Wild Goose Storage, LLC

Wild Goose Underground Natural Gas Storage Facility Monitoring Plan

Previous Submittal: December 2017
Revised: June 28, 2024

Title 17 California Code of Regulations (CCR) Division 3, Chapter 1, Subchapter 10, Article 4, Rule 13 Section 95668(h)(1)&(2)
Natural Gas Underground Storage Facility Monitoring Requirements

For Submittal to:
California Air Resources Board

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1. Introduction and Purpose

The following monitoring plan has been prepared by Wild Goose Storage (WGS) as required by the California Air Resources Board (CARB) Greenhouse Gas Emission Standard for Crude Oil and Natural Gas Facilities, herein referred to as the CARB Oil and Gas Rule or Rule.[1]

The monitoring plan addresses the following three key areas, as specified in Section 95668(h)(4) of the Rule:

(a) Continuous Ambient Monitoring;
(b) Wellhead Daily or Continuous Monitoring; and,
(c) Well Blowout Procedures.

In 2018, WGS submitted the monitoring plan to CARB and Butte County Air Quality Management District (BCAQMD). WGS received approval from CARB and BCAQMD for the most recent version of the monitoring plan on February 01,2021. WGS is submitting this updated monitoring plan to CARB by July 1, 2024, in accordance with Section 95668(h)(1)(B) of the Rule.

Within 180 days of CARB approval of the updated monitoring plan, and consistent with Section 95668(h)(3) of the Rule, WGS will begin monitoring the Wild Goose Facility according to the approved updated monitoring plan. WGS will continue to monitor the Wild Goose Facility in accordance with the previously approved plan while awaiting CARB's approval for the updated monitoring plan.

2. Facility Description

As shown in Figure 1 and 2, the Wild Goose Facility is located in southwestern Butte County, approximately 7 miles west of Gridley, California and approximately 4 miles north of Pennington, California, surrounded by flat agricultural space. The Facility is under the jurisdiction of the Butte County Air Quality Management District (BCAQMD). The Gray Lodge Waterfowl Management Area is located to the southeast of the Facility. Note that in Figure 2, the Wild Goose Facility is designated as Remote Facility Site. These terms, as well as Plant site, are synonymous with one another. Also shown in Figure 2 is the Well Pad site (in Butte County) and the PG&E Delevan Meter Station / Interconnect (located in Colusa County).

WGS receives transmission-quality natural gas from PG&E's Delevan interconnect / backbone pipeline system via a 30" x 25 mile sales pipeline. The 30" line ties into the Wild Goose Facility, which includes four (4) individual plants, four (4) glycol dehydration units, and eight (8) natural gas driven compressor units, rated for a total of 27,900 HP. Gas received from PG&E is routed through the WGS Facility compressor units and boosted to sufficient discharge pressure for injection into the underground gas storage reservoir via two 4.5 mile pipelines (18" and 24"). Seventeen (17) horizontal storage wells are situated at a central well pad site, and are used for injection and withdrawal of gas into and out of the reservoir. The number of wells utilized at any given time depends on the gas flow nomination for that particular day. When withdrawn, the gas flows in an opposite direction towards the plant via the 18" and 24" pipelines. Gas that enters the Wild Goose Facility on withdrawal is routed through separation/filtration processes and a dehydration facility which consists of four (4) gas/glycol contactors, four (4) glycol regeneration units and three (3) thermal oxidizer units. Once processed by the plant, gas is either routed directly to PG&E's transmission system, or through the compressor units first. The use of compression during withdrawal mode is dependent on the gas inventory within the reservoir at that given point in time, and whether there is sufficient pressure to support free flowing directly into PG&E's transmission system. A map of the Facility, including the well pad site, is included in Appendix A. The WGS reservoir is designed for storing a maximum of 75 billion cubic feet

[1] Rule is promulgated under 17 California Code of Regulations, Division 3, Chapter 1, Subchapter 10, Article 4, Rule 13, Section 95668(h)(2).

of working gas. The Facility is rated for a peak injection of 525 million cubic feet per day, and peak withdrawal of 950 million cubic feet per day.

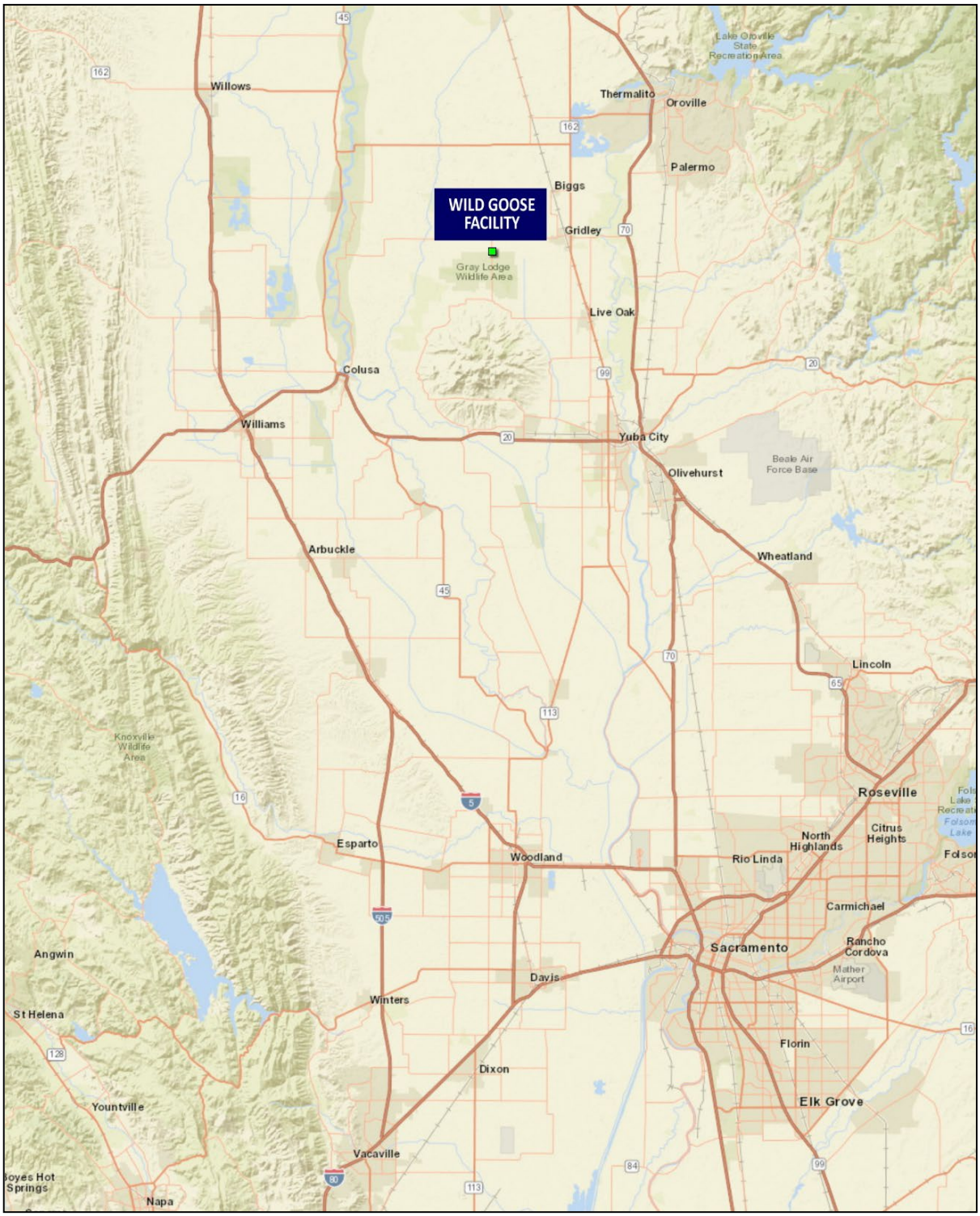
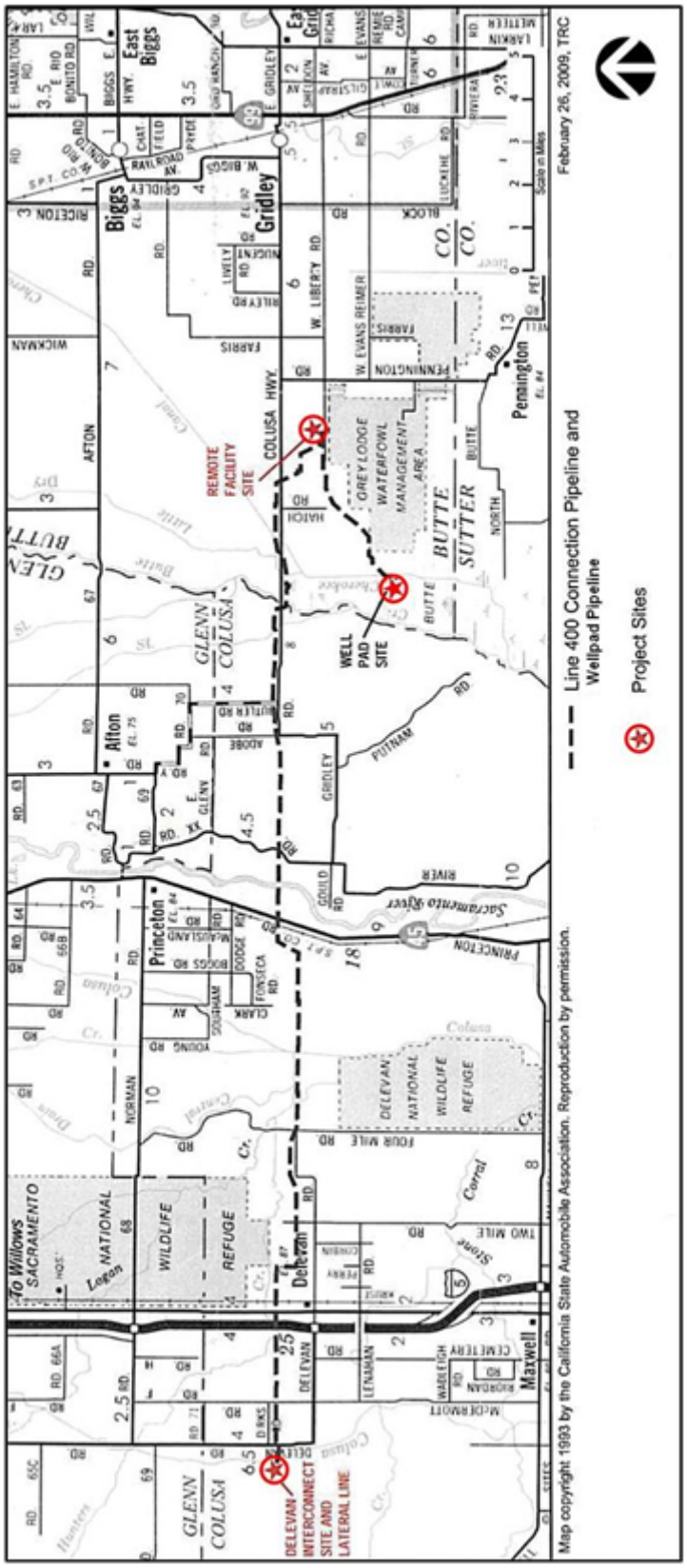


Figure 1: Location Map of Wild Goose Facility in Butte County


Line 400 Connection Pipeline and Wellpad Pipeline
Project Sites
REMOTE FACILITY SITE
WELL PAD SITE
DELEVAN INTERCONNECT SITE AND LATERAL LINE
February 26, 2009, TRC
Map copyright 1993 by the California State Automobile Association. Reproduction by permission.

3. Continuous Ambient Monitoring

3.1 Ambient Air Monitor Technology and Operation

3.1.1 Technology

As required by Section 95668(h)(4)(A)(1)(a) of the Rule, and approved by CARB in February 2021, WGS owns and operates two ambient air monitors, which are placed at the predominant upwind and downwind locations. The ambient monitoring instruments are capable of measuring a minimum of 250 ppb for ambient methane concentrations with resolution of one minute data, as required by the CARB Oil and Gas Rule.

In accordance with the previously approved monitoring plan, WGS installed Baseline-Mocon series 9000 ambient monitors with supporting instrumentation that will provide automated zero/span verifications. Furthermore, WGS will have secondary monitoring systems that will be used as replacement devices in the event of a malfunction of the primary systems. The systems will be SENSIT Gas Trac fixed methane detectors (FMDs). The FMD uses tunable diode laser spectroscopy (TDLAS) technology and are capable of detecting methane as low as 200 ppb. Detailed instrument specifications have been provided in Appendix B.

3.1.2 Operation

As required by Section 95668(h)(4)(A)(1)(b) of the Rule, WGS will calibrate the ambient air monitors at least once annually or at the manufacturer's recommended frequency. WGS will continue to repair or replace any defective air monitors within 14 calendar days from the date of calibration or discovery of malfunction. In the event that the parts or equipment needed to complete the necessary repairs are unavailable within this timeframe, WGS will notify the CARB Executive Officer and request extension to the replace or repair timeline in accordance with Section 95670.1 of the Rule.

As required by Section 95668(h)(4)(A)(10) of the Rule, the facility owner or operator shall keep records of any time the monitoring system is inactivated, including an explanation of the reason for the system being inactivated. The facility owner or operator shall also record when the system is reactivated.

