GasAlertMicro 5

O_2, CO, H_2S, PH_3, SO_2, Cl_2, NH_3, NO_2, HCN, ClO_2, O_3, VOC, and Combustibles

1, 2, 3, 4, and 5 Gas Detectors

User Manual

"INNOVATORS IN GAS DETECTION"

BW Technologies

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.

GasAlertMicro 5 Multi-Gas Detector

Standard instrument is equipped with integral concussion-proof boot and internal vibrator alarm.

GasAlertMicro 5 with User Downloadable Datalogger

Provides full-time continuous datalogging while the instrument is operating. Data is saved on a convenient MultiMediaCard (MMC) and can be removed and downloaded by the user. Data is imported into standard office software (Microsoft® Excel, Access etc.). Wraparound memory ensures the most recent data is always saved. Datalogging units include the Fleet Manager software.

Introduction

⚠ Warning

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

The GasAlertMicro 5 gas detector ("the detector") warns of hazardous gas at levels above user-selectable alarm setpoints. This product is a gas detector, not a measurement device.

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 Monitored

Gas Detected	Unit of Measure
Oxygen (O_2)	percent by volume (%)
Combustible gases Field selectable for:	a) percent of lower explosive limit (% LEL) b) percent by volume methane 0-5.0% v/v
Carbon monoxide (CO)	parts per million (ppm)
Hydrogen sulfide (H_2S)	parts per million (ppm)
Phosphine (PH_3)	parts per million (ppm)
Sulfur dioxide (SO_2)	parts per million (ppm)
Chlorine (Cl_2)	parts per million (ppm)
Ammonia (NH_3)	parts per million (ppm)
Nitrogen dioxide (NO_2)	parts per million (ppm)
Hydrogen cyanide (HCN)	parts per million (ppm)
Chlorine dioxide (ClO_2)	parts per million (ppm)
Ozone (O_3)	parts per million (ppm)
Volatile organic compounds (VOC)	parts per million (ppm)

Contacting BW Technologies

To contact BW Technologies, call:

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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 **Warnings** and **Cautions** on the following pages before using the detector.

Note

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

⚠ Caution

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

⇒ ***Caution:*** **For safety reasons, this equipment must be operated and serviced by qualified personnel only. Read and understand the user manual completely before operating or servicing.**

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

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

⇒ **Use only a sensor specifically designed for your GasAlertMicro 5 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).**

⇒ **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 high alarm setpoints. Manually verify that the audible and visual alarms are activated. Calibrate if the readings are not within the specified limits.**

⇒ **It is recommended that the combustible sensor be checked with a known concentration of calibration gas after any known exposure to catalyst contaminants/poisons (sulfur compounds, silicon vapors, halogenated compounds, etc.).**

⇒ **The combustible sensor is factory calibrated to 50% LEL methane. If monitoring a different combustible gas in the % LEL range, calibrate the sensor using the appropriate gas. High off-scale % LEL or % v/v methane readings may indicate an explosive concentration.**

⇒ **Only the combustible gas detection portion of this instrument has been assessed for performance by CSA International.**

- ⇒ **Protect the combustible 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 recommended AA alkaline or NiMH batteries properly charged and installed in the detector case. (See the section, Replacement Parts and Accessories.)**
- ⇒ **Charge NiMH batteries using recommended charger only. Do not use any other charger. Failure to observe this precaution could lead to fire or explosion.**
- ⇒ **Protect the PID sensor from exposure to silicone vapors.**
- ⇒ **The optional BW pump module (M5-PUMP) is certified for use with the GasAlertMicro 5 only.**
- ⇒ **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.**
- ⇒ **Extended exposure of the GasAlertMicro 5 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.**
- ⇒ **Do not test the combustible sensor's response with a butane cigarette lighter; doing so will damage the sensor.**
- ⇒ **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.**

⇒ **Electromagnetic interference (EMI) may cause incorrect operation under certain circumstances.**

⇒ **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
	Approved to both U.S. and Canadian Standards by the Canadian Standards Association
	European Explosives Protection
CE	Conforms to European Union Directives
BAM	BAM performance verification to European Performance Standards
ATEX	Conforms to European ATEX Directives
IECEx	International Electrotechnical Commission Scheme for Certification to Standards for Electrical Equipment for Explosive Atmospheres
	Type approved by ABS America for use aboard cargo vessels

Getting Started

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

- Batteries (three replaceable alkaline cells or one rechargeable battery pack and the GasAlertMicro 5 Battery Charger);
- Sensors (O_2, combustible (LEL), toxic, and H_2S/CO (dual sensor)/PID);
- Calibration hose and cap;
- Screwdriver;
- Quick reference guide; and
- CD.

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

The detector comes with sensors and alkaline batteries installed. The Maintenance section describes how to replace the batteries.

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

- Figure 1 and Table 3 describes the detector's components.
- Figure 2 and Table 4 describes the detector's display elements.
- Table 5 describes the detector's pushbuttons.

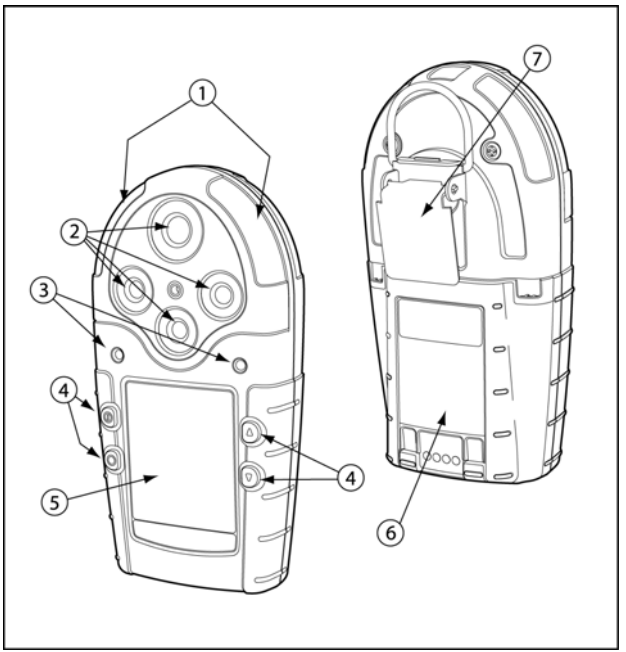


Figure 1. GasAlertMicro 5 Detector

Table 3. GasAlertMicro 5 Detector

Item	Description
1	Visual alarm bars
2	Sensors
3	Audible alarm
4	Pushbuttons
5	Display
6	Battery pack
7	Alligator clip

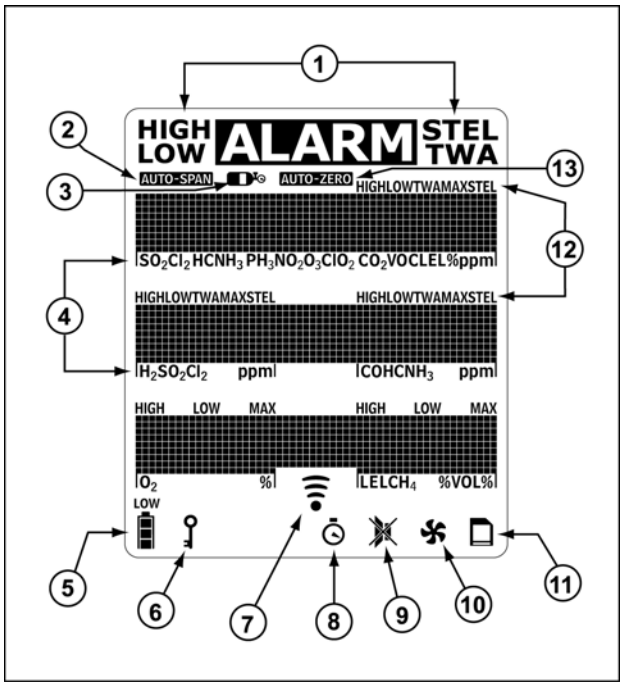


Figure 2. Display Elements

Table 4. Display Elements

Item	Description
1	Alarm condition
2	Automatically span sensor
3	Gas cylinder
4	Gas identifier bars
5	Battery life indicator
6	Pass code lock
7	Data transmission (future use)
8	Clock
9	Stealth mode
10	Optional pump indicator
11	Optional datalogger card indicator
12	Alarm condition (low, high, TWA, STEL, or multi-gas) or view TWA, STEL, and maximum (MAX) gas exposures
13	Automatically zero sensor

Note

The display backlight automatically activates for 8 seconds when there is an alarm condition and (if enabled) whenever there is insufficient light to view the display. Any pushbutton reactivates the backlight in low-light conditions.

Table 5. Pushbuttons

Pushbutton	Description
ⓘ	• To turn on the detector press ⓘ. • To turn off the detector, press and hold ⓘ until countdown is complete.
▲	• To increment the displayed value or scroll up, press ▲. • To enter the user options menu, press ▲ and ▼ simultaneously and hold until the countdown is complete. • To clear the TWA, STEL, and maximum gas exposure readings, press ◯ and ▲ simultaneously and hold until countdown is complete. • To view the TWA, STEL, low, and high alarm setpoints of all the sensors and the correction factor (if applicable), press ▲.
▼	• To decrement the displayed value or scroll down, press ▼. • To initiate calibration and setting alarm setpoints, press ◯ and ▼ simultaneously and hold until countdown is complete.
◯	• To view the TWA, STEL, and maximum (MAX) hold readings, press ◯. • To acknowledge latched alarms press ◯.

Activating the Detector

Attach all the accessories before activating the detector (e.g., pump module, sampling probe, hose, etc.).

