GasAlert Max

H_2S, CO, O_2, Combustibles

1, 2, 3, and 4 Gas Detectors

User Manual

BW Technologies
by Honeywell

Limited Warranty & Limitation of Liability

BW Technologies LP (BW) warrants this product to be free from defects in material and workmanship under normal use and service for a period of two years, beginning on the date of shipment to the buyer. This warranty extends only to the sale of new and unused products to the original buyer. BW's warranty obligation is limited, at BW's option, to refund of the purchase price, repair, or replacement of a defective product that is returned to a BW authorized service center within the warranty period. In no event shall BW's liability hereunder exceed the purchase price actually paid by the buyer for the Product.

This warranty does not include:

a) fuses, disposable batteries or the routine replacement of parts due to the normal wear and tear of the product arising from use;

b) any product which in BW's opinion, has been misused, altered, neglected or damaged by accident or abnormal conditions of operation, handling or use;

c) any damage or defects attributable to repair of the product by any person other than an authorized dealer, or the installation of unapproved parts on the product; or

The obligations set forth in this warranty are conditional on:

a) proper storage, installation, calibration, use, maintenance and compliance with the product manual instructions and any other applicable recommendations of BW;

b) the buyer promptly notifying BW of any defect and, if required, promptly making the product available for correction. No goods shall be returned to BW until receipt by the buyer of shipping instructions from BW; and

c) the right of BW to require that the buyer provide proof of purchase such as the original invoice, bill of sale or packing slip to establish that the product is within the warranty period.

THE BUYER AGREES THAT THIS WARRANTY IS THE BUYER'S SOLE AND EXCLUSIVE REMEDY AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. BW SHALL NOT BE LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES OR LOSSES, INCLUDING LOSS OF DATA, WHETHER ARISING FROM BREACH OF WARRANTY OR BASED ON CONTRACT, TORT OR RELIANCE OR ANY OTHER THEORY.

Since some countries or states do not allow limitation of the term of an implied warranty, or exclusion or limitation of incidental or consequential damages, the limitations and exclusions of this warranty may not apply to every buyer. If any provision of this warranty is held invalid or unenforceable by a court of competent jurisdiction, such holding will not affect the validity or enforceability of any other provision.

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CAUTION: FOR SAFETY REASONS THIS EQUIPMENT MUST BE OPERATED AND SERVICED BY QUALIFIED PERSONNEL ONLY. READ AND UNDERSTAND INSTRUCTION MANUAL COMPLETELY BEFORE OPERATING OR SERVICING.

GasAlertMax Gas Detector

Order Number	Description
GAMAX3-4	GasAlertMax (4 Gas) Detector (H_2S, CO, O_2, %LEL)
GAMAX3-4-DL1	GasAlertMax (4 Gas) c/w Black Box Datalogger
GAMAX3-4-DL2	GasAlertMax (4 Gas) c/w User Downloadable Datalogger
GAMAX3-3H	GasAlertMax (3 Gas) Detector (H_2S, O_2, %LEL)
GAMAX3-3H-DL1	GasAlertMax (3 Gas) c/w Black Box Datalogger
GAMAX3-3H-DL2	GasAlertMax (3 Gas) c/w User Downloadable Datalogger
GAMAX3-2	GasAlertMax (2 Gas) Detector (O_2, %LEL)
GAMAX3-2-DL1	GasAlertMax (2 Gas) c/w Black Box Datalogger
GAMAX3-2-DL2	GasAlertMax (2 Gas) c/w User Downloadable Datalogger
GAMAX3-2MW	GasAlertMax (2-Gas) Detector (%LEL, CO)
GAMAX3-2MW-DL2	GasAlertMax (2-Gas) c/w User Downloadable Datalogger

GasAlertMax Multi-Gas Detector

The detector comes complete with a motorized sampling pump.

GasAlertMax with Black Box Datalogger

Provides full-time continuous datalogging while the detector is operating. Wraparound memory ensures the most recent data is always saved. Data cannot be accessed by the user. Data is retrievable by an authorized BW factory service center in the event of an incident or occurrence.

GasAlertMax with User Downloadable Datalogger

Provides full-time continuous datalogging while the instrument is operating. Data is saved on a convenient MultiMediaCard and can be removed and downloaded by the user. Data is imported into standard office software (Microsoft® Excel, Access, etc.).

GasAlertMax

Introduction

⚠ **Warning**

To ensure your personal safety, read "Safety Information" before you use the detector.

The GasAlertMax gas detector ("the detector") warns of hazardous gas at levels above factory set alarm setpoints. This product is a gas detector.

The detector is a personal safety device. It is your responsibility to respond properly to the alarm.

Table 1 lists the gases monitored.

Table 1. Gases Detected

Gas Detected	Unit of Measurement
Hydrogen sulfide (H_2S)	parts per million (ppm)
Carbon monoxide (CO)	parts per million (ppm)
Oxygen (O_2)	percent by volume (%)
Combustible gases (LEL)	percent of lower explosive limit (% LEL)

Contacting BW Technologies

To contact BW Technologies, call:

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Europe: +44 (0) 1295 700300
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Calgary, AB T2A 7X9
CANADA

Email us at: info@bwtnet.com

Visit BW Technologies' website at: www.gasmonitors.com

ISO 9001

Safety Information - Read First

Use the detector only as specified in this manual, otherwise the protection provided by the detector may be impaired.

International symbols used on the detector and in this manual are explained in Table 2.

Read the **Cautions** on the following pages before using the detector.

Note

This instrument contains a rechargeable battery. Do not mix with the solid waste stream. Spent batteries should be disposed of by a qualified recycler or hazardous materials handler.

⚠ Cautions

To avoid possible personal injury:

⇒ *Warning:* **Substitution of components may impair Intrinsic Safety.**

⇒ **Do not use the detector if it is damaged. Before you use the detector, inspect the case. Look for cracks or missing plastic.**

⇒ **If the detector is damaged or something is missing, contact BW Technologies immediately.**

⇒ **For use only in potentially explosive atmospheres where oxygen concentrations do not exceed 20.9% (v/v).**

⇒ **Make sure the back is closed and fastened, and the battery is locked in place before you operate the detector.**

⇒ **Use only a sensor specifically designed for your GasAlertMax model. (See the section, Replacement Parts and Accessories.)**

⇒ **Calibrate the detector before first-time use and then on a regular schedule, depending on use and sensor exposure to poisons and contaminants. BW recommends at least once every 180 days* (6 months).**

⇒ **Do not turn off the detector during a work shift. Turning off the detector resets the TWA (time-weighted average), STEL (short-term exposure limit), and maximum gas exposure values to 0. (See the section, Alarms.)**

⇒ **It is recommended that the accuracy of the GasAlertMax be checked with known concentration calibration gas before each day's use and immediately after any known exposure to contaminants (e.g., after an H_2S alarm if such a sensor is fitted).**

*Refer to Specifications.

⚠ Cautions

⇒ **BW recommends to "bump test" the sensors before each day's use, to confirm their ability to respond to gas by exposing the detector to a gas concentration that exceeds the alarm setpoints. Manually verify that the audible and visual alarms are activated. Calibrate if the readings are not within the specified limits.**

⇒ **Make sure the pump filter is not blocked.**

⇒ **The LEL sensor is factory calibrated to methane. If monitoring a different combustible gas, calibrate the sensor using the appropriate gas.**

⇒ **High off-scale % LEL readings may indicate an explosive concentration.**

⇒ **Protect the LEL sensor from exposure to lead compounds, silicones, and chlorinated hydrocarbons. Although certain organic vapors (such as, leaded gasoline and halogenated hydrocarbons) may temporarily inhibit sensor performance, in most cases, the sensor will recover after calibration.**

⇒ **Any rapid up-scaling reading followed by a declining or erratic reading may indicate a gas concentration beyond upper scale limit, which may be hazardous.**

⇒ **Use only Black & Decker VersaPak™ battery. Ensure it is properly charged and installed in the detector case. (See the section, Replacement Parts and Accessories.)**

⇒ **Only charge batteries using VersaPak™ charger. Do not use any other charger. Failure to observe this precaution could lead to fire or explosion.**

⇒ **Do not change or charge batteries in a hazardous location. Doing so will impair the Intrinsic Safety of the unit, and may lead to fire or explosion.**

⇒ **Read and observe all instructions and precautions in the literature provided with the charger. Failure to do so may result in fire, electric shock, or other forms of personal injury or property damage.**

⚠ **Cautions**

To avoid possible damage to the detector:

⇒ **Extended exposure of the GasAlertMax to certain concentrations of combustible gases and air may stress a detector element, which can seriously affect its performance. If an alarm occurs due to high concentration of combustible gases, recalibration should be performed, or if needed the sensor replaced.**

⇒ **Exposure to some substances (e.g., silicones, phosphates, lead, or sulfur containing compounds) can cause LEL sensor sensitivity loss.**

⇒ **Do not test the combustible sensors response with a butane cigarette lighter.**

⇒ **Do not expose the detector to electrical shock and/or severe continuous mechanical shock.**

⇒ **Do not attempt to disassemble, adjust, or service the detector unless instructions for that procedure are contained in the manual and/or that part is listed as a replacement part. Use only BW Technologies replacement parts.**

⇒ **Do not immerse the detector in liquids.**

⇒ **The detector warranty will be voided if customer personnel or third parties damage the detector during repair attempts. Non-BW Technologies repair/service attempts void this warranty.**

Table 2. International Symbols

Symbol	Meaning
c**SP**us	Approved to both U.S. and Canadian Standards by the Canadian Standards Association
⟨Ex⟩	European Explosion Protection
CE	Conforms to European Union Directives
BAM	BAM performance verification to European Performance Standards
ATEX	Conforms to European ATEX Directives 94/9/EC

Getting Started

The items listed below are included with your detector. If the detector is damaged or something is missing, contact the place of purchase immediately.

