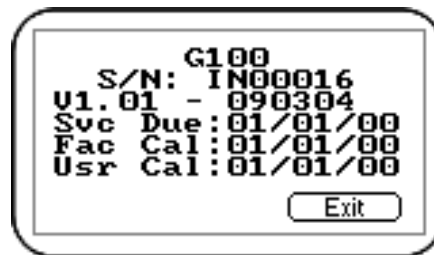
Screen 2 - Information

Utilities

The 'Utilities' option enables the operator to configure instrument settings prior to taking readings.

1) From the 'Main Read Screen' press the 'Menu' key on the instrument panel.

2) Press 'Key 2' to display the 'Utilities' menu and the following screen is displayed:

Screen 3 - Utilities menu

Time & Date

The 'Time and Date' option enables the operator to check or set the instrument's internal clock. The current time/date are appended to every stored reading.

1) From the 'Main Read Screen' press the 'Menu' key on the instrument panel.

2) Press 'Key 2' to display the 'Utilities' menu.

3) Press 'Key 1 – Time & Date' and the 'Set Time & Date' menu is displayed:

Screen 4 - Set time & date

4) Press 'Key 1' to change the time or press 'Key 2' to change the date.   Type the time or date using the numeric keypad followed by the 'Enter' key. The instrument will not allow invalid times or dates to be entered.

Note: The clock will need to be manually adjusted to cope with daylight saving changes or

> changes when crossing time zones.

Contrast

The 'Contrast' option enables the operator to adjust the instrument screen contrast to compensate for changes in ambient temperature. The default setting is 0.

1)   From the 'Main Read Screen' press the 'Menu' key on the instrument panel.

2)   Press 'Key 2' to display the 'Utilities' menu.

3)   Press 'Key 2' to select the instrument panel contrast settings and the following screen is displayed:

```
Adjust Contrast
      +0
Use Cursor Keys

  [Accept][Reject]
```
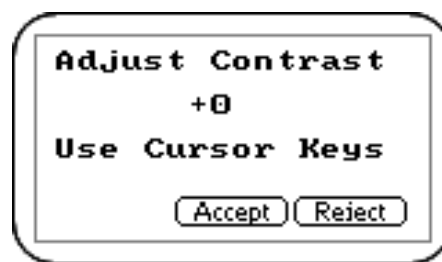
Screen 5 - Adjust contrast

4)   Press 'Key 3 - Scroll Left' and 'Key 6 - Scroll Right' to adjust the value displayed.

5)   Press the soft-key 'Accept' or 'Reject' accordingly to accept or reject the changes.

> Note: The manually set contrast setting is retained when the instrument is switched off.

Alarms

The G100 range of instruments has the facility to set rising or falling alarms for the two main gas channels, CO_2 and O_2 (if selected as an option). The alarms for each channel can be enabled or disabled independently via the 'Alarms' menu option.

Once enabled these alarms become active in the 'Main Read Screen'; this is indicated by a bell 🔔 icon. If an alarm is triggered the screen turns red and a flashing bell 🔔 icon is displayed. The beeper is sounded until the gas level has recovered beyond the trigger point.

- Rising alarms are triggered when the gas level exceeds the maximum value entered by the user.

- Falling alarms are triggered when the gas level falls below the minimum value entered by the user.

1)   From the 'Main Read Screen' press the 'Menu' key on the instrument panel.

2)   Press 'Key 2' to display the 'Utilities' menu.

3)   Press 'Key 3' to select alarm settings and the following screen is displayed:
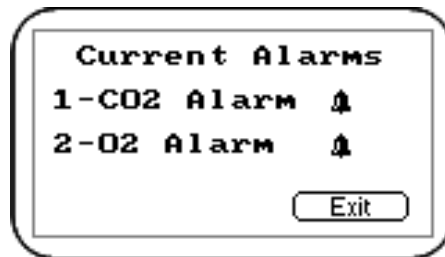
Screen 6 - Current alarms

4)   Press 'Key 1' to maintain CO_2 alarm and 'Key 2' to maintain O_2 alarm.

5)   Select from the following:

- 1 – Enabled/Disabled: Toggle between disabled and enabled alarm status.

- 2 – Max: Sets the upper limit alarm setting.

- 3 – Min: Sets the minimum alarm setting. The default is 0.

6)   Select the option to modify followed by the soft-key 'Accept' or 'Reject'.

Settings

The 'Settings' option enables the operator to maintain information with regards to taking samples and readings.

1)   From the 'Main Read Screen' press the 'Menu' key on the instrument panel.

2)   Press 'Key 2' to display the 'Utilities' menu.

3)   Press 'Key 4' to select settings and the following screen is displayed:

Screen 7 - Settings

4)   The following instrument settings may be maintained:

- 1 – Prompt ID: Press 'Key 1' to prompt for ID code for each sample reading, answer Yes or No accordingly.

- 2 – Temperature: Press 'Key 2' to enter the default unit temperature, choosing from ^{O}C or ^{O}F.

- 3 – Date: Press 'Key 3' to switch the date format between dd/mm/yy and mm/dd/yy formats.

- 4 – Auto Off: Press 'Key 4' to auto switch off the instrument when not in use. Toggle between 'Yes' or 'No'. If set to Yes, the instrument will switch off after 10 minutes if not in use.

Flow Fail

The 'Flow Fail' option enables the operator to adjust the instrument flow fail detection point should it fail in normal operation with a clean filter.

The instrument's internal pump can be stalled when pulling against a vacuum or through a blocked filter. This is indicated by a flashing pump icon ❀ and a red screen; to prevent damage to the pump, the pump will switch off after a few seconds.

Press the 'Pump' key again to remove the flashing pump icon.

> Note: Dirty or discoloured filters should be changed before use. Filters that have drawn in water should be changed immediately to prevent damage to the instrument.

1)   From the 'Main Read Screen' press the 'Menu' key on the instrument panel.

2)   Press 'Key 2' to display the 'Utilities' menu.

3)   Press 'Key' 5 to select flow fail and the following screen is displayed:

```
Adjust Flow Fail
       -12
Use  Cursor  Keys

   (Accept)(Reject)
```
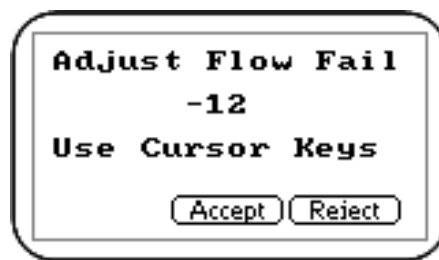
Screen 8 - Adjust flow fail

4)   Use the 'Scroll' keys to adjust the value displayed. The larger the value, the less sensitive the flow fail detection is.

5)   Press soft-key 'Accept' or 'Reject' accordingly.

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Flow Fail Set-up Process – Best Practice

START → Increase the displayed value by 2 → Turn pump on → Wait 5 seconds → Flow fail alarm?

Flow fail alarm? — Yes → Press pump cancel alarm → Increase the displayed value by 2

Flow fail alarm? — No → Decrease the displayed value by 1 → Wait 5 seconds → Flow fail alarm?

Flow fail alarm? — No → Increase the displayed value by 3 → Turn pump on → Block gas inlet → Wait 5 seconds → Flow fail alarm?

Flow fail alarm? — No → Decrease the displayed value by 1 → Block gas inlet → Wait 5 seconds → Flow fail alarm?