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

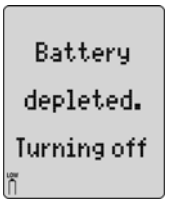
Self-Test

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

Note

If any error message appears during the self-test, refer to the Troubleshooting section of the manual.

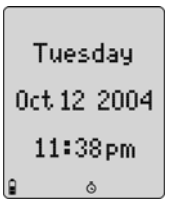
The detector administers a battery test during start-up. If the battery has insufficient power to operate (at any time during the start-up), the LCD displays the following screen before turning off.



Replace the batteries and restart the detector.

1. The display shows all the display elements as it beeps, flashes, and briefly turns on the backlight.
2. The version and serial number of the detector is then shown on the LCD.

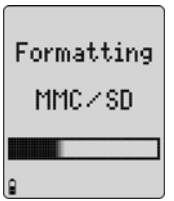
3. Next, the date and time are displayed.



Datalogging Unit (Optional)

4. If this is a datalogging unit, the detector will perform the following checks:
   - whether a MultiMediaCard (MMC) or secure digital (SD) card is installed;
   - whether the detector can communicate with the card;
   - whether the detector supports the size of the card; and
   - whether the card needs formatting.

   If the card needs formatting, the following screen appears as the card is being formatted.



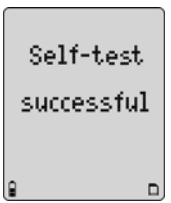
Note

Nothing appears on the display while the detector is running these checks.

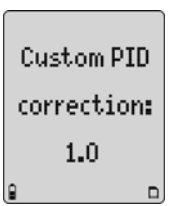
If any type of MMC/SD error message appears, the display shows ***Datalogger disabled*** *before continuing with the start-up sequence.*

5. The detector then runs a self-test to test the sensors and power.

A screen then appears confirming that the self-test was successful.



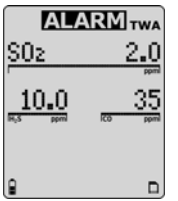
6. The LCD then displays the LEL and PID (custom) correction factor (if it is enabled in the user options menu).

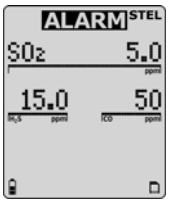


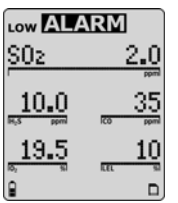
7. Next, the display shows the TWA, STEL, low, and high alarm setpoints.

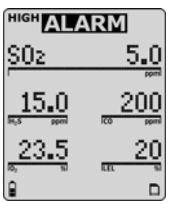
Note

The alarm setpoints on a shipped detector may vary by region. See Resetting Gas Alarm Setpoints.





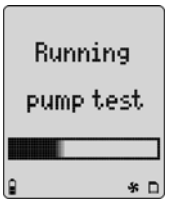




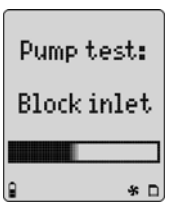
Pump Module (Optional)

8. If the optional pump module is attached to the detector, the display reads **Starting sampling pump** to begin the pump test.

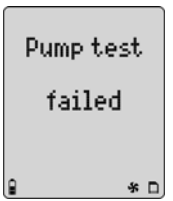
   During the pump test the pump is calibrated. The pump executes the auto zero function as the following screen appears:

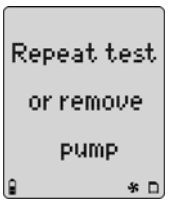


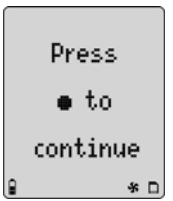
Then the detector begins spanning the pump as the display advises to block the pump inlet.



If the pump inlet is not blocked within 10 seconds or the pump test fails, the following screens will appear:



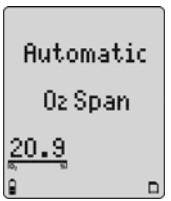




If ◯ is not pressed or the pump is not removed within 25 seconds, the detector will administer the pump test again.

If the pump test is successful, the LCD displays **Pump test successful** and then start-up sequence continues.

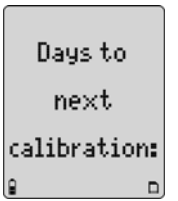
9. The oxygen sensor is calibrated automatically (unless it is disabled in the user options menu). The detector beeps twice to signal a successful span.

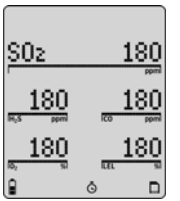


Note

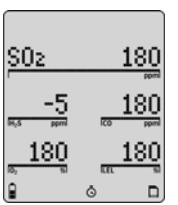
If the automatic oxygen calibration feature has been disabled the display will read **Automatic O_2 span disabled**.

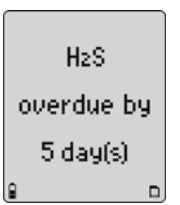
10. Lastly, the display shows the number of days remaining until the next calibration for all the sensors.





If any sensor is past its calibration due date, the detector displays which sensor is overdue and by how many days before entering normal operation.





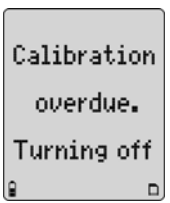
Note

If calibration is overdue for any sensor, ⏲ remains on the LCD until calibration is performed for that sensor.

Due-Lock Is Enabled

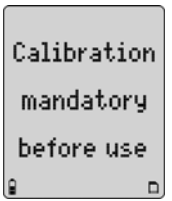
If **Due-lock** is enabled in the user options menu, the pass code needs to be entered before the detector enters normal operation (refer to the Pass Code Protect Option section).

If an incorrect pass code is entered, the following screen will appear before the detector turns off.

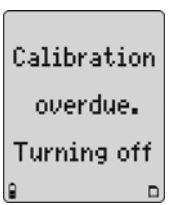


Force Calibration Is Enabled

If **Force cal** is enabled in the user options menu, a calibration is mandatory before the detector enters normal operation (refer to the Calibration and Setting Alarm Setpoints section).



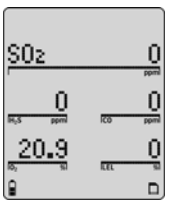
If ◯ is not pressed, the following screen appears before the detectors turns itself off.



11. Then the detector emits three quick beeps before entering normal operation.

Self-Test Pass

If the detector passes the self-test, the detector begins normal operation. The display shows the ambient gas readings:

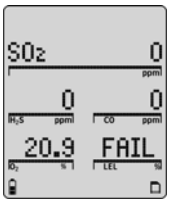


The detector starts recording the maximum gas exposure (MAX) and calculating the short-term exposure level (STEL) and time-weighted average (TWA) exposures.

Self-Test Fail

If a sensor fails the self-test, the display advises which sensor(s) has failed the test.

Once the detector enters normal operation, the LCD continues to advise which sensor has failed the self-test. (Refer to the Troubleshooting section.)



Battery Test

The batteries are tested on activation and continuously thereafter. Battery power is continually displayed during normal operation. If battery power is low, LOW flashes.

Note

If the confidence beep is on, the audible alarm beeps if the batteries have sufficient power and stops if the battery power is low. See the section, Confidence Beep.

Datalogger Operation

⚠ Caution

Do not remove the battery pack while the detector is turned on. Doing so will prevent the datalogger from logging properly.

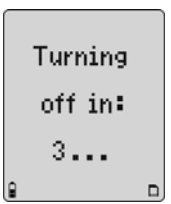
Datalogger operation is automatic and requires no settings. During normal operation the card is tested every 20 seconds.

Note

The MMC/SD icon (🗀) is displayed continuously in datalogger units when the card is inserted. The card is not required for operation of a datalogger unit.

Deactivating the Detector

To turn off the detector, press and hold ⓘ while it beeps and flashes to the corresponding countdown.



At the end of the countdown, the detector emits one long beep and flash, and the countdown displays **0** before completely turning off.

Note

If ⓘ is not held down for the complete countdown, the detector will not turn off.

User Options Menu

Note

If the detector is pass code protected, attempting to enter the user options menu causes the detector to prompt for the pass code before proceeding. See the section, Pass Code Protection.

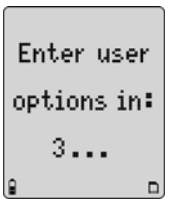
The following are the available user options:

1. Exit;
2. Options: backlight, confidence beep, force cal, due-lock, latch, pass code, safe, and fast pump;
3. Sensors: sensor on/off, span gas, STEL period, TWA method, resolution, % vol CH_4, correction, and auto-cal;
4. Logger;
5. Clock;
6. Language: English, French, German, Spanish, and Portuguese;
7. Tech mode: stealth, sensors, and initialize.

Note

Tech mode is not visible unless it is intentionally entered from within the user options menu. See the Tech Mode section.

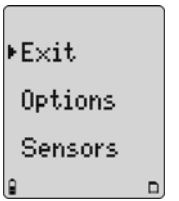
To enter the user options menu, press and hold ▲ and ▼ simultaneously as the detector beeps and flashes to the corresponding countdown.



Note

If ▲ and ▼ are not held down for the entire countdown, the detector will not enter the user options menu.

Once the countdown is complete, the revision/serial number screen displays before you see the following screen:



To scroll through the options, press ▼ or ▲. Press ◯ to select the option.

Note

If you do not press any pushbuttons within 20 seconds of entering the user options menu, the detector returns to normal operation.