3.2 Placement of Ambient Air Monitors

Figure 3 and 4 identifies WGS's upwind and downwind locations for ambient monitors at the Wild Goose Facility. These monitoring locations and the meteorological tower are located at the following locations.

- Upwind Monitoring Station (West): 10, 601563, 4356124 UTM; Elevation: 70 ft
- Downwind Monitoring Station (East): 10, 602094, 4356045 UTM; Elevation: 72 ft
- Meteorological Monitoring Station: 10, 601564, 4356120 UTM; Elevation: 70 ft

The wind rose, as captured by the WGS meteorological tower and shown in Figure 3 and 4 indicates the prevailing wind direction at the Facility is from the northwest. The first location selected for a monitor is on the southeast corner of the compressor station pad adjacent to West Liberty Road. The location of the second monitoring location is on the northwest corner of the compressor station pad adjacent to a utility road. The monitor locations are suitable for obtaining representative air quality measurements and minimally impacted by Wild Goose's emission sources.

Due to the small footprint of the Well Pad, power availability issues, and vegetation and earthen berm obstructions lining the boundary of the Well Pad, placement of the monitors at the Well Pad were not logistically feasible for making ambient measurements. Therefore, WGS upwind and downwind ambient monitors have been placed at the compressor station site.

The ambient monitoring locations were chosen to meet the requirements of Section 95668(h)(4)(A) of the Rule. Guidance presented in the following documents was utilized in monitor site selection:

- 40 CFR Part 58, Appendices A & E;
- EPA's Meteorological Monitoring Guidance for Regulatory Modeling Applications;
- EPA's Quality Assurance Handbook for Air Pollution Measurement Systems: Volume II: Ambient Air Quality Monitoring Program; and,
- EPA's Quality Assurance Handbook for Air Pollution Measurement Systems: Volume IV: Meteorological Measurements Versions 2.0.

The monitoring sites are selected based on suitability of terrain and distance from obstructions to ensure that representative data will be collected. Availability of power and accessibility to the site were also important considerations in choosing the location of the monitors. WGS believes the locations of the ambient monitors (as outlined in Figure 3) continue to act as a suitable methane monitoring network for the Facility. The locations of the ambient monitors and meteorological station in relation to the compressor station are presented in Figure 4.

Generally, wind sensors are placed a distance of at least 10 times the height of nearby obstacles; however, the Wild Goose Facility does not have enough surface property available to place a monitor at the recommended distance. The location selected for the meteorological tower is believed to be the most suitable for making the least obstructed measurements.

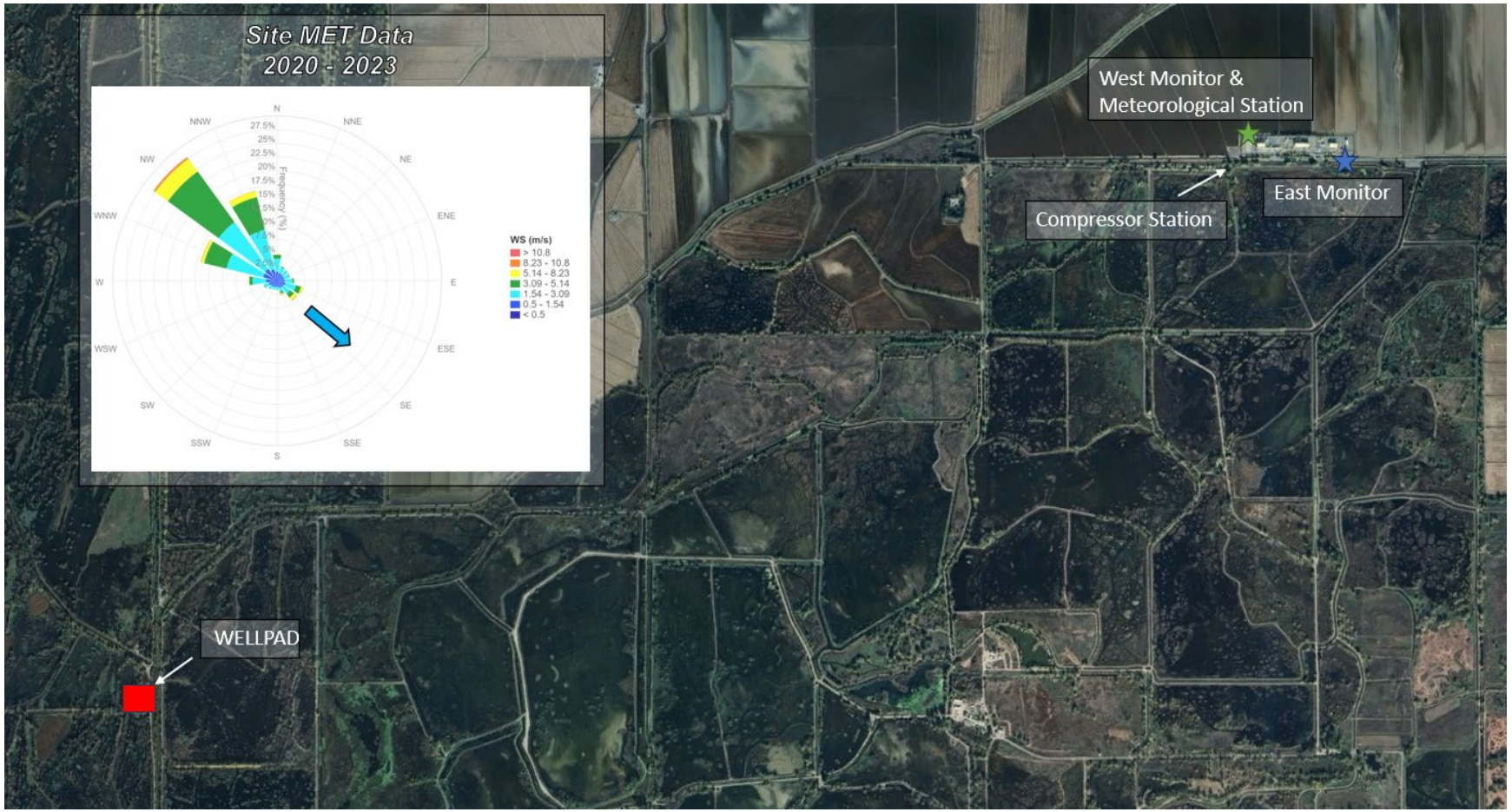


Figure 3: Locations of Ambient Monitors and Meteorological Station at Wild Goose Facility

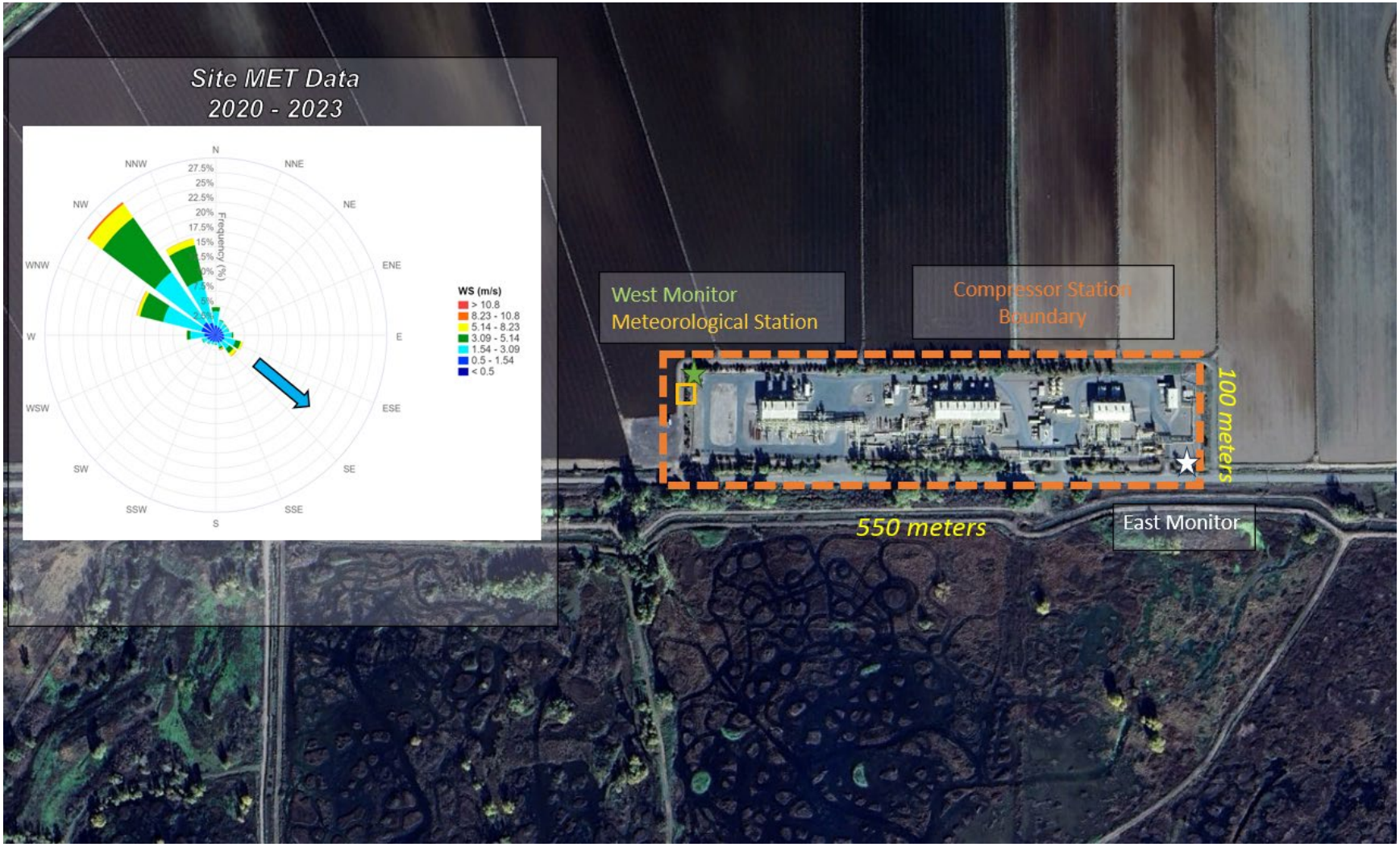


Figure 4: Locations of Ambient Monitors and Meteorological Station in relation to the Compressor Station

3.2.1 Supporting Wind Data

Wind roses referenced in the initial monitor placement review were generated from meteorological data collected[2] at the following established stations: Briggs, Sacramento National Wildlife Refuge (NWR), and Yuba Airport. The locations of the established wind monitors are presented in Table 1. Upwind and downwind monitoring locations were determined based on the subsequent wind roses.

Table 1. Established Meteorological Stations

Station	Coordinates (UTM)	Elevation (ft)	Distance from Facility
Briggs	10, 600309, 4360331	71	2.84 mi NW
Sacramento NWR	10, 570372, 4363397	89	20.06 mi W
Yuba Airport	10, 623681, 4328602	58	21.77 mi SE

WGS installed a meteorological station to monitor the meteorological properties at the Facility. Wind data from the monitoring network were evaluated and compared from 2020 - 2023. Winds from the WGS tower show a predominantly northwest wind flow pattern at the Facility. The placement of the methane monitoring stations still aligns with the predominant wind flow pattern but with a reversed pattern to the original analysis. WGS will be renaming the stations from upwind to West and downwind to East. This will help make alarm event notifications clearer as to which station is having an event and allow for the description of whether the station is truly upwind or downwind without the added confusion of the monitor location name.

3.3 Meteorological Measurements

As required by Section 95668(h)(4)(A)(2) of the Rule, the ambient monitoring system includes instrumentation that will allow for continuous measurement and recording of ambient temperature, ambient pressure, relative humidity, wind speed, and wind direction. WGS operates one 10-meter meteorological measurement tower at the Facility to measure the meteorological parameters discussed above. WGS believes the one station is adequate to provide meteorological data representative of conditions at the site. WGS installed the meteorological station at the same location as the West ambient air monitor shown in Figure 3 and 4. Placing the wind sensor a distance of at least 10 times the height of nearby obstacles, as recommended in EPA guidance, is not feasible at the site due to land area restrictions. However, the station is located in an open area with limited obstruction and surrounded by low-level vegetation and row crops. WGS believes the location provides sufficient meteorological data representative of the surrounding conditions.

Table 2 summarizes the meteorological instrumentation installed at the Facility's West monitoring station.

[2] Mesowest/Synoptic Labs (2017), Data made available from governmental agencies, commercial firms, and educational institutions, Retrieved from https://mesowest.utah.edu

Table 2. Wild Goose Meteorological Equipment

Parameter (Manufacturer/Model)	Specified Accuracy
Wind Speed - MetPak Base Station/ Sensit RAMP	±0.20 m/s or 1% of reading
Wind Direction - MetPak Base Station/ Sensit RAMP	±3 degrees
Temperature - MetPak Base Station/ Sensit RAMP	±0.2°C @ 23°C
Relative Humidity - MetPak Base Station/ Sensit RAMP	±1.3% RH @ 23°C
Barometric Pressure - MetPak Base Station/ Sensit RAMP	±0.3 mb @ +20°C

3.4 Data Handling

3.4.1 Data Validation and Storage

The necessary practices and procedures in the following EPA documents will be utilized to validate data being captured by the ambient monitoring system:

- 40 CFR Part 58, Appendix A – Quality Assurance Requirements for Monitors used in Evaluations of National Ambient Air Quality Standards (NAAQS);
- Quality Assurance Handbook for Air Pollution Measurement Systems, Vol. IV: Meteorological Measurements, EPA-454/B-08-002, March 2008;
- Quality Assurance Handbook for Air Pollution Measurement Systems, Vol. II: Ambient Air Quality Monitoring Program, EPA-454/B-17-001, January 2017; and,
- Meteorological Monitoring Guidance for Regulatory Modeling Applications, EPA-454/R-99-005, February 2000.