Flow fail alarm? — Yes → Press pump cancel alarm → Decrease the displayed value by 1 → Accept → END

Flow fail alarm? — No → Blocked or excessive restriction → Refer to Section 8.0 Problem Solving

Flow Fail Set-up Process – Best Practice
G100 Range

Logging

Data logging mode can be started or stopped via 'Key 6 - Logging' accessed from the 'Utilities' menu. Press 'Key 4 – Start/Stop Logging' to start and stop data logging.

Whilst in data logging mode the instrument will automatically record data at the pre-set intervals including running the pump for a pre-set time.

Active logging mode is indicated on the 'Main Read Screen' by the ⬆ icon.

The operator is able to edit the default ID, pump run-time, interval and start/stop logging.

1) From the 'Main Read Screen' press the 'Menu' key on the instrument panel.

2) Press 'Key 6' to display the 'Logging' menu and the following screen is displayed:

Screen 9 - Logging menu
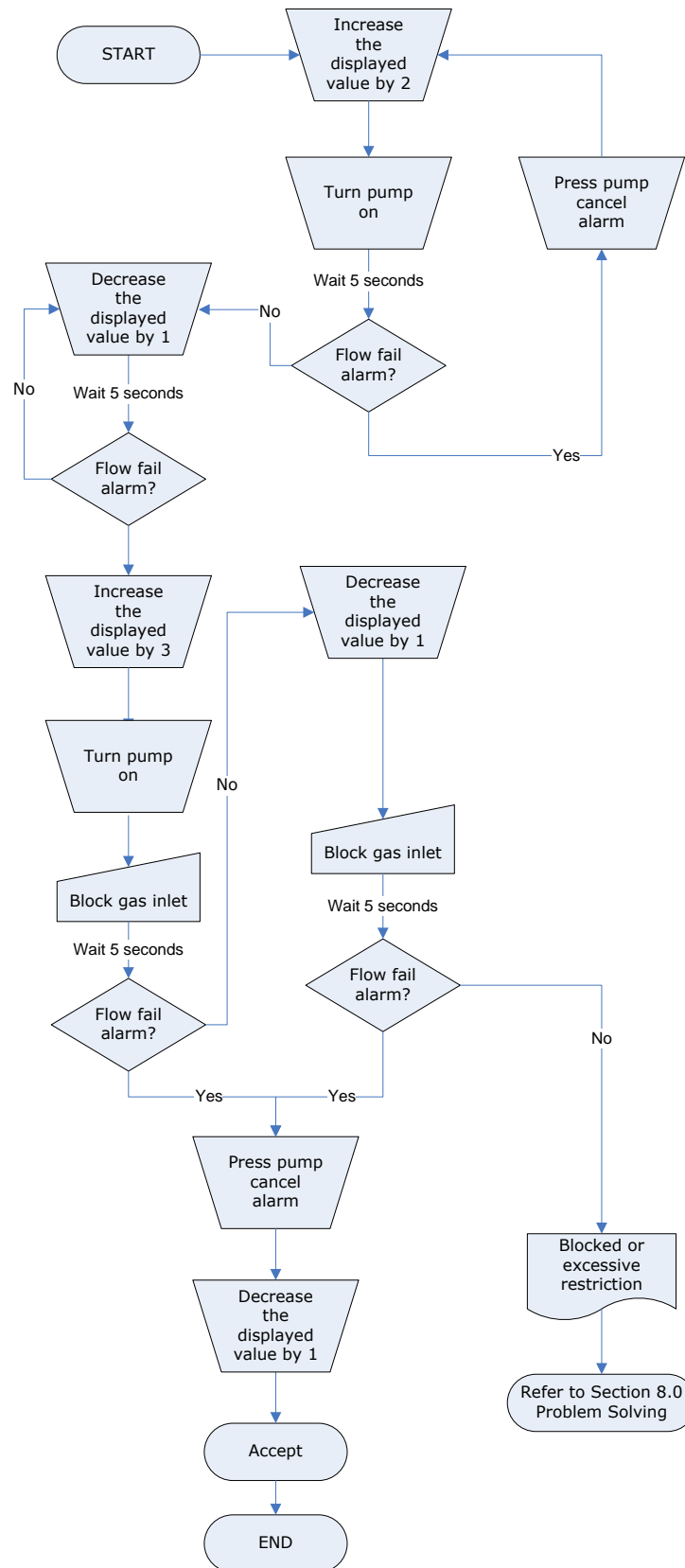
3) Select the desired option by pressing 'Keys 1 to 4'. Then enter the appropriate setting using the keypad followed by the 'Enter' key.

- 1 – Every 00 mins: Press 'Key 1' to enter the time in minutes for the timeframe between sample readings. The interval controls the reading frequency in minutes, i.e. every 10 minutes.

- 2 – Pump 00 secs: Press 'Key 2' to enter the time in seconds for the length of time you wish the pump to run when taking a sample reading. The pump run-time is the time in seconds for which the pump runs prior to the reading being stored. This figure will also need to take into account the length of sample tube and the volume of the sample gas. For example, there is little point setting a pump run-time of 10 seconds if it takes 30 seconds to draw in a new sample.

- 3 – ID 00000000: Press 'Key 3' to create an 8-digit numeric ID Code.

- 4 – Start/Stop Logging: Press 'Key 4' to start and stop data logging.

Note: Data logging mode is automatically stopped when the instrument is switched off or if the logging parameters are edited.

Reset

The instrument can be reset by pressing 'Key 7 - Reset' accessed via the 'Utilities' menu. Selecting this option will clear all user settings and any stored data including the event log.

A confirmation code (12345678) must be entered to confirm that a reset is really required.

Calibration

The G100 range of instruments is fully calibrated during manufacture and when returned for service. However, to improve accuracy between services a user/field calibration can be performed.

> Note: For further information please refer to <u>Calibration</u> of this manual.

View Data

The 'View Data' option enables the operator to view the stored readings.

1) From the 'Main Read Screen' press the 'Menu' key on the instrument panel.

2) Press 'Key 4' to view stored data readings and the following screens are displayed:
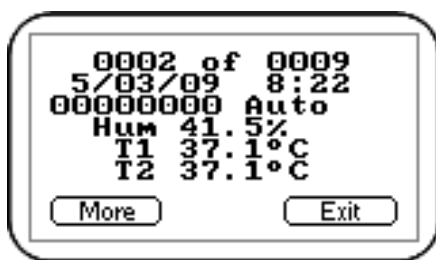
Screen 10 - View data 1
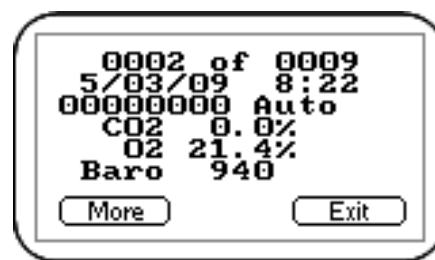
Screen 11 - View data 2

3) Press 'Key 4 - Scroll Left' and 'Key 6 - Scroll Right' to move through the stored readings either forwards or backwards. Press 'Key 2 - Scroll Up' and 'Key 8 - Scroll Down' to switch between the first (CO_2, O_2 & Baro) and second (T_1, T_2 & humidity) group of reading parameters.

4) Press the soft-key 'More' to refine or filter the readings to view.

Screen 12 - Soft-key 'More'

- 1 – Delete All: Enables the operator to delete all the readings stored

- 2 – Filter: Used to refine/filter the range of readings displayed by ID or date ranges. Press between two dates, after a date, before a date or all dates.

- 3 – Go to: Enables the operator to jump to the first or last reading in the memory or any other reading.

Clear Reading Memory

The 'Clear Reading Memory' function enables the user to check how many readings have previously been taken and clear them if necessary.