*After selecting an option, press ◯ when the cursor is beside **Back** to return to the previous menu.*

Exit User Options Menu

To exit the user options menu and return to normal operation, press ◯ when the cursor is beside the **Exit** option. The display will advise that the detector is exiting the user options menu.

Note

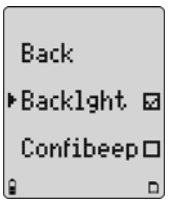
The user options menu can also be exited by pressing ⓘ until the detector returns to normal operation.

Options Menu

All of the choices within the **Options** menu are enabled or disabled by pressing ◯ to toggle the checkbox. If the box is checked, it means the option is enabled. If the box is unchecked, the option is disabled.

After you enter the **Options** menu, there are seven options for you to alter. To return to the main options menu, press ◯ when the cursor is beside **Back**.

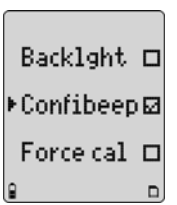
Backlight



The backlight (**Backlght)** option allows you to enable the LCD backlight when the detector is in low-light conditions. Press ◯ to toggle the option. The detector is shipped with this option enabled.

When disabled, the backlight is only activated when the detector is in alarm mode.

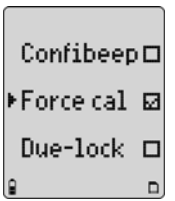
Confidence Beep



The confidence beep (**Confibeep**) notifies that the detector is on and the batteries have sufficient power to respond to a hazardous level of gas and emit an alarm. Instead of beeping when battery power is low, the audible alarm beeps (once every 10 seconds) to advise that the batteries have sufficient power. The confidence beep stops when the battery power is low. Press ◯ when the cursor is beside **Confibeep** to toggle the option. This option is disabled upon shipment.

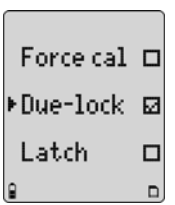
Force Calibration

Enabling the **Force cal** option forces the detector to enter calibration if a sensor is overdue upon start-up. If the detector is not calibrated instantly, the unit will shutdown. The detector is shipped with this option disabled. Pressing ◯ toggles this option.



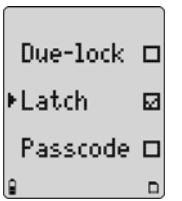
Due-Lock

If **Due-lock** is activated and a sensor is overdue for calibration upon startup, the detector forces you to enter the pass code before entering normal operation. If the correct pass code is not entered, the detector will shutdown. This option is disabled upon shipment.



Latched Alarms

The detector is shipped with the latching alarm function (**Latch**) disabled. If the low and high gas alarms are set to latch, the audible, visual, and vibrator alarms persist in the event of an alarm condition until the alarm is acknowledged by pressing ◯ and the alarm condition is no longer present.



Pass Code Protect

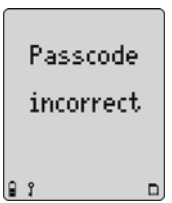
Note

Pass code is provided separately.

Enabling the pass code option prevents unauthorized personnel from having access to the user options menu, calibration function, and alarm setpoint adjust function. The detector is shipped with the pass code protect option disabled. Press ◯ when the cursor is beside **Passcode** to toggle the option.

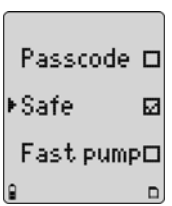
If pass code protect is enabled, press ▲ or ▼ to scroll to the correct pass code when the following display appears. Then press ◯ to select that code.

If the pass code is incorrect, the display reads **Passcode incorrect**, the audible alarm beeps three times, and the detector either resumes normal operation or automatically shuts down. If the pass code is correct, the detector proceeds to the next display.



Safe Display

When enabled, the safe display function advises that normal ambient conditions prevail and no gas hazard monitored exist. **Safe** is constantly displayed when all gas levels are normal or below the alarm setpoints.

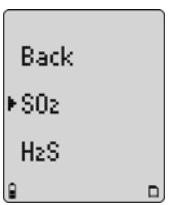


Fast Pump

This option is only applicable if the optional pump is attached to the detector. If the detector has a pump and the sampling hose is longer than 50 ft., the **Fast pump** option needs to be enabled.

Sensor Configuration

Press ◯ when the cursor is beside **Sensors** and you will see the following screen:



Note

The sensors that are shown on the display is dependent upon the type of sensors that come with the detector.

Press ▲ or ▼ to select a sensor and press ◯ to enter its menu. The following information is available for your configuration:

- Enabling/disabling a sensor;
- Setting the span gas value;
- Adjusting the STEL period (not applicable to LEL and O_2 sensors);
- Selecting the TWA method (not applicable to LEL and O_2 sensors);
- Resolution setting (not applicable to CO, LEL, and O_2 sensors);
- % vol CH_4 (LEL sensor only);
- Selecting the correction factor (LEL and PID sensors only); and
- Automatic calibration (O_2 sensor only).

Enable/Disable a Sensor

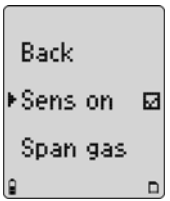
⚠ Warning

Disabling an installed sensor configures the detector to a 1, 2, 3, or 4-gas unit. No protection is now provided for the gas targeted by that sensor(s). Disabling a sensor should be performed with extreme caution.

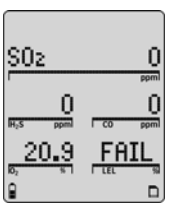
In the event a sensor fails, disabling the sensor turns off the sensor fail alarm. The sensor should be replaced and enabled as soon as possible.

The detector will function normally with the remaining enabled sensors. The sensor may be enabled again at any time.

Once a sensor's menu is entered, the first setting allows you to enable or disable the sensor. All sensors are enabled upon shipment (as shown by a check in the checkbox). Once the cursor is beside **Sens on**, press ◯ to toggle the option. If a sensor is disabled, it can no longer be viewed on the display during normal operation.



If a sensor is enabled and the sensor is not installed in the detector, the LCD will display the following screen once entering normal operation.



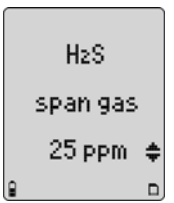
Note

If all the sensors are turned off, the display advises: ***Exit not allowed unless at least one sensor is enabled****.*

Span Gas Value

The **Span gas** option allows you to input a new calibration gas concentration for each sensor. Press ◯ when the cursor is beside **Span gas** to enter this option.

To change the calibration gas setting, press ▲ or ▼ until the display matches the concentration of the calibration gas. Then press ◯ to accept the value.



Note

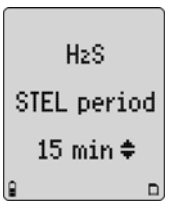
BW recommends that span concentration values be set between specific ranges. Refer to the Calibration and Setting Alarm Setpoints section.

If you change the calibration gas concentration but pause for 5 seconds before pressing ◯, the detector rejects the new value. The display shows ◯ ***was not pressed – resetting****, the audible alarm beeps twice, and the detector retains the original value.*

STEL Period

Each sensor has a user settable short-term exposure limit (STEL) period. To enter this option, press ◯ when the cursor is beside **STEL period**.

The detector is shipped with the STEL calculation period set to 15 minutes. This value can be adjusted between 5 and 15 minutes. Press ▲ or ▼ to change the existing STEL value and press ◯ to accept the new value.



Note

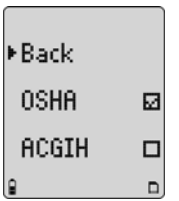
If you do not press any pushbuttons within 10 seconds of entering this option, the detector returns to the previous screen.

If you change the STEL period but pause for 5 seconds before pressing ◯, the detector rejects the new value. The display shows ◯ ***was not pressed – resetting****, the audible alarm beeps twice, and the detector retains the original value.*

TWA Method

This option allows the time-weighted average (TWA) to be calculated according to Occupational Safety and Health Administration (OSHA) or American Conference of Governmental Industrial Hygienists (ACGIH) methods. To enter this option, press ◯ when the cursor is beside **TWA method**.

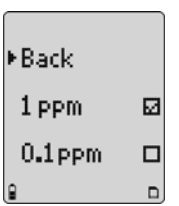
Currently, the **OSHA** checkbox is checked as it is the default TWA method upon shipment. To change this option, place the cursor beside **ACGIH** and press ◯ to confirm your selection.



Resolution

This option allows you to choose the resolution with which the gas measurement is displayed (either regular or extra resolution). You can enter this option by pressing ◯ when the cursor is beside **Resolution**.

The detector is shipped with **Regular** resolution (1 ppm) as its default (as indicated by a check in the corresponding checkbox). To change your setting, place the cursor beside **Extra** (0.1 ppm) and press ◯. A check will appear in the corresponding checkbox confirming your selection.

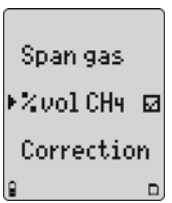


Note

Regular resolution for O_3 and ClO_2 sensors is 0.1 ppm, while extra resolution is 0.01 ppm.

CO, O_2, and LEL sensors do not have resolution settings.

% Vol CH_4

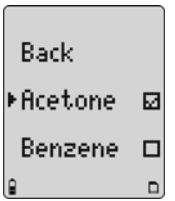


This option is only applicable to LEL sensors. If this option is enabled, it shows the LEL reading in % vol assuming a methane environment. To enable this option, press ◯ when the cursor is beside **% vol CH_4** and a check appears in the corresponding checkbox.