Procedures outlined in the reference documents listed above represent best practices for ambient air quality monitoring and provide sound data validation protocols.

Methane and meteorological data are routinely checked for irregularities during daily data reviews. This aids in determining the validity of the data that is collected within the ambient monitoring network, and the validity of triggered alarms. The various items included during daily data reviews include:

- Check maintenance logs, field notes, blowdown logs, etc. and compare methane or meteorological data with the above to indicate any monitored events.
- Check for power failures.
- Check traces exhibiting noise, spikes, non-varying data, or influences of other equipment (e.g., air conditioner).
- Check for instrument alarms or warnings.
- Data associated with any calibration run which produces readings of zero or span outside the specified tolerance.
- Check for data outside the plausible ranges.
- Investigate the cause of unexpected outlier measurements.
- Check measurements for consistency with other monitoring stations in the region if available.
- Flag data that are missing, invalid, or questionable.
- Record all validation steps for quality control.

All erroneous data identified is documented and removed, as necessary, from the final data set. Additionally, results of calibration test as well as diagnostic information from the analyzer and meteorological sensors will be used for determining the validity of the data that is collected within the ambient monitoring network.

To perform sampling and analysis operations consistently, standard operating procedures (SOPs) for the WGS monitoring network were developed. The SOPs ensure consistent performance with organizational practices; serve as training aids; provide ready reference and documentation of proper procedures; reduce work effort; reduce error occurrences in data; and improve data comparability, credibility, and defensibility. For ease of use, each SOP is sufficiently clear and written in a step-by-step format.

Pursuant to Section 95668(h)(4)(A)(3) of the Rule, WGS's ambient air monitoring system (including the meteorological station) has the ability to store at least 24 months of continuous data with the capability to generate hourly, daily, weekly, monthly, and annual reports.

3.4.2 Data Reporting

Pursuant to Sections 95668(h)(4)(A)(5) and 95673(a)(11) of the Rule, WGS will provide an annual report of all meteorological data and ambient air data collected at the Facility to CARB electronically at oilandgas@arb.ca.gov with the subject line "Natural Gas Underground Storage Reporting". Additionally, WGS will make meteorological data and ambient air data available at the request of the CARB Executive Officer.

3.5 Alarm System and Monitoring Baseline Conditions

Pursuant to Section 95668(h)(4)(A)(4) of the Rule, WGS has established an integrated alarm system connected to the ambient air monitors that will be continuously audible and visible in the control room at WGS. Per Section 95668(h)(4)(A)(7) of the Rule, the alarm system will be triggered under the following conditions:

- The 1-hour average concentration, for a full operating hour, is greater than or equal to four times the monitor baseline; or
- An alternative scenario agreed upon in consultation with CARB is met.

Pursuant to Section 95668(h)(4)(A)(6) of the Rule, WGS has established a baseline monitoring value for the facility using 12 months of continuous monitoring data. The baseline condition was established from the 98th percentile of the 12-month continuous period of 1-hour measurements.

A summary of the baseline concentration values at the Facility's West and East monitoring stations is presented in Table 3 below.

Table 3. Wild Goose Facility Baseline Concentration Values

	West	East
Approved Baseline Value (ppm)	13.49	13.3
Alarm Threshold (ppm)[1]	53.96	53.2

1. Alarm system is triggered when the sensor detects a reading that is greater than or equal to 4 times the baseline concentration value.

For the purposes of determining the ambient air monitor 1-hour values, a full operating hour will be considered as at least 45 valid 1-minute data points that will be used to calculate the hourly average. Hourly data will not include partial operating hours (any clock hour with less than 45 minutes of monitor operation) and hours when maintenance or quality-assurance activities are performed on the monitors. Pursuant to Section 95668(h)(4)(A)(9), WGS recognizes that the West and East baseline conditions may be re-evaluated every 12 months for changes in local conditions and must be approved by CARB.

In the event that an alarm is triggered, WGS will confirm an alarm condition has occurred, review data to confirm the validity of the alarm, and then contact the following agencies within 24 hours of the alarm trigger in accordance with Section 95668(h)(4)(A)(8):

- CARB;
- California Department of Conservation Geologic Energy Management Division (CalGEM) and,
- BCAQMD.

The following scenarios will not be considered as an alarm condition for the purposes of the CARB Oil and Gas Rule:

1. Natural gas blowdown events;
2. Natural gas releases due to maintenance activities or emergency shutdowns;
3. Leaks at or below 1,000 ppmv total hydrocarbons.

If any of the above scenarios lead to an alarm, WGS will provide CARB with a courtesy notification via email within 24 hours. The email will notify CARB that an alarm was triggered but the associated cause of the alarm is not believed to be an alarm condition for the purposes of the CARB Oil and Gas Rule.

4. Wellhead Daily Monitoring and Reporting

4.1 Daily or Continuous Monitoring

In accordance with Section 95668(h)(4)(B)(1) of the Rule, WGS has been conducting and will continue to conduct daily monitoring at each injection/withdrawal wellhead and attached pipelines using portable monitoring instruments approved by the CARB Executive Officer. Monitoring may be suspended in cases such as, but not limited to, emergencies, extreme weather, and unsafe working conditions. Monitoring will resume as soon as possible after a suspended monitoring event. Under the DOGGR approved inspection and leak detection protocol (provided in Appendix C), WGS currently performs daily leak surveys. WGS proposes to continue to use these procedures to meet the leak screening requirement in the CARB Oil & Gas Rule. The monitor is described in detail in Section 4.1.1. A map of the Well Pad is shown in Figure 5.

Should WGS choose to use continuous leak instrumentation to meet the requirements of Section 95668(h)(4)(B) of the Rule, WGS will submit a request to CARB to amend the monitoring plan to reflect the use of this instrumentation in lieu of the daily leak survey.

Pursuant to Section 95668(h)(4)(B)(1)(a) of the Rule, WGS will report a delay of inspection if wildlife is found to be present on a component and inspection must be halted or postponed within a certain distance of the wildlife in order to comply with state and federal wildlife regulations. WGS will report the delay of the inspection to CARB within 24 hours of discovering the wildlife. The notification will include a description of the type of wildlife and the regulations required work to be halted. Once the reason for the inspection delay is resolved, WGS will resume inspection and notify CARB within 24 hours of resuming the daily leak inspections.

Figure 5: MAP of Wild Goose Well Pad

4.1.1 Monitoring Technology

Wild Goose currently uses Honeywell GasAlertMax XT II (XT II) personal monitors for general leak surveillance, which are approved by DOGGR under the inspection and leak detection protocol and also meet the leak screening requirements of Section 95668(h)(4)(B)(1) of the Rule. The XT II instrument uses high-performance infrared technology and data-logging functionality to ensure the integrity of sampling. WGS proposes to add both the RKI GX-Force personal monitor and MSA Altair 5x multi-gas detector as well as continue using the XT II for leak monitoring purposes. These monitors are utilized at Rockpoint Gas Storage's other U.S. facilities, and would allow for greater flexibility and harmonization between Rockpoint's U.S. facilities. Detailed specifications for all three monitors are provided in Appendix C.

4.2 Monitoring Discovery and Repair

4.2.1 Monitoring Discovery

Per Section 95668(h)(4)(B)(3) of the Rule, within 24 hours of detecting a leak through the daily monitoring procedures, WGS will perform leak measurements in accordance with EPA Method 21, excluding the use of PID instruments. WGS will continue using the RKI Eagle 2 for leak monitoring purposes. WGS proposes to add both the Bascom-Turner Instruments Model CCD-201 and OVA 88 flame ionization detector, which are utilized at Rockpoint Gas Storage's other U.S. facilities and meet the requirements of Section 95668(h)(4)(B)(1) of the Rule, as additional EPA Method 21 monitoring devices that may be used to perform leak measurements. Detailed specifications for the monitors are included in Appendix D.

Pursuant to Section 95669(i) of the Rule, the following procedures will be completed upon leak detection:

- WGS will affix a weatherproof readily visible tag that identifies the date and time of leak detection and the measured leak concentration to the leaking component.
- The tag shall remain affixed to the component until the leaking component has been successfully repaired or replaced, after which the tag shall be removed.
- Successful repair shall be confirmed by re-measuring the component using US EPA Reference Method 21 (October 1, 2017) as specified in Section 95669(b) to determine that the component is below the minimum leak threshold after repair or replacement.

4.2.2 Leak Repair

After determining the leak rate using EPA Method 21, WGS will repair the leak according to the timelines noted below, as outlined in Sections 95669(h) of the Rule.

Leak Rate	Repair Time Period
1,000 – 9,999 ppmv	First attempt at repair within 5 calendar days and successful repair within 14 calendar days
10,000 – 49,999 ppmv	5 calendar days
≥ 50,000 ppmv	2 calendar days
Critical Component or Critical Process Unit Leak	By next process shutdown or within 12 months, whichever is sooner

4.3 Leak Reporting and Recordkeeping

4.3.1 Individual Leak Reporting

In accordance with Section 95668(h)(4)(B)(6) of the Rule, WGS will report the following individual leaks to CARB, CalGEM, and BCAQMD within 24 hours of measurement:

- Leaks > 50,000 ppmv total hydrocarbons; and,
- Leaks > 10,000 ppmv total hydrocarbons for more than 5 continuous calendar days.

4.3.2 Leak Recordkeeping

In accordance with Section 95668(h)(4)(B)(7) of the Rule, WGS will maintain and make available to the CARB Executive Officer records of the initial and final leak concentration measurements for leaks identified during daily monitoring processes that are above the minimum allowable leak thresholds specified in Section 4.2. WGS will utilize the record format as specified in Appendix A, Table A5 of the CARB Oil and Gas Rule.

5. Well Blowout Procedures

Per Section 95667(a)(3) of the Rule, “blowout” means the uncontrolled flow of gas, liquids, or solids (or a mixture thereof) from a well onto the surface.

5.1 Optical Gas Imaging (OGI) Procedures

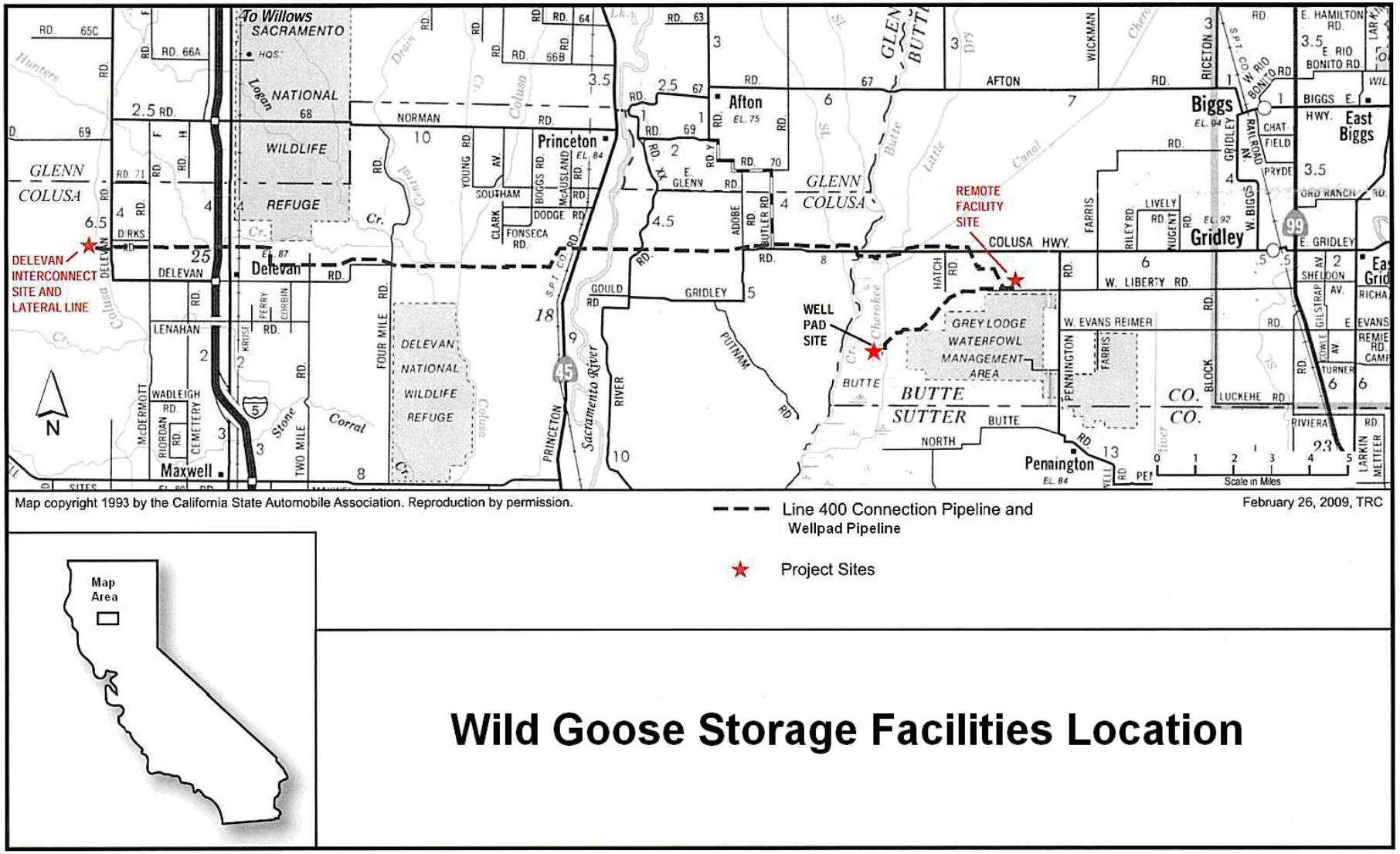
Per Section 95668(h)(4)(C) of the Rule, WGS will direct a qualified technician (with training in basic thermal science, OGI camera operation and safety, and OGI inspections) to obtain daily OGI video footage of a leak resulting from a well blowout according to the following timeline[3]:

- As soon as possible after WGS has confirmed that a well blowout event has occurred, a qualified technician will collect 10 minutes of OGI video footage of the leak resulting from the well blowout.
- The qualified technician will continue to record OGI video footage of the leak for a minimum of 10 minutes every four (4) hours until the blowout is capped.
- Within one business day after recording OGI video footage, WGS will post the video footage on a facility-maintained public internet website.