> Note: Before readings are actually deleted a caution message is displayed; once readings have been deleted they cannot be recovered.

The instrument can store up to 1000 readings. The reading structure is fixed and may contain optional parameters not activated for your particular instrument configuration, i.e. oxygen, temperature and humidity.

Once the reading memory is full it is not possible to store any more readings. When full and the 'Store' key is pressed or data logging is activated the instrument will show a brief message stating that the memory is full and that no further data will be recorded.

1)   From the 'Main Read Screen' press the 'Menu' key on the instrument panel.

2)   Press 'Key 4' to view data.

3)   To clear the readings press the soft-key 'More' followed by 'Key 1 - Delete all'.

Diagnostics

The 'Diagnostics' option enables QED Technical Support to identify and resolve issues with the instrument and readings. If required, the operator may be asked to confirm the diagnostics displayed.

1)   From the 'Main Read Screen' press the 'Menu' key on the instrument panel.

2)   Press 'Key 5' to view diagnostics.

> Note: For further information contact Technical Support at QED on +44(0)330 800 0088 or email technical@qedenv.co.uk.

Warning and Error Codes

When switched on the instrument will perform a predetermined self-test sequence taking approximately 30 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 Problem Solving of this manual.

Battery/Charging

> Note: Fully charge the unit before use when the instrument is first received or if the instrument has been in storage for six months or more.

The battery used in the instrument is 2.6 Ah Lithium-Ion cell. The instrument must be charged using the power supply supplied with your instrument. The power supply supplied is intended for indoor use only. Please ensure adequate ventilation whilst charging.

> Note: The instrument cannot be powered or charged via the USB connector.
>
> Note: When plugged into the power supply the instrument will power on and display charging. When complete the display will change to show that the instrument is charged. To switch the

> instrument ON whilst charging or charged is displayed, the operator will need to press and hold the power key briefly.
>
> Note: Once the instrument is fully charged, the power supply should be disconnected from the instrument.

Instrument: Input: 5Vdc ± 0.5V (max 1000mA)

Power Supply: Input: 100 -240Vac 60/50Hz 120mA

Output: 5Vdc 1000mA (5VA)

> Note: A full charge will take approximately **4 hours**. Typically, a fully charged battery will last 10-12 hours.

When the instrument is already powered on, the operation is slightly different as the battery icon changes to a flashing plug symbol. This will stop flashing when the charge is complete.

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TAKING READINGS

Preliminary Checks - Best Practice
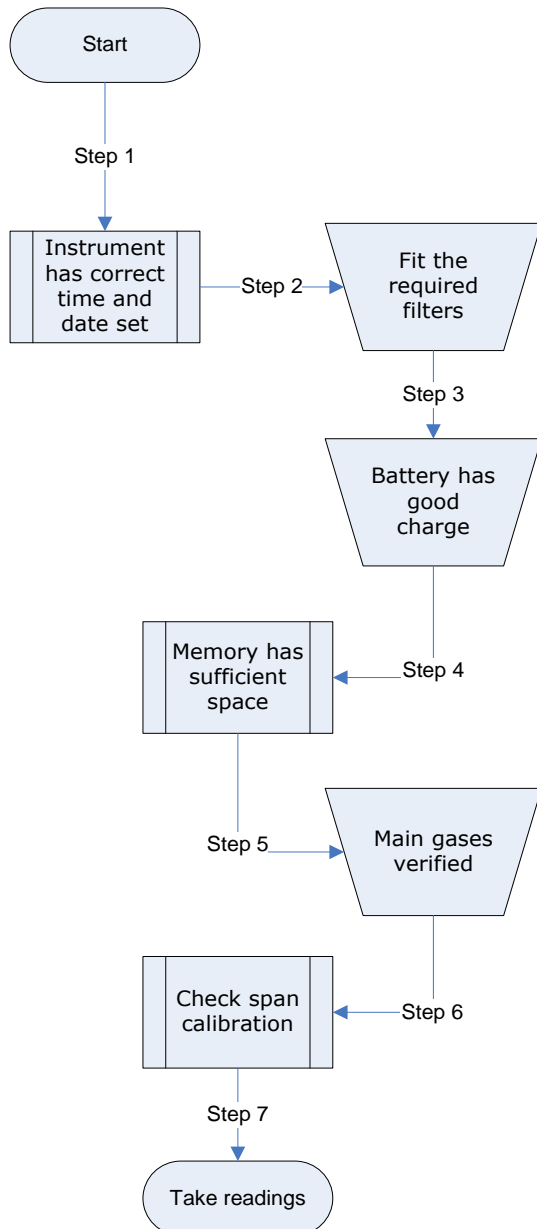
Prior to use, it is good practice to ensure that:

Step 1   The instrument has the correct time and date set.

Step 2   Fit the sample filter checking that it is clean and dry. If experiencing condensation in sample line or the sample filter keeps getting blocked, fit the moisture trap or similar at take-off point.

Step 3   The battery has a good charge (minimum 25% charge, even if only a few readings are required).

Step 4   The memory has sufficient space available.

Step 5   The main gases have been verified with zero gas concentration present.

Step 6   If necessary check the span calibration with a known concentration calibration-check gas.

Step 7   Take readings.

Do protect the instrument from strong direct sunlight which will quickly raise the temperature of the instrument beyond its operating range and the LCD display will appear almost black. The contrast setting cannot then alter the contrast.

Do remember to always use the sample filter! If the sample filter becomes flooded, change it and ensure all sample tubes are clean and dry before re-use.

Do not place the instrument against anything hot as this may cause excessive internal temperatures which can lead to erroneous readings.

Do not get the instrument wet, for example exposure to rain.

```
Start
  │ Step 1
Instrument has correct time and date set ── Step 2 ──▶ Fit the required filters
                                                              │ Step 3
                                                        Battery has good charge
Memory has sufficient space ◀── Step 4 ──────────────────────┘
  │
Main gases verified ◀── Step 5
  │
Check span calibration ◀── Step 6
  │ Step 7
Take readings
```

Preliminary Checks

(G100 - Best Practice)

> ❗ Always ensure that the exhaust gases emerge in a safe manner into a well ventilated area.

