

PS200 Series

Auto Bump & Calibration

1



2



Open



3



Insert

4



Close/testing



5



6



Pass



Fail

8

After the step 7, please follow the steps below to print the certificate –

7



Open/remove

1. Insert the USB stick into the calibration station, wait for 10 seconds till only 1 green LED light is shown
2. Take out the USB from the station and put it into the PC
3. Open the file in the USB stick and click on "PS200 Settings"
4. Click "View Test / Calibration Certificate"
5. For "Customer Name" – Put in vessel name
6. For "Customer Detail 1" – Put in company name
7. For "Calibrated By"- Put in the name of the person who does the calibration
8. You can leave all other fields blank
9. Click "Create Certificate"
10. Choose the relevant Test Result file and click Open
11. The calibration certificate is now generated. Print out the certificate and sign

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INTRODUCTION

1.1 GENERAL DESCRIPTION

The GMI PS200 series combines quality, ruggedness and advanced technology in a user friendly, portable gas detector. It is compact, lightweight, water resistant, extremely robust and is suitably certified to recognised International Standards.

The PS200 is designed for confined space monitoring, for example, in sewers, underground piping, or within tanks and other personal monitoring applications. With audible, visual and vibrating alarms, it provides early warning of dangerous gas levels.

The instrument is available as either a pumped or diffusion model and is powered by an internal Li-ion (lithium ion) rechargeable battery with minimum operating time of 14 hours for non-pumped operation (8 hours for pumped operation). Maximum recharge time is 4 hours.

Operated via two push buttons, this instrument provides the user with a simple to use, yet state-of-the-art, gas detector. (Fig. 1-1).

The PS200 series features high visibility LED's, a display that changes colour from green to red when an alarm is present, a sounder with a 90dB minimum output and a vibrating alarm. Users can be confident that, should gas levels exceed configured threshold limits or a sensor / flow / battery fault exists, a clear and unmistakeable indication is evident.



Fig. 1-1 PS200 Series Instrument

The PS200 Series has the ability to detect up to four (4) of the following gases simultaneously:

- 0 to 100% LEL Hydrocarbons
- 0 to 25% Oxygen (O₂)
- 0 to 1000ppm Carbon Monoxide (CO)
- 0 to 100ppm Hydrogen Sulphide (H₂S)

The instrument display identifies the gas(es) the instrument is monitoring. An example of a four gas instrument display is illustrated in Fig. 1-2:



Fig. 1-2 Display Example (4-Gas)

Note: If configured with less sensors, the character size is adjusted accordingly to maximise the display, as illustrated in Fig. 1-3.



Fig. 1-3 Display Examples

The display, illustrated in Fig's 1-2 and 1-3, details the current gas readings and operational / status information. Alternatively, the instrument can be set up to display a simple 'OK' message, as illustrated in Fig. 1-4.



Fig. 1-4 'OK' Display Example (4-Gas)

Note: This Handbook describes the operation of a standard 4-gas instrument. On other models, operation is similar to the example shown. Operational differences are highlighted if and where they exist. Configurable options are available that allow the instrument to be set up to suit your particular requirements. These options are detailed in *italic text*, where applicable, and are also detailed in the 'CONFIGURATION HANDBOOK' CD-ROM (Part No. 64193).

1.2 FEATURES

The main features of the PS200 series instrument are:

- Compact, lightweight and extremely robust.
- Simultaneous detection and display of up to four (4) gases.
- Simple 2 button operation.
- Clear audible, visual (hi-viz) flashing LED's and vibrating alarms.
- Audible and visual confidence signal (fully configurable) every 15 seconds, confirming to the user that the instrument is correctly energised and operating normally.

- *Motion sensor to detect movement and activate alarms in a 'man down' situation.*
- Alphanumeric display with screen backlighting. Backlighting is coloured green during normal operation and red during alarm condition.
- Internal electric pump (optional) with a nominal flow rate of 0.5 to 0.7 litres per minute.
- Both manual and fully automatic data logging.
- Powered by an internal Li-Ion (Lithium Ion) rechargeable battery, this will provide an operating time of up to 14 hours (non-pumped) or 8 hours (pumped). Maximum recharge time is 4 hours.
- Robust crocodile clip to allow fitting to belt, pocket, etc.
- Communications interface to allow downloading of stored data.
- Fully certified to international standards.
- Comprehensive range of accessories available.

'TYPICAL OPERATING PARAMETERS' are detailed in Appendix 'A' of this Handbook.

1.3 DATA LOGGING

Data logging is a standard feature of all PS200 series instruments and allows gas measurements, event logs, bump tests and calibration details to be automatically stored and later downloaded to a Personal Computer (PC) via a USB connection.

The instrument can store in excess of 24 hours of readings at a recording interval of 1 minute, 180 On / Off event logs and alarms, 180 bump test logs and 8 calibrations.

1.3.1 Archiving Stored Readings

Stored readings can be downloaded from the PS200 series instrument to a PC, using the standard charging / comms cable and additional software. Contact the GMI Sales Department for further details.

1.4 FILTERS

The instrument is protected from water and dust ingress by hydrophobic and dust (sample inlet) filters.

These filters should be checked regularly and replaced if necessary (refer to 'FILTER REPLACEMENT' section in Chapter 5 'OPERATOR MAINTENANCE').

1.5 CONSTRUCTION

The PS200 series is housed in a tough, impact resistant moulded case. Sealed to IP67, it can withstand physical impact testing to EN 60079 section 1-5.

1.6 IDENTIFICATION LABEL

The label on the rear of the instrument includes serial number and relevant certification details.



1.7 CERTIFICATION

The PS200 series instrument is certified as follows:
Note: Check instrument labels for actual certification.

ATEX  II 2 G Ex ia d IIC T4 Gb (Ta = -20°C to + 50°C)

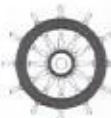
IECEX Ex ia d IIC T4 Gb (Ta = -20°C to + 50°C)



Class I, Div.1 Groups A, B, C and D T4

Class I, Zone 1 AEx ia d IIC T4 Ex ia d IIC T4
(combustible instruments)

Class I, Zone 0 AEx ia IIC T4 Ex ia IIC T4
(toxic, non-combustible instruments)



MED (Marine Equipment Directive) - A.1 / 3.30
0038/YY (Module B&E)



0518 European Mark of Conformity

1.7.1 Certification Marks

Refer to the following for details:

www.europe.eu.atex

www.iecex.com

1.7.2 Performance

This apparatus conforms to standard EN 50104.

Complies with:

EN 60079-29-1 (Flammable)

IEC 60079-29-1 (Flammable)

EN 50104: 2002 including amendment No.1 2004 (Oxygen)

ANSI / ISA S12.13.01 - 2000 (Combustible)

C22.2 No.152 - M1984 (Combustible)

OPERATION

2.1 OPERATING PROCEDURE

CAUTION: The GMI PS200 instrument can be supplied with a flammable gas sensor. This sensor is designed for use in concentrations of gas not exceeding the Lower Explosive Limit (LEL). Exposing the sensor to high concentrations of flammable gas above the LEL can cause damage to the sensor and inhibit its proper operation. The GMI PS200 has an inbuilt safety alarm feature to prevent this. Refer to ALARMS section of this handbook for details.

Check the following before use:

- The PS200 instrument is clean and in good condition.
- The hydrophobic and inlet filters are clean and in good condition.
- The sample line (pumped instruments) and any other accessories used are in good condition and leak-free.
- Switch instrument ON in fresh air and check that the battery is fully charged.
- Verify there are no faults.
- Attach optional accessories, as required.
- All gas ranges are operational and the instrument is zeroed.

- The instrument is within the calibration period you have decided is necessary for your application.
- If oxygen sensor is fitted, check oxygen readings to ensure correct operation. The oxygen sensor responds to the user breathing on the instrument front face (sensor area) by displaying a decreased value, i.e. below 20.9%.

Switch the instrument OFF, in fresh air, after use.

Additional:

- Perform regular leak check on pumped instruments, by placing thumb over sample inlet nozzle and making sure that instrument displays 'FLOW FAULT'.
- Perform regular bump tests using either the Auto Bump / Calibration Station or by performing manual bump tests.

2.2 SWITCH THE INSTRUMENT ON

Press and hold the Right Hand (RH) button  for one second to switch the instrument ON. Refer to Fig. 2-1.

The instrument begins its warm-up routine, which lasts approximately 30 seconds. During the warm-up, a countdown timer appears in the top (RH) corner of the display.

Note: The display backlight illuminates green and remains ON during warm-up. When warm-up is complete, the screen light automatically switches off.



Fig. 2-1 PS200 Switch ON

2.2.1 Instrument Identification

During warm-up, the instrument display identifies the serial number, software version and battery status information as illustrated in Fig. 2-2:



Fig. 2-2 PS200 Series Identification Display

2.2.2 Battery Status

Provides the user with the battery charge level, as shown in previous display. This will be indicated by a battery symbol with a bar graph showing FULL, 75%, 50% and 25%, which is shown continually during normal operation.

2.2.3 User Name / Number Only (Option)

This configurable option, disabled by default, allows the user to select a name or identification code, as illustrated in Fig. 2-3. This name or code will be included with all Bump, Calibration and Event logs.

Refer to 'USER NAMES' in 'CONFIGURATION HANDBOOK' CD-ROM (Part No. 64193), for further details.



Fig. 2-3 User Name

2.2.4 'Man Down' (Motion Sensor) Alarm Option

The PS200 series instrument is fitted with a motion sensor. The sensor is disabled by default but can be configured to be either selected at start-up, or always on. The motion sensor has a pre-alarm feature (10 seconds fixed) to alert the user that activation is imminent and will activate the alarm if the instrument is not moved for a pre-set time.


The time delay (30 seconds default), before activation of the motion alarm, is configurable and can be set as detailed in 'CONFIGURATION HANDBOOK'. Refer to CD-ROM (Part No. 64193) for details.

If configured to 'SELECT AT START', i.e. during the instrument warm-up cycle, the user can enable or disable this feature from operation during the present power cycle, as illustrated in Fig. 2-4.



Fig. 2-4 Enable / Disable Motion Sensor

The 'Man Down' alarm is latched and generates both audible and visual alarms. If an alarm is activated, it will be uniquely data logged.

To cancel the alarm, press and hold the Right Hand (RH) button .

2.2.5 Date and Time

The date and time from the instrument's built-in clock is displayed on the screen during warm-up, as illustrated in Fig. 2-5.



Fig. 2-5 Date and Time

2.2.6 Bump Due Date (Option)


This configurable option is disabled by default but can be configured to either, indicate briefly that bump test is due, as illustrated in Fig. 2-6, indicate that bump test is overdue then pause awaiting user acceptance, as illustrated in Fig. 2-7, or force the user to switch instrument OFF when overdue.