- One Black & Decker VersaPak™ battery;

- VersaPak™ battery Vac charger;

- H_2S/CO sensor (Twin tox sensor);

- O_2 sensor;

- LEL sensor;

- Calibration hose;

- Sampling hose;

- Carrying holster.

To order replacement parts, see the Replacement Parts and Accessories section.

The detector comes with the sensors installed. The Maintenance section describes how to install the battery.

To become familiar with the features and functions of the detector, study the following figures and tables:

- Figure 1 and Table 3 describe the detector's components.

- Figure 2 and Table 4 describe the detector's display elements.
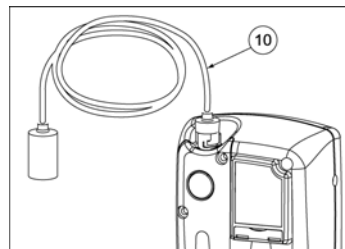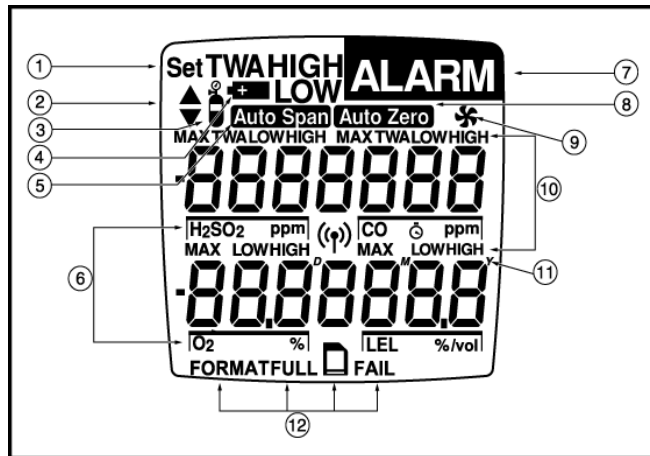
- Table 5 describes the detector's pushbuttons.
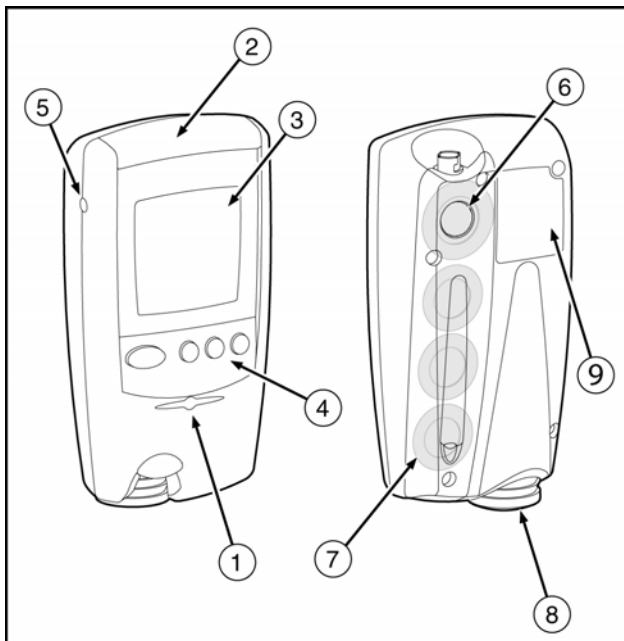
Figure 1. GasAlertMax Detector

Table 3. GasAlertMax Detector

Item	Description
1	Audible alarm
2	Visual alarm bar (LED)
3	Liquid crystal display (LCD)
4	Pushbuttons
5	Accessory output jack
6	Pump and pump filter
7	Sensors
8	Battery
9	Datalogger (optional)
10	Sampling hose

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Figure 2. Display Elements

Note

The LCD backlight automatically activates for 10 seconds whenever there is insufficient light to view the LCD and during alarm conditions. Any pushbutton reactivates the backlight.

Table 4. Display Elements

Item	Description
1	Set value
2	Increment or decrement value
3	Gas cylinder
4	Battery
5	Automatically span sensor
6	Gas identifier bars
7	Alarm setpoint or alarm
8	Automatically zero sensor
9	Pump
10	Alarm condition (low, high, TWA, STEL, or multi-gas) or view TWA, STEL, and maximum (MAX) gas exposures
11	Real time calendar (date, month, year)
12	Datalogger card indicator (optional)

Table 5. Pushbuttons

Pushbutton	Description
$\textcircled{\scriptsize{\text{O}}}$	• To activate the detector press $\textcircled{\scriptsize{\text{O}}}$. • To deactivate the detector, press $\textcircled{\scriptsize{\text{O}}}$ and hold for 5 seconds. • To activate the confidence beep, press and hold $\bigcirc$ then press $\textcircled{\scriptsize{\text{O}}}$ at each start-up.
$\blacktriangledown$ CAL	• To decrement the displayed value, press $\blacktriangledown$. • To initiate calibration and setting alarm setpoints, press $\blacktriangledown$ and $\bigcirc$ simultaneously. • To enter the user options menu, press $\blacktriangledown$ and $\blacktriangle$ simultaneously.
$\blacktriangle$ <u>TWA</u> MAX	• To increment the displayed value, press $\blacktriangle$. • To view the TWA and maximum gas exposures, press $\blacktriangle$ and $\bigcirc$ simultaneously.
$\bigcirc$ OK	• To manually reset the maximum (peak) hold reading, press $\bigcirc$ and hold for 5 seconds. • To initiate the sampling pump recalibration (when a pump alarm activates), press $\bigcirc$ and hold for 3 seconds. • To acknowledge latched alarms, press $\bigcirc$.

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Activating the Detector

Note

The detector must be activated before entering a potentially explosive area.

To activate the detector, press ⓪ in a normal atmosphere (20.9% oxygen).

Self-Test

Once the detector is activated, it performs the following checks. Manually check that all actions occur.

1. If the battery is low, ▣ **LOW** flashes and the LCD reads **OFF**. Replace the battery and restart the detector.

2. The LCD displays all the elements.

3. The audible alarm beeps, the visual alarm flashes, and the backlight briefly turns on.

Note
Steps #4 and #5 are for datalogger models only.

4. The detector tests the data card.

Note
The MultiMediaCard (MMC) icon (▯) is displayed continuously on black box datalogger detectors and when a card is present in user downloadable datalogger detectors.

Datalogger operation is automatic and requires no settings.

Black Box Datalogger

The **FAIL**, **ALARM**, and ▯ icons blink if the card malfunctions or is removed.

User Downloadable Datalogger

The detector tests the MMC. The LCD displays if the card is present and ready for use.

CArd tESt   CArd IS rEAdY
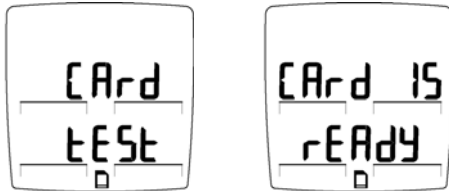
If the card is missing or malfunctioning, the detector beeps and flashes quickly. The LCD displays **CArd Error** and the detector continues the self-test before proceeding to normal operation.

ALARM
CArd
Error
FAIL

Note

The detector does not require the MMC to be present or functioning in order to operate.

Removing the card will cause a **CArd Out** message and a brief alarm. Inserting the card will cause a **CArd In** message and a beep for confirmation.

You can add or change the data card on user downloadable units at any time. The detector supports card insertion and removal while the instrument is active.

5. The LCD displays shows the time and date.

6. The LCD displays then shows the TWA, STEL, low, and high alarm setpoints.

1. TWA alarm	3.Low alarm
TWA LOW ALARM 0 10 035 H2S ppm CO ppm	LOW ALARM 0 10 035 H2S ppm CO ppm 19.5 0 10 O2 % LEL %
2. STEL alarm	**4.High alarm**
TWA HIGH ALARM 0 15 050 H2S ppm CO ppm	LOW ALARM 0 10 035 H2S ppm CO ppm 19.5 0 10 O2 % LEL %

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7. The calibration status is shown. The number of days remaining before a calibration is due is displayed.

```
CAL duE
180 d
```

If the calibration is overdue, the LCD displays the number of days it is overdue. Press ◯ to acknowledge the warning. BW recommends that you calibrate the detector.

8. The LCD displays **tESt** as the detector tests the sensors.

The pump draws air over the sensors. If the sensor test fails, the audible alarm emits a slow modulating tone and the visual alarm flashes slowly. The LCD displays which sensor(s) has failed.

```
ALARM
--- ---
H₂S    ppm    CO    ppm
20.9   000
O₂     %      LEL   %
```
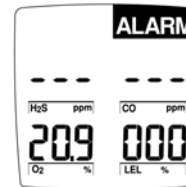
9. The detector then runs a pump test check (if enabled in the user options).

10. The oxygen sensor is then automatically calibrated (if enabled in the user options).

Battery Test

The battery is tested on activation and continuously thereafter. If the battery is low, ▉▉ **LOW** flashes.

Note

If the confidence beep is on, the audible alarm beeps if the battery has sufficient power and stops if the battery power is low. Refer to the section, Confidence Beep.