Correction Factor

LEL Sensor

Entering the correction factor option allows you to enter compensation factors for hydrocarbons other than methane. This simulates as if you calibrated to a non-methane hydrocarbon. To enter this option, press ◯ when the cursor is beside **Correction** within the LEL sensor menu.

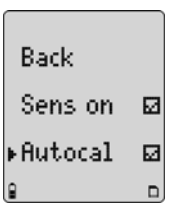


Once you are inside the correction factor library, make your selection and press ◯. A check will appear in the corresponding checkbox to indicate your selection.

PID Sensor

Please contact BW Technologies for more information.

Automatic Oxygen Calibration

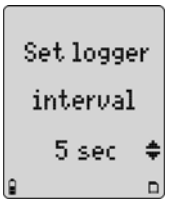


When the **Autocal** option is enabled, it forces the detector to automatically calibrate the oxygen sensor upon startup. When the cursor is beside the **Autocal** option, press ◯ to toggle its functionality. The automatic calibration option is enabled upon shipment.

Logger Option

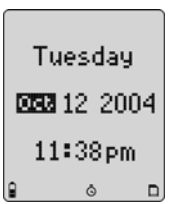
The detector is shipped with the datalogger set to record a sample every 5 seconds. The sample rate can be adjusted between 1 and 127 seconds. To enter this option, press ◯ when the cursor is beside **Logger**.

Once inside the option, press ▲ or ▼ to change the existing logger rate and press ◯ to accept the new rate.



Clock Option

To set or adjust your date and clock setting, press ◯ when the cursor is beside the **Clock** option. Once you have entered the clock option, you will see the following screen:



Currently, the month is highlighted indicating that it is the first setting to change.

The date and time are set in the following order:

Month;
Day;
Year;
Hour; and
Minutes.

Press ▲ and ▼ to scroll to the correct month and press ◯ to confirm your selection. Continue with this process until you have confirmed every setting for the date and time. Once you have finished setting the clock, the detector will beep twice before returning to the main user options menu.

Language Selection

The detector is shipped with English as the default displayed language. You can choose to view the display in these additional languages:

- French (**Français**);
- German (**Deutsch**);
- Spanish (**Español**); and
- Portuguese (**Prtuguês**).

Press ▼ or ▲ to scroll through the selections and press ◯ to select the new language. The checkbox appears beside the language of your choice.

Tech Mode

⚠ Warning

Tech mode should only be entered by trained personnel.

The following options are found in tech mode:

- Stealth mode;
- Sensors;
- Pump; and
- Initialize.

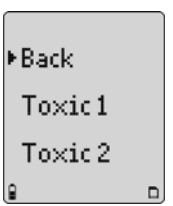
To enter tech mode you must ensure that the cursor is pointed to **Language** in the user options menu. Press and hold ▼, then ▲, and lastly ◯. Once ◯ is pressed, the detector emits two quick beeps and **Tech mode** appears below the **Language** option.

Stealth Mode

The detector is shipped with stealth mode disabled. When it is activated, stealth mode disables the beepers, backlight (even if the backlight option is enabled), and alarm LEDs. Press ◯ when the arrow is beside **Stealth** to enable this option.

Sensors

Press ◯ when the arrow is beside **Sensors** to enter this option. You will see the following screen:



To enter either option, press ◯ when the arrow is beside either **Toxic 1** or **Toxic 2**.

Once you have entered either option a list of available toxic sensors is shown. The active toxic sensor is indicated by a checkbox beside the gas measured. To change sensors, press ▼ or ▲ until the arrow is beside the sensor of your choice and press ◯ to accept this change.

Once you exit the user options menu, **Unit must restart to reconfigure** appears on the display and the detector runs a self-test to reconfigure itself to the new sensor.

Note

The Toxic 2 list includes the H_2S/CO COSH sensor.

Pump

If you have just attached the optional motorized pump to your detector, the flow rate needs to be set before the pump can be used.

Press ◯ when the cursor is beside **Pump** to enter this option. Press ▲ and ▼ to scroll to the factory calibrated number that BW provides and press ◯ to accept the chosen value.

Once the flow rate has been chosen, you must exit the user options menu. The detector automatically launches a pump test before returning to normal operating mode.

Initialize

This option allows you to set the detector back to its default factory settings. To enter this option, press ◯ when the cursor is beside **Initialize**.

Once you enter the option, you will see the following screen.

If you press ⓘ (**No**), the screen displays **Could not initialize** and the detector exits the option.

If you press ◯ (**Yes**), the screen displays **Initializing** as the bar fills to complete the function. Once initializing is complete, the unit exits the option.

Alarms

The following table describes the detector alarms and shows how the display looks for each alarm.

During an alarm condition, the detector activates the backlight and the display shows 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.

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

Table 6. Alarms

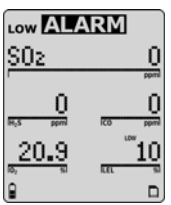
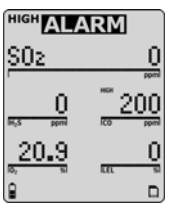
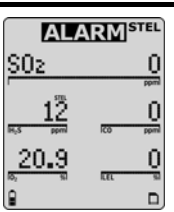
Alarms	Display`	Alarms	Display
Low Alarm: • Fast beep • Slow flash • ALARM and target gas bar flash • Vibrator alarm activates		**High Alarm:** • Constant beep • Fast flash • ALARM and target gas bar flash • Vibrator alarm activates	
STEL Alarm: • Constant beep • Fast flash • ALARM and target gas bar flash • Vibrator alarm activates		**TWA Alarm:** • Fast beep • Slow flash • ALARM and target gas bar flash • Vibrator alarm activates	

Table 6. Alarms (cont.)

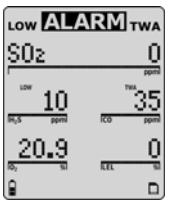
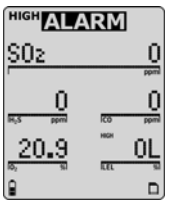
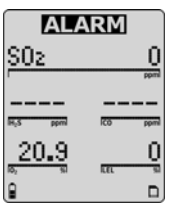
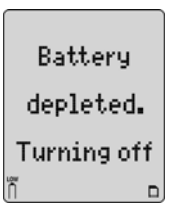
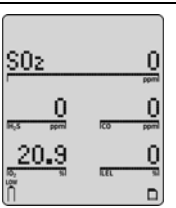
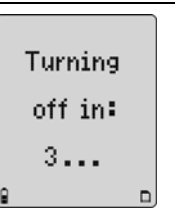
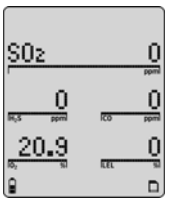
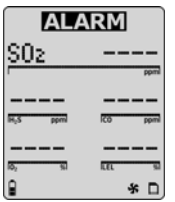
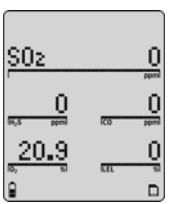
Alarms	Display	Alarms	Display
Multi-Gas Alarm: • Alternating low and high alarm beep and flash • ALARM and target gas bars flash • Vibrator alarm activates		**Over Range Alarm:** **(Over Level Exposure)** • Fast beep and flash • ALARM and target gas bar flash • Vibrator alarm activates	
Sensor Alarm: • One beep, one flash, and one vibrate every 10 seconds • **FAIL** flashes above the failed sensor		**Automatic Shutdown Alarm:** • Eight beeps and flashes • LOW displays • Vibrator alarm temporarily activates	
Low Battery Alarm: • One beep and one flash every 25 seconds • LOW flashes		**Normal Shutdown:** • Three beeps and flashes	

Table 6. Alarms (cont.)

Alarms	Display	Alarms	Display
Confidence Beep: • Two fast beeps every 10 seconds		**Pump Alarm:** • Slow beep and flash • ALARM and flash	
MMC Fail Alarm: • One beep every 5 seconds • 🗋 flashes			

Note

If the latched alarm function is activated, the audible and visual alarms continue to beep and flash until the alarm condition is acknowledged. To acknowledge a latched alarm, press ◯. The alarms cannot be deactivated if an alarm condition is still present.

If the detector is in stealth mode, it only vibrates in alarm mode (the audible and visual alarms are disabled).

Gas Exposures Computed

⚠ Warning

To avoid possible personal injury, do not turn off the detector during a work shift. TWA and STEL readings reset if the detector is deactivated for more than 5 minutes.

Table 7. Computed Gas Exposures

Gas Exposure	Description
TWA (toxic only)	Time-weighted average based on accumulated exposure to toxic gases averaged over a work day according to OSHA or ACGIH method.
STEL (toxic only)	Short-term exposure limit to gas based on a 5-15 minute user selectable period.
Maximum* (peak)	Maximum concentration encountered during work shift.

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

Viewing Gas Exposures

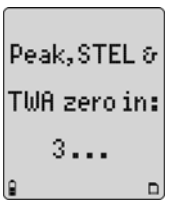
Press ◯ until the display shows the maximum gas exposures.

The display then shows the TWA gas exposures.

Then the STEL gas exposures.

Clearing Gas Exposures

To clear the maximum gas, TWA, and STEL exposure readings, press and hold ◯ and ▲ simultaneously and the detector displays the following and administers a countdown.



Note

If you do not hold ◯ and ▲ for the entire countdown, the maximum gas, TWA, and STEL exposure readings will not clear.