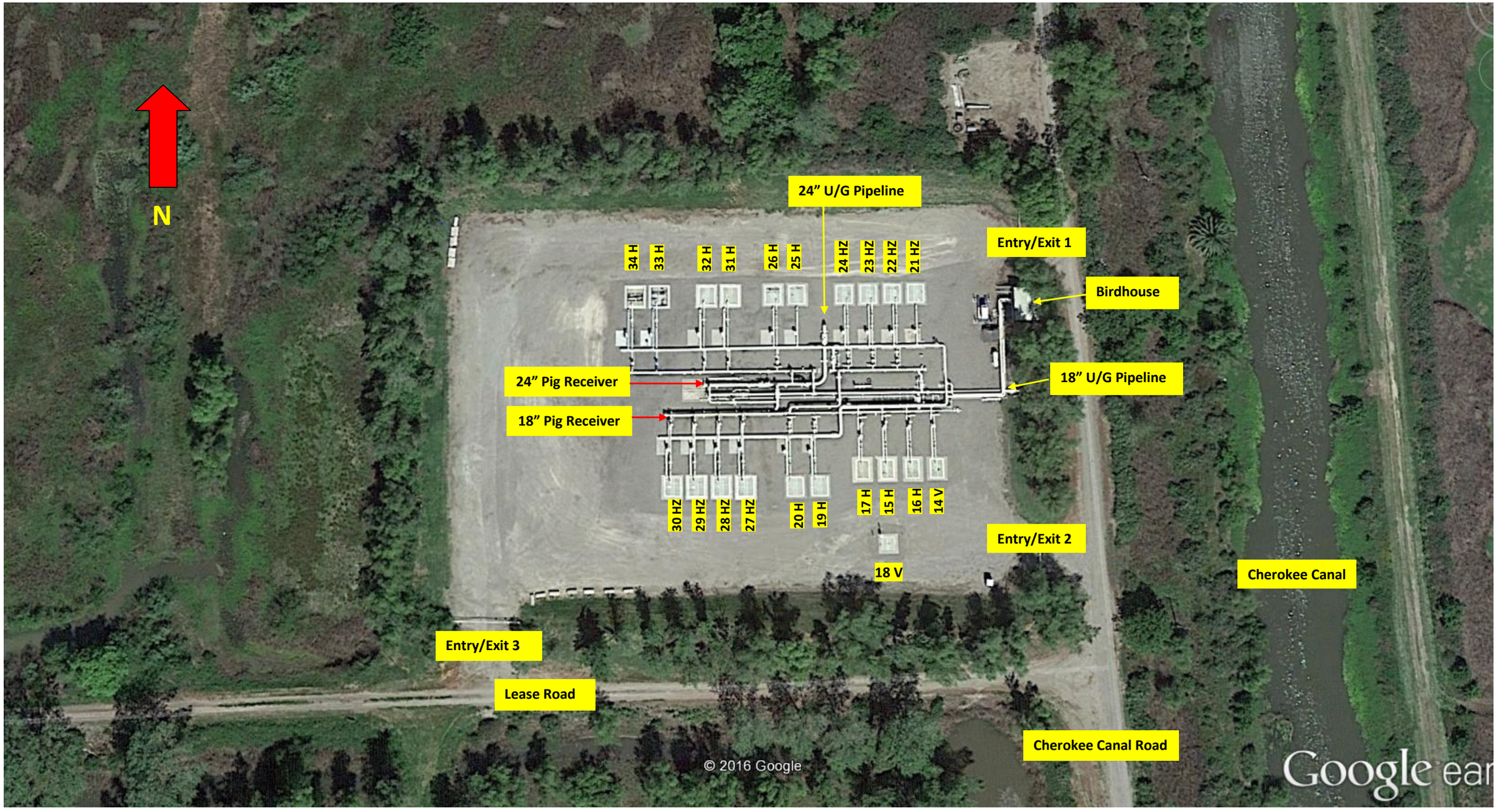
Pursuant to Section 95668(h)(4)(C)(3) of the Rule, WGS will provide OGI video footage to the CARB Executive Officer upon request, for publication on a CARB-maintained public internet web site.

[3] In the event of a well blowout, WGS will utilize an outside contractor to capture the required OGI footage. Therefore, the specifications for OGI equipment cannot be provided in this Plan. Prior to collecting the footage, WGS will ensure the OGI equipment meets the criteria in 40 CFR 60.5397a.

Appendix A – Map of Wild Goose Facility and Wellhead Sites



Wild Goose Storage Facilities Location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24” U/G Pipeline
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Entry/Exit 1
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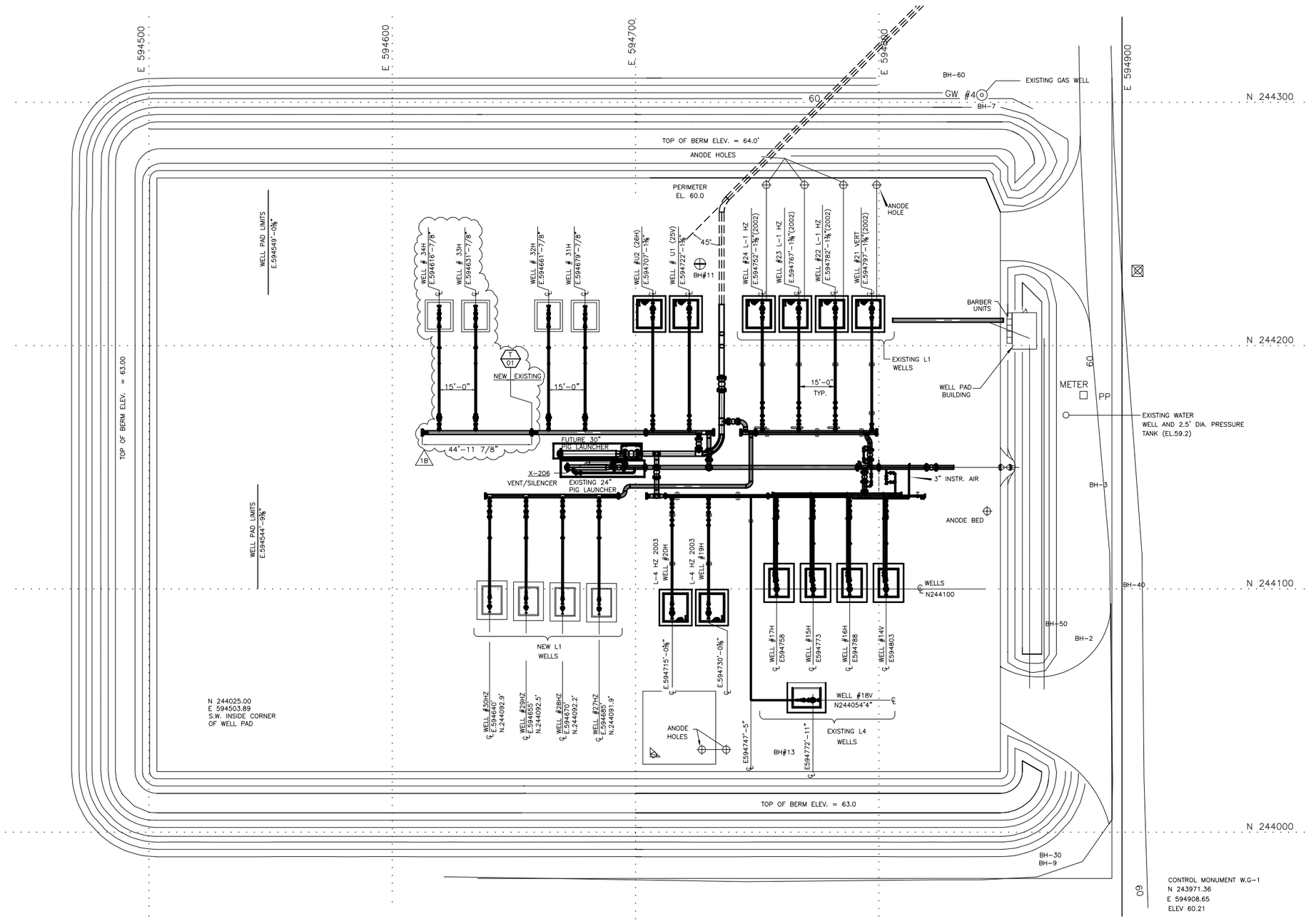

GENERAL NOTES:

REFERENCE DRAWINGS	DWG. No.
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PERMIT STAMP

ENGINEER'S STAMP

No.	DATE (Y/M/D)	CLIENT PROJECT DESCRIPTION	PROJ.	AFE	EPCM	EPCM No.	APPD.
A	2011/03/15	WELL PAD EXPANSION-33H/34H	.	.	SWIFT	5376	.

REV. NUMBER	ISSUE STAGE	DATE	BY	CHKD.	APPD.
A	A-PRELIMINARY	11/03/23	MA	.	.
B	B-BID	11/06/10	MA	.	KJ
C	C-	YY/MM/DD	.	.	.

Swift Engineering Inc.
www.swift-eng.com

Niska Gas Storage

CLIENT: NISKA
WILD GOOSE GAS STORAGE

PROJECT:
WELL PAD EXPANSION
PLOT PLAN
NEW WELLS-U3 EXPANSION-33H/34H
AREA: SW 1/4, SECTION 17, T17N R1E, M.D.M

SCALE:	PROJECT NO.:	DATE:	DRAWN BY:	DRAWING NUMBER:
NTS	5376	11/03/23	MA	NSK-WGS-WPAD-PP-001

P:\NISKA GAS\5376.1002 Wellpad Tie-Ins\2. Design & Drafting\1. General\1. Working Drawings\2. Orthographic\NSK-WGS-WPAD-PP-001.dwg, 02/02/2012 7:15:47 AM, Kent.Chan

Appendix B – Ambient Air Monitors Specifications

PRODUCT BROCHURE

BASELINE® 9000
HYDROCARBON ANALYZERS

Continuious Monitoring of Hydrocarbons in Non-Condensing Gases

AMETEK® | mocon®

BASELINE® 9000
HYDROCARBON ANALYZER

The Baseline® 9000 Hydrocarbon Analyzer product line are microprocessor-based instruments designed for continuous ambient or process hydrocarbon gas measurement in environmental or industrial settings. The analyzers can be purchased in a variety of configurations with internal components for single or multi-point sampling (with or without a sample pump) for pre-filtered non-condensing samples.

Using a Flame Ionization Detector (FID), MOCON's FlowGuard electronic control regulates the delivery of fuel, air, and a small portion of the sample gas, to the FID. During the combustion process, organic or hydrocarbon-based gases in the sample are ionized, detected by the instrument, and then reported as a concentration. The automatic calibration feature enhances the long-term analytical stability of the instrument.

All instrument parameters are reported clearly and continually refreshed on a large, graphical LCD display. Using analog, digital, and logic output communication capabilities, analytical information from the analyzer can be acquired using an external PC and a simple communications program such as Windows® HyperTerminal or the analyzer can output binary or ASCII formats directly to a data acquisition system or PLC. Every Baseline 9000 analyzer includes MOCON's free PC utility 9000 Keeper used for storing and uploading multiple methods, as well as sending configuration settings, directly to the analyzer.