Pump Test

The pump is tested continuously after activation. If the pump test fails, the LCD displays the following:
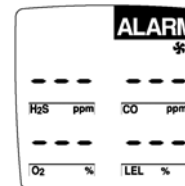
Note

*If the pump alarm continues for more than 5 seconds and the LCD displays **InlEt bLockEd**, refer to the Pump Calibration section.*

Self-Test Pass

If the detector passes the self-test, the detector begins normal operation. The LCD displays the ambient gas readings.
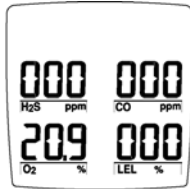
The detector starts recording the maximum gas exposure (MAX) and calculating the short-term exposure level (STEL) and time-weighted average (TWA) exposures.

Self-Test Fail

If the detector fails the self-test, refer to the Troubleshooting section.

Deactivating the Detector

To deactivate the detector, press ⊚ and hold for 5 seconds.

The audible alarm beeps four times, the visual alarm flashes four times, and then the LCD displays the following:
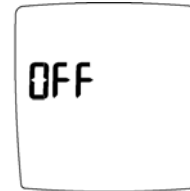
The LCD deactivates and the detector stops normal operation.

Note
If ⊚ is held down for less than 5 seconds, the detector will not shutdown.

Confidence Beep

The confidence beep notifies that the detector is activated and the battery has sufficient power to respond to a hazardous level of gas and emit an alarm. Instead of beeping when the battery power is low, the audible alarm beeps to advise that the battery has sufficient power. The confidence beep stops when the battery power is low.

The confidence beep can only be enabled at start-up

To activate the confidence beep:

1. If the detector is activated, deactivate the detector.

2. Press and hold ◯ then press ⓪ at each start-up.

After the self-test completes, the detector continuously beeps once every 5 seconds.

User Options Menu

The following are the available user options:

1. **FiniSh OptionS:** Exits the user options menu

2. **AdJuSt Clock:** Adjust real-time clock and calendar;

3. **toggLE H2S SEn:** Enable/disable H_2S sensors;

4. **toggLE CO SEn:** Enable/disable CO sensors;

5. **toggLE LEL SEn:** Enable/disable LEL sensors;

6. **toggLE O2 SEn:** Enable/disable O_2 sensors;

7. **PASS Lock:** Enable/disable pass code protection;

8. **LAtch in ALArmS:** Enable/disable latching alarm;

9. **toggLE 02 CAL:** Enable/disable automatic oxygen calibration at start-up;

10. **SEt CAL SPANS:** Set calibration gas span concentration values;

11. **toggLE PumPtSt:** Enable/disable pump test at start-up;

12. **StEL Period:** Set STEL calculation period;

13. **AnZEIgE dEutSCH:** Select German language.

To access the user options menu, activate the detector (if applicable). Press ⬇ and ⬆ simultaneously until the LCD displays the following two screens. The first screen refers to which version of firmware the detector has.

FLASH
CODE P

The second screen shows that the user options menu is being entered.

USEr
OPtionS

If the user options menu is pass code protected, the following screen will appear. You must enter the correct pass code before you can enter the user options menu.

SEt --
CodE
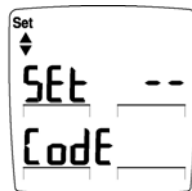
Press ⬇ or ⬆ to scroll through the options.

Finish Option

To exit the options menu and return to normal operation at any time, press ◯ when the LCD displays **FiniSh OPtionS**.
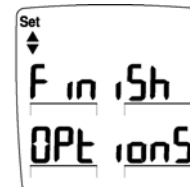
FiniSh
OPtionS

Note

*If the user has enabled/disabled the sensors, pump test, or automatic O2 calibration options, the detector administers a self-test after **FiniSh OptionS** is selected. Refer to Self-Test.*

Date and Time Option

Note

Time and date adjustments only apply to user downloadable datalogger detectors.

To set the real-time clock calendar, press ◯ when the LCD displays **AdJuSt Clock**.

AdJuSt
Clock

The date and time displays in the following order:

Day of the week (Monday = 1),
Hours (h),
Minutes,
Date $^{(D)}$,
Month $^{(M)}$,
Year $^{(Y)}$.

Use ⊙ and ⊙ to adjust the time and date to your local setting. Press ◯ to confirm each setting.

Sensor Enable/Disable Option

⚠ **Warning**

Disabling an installed sensor configures the detector to a one, two, or three-gas unit. No protection is now provided for the gas targeted by that sensor(s). Disabling a sensor should be performed with extreme caution.

In the event a sensor fails, sensor disable can be used to deactivate the sensor fail alarm. The sensor should be replaced and enabled as soon as possible.

If a sensor is disabled, the detector still functions normally with the remaining enabled sensors. The sensor can be enabled again at any time.

To enable or disable a sensor, press ◯ when the LCD displays **toggLE H2S (CO, LEL, or O2) SEn**. For this example the H_2S sensor is toggled.
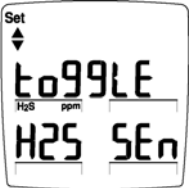
Note

Whenever you enter the sensor enable/disable option, it toggles the option on or off (depending on its current status).

The LCD displays whether the sensor is now on or off.

Pass Code Protection Option

Pass code protection prevents unauthorized personnel from accessing to the user option menu, calibration function, and alarm setpoints adjust function.

Entering the Pass Code

If pass code protection is enabled, press ⊽ or ⊿ to scroll to the correct pass code when the following screen appears:
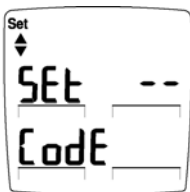
Note
The factory pass code is provided separately.

Then press ◯ to accept the pass code.

The correct three-digit factory pass code must be entered in 8 seconds or the LCD advises that the code is not correct/error and returns to normal operation.

No code entered or incorrect code entered and confirmed. • Beeps and flashes • Returns to normal operation	**not CorrEct**
Code entered, but not confirmed. • LCD displays both screens • Beeps and flashes • Returns to normal operation	**SEt Err CodE** **not CorrEct**

The detector is shipped with the pass code protection option disabled.

Enable/Disable Pass Code Protect

To enter the pass code protection option, press ⃝ when the LCD displays **PASS Lock**.
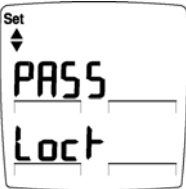
Note

Whenever you enter the pass code protection option, it toggles the option on or off (depending on its current status).

The LCD displays whether pass code protect is on or off.

Latching Alarm Option

If an alarm is set to latch, the audible and visual alarms persist during an alarm. The alarm deactivates when it is
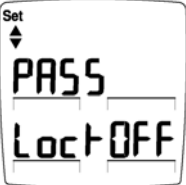
acknowledged by pressing ⃝ and the alarm conditions no longer persist.

The detector is shipped with the latching alarm function disabled.

To enter the latching alarm function, press ⃝ when the LCD displays **LAtchin ALArmS**.

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Note

Whenever you enter the latching alarm option, it toggles the option on or off (depending on its current status).

The LCD displays whether the latching alarm function is now on or off.

To enter the automatic oxygen calibration option, press ◯ when the LCD displays **toggLE O2 CAL**.
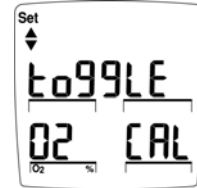
Note

Whenever you enter the automatic oxygen calibration option, it toggles the option on or off (depending on its current status).

The LCD then displays whether the option is on or off.

## Automatic Oxygen Calibration Option

This option allows you to enable or disable the automatic oxygen calibration. Enabling this option allows the detector to calibrate the oxygen sensor during startup.

The detector is shipped with this function enabled.
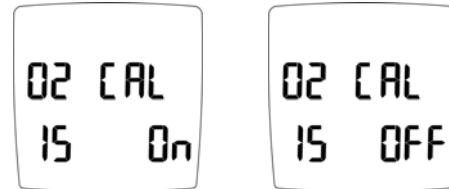
Calibration Span Concentration Option

With this option you can input new gas concentrations before calibrating your detector.

To enter the calibration gas span concentration values option, press ◯ when the LCD displays **SEt CAL SPAnS**.
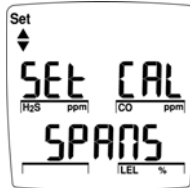
You can change the span values for H_2S, CO, and LEL. The detector will scroll through each calibration gas span value. It will pause at each value but scroll to the next value if no pushbuttons are pressed.
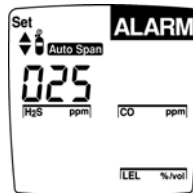
Once you change a value, you must press ◯ to confirm your selection.

If you do not press any pushbuttons within 8 seconds of viewing a calibration gas span concentration, the detector automatically saves the displayed concentration of the calibration gas.

If you change the calibration gas concentration but pause for 8 seconds before pressing ◯, the detector rejects the new value. The LCD displays the original value and then continues setting the other gas concentrations.

Pump Test Option

The pump test option allows you to enable or disable the pump test at start-up. Enabling this option allows the detector to try and detect a blocked inlet during start-up.

To enter this option, press ◯ when the LCD displays **toggLE PumP tSt**.
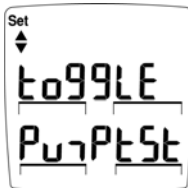
The LCD then displays whether this option is now on or off.
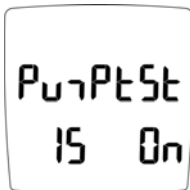
Note

Whenever you enter the pump test option, it toggles the option on or off (depending on its current status).