Gas Measurement Process – Best Practice
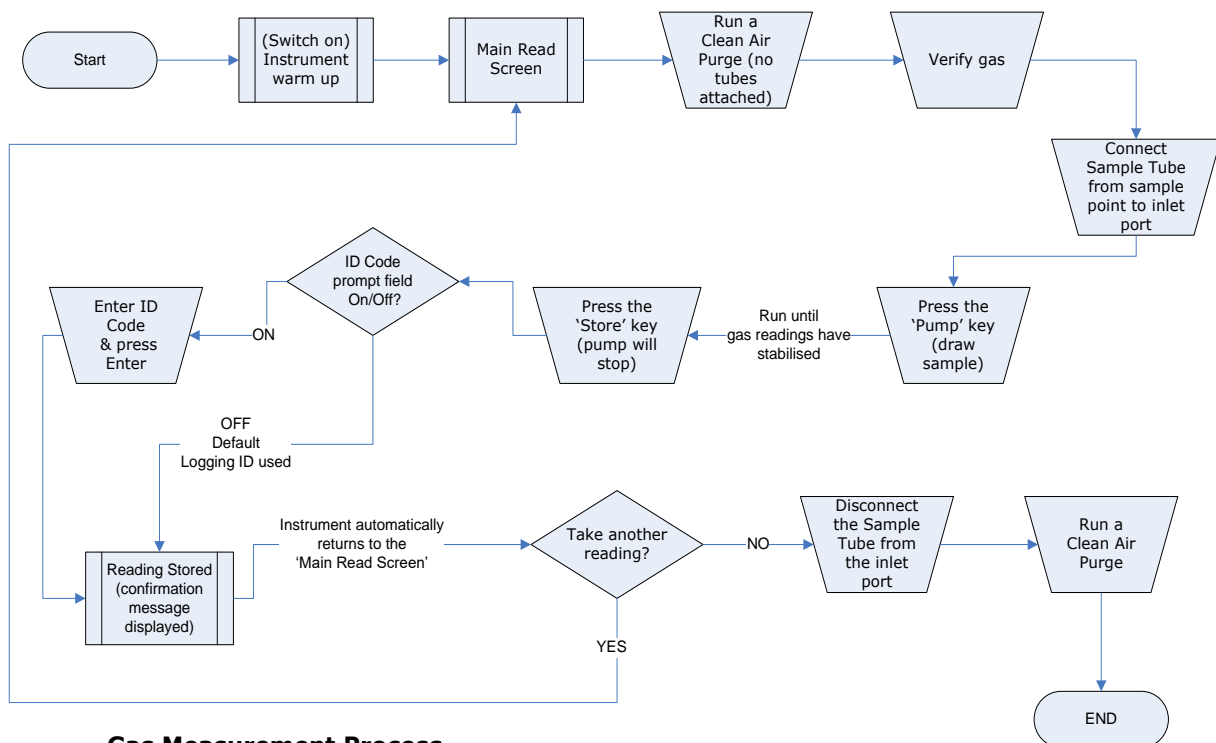
Gas Measurement Process
(G100 - Best Practice)

Depending on preferences the exact reading procedure can change.

The following method is considered best practice and when followed correctly will allow quick and consistent readings to be recorded.

1) When the instrument is first switched on it should be purged with fresh air and allowed to stabilise for a few minutes.

2) At this point it is good practice to verify the CO_2 channel. Calibrate only if required. This option is available via the 'Calibration' menu. The instrument is now ready to take the first reading.

3) Connect the sample tube, if relevant (always use the sample filter) from the sample point to the inlet port of the instrument, ensuring the filter is seated correctly.

4) Press the 'Pump' key to draw a sample into the instrument.

5) Notice the main gas readings start to change. It is recommended to run the pump until the gas readings have stabilised (approx. 30 seconds) then press the soft-key 'Store'.

6) The pump will stop and the operator will be prompted to enter an ID code to identify the reading. A "reading stored" confirmation message will be displayed briefly before returning to the 'Main Read Screen'.

Note: The ID code prompt can be switched on or off. This option is accessed via the 'Settings' menu, then press 'Key 1 - Prompt for ID: Yes or No'. If the ID prompt is set to 'No' the reading is

stored using the default logging ID.

7)   After each reading the instrument should be purged with fresh air.

8)   Disconnect the sample tube from the instrument. Then, run the pump for a minimum of 30 seconds. The gas readings should return to nominal values for fresh air.

Regardless of the instrument configuration the following data will be stored for each reading:-

- ID code (8 characters)

- Reading Type (0=User, 1=Auto, 2=peak, 3=hold)

- Current time/date

- Gas readings (CO_2, O_2)

- Sample pressure (for indication only)

- Temperature x 2

- Humidity

Alternative Reading Methods

There are three other reading types or methods which each require slightly different operating procedures.

- Logged reading

- Peak reading

- Hold reading

Logged Reading

Logged readings need to be configured and initiated via the 'Utilities' menu by pressing 'Key 6 - Logging'. During configuration the user will be asked to supply an ID, reading interval and pump run-time.

These parameters are used to control the reading frequency in logging mode. Once logging mode is activated the instrument will automatically record a reading at every interval until stopped by the operator or the memory becomes full. Logging is also suspended temporarily whilst the user is accessing the menu options.

Whilst the logging mode is active the 'Hold', 'Pump' and 'Store' key will be deactivated, only logged readings can be stored.

Peak Reading

The operator can toggle the reading mode between normal (current) and peak readings. Whilst in peak reading mode the instrument will only display peak values for each of the channels. These values can then be stored by pressing the 'Store' key or automatically at the appropriate logging interval (if logging is enabled).

The peak value is reset after a reading is stored or by exiting the peak mode using the appropriate soft-key. The current mode of operation can be identified by the status of the soft-key, either 'Normal' or 'Inverse', where inverse indicates peak mode is active.

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Hold Reading

The 'Hold Reading' option allows the user to freeze the currently displayed reading. This allows it to be manually recorded or moved away from the sample point. Once activated, press the soft-key 'Hold' and the readings are fixed until the 'Hold' key is pressed again or by storing the reading.

The current mode of operation can be identified by the status of the soft-key which is inversed whilst in the hold phase.

Screen 13 - Hold reading

CALIBRATION

User Calibration

The G100 range of instruments is fully calibrated during manufacture and when returned for service. However, to improve accuracy between services a user/field calibration can be performed.

This section sets out the correct procedures to achieve an accurate user calibration.

> Note: If the calibration is completed incorrectly it may decrease the accuracy of the instrument.

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

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

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

Calibration Gases

User calibration of the instrument will improve the data accuracy in the range of the calibration gases used. However, it 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. Only use gases with a known certified gas concentration.

> Note: Certified calibration gases can be supplied by QED.

> **!**   For each gas used the appropriate material safety data sheet must be read and understood before proceeding. Calibration gases and the use of pressure regulators can be dangerous.

Calibration Set-up

The regulator supplied with the calibration kit has been configured to deliver a fixed flow. It only requires a few turns to open and no adjustment is necessary.

> **!**   Exhaust Port
>
> When the instrument is being calibrated, there are two possible exits for the gas; via the usual manner out of the exhaust port of the instrument or in cases of over-pressurisation the 1/16" port on the pressure relief valve.
>
> It is recommended that both ports have exhaust tubing attached. The exhaust tubing must emerge in a well-vented area. Ensure there are no leaks in the tubing and connections.
>
> The calibration should always be carried out in a safe area with all necessary precautions taken as all pressurised gases are potentially dangerous.