Gas Alarm Setpoints

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

Table 8. Gas Alarm Setpoints

Alarm	Condition
Low alarm	*Toxics and combustibles:* Ambient gas level above low alarm setpoint. *Oxygen:* Ambient gas level may be set to above or below 20.9%.
High alarm	*Toxics and combustibles:* Ambient gas level above high alarm setpoint. *Oxygen:* Ambient gas level may be set to above or below 20.9%.
TWA alarm	*Toxic only:* Accumulated value above the TWA alarm setpoint.
STEL alarm	*Toxic only:* Accumulated value above the STEL alarm setpoint.
Multi-gas alarm	Two or more gas alarm conditions.

Viewing the Alarm Setpoints

To view the current alarm setpoints of all of the sensors, press ▲ during normal operation.

Resetting Gas Alarm Setpoints

Note

Standard factory alarm setpoints will vary by region.

Occupational Safety and Health Association (OSHA) standard settings are used as an example.

The following table lists the factory alarm setpoints.

Table 9. Sample Factory Alarm Setpoints

Gas	TWA	STEL	Low	High
O_2	N/A	N/A	19.5% vol.	23.5% vol.
LEL	N/A	N/A	10 % LEL	20% LEL
CO	35 ppm	50 ppm	35 ppm	200 ppm
H_2S	10 ppm	15 ppm	10 ppm	15 ppm
PH_3	0.3 ppm	1.0 ppm	0.3 ppm	1.0 ppm
SO_2	2 ppm	5 ppm	2 ppm	5 ppm
Cl_2	0.5 ppm	1.0 ppm	0.5 ppm	1.0 ppm
NH_3	25 ppm	35 ppm	25 ppm	50 ppm
NO_2	2.0 ppm	5.0 ppm	2.0 ppm	5.0 ppm
HCN	4.7 ppm	10.0 ppm	4.7 ppm	10.0 ppm
ClO_2	0.1 ppm	0.3 ppm	0.1 ppm	0.3 ppm
O_3	0.1 ppm	0.1 ppm	0.1 ppm	0.1 ppm
VOC	50 ppm	100 ppm	50 ppm	100 ppm

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

Note

You can disable an alarm by setting the alarm setpoint to 0.

Stopping a Gas Alarm

The low and high alarms stop when the ambient gas level returns to the acceptable range.

Note

If alarms are set to latch, press ◯ to reset the alarms.

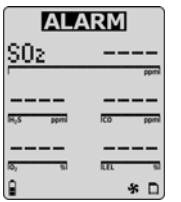
The detector computes the TWA value based on the OSHA or ACGIH standard (see TWA Method) and the STEL value based on a user selectable 5 to 15 minute period (see STEL Period).

Sensor Alarm

The detector tests for a missing or defective sensor during the activation self-test. If a sensor fails the self-test, **FAIL** appears above the location of the given sensor. Refer to the Troubleshooting section.

Pump Alarm

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



The pump alarm continues until the blockage is cleared or it is acknowledge by pressing ◯. If ◯ is pressed, the detector administers a pump test to recalibrate the pump module (refer to the Pump Test section). If the pump test is successful, the detector will return to normal operation. If not, the pump alarm will continue.

Low Battery Alarm

The detector tests the batteries on activation and continuously thereafter. Battery power is continually displayed during normal operation. If the battery voltage is low, the detector activates the low battery alarm.

The low battery alarm continues until you replace the batteries 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 on, the audible alarm does not beep during a low battery alarm (see the section, Confidence Beep). Typically, the low battery alarm continues for 30 minutes before an automatic shutdown.

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 display blanks out and the detector stops normal operation. The display shows LOW periodically until the battery power is depleted.

Replace the batteries. See the section, Replacing the Batteries.

Calibration and Setting Alarm Setpoints

Guidelines

When calibrating the detector, adhere to the following guidelines:

- Recommended gas mixture:
  CO: 50 to 500 ppm balance N_2
  H_2S: 10 to 100 ppm balance N_2
  PH_3: 1 to 5 ppm balance N_2
  SO_2: 10 to 50 ppm balance N_2
  Cl_2: 3 to 25 ppm balance N_2
  NH_3: 20 to 100 ppm balance N_2
  NO_2: 5 to 50 ppm balance N_2
  HCN: 5 to 20 ppm balance N_2
  ClO_2: 0.1 to 1.0 ppm balance N_2
  O_3: 0.1 to 1.0 ppm balance N_2
  VOC: 100 ppm isobutylene
  LEL: 10 to 100% LEL or .5 to 5% by vol. methane balance air
  O_2: clean air, 20.9 %
- CG-Q58-4 and CG-Q34-4 Calibration Gas (4-gas mix) are available from BW Technologies. See 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 the National Institute of Standards and Technology (NIST) 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 (for HCN detectors calibrate at least once every 90 days), depending on use and sensor exposure to poisons and contaminants.
- Calibrate the detector if the ambient gas display varies at start-up.
- It is best to calibrate the sensor before changing the alarm setpoints.
- Calibrate only in a clean atmosphere that is free of background gas.
- To disable an alarm, set the alarm setpoint to 0.
- The oxygen sensor can be automatically calibrated each time upon activation (if this feature is enabled). Activate the detector in a normal (20.9% oxygen) atmosphere.
- The detector should be allowed to stabilize for 1 minute, after activation, prior to calibration, or a bump test.
- If you require a certified calibration, contact BW Technologies.

Note

A generator must be used to calibrate O_3, ClO_2, and Cl_2 sensors.

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.

In auto zero, if any background target gas is present, the sensor(s) affected will read **Err** and exit the auto zero function, retaining the previous set value(s).

In auto span, if any target gas is not present or does not meet expected values, the display will advise you and exit calibration mode, retaining the previous set value(s).

Applying Gas to the Sensors

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

Note

The calibration cap should only be used during the calibration process.

Table 10. Applying Gas to the Sensors

Item	Description
1	Detector and calibration cap
2	Calibration hose
3	Regulator and gas cylinder

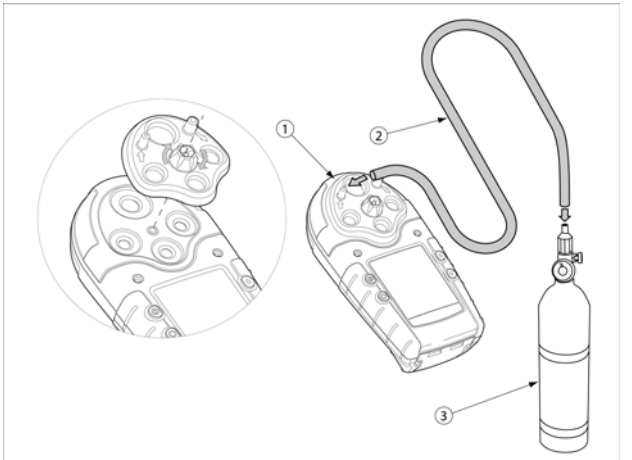


Figure 3. Applying Gas to the Sensors

Calibration Procedure

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

Note

To bypass a step during the calibration process (after auto zero), press ⓘ.

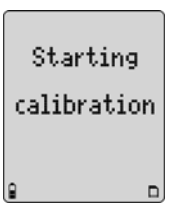
Calibrate O_2 in clean air.

Start Calibration

Note

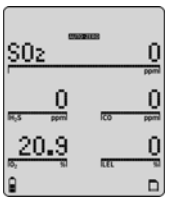
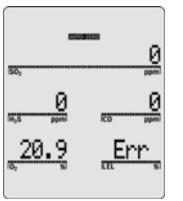
Verify that the calibration gas you are using matches the span concentration value(s) in the detector. See the section, Span Gas Value.

1. In a clean atmosphere, press and hold ◯ and ▼ simultaneously as the detector beeps, flashes, and vibrates to the corresponding countdown. The display shows the following to indicate that it has entered calibration mode.



Auto Zero and Oxygen Sensor Calibration

2. The display flashes AUTO-ZERO while the detector automatically zeroes the toxic and combustible sensors and calibrates the oxygen sensor. The display will notify you if the auto zero has failed for a sensor.

Auto Zero	Sensor Fail
	

The audible alarm then beeps twice.

Note

Do not apply the calibration gas at this point, otherwise the auto zero step will fail.

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 the alarm setpoints.

3. The display then requests the pass code (refer to Pass Code Protect).

Note

If the correct code is entered, the detector beeps twice and automatically proceeds to span the sensors.

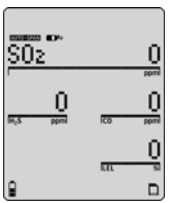
If the incorrect pass code is entered or ◯ is not pressed within 5 seconds, the display advises that the pass code is incorrect. The detector will then save the calibration before returning to normal operation.

Auto Span

You can calibrate anywhere from one to all five sensors as desired.

4. The display now prompts you to either apply calibration gas to the sensors or press ⓘ to bypass the span.

5. Attach the calibration cap and apply gas to the sensor at a flow rate of 250 to 500 ml/min. (for NH_3 and Cl_2: 1000 ml/min.). (Refer to Figure 3. Applying Gas to the Sensors.) The display flashes as it spans the sensors.



When the detector senses a sufficient amount of gas concentration (30 seconds), the audible alarm beeps once. The detector then begins spanning the sensor(s) (2 minutes).

No Gas Detected

If the detector does not detect any gas within 2 minutes, it will display the following screens.

Press ▲ to try calibrating with another gas bottle or press ▼ to end the span. (If you choose to end the span, go to step #12.)

Large Span

If the span adjustment is unusually large (more than 20%), the detector will advise which sensor had the large span change.

Confirm that the calibration gas bottle you are using is correct and that the span concentration value(s) of the detector matches the value of the calibration gas bottle. *See the section, Set Span Concentration Values.*

If the calibration adjustment is expected, press ◯ to accept this span. If the calibration adjustment is not expected or the span concentration value does not match the calibration gas bottle, press ⓘ to reject the span and calibrate that sensor again.