Unlimited Applications

- **Beverage-grade CO2 analysis**
- **Fenceline (perimeter) monitoring**
- **Scrubber and oxidizer efficiency**
- **Carbon bed breakthrough detection**
- **Contaminant analysis**
- **Ultra-Pure gases**
- **Well Logging**
- **Industrial hygiene & safety**
- **LEL monitoring**
- **VOC continuous emission monitoring systems**
- **Ambient air quality monitoring system**
- **Airborne molecualr contamination**
- **Compliance monitoring for EPA Method 25A**
- **Continuous emission stack monitoring**
- **Vehicle emissions**

Features & Benefits

Automated Control Featues

- Automatic FID ignition
- Automatic calibration at user-defined intervals
- Internal multi-point sampling option
- Electronic back-pressure regulator with sample bypass system
- FlowGuard Control of fuel, air, and sample

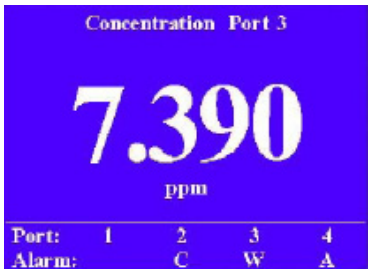
Versatile Platform

- Graphic LCD dispaly with easy to use menu
- Benchtop or rack-mountable
- Single or multi-point sampling
- Customizable ethernet or serial output
- Programmable analog output ranges
- Programmable relays for diagnostics, concentration, alarms, and events

BASELINE® 9000
HYDROCARBON ANALYZER

PRODUCT BROCHURE

TOTAL HYDROCARBONS
BASELINE 9000 THA

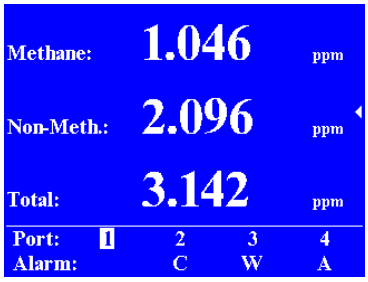


The 9000 Total Hydrocarbon analyzer is a versatile instrument for use in numerous applications ranging from parts-per-billion level detection for trace analysis in ultra pure gases to %-level for process optimization or LEL monitoring.

Applications
- Beverage-grade CO2 analysis
- Fenceline (perimeter) monitoring
- Scrubber and oxidizer efficiency
- Carbon bed breakthrough detection
- Contaminant analysis
- Well Logging
- Industrial Hygiene & safety
- LEL monitoring

Accurate Detection
- User definable ranges
- Automatic FID ignition

METHANE/NON-METHANE
BASELINE 9000 MNME

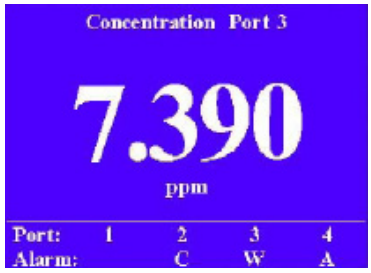


The 9000 Methane/Non-Methane analyzer uses a flame ionization detector (FID) in conjunction with an oxidation catalyst that oxidizes all hydrocarbons except methane to produce a methane measurement which is then subtracted from the total concentration to determine the non-methane hydrocarbon reading.

Applications
- VOC Continuous emission monitoring systems
- Ambient air quality monitoring system
- Airborne molecular contamination
- Available in ambient or 120º for heated samples

Accurate Detection
- User definable ranges
- Automatic adjustment for catalyst efficiency variance
- Fast (<30 sec) reproduceable response
- Automatic calibration

HEATED TOTAL HYDROCARBONS
BASELINE 9000 H-THA

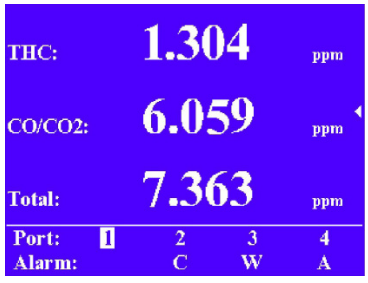


The 9000 Heated analyzer functions like the 9000 THA but is configured for single point analysis (with or without a sample pump) of samples heated up to 376 °F (191 °C) for pre-filtered (< 10 microns) non-condensing samples.

Applications
- Compliance monitoring for EPA Method 25A
- Continuous emission stack monitoring
- Scrubber and oxidizer efficiency
- Carbon bed breakthrough detection
- Vehicle emissions

Accurate Detection
- User definable ranges
- Detection limits <150 ppb as methane
- Automatic calibration
- Drift <0.025% of full-scale over 24 hours

HYDROCARBONS & CO/CO_2
BASELINE 9000 TCA



The 9000 Total Carbon analyzer utilizes a flame ionization detector (FID) in conjunction with a catalytic methanizer that converts the CO and CO2 to methane (CH4) and leaves the hydrocarbons unchanged for a total carbon measurement which is then subtracted from the total carbon concentration to determine the combined CO/CO2 reading.

Hydrocarbon & CO/CO_2 Impurities in Ultra-Pure Gasses
- Argon, Ar
- Helium, He
- Hydrogen, H_2
- Nitrogen, N_2

Accurate Detection
- User definable ranges
- Detection limits <100 ppb as methane
- Automatic calibration
- Drift <0.01% of full-scale over 24 hours

BASELINE® 9000
HYDROCARBON ANALYZER

PRODUCT BROCHURE

Technical Specifications

	9000 THA	9000 MNME	9000 MNME 120	9000 TCA	9000 H
DETECTOR	Flame Ionization Detector (FID)	Flame Ionization Detector (FID) *w/ Oxidizer*	Flame Ionization Detector (FID) *w/ Oxidizer*	Flame Ionization Detector (FID)	Flame Ionization Detector (FID) *w/ Oxidizer*
RANGES (AS CH_4)	User definable based upon calibration: • Very Low - 0.01 ppm to 200 ppm • Low - 0.1 ppm to 2,000 ppm • Medium - 0.3 ppm to 20,000 ppm • High - 0.003% ppm to 100% ppm	User definable based upon calibration: • Low - 0.03 ppm to 50 ppm • Medium - 0.06 ppm to 500 ppm • High - 0.15 ppm to 5000 ppm	User definable based upon calibration: • Low - 0.06 ppm to 50 ppm • Medium - 0.6 ppm to 500 ppm • High - 1.0 ppm to 5000 ppm	User definable based upon calibration: • Low - 0.1 ppm to 100 ppm	User definable based upon calibration: • Very Low - 0.15 ppm to 200 ppm • Low - 0.3 ppm to 2,000 ppm • Medium - 0.6 ppm to 20,000 ppm • High 0.003% to 50%
ACCURACY, REPEATABILITY	+1% full-scale response	+1% full-scale	+1% full-scale	+1% full-scale	+1% full-scale
DRIFT, ZERO	+0.025% full-scale over 24 hours	+0.01% full-scale, 24 hours	+0.01% full-scale, 24 hours	+0.01% full-scale, 24 hours	+0.025% full-scale, 24 hours
DRIFT, SPAN	+1% full-scale, 24 hours	+1% full-scale, 24 hours	+1% full-scale, 24 hours	+1% full-scale, 24 hours	+1% full-scale, 24 hours
RESPONSE TIME	T90 < 5 seconds	T90 < 30 seconds	T90 < 30 seconds	T90 < 30 seconds	T90 < 5 seconds
SAMPLING	Internal single or multi-point, (pump optional)	Internal single or multi-point, (pump optional)	Internal single or multi-point, (pump optional)	Internal single point (pump optional)	Internal single point (pump optional)
ALARMS	Multilevel concentration and fault alarms, audible and visual	Multilevel concentration and fault alarms, audible and visual	Multilevel concentration and fault alarms, audible and visual	Multilevel concentration and fault alarms, audible and visual	Multilevel concentration and fault alarms, audible and visual
CALIBRATION	Programmable automatic or manual calibration	Programmable automatic or manual calibration	Programmable automatic or manual calibration	Programmable automatic or manual calibration	Programmable automatic or manual calibration
SUPPORT GAS REQUIREMENT	• UHP Hydrogen (H_2) 30 cc/min • Zero air - 175 cc/min • Span gas - methane is typical **Fuel blend options available*	• UHP Hydrogen (H_2) 35 cc/min • Zero air - 175 cc/min • Span gas - methane/propane is typical **Fuel blend options available*	• UHP Hydrogen (H_2) 35 cc/min • Zero air - 175 cc/min • Span gas - methane/propane is typical **Fuel blend options available*	• UHP Hydrogen (H_2) 35 cc/min • Zero air - 175 cc/min • Span gas - methane w/ C0 or $C0_2$ typical **Fuel blend options available*	• UHP Hydrogen (H_2) 30 cc/min • Zero air - 175 cc/min • Span gas - methane is typical **Fuel blend options available*
DISPLAY	Graphical LCD, 3.4" x 4.5" (8.64 cm x 11.43 cm)	Graphical LCD, 3.4" x 4.5" (8.64 cm x 11.43 cm)	Graphical LCD, 3.4" x 4.5" (8.64 cm x 11.43 cm)	Graphical LCD, 3.4" x 4.5" (8.64 cm x 11.43 cm)	Graphical LCD, 3.4" x 4.5" (8.64 cm x 11.43 cm)
OUTPUTS	• LAN/Ethernet, RS-232 • Analog, 1 programmable 0-20mA/4-20mA isolated output •Relays, 5 programmable From A relays rated to 3A @230VAC (Optional) • 3 additional analogs • 9 additional relays	• LAN/Ethernet, RS-232 • Analog, 1 programmable 0-20mA/4-20mA isolated output •Relays, 5 programmable From A relays rated to 3A @230VAC (Optional) • 3 additional analogs	• LAN/Ethernet, RS-232 • Analog, 1 programmable 0-20mA/4-20mA isolated output •Relays, 5 programmable From A relays rated to 3A @230VAC (Optional) • 3 additional analogs	• LAN/Ethernet, RS-232 • Analog, 4 programmable 0-20mA/4-20mA isolated output • Relays, 14 programmable From A relays rated to 3A @230VAC	• LAN/Ethernet, RS-232 • Analog, 1 programmable 0-20mA/4-20mA isolated output •Relays, 5 programmable From A relays rated to 3A @230VAC
OPERATING TEMPERATURE	32 to 104° F (0 to 40 C)	32 to 104° F (0 to 40 C)	32 to 104° F (0 to 40° C)	32 to 104° F (0 to 40° C)	32 to 104° F (0 to 40° C)
OPERATING HUMIDITY	0 to 95% (non-condensing)	0 to 95% (non-condensing)	0 to 95% (non-condensing)	0 to 95% (non-condensing)	0 to 95% (non-condensing)
CONFIGURATION	Benchtop or 19" (48.3cm) rack-mount, 3U	Benchtop or 19" (48.3cm) rack-mount, 3U	Benchtop or 19" (48.3cm) rack-mount, 3U	Benchtop or 19" (48.3cm) rack-mount, 3U	Benchtop or 19" (48.3cm) rack-mount, 3U

Accessories

Preventive Maintenance Kit

• Includes all parts potentially needed on-hand

Gas Generators

• Hydrogen Generator
• Zero Air generators

Software

• 9000 Keeper provided for method switching via PC

Service & Support Options

• Start-up and training, 1 day onsite

Other Specifications

Physical Specifications

• 5.25"H x 19"W x 16.25"D (13.02 cm x 48.26 cm x 41.28 cm)
• <20 Lbs. (9.07 kg)

Electrical Specifications

• Voltage: 100 - 240 VAC 50/60 Hz, 1A

AMETEK® | mocon®

AMETEK MOCON, INC.
PO Box 649, 19661 US-36
Lyons, CO 80540 USA
www.ametekmocon.com
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GAS TRAC® FMD

FIXED METHANE DETECTOR

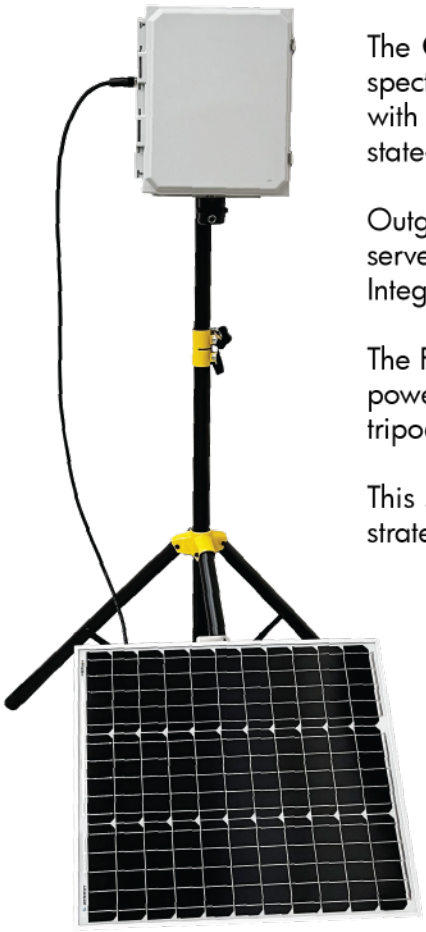
ADVANCED METHANE MONITORING SYSTEM

SENSIT Technologies

GAS•TRAC® FMD

FIXED METHANE DETECTOR

REMOTE METHANE MONITORING PLATFORM



The **GAS•TRAC® FMD** is an active sampling system equipped with a tunable diode laser spectroscopy (TDLAS) cell capable of detecting methane as low as 200 PPB. When equipped with an anemometer, the **FMD** is capable of localizing leaks, as well as providing state-of-the-art data to aid in quantification.

Outgoing data is transmitted via cellular to either **SENSITConnect** or the user's chosen server. Advanced analytics, alarms, and automated alerts are available via **SENSITConnect**. Integration with other software infrastructure is available upon request.

The FMD is designed for autonomous and continuous operation via solar panel or connected power. Setup is quick and easy. The **FMD** weighs 15 pounds and can be deployed on a tripod, providing easy portability, or it can be permanently mounted to a pole.

This system is the perfect addition to any continuous compliance monitoring or event survey strategy.