Fig. 2-6 Bump Due Date



Fig. 2-7 Bump Overdue

To continue instrument operation, press the Right Hand (RH) button  once to acknowledge bump test is overdue.

To abort the warm-up routine and automatically switch the instrument OFF, press the Left Hand (LH) button  once.

Further details are available in the 'CONFIGURATION HANDBOOK' CD-ROM (Part No. 64193).

2.2.7 Calibration Due Date

The calibration due date appears on the display, as illustrated in Fig. 2-8.

A configurable option is available not to display this screen.



Fig. 2-8 Calibration Due Date

If the Calibration Due Date has expired, the following warning is displayed:

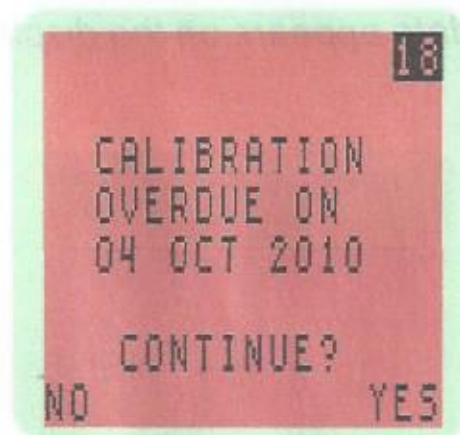




Fig. 2-9 Calibration Overdue

To continue instrument operation, press the Right Hand (RH) button  once to acknowledge calibration is overdue.

To abort the warm-up routine and automatically switch the instrument OFF, press the Left Hand (LH) button  once.

Alternatively, a configurable option is available to force the user to switch the instrument OFF.

Further details are available from the 'CONFIGURATION HANDBOOK' CD-ROM (Part No. 64193).

2.2.8 Service Due Date (Option)

This configurable option, disabled by default, allows the user to select from a number of options listed, when the service date expires on the instrument.

In all instances, if enabled, message is only displayed if within 90 days of service due date.

- *To indicate the service due date briefly during instrument warm-up routine.*
- *To indicate that service is overdue then pause awaiting user acceptance, or rejection, to continue.*
- *To force the user to switch the instrument OFF when service is overdue.*

The service due date appears on the display, as illustrated in Fig. 2-10.



Fig. 2-10 Service Due Date

2.2.9 Select Calibration Gas (Option)

This configurable option is available to allow the user to measure a different flammable gas from that which was originally used to calibrate the instrument.

This action allows the instrument software to compensate and display more accurate readings.

The default is to select calibration gas at 'Setup'. Details are available in the 'CONFIGURATION HANDBOOK' CD-ROM (Part No. 64193).

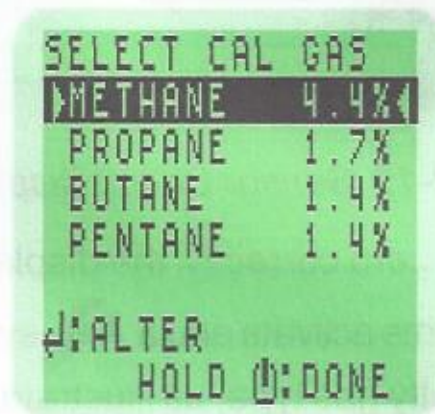




Fig. 2-11 Cal Gas Selection

When this option is displayed, as shown in Fig. 2.11, the gas that was originally used to calibrate the instrument is identified between two arrowheads.

Note: The instrument calibration certificate also identifies the original calibration gas type.

To select a different gas type, press the Left Hand (LH) button  to step through the available options from Methane, Propane, Butane and Pentane.

When the required option is highlighted, press and hold the Right Hand (RH) button  to select.

Note: Accuracy for the re-selected gas type is $\pm 20\%$.

2.2.10 Sensor Confirmation Check

The ✓ symbol appears adjacent to each sensor type to confirm that the sensor has been zeroed correctly.

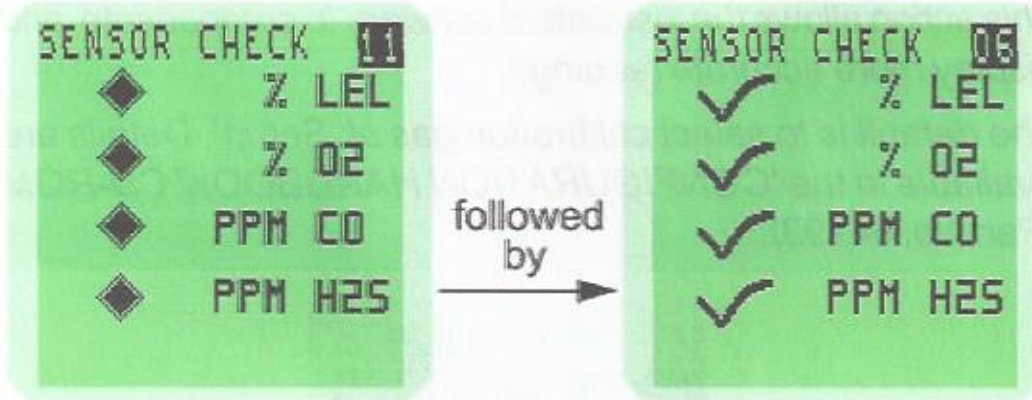



Fig. 2-12 Sensor Check Displays

If a sensor fails to zero correctly, the display will be red, the audible / visual alarms activate and a wrench symbol is displayed adjacent to the faulty gas type, as illustrated in Fig. 2-13:



Fig. 2-13 Failed Sensor

To acknowledge this fault, press the Right Hand (RH) button  once. This will clear the audible / visual alarm and display a flashing spanner symbol alternating with the faulty sensor zero reading.

A faulty LEL sensor zero reading is shown in Fig 2-14:

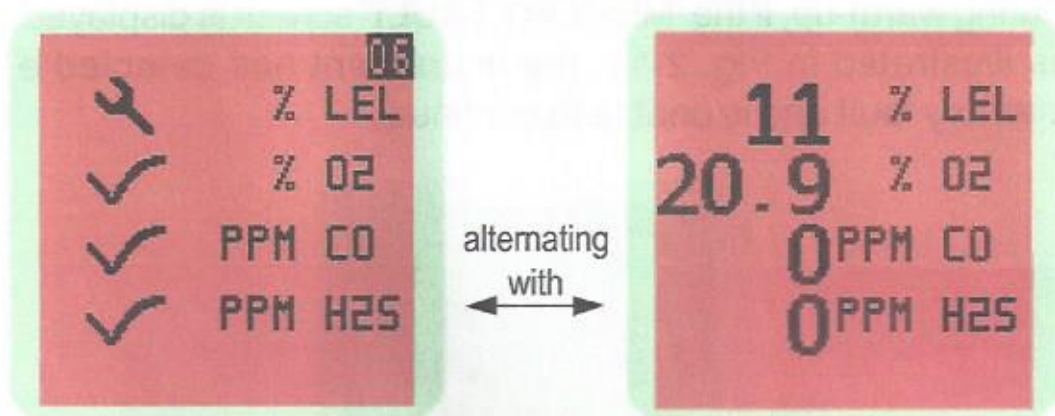


Fig. 2-14 Acknowledge Alarm

A configurable option is available to force the user to switch the instrument off if a zero fault is detected, as shown in Fig. 2-15:



Fig. 2-15 Switch OFF

Note: If a sensor fault is detected during normal operation of the instrument, the backlight illuminates red, an audible / visual alarm is activated immediately and a spanner symbol is shown adjacent to the faulty sensor type in the display.

2.2.11 Memory Fault

During warm-up, if the 'MEMORY FAULT' screen is displayed, as illustrated in Fig. 2-16, the instrument has detected a memory fault and is unable to continue.



Fig. 2-16 Memory Fault

Please contact GMI, as the instrument must be returned for service.

2.2.12 Normal Operating Display

When warm-up is completed successfully, the backlight switches off and the normal operating screen is displayed, as illustrated in Fig. 2-17. The display varies depending on the number of sensors fitted:



1-Gas



2-Gas

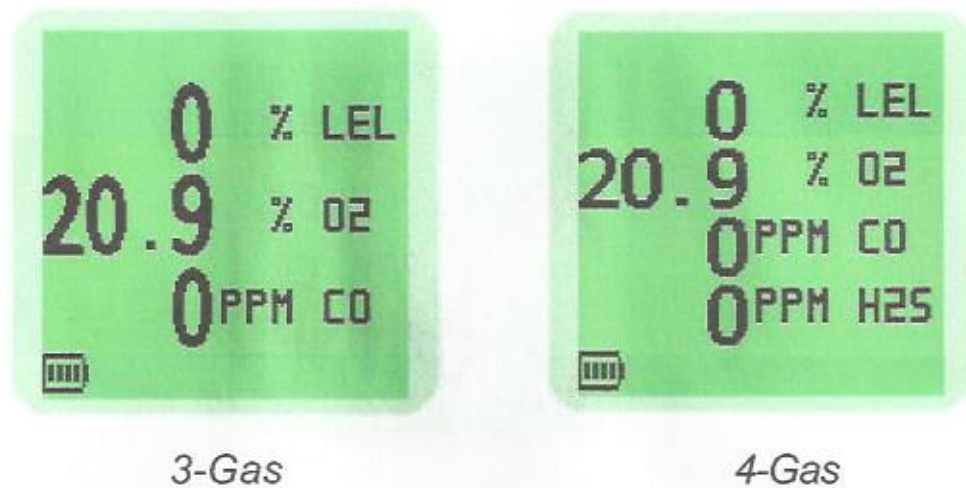




Fig. 2-17 Normal Operating Display

2.3 SWITCH THE DISPLAY BACKLIGHT ON / OFF

The display screen backlight can be manually switched ON when working in poor lighting conditions.

Press the Right Hand (RH) button  once to switch the screen backlight ON. It remains ON for 20 seconds and then automatically switches OFF.

2.4 MANUAL DATALOG

A manual datalog can be stored at any time during operation and is achieved simply via a single press of the Left Hand (LH) button .

2.5 VIEW MAXIMUM AND MINIMUM RECORDED VALUES SINCE SWITCH ON

The instrument records the maximum and minimum gas values for each sensor, since switch-on.

To view max / min values, proceed as follows:



- 1) Start from the normal operating display, as shown in Fig. 2-18. Press the Right Hand (RH) button  once to switch the instrument backlight ON.




Fig. 2-18 Normal Operating Display

Press the Right Hand (RH) button  again, while the screen light is ON, to view the maximum gas values stored in the instrument.

The example in Fig. 2-19 illustrates the maximum (MAX) gas values stored in a 4-gas instrument.