STEL Period Option

By default, the short-term exposure limit (STEL) is based on a 15-minute period. This option allows you to change the period between 5-15 minutes.

To enter this option, press ◯ when the LCD displays **StEL PEriod**.
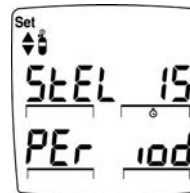
To change the STEL period, press ⬇ and ⬆. Then press ◯ to save the new value.

Note
If no pushbuttons are pressed within 8 seconds of entering this option, the detector automatically saves the displayed value.
*If you change the STEL period but pause for 8 seconds before pressing ◯, the detector rejects the new value. The LCD displays **Err**, the detector retains the original value, and the detector returns to the user options menu*

German Language Option

The detector's text can be viewed in either English or German. This option allows you to toggle the text between the two languages. The detector is shipped with English as its default.

To change the text to German, press ◯ when the LCD displays **AnZEIgE dEutSCH**.

To switch the text from German to English, press ◯ when the LCD displays **SEt tO EngLISH**.

Alarms

Table 6 describes the detector alarms and shows how the LCD looks for each alarm.

Table 7 describes the computed gas exposures.

During an alarm condition, the detector activates the backlight and the LCD displays the current ambient gas reading.

If more than one type or level of alarm exists at the same time, a multi-gas alarm will result. For any single sensor, a high alarm will override a low alarm.

Table 6. Alarms
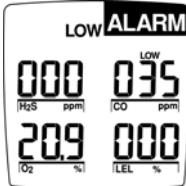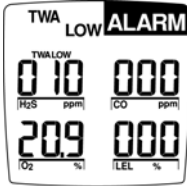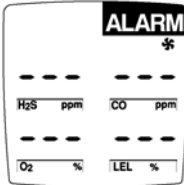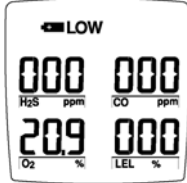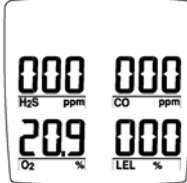
Alarms	Display	Alarms	Display
Low Alarm: • Slow modulating beep and flash • **ALARM** icon and target gas bar flash	LOW **ALARM** 000 035 H2S ppm /CO ppm 20.9 000 /O2 % /LEL %	**TWA Alarm:** • Slow modulating beep and flash • **ALARM** icon and target gas bar flash	TWA LOW **ALARM** 0 10 000 H2S ppm /CO ppm 20.9 000 /O2 % /LEL %
High Alarm: • Fast modulating beep and flash • **ALARM** icon and target gas bar flash	HIGH **ALARM** 000 200 H2S ppm /CO ppm 20.9 000 /O2 % /LEL %	**STEL Alarm:** • Fast modulating beep and flash • **ALARM** icon and target gas bar flash	TWA HIGH **ALARM** 0 15 000 H2S ppm /CO ppm 20.9 000 /O2 % /LEL %

Table 6. Alarms

Alarms	Display	Alarms	Display
Over Range Alarm: (Over Level Exposure) • Fast modulating beep and flash • **ALARM** icon and target gas bar flash		**Multi-Gas Alarm:** • Alternating low and high alarm beep and flash • **ALARM** icon and target gas bars flash	
Sensor Alarm: • Slow modulating beep and flash • **ALARM** icon and gas bar(s) flash		**Pump Alarm:** • Slow modulating beep and flash • **ALARM** icon and gas bars flash. If LCD displays **InlEt bLockEd**, clear the pump filter. If alarm persists, refer to Pump Calibration.	

Table 6. Alarms

Alarms	Display	Alarms	Display
Low Battery Alarm: (Confidence beep disabled) • One beep and one flash every 5 seconds • ▪▪▪ **LOW** flashes	▪▪ LOW 000 000 H2S ppm CO ppm 20.9 000 O2 % LEL %	**Confidence Beep:** • One beep every 5 seconds	000 000 H2S ppm CO ppm 20.9 000 O2 % LEL %
Automatic Shutdown Alarm: • Eight beeps and flashes • ▪▪▪ **LOW** displays periodically	▪▪ LOW OFF	**Normal Shutdown:** • Four beeps and flashes	OFF

Note

Alarms can be set to be latching or non-latching. To confirm this seeting, access the Latching Alarm Option in the user options menu.

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Gas Exposures Computed

⚠ Warning

To avoid possible personal injury, do not deactivate the detector during a work shift. The detector automatically resets the TWA, STEL, and maximum (MAX) gas exposures at start-up. If you reactivate the detector during a work shift, these values will not reflect the entire work shift.

Table 7. Computed Gas Exposures

Gas Exposure	Description
TWA (CO and H_2S only)	• Time-weighted average based on accumulated exposure to toxic gases averaged over a workday • Accumulated value.
STEL (CO and H_2S only)	• Short-term exposure level base on a 5-15 minute period (user selectable). • Accumulated value.
Maximum* (Peak)	• Highest gas level encountered during the period the detector is turned on.

* For oxygen, it is the highest or lowest concentration encountered.

Viewing Gas Exposures

Press ⊙ and ◯ simultaneously and the LCD first displays the TWA gas exposure.

The LCD then shows the STEL gas exposure.

And lastly, the LCD displays the maximum (MAX) gas exposure.
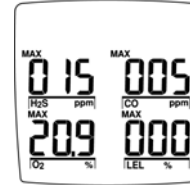
Press and hold ◯ for 5 seconds to reset the maximum (MAX) exposures after seeing the maximum (MAX) gas exposure.

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Gas Alarm Setpoints

The detector's gas alarm setpoints trigger the gas alarms described in the table below.

Table 8. Gas Alarm Setpoints

Alarm	Condition
Low alarm	CO, H_2S, and LEL: Ambient gas level above low alarm setpoint. (For O_2, Oxygen Alarm Setpoints)
High alarm	CO, H_2S, and LEL: Ambient gas level above high alarm setpoint. (For O_2, see Oxygen Alarm Setpoints.)
TWA alarm (CO and H_2S only)	Accumulated value above the TWA alarm setpoint.
STEL alarm (CO and H_2S only)	Accumulated value above the STEL alarm setpoint.
Multi-gas alarm	Two or more gas alarm conditions.

Oxygen Alarm Setpoints

User selectable for low and high alarms in the 0-30.0%** range. Set both below, both above, or one above and one below 20.9% as desired.

Alarm setpoints > 20.9% (v/v) for increasing oxygen concentrations.

Alarm setpoints < 20.9% (v/v) for decreasing oxygen concentrations.

** Refer to **Specifications**

Resetting Gas Alarm Setpoints

Note
Standard factory alarm setpoints may vary by region.

Table 9. Factory Set Alarm Setpoints

Gas	Low	High	TWA	STEL
CO	35 ppm	200 ppm	35 ppm	50 ppm
H_2S	10 ppm	15 ppm	10 ppm	15 ppm
O_2	19.5% vol	22% vol	N/A	N/A
Combustible Gases	10% LEL	20% LEL	N/A	N/A

To change the factory-set alarm setpoints, refer to the
Calibration and Setting Alarm Setpoints section.

Note

*You can disable an alarm by setting the alarm
setpoint to 0 (display: **- -**).*

Stopping a Gas Alarm

The low, high, and STEL alarm stops when the ambient gas
level returns to the acceptable range.

The detector computes the TWA value based on an 8-hour
workday. Only deactivating the detector can stop the TWA
alarm.

Acknowledge Latched Alarm

If the latched alarm option is activated, the audible and visual
alarms continue to sound and flash until the low, high, or
STEL alarm condition is acknowledged. Press ◯ to
deactivate the audible and visual alarms when the current
ambient gas reading falls below the low alarm level. The
alarms cannot be deactivated if an alarm condition is still
present. A TWA alarm condition will not reset.

Note

*A STEL alarm may take up to 15 minutes of clean
air readings before the latched alarm can be
deactivated.*

Sensor Alarm

The detector tests for a missing or defective sensor during
the activation self-test. Refer to the Troubleshooting section.

Pump Alarms

The internal pump draws air over the sensors. If the pump
stops working or the pump filter becomes clogged, the
detector activates the pump alarm.

Pump Alarm

Deactivate the detector immediately
and clear the pump inlet, hose, and
filter.
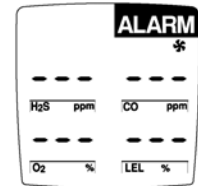
Blocked Pump Alarm

If the pump alarm continues and the
LCD advises the inlet is blocked, see
the Pump Calibration section.
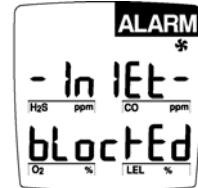
Pump Failure Alarm

This alarm activates if the startup pump test has failed or the pump is missing/broken.

Note

The pump may alarm when attaching a calibration hose or replacing the filter.

Low Battery Alarm

The detector tests the battery on activation and continuously thereafter. If the battery voltage is low, the detector activates the low battery alarm.

The low battery alarm continues until you replace the battery or the battery power is almost depleted. If the battery voltage drops too low, the detector executes an automatic shutdown.

Note

If the confidence beep is activated, the audible alarm does not beep during a low battery alarm. (See the Confidence Beep section.)

Automatic Shutdown Alarm

If the battery voltage is in immediate danger of dropping below the minimum operating voltage, the audible alarm beeps eight times and the visual alarm flashes eight times. After 3 seconds, the LCD blanks out and the detector stops normal operation. The display shows **LOW** periodically until the battery power is depleted.