Calibration Equipment

The diagram below displays the regulator and tubing equipment for user calibration:
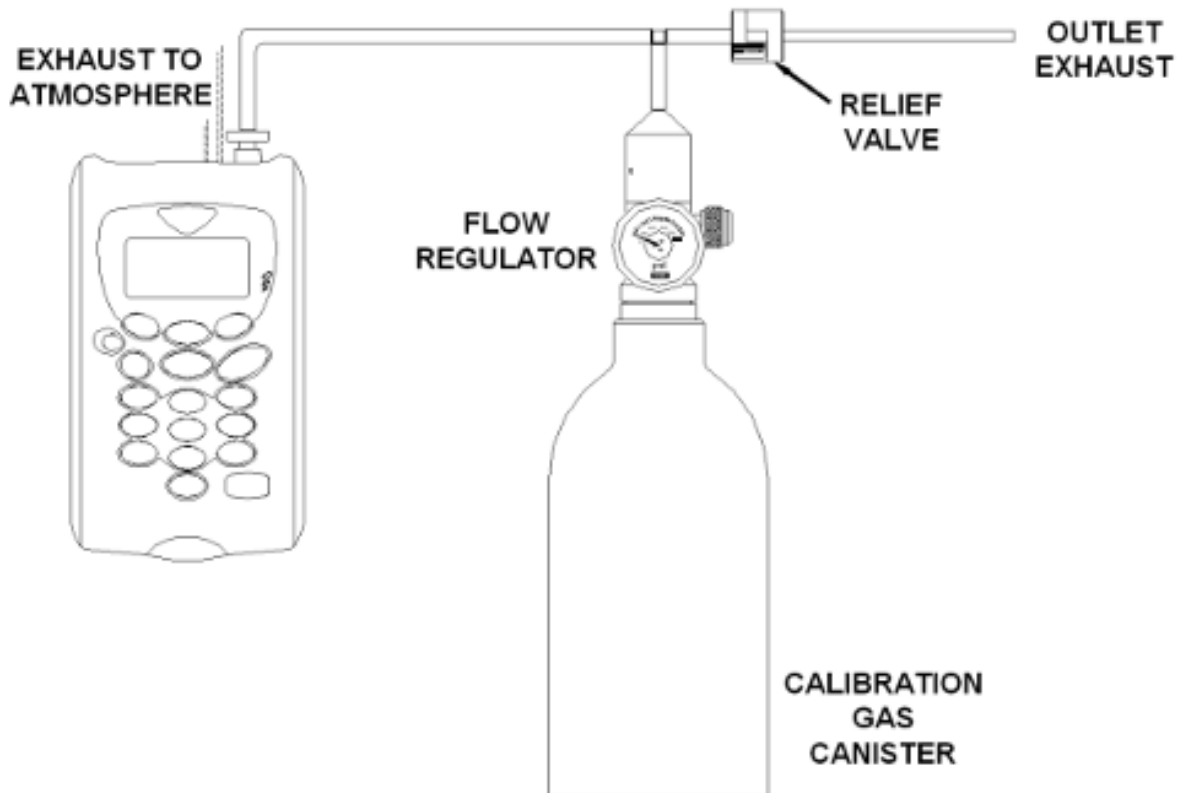
- Certified calibration gas in 58 litre gas canisters is supplied with the QED calibration kit. Please refer to the QED website www.geotechuk.com for further information.

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

Note: Maximum input pressure 250mb, maximum flow 300ml.

Calibration Method

Before you begin ensure the unit is turned on and allowed to stabilise at its working temperature before performing any of the calibration options, this will typically be 15-20 minutes.

To achieve the processes set out in this section, press 'Key 3 – Calibration' from the 'Main' menu. The first screen displayed provides the option to select the gas that requires calibration.

Screen 14 - Calibration menu

The exact calibration method can vary depending on the gases used.

Reset Factory Settings

This option will reset the instrument to its factory programmed calibration characteristics and will clear the user calibration points for both gas channels.

1)   To reset to factory settings, press 'Key 1 - Factory Reset' from the 'Calibration' menu.

Screen 15 - Reset calibration screen

2)   To prevent the user calibration data being accidentally erased the user must confirm the action by pressing the soft-key 'Accept', or soft-key 'Reject' to exit without change.

Zero CO_2 Channel

For maximum accuracy it is recommended that the CO_2 Channel is zeroed using bottled gas (certified 100% N_2). However, if nitrogen gas is not available the optional soda lime filter kit can be fitted to the gas inlet. This allows the user to perform a zero using normal air as the soda lime filter will absorb virtually all CO_2 from the sample air. For both these options select 'Key 1-Zero with N_2' from the user calibration menu.

If neither of the recommended methods is available the user can select the option to perform an air calibration. This option assumes that the user has access to fresh air at around 390ppm. Generally, this can be found outside or in a well ventilated corridor (typically, an office or lab would have a higher CO_2 concentration).

1)   From the 'Calibration' Menu, press 'Key 2 - CO_2 channel'.

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Screen 16 - CO2 channel menu

2) Press either 'Key 1 - Zero with N_2' (recommended) or 'Key 2 - Zero with Air' from the menu. Then, either attach the 100% N_2 or sample pipe to allow access to fresh air.

3) Ensure the zero gas has flowed and is stable.

4) Press the 'Start' key. The instrument will now wait (approximately 60 seconds) for the gas reading to stabilise at the correct level. If zeroing with air press the 'Pump' key to draw in fresh air.

5) The instrument will then indicate a successful zero has been completed. Press the soft-key 'Accept' to confirm the calibration and 'Store' the new user offset. Alternatively, soft-key 'Reject' to exit without change.

> Note: If the calibration failed then purge and try again or select a different air source.
>
> Note: If using G110 – very high concentrations of CO_2 may take up to **30 minutes** to purge completely.

Span CO_2 Channel

It is recommended that the instrument is spanned to target the desired reading range (e.g. 5%); ideally this should not be a low level close to zero.

1) If not already preset, enter the **span target**, i.e. certified concentration of your calibration gas. Press 'Key 1' and enter the new value. Then attach the gas and open regulator valve to allow the gas to flow.

2) Press the 'Start' key and wait for the reading to stabilise. This can take a couple of minutes.

3) Once a stable reading is shown press the soft-key 'Accept'. A successful span calibration message will then be displayed. Press the soft-key 'Accept' again to confirm the calibration and 'Store' the new user span. Alternatively, press soft-key 'Reject' to exit without change.

> Note: If the calibration failed then try again using a longer purge time or different target gas.

Zero O_2 Channel

It is not required to zero the O_2 channel. A span calibration corrects the reading across the whole range.

Span O_2 Channel

It is recommended that the O_2 channel is spanned in fresh air with a target concentration of 20.9%, although other gases and target concentrations can be used if required.

1) If not already preset, enter the **span target**, i.e. certified concentration of your calibration gas.

2) Press the soft-key 'Start' and wait for the reading to stabilise. Press the 'Pump' key to draw in fresh air. It can take a couple of minutes to stabilise.

3) Once a stable reading is shown press the soft-key 'Accept'. A successful span calibration message should then be displayed. Press the soft-key 'Accept' again to confirm the calibration and 'Store' the new user span. Alternatively, press soft-key 'Reject' to exit without change.

> Note: If the calibration failed then try again using a longer purge time or different target gas.

Last Field Calibration

This data can be found in the 'Information' screen accessed via the 'Utilities' menu. This option displays the date that the last field calibration was perfomed on the instrument.

Calibration Record

The G100 instruments have the facility to log user calibrations via the 'Event Log'. This can be used as an aid in ensuring that gas measurements are valid and accurate.

During calibration the instrument will record the following in the event log. For each entry the time and date will be stored.

Event	Data Recorded
Successful user zero CO_2	Type (N_2 or Air) and Readings before and after
Successful user span CO_2	Target Value, Readings before and after
Successful user span O_2	Target Value, Readings before and after
Failed user zero CO_2	Type (N_2 or Air) and Reading
Failed user span CO_2	Target Value, Gas Reading
Failed user span O_2	Target Value, Gas Reading
Return to factory settings	

> Note: If the calibration failed, then try again using a longer purge time or different target gas. This event log can only be downloaded and viewed via the optional Analyser Data Manager software. It cannot be viewed on the analyser screen.

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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 QED on +44(0)330 800 0088 or email technical@qedenv.co.uk.

Warnings and Errors

When switched on the instrument will perform a predetermined self-test sequence. 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.

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

There are two types of warning that may be displayed:

- 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 operating criteria, e.g. battery charge low, memory nearly full.

- Operational parameters that could affect the performance of the instrument, e.g. CO_2 out of calibration.

The most likely reason for these errors is either an incorrect user calibration, or may indicate 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.

Under and Over Range Codes

If a reading is over range (i.e. above the maximum allowed reading) it will be displayed with more than chevrons (>>.>). This can occur if a channel has been incorrectly calibrated or the sample gas has exceeded its specified range (e.g. $CO_2 > 20\%$).