Did Not Reach Target Span

If the span did not reach its target (span gas concentration within the user options menu), it will advise which sensor did not reach its target and ask whether or not you would like to keep the span.

This warning usually indicates that the calibration bottle is past its expiry date and you should calibrate the sensor with a new bottle.

Successful Span

If the sensor(s) has spanned successfully, the audible alarm beeps three times and the following screens will appear.

If there are more sensors to span, remove the existing calibration bottle, connect the next bottle, press ▲, and repeat step #5 to span the other sensor(s).

If you choose not to span the other sensors, press ▼ to continue with the calibration process.

If all of the sensors have been spanned, the following screen appears before the calibration procedure continues.

Unsuccessful Span

If all sensors fail the span, the screen shows the following:

If only some sensors failed the span, the detector bypasses the span for the failed sensor(s). **Err** appears beside the failed sensor once the detector is in normal operation.

Press ⓘ to exit, and then restart calibration in an atmosphere that is clear of the targeted gases. If the auto span fails a second time, restart the detector to test the sensors.

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, repeat the calibration process using a new gas cylinder. If the sensor fails the span a second time, replace the sensor. See the section, Replacing a Sensor or Sensor Filter.

Setting the Calibration Due Date

Note

If a sensor does not successfully span, you cannot change its calibration due date.

After span is complete, you can change the next calibration due date for each sensor. The following screen is displayed.

If you press ⓘ to bypass this section, go to step #10.

If you press ◯, the detector shows the following screen before the due date for the first toxic sensor is displayed.

Note

Calibration due dates are always set in the following order: toxic 1, toxic 2, LEL, and O_2.

6. To change the calibration due date (1 to 365 days), press ▼ or ▲ until the display shows the new value.
7. Press ◯ to save the displayed value. The detector will then proceed to the next sensor.
8. Repeat steps #6-7 to set the calibration due date for the rest of the sensors.
9. Once all of the sensors calibration due dates have been set, the detector will emit two quick beeps before proceeding to the alarm setpoint section.

If a sensor did not successfully span, pressing ▼ or ▲ will cause the following screens to appear for the applicable sensor:

The display then proceeds to the next sensor's due date.

Note

If you do not press any pushbuttons within 5 seconds, the detector automatically retains the previous calibration due date.

Alarm Setpoints

Factory alarm setpoints may vary by region. Refer to the Resetting Gas Alarm Setpoints section for an example of these factory alarm setpoints. Set the setpoints as desired.

Note

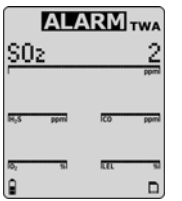
Alarms may be set anywhere within the detection range for the sensor. See the Specifications section or set to zero for off.

If you do not press any pushbuttons within 10 seconds, the detector automatically retains the previous alarm setpoint.

*If you change an alarm setpoint but pause for 10 seconds before pressing ◯, the detector will display **Err** and reject the new value.*

Setting the TWA Alarm Setpoint

The display shows the TWA alarm setpoint for SO_2:



10. To change the TWA alarm setpoint for this sensor, press ▼ or ▲ until the display shows the new value. Press ◯ to save the displayed value.

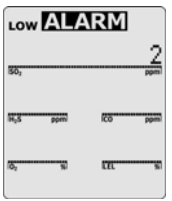
Setting the STEL Alarm Setpoint

The display shows the STEL alarm setpoint for SO_2:

11. To change the STEL alarm setpoint for this sensor, press ▼ or ▲ until the display shows the new value. Press ◯ to save the displayed value.

Setting the Low Alarm Setpoint

The display shows the low alarm setpoint for SO_2:



12. To change the low alarm setpoint for this sensor, press ▼ or ▲ until the display shows the new value. Press ◯ to save the displayed value.

Setting the High Alarm Setpoint

The display shows the high alarm setpoint for H_2S:

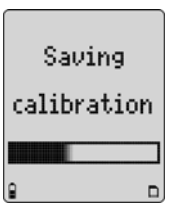
13. To change the high alarm setpoint for this sensor, press ▼ or ▲ until the display shows the new value. Press ◯ to save the displayed value.

Setting the Remaining Alarm Setpoints

14. Repeat steps 3 through 6 to set alarm setpoints for the other sensors. The audible alarm will beep four times when the alarm setpoint function is complete.

Finish Calibration

15. The detector displays the following to indicate that the calibration process is complete and then enters normal operation.



Verification

After calibration is complete and the detector is in normal operating mode, test it using a gas cylinder other than the one used in calibration. The gas concentration should not exceed the sensor's detection range. Confirm that the display shows the expected concentration.

Datalogger

The datalogger version allows the detector to record various information so the user can compile a report.

Datalog

Please contact BW Technologies for more information.

MultiMediaCard Compatibility

A standard 32 MB MMC Flash Memory card is supplied with the detector. When purchasing additional MultiMediaCards, BW Technologies recommends MMC flash memory cards that contain between 32 MB and 256 MB storage capacity.

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

The “MMC” is not the same as the following:

- MultiMedia card
- Multi media card
- SmartMedia
- CompactFlash
- Memory Stick

MMC cards are available through retailers throughout the world. They are also available through mail order and Internet vendors.

MultiMediaCard Troubleshooting

A warning message will display if the card is not inserted. **Note: No data card is installed.** The card is not required for operation of the User Downloadable Datalogger models.

A new MMC card is automatically formatted when it is inserted in the detector. When installing any new or blank MMC card into the detector the LCD displays **the card is blank**, then the detector proceeds to auto-format the MMC card.

Recovering Data Files

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

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

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

- If not, verify that the card reader is inserted correctly and that the connections are secure.

- In the “Removable Disk” drive window, ensure **All Files** are selected in the **File Types** field.
- “Reformat and Recover Deleted Files”

Insert the MMC card back into the detector. The detector will reformat. The file should now be available.

If the recorded data file (Logfile0.csv), is still not visible:

- Format the MMC card in Windows.
- Remove the MMC card from the card reader.
- Insert the MMC card back into the detector.
- Allow the detector to reformat the MMC card.
- Remove the MMC card from detector.
- Insert the MMC card back into card reader.
- Select the **My Computer** icon.
- Select the drive that corresponds to the card reader.
- The **Recorded Data File** (**Logfile0.csv**), will now be visible.

If the Recorded Data File is still not visible, insert the MMC card into the detector and turn it on. The LCD will advise: **Error. Data file has been deleted**. You will then be given the choice of erasing or restoring the data. Use ▲ or ▼ to scroll through the options. Press ◯ to confirm your choice.

To restore the data, select **Restore**. The detector will then restore the data to the MMC card, and will resume the start-up procedure.

To permanently erase the data on the MMC, select **Erase**. The display will then read, **Are you sure?**

Note

Once data is erased using this process, it cannot be retrieved.

Press ◯ to confirm your choice or press ⓘ to abort. If you choose to abort the erasing procedure, the display will read, **Erase aborted**.

The display will then read **Note: Card cannot be used Pull out the card to continue**. Insert a new card or erase the data. Once you confirm your decision to erase the data on the MMC card or there is a new card inserted the detector will resume normal operation.

Direct Import into Compatible Programs

Information from this point on applies only to users who are not using the Fleet Manager plug-in. The following information applies to direct data import into Excel and other compatible programs. To use the datalogger data, insert the data card into a computer adapter and open the data file **LOGFILE0.CSV** using spreadsheet or database software.

Word processors and text editors may also be used, but performance may be poor, since the datalogger file is at least 16 megabytes in size.

Data for user-accessible models is comma-separated-values (CSV) format. The data order is:

- Date, day, time
- H_2S, CO, Combustibles, O_2
- H_2S TWA, CO TWA
- Status codes, serial number

Recorded data includes eight single-character unit status codes. The eight characters represent codes for the H_2S, CO, combustibles, and O_2 sensors, datalogger, unit battery status, and unit alarm status. A summary of most of the available codes can be seen in table A.

Importing the Data File Into Compatible Desktop Applications

Information from this point forward only applies to users who are not using the Fleet Manager plug-in.

The recorded data can be loaded into most spreadsheet, database, word processor, or text editor applications. Some examples are:

- Microsoft® Excel 95, 98 and 2000;
- Quattro Pro;
- Lotus 1-2-3;
- Microsoft® Access; and
- Microsoft® Word.

Determining Application Compatibility

To determine if the application selected is compatible:

- Insert MMC card in to the card reader;
- Open desired application;
- Use the applications **File/Open** menu options 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.

Important

Some applications have an internal file size limits, 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
U	Dual alarm (low and TWA alarms)
V	Dual alarm (high and TWA alarms)
s	STEL alarm
u	Dual alarm (low and STEL alarms)
v	Dual alarm (high and STEL alarms)
w	Dual alarm (TWA and STEL alarms)
x	Triple alarm (TWA, STEL and low)
y	Triple alarm (TWA, STEL and high)
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)
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	
—	Batteries 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
S	Automatic shutdown
F	Self-test fail
R	Real-time clock failure

Note: *TWA readings greater than 99 are recorded as OL.*

Maintenance

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

- Calibrate, bump test, and inspect the detector at regular intervals.
- Keep an operations log of all maintenance, calibrations, bump tests, 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 Batteries

⚠ Warning

To avoid personal injury:

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

⇒ **Use only batteries recommended by BW Technologies to prevent damage or personal injury.**

⇒ **Use only approved batteries, properly installed in the detector case. See the section Specifications for approved batteries.**

⇒ **Charge batteries using only a recommended charger. Do not use any other charger. Failure to observe this precaution can lead to fire or explosion.**

Note

Both the rechargeable battery pack and the alkaline battery pack are hot-swappable, but replacing the alkaline batteries needs to be done in a non-hazardous location.