For directions on how to replace the battery, refer to the section Replacing the Battery.

Note

Typically, the low battery alarm continues for 30 minutes before an automatic shutdown.

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Calibration and Setting Alarm Setpoints

Guidelines

When calibrating the detector, adhere to the following guidelines.

- Recommended gas mixture:
  CO: 35 to 255 ppm balance N_2
  H_2S: 10 to 100 ppm balance N_2
  LEL: 10 to 100% LEL or 0.5 to 5% vol. methane balance air
  O_2: Clean air, 20.9%

- CG-Q58-4 calibration gas (four-gas mix) is available from BW Technologies. Refer to the section Replacement Parts and Accessories.

- Calibration accuracy is never better than the calibration gas accuracy. BW Technologies recommends a premium-grade calibration gas. Gases with NIST (National Institute of Standards and Technology) traceable accuracy will improve the validity of the calibration. Do not use a gas cylinder beyond its expiration date.

- Calibrate a new sensor before use. Install the sensor, activate the detector, and allow the sensor to stabilize before starting calibration (used: 60 seconds; new: 5 minutes).

- Calibrate the detector at least once every 180 days*, depending on use and sensor exposure to poisons and contaminants.

- Calibrate the detector if the ambient gas values varies at start-up.

- It is best to calibrate the sensor before changing the alarm setpoints.

*Refer to Specifications.

- Calibrate only in a clean atmosphere, which is free of background gas.

- To disable an alarm, set its alarm setpoint to 0.

- The LEL sensor is factory calibrated to methane. If monitoring a different combustible gas, calibrate the sensor using the appropriate gas.

- The oxygen sensor can be automatically calibrated on activation if this feature is enabled. Activate detector in a normal (20.9% O_2) atmosphere.

- If you require a certified calibration, contact BW Technologies.

- High CO concentrations above the top of the measuring range are not indicated as **OL** (transgression of the measuring range). If the end of the measuring range is exceeded, the function of the apparatus has to be checked with test gas.

- CO measuring values from –3 ppm (v/v) up to +3 ppm (v/v) and H_2S measuring values from –1 ppm (v/v) up to +1 ppm (v/v) are indicated during measuring operation as 0 ppm (v/v).

- The cross sensitivities described in the sensor datasheet are to be considered. Due to sensor cross sensitivities, H_2S concentrations within the measuring range can cause a CO indication.

- H_2S concentrations within the measuring range can cause an adverse effect on the catalytic LEL sensor. After an H_2S alarm, it is necessary to check the measuring function of the LEL sensor.

Note
The detector must be calibrated if a negative measuring value is indicated during operation.

Diagnostics Protection

The detector tests the ambient air (auto zero) and the test gas that is applied (auto span) to ensure it meets expected values.

If a significant level of background target gas is present during an auto zero, the sensor(s) affected will read **Err** and exit the auto zero function while retaining the previous set value(s).

In an auto span, if any target gas is not present or does not meet expected values, the LCD advises you and exits the calibration mode while retaining the previous set value(s).

Applying Gas to the Sensors

The calibration hose, which is shipped with the detector, simplifies the sensor testing and calibration. Table 10 and Figure 3 show how to use it when applying gas to the sensors.

Table 10. Applying Gas to the Sensors

Item	Description
1	Detector back
2	Calibration hose
3	Regulator and gas cylinder
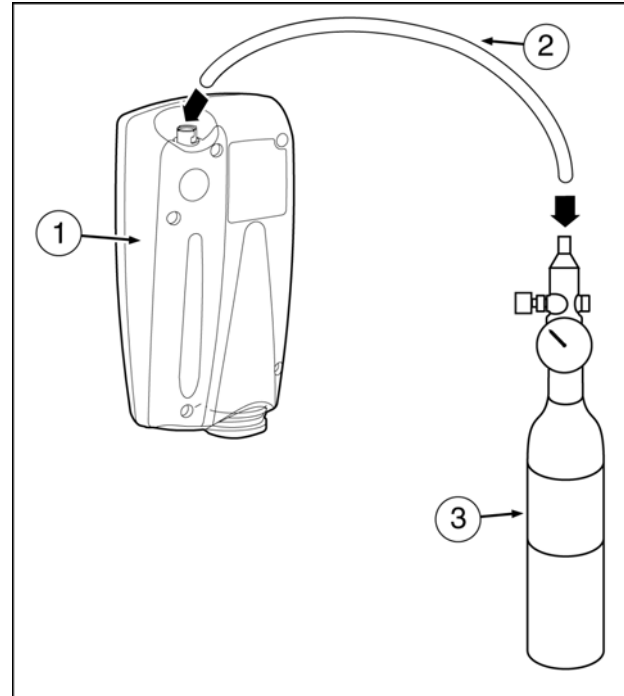
Figure 3. Applying Gas to the Sensors

Calibration Procedure

To calibrate the detector and set its alarm setpoints, perform the following procedure.

Note

To quit at any point after the auto zero, press ◯ to exit auto span. Then press ⓪ to exit setting alarm setpoints. The detector retains any saved values and the audible alarm beeps four times before the detector returns to normal operation.

Start Calibration

1. Activate the detector (if applicable).

2. Press ◯ and ⊙ simultaneously. The LCD displays the following:
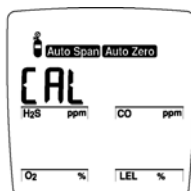
The audible alarm beeps once.

Auto Zero and Oxygen Sensor Calibration

3. The LCD displays flashes Auto Zero while the detector automatically zeroes the H_2S, CO, and LEL sensors and calibrates the O_2 sensor.

   The audible alarm then beeps twice.

Auto Zero	Sensor Fail

Note

Do not apply the calibration gas until the LCD displays a flashing gas cylinder; otherwise, the auto zero will fail.

*If a sensor fails, the LCD displays **Err** (error) and skips the span for the failed sensor(s). Press ◯ to exit auto span. Then press ⓪ to exit setting alarm setpoints. Then restart calibration in an atmosphere that is clear of the targeted gases. If the auto zero fails a second time, restart the detector to test the sensors.*

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Pass Code Protect Activated

After a successful auto zero, the detector asks for the pass code if the detector is pass code protected. The pass code needs to be entered before proceeding to auto span and alarm setpoints.

4. The LCD displays that calibration is locked.
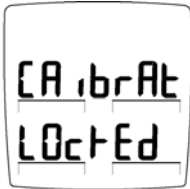
It then requests the pass code. (Refer to the Entering the Pass Code section.)
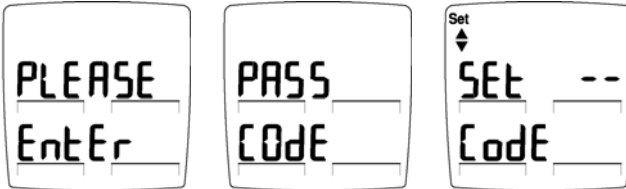
Note

If the correct code is entered, the detector automatically proceeds to auto span.

*If the pass code is not entered within 8 seconds or the wrong pass code is entered, the LCD displays **Not CorrEct**.*

The detector then beeps four times and automatically returns to normal operation.

Auto Span

The LCD displays prompting you to apply the calibration gas to the sensors or you can skip the span (sensitivity adjustment).
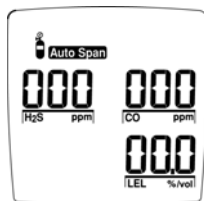
Use a calibration gas meeting the recommended gas mixture as listed in the guidelines.

   5. Apply gas to the sensor at a flow rate of 250 to 500 ml/min.
   OR
   Press ⬭ to skip the span.

When the detector senses approximately one-half of the expected gas concentration (30 seconds), the audible alarm beeps once. The detector then begins spanning the sensor (2 minutes). (These times are valid if a GasAlertMax calibration gas is used.)

The audible alarm beeps three times at the end of the span.

Note

The detector will not span a sensor if:

- *You do not apply gas to the sensor.*

- *The sensor fails to detect at least one-half of the expected gas concentration in the first 30 seconds.*

- *The gas concentration drops below one-half of the expected gas level during the 2-minute span.*

If you apply gas to a sensor and the detector fails to span the sensor, press ⬭ to exit auto span. Then press ⬭ to exit the calibration and repeat the calibration process using a new gas cylinder. If the sensor fails the span a second time, replace the sensor. Refer to the section, Replacing a Sensor, Pump, or Pump Filter.

Setting the Alarm Setpoints

Note

TWA, STEL, low, and high alarm setpoints are set for each sensor in the following order: H_2S, CO, LEL, and O_2.

TWA and STEL do not apply to LEL and O_2.

The LCD first displays the TWA alarm setpoint for H_2S.
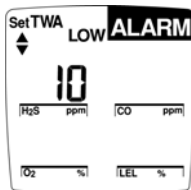
The set up/down arrow icon lights, prompting you to input a new TWA alarm setpoint.

6. To change the TWA alarm setpoint, press ▾ or ▴ until the LCD displays the new value.

7. Press ◯ to save the displayed value.

8. Repeat steps #5 and #6 for the remaining alarm setpoints and the remaining sensors.

Note

If you do not press any pushbuttons within 10 seconds of entering this display, the detector automatically retains the existing alarm setpoint.