If a reading is under range (i.e. below zero) it will be displayed with less than chevrons (<<. <). Refer to section Calibration of this manual to remedy under-range by performing a user zero.

A number displayed as asterisks (**.*) indicates an error, usually where the instrument has been unable to complete a particular calculation. Typically, this will be the first indication of a fault condition.

Where no data is available dashes (--.-) are displayed. This usually occurs when a particular reading or parameter has been skipped by the user, or where an optional accessory is not fitted correctly, i.e. a temperature probe.

Flow Fail Warning

Occasionally an instrument may report a flow fail that is caused by a blocked or flooded inlet filter, please refer to 'section Flow Fail for further information.

Self-test Warning Messages

The following warnings may be displayed during the self-test period when the instrument is switched ON.

Warning	Icon	Description
Check Memory		The instrument only has space to store less than 50 readings before it is full. The exact number can be checked using the 'View Readings' option.
Memory Full		There is no more space in memory to store readings. Both the store and log options will be disabled until the memory is cleared. The readings should be downloaded to PC using the optional download software before memory is cleared.
Battery Low	🔋	The instrument does not have enough power to operate for a full day. The instrument should be recharged or connected to an external power supply.
Service Due	🔧	It has been 12 months (or more) since your instrument was returned to the manufacturer for a service. The performance and accuracy of the instrument may be impaired.
User Cal. Due		It has been over a month since the instrument was last user calibrated. For optimal performance and accuracy it is recommended that the instrument is user calibrated each time it is used.
Invalid Time		The instrument has an invalid time. This is most likely to occur after a reset. The correct time should be entered using the set 'Time & Date' option via the 'Utilities' menu.
Invalid Date		The instrument has an invalid date. This is most likely to occur after a reset. The correct date should be entered using the set 'Time & Date' option via the 'Utilities' menu.
Baro. Fault		The instrument has detected a fault with the barometric sensor or its calibration. This will have an effect on the accuracy of the readings as they are pressure compensated. The instrument will need to be returned to the manufacturer for service.
Sensor "0-8" range		This indicates that one of the measurement channels within the analyser has an issue on start-up. Please contact technical support for further guidance.

> Note: Certain configuration problems can be corrected remotely. Using the Analyser Data Manager software, it is possible to export the current configuration and e-mail it to the manufacturer's Technical Support or Service Department. Depending on the type of error it may be possible to correct the configuration file and import it back into the instrument.

User Calibration Trouble Shooting

Error	Remedy
User Zero failed	A possible reason for this is because the instrument is trying to zero to a level which is outside the predetermined range set when the unit was calibrated at the factory or; the gas is not stable i.e. is still flushing the measure gas or is using ambient air/gas that is varying in concentration. To rectify this, first ensure the unit contains absolutely none of the gas which is being zeroed by flushing thoroughly with nitrogen. If it will not zero, then refer to the instructions given in the 'Factory Settings' section. If the instrument continues to fail to zero then the unit must be returned to the manufacturer for investigation.
Calibration failed	Check the span target is set to the correct value, if not, correct and retry spanning the channel. Repeat the entire procedure, including zeroing the channel and then calibrate the span. Ensure the reading is stable before spanning the channel.

User Calibration Explained
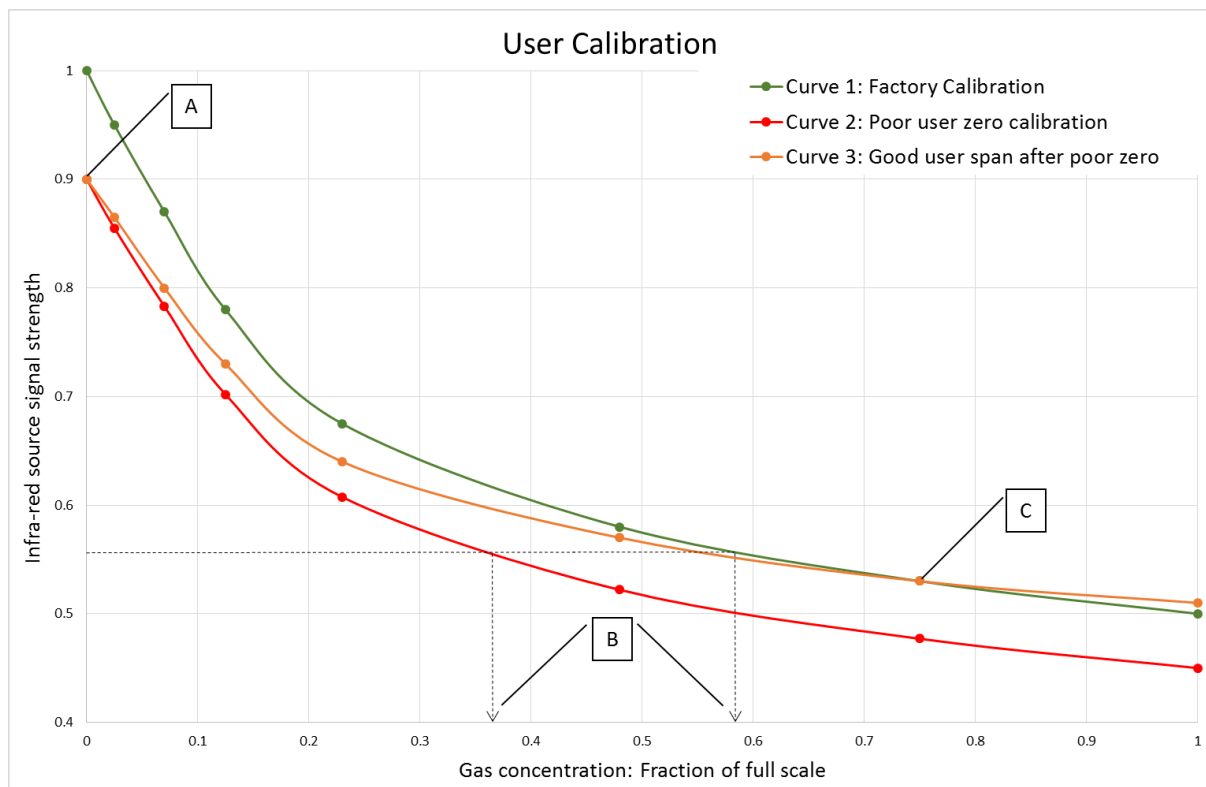
Graph 1 - User calibration explained

User calibration is a means of optimising the performance of the instrument to the current operating conditions such as ambient temperature and pressure as well as correcting for instrument drift caused by lamp and filter settling.

In general, the instrument should not require calibration more than once a month, but we do recommend verifying the instruments operation each day.

User calibration has two operations and each may be performed individually, however for a complete user calibration both must be completed.

Factory Calibration

When the instrument is factory calibrated, a stable gas curve is generated (see curve 1 on Graph 1 - User calibration explained). This curve is then used to determine the gas concentration based on the infrared signal strength after being absorbed by the gas.

Zero Calibration

A zero calibration is used to correct the entire curve for the infrared source and filter variations caused by aging and induced drift due to dirt and other contaminants. If done correctly, there is often no need to complete a span calibration, as the new curve will follow closely to the factory calibration curve (curve 1 on Graph 1 - User calibration explained).

The zero calibration is very sensitive and a rushed or poor calibration, (such as the target gas still being present), will result in a zero error; see point A on curve 2 of Graph 1 - User calibration explained. This also produces an error throughout the remainder of the curve proportional to signal strength, but the effect on the span is significant, see point B on Graph 1 - User calibration explained.