To preserve battery life, turn off the detector when you are not using it.

To replace the alkaline batteries, refer to the following figure, table, and set of instructions. (To charge the rechargeable battery pack, refer to the *GasAlertMicro 5 Battery Charger manual*.)

1. Open the latch on the bottom of the detector.
2. Remove the battery pack by lifting the end of the pack away from the detector.
3. Unscrew the two captive screws on the battery pack and open the pack.
4. Install the three alkaline batteries and screw the battery pack back together.

5. Insert the battery pack back into place and secure the latch.

Table 12. Replacing the Batteries

Item	Description
1	Detector
2	Latch
3	Battery pack
4	Battery tray
5	Captive screws (2)
6	Alkaline batteries
7	Battery shell

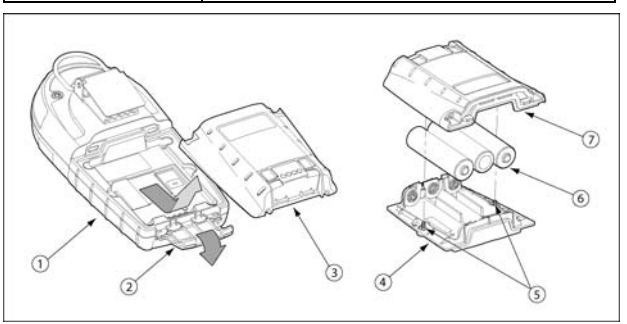


Figure 4. Replacing the Batteries

Replacing a Sensor or Sensor 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 move the detector to a clean environment and wait 10 to 30 minutes. Do not expose a sensor to the vapors of inorganic solvents, such as paint fumes or organic solvents. The Troubleshooting section describes problems caused by a sensor in need of calibration or replacement.

To replace a sensor or sensor filter, refer to the following figure, table, and set of instructions.

1. If the detector is on, turn it off.
2. Remove the two machine screws on the rear shell and remove the sensor cover (or optional pump module).
3. Replace the sensor filter or replace the sensor(s). Gently rocking the sensor back and forth may help free a tightly held sensor.
4. Insert a new sensor, ensuring that sensor posts are aligned correctly.

Note

Detectors that are configured for 1, 2, 3, or 4 gases may contain a dummy sensor in one of the four sensor locations.

5. Re-assemble the detector.

Calibrate the detector after changing any sensor(s). See the section, Calibration and Setting Alarm Setpoints.

Table 13. Replacing a Sensor or Sensor Filter

Item	Description
①	Sensor cover
②	Sensor filter
③	Sensors
④	Detector
⑤	Machine screws (2)

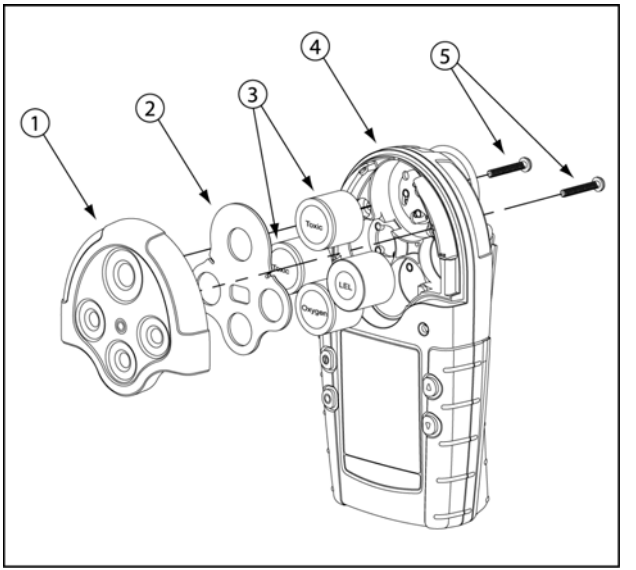


Figure 5. Replacing a Sensor or Sensor Filter

Photoionization Detector (PID)

Parts of the PID

Table 14. Parts of the PID sensor

Item	Description
①	Sensor cover
②	Electrode stack
③	Diffusion barrier
④	Lamp
⑤	PID sensor

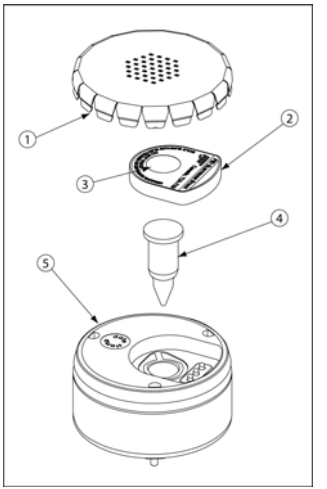


Figure 6. Parts of the PID

Clean the Lamp

⚠ Caution

Never handle the lamp with your bare hands.

The PID lamp needs to be cleaned on a regular basis (with a cleaning kit). To clean the PID lamp refer to Figure 6, Table 14, and the following set of instructions.

1. Place finger covers on your fingers.
2. Take apart the sensor to remove the lamp.
3. Place some methanol on the end of a cotton-tipped stick before using it to clean the lamp.
4. Once clean, reassemble the sensor.

Replace the Electrode Stack

Replace the electrode stack when it is contaminated. To replace the electrode stack, refer to Figure 6, Table 14, and the following set of instructions.

1. Remove the sensor cover.
2. Remove the old electrode stack.
3. Install the new electrode stack in its place.

Note

Ensure your fingers do not make contact with the diffusion barrier and the electrodes on the underside of the stack.

4. Replace the sensor cover.

Replace the Lamp

Replace the lamp when it falls below the acceptable level. To replace the lamp refer to Figure 6, Table 14, and the following set of instructions.

1. Remove the old lamp from the PID.
2. Ensure finger covers are on before inserting the new lamp into the PID shell.
3. Reassemble the sensor.

Installing the MMC/SD Card

The following figure and set of instructions illustrate how to install the MultiMediaCard (MMC)/secure digital (SD) card.

1. If the detector is on, turn off the detector.
2. Remove the battery pack (see Figure 3).
3. Slide the MMC/SD face down (pins facing down) into the MMC/SD port.
4. Replace the battery pack and secure the latch.

Table 15. Installing the MMC/SD Card

Item	Description
①	Back of detector
②	Battery pack
③	MMC/SD card

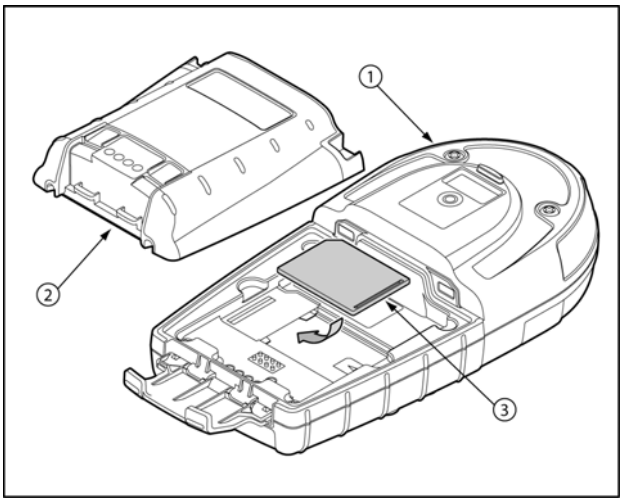


Figure 7. Installing the MMC/SD

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

Table 16. Troubleshooting Tips

Problem	Possible Cause	Solution
The detector does not turn on.	→ No batteries	→ Install batteries (see the section, Installing the Batteries)
	→ Depleted batteries	→ Replace batteries (see the section Replacing the Batteries)
	→ Damaged or defective detector	→ Contact BW Technologies
The detector enters alarm mode immediately when turned on.	→ Sensor needs to stabilize	→ Used sensor: wait 60 seconds New sensor: wait 5 minutes
	→ Low battery alarm	→ Replace batteries (see the section, Replacing the Batteries)
	→ Sensor alarm	→ Replace sensor (see the section, Replacing a Sensor or Sensor Filter)
	→ Pump alarm	→ 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 page 30 or contact BW.
The activation self-test fails	→ General fault	→ Contact BW Technologies

Table 16. Troubleshooting Tips (cont.)

Problem	Possible Cause	Solution
The detector displays: 	→ The MMC/SD card is not inserted	→ Insert the MMC/SD card (refer to the Installing the MMC/SD Card section.
The detector displays: 	→ The MMC/SD card that is inserted in the detector has a storage size which is not supported by the detector	→ Insert an MMC/SD card which is 32, 64, 128, or 256 MB in size
The detector displays: 	→ The detector has lost communication with the MMC/SD card	→ Contact BW Technologies

The detector displays: **Clock error: using last known time**	→ General fault	→ Contact BW Technologies
Detector does not display normal ambient gas reading after 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 (see the section, Calibration and Setting Alarm Setpoints) → Detector is operating properly. Use caution in suspect areas.
Detector does not respond to pushbuttons.	→ Batteries are depleted → Detector is performing operations that do not require user input	→ Replace batteries (see the section, Replacing the Batteries) → Pushbutton operation restored automatically when the operation ends
Detector does not accurately measure gas.	→ Detector requires calibration → Detector is colder/hotter than ambient gas → Sensor filter is blocked	→ Calibrate sensor (see the section, Calibration and Setting Alarm Setpoints) → Allow the detector to acquire ambient temperature before use → Clean the sensor filter (see the section, Replacing a Sensor or Sensor Filter)

Table 16. Troubleshooting Tips (cont.)