*If you change the displayed value but pause for 10 seconds before pressing ◯, the detector rejects the new value. The display shows **Err** (error) and the audible alarm beeps six times. The detector will then continue to the next value.*

If the detector is on the last alarm setpoint and no pushbuttons are pressed, the detector will exit setting the alarm setpoints.

Setting the Calibration Due Date

After all the alarm setpoints have been set, the LCD displays the number of days remaining before the next calibration is due. (The default setting is 180 days.)

Note
If you do not calibrate all of the sensors, the LCD displays **notE: SPAn ALL SEnSorS to rESEt CAL duE dAtE**.

The LCD flashes prompting you to change the calibration due date between 1 and 365 days.

9. If you want to change the next calibration due date, press ⬇ and ⬆ until the LCD displays the new value.

10. Press ○ to save the new value.

After the calibration due date is set, the audible alarm beeps four times and the detector returns to normal operation.

Note
If you do not press any pushbuttons within 10 seconds of entering this setting, the detector automatically retains the existing value.

Verification

After calibration has been completed and the detector is in normal operating mode, test the detector using a gas cylinder other then the one used in the calibration. The gas concentration should not exceed the sensor's detection range. Confirm that the LCD displays the expected concentration.

The catalytic LEL sensor must be checked if a fitted H_2S sensor gives an alarm (potential poison gas).

Pump Calibration

The pump needs recalibration if the pump alarm continues for more than 5 seconds and the LCD displays that the inlet is blocked.
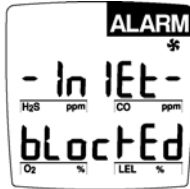
Note

The pump can only be calibrated if the above screen is shown.

1. Press and hold ◯ for 3 seconds until the audible alarm beeps.

2. Wait for the auto zero function to complete. The LCD displays **PumP rEcAl**.

3. Then the audible alarm beeps twice, ✻ remains lit, Auto Span flashes, and the LCD displays the following:
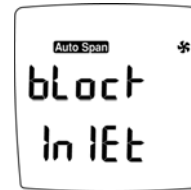
4. To complete the calibration, block the pump inlet (within 8 seconds).

Pump Calibration Pass

If the pump calibration/pump test passes, the audible alarm beeps three times, the LCD displays **rECAL SuccESS**, and the detector returns to normal operation.

Pump Calibration Fail

If the pump calibration/pump test fails, the audible alarm beeps six times and the LCD displays **PumP FAiLurE**.

If the pump calibration fails, try to calibrate it again. If the calibration continues to fail, replace the pump. Refer to Replacing a Sensor, Pump, or Pump Filter.

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Sampling Hose

The sampling hose can be used to draw a gas sample from a remote area. For instructions on how to connect the sampling hose, refer to Figure 1.

For the sample to reach the detector, allow approximately 3 seconds per 1 ft./0.3 m of hose.

Datalog

The GasAlertMax datalogger version allows the detector to record various information so a report can be compiled. Datalog information is recorded onto the MMC (refer to the MultiMediaCard (MMC) section) at the standard sampling rate of 5 seconds. The following information is recorded in a datalog:

- The date and time;

- The current gas readings;

- TWA readings for H_2S and CO;

- The unit status; and

- The serial number.

MultiMediaCard (MMC)

A standard 32 MB MMC flash memory card is supplied with the GasAlertMax datalogger. When purchasing additional MultiMediaCards, BW Technologies recommends Sandisk® MMC flash memory cards that contain between 8 MB and 64 MB storage capacity.

MultiMediaCard(s) compatible with the MMC specification will always have the exact word "MultiMediaCard" or "MMC" written on the disk. Cards that do not contain these exact words are not MultiMediaCards.

The MMC is **not** the same as the following:

- MultiMedia card;

- Multi media card;

- SmartMedia.

Hitachi and Infineon manufacture compatible MMCs. MMCs are available through retailers in North America and Europe. They are also available through mail order and Internet vendors.

Installing the MMC Card Reader

To retrieve recorded data, an MMC reader has to be configured and installed on your computer. The adapter provides the physical connection between the MMC and your computer. Follow the manufacturer's instructions.

Ensure your card reader is compatible with your computer. Several card readers that support Windows are available from BW Technologies.

Types of MultiMediaCard Readers

MMC readers are available in the following:

- Floppy disk adapter;
- Parallel port external drive adapter (USB);
- Universal serial bus (USB); or
- PCMCIA (PC card) adapter.

Installing a New MMC

The new MMC is automatically formatted when it is installed in the detector. When installing a new or blank MMC into the GasAlertMax, the LCD displays **CArd IS bLAnk** and then the datalogger proceeds to auto format the card.

Recovering Data Files

If the MMC is reformatted or erased accidentally by your computer application, the recorded data file can still be recovered.

First, ensure the card is installed properly in the card reader. If the recorded data file is not visible, ensure that:

1. The card reader is visible in the My Computer window.

2. If not, verify that the card reader is installed correctly and that the connections are secure.

3. In the Removable Disk drive window, ensure **All Files** is selected in the file types field.

Place the MMC back into the GasAlertMax. The detector will reformat part of the card and the file should now be available.

If the data file (LOGFILE0.CSV), is still not visible, try formatting the MMC in Windows and then follow the procedure below.

1. Remove the MMC from the card reader.

2. Insert the MMC back into the GasAlertMax and allow the datalogger to reformat part of the MMC.

3. Remove the MMC from the datalogger and insert it back into the card reader.

4. Double-click on the **My Computer** icon.

5. Select the drive letter that corresponds to the card reader.

6. The recorded data file (LOGFILE0.CSV) should now be visible.

Importing the Data File

The data is stored in a file called LOGFILE0.CSV. There are two ways to display and organize this MMC data file:

1. By importing the file using the Excel Datalog Manager (E.D.M.) plug-in. Refer to the *E.D.M. Help manual* once E.D.M. is loaded onto the computer;

2. By importing the data file into a compatible desktop application.

Direct Import to a Compatible Program

Note
Information in this section only applies to users who are not using the E.D.M. plug-in.

To view the data, insert the MMC into a card reader and open the LOGFILE0.CSV file with a spreadsheet, database, word processor, or text editor application. Some examples of these applications are as follows:

• Microsoft® Excel;

• Quattro Pro;

• Lotus 1-2-3;

• Microsoft® Access; and

• Microsoft® Word.

Note
Word processor and text editor performance may be poor since the datalogger file is at least 32 MB in size.

The data for user-accessible models is in comma-separated-value (CSV) format. The data is shown in the following order:

• Date, day, time;

• H_2S, CO, LEL, O_2;

• H_2S TWA, CO TWA;

• Status codes, serial number.

The recorded data includes an eight single-character unit status codes. The eight characters represent codes for the H_2S, CO, LEL, and O_2 sensors, sample pump, datalogger, unit battery status, and unit alarm status. A summary of most of the available codes can be seen in Table 11.

Determining Application Compatibility

To determine if the application selected is compatible:

1. Insert the MMC into the card reader.

2. Open the desired application.

3. Use the application's **File>Open** menu option to locate and open the data file.

If the recorded data file is compatible with the application, it will open. If not, the application will report an error in opening the file.

Note

Some applications have an internal file size limit and may not load the entire file. Check the application's specifications prior to use.

Table 11. Datalogger Status Codes

Codes	Explanation
General Codes	
—	Normal operation
G	Backlight is on
Sensor Codes	
L	Low alarm
H	High alarm
T	TWA alarm
s	STEL alarm
U	Dual alarm (Low and TWA alarms)
V	Dual alarm (High and TWA alarms)
u	Dual alarm (Low and STEL alarms)
v	Dual alarm (High and STEL alarms)
w	Dual alarm (TWA and STEL alarms)
O	Sensor is over-ranged
C	Calibrating
F	Sensor failure
1	Alarm setpoint 1 (Low alarm)
2	Alarm setpoint 2 (High alarm)
3	Alarm setpoint 3 (TWA alarm)
4	Alarm setpoint 4 (STEL alarm)

Codes	Explanation
D	Calibration due date (in days)
E	Last calibration (in days)
Z	Auto-zeroing
Pump Codes	
P	Pump alarm
F	Pump failure
Battery Status Codes	
—	Battery OK
B	Low battery alarm
K	Confidence beep is active
Alarm Status Codes	
L	Low alarm
H	High alarm
T	TWA alarm
M	Multi-gas alarm
C	Calibration
Q	Manual shutdown
P	Pump alarm
S	Automatic shutdown
F	Self-test fail
R	Real-time clock failure

Example of a CSV File

When datalogger information is imported into most spreadsheet software, it will appear similar to the example below (line numbers are included here for clarity).

Table 12. CSV File Example

Line	Date (dd-mm-yy)	Day (Mon=1)	Time (hh:mm:ss)	H2S (ppm)	CO (ppm)	LEL (%LEL)	O2 (%)	H2S TWA (ppm)	CO TWA (ppm)	Unit status	Serial number
1	3/5/04	#1	19:17:14	10	35	--	--	--	--	33------	0521871
2	3/5/04	#1	19:17:19	15	50	--	--	--	--	44------	0521871
3	3/5/04	#1	19:17:36	10	35	10	19.5	--	--	1111----	0521871
4	3/5/04	#1	19:17:53	15	200	20	23.5	--	--	2222----	0521871
5	3/5/04	#1	19:17:58	--	172	--	8	--	--	-D-E---D	0521871
6	3/5/04	#1	19:18:03	0	0	0	20.9	0	0	--------	0521871
7	3/5/04	#1	19:18:09	0	0	5	20.9	0	0	--------	0521871
8	3/5/04	#1	19:18:13	12	21	7	20.9	0	0	L------L	0521871
9	3/5/04	#1	19:18:19	16	30	9	20.9	0	0	H------H	0521871
10	3/5/04	#1	19:18:23	20	37	10	20.9	0	0	HLL----M	0521871
11	3/5/04	#1	19:18:28	--	---	--	--.-	-	-	----P--P	0521871
12	3/5/04	#1	19:18:33	0	0	0	20.9	0	0	------B-	0521871
13	3/5/04	#1	19:18:38	0	0	0	20.9	0	0	------BS	0521871

Description of Line Examples

This example shows the following information:

Line 1: TWA alarm setpoints (code 3) for H_2S and CO.