Fig. 2-19 Maximum Gas Values

- 2) Press the Right Hand (RH) button  again to view the minimum gas values stored in the instrument. Note: This screen is only displayed when an Oxygen sensor is fitted in the instrument.

The example in Fig. 2-20 illustrates the minimum (MIN) gas values stored in a 4-gas instrument.



Fig. 2-20 Minimum Gas Values

- 3) These readings can be reset by pressing and holding the Right Hand (RH) button  for 2 seconds when either MAX / MIN screen is displayed.


The instrument will return to the normal operating screen.




Fig. 2-21 Normal Operation

2.6 ALARMS RESET OR ACKNOWLEDGE

When the instrument detects an alarm set point has been reached, the audible, visual and vibrating alarm will be activated to alert the user.

The alarms are individually programmable to be either Latching, (i.e. alarm will stay on until the user resets by a press and hold of the Right Hand (RH) button  when the gas reading has returned within the preset alarm limits), or Non-Latching (i.e. the audible and visual alarm will reset automatically when the reading returns within the preset alarm limits). Refer to Alarms Table, Chapter 4, for individual alarms.

Note: Default alarms are set in accordance with current international standards.

The audible alarm on each pre-set alarm can be muted for a period of 60 seconds by a press and hold of the Right Hand (RH) button . After this period, should the gas value remain outwith the pre-set alarm limit, the non-latching audible alarm will become active again. If latching, the audible alarm will become active again regardless of gas value.

2.6.1 Confidence Signal

During normal operation, the instrument sounds a confidence beep and illuminates the green LED's briefly every 15 seconds. This function makes the user aware that the instrument is operating correctly:

Note: The confidence beep and / or LED's can be disabled. Refer to the optional 'CONFIGURATION HANDBOOK' CD-ROM (Part No. 64193) for further information.


2.7 REMOTE SAMPLING (with pump option)


Remote sensing is possible with the internal electric pump option, or by using a hand aspirator. Connect the sample line to the sample connector at the bottom of the instrument.

On pumped models, the pump is OFF after start-up.

Warning (Hand Aspirator): The PS200 Series is designed to be used with a built-in pump for remote sampling. A hand aspirator can be used for indicative sampling, but it must be noted that when using a hand aspirator, a reading error in the region of $\pm 20\%$ is possible. In addition, whereas the pump can sample quickly and accurately with up to 30 metres of sample line, the hand aspirator must only be used with up to 10 metres of sample line and the sample time is extended. The sample line must be intact and the proper flow established.

2.7.1 Pump Operation:

Press and hold the Right Hand (RH) button  to start or stop the pump.

When the pump is running, a pump symbol , illustrated in Fig. 2.22, rotates in the display.

Note 1: It is only possible to switch the pump ON / OFF when instrument alarms are inactive.

Note 2: Pump cannot be switched OFF if instrument is configured with setting 'PUMP ALWAYS ON'.




Fig. 2-22 Pump Symbol Displayed

2.8 SELF TEST

The PS200 series instrument has the ability to perform a self test. The test can be performed any time during normal operation of the instrument.

In this mode, the instrument tests the buzzer, LED's, vibration function and displays both the flammable gas type used for calibration and the current username.

To perform a self test, press and hold the Left Hand (LH) button .

2.9 SWITCH THE INSTRUMENT OFF

Press and hold both the Left Hand (LH) button  and the Right Hand (RH) button  to switch the instrument OFF.

The instrument display starts a countdown from three (3) to OFF. Both buttons must be pressed together until the display goes blank.

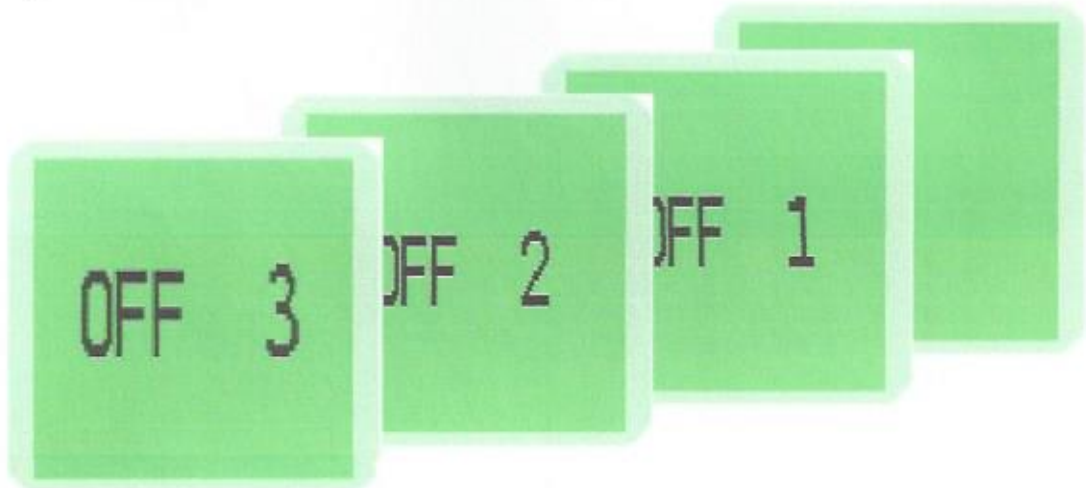


Fig. 2-23 Switch OFF

While both buttons are pressed, the audible alarm sounds every second to alert user that the instrument is switching OFF.

MANUAL BUMP TEST OPTIONS

3.1 BACKGROUND

A bump test verifies sensor response and alarm operation by exposing the instrument to a known concentration of gas. The PS200 series of instruments can be bump tested either manually or automatically (using the Auto Bump / Calibration Station).

This chapter describes the manual bump test options that validate either the alarm operation (quick bump), or both alarm operation and sensor response (full bump). By default, both of these options are disabled.

To facilitate manual bump testing, a test kit (Part No. 64051) is available and contains the necessary test gas, regulator and Tygon[®] tubing to ensure a proper bump test is performed.

CAUTION: *When performing a bump test, the test gas concentration should be high enough to trigger the instrument's alarms. Should any instrument fail a bump test, then a full calibration must be performed.*

A Quick bump test only checks the operation of the audible and visual alarms and does not validate sensor accuracy or response time.

3.2 MANUAL BUMP OPTIONS

The PS200 series provides two bump test options, QUICK and FULL.

The QUICK bump test validates that the alarm threshold has been exceeded for each range.

The FULL bump test checks the response of all ranges against set limits.

By default, both of these options are disabled.

3.3 INITIATING A MANUAL BUMP TEST


To initiate a manual bump test, switch the instrument ON with a long press of the LH  button. During warm-up 'BUMP TEST' will flash on the top line of the display, as indicated in Fig. 3.1.



Fig. 3.1 Bump Test mode

When the warm-up is complete, the user is prompted to apply the test gas, as shown in Fig. 3-2.

MANUAL BUMP TEST OPTIONS

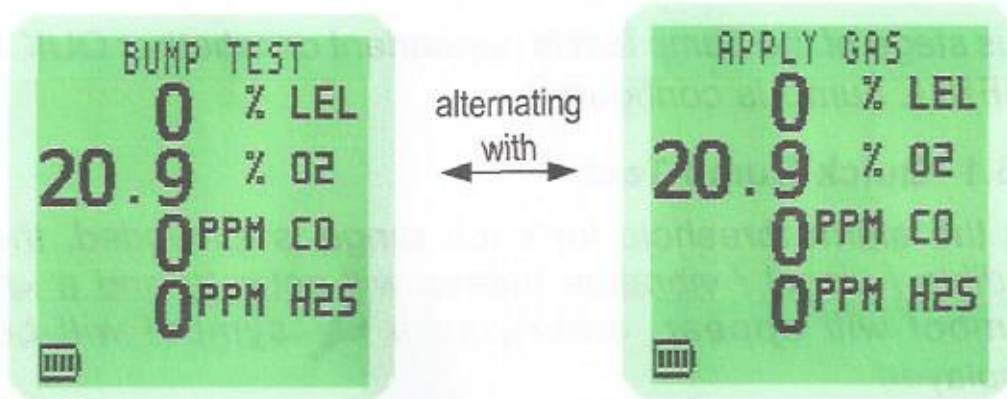


Fig. 3-2 Apply Gas Screen (4-gas model)

3.4 APPLYING TEST GAS

Apply the test gas to the instrument (via the Direct Flow regulator set to 0.5 l/min, as shown in Fig. 3-3).



Fig. 3-3 Bump Test Kit

3.5 QUICK / FULL BUMP TEST

This stage of the bump test is dependent on whether QUICK or FULL bump is configured.

3.5.1 Quick Bump Test

As the alarm threshold for each range is exceeded, the audible / visual / vibration alarms will activate and a ✓ symbol will appear, otherwise a ✘ symbol will be displayed.

3.5.2 Full Bump Test

After a short period of time, the gas readings are checked against configurable limits. The audible / visual / vibration alarms will activate and a ✓ symbol will appear if the readings are within these limits, otherwise a ✘ symbol will be displayed.

3.6 ALARM CONFIRMATION

The user is then prompted to confirm if the audible and visual alarms were activated, as shown in Fig. 3-4



Fig. 3-4 Confirm Alarms (4-gas model)

Note: The audible, visual and vibrating alarms activate for 2 seconds only (default setting) when activated during the bump test.

3.7 BUMP TEST RESULT

After selecting 'YES' or 'NO' the user is informed of the overall bump test result as shown in Fig. 3-5.

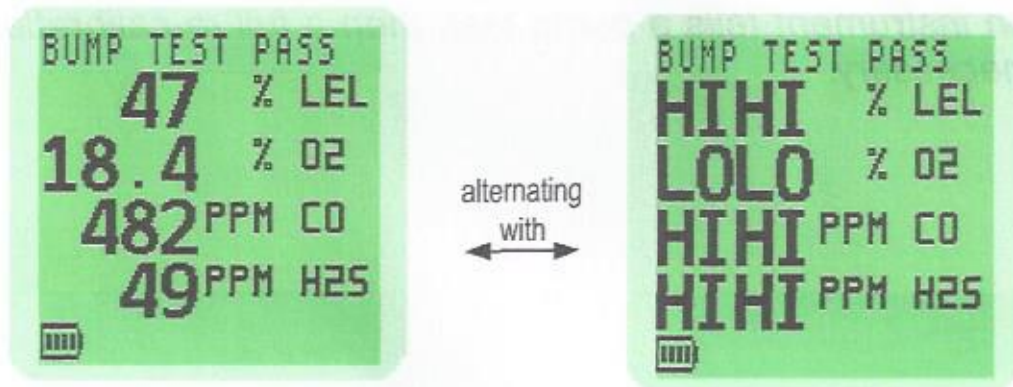



Fig. 3-5 Bump Test Pass

The bump test gas should now be removed.

The bump test result including date and time will be automatically datalogged.