> Note: To perform an accurate user calibration it is critical that a good user zero has been performed. QED recommend that this be done in nitrogen in order to guarantee that none of the gas of interest is present.
>
> Note: The Zero calibration is very sensitive and even 100% instruments will detect in the 0 to 100ppm range even though they do not display to this resolution. Please refer to Graph 2 - Typical zero gas purge times.

Span Calibration

A span calibration is used to optimise the analyser at the span calibration concentration (see point C on Graph 1 - User calibration explained) for the current operational conditions. It corrects the span point but leaves the zero unadjusted (this will be left at the last user zero if this has been performed) and should be done at the concentration of interest in the particular application.

If the user zero is poor and the span calibration is good, it will correct the gas curve for the point of interest, but other points on the curve could be incorrect, see curve 3 on Graph 1 - User calibration explained.

Typical Calibration Purge Times

Typical zero calibration although displaying zero needs to be given time to settle. We recommend commencing the calibration at least five minutes after the display concentration stabilises.

> Note: If using G110 – very high concentrations of CO_2 may take up to **30 minutes** to purge completely.

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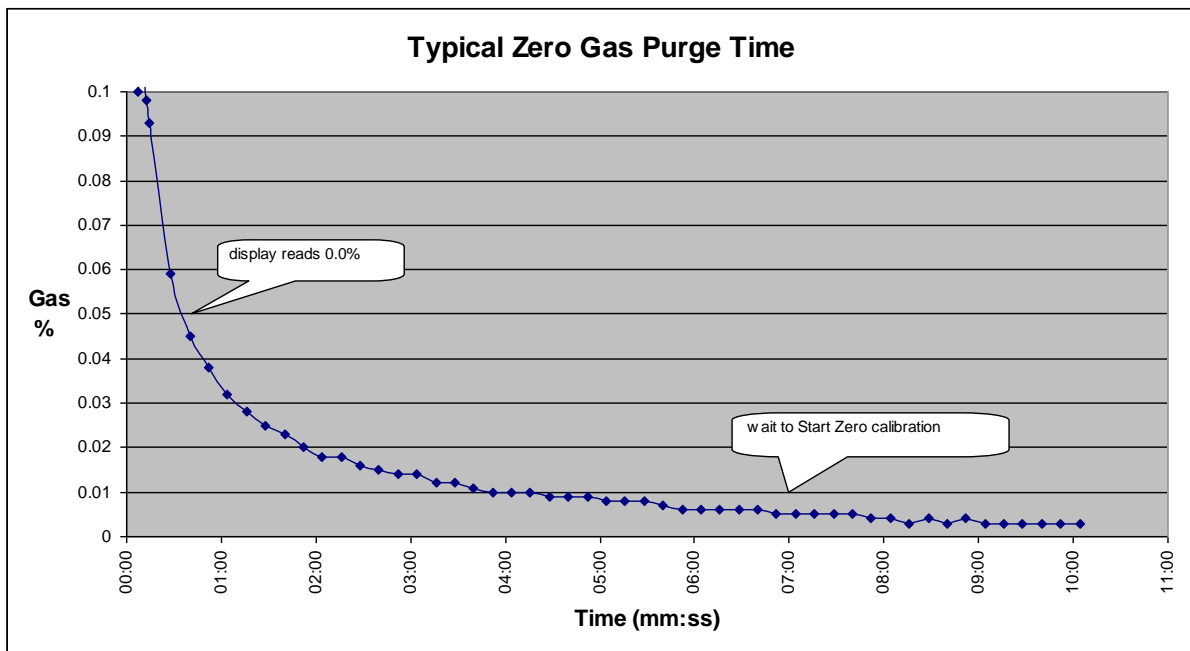
Graph 2 - Typical zero gas purge times

Cross-Gas Effects

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

Error Due to CO_2 Solubility in Water

Due to the water trap and filter it is possible that some of the CO_2 in the sample gas will be absorbed in to any trapped water.

Hardware Reset

If for any reason the instrument 'locks up' and will not switch off, or the instrument appears off and will not turn on, it is possible to force an emergency power off. Pressing and holding the 'On/Off' key for 10 seconds will power off the instrument. Once this time has elapsed, the instrument can be powered on as normal.

Note: Performing a hardware reset may cause loss or corruption of currently stored data including the time/date.

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SERVICE

The G100 instrument should be regularly serviced to ensure correct operation and accurate readings. The manufacturer recommends a full service and recalibration **every 12 months**.

Depending on usage the O_2 cell should be replaced every 2-3 years.

User Serviceable Parts

Note: There are no user serviceable parts <u>inside</u> the instrument. Please do not attempt any repair as this may invalidate any warranty supplied with your instrument.

The following parts are supplied by your instrument manufacturer and can be replaced by the user:

Sample Filter	This should be regularly inspected for damage or discolouration and changed if needed. The instrument should never be operated without the sample filter as this may result in water or dust entering the instrument. The filter should be changed immediately if water can be seen. Failure to do so can damage the instrument.
Sample Tubing	Always ensure that sample tubes are not contaminated or damaged.

Cleaning

The instrument and accessories (including power supply unit) can be wiped clean using a non-fibrous damp cloth.

Note: Do NOT apply pressure to the LCD display as this can cause damage.

Do NOT apply any moisture to the moisture removal tube on the rear of the instrument as this may damage the membranes.

Do NOT use solvents or any other chemical cleaners.

WARRANTY POLICY

G100 Range and G200 Range Warranty Terms and Conditions

QED will repair or replace (at QED's discretion) any goods supplied by the company in respect to defects arising within **12 months** from date of purchase or delivery, whichever is later, provided that:

- The model is a G100, G110, G150, G200, or G210 gas analyser.
- The defect is due to faulty parts or workmanship provided by QED.
- Proof of delivery/purchase must be provided to QED for any claims. This includes a QED sales order, invoice, or delivery note.
- All warranty repairs can only be carried out by QED or its authorised agents. In certain circumstances, permission may be granted by QED for the owner to replace a supplied part under warranty.
- Any repair or replacement component under warranty will not extend the warranty period of the analyser.
- Products must have been returned for service and calibration as recommended by QED as per the individual operating manual.
- Where replacement parts have been supplied by QED under warranty, the replaced parts must be returned to QED. If not returned, QED reserve the right to charge for the replacement part.
- If no fault is found an investigation charge may apply.
- QED's Technical Support MUST be notified in the event of a pending warranty claim. They will then issue a returns reference number that must be included in any return. Failure to provide this will void any warranty claim.

The following is not included:

- Normal wear and tear of parts that might wear out over time, or be consumed, is not covered. Parts not covered include, but not limited to the PTFE filter, oxygen sensor, and tubing.
- A service is not part of a warranty claim.
- Accidental damage, including dropping during use.
- Damage as a result of vandalism.
- Faults arising from use of the equipment that is not in accordance with standard operating procedures laid out in QED's operating manual.
- Faults arising from use of the equipment in unsuitable applications.
- Repairs or alterations carried out by parties other than QED, its authorised agents, or under the instruction of QED.
- Any data stored on the equipment that may be lost.
- A claim due to a failure in maintaining the analyser in accordance with the operating manual.
- A claim as a result of poor quality or inadequate repairs.
- Any business related losses such as income, profits, and contracts (as far as the law allows).

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G100 Range and G200 Range Warranty Terms and Conditions

Page **2** of **2**

The following voids the warranty:

- When non-approved QED parts have been used for repair or maintenance.
- When parts are added, or alterations made, to the analyser outside the scope of the operating manual.
- The analyser has been opened, unless by QED approved service centres (where applicable).
- The equipment has been stored or installed outside of the operating range and environmental conditions determined in the operating manual.
- The equipment has not been maintained in accordance with the operating manual.