Line 2 :STEL alarm setpoints (code 4) for H_2S and CO.

Line 3: Low alarm setpoints (code 1) for all the sensors.

Line 4: High alarm setpoints (code 2) for all the sensors. Alarm points are only recorded when the unit is turned on, indicating the unit has just been activated.

Line 5: Number of days remaining before calibration is due and the days since the last calibration.

Lines 6 and 7: Normal operation – no gas readings or alarms.

Line 8: H_2S is in low alarm. CO and LEL gases are also present but below alarm levels. The unit is in low alarm.

Line 9: The H_2S sensor is in high alarm. The unit is in high alarm.

Line 10: The H_2S sensor is in high alarm and the CO and LEL sensor in low alarm. The unit is in multi-gas alarm.

Line 11: The unit is in pump alarm. The sampling pump has been blocked and gas readings are not available.

Line 12: The unit is emitting a low battery alarm. There are no gas alarms.

Line 13: The unit is automatically shutting down because of a low battery. The battery is low and the unit is sounding an automatic shutdown alarm.

Maintenance

To keep the detector in good operating condition, perform the following basic maintenance as required:

- Calibrate, bump check, and inspect the detector at regular intervals.

- Keep an operations log of all maintenance, calibrations, bump checks, and alarm events.

- Clean the exterior with a soft damp cloth. Do not use solvents, soaps, or polishes.

- Do not immerse the detector in liquids.

Replacing the Battery

⚠ **Warning**

To avoid personal injury:

- **Replace the battery as soon as the detector emits a low battery alarm.**

- **Use only a Black & Decker VersaPak™ battery, properly installed in the detector case.**

- **To properly remove the battery from the detector, use the release button.**

- **Only charge batteries using a VersaPak™ charger (such as the D4-VP130 or V-CHRG1). Do not use any other charger. Failure to observe this precaution could lead to fire or explosion.**

- **Do not change or charge batteries in a hazardous location. Doing so will impair the intrinsic safety of the unit and may lead to fire or explosion.**

- **Before you use the detector for the first time, fully charge the battery by following the instructions provided with the charger.**

The following table and figure illustrate how to replace the battery. If the detector is activated, deactivate the detector before replacing the battery. Push the release button; the battery pulls out and snaps back in.

Table 13. Replacing the Battery

Item	Description
1	Detector front
2	Release button
3	Battery

Note
To preserve the battery life, deactivate the detector when you are not using it.
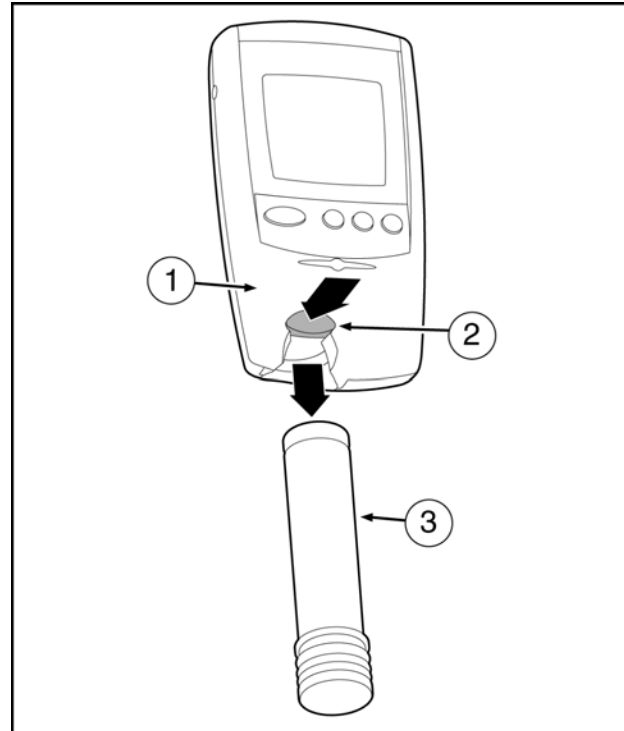
Figure 4. Replacing the Battery

Replacing a Sensor, Pump, or Pump Filter

⚠**Warning**

To avoid personal injury, use only sensors specifically designed for the detector. See the section, [Replacement Parts and Accessories](#).

Each sensor has a high degree of resistance to common vapors and gases. A sensor will most likely clear itself if you remove the detector to a clean environment and wait 10 to 30 minutes. Do not expose a sensor to the vapors of inorganic solvents (e.g., paint fumes) or organic solvents. The [Troubleshooting](#) section describes problems caused by a sensor in need of calibration or replacement.

The internal pump draws air over the sensors. If the pump stops working or the pump filter becomes clogged, the detector activates the pump alarm. Turn off the detector immediately.

Pump Filter

Check if the pump filter is clogged by viewing the pump filter through the window on the back of the detector. Clean the filter using a soft, clean brush and clean, warm water. Let the filter dry before replacing it.

If the pump alarm activates a second time, insert a new pump filter. If the alarm activates with the new filter in place, contact [BW Technologies](#).

Replacing/Adding a Sensor

A GAMAX3-2 (2-gas: O_2, LEL) or GAMAX3-3H (3-gas O_2, LEL, H_2S) detector can be upgraded in the field to a 3 or 4-gas unit. Install the desired H_2S or Twintox (CO/H_2S) sensor (this must be done outside the potentially explosive atmosphere). Refer to the [Sensor Enable/Disable Option](#) section.

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The following table and figure illustrate how to replace a sensor, pump, or pump filter. If the detector is activated, deactivate the detector. Use a Phillips head screwdriver to loosen and tighten any screws.

Do not use excessive force when removing or inserting the sensor, or the sensor can be damaged. Gently rocking the sensor back and forth can help free a tightly held sensor. Insert the new sensor in the corresponding labeled compartment.

Table 14. Replacing a Sensor, Pump, or Pump Filter

Item	Description
1	Detector back screws
2	Sensor and pump cover
3	Pump filter window
4	Pump filter and o-ring
5	Pump
6	Sensors
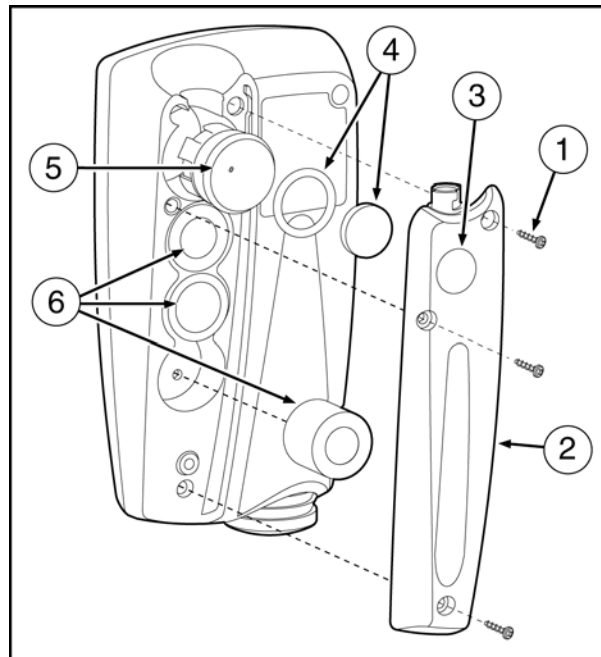
Figure 5. Replacing a Sensor, Pump, or Pump Filter

Troubleshooting

The detector's electronics are protected from variations in humidity and corrosive atmospheres. If you encounter a problem, try the solutions listed in the following table.

If you still are unable to correct the problem, contact BW Technologies.