When the gas readings fall below their alarm set-points, or after 60 seconds, the bump test is complete, and the instrument will automatically return to normal operation.

Should any gas range fail the bump test, the display will be red and a  symbol will be displayed as shown in Fig. 3-6.

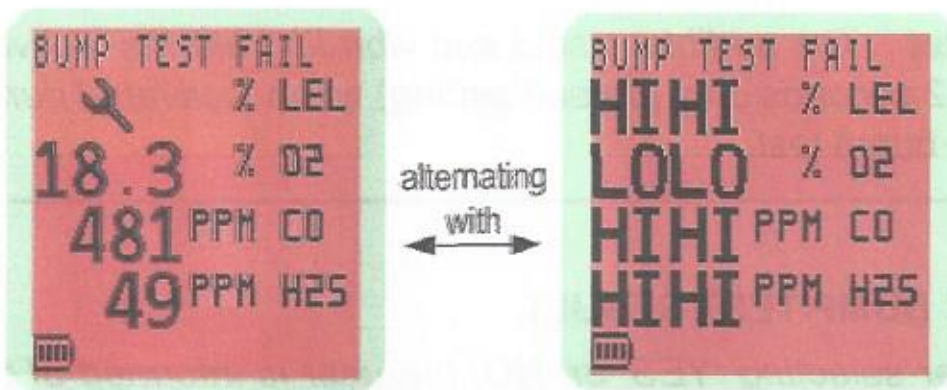


Fig. 3-6 Bump Test Fail

If an instrument fails a bump test, then a full re-calibration is necessary.

ALARMS


CAUTION: HIGH OFF-SCALE READINGS MAY INDICATE AN EXPLOSIVE CONCENTRATION.

4.1 GAS ALARMS

Gas alarms are enabled when the instrument is switched on and warm-up is complete.

All gas ranges have alarm limits that trigger the alarm if the measured gas value exceeds the set level. If a preset alarm level is exceeded, the instrument vibrates, the display backlight illuminates red, the audible alarm sounds, the LED's flash red and the gas range in alarm flashes on the display.

The alarms are individually programmable to be either 'Latching' or 'Non-Latching'.

A 'Latching' alarm will stay on until reset by the user with a press and hold of the Right Hand (RH) button  when the gas readings are safe.

A 'Non-Latching' alarm will reset automatically when the gas readings are safe.

The following table illustrates the factory default alarm indications:

ALARM TYPE	LATCHING	MUTE	AUDIBLE	VIBRATING	VISUAL (RED LED)
LEL (HI)	Disabled	Disabled	Siren	N / A	Slow Flashing
LEL (HI HI)	Yes	Disabled	Siren	Yes	Flashing
O ₂ (HI HI)	Yes	Disabled	Siren	Yes	Flashing
O ₂ (LO)	Disabled	Disabled	Siren	N / A	Slow Flashing
O ₂ (LO LO)	Yes	Disabled	Siren	N / A	Flashing
Toxic 1 (HI)	Disabled	Disabled	Siren	N / A	Slow Flashing
Toxic 2 (HI HI)	Yes	Disabled	Siren	Yes	Flashing
Toxic 3 (STEL)	Yes	Disabled	Siren	Yes	Flashing
Toxic 4 (LTEL / TWA)	Yes	Disabled	Siren	Yes	Flashing
Low Battery Fault	N / A	N / A	Regular Beep	N / A	Slow Flashing
Zero Fault	N / A	N / A	Regular Beep	N / A	Slow Flashing
Sensor Fault	N / A	N / A	Regular Beep	N / A	Slow Flashing
Low Flow (Pumped Instr. Only)	N / A	N / A	Regular Beep	N / A	Slow Flashing
Flow Fault (Pumped Instr. Only)	N / A	N / A	Regular Beep	N / A	Flashing
Calibration Required	N / A	N / A	Regular Beep	N / A	Slow Flashing
Calibration Expired	N / A	N / A	Regular Beep	N / A	Slow Flashing
Over Range (LEL)	Yes	N / A	Siren	Yes	Flashing

N/A = Not Applicable

PS200 Series (Default) Alarm Indications

4.1.1 Flammable LEL Alarm Limit

Two alarm levels, 'HI' and 'HIHI', are available, each with different pitch and tone. All alarms are user configurable to meet the specific needs of different companies.

4.1.2 Over-Range Flammable Gas Alarm Function

The flammable sensor is designed for use in the LEL range only. Exposure to high concentrations of flammable gas, such as lighter fuel, can damage the flammable sensor. If the flammable gas readings exceed 100% LEL, a safety alarm will be activated. The instrument should then be switched OFF and returned to fresh air.

4.1.3 Oxygen (O₂) Alarm Limits

Three alarm levels, 'HIHI', 'LO' and 'LOLO' are available, each with different pitch and tone. All alarms are user configurable to meet the specific needs of the end user.

4.1.4 Toxic Alarm Limits

When operating normally, the instrument calculates the Short Term Exposure Limit (STEL) and Long Term Exposure Limit (LTEL), known as Time Weighted Average (TWA) readings, for each toxic gas range alarm. TWA alarms are programmable for each toxic range fitted to the instrument. Additionally, two alarm levels 'HI' and 'HI HI' are available.

Note: A Time Weighted Average (TWA) value is the mean average gas level over a specific period. The STEL is 15 minutes and the LTEL is 8 hours. Typically, TWA alarms make the instrument single user applicable. *An option is available to restart the averaging after each instrument switch-off, thus allowing for multiple user application.*

Note: The toxic gas alarm levels – instantaneous, STEL and LTEL are set at the time of instrument manufacture. It is important that the user ensures that the levels are in accordance with their company’s alarm levels and with health and safety legislation. The alarm levels may be changed, if required, via the instrument set up menu, as detailed in the optional ‘CONFIGURATION HANDBOOK’ CD-ROM (Part No. 64193).

In the following examples, Fig. 4-1 illustrates a 4-gas instrument signalling a ‘LO LO’ Oxygen alarm and Fig. 4.2 shows a 4-gas instrument signalling a ‘HI HI’ LEL alarm. If more than one gas alarm level is exceeded, the gas value will flash for each gas type in alarm.

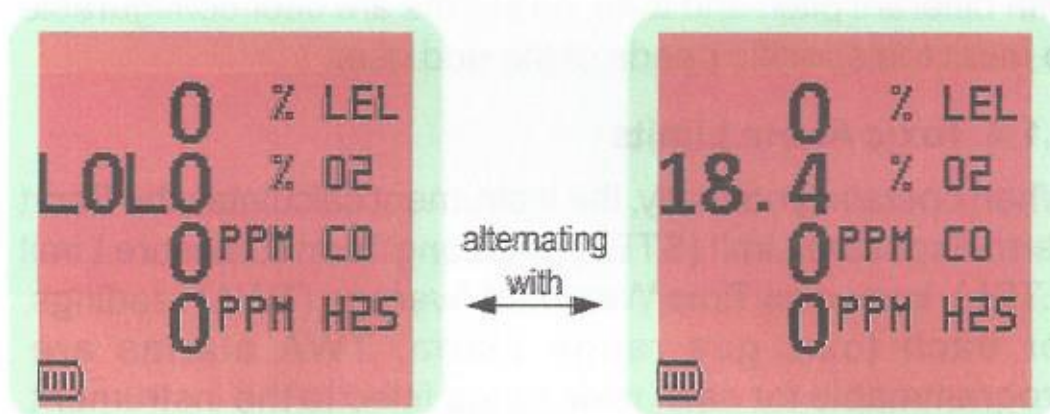


Fig. 4-1 ‘LOLO’ Alarm

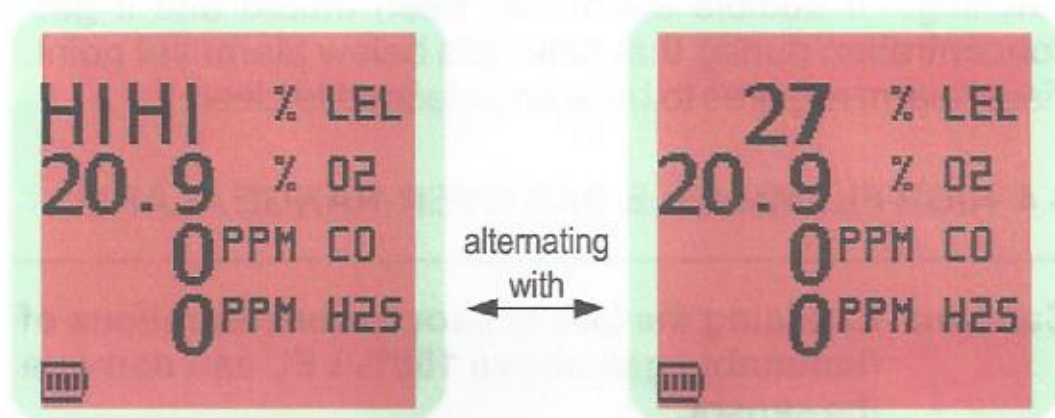


Fig. 4-2 'HIHI' Alarm

Note: See the 'CONFIGURATION HANDBOOK' CD-ROM (Part No. 64193) for further information.

4.2 ACKNOWLEDGE GAS ALARMS

Once in a safe area, or the gas reading has returned within the preset limits, press and hold the Right Hand (RH) button



to mute the alarm sounder and extinguish the gas LED's.

4.3 MUTE ALARMS

If configured, a muted alarm will be silenced for 60 seconds.

Mute 'disabled' cannot silence the alarm until gas falls below the alarm level.

If alarm configuration allows muting of audible alarm, the following applies:

Non-latching: Once alarm has been muted, the audible alarm is cancelled for a period of 60 seconds, and if gas concentration during that time falls below alarm set point, the visual alarm clears automatically.

Latching: If audible alarm has been muted and if gas concentration during that time falls below alarm set point, visual alarm requires to be acknowledged to clear.

4.4 HIGH FLAMMABLE GAS OVER-RANGE ALARM

Caution: Exposing the LEL sensor to concentrations of flammable gas above 100% LEL can damage the sensor.

In order to protect the user from danger in the event of the flammable gas (LEL) sensor being over exposed to a high concentration of flammable gas, the instrument has an over-range alarm.