Problem	Possible Cause	Solution
Detector does not enter alarm.	→ Alarm setpoint(s) are set incorrectly	→ Reset alarm setpoints (see the section, Calibration and Setting Alarm Setpoints)
	→ Alarm setpoint(s) set to zero	→ Reset alarm setpoints (see the section, Calibration and Setting Alarm Setpoints)
	→ Detector is in calibration mode	→ Complete the calibration procedure
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 (see the section, Calibration and Setting Alarm Setpoints)
	→ Missing or faulty sensor	→ Replace sensor (see the section, Replacing a Sensor or Sensor Filter)
Detector automatically shuts off.	→ Automatic shutdown feature activated due to weak batteries	→ Replace batteries (see the section, Replacing the Batteries)

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 listed in Table 17, contact BW Technologies.

Table 17. Replacement Parts and Accessories

Model No.	Description	Qty
S4-W04	Replacement combustible sensor	1
S4-W04-SF	Replacement combustible sensor (with silicone filter)	1
SR-X10	Replacement O_2 (2 year) sensor	1
PS-RM04	Replacement CO sensor	1
PS-RH04S	Replacement H_2S sensor	1
SR-P04	Replacement PH_3 sensor	1
PS-RS04	Replacement SO_2 sensor	1
PS-RC10	Replacement Cl_2 sensor	1
SR-A04	Replacement NH_3 sensor	1
PS-RD04	Replacement NO_2 sensor	1
PS-RZ10	Replacement HCN sensor	1
SR-V04	Replacement ClO_2 sensor	1
SR-G04	Replacement O_3 sensor	1
D4-RHM04	Replacement TwinTox H_2S/CO sensor	1
SR-PID32	Replacement PID sensor	1
RL-PID10.6-1	Replacement lamp for PID sensor	1
PID32-ES-1	Replacement electrode stack for PID sensor	1
CG-Q58-4	Quad calibration gas, CH_4-2.5%, O_2-18.0%, H_2S-25 ppm, CO-100 ppm, bal. N_2 (58 l)	1
CG-Q34-4	Quad calibration gas, CH_4-2.5%, O_2-18.0%, H_2S-25 ppm, CO-100 ppm, bal. N_2 (34 l)	1
CG-T34	Two gas calibration cylinder, 50% LEL (CH_4-2.5%) O_2-20.9%, bal. N_2 (34 l)	1
CG-S25	Calibration gas, SO_2 25 ppm (58 l)	1
CG-BUMP-S25	SO_2 bump test gas	1
CG-BUMP1	Bump alarm gas aerosol (CH_4-2.5%, O_2-10%, H_2S-40 ppm, CO-200 ppm)	1
REG-0.5	Regulator (0.5 l/min)	1
G0042-H25	Calibration gas, H_2S 25 ppm (58 l)	1
CG2-M-200-	Calibration gas, CO 200 ppm	1

Model No.	Description	Qty
103	(103 l)	
CG2-S-25	Calibration gas, SO_2 25 ppm (58 l)	1
CG2-C-5	Calibration gas, Cl_2 5 ppm (58 l)	1
CG2-Z-10	Calibration gas, HCN 10 ppm (58 l)	1
CG2-D-10	Calibration gas, NO_2 10 ppm (58 l)	1
CG2-P-1-58	Calibration gas, PH_3 1 ppm (58 l)	1
CK-Q34-4	Quad calibration kit with regulator, quad gas cylinder (CG-Q34-4), hose and carrying case	1
CK-Q58-4	Quad calibration kit with regulator, quad gas cylinder (CG-Q58-4), hose and carrying case	1
CR-MMC-USB1	MMC USB reader (USB port) with software for user-downloadable datalogger	1
MMC32	32 MB MultiMediaCard	1
MMC64	64 MB MultiMediaCard	1
MMC128	128 MB MultiMediaCard	1
M5-BAT01	Rechargeable battery pack	1
M5-BAT02	Alkaline battery pack	
GAMIC-BAT-K	Rechargeable AA NiMH batteries, 1800 mAh, kit of 4 (not applicable for Europe)	1

Model No.	Description	Qty
GAMIC-BAT-K2	Rechargeable AA NiMH batteries, 1600 mAh, kit of 4	1
M5-CO1*	GasAlertMicro 5 battery charger	1
M5-CO1-BAT01*	GasAlertMicro 5 battery charger and battery pack kit	
GA-CH-2	Chest harness	1
GA-ES-1	Extension strap	1
	Calibration cap (standard)	1
GAMIC-AG2	Alligator clip (stainless steel)	1
D4-AS01	Manual aspirator pump with 10 ft./3 m hose	1
GA-AS02	Manual aspirator pump with 1 ft./0.3 m probe	1
GA-TPROB6	Telescopic sample probe (6.5 ft./2 m)	1

**Add suffix (-UK) for United Kingdom mains plug, (-EU) for European mains plug, (-AU) for Australian mains plug.*

Specifications

Instrument dimensions: 14.5 x 7.4 x 3.8 cm (5.7 x 2.9 x 1.5 in.)

Weight: 300 g (10.6 oz.)

Operating and Storage Conditions:
Temperature:
VOC: -10°C to +40°C (-14°F to +104°F)
Other gases: -20°C to +50°C (-4°F to +122°F)
Humidity:
O_2: 0% to 99% relative humidity (non-condensing)
VOC: 0% to 95% relative humidity (non-condensing)
Combustibles: 5% to 95% relative humidity (non-condensing)
Cl_2: 10% to 95% relative humidity (non-condensing)
HCN, ClO_2: 15% to 95% relative humidity (non-condensing)
Other gases: 15% to 90% relative humidity (non-condensing)
Pressure:
95 to 110 kPa

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

Detection range:
O_2: 0 – 30.0% vol. (0.1% vol. increments)
CO: 0 – 999 ppm (1 ppm increments)
H_2S: 0 – 100 ppm (1 ppm increments)
Combustibles: 0 – 100% LEL (1% LEL increments) or 0 – 5.0% v/v methane
PH_3: 0 – 5.0 ppm (0.1 ppm increments)
SO_2: 0 – 100 ppm (1 ppm increments)
Cl_2: 0 – 50.0 ppm (0.1 ppm increments)
NH_3: 0 – 100 ppm (1 ppm increments)
NO_2: 0 – 99.9 ppm (0.1 ppm increments)
HCN: 0 – 30.0 ppm (0.1 ppm increments)
ClO_2: 0 – 1.00 ppm (0.01 ppm increments)
O_3: 0 – 1.00 ppm (0.01 ppm increments)
VOC: 0 – 1000 ppm (1.0 ppm increments)

Sensor type:
H_2S/CO: Twin plug-in electrochemical cell
Combustibles: Plug-in catalytic bead
VOC: Photoionization detector (PID)
Other gases: Single plug-in electrochemical cell

O_2 measuring principle: Capillary controlled concentration sensor

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

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 dual beepers

Visual alarm: Dual red light-emitting diodes (LED)

Display: Alphanumeric liquid crystal display (LCD)

Backlight: Automatically activates whenever there is insufficient light to view the display (if enabled) and during alarm conditions.

Self-test: Initiated upon activation

Calibration: Automatic zero and automatic span

Oxygen sensor: Automatic span upon activation (selectable)

User field options: Confidence beep, latching low and high alarms, pass code protection, enable/disable safe display mode, combustible sensor measurement, sensor disable, set calibration due date, TWA and STEL, stealth mode, language selection, enable/disable automatic oxygen calibration, set span concentration values, set STEL calculation period, set TWA method, enable/disable automatic backlight, adjust clock calendar, and set logging rate (datalogger models only).

Battery operating time:
Given that the detector is operating with an LEL and PID sensor and the optional BW M5 pump module:
3 alkaline cells: 8-10 hours
1 rechargeable NiMH pack: 14-16 hours

Approved batteries:

North America

Approved batteries for product (standards IEC 60279-11, EN50020, UL913, C22.2 No. 157)

Alkaline:		**Temperature Code**
Duracell MN1500	-20°C ≤Ta ≤ +50°C	
	-20°C ≤Ta ≤ +40°C	
Energizer E91	-20°C ≤Ta ≤ +50°C	
	-20°C ≤Ta ≤ +40°C	

NiMH rechargeable:

M5-BAT01	-20°C ≤Ta ≤ +50°C	T4

Battery charger: GasAlertMicro 5 battery charger

First-time charge: 4 hours per battery pack

Normal charge: 3-4 hours per battery pack

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 of 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: MultiMediaCard (MMC)

Size: 32 MB (standard); (64, 128, and 256 MB card available)

Storage: 500,000 lines of data available; 4.4 months at 5 second intervals (based on a normal work week)

Memory type: Wraparound 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, pump status, sensor status, confidence beep activation, and detector status along with the time and date for each reading and unit serial number

MMC card test: Automatically on activation

GasAlertMicro 5 with User Downloadable Datalogger

Operation: Requires no user intervention (automatic)

Indicators: Icon advises datalogger is operating normally, MMC card missing/malfunction advise

Compatible with: Desktop PC computer or laptop

Operating system: Windows 95 or higher; Macintosh OS 8.6 or higher

Download via: MMC/SD card reader.

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

Card alarm: Card fail or missing

Support:
Fleet Manager: Fleet Manager is an Access software add-in that enhances the abilities of Microsoft® Access when handling GasAlertMicro 5 user downloadable datalogger data files.

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iERP: 115695