Table 15. Troubleshooting Tips

Problem	Possible Cause	Solution
The detector does not activate.	→ No battery → Depleted battery → Damaged or defective detector	→ Install battery → Replace battery → Contact BW Technologies
The detector enters alarm immediately when it is activated.	→ Sensor needs to stabilize → Low battery alarm → Sensor alarm → Pump alarm	→ Used sensor: wait 60 seconds New sensor: wait 5 minutes → Replace battery → Replace sensor → If the sampling hose is attached, determine if it is obstructed. If it is not, clean or replace the pump filter. If this does not work, see the Pump Alarm section or contact BW Technologies

Table 15. Troubleshooting Tips

Problem	Possible Cause	Solution
The activation self-test fails during one of the checks.	→ General fault	→ Contact BW Technologies
The detector does not display normal ambient gas reading after the activation self-test.	→ Sensor not stabilized → Detector requires calibration → Target gas is present	→ Used sensor: wait 60 seconds New sensor: wait 5 minutes → Calibrate detector → Detector is operating properly. Use caution in suspect areas.
The detector does not respond to the pushbuttons.	→ Battery is depleted → Detector is performing operations that do not require user input	→ Replace battery → Pushbutton operation restored automatically when the operation ends
The detector does not accurately measure gas.	→ Detector requires calibration → Detector is colder/hotter than ambient gas → Sensor screen is blocked	→ Calibrate detector → Allow detector to acquire ambient temperature before use → Clean sensor screen

Table 15. Troubleshooting Tips

Problem	Possible Cause	Solution
The detector does not enter alarm.	→ Alarm setpoint(s) are set incorrectly	→ Reset alarm setpoints
	→ Alarm setpoint(s) set to zero	→ Reset alarm setpoints
	→ Detector is in calibration mode	→ Complete the calibration procedure
The detector intermittently enters alarm without apparent reason.	→ Ambient gas levels are near alarm setpoint or the sensor is exposed to a puff of the target gas	→ Detector is operating normally. Use caution in suspect areas. Check maximum gas exposure reading.
	→ Alarms set incorrectly	→ Reset alarm setpoints
	→ Missing or faulty sensor	→ Replace sensor
The detector automatically deactivates.	→ Automatic shutdown feature activated due to weak battery	→ Replace battery
Unit will not auto zero or calibrate. O_2 sensor reading is erratic.	→ O_2 sensor replacement may not be compatible	→ Change O_2 sensor

Replacement Parts and Accessories

⚠ **Warning**

To avoid personal injury or damage to the detector, use only the specified replacement parts.

To order parts or accessories, contact BW Technologies.

Table 16. Replacement Parts and Accessories

Model No.	Description	Qty
D4-VP130* V-CHRG1 VP-160-EU VP-160-UK	110 VAC battery charger 12 volt vehicle charger 4-port VersaPak 230 Vac charger Europe 4-port VersaPak 230 Vac charger U.K.	1
GA-VP110	VersaPak™ battery, Rechargeable: NiMH	1
D4-VP100	VersaPak™ battery, Rechargeable: NiCd	1

* Add suffix (-UK) for United Kingdom 230 Vac battery charger, (-EU) for European 230 Vac Battery charger, (-AU) for Australian 230 Vac battery charger.

Model No.	Description	Qty
GA-HMAX	Holster	1
GA-WS-2	Wrist strap, nylon for concussion-proof boot	1
GA-PFMAX	Pump filter	5
M2325	Pump gasket	1
GA-RPMAX	Replacement pump	1
MMC32	32 MB MultiMediaCard (MMC) (>4 months of data)	1
MMC64	64 MB MultiMediaCard (MMC) (>8 months of data)	1
DOOR1-K10	GAMAX3-DL2 single use card lock doors	10
D4-RHM04	Replacement H_2S/CO (Twintox) sensor	1
SR-X10	Replacement O_2 (2 year) sensor	1
SR-W04	Replacement LEL sensor	1
PS-RH04S	Replacement H_2S sensor	1
D4-HSP-10	Sampling hose (10 ft./3 m)	1

Model No.	Description	Qty
M1806	Replacement tube for sampling hose	/ft.
M0931K	Quick connector spares for sampling hose	2
GA-CPROB1	Collapsible sample probe with handle	1
GA-TPROB6	Telescopic sample probe (6.5 ft./2 m)	1
GAMAX-CK	Confined space kit without detector	1
D4-PROB# (# = 1, 3, 6)	Search probe with handle and quick connect	/ft. /0.3 m
CR-MMC-USB1	MMC USB reader with software	1
CG-Q34-4	Quad gas cylinder (34 l)	1
CK-Q34-4	Quad calibration kit (34 l)	1
CG-Q58-4	Quad gas cylinder (58 l)	1
CK-Q58-4	Quad calibration kit (58 l)	1
CG-BUMP1	Bump alarm test gas aerosol	1
REG-0.5	Regulator (0.5 l/min.)	1

Specifications

Instrument dimensions: 40 x 75 x 150 mm
(1.6 x 3.0 x 5.9 in.)

Weight: 396 g (15.4 oz)

Operating temperature: -20°C to +50°C (-4°F to +122°F)

Storage temperature: -25°C to +55°C (-13°F to +131°F)

Operating humidity: 5% to 95% relative humidity
(non-condensing)

Operating pressure:
95 to 110 kPa (LEL)
80 to 120 kPa (O_2)
90 to 110 kPa (CO, H_2S)

Alarm setpoints: May vary by region and are user-settable

Detection range:
CO: 0 - 500 ppm (1 ppm increments)
H_2S: 0 - 100 ppm (1 ppm increments)
O_2: 0 - 30% (0.1% increments)
LEL: 0 - 100% LEL (1% LEL increments)

Sensor type:
H_2S/CO: Twin plug-in electrochemical cell
O_2: Plug-in electrochemical cell
LEL: Plug-in catalytic bead

O$_2$ measuring principle: Capillary controlled concentration sensor

Pump flow rate: 250 ml/min. (minimum)

Detection techniques:
H$_2$S and CO: TWA, STEL, low, and high alarms
O$_2$ and LEL: Low and high alarms

Alarm conditions: TWA alarm, STEL alarm, low alarm, high alarm, multi-gas alarm, sensor alarm, pump alarm, low battery alarm, confidence beep, automatic shutdown alarm.

Audible alarm: 95 dB at 1 ft (0.3 m) variable pulsed beeper

Visual alarm: Red light-emitting diode (LED)

Display: Alphanumeric liquid crystal display (LCD)

Backlight: Automatically activates whenever there is insufficient light to view the LCD and during alarm conditions.

Self-test: Initiated at activation

Calibration:
Automatic zero and automatic span
Oxygen sensor: on activation (if enabled in the user options menu)

User enable/disable options:
Confidence beep, latching alarm, pass code protect, automatic O$_2$ calibration at startup, automatic pump test at startup (supplied by manufacturer with these options disabled); set calibration due date; set STEL calculation period, set span concentration values, adjust clock calendar, language selection, and sensor disable.

Approved batteries:
Black & Decker VersaPak™ NiCd (VP-100) rechargeable battery
Black & Decker VersaPak™ NiMH (VP-110) rechargeable battery

Area	NiCd (VP-100)	NiMH (VP-110)
North America	T4 (131.6°C)	T4 (134.6°C)
Europe	T4	T3 (184°C)

Battery charger: Black & Decker VersaPak™ VP130 charger

Battery operating time:
NiCd: 8 hours
NiMH: 10 hours

First-time charge:
NiCd: 6 hours for two batteries
NiMH: 12 hours for two batteries

Normal charge:
NiCd: 3-4 hours for two batteries
NiMH: 12 hours for two batteries

Approvals:
Approved by CSA to both U.S. and Canadian Standards

Approved: Class I, Division 1, Group A, B, C, and D;
Class I, Zone 0, Group IIC

ATEX:
CE 0539 ⟨Ex⟩ II 2G
LCIE 02 ATEX 6103 X
EEx ia d IIC 184°C
BAM 03 ATEX 0002 X

BAM: Verification of measuring function according to EN 61779-1, EN 61779-4 and EN 50271 for methane. Verification of measuring function to EN 50104 for oxygen. The software version label must correspond with the certificate.

* It is recommended that BAM certified detectors be calibrated once every 90 days.

Performance data according to EN 45544 Part 1 and 2:

Target Gas	CO	H$_2$S
Time of response	<30 s	<30 s
Time of recovery	<30 s	<30 s
Alarm response time	<10 s	<10 s
Zero variation	8 ppm (v/v)	1 ppm (v/v)
Overall uncertainty	7%	10%
Lower limit of the measuring range	4 ppm (v/v)	1 ppm (v/v)
Drift under zero gas (3 month)	0 ppm (v/v)	0 ppm (v/v)
Drift under standard test (3 month)	4 ppm (v/v)	2 ppm (v/v)
Maximum calibration period	3 month	3 month

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules and ICES-003 Canadian EMI requirements. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.

- Increase the separation between the equipment and receiver.

- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

Consult the dealer or an experienced radio/TV technician for help.

General Specifications for Datalogger Units

Media type: MMC (MultiMediaCard)

Size: 32 MB (standard); 32 and 64 MB cards available

Storage:
500,000 lines of data (32 MB)
4.5 months (based on a normal work week)

Memory type: Wrap-around memory ensures most recent data is always saved

Sample rate: One reading every 5 seconds (standard)

Data recorded: All sensor readings, all alarm conditions, calibrations, event flags, battery status, sensor status, confidence activation, sampling pump status, and product status along with the time and date for each reading and unit serial number.

MMC card test: Automatically on activation

MMC not part of BAM certification

GasAlertMax with Black Box Datalogger

Operation: Requires no user intervention

Continuous: Full-time continuous datalogging while the detector is operating

Access: Data cannot be accessed or manipulated by the user

Data retrieval: Authorized factory representative if required

Advise indicators: Icon advises datalogger operating status

Card alarm: MMC failed or missing

GasAlertMax with User Downloadable Datalogger

Operation: Requires no user intervention (automatic)

Indicators: Icon advises datalogger is operating normally, MMC missing/malfunction advise and card in/out advise.

Compatible with: Desktop PC computer or laptop

Operating system: Windows 95 or higher

Download via: USB, parallel port, floppy disk, or PC card adapter.

Software required: Spreadsheet or database compatible with comma-separated-value (CSV) text files (e.g., Excel, Access, Quattro, etc.)

Card alarm: MMC fail or missing

Support
BW E.D.M. (Excel Datalog Manager): E.D.M. is an Excel software add-in that enhances the abilities of Microsoft Excel when handling GasAlertMax User Downloadable Datalogger data files. Refer to the EDM help file for more information.

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