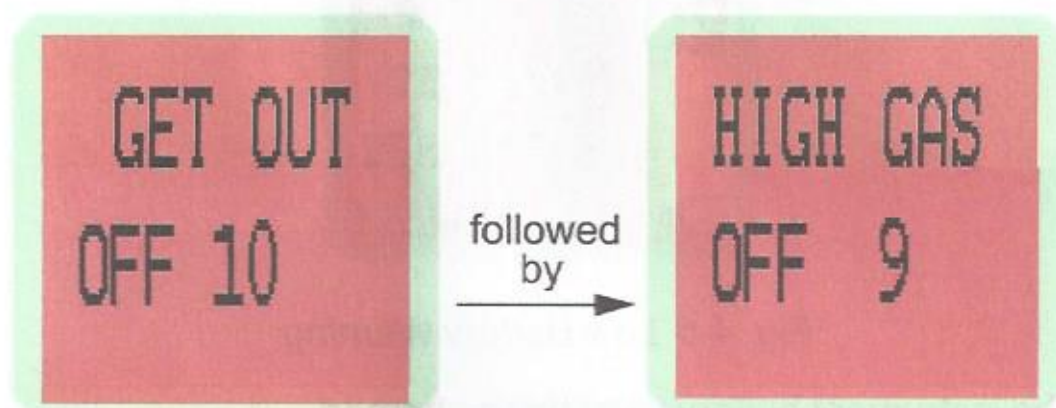
If the LEL sensor is exposed to a gas reading above 100% LEL, the instrument vibrates, the displayed value changes to 4 rising arrows, the backlight illuminates red, the tone of the audible alarm changes, and the visual alarm LED's flash quickly. The flashing message 'DANGER OVER RANGE' is displayed, as shown in Fig 4-3:



Fig. 4-3 Over Range Alarm

Switch OFF by a press and hold of both buttons together.

A timer, counting down from 10 seconds to zero, is displayed together with the message 'GET OUT' alternating with 'HIGH GAS', as shown in Fig. 4-4:



... alternating until zero is reached

Fig. 4-4 'High Gas' / 'Get Out' Timer


The instrument must be returned to a gas free area or sample clean air. The instrument must now be switched OFF.

Note: To avoid accidental switch-off in this dangerous state, the off cycle is increased to 10 seconds.

4.5 FAULT ALARMS

Refer to Alarms Table, in paragraph 4.1 of this handbook, to identify the audible / visual indication for any of the following faults.

4.5.1 Low Battery

The  'LOW BATTERY' warning flashes when approximately 30 minutes operating time remains.

The display will be red, the audible alarm sounds once every two seconds and the red LED's flash.



Fig. 4-5 Low Battery Warning

The instrument battery must be re-charged.

Note: Gas alarms continue to operate after the 'LOW BATTERY' warning appears.



The  'BAT FAULT' warning flashes when approximately 3 minutes operating time remains, as illustrated in Fig. 4-6. The display will be red, the audible alarm sounds continuously and the red LED's remain on. After 3 minutes, the instrument automatically switches off.




Fig. 4-6 Exhausted Battery Warning

4.5.2 Zero Fault

A “ZERO FAULT” warning and a flashing spanner symbol  appears after warm-up if the instrument is switched on in the presence of gas or the instrument has been unable to zero all sensors correctly.

The screen backlighting illuminates red, the audible alarm sounds once every 2 seconds and the red LED's flash.

It is strongly recommended the instrument is returned to a gas free area. Switch the instrument OFF and then switch ON again in fresh air. If the fault persists, return the instrument to a GMI approved Service / Repair facility..

The instrument can however still be used to detect and alarm on the other sensor(s) fitted. Press the Right Hand (RH) button , as per the screen prompt, to continue.

The faulty sensor will cause the instrument to display a flashing spanner symbol to warn the user that this sensor is not working correctly, as shown in Fig. 4-7:

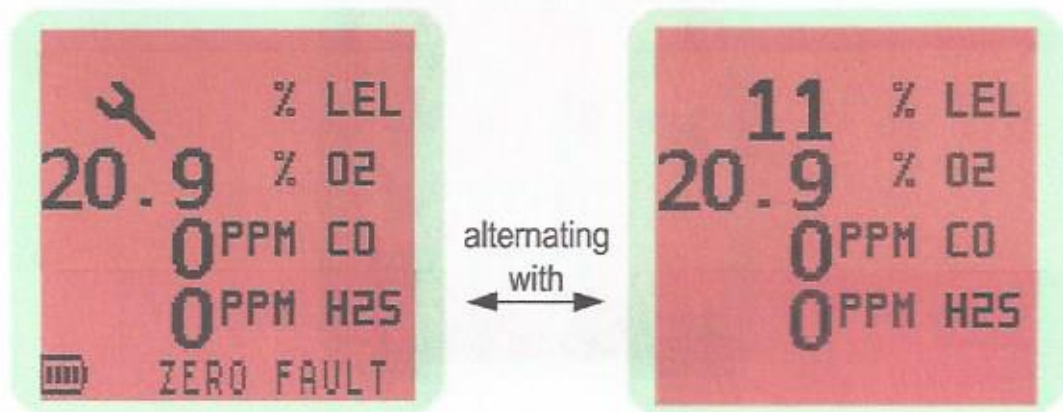


Fig. 4-7 Zero Fault

4.5.3 Sensor Fault

Note: The PS200 instrument features continual toxic sensor integrity detection. This may generate a sensor fault indicated by a red illuminated backlight, audible beeping and flashing red LED's. Unlike zero fault, it would only occur immediately after switch-on and occasionally during operation. If this fault occurs, allow instrument to run in fresh air for up to 20 minutes. If fault does not clear, return instrument to an approved Service / Repair facility.

There are three types of sensor fault as illustrated in the following displays:

1) If a "SENSOR FAULT" warning and a spanner symbol appears adjacent to a gas type, as illustrated in Fig. 4-8, then the sensor requires replacement or an electrical fault exists. Return instrument to an approved Service / Repair facility.



Fig. 4-8 Sensor Fault

2) If a "ZERO FAULT" warning and a flashing spanner symbol appear, alternating with a zero LEL reading as illustrated in Fig. 4-9, apply test gas for two minutes to allow the display to return to zero then switch instrument OFF and ON again. If fault remains, return instrument to a GMI approved Service / Repair facility.



Fig. 4-9 Check Fault

3) If a “ZERO FAULT” warning and a flashing spanner symbol appear, alternating with an LEL gas value as shown in Fig. 4-10, leave instrument on for 30 to 60 minutes then switch instrument OFF and ON again. If fault remains, return instrument to a GMI approved Service / Repair facility.



Fig. 4-10 Check Fault

4.5.4 Low Flow - (Pumped instruments only)

If there is a restricted flow, a "LOW FLOW" warning flashes in the display, the display will be red and both audible alarm and red LED's will be activated.

In this alarm condition, the pump symbol is not displayed. Refer to example Fig. 4.11.



Fig. 4-11 Low Flow

Check maximum sample line length (30 metres) is not exceeded and check sample filter or probe for blockage, if applicable.

4.5.5 Flow Fault (Pumped Instruments Only)

If a flow fail or sample fault exists, a 'FLOW FAULT' warning is displayed, as illustrated in Fig. 4-12. The display will be red and both the audible alarm and red LED's will be activated.


Check sample line, filter or probe for blockage, if applicable. Clear the blockage then restart the pump by a press and hold of the Right Hand (RH) button .




Fig. 4-12 Flow Fault

4.5.6 Calibration Required

If the instrument requires calibration then during warm-up, a 'CALIBRATION OVERDUE' warning is displayed. The instrument will operate using its previous calibration settings, however, as the sensors response may have diminished, the instrument should be recalibrated and tested.



Fig. 4-13 Calibration Overdue

Press the Right Hand (RH) button  once to acknowledge that calibration due date is overdue, cancel the audible / visual alarm, and continue to the next display. A 'CAL EXPIRED' warning, red backlighting and red LED's will flash every 30 seconds.

Press the Left Hand (LH) button once to abort the warm-up routine and automatically switch OFF the instrument.

Alternatively, during warm-up, a configurable option is available to force the user to switch OFF the instrument.

The following 'CALIBRATION REQUIRED' warning is displayed and the instrument is unable to continue without recalibration.



Fig. 4-14 Calibration Required

4.5.7 Calibration Expired

During normal operation of the instrument where the calibration date has expired, a 'CAL EXPIRED' warning will flash in the display every 30 seconds.



Fig. 4-15 Calibration Expired

4.6 'MAN DOWN' (MOTION SENSOR) ALARM

The motion sensor alarm can be configured 'NOT USED' (default), 'SELECT AT START' or 'ALWAYS ON', as detailed in 'CONFIGURATION HANDBOOK' CD-ROM (Part No. 64193).

The sensor will activate an alarm if the instrument is not moved for a pre-set period, configurable from 30 seconds to 90 seconds in 1 second increments.

The 'Man Down' alarm has a pre-alarm feature that alerts the user that alarm activation is imminent. This pre-alarm time is not adjustable and activates 10 seconds before the 'Man Down' alarm.

e.g. if configuration of 'Man Down' alarm is set at 30 seconds, the pre-alarm activates 20 seconds after last detected motion.

The pre-alarm countdown (in seconds) on the display, illustrated in Fig. 4-16, together with an audible 'beep' and corresponding flash of red LED's, precede the 'Man Down' alarm, illustrated in Fig. 4-17.



Fig. 4-16 Pre-Alarm


If the pre-alarm countdown reaches zero and is not reset, by movement of instrument, then the 'Man Down' alarm will be activated and logged.

When a 'Man Down' alarm condition is activated, following the pre-alarm, the display backlight flashes red, as illustrated in Fig. 4-17. The audible alarm sounds once every two seconds and the warning red LED's flash.



Fig. 4-17 Motion Sensor Alarm

The alarm is 'latched' and must be acknowledged to clear.

To clear the alarm, press and hold the Right Hand (RH) button  after the instrument is handled / moved.

OPERATOR MAINTENANCE

5.1 CLEANING

CAUTION: Do not use polishes containing silicon or solvent to clean the instrument as these may damage the flammable gas sensor (if fitted). Do not use abrasive materials or strong volatile chemical solutions as these could damage the impact resistant casing.

The outer, impact resistant, casing of the PS200 Series instrument may be cleaned using a non-abrasive moist cloth. Rub the cloth over the outer casing to remove any dirt and grime.

In extreme cases, a mild soap solution may be used with a non-abrasive cloth to remove any stubborn marks.

5.2 REPLACE INSTRUMENT FILTERS

The instrument has 2 filters protecting the instrument from contamination. A hydrophobic filter is located behind the filter cover on the front face of the instrument. The sample inlet (dust) filter is located in the sample inlet connector at the bottom of the instrument. The filters should be inspected periodically for contamination or damage.

To inspect / replace the filters, proceed as follows:

5.2.1 Replace Sensor Hydrophobic Filter

- 1) Using a No.1 Pozidrive[®] screwdriver, unscrew the captive screw and remove the filter cover by sliding it away from the display screen to disengage the locating lugs from the corresponding slots in the filter recess.