STANDARD FEATURES

- Methane Selective Internal Optical Assembly for Local Detection
- Built-in Sampling Pump
- Built-in Rechargeable Battery
- Wireless Communication to Secure Server
- Continuous Datalogging

APPLICATIONS

- **Greenhouse Gas Emissions Monitoring**
- **Periodic Environmental Compliance**
- **Leak Detection and Localization**

STANDARD KIT

Controller Box
Tripod
Solar Panel
Instruction Manual

OPTIONAL HARDWARE:

Ultrasonic Anemometer
Vane Anemometer
Indicator Alarm Light
Alarm Siren
Calibration Gas

PRODUCT SPECIFICATIONS

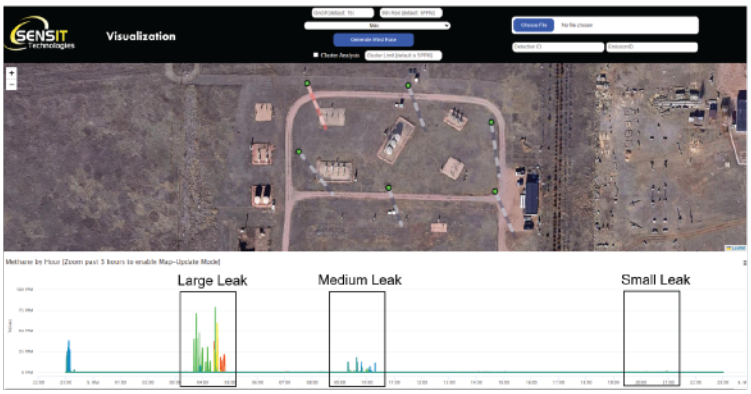
Size: Fully assembled with anemometer and antenna D x W x H (8in x 12in x 24in)
Weight: Base unit: 15 lbs approx
Operational Temp: -20°C to 50°C (-4°F to 122°F)
Operating Humidity: 0% and <95% non-condensing
Storage Temp: -40°C to 60°C
Battery Life: 8 Days without Recharging via Solar Panel
Power Requirement: Built in Rechargeable Battery Maintained by Solar Panel
Power Consumption: Less than 2 Watts
Environmental Pressure: 68kpa-115kpa
Laser Safety: Class IIIr
Enclosures: NEMA 4X Fiber Reinforced Enclosure
Communication Interface: Local USB and Cellular. Local wireless available upon request.

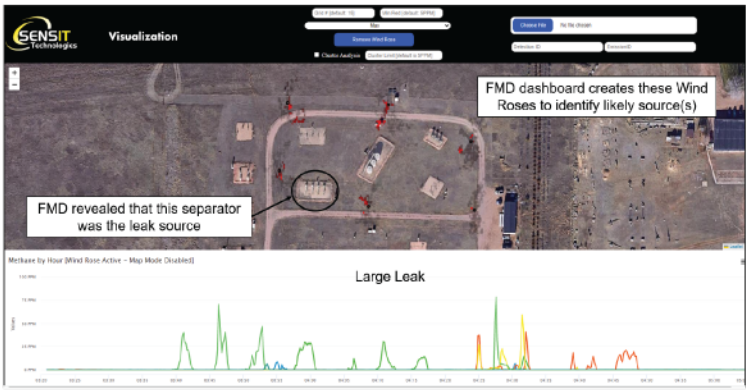
DETECTOR SPECIFICATIONS

PARAMETER	DESCRIPTION
Technologies	Near IR TDLAS with Multi-pass Cell
Wavelength	~1650 nm
Methane Range	0-100 vol.%
Methane Resolution	0.2 PPM (200 PPB)
Methane Accuracy	10% (+/- 0.5 ppm min)
Methane T90	<10 seconds
Laser Life	>5 years
Pre-Filter Life	6 months estimated
Internal-Filter Life	6 months estimated
Pump Life	10,000 hours

6 FMDS DEPLOYED AT A SIMULATED OIL AND GAS SITE. CONTROLLED EMISSIONS INTRODUCED.

ADVANCED METHANE DETECTION SYSTEM CAPABLE OF IDENTIFYING AND LOCATING INTRODUCED EMISSIONS.





GAS•TRAC® FMD
Accessories & Replacement Parts

GAS•TRAC® FMD	Part # 932-00000-50
Controller Box	Part # 832-00000-50
Laser Assembly	Part # 870-00103
Vane Anemometer	Part # 882-00187
Solar Panel	Part # 870-00110
Ultrasonic Anemometer	Part # 870-00114
Indicator/ Alarm Light	Part # 870-00107
Alarm Siren	Special Request
Tripod	Part # 870-00149

SENSIT Technologies

851 Transport Drive
Valparaiso, IN 46383-8432

Phone: 888 4SENSIT
888 473 6748
219 465 2700

Fax: 219 465 2701
www.GasLeakSensors.com

MADE IN THE USA
WITH GLOBALLY SOURCED COMPONENTS

SENSIT Technologies
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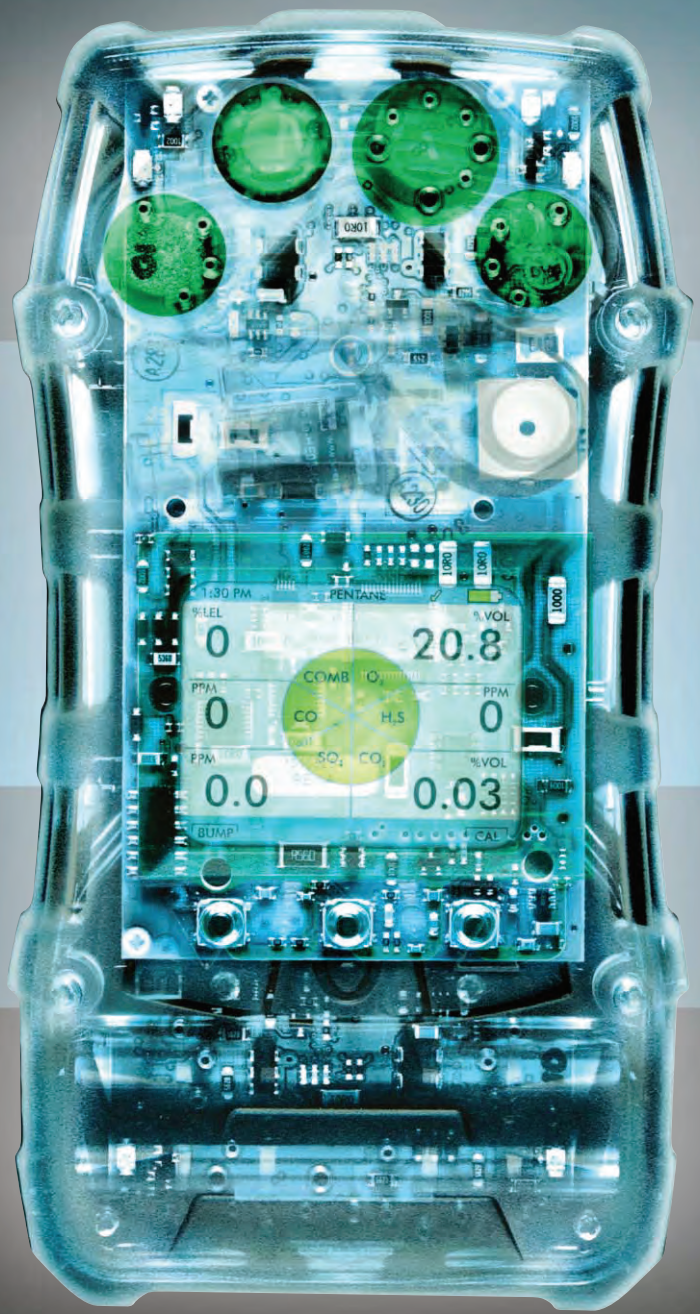
Appendix C – Daily Leak Monitoring Policy and Procedure and Wellhead Monitoring Equipment Specifications

MSA
The Safety Company

ALTAIR® 5X

IT'S WHAT'S INSIDE THAT COUNTS

ALTAIR 5X Multigas Detector
With MSA XCell® Sensor Technology



Fully compatible with MSA Link™ Software and MSA GALAXY® GX2 Automated Test System

Variety of optional MSA infrared sensors

Robust integral pump for consistent flow

High contrast color or monochrome display

18 language options

Large buttons for easy operation

Advanced MotionAlert and InstantAlert features

High performance MSA XCell Sensors

24-hour bump checkmark

End of XCell Sensor life warning

Durable, rubberized housing for secure grip

■ MSA-exclusive feature

IT'S WHAT'S INSIDE THAT COUNTS

WORKERS who face potentially hazardous situations deserve the best protection available. At MSA, we work tirelessly to build smarter, better gas detection instruments upon which people of the world rely. First we introduced MSA's advanced technology with the ALTAIR 4X Multigas Detector with XCell Sensors. Now we're proud to offer the most advanced sensor technology available in a six-gas portable instrument:

the ALTAIR 5X Multigas Detector with XCell Sensor Technology.

Built on Durability

The ALTAIR 5X Multigas Detector for LEL, O_2 and toxic gas detection is as tough and functional as it looks. A rugged polycarbonate housing provides unsurpassed durability, including the ability to survive a 10-foot drop. Inside, a field-proven integral pump provides consistent gas flow without the problems of externally-attached components. Ergonomic design, glove-friendly buttons and high-contrast display make the ALTAIR 5X Multigas Detector easy to use for all applications.

Powered by Performance

Toughness and durability aren't the whole story. The real strength of the ALTAIR 5X Multigas Detector comes from new sensor technology. MSA XCell Sensors have a typical life of more than double the industry average, and are engineered using MSA's proprietary application-specific integrated circuit (ASIC) design. By miniaturizing the sensor controlling electronics and placing them inside the sensor itself, MSA XCell Sensors offer superior stability, accuracy and repeatability.

MSA XCell Sensors are a breakthrough in chemical and mechanical sensor design, enabling faster response and span calibration times. With less time spent on calibration and bump tests, you save calibration gas, maintenance costs and in turn, save money. But most importantly, in your industry, saving seconds on response time can also mean saving lives.

In addition to MSA XCell Sensors, the ALTAIR 5X Multigas Detector can also be equipped with our wide variety of IR sensors covering many gases and ranges including CO_2.

Flexibility to Meet Your Needs

MSA's ALTAIR 5X Multigas Detector provides many options to fit various applications. The detector is configurable with either a high-resolution color or monochrome LCD display with multilingual capabilities. MSA's Logo Express® Service option is available to customize the color display. The detector is easily configurable with interchangeable plug-and-play sensor slots for MSA XCell Sensors. Up to six gases can be monitored simultaneously.

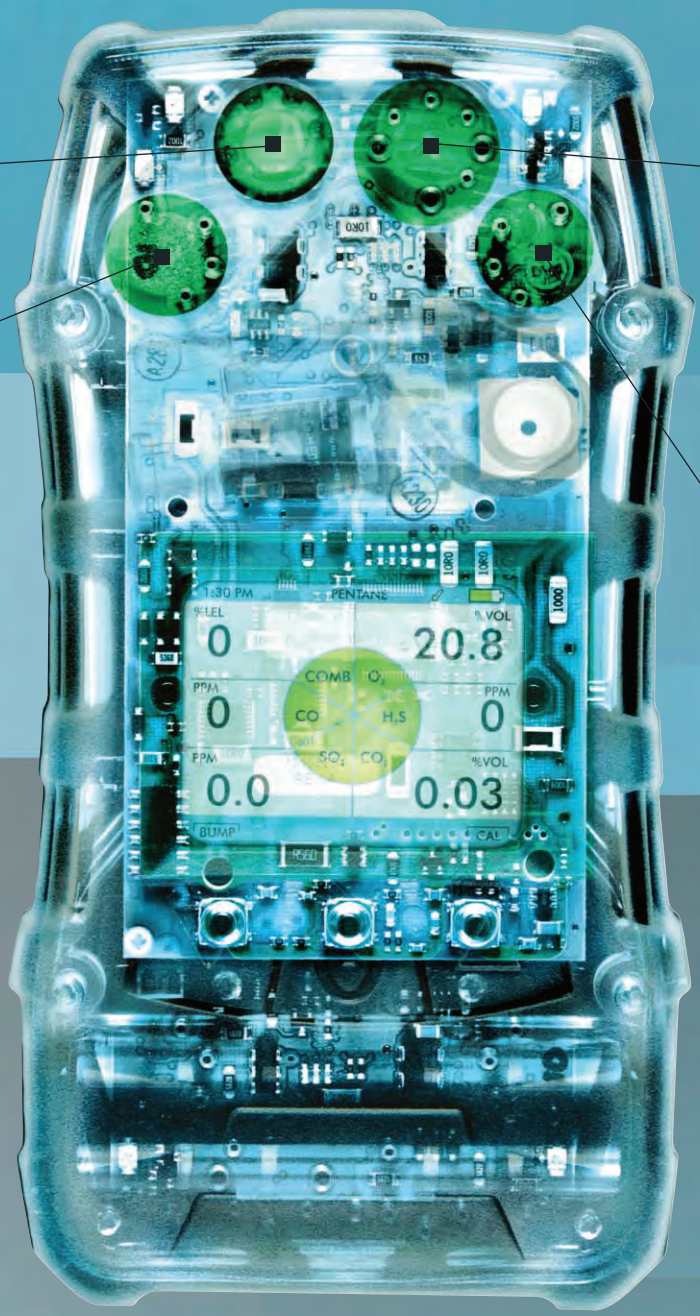
Furthermore, this multigas detector offers optional glow-in-the-dark instrument housing for IR sensor-equipped units. The ALTAIR 5x Multigas Detector's lithium-ion battery lasts up to 20 hours, allowing it to be used over multiple shifts. An alkaline battery pack is also available as an accessory. MSA's ALTAIR 5X Multigas Detector is fully compatible with the MSA GALAXY GX2 Automated Test System and MSA Link™ Pro and MSA Link Software.