Service Warranty:

- QED offer a three-month warranty period, following a QED service, to cover any defects that have arisen because of that service.

> **i** **Note**
>
> Warranty repair is only granted after an investigation by QED.
>
> For assistance in determining if your equipment qualifies for warranty investigation, please contact your local distributor, or our technical support team at QED on +44(0)333 800 0088 or email technical@qedenv.co.uk.
>
> For extended warranty options, please contact your local distributor, or our sales team at QED on +44(0)333 800 0088 or email sales@qedenv.co.uk.
>
> For any other queries please contact your local distributor, or our sales team at QED on +44(0)333 800 0088 or email sales@qedenv.co.uk.

QED Environmental Systems reserve the right to update these terms and conditions without notice.

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EVENT LOG

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

Event	Data
Cold Start/Reset	Type of start (MCUSR, boot_key)
Firmware Version	Description
Set time	Before and After
Set date	Before and After
Re-flash requested	None
Restore to factory settings	Type
Comms clear memory	Type 0=Readings, 1=Event Log
Change contrast	Before and After
Change flow fail current limit	Before and After
Battery less than critical voltage	Critical, Actual
RTC date/time invalid	None
Factory calibration invalid or overdue	Date, difference
Service invalid or overdue	Date, difference
Power on self-test, sensor out of range	Channel, reading, limit
User calibration set zero OK	Before, After
User calibration set span OK	Target, Before, After
User calibration set zero failed	Target, Reading
User calibration set span failed	Target, Reading
Attempt to store when readings memory full	Max
Readings memory nearly full	Limit, Actual
Change logging mode	Status, Interval, Pump time
Change logging mode ID	ID
Flow fail current limit exceeded	Limit, Actual

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WEEE COMPLIANCE

WEEE COMPLIANT

The wheelie bin symbol now displayed on equipment supplied by QED 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.

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

Our Producer Registration Number is WEE/GB0052TQ

So when your instrument is at the end of its life, please contact the Sales team at QED who will advise you on the next step in order to help us meet our obligations.

EU DECLARATION OF CONFORMITY

EU Declaration of Conformity

This Declaration of Conformity is issued under the sole responsibility of the manufacturer:

QED Environmental Systems
Cyan Park – Unit 3
Jimmy Hill Way
Coventry
CV2 4QP
UNITED KINGDOM

Product: G100, G110, G150

Type of equipment:

- G100 – portable CO2 monitor for incubator verification
- G110 – portable CO2 monitor for specialist controlled atmosphere monitoring
- G150 – portable CO2 monitor for indoor air quality monitoring and detection of concealed persons.

The G100, G110 and G150 described above are in conformity with the relevant Union harmonisation legislation:

2014/30/EU: Electromagnetic capability (EMC)

- EN 50270:2006

2014/35/EU: Electrical equipment designed for use within certain voltage limits (LVD)

- EN 61010-1:2010

2011/65/EU: Restriction of the use of hazardous substances in electrical and electronic equipment (RoHS)

Signed for and on behalf of:

Name: Mr. Craig Millar
Position: Engineering Manager
Done at: QED Environmental Systems
On: 28th August 2018

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GLOSSARY OF TERMS

Analyser error messages	For a list of standard error codes and for more information, please refer to section Problem Solving of the operating manual.
Analyser warnings	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 CO_2 out of calibration.
Battery charge	A full battery charge will take approximately four hours.
Calibration	The process that an instrument will undergo to enable it to measure and display the various parameters in accordance with the manufacturer's specification.
Chemical cell	Type of gas detector which can be fitted internally to the analyser at the time of manufacture.
Clean air purge	Process used to clear out gas from the inlet pipe and the analyser's gas sensors prior to taking a new reading.
CO_2	Carbon dioxide gas.
Contrast adjustment	Adjustable setting which darkens or lightens the text displayed on the screen. Typically, this is used to compensate for different environmental temperatures. High temperature causes the display to darken and low temperature causes the display to lighten.
Data logging	A mode of operation that enables the user to leave the analyser unattended to take readings automatically at predetermined times. The reading interval and pump run-time may be adjusted prior to commencing the logging cycle.
Download	Terminology used to describe the transfer of data from the analyser to a PC via the Analyser Data Manager software.
Event log	Record of significant events in the life of the analyser. Used as an aid to monitoring the use of the analyser. It can also be used as a diagnostic tool if there is a problem with the analyser. The event log can be viewed via the –Analyser Data Manager software. It cannot be viewed on the analyser screen.
Exhaust port	The point at which the gas exits the analyser. This is located on the top of the analyser. It is threaded to take an M5 hose-barb to allow an exhaust tube to be

	attached if required.
Exhaust tube	Clear plastic tubing used to route gases from the exhaust port.
Factory settings	Default calibration settings preset at time of factory calibration.
Firmware	Firmware is the name given to the analyser's internal software. This can be programmed using the re-flash command on the Analyser Data Manager software. The latest software release can be downloaded from the QED website. It is also automatically updated when the analyser is returned for servicing.
Analyser Data Manager	Analyser Data Manager software enables the user to maximise the operation of the incubator analyser. Instrument readings and event log data may be downloaded to a PC for further analysis and exported to other applications such as MS Excel.
General warnings	Displayed throughout the documentation with a warning symbol. Warning information may affect the safety of users.
Inlet port	Port located on the top of the analyser to which the inlet tube is attached.
LCD display	Liquid Crystal Display. Fitted to the front panel of the analyser.
Main Read Screen	The main analyser screen for normal operations and all operations are carried out from this screen.
Memory	The analyser memory should not be used as a permanent storage medium and data collected should be transferred using the Analyser Data Manager software.
Moisture removal tube	Device used to remove water vapour from the sample gas. This is located at the back of the analyser and should not be covered or partially covered. This is not user serviceable and should NOT be removed by the user.
Moisture Trap	Device to remove condensed water from the sample line. This can be a simple absorption filter as per a moisture trap, a catch-pot or simple return tube depending on the application.
O_2	Oxygen gas typically 20.9% in air, measured via electro-chemical cell.
Over range codes	Over range codes are errors above the maximum allowed reading and will be displayed with more than chevrons (>>.>)

ppm	Parts per million
Pressure	Maximum input pressure 300mb maximum flow 250ml.
Pump	The device used to transfer a gas sample into the instrument where that sample is not under pressure. Select the 'Pump' key on the analyser to activate.
Regulator flow	The regulator's flow is factory set. It only requires a few turns to open, no adjustment is available.
Sample tube	Tube used to transfer sample gas from the source to the analyser.
Span	The point at which the gas analyser is calibrated when a known concentration of the target gas is present.
Temperature probe	External device to enable the instrument to display data and record the temperature readings. This is an optional feature.
Under range codes	Under range codes are errors below zero and will be displayed with less than chevrons (<<.<)
User calibration	Users have the facility to calibrate the analyser between services. User calibration of the gas analyser will improve the data accuracy in the range of the calibration gases used.
Verify	Checking instruments operation using calibration gas.
Warm-up self test	Predetermined self-test sequence to test the analyser functions which takes place after the analyser is switched on and lasts approximately 30-40 seconds.
Warranty	The instrument is guaranteed against defect in materials and workmanship for a period of 12 months from the date of shipment to the user and is subject to the recommended service and recalibration requirements.
Zero	The point at which the gas analyser is calibrated when there is none of the target gas present.