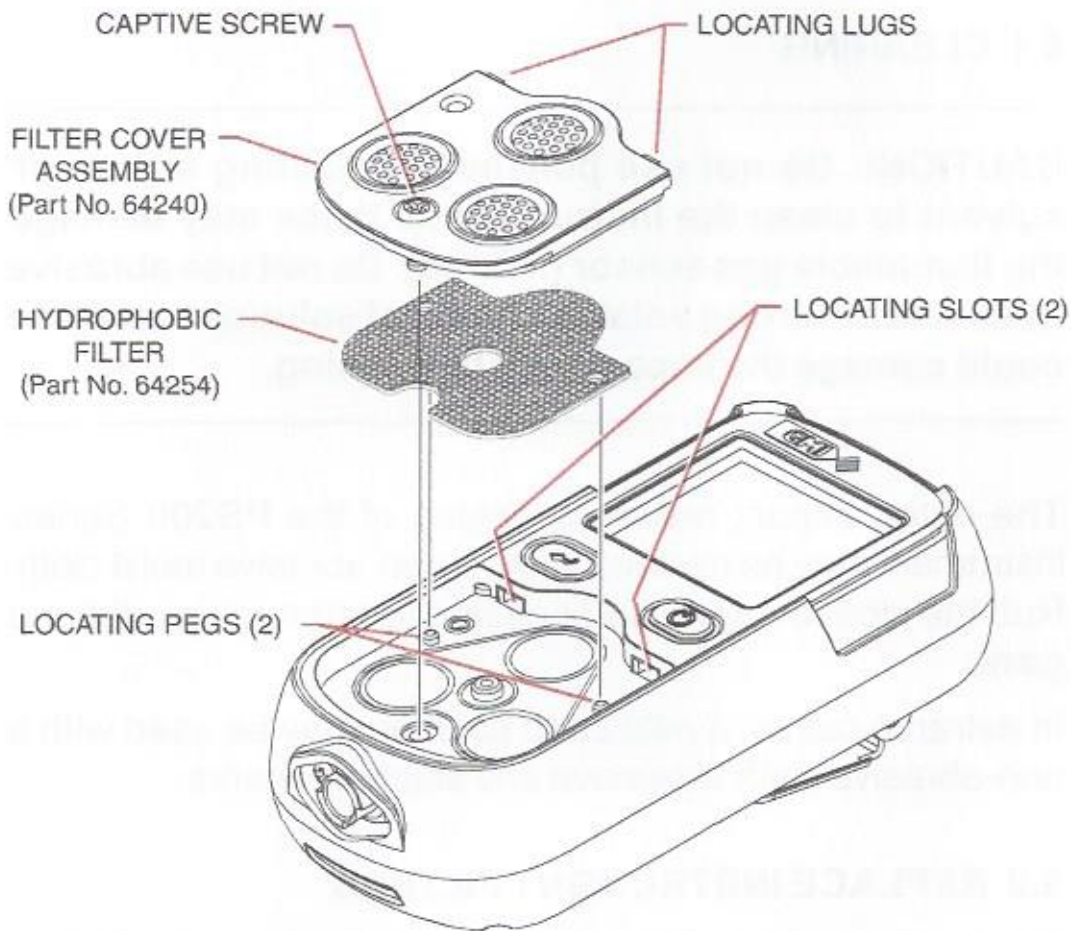


Fig. 5-1 Replace Sensor Filter

- 2) Carefully lift then remove the hydrophobic filter from the instrument filter recess.

Note the locating pegs in the instrument filter recess and mating pin-holes in the hydrophobic filter. Ensure correct orientation of filter during assembly.

OPERATOR MAINTENANCE

- 3) Fit a new Hydrophobic Filter (Part No. 64254).
- 4) Carefully place the hydrophobic filter in position over the instrument sensors, locating filter pin holes over locating pegs in instrument filter recess.
- 5) Place the filter cover over the filter recess then carefully slide it towards the display screen until the lugs are located in the mating slots in the instrument filter recess. Press the cover down on to the filter then, using a No.1 Pozidrive[®] screwdriver, tighten the captive screw until secure.

Note: Care must be taken not to overtighten the cover screw.

5.2.2 Replace Sample Inlet (Dust) Filter



Fig. 5-2 Replace Inlet Filter

- 1) Using a No.1 Pozidrive[®] screwdriver, unscrew then remove the 2 Pozi Pan screws then remove the inlet nozzle complete with inlet filter located in the inner recess of the nozzle.
- 2) Push the sample inlet filter disc out of inner recess by inserting a matchstick, or similar, into the inlet nozzle outer recess..
- 3) Fit a new Sample Inlet Filter (Part No. 66084).
- 4) Press the new sample inlet filter disc into the inlet nozzle shallow recess, with rough disc surface towards inner surface of recess (sample side).
- 5) Fit the inlet nozzle. The inlet nozzle is moulded to fit in one direction only. Make sure that orientation is correct to locate easily into the instrument front cover inlet.
- 6) Fit then tighten the 2 Pozi Pan screws using a No.1 Pozidrive[®] screwdriver.

Note: Care must be taken not to overtighten the screws.

5.2.3 In-line Hydrophobic Filter (Accessory)

The in-line hydrophobic filter assembly consists of the filter and a luer fitting on one side of the filter and a push-fit connection on the other, and is available as an accessory (Part No. 66485). The filter assembly is used to protect the instrument from the ingress of water when sampling in moist conditions.

The filter is located between two lengths of sample line tubing (Part No. 64118) and attached to the instrument via a Sample Line Connector (Part No. 66045) as illustrated in Fig. 5.3.

OPERATOR MAINTENANCE



Fig. 5.3 In-line Hydrophobic Filter

To replace the filter, proceed as follows:

- 1) Unscrew the luer fitting from one side of the the filter in a counter clockwise direction, detach the tubing from the other side then remove the hydrophobic filter.

Note: If re-fitting the same filter, make sure that filter direction of flow orientation is maintained. This can be easily identified by position of yellow label on filter, i.e. facing instrument.

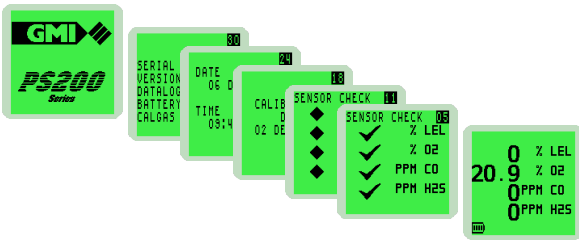
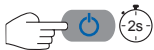
- 2) Fit a new In-line Hydrophobic Filter (Part No. 66484). Note that the filter should be fitted with the yellow label facing the instrument.
- 3) Attach the luer fitting, with sample line attached, to the mating side of the filter then tighten in a clockwise direction to secure. Do not overtighten the fitting.
- 4) Attach the sample line to the other side of the filter making sure that it is securely fitted.

PS200 Series

Quick Operation Guide / Prise en main rapide



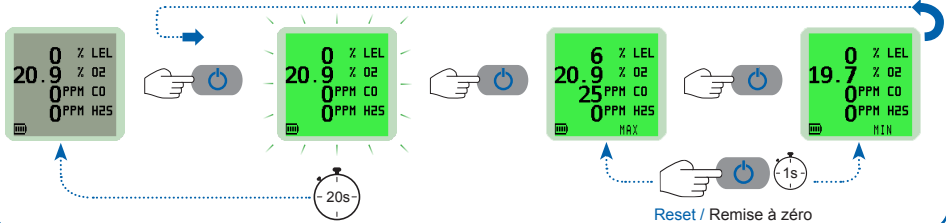
Switch On / Mise en marche



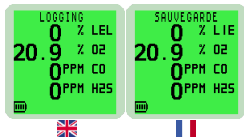
Backlight On / Rétro-éclairage de l'écran

Max

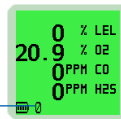
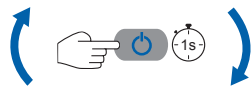
Min



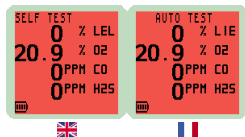
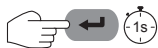
Manual Datalog / Sauvegarde manuelle



Pump / M/A pompe



Self Test / Auto Test



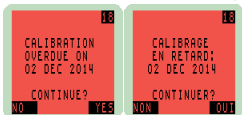
Alarms / Alarmes gaz



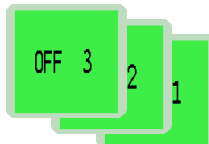
Alarm Acknowledge / Acquittement



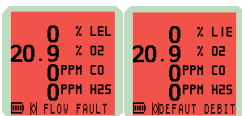
Calibration Overdue / Date de calibrage dépassée



Switch Off / Mise à l'arrêt



Flow Fault / Défaut débit

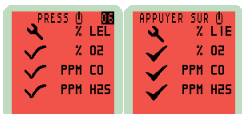


Reset / Acquittement

Charging / Mise en charge



Zero Fault / Défaut de la mise à zéro



IMPORTANT

MARINE 4 QUICK START




CALIBRATION AND

TROUBLESHOOTING GUIDE

READ BEFORE USE


Refer to Essential Health and Safety Requirement (EHSR) and MARINE-4 User Handbook before first use.

Switch ON

- Press and hold the Right Hand button  for one second to switch the instrument ON and initiate a warm-up routine.
- The display will show the serial number, software version, battery status and calibration gas. Next, the date and time are shown, followed by the Calibration Due date. If expired, press the  button to acknowledge.
- Lastly, a sensor check is run. If sensors are working OK and were zeroed correctly, a ✓ symbol is displayed adjacent to the gas type. If a sensor fails the zero check, the display will be red, the audible / visual alarms activate and a wrench symbol is displayed adjacent to the faulty gas type. To acknowledge this fault, press the  button.



Switch ON - Manual Bump Test



Press and hold the  button to switch the instrument ON and initiate a Manual Bump Test (after the warm-up routine is complete). When concluded, the instrument will operate as normal.

Normal Operation

The standard operating screen for the 4 Gas model is shown here. Other models will report the relevant gases they are capable of detecting.




Backlight / MAX & MIN

Press the  button once to switch the backlight ON. (After 20 seconds it will automatically switch OFF.) Press again to view MAX readings and a further press to view the MIN readings. To reset MAX / MIN readings, press and hold the  button for 2 seconds when either MAX / MIN screen is displayed.




Alarms Reset / Acknowledge


In alarm condition, the display will be red and the audible and visual alarms are activated. When the gas readings (of a Latching Alarm) are safe, press and hold the  button to reset / acknowledge the alarm. (If alarms are Non-Latching, the audible and visual alarms reset automatically when gas readings are safe.)



Switch Pump ON / OFF

Press and hold the  button to toggle the pump ON / OFF (Pumped instruments only).

Manual Datalog

Press the  button once to perform a manual datalog, briefly indicated on the display as 'LOGGING'.