"We liked how the total cost of ownership package was presented to us."

– Safety director at energy company

MSA

XCell® SENSORS



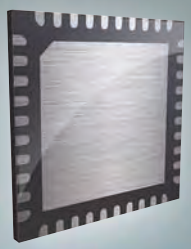
MSA XCell O_2 Sensor

MSA XCell Ex Sensor, combustible

MSA XCell SO_2, Cl_2, or NH_3 Sensor

Additional exotic sensors: ClO_2, HCN, PH_3, NO_2

MSA XCell CO/H_2S Sensor



Adding microelectronics inside the sensors provides more control and higher performance than previous generations.

MSA XCell Sensors are a breakthrough in chemical and mechanical sensor design, enabling faster response and span calibration times.

THE MSA COMMITMENT. FROM THE LATEST IN SENSOR TECHNOLOGY TO INSTRUMENT DESIGN AND MANUFACTURING, MSA HAS THE CAPABILITIES AND EXPERTISE TO SUPPORT YOUR PORTABLE GAS DETECTION CHALLENGES.

www.MSAsafety.com/ALTAIR5X | 1.800.MSA.2222

MSA XCell Technology:

Save Time, Save Money, Save Lives

Building on years of sensor design experience, MSA has revolutionized sensor technology with design breakthroughs that improve performance.

- New XCell exotic SO_2, Cl_2 and NH_3 Sensors for expanded monitoring applications
- Sensor response and clear times in less than 15 seconds for most common sensor configurations
- Bump test in less than 15 seconds for most common sensor configurations
- Span calibration time of 60 seconds for most common sensor configurations
- Greater signal stability and repeatability under changing or extreme environmental conditions
- All XCell Sensors are capable of plug-and-play capabilities for easy reconfiguration

With reliable, extended-life XCell Sensors, there's no need to replace sensors after two years.

- Typical life greater than four years for combustible, O_2, CO/H_2S, and SO_2 sensors
- Typical life greater than three years for NH_3 and Cl_2 sensors
- Combustible sensor proprietary operating mode helps poison-resistance over the life of the sensor
- End-of-sensor-life warning gives advanced notice to user, reducing service outages

Three-year back-to-back instrument warranty includes $CO/H_2S/O_2/LEL/SO_2$ and IR sensors

Two-year warranty on NH_3 and Cl_2; minimum 12-month warranty on other sensors

Count on the ALTAIR 5X Detector

Exclusive MotionAlert™ and InstantAlert™ features make the ALTAIR 5X Multigas Detector ideal for applications such as confined space monitoring . MotionAlert feature activates when a user becomes disabled and motionless, quickly alerting others to the disabled user's location. And with a simple push of a button, InstantAlert feature enables users to manually alert others to potentially hazardous situations.

The ALTAIR 5X Multigas Detector outlasts the competition. To prove it,the instrument comes with a full three-year warranty*, an entire year longer than the industry average, so that you can depend upon the ALTAIR 5X Multigas Detector to withstand the wear and tear that other portable gas detectors can't.

* Three-year warranty is for most common sensor configurations.

Online Training and Product Simulation

MSA's online training and web content include the new ALTAIR 5X Multigas Detector media simulator that takes viewers through instrument operation. This tool is found at http://www.msasafety.com/altair5x.

"The three-year warranty is huge."

– Safety manager at energy company

MSA

Technical Specifications

Gas type	Range	Resolution
Combustible	0-100% LEL	1% LEL
	0-5% Vol, CH_4	0.05% Vol CH_4
Oxygen	0-30%Vol	0.1%Vol
Carbon monoxide	0-2000 ppm	1 ppm
Hydrogen sulfide	0-200 ppm	1 ppm
Sulfur dioxide	0-20 ppm	0.1 ppm
Chlorine	0-10 ppm	0.05 ppm
Ammonia	0-100 ppm	1 ppm
Nitrogen dioxide	0-20 ppm	0.1 ppm
Chlorine dioxide	0-1 ppm	0.01 ppm
Phosphine	0-5 ppm	0.05 ppm
Hydrogen cyanide	0-30 ppm	0.5 ppm
Carbon dioxide, CO_2	0-10%Vol	0.01%Vol
Butane, C_4H_{10}	0-25%Vol	0.1%Vol
Methane, CH_4	0-100%Vol	1%Vol
Propane, C_3H_8	0-100%Vol	1%Vol

Drop test	10 feet
Housing	Rugged rubberized armor
Weight	1 lb (without IR sensor)
Dimensions (L x W x D)	6.69" H x 3.49" W x 1.79" D without belt clip or IR sensor
Audible alarm	>95 dB typical
Visual alarm	2 ultra-bright LEDs, on top
Vibrating alarm	Standard
MotionAlert & InstantAlert features display	Standard High-contrast monochrome or color display
Backlight	Adjustable time-out
Battery	RechargeableLi-ION or AA alkaline
Run time	20 hrs @ room temperature
Charging time	≤ 6 hours
Operating temperature	–20˚C to + 50˚C
Short-period operation	–40˚C to + 50˚C
Humidity	15-90% RH non-condensing
Ingress protection	IP65
Data log	Adjustable, 200 hrs minimum
Event log	Standard 1000 events
Standard warranty	3 years on CO, H_2S, LEL, O_2, SO_2, and IR sensors 2 years on NH_3, Cl_2 sensors 1 year on other sensors

For additional customized versions and calibration gases, use MSA's ATO ordering sheet or contact MSA Customer Service at 1-800-MSA-2222.

ALTAIR 5X Detector with 3-year warranty, monochrome display, data logging, charger, integral pump, and tubing

Approvals		
U.S.	***Canada***	***Configuration***
ALTAIR 5X Detector Economy Kits - monochrome display		
10116924	10115118	LEL, O_2, CO, H_2S
10116925	10115119	LEL, O_2, CO, H_2S, SO_2
ALTAIR 5X Detector Industrial Kits - monochrome display,10-ft sampling line, and 1-ft probe		
10116926	10115120	LEL, O_2, CO, H_2S
10116927	10115141	LEL, O_2, CO, H_2S, SO_2
ALTAIR 5X Detector Deluxe Kits - color display, 10-ft sampling line, and 1-ft probe		
10116928	10115142	LEL, O_2, CO, H_2S
10116929	10115143	LEL, O_2, CO, H_2S, SO_2

ALTAIR 5X GALAXY GX2 Automated Test System

N. America	***Configuration***
10128626	1 cylinder, charging
10128625	Up to 4 cylinders, charging
10128628	1 cylinder, non-charging
10128627	Up to 4 cylinders, non-charging

Calibration Gas

10048280	Calibration gas cylinder (34L) 1.45% CH_4, 15% O_2, 60 ppm CO, 20 ppm H_2S
10045035	Calibration gas cylinder (54L) 1.45% CH_4, 15% O_2, 60 ppm CO, 20 ppm H_2S
10098855	Calibration gas cylinder (34L), 1.45% CH_4, 15% O_2, 60 ppm CO, 20 ppm H_2S, 10 ppm SO_2
10117738	Calibration gas cylinder (58L), 1.45% CH_4, 15% O_2, 60 ppm CO, 20 ppm H_2S, 10 ppm SO_2

Replacement Sensors

10080222	ClO_2 sensor	10106726	XCell NH_3 sensor
10080224	NO_2 sensor	10106727	XCell SO_2 sensor
10106375	HCN sensor	10106728	XCell Cl_2 sensor
10106722	XCell Ex Sensor, combustible	10106729	XCell O_2 sensor
10106725	XCell CO/H_2S Sensor	10116638	PH_3 sensor

Accessories

10082834	USB IR receiver	10114837	Battery pack, alkaline
10088099	MSA Link Software CD		

Approvals

USA / Canada
Class I, Division 1, Groups A, B, C & D
Class II, Division 1, Groups E, F & G
Class III, Division 1
Ambient temperature: -40˚C to +50˚C; T4
ALTAIR 5X Multigas Detector with alkaline battery pack T3/T4
ALTAIR 5X or ALTAIR 5X iR Multigas Detector with rechargeable battery pack T4

USA / Canada
Class I, Division 1, Groups A, B, C & D
CAN/CSA C22.2 No. 152 Combustible Gas Detection Instruments
C22.2 No. 152 Performance Ambient Temperature: -20˚C to +50˚C
C22.2 No. 157 Intrinsic Safety Ambient Temperature: -40˚C to +50˚C
ALTAIR 5X Multigas Detector with alkaline battery pack T3/T4
ALTAIR 5X or ALTAIR 5X iR Multigas Detector with rechargeable battery pack T4

ID 0802-46-MC / May 2013

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FAX 724-741-1559

MSA
The Safety Company

INSTRUMENTS

SAMPLE DRAW 4 GAS MONITOR

Gas Detection For Life

GX-Force Model

Features

- **2 Operating modes**
  — **Normal and Leak Check**
- **Internal sample pump with 100' sample range**
- **30 hours of operation (Lithium-ion battery)**
- **USB C charging and data connection**
- **Easy to grip lightweight design**
  — 2.5" W x 6.81" H x 1.85" D, 9.87 ounces
- **Water and dust resistant design, IP67**
- **Field replaceable sensors & filters**
- **Impact resistant body**
- **Intrinsically safe**
- **Large LCD Auto-backlit display**
- **3 Year warranty**

Applications

- **Personal monitoring**
- **Confined spaces**
- **Refineries/petrochemical**
- **Utilities**
- **Oil and Gas**
- **Water/wastewater**
- **Fire services**
- **Construction**

The GX-Force is RKI's smallest personal 1-4 gas monitor with a strong internal sample pump capable of a 100' sampling range. Weighing only 9.8 ounces, the GX-Force can monitor the standard confined space gases (LEL combustibles, Oxygen, Carbon Monoxide, and Hydrogen Sulfide). Utilizing the same micro-sensor technology, which are compatible with the GX-3R, GX-3R Pro, 04 Series, and Gaswatch 3 instruments.

With the GX-Force, you have multiple tools in one instrument. Having 2 operating modes, the GX-Force can be used for confined space, safety monitoring in its Normal Operating mode. A Leak Check mode is the solution for leak investigations. In Leak Check Mode, the GX-Force can monitor for combustibles in the ppm range.

The GX-Force operates 30 hours on a Li-ion battery, and has a large LCD display showing all gas readings, battery level, current time and automatically backlights in alarm conditions. Standard alarm types include vibration, visual, and audible alarms, which can be set to latching or non-latching. Controlled by a microprocessor, the GX-Force continuously checks itself for sensor connections, low battery, circuit trouble, low flow, and calibration errors.

Calibration and bump test intervals and reminders are user adjustable and can be set to either go into alarm or to lock the user out of normal measurement mode once a calibration period has expired. Calibration can be done individually or in a group.

RKI Instruments, Inc. • 33248 Central Ave. Union City, CA 94587 • Phone (510) 441-5656 • (800) 754-5165 • Fax (510) 441-5650

GX-Force Model

Model	GX-Force
Sampling Method	Internal sample pump, flow rate nominal 0.5 LPM, includes hydrophobic filter
Suction Flow Rate	Minimum 0.35 L/min (open flow rate)
Gas Alarm Pattern	Lamp flashing, continuous modulating buzzer sounding, gas concentration display flashing, vibration
Gas Alarm Reset Operation	Self-resetting or latching
Fault Alarm/Self-Diagnosis	System, clock, or sensor abnormality; battery voltage drop; calibration failure; pump abnormality; low flow rate
Fault Alarm Pattern	Lamp flashing, intermittent buzzer sounding, detail display
Fault alarm reset operation	Self-resetting
Display	LCD digital (7-segment + 14-segment + icons) with backlight
Individual Operations	Operational status, clock, battery level, peak reading, pump status, calibration notification
Sound Pressure	Approx. 90 dB (30 cm)
Data Logger Function	Maximum storage capacity: 3,600 items Interval: 5 minutes (adjustable)
Communication Specifications	USB, 2.0 (for data logger) Connector: Type-C
Power Source	Rechargeable lithium ion battery
Continuous Operating Time	Approx. 30 hours (25 °C, fully charged, no alarm, no backlight)
Operating Ambient Temperature / Humidity Range	-20 °C to +50 °C (no sudden changes), 0 - 95 % RH (no condensation) (-4 °F to +122 °F)
Approvals	Intrinsically safe construction IECEx (Ex da ia IIC T4 Ga/Ex ia IIC T4 Ga) ATEX (II1G Ex da ia IIC T4 Ga/II1G Ex ia IIC T4 Ga)
Certifications	ATEX / IECEx, QPS (pending)
Protection Level	IP67 equivalent
External Dimensions / Weight	Approx. 2.52 (W) × 6.81 (H) × 1.85 (D) (excluding protrusions) / Approx. 9.87 oz.
Warranty	Three years material and workmanship

Detection target gas	Combustible gas (CH4 or HC)	Oxygen (O2)	Carbon monoxide (CO)	Hydrogen sulfide (H2S)
Detection principle	Catalytic combustion	Electrochemical type		
Detection range	0 - 100 % LEL	0.0 - 40.0 vol %	0 - 2,000 ppm	0.0 - 200.0 ppm
Resolution	1 % LEL	0.1 vol %	1 ppm	0.1 ppm
Alarm setpoints (User-defined setting)	1st alarm: 10 % LEL 2nd alarm: 25 % LEL 3rd alarm: 50 % LEL OVER alarm: 100 % LEL	L alarm: 19.5 vol % LL alarm: 18.0 vol % H alarm: 23.5 vol % OVER alarm: 40.0 vol %	1st alarm: 25 ppm 2nd alarm: 50 ppm 3rd alarm: 1200 ppm TWA alarm: 25 ppm STEL alarm: 200 ppm OVER alarm: 2,000 ppm	1st alarm: 5.0 ppm 2nd alarm: 30.0 ppm 3rd alarm: 100.0 ppm TWA alarm: 1.0 ppm STEL alarm: 5.0 ppm OVER alarm: 200.0 ppm
Response time (T90)	CH4: Within 30 seconds, HC: Within 40 seconds	Within 20 seconds	Within 30 seconds	Within 30 seconds

RKI INSTRUMENTS
Gas Detection For Life

(800) 754-5165
www.rkiinstruments.com

Authorized Distributor:

GasAlert MaxXT II

multi-gas detector

H_2S

CO

O_2

LEL

Go the distance, and save

GasAlertMax XT II is the smart, simple, economical way to compliance. Workers feel safe and incidents are minimized so everyone will be able to do more. That means savings realized from business continuity and productivity.