Switch OFF

Press and hold both  and  buttons, for 3 seconds, to switch the instrument OFF.

Calibration using ABC station

Equipment required:

1. ABC Station and power adapter
2. USB stick supplied with ABC station – complete with software as supplied
3. Test gas and tubing with connectors
4. Demand flow regulator
5. Marine 4

1. Connect demand flow regulator and tubing to gas bottle



2. Connect tubing into the back of the ABC station

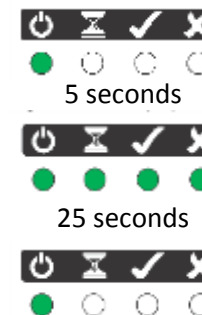


3. Connect Air / Exhaust Tubing to ABC Station (if required)
If the ABC Station is located in a poorly ventilated area, it is recommended that tubing is connected and routed to the nearest window for the supply of fresh air/exhaust ventilation.

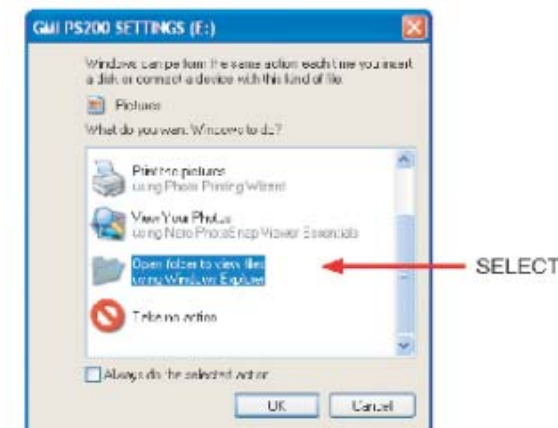
4. Connect power to ABC station



5. Allow 30 seconds for the unit to warm up, ensure that the light sequence Orange-Orange-Red is seen during power-up after which all LEDs will light up green and when completed only the power light will be lit



6. Put memory stick supplied into **PC/laptop** and select "Open Folder to View Files" (note actual display may vary with different operating systems)

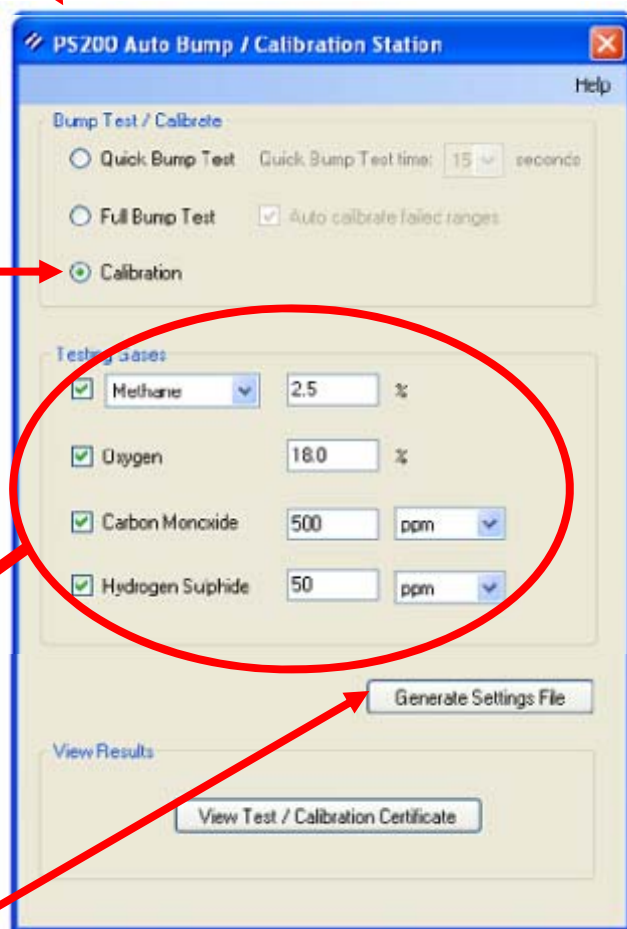


7. Select below from the folder



The image shown will load.

8. Choose unit calibration



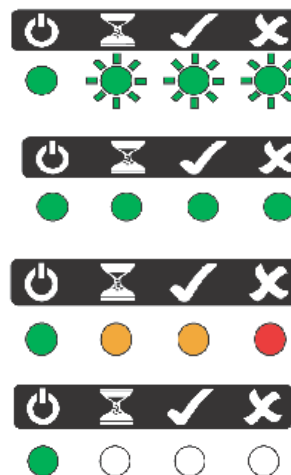
9. Compare gas types and ranges with gas bottle and ensure they are the same, make changes if needed.

10. Ensure the USB stick is still connected to laptop/PC and press generate settings file button. This will save them to the USB stick

11. Put USB into the ABC station



12. The LED's will flash while the settings are uploaded. Wait for light sequence to complete



13. Wait for the lights to STOP flashing and then **REMOVE THE USB STICK**

14. Open the front cover of the ABC unit by pressing the latch



16. Close the front door until it 'clicks' in to place



15. Insert the unit to be tested into the ABC station connecting the gas supply nozzle at the base of the unit. The marine 4 can be switched on or off.



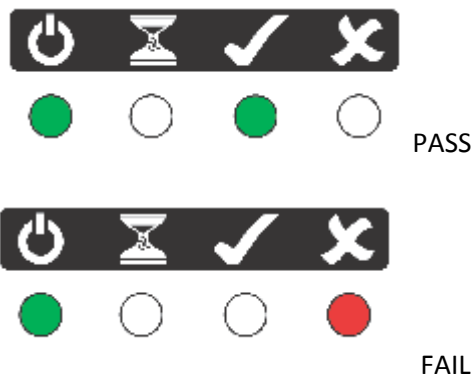
17. The process will start automatically when the door is closed. While testing is in progress the lights will cycle through a sequence of orange flashing lights – first will be the test in progress light as shown below.



18. The marine 4 will also start up and go through a sequence of tests with gas being delivered for 60 seconds

19. Audible alarms will also be present as the unit is tested and alarm set points are reached.

20. The unit will then indicate pass or fail by either a green or red led

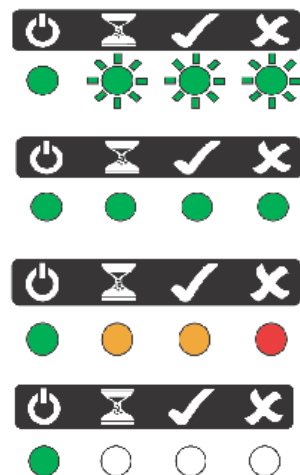


21. Remove the unit from the ABC station. If it has passed it can be put into operation. If failed please refer to the troubleshooting guide.

22. When units have been calibrated successfully and **removed** from the ABC station, Insert the USB stick to download the results from the ABC internal memory.

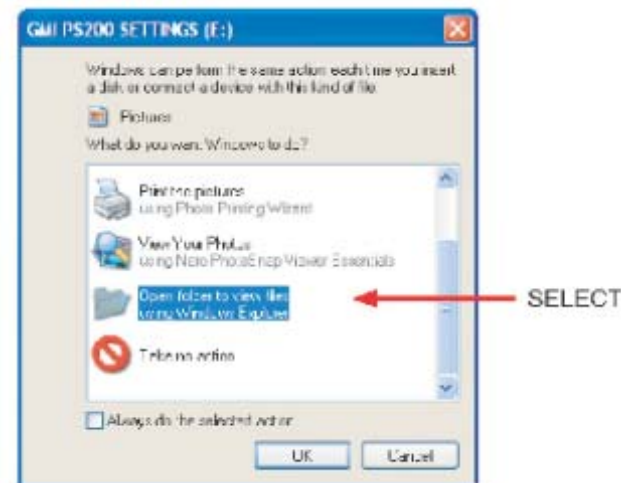


23. Wait for light sequence to complete



24. Remove USB from the ABC

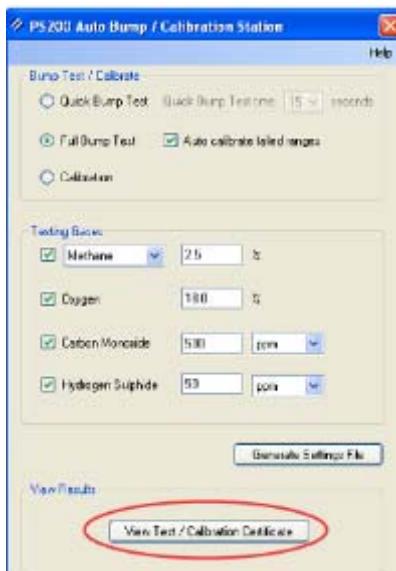
25. Put memory stick supplied into **PC/laptop** and select “Open Folder to view files from Windows Explorer” (note actual display may vary with different operating systems)



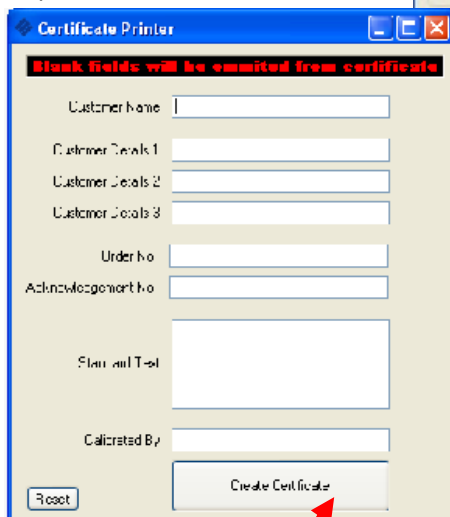
26. Select below from the folder



27. Click the button to generate the calibration certificate

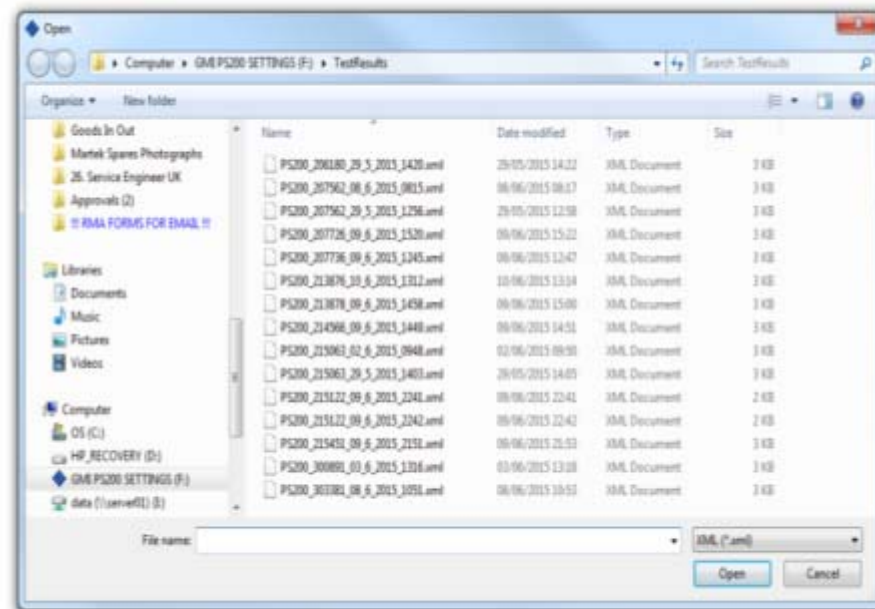


28. The below box will appear to input specific information if required



29. Click create certificate

30. Select the test result that you wish to produce the certificate for from the list of test results that are displayed in the new window



31. Click OK to open produced certificate



32. Example calibration certificate

Calibration Certificate

Customer Name: Acme Inc
 Customer Details: 100 High Street, Anytown
 Order No.: 123456
 Acknowledgement No.: 654321
 Model: GMI PS200
 Serial No.: 200763
 Tested on: 05 September 2011 - 12:22
 Audible Alarm: PASS
 Visual Alarm: PASS
 Calibrated For: MCTI/ANC
 100% LEL equivalent: 4.4% by VOL
 Overall Result: PASS



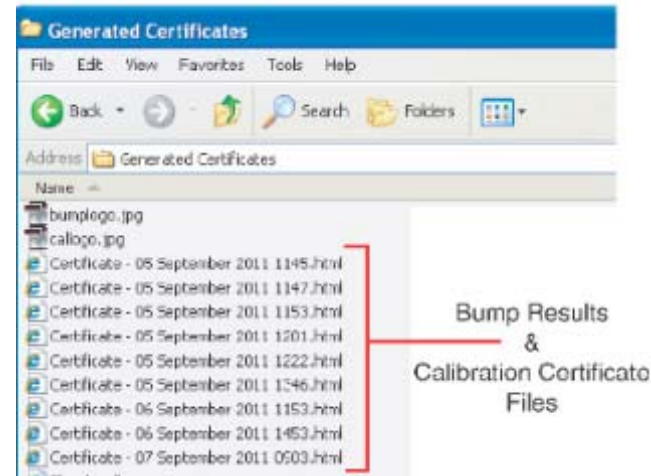
Calibration Results

Gas Applied	Range	Reading	Calibrated To	Result
Zero Air	% LEL	0	0	PASS
Zero Air	% O ₂	20.9	20.9	PASS
Zero Air	(% W ₁₀₀)	0	0	PASS
Zero Air	PPM H ₂ S	0	0	PASS

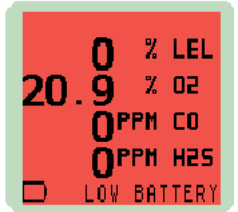
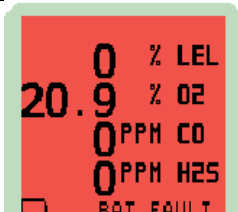
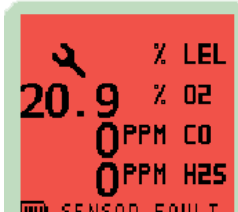
Gas Applied	Range	Reading	Calibrated To	Result
N ₂ /O ₂ Mixture	% O ₂	N/A	N/A	PASS
18 Revol Oxygen	% O ₂	17.8	N/A	PASS
500 PPM CO	PPM CO	484	501	PASS
N ₂ /PPM H ₂ S	(% W ₁₀₀)	49	N/A	PASS

Calibrated by: A N O'Neil


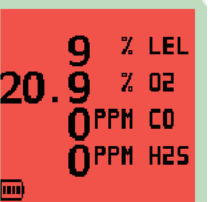

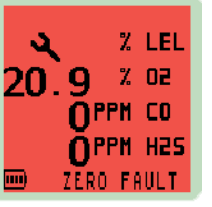
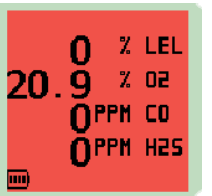
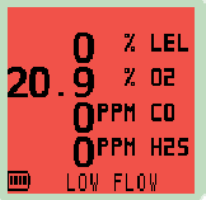


33. Certificates that have been created can then be viewed in the Generated certificates folder



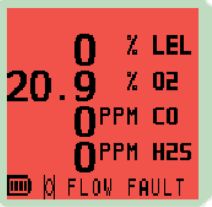

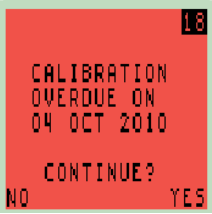

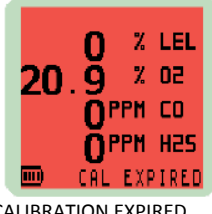
MARINE 4 QUICK START, CALIBRATION AND TROUBLESHOOTING GUIDE

Screen Display showing...	Audible alarm status	LED status	Probable Cause	Solution	If not resolved
 <p>LOW BATTERY warning</p>	Sounds once every 2 seconds	Red LED's flashing	<p>Battery requires charging. There is less than 30 minutes normal operation left before the unit turns off</p> <p>Note: Gas alarms continue to operate after the 'LOW BATTERY' warning appears.</p>	Place the unit on charge, it will take a maximum of 4 hours to recharge fully	If battery will not charge up please contact service@martek-marine.com
 <p>BAT FAULT warning</p>	Sounds continuously	Red LED's stay on	Battery requires charging. There is less than 3 minutes normal operation left before the unit turns off.	Place the unit on charge, it will take a maximum of 4 hours to recharge fully	If battery will not charge up please contact service@martek-marine.com
NO DISPLAY UNIT WILL NOT TURN ON	NO ALARMS	NO LIGHTS	Battery has been allowed to become fully depleted and requires charging	Place the unit on charge – allow up to 3 hours for charging symbol to appear – leave on charge until fully charged. This may take up to 8 hours.	If after leaving on charge for 8+ hours the unit will not turn on please contact service@martek-marine.com
 <p>SENSOR FAULT warning</p>	Sounds once every 2 seconds	Red LED's flashing	Sensor requires replacement or an electrical fault exists.	<p>Calibrate the unit (NOT bump test). To confirm the fault.</p> <p>If problem persists after calibration, replace sensor.</p>	<p>If your unit is under warranty please contact service@martek-marine.com</p> <p>To purchase a new sensor please contact Fastcalgas@martek-marine.com</p>






MARINE 4 QUICK START, CALIBRATION AND TROUBLESHOOTING GUIDE

Screen Display showing...	Audible alarm status	LED status	Probable Cause	Solution	If not resolved
 <p>ALTERNATING WITH A GAS READING HIGHER THAN 0% AS SHOWN BELOW</p> 	<p>Sounds once every 2 seconds</p>	<p>Red LED's flashing</p>	<p>Unit has been turned on in the presence of gas</p> <p>Or</p> <p>The cell has been over exposed to gas</p>	<p>Leave the instrument ON for 30 minutes in fresh air. Then switch off and back on again still in fresh air.</p> <p>NOTE: The instrument can still be used to detect and alarm on the other sensor(s) fitted. Press the  button to continue.</p> <p>The faulty sensor will continue to display a flashing spanner symbol to warn the user that this sensor is NOT working correctly</p>	<p>If the fault persists contact service@martek-marine.com</p>
 <p>ALTERNATING WITH A GAS READING OF 0% AS SHOWN BELOW</p> 	<p>Sounds once every 2 seconds</p>	<p>Red LED's flashing</p>	<p>Cell is unable to zero.</p>	<p>Apply test gas for two minutes to allow the display to return to zero then switch instrument OFF and ON again.</p>	<p>If the fault persists contact service@martek-marine.com</p>
 <p>LOW FLOW alarm</p>	<p>Sounds continuously</p>	<p>Red LED's stay on</p>	<p>Flow is restricted due to a blockage in the sample tube, sample filter or probe.</p> <p>Or sample tube is in excess of 30m</p>	<p>Check for and clear any blockages found in sample tube, filter or probe. Restart pump by pressing  button</p> <p>Connect a maximum of 30m sample line Restart pump by pressing the  button</p>	<p>If no blockages found but alarm move onto the below step</p> <p>If tubing is correct length and no blockages found but fault remains contact service@martek-marine.com</p>

MARINE 4 QUICK START, CALIBRATION AND TROUBLESHOOTING GUIDE

Screen Display showing...	Audible alarm status	LED status	Probable Cause	Solution	If not resolved
 <p>FLOW FAULT alarm</p>	<p>Sounds once every 2 seconds</p>	<p>Red LED's stay on</p>	<p>Flow is restricted due to a blockage in the sample tube, sample filter or probe.</p>	<p>Check for and clear any blockages found in sample tube, filter or probe. Restart pump by pressing  button</p>	<p>If no blockages found but the fault remains contact service@martek-marine.com</p>
 <p>CALIBRATION OVERDUE warning</p>	<p>Sounds continuously</p>	<p>Red LED's stay on</p>	<p>Calibration of the unit is overdue. The instrument will operate using its previous calibration settings; however, as the sensors response may have diminished, the instrument should be recalibrated and tested.</p>	<p>Press the  button once to acknowledge that calibration due date is overdue, cancel the audible / visual alarm, and continue to the next display. A 'CAL EXPIRED' warning, red backlighting and red LED's will flash every 30 seconds.</p> <p>Calibrate the unit at the earliest opportunity</p>	<p>If warning remains after calibration please contact service@martek-marine.com</p>
 <p>CALIBRATION EXPIRED warning</p>	<p>None</p>	<p>Red LED's will flash every 30 seconds</p>	<p>Calibration of the unit is overdue</p>	<p>Calibrate the unit either manually or using the auto calibration station</p>	<p>If warning remains after calibrations please contact service@martek-marine.com</p>

MARINE 4 QUICK START, CALIBRATION AND TROUBLESHOOTING GUIDE

Screen Display showing...	Audible alarm status	LED status	Probable Cause	Solution	If not resolved
<p>DATE AND TIME HAS RESET TO 2000</p>	<p>None</p>		<p>The battery has been allowed to completely deplete and has reset the internal clock</p>	<p>SWITCH THE INSTRUMENT ON Wait until the following screen appears</p>  <p>Push the buttons in this sequence, with a slight pause between each press.</p> <p>Left Hand (LH) button </p> <p>Right Hand (RH) button </p> <p>Left Hand (LH) button </p> <p>Right Hand (RH) button </p> <p>The countdown timer (top right of the screen) will now alternate between a number and the letter M. Once the countdown has finished the screen will display:</p> <p>Normal Calibrate Alarms Setup Default Clock</p> <p>Scroll down (left button) until clock is highlighted and enter (right button)</p>	