Simple operation, with SmartSample pump.
GasAlertMax XT II reliably monitors up to four hazards and combines straightforward one-button operation with our robust, motorized pump for intelligent, remote sampling, ideal for confined spaces. The GasAlertMax XT II is fully compatible with MicroDock II automated test and calibration system.

WATER RESISTANT

- Minimize costs and training with one-button operation
- More accurate sampling results with SmartSample pump technology
- Compact, comfortable and field tough

BW Technologies by Honeywell

Wear yellow. Work safe.

Standard features of BW products:

- Continuous LCD shows real-time gas concentrations
- Compact and lightweight design makes it comfortable to wear
- Water-resistant
- Simple automatic calibration procedure; compatible with BW MicroDock II automatic test and calibration station
- Full function self-test of sensor, battery status, circuit integrity and audible/visual alarms on start up
- Bright wide-angled visual alarm bars
- Built-in concussion-proof boot

GasAlertMax XT II Specifications

Size	5.1 x 2.8 x 2.0 in. / 13.1 x 7.0 x 5.2 cm
Weight	11.5 oz. / 328 g
Temperature	-4 to 122ºF / -20 to 50ºC
Humidity	10 - 100% RH (non-condensing)
Alarms	- Visual, vibrating, audible (95dB) - Low, High, STEL, TWA, OL (over limit), Low Battery, Pump
Tests	Audible/visual alarms on activation, sensors, battery, pump and circuitry (continuous)
Typical battery life	13 hours @ 32ºF / 0ºC 8 hours @ -4ºF / -20ºC Recharges in 6 hours
Pump draw	Sample from up to 75 ft. / 23 m
User options	Confidence beep Safety (sensor) lock Latching alarms Safe display mode Calibration IR lock Location selection Force block test Force bump test when overdue Force calibration when overdue Sensor configuration Detector identification Low alarm acknowledge Language choices (five) Set custom start-up message Confidence interval Datalog interval
Ratings Ingress Protection	EMI/RFI: Complies with EMC Directive 2004/108/EC IP66/67
Certifications and approvals	Class I, Div. 1, Gr. A, B, C, D **IECEx:** Ga Ex ia IIC T4 **ATEX:** II 1 G Ga Ex ia IIC T4 Br Ex ia IIC T4
Warranty	Full two year warranty including all sensors

Additional GasAlertMax XT II features:

- Integrated sampling pump with reliable diaphragm technology
- Best in class block detection with semi-conductor pressure sensor
- Multi-language support in English, French, German, Spanish and Portuguese
- Conveniently manage your detector with Fleet Manager II
- Equipped with standard datalogging and event logging

Options and Accessories


MicroDock II compatible


Belt holster


Multi-unit cradle charger


Concussion-proof boot

For a complete list of accessories, please contact BW Technologies by Honeywell.

Sensor Specifications

Gas	Measuring Range	Resolution
H_2S	0-200 ppm	1 ppm
CO	0-1000 ppm	1 ppm
O_2	0-30.0%	0.1%
Combustible gases	0-100% LEL 0-5.0% v/v	1% 0.1%

Alarm setpoints for all sensors are user adjustable. Setpoint(s) are automatically displayed during instrument start-up.

Locally available from

BW Technologies by Honeywell

DUE TO ONGOING RESEARCH AND PRODUCT IMPROVEMENT, SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT NOTICE.

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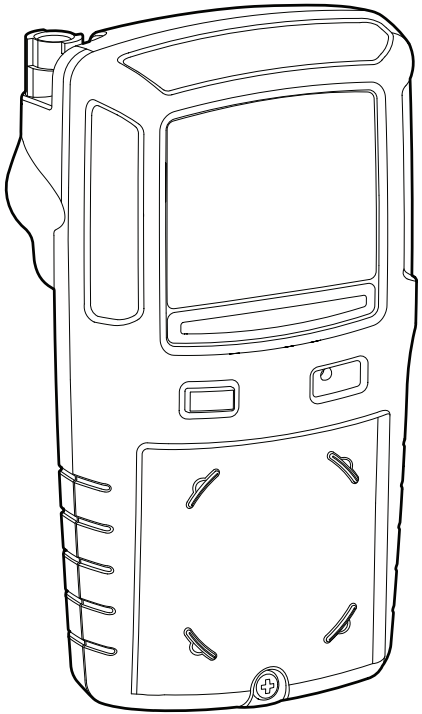

GasAlert MaxXT II

1, 2, 3, and 4-Gas Detector

Technical Reference Guide

BW Technologies
by Honeywell

Limited Warranty and Limitation Liability

BW Technologies LP (BW) warrants the 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 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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Visit BW Technologies by Honeywell's website at:
www.gasmonitors.com

ISO 9001

Introduction

⚠ Warning

To ensure personal safety, read Safety Information - Read First and ⚠Cautions before using the detector.

The GasAlertMax XT II gas detector (“the detector”) warns of hazardous gas at levels above user-defined alarm setpoints.

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

Gases Monitored

The following table lists the gases that are monitored by the detector.

Table 1. Gases Monitored

Gas Detected	Unit of Measure
Hydrogen sulfide (H_2S)	parts per million (ppm)
Carbon monoxide	parts per million (ppm)
Combustible gases (LEL)	a) percent of lower explosive limit (%LEL) b) percent by volume methane 0-5.0% v/v
Oxygen (O_2)	% volume

CAUTION: FOR SAFETY REASONS, THIS EQUIPMENT MUST BE OPERATED AND SERVICED BY QUALIFIED PERSONNEL ONLY. READ AND UNDERSTAND THIS TECHNICAL REFERENCE GUIDE COMPLETELY BEFORE OPERATING AND SERVICING.

Safety Information - Read First

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

International symbols used on the detector and in this technical reference guide are defined in Table 2.

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

♻ Warning

This instrument contains a lithium polymer battery. Dispose of lithium cells immediately. Do not disassemble and do not dispose of in fire. Do not mix with the solid waste stream. Spent batteries must be disposed of by a qualified recycler or hazardous materials handler.

⚠Cautions

- ***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 technical reference guide completely before operating or servicing.**
- **Do not use the detector if it is damaged. Inspect the detector before using. Look for cracks and/or missing parts.**
- **If the detector is damaged or parts are missing, contact BW Technologies by Honeywell immediately.**
- **Use only sensor(s) that are specifically designed for the GasAlertMax XT II model. Refer to 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. Sensors must be calibrated regularly and 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 alarm setpoints. Manually verify that the audible and visual alarms are activated. Calibrate if the readings are not within the specified limits.**
- **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.**
- **BW recommends 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.**
- ***Warning:*** **High off-scale LEL readings may indicate an explosive concentration.**
- **Only the combustible gas detection portion of this instrument has been assessed for performance by CSA International.**
- **For use only in potentially explosive atmospheres where oxygen concentrations do not exceed 20.9% (v/v).**
- **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.**
- **Calibrate only in a safe area that is free of hazardous gas.**

⚠Cautions

- **Use only BW approved batteries for the GasAlertMax XT II detector. Refer to Replacement Parts and Accessories.**
- **Charge the detector before first-time use. BW recommends the detector be charged after every workday.**
- **Charge the GasAlertMax XT II using the recommended charging adapter only. Do not use any other charging adapter. Failure to adhere to this precaution can lead to fire and/or explosion. Read and adhere to all instructions in the charger operator's manual. Failure to do so can result in fire, electrical shock, personal injury, and/or property damage.**
- **Extended exposure of the GasAlertMax XT II 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 or severe continuous mechanical shock.**
- **Do not immerse the detector in liquids.**
- **The pump (XT-RPUMP-K1) is certified for use with the GasAlertMax XT II detector only.**
- **Do not attempt to disassemble, adjust, or service the detector unless instructions for that procedure are provided in the technical reference guide and/or that part is listed as a replacement part. Use only BW Technologies by Honeywell Replacement Parts and Accessories.**
- **The detector warranty will be voided if customer, personnel, or third parties damage the detector during repair attempts. Non-BW Technologies by Honeywell repair/service attempts void this warranty.**
- ***Warning:* The lithium battery (MX-BAT01) may present a risk of fire or chemical burn hazard if misused. Do not disassemble, heat above 212°F (100°C), or incinerate.**
- **Do not use any other lithium batteries with the GasAlertMax XT II detector. Use of any other cell can cause fire and/or explosion. To order and replace the MX-BAT01 battery, refer to Replacement Parts and Accessories.**

⚠Cautions

- ***Warning:*** **Lithium polymer cells exposed to heat at 266°F (130°C) for 10 minutes can cause fire and/or explosion.**
- **Dispose of used lithium cells immediately. Do not disassemble and do not dispose of in fire. Do not mix with the solid waste stream. Spent batteries must be disposed of by a qualified recycler or hazardous materials handler.**
- **Keep lithium cells away from children.**
- **Calibration cylinders that are used with a demand flow regulator must meet the following maximum inlet pressure specifications:**
  - **Disposable cylinders 0-3000 psig/70 bar**
  - **Refillable cylinders 0-3000 psig/70 bar**

Table 2. International Symbols

Symbol	Meaning
C SA US	Approved to both U.S. and Canadian Standards by CSA International
Ex	European Explosives Protection
CE	Conforms to European Union Directives
ATEX	Conforms to European ATEX Directives
IECEx	International Electrotechnical Commission Scheme for Certification to Standards for Electrical Equipment for Explosive Atmospheres

Getting Started

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

- Sensors: H_2S, CO, O_2, and combustible (LEL)
- Calibration hose with quick connector
- Charging adapter
- Operator's manual
- Quick reference card
- Technical reference guide on CD-ROM

Note

The IR connectivity kit, which includes the IR Link, is sold separately.

To order parts, refer to Replacement Parts and Accessories.

The detector is shipped with the sensors, pump, and rechargeable battery installed. To replace sensors, the pump, or the battery, refer to Replacement Parts and Accessories.

For instructions to replace the sensor(s), pump, or battery, refer to the procedures in the following sections:

- Replacement Parts and Accessories
- Replacing the Pump
- Replacing the Battery

To become oriented with the features and functions of the detector, refer to the following figures and tables:

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

Parts of the GasAlertMax XT II

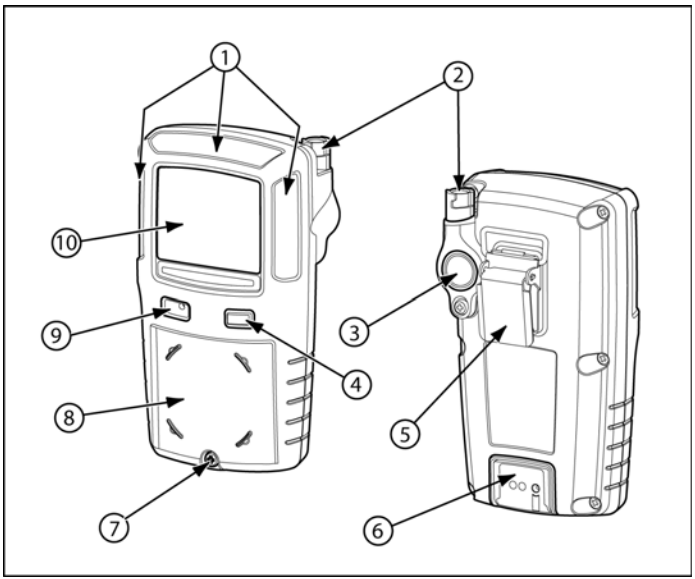


Figure 1. Parts of the GasAlertMax XT II

Table 3. Parts of the GasAlertMax XT II

Item	Description
1	Visual alarm indicators (LEDs)
2	Pump quick connector
3	Pump filter and moisture filter
4	Pushbutton
5	Alligator clip
6	Charging connector and IR interface
7	Diffusion cover locking screw
8	Diffusion cover
9	Audible alarm
10	Liquid crystal display (LCD)

Display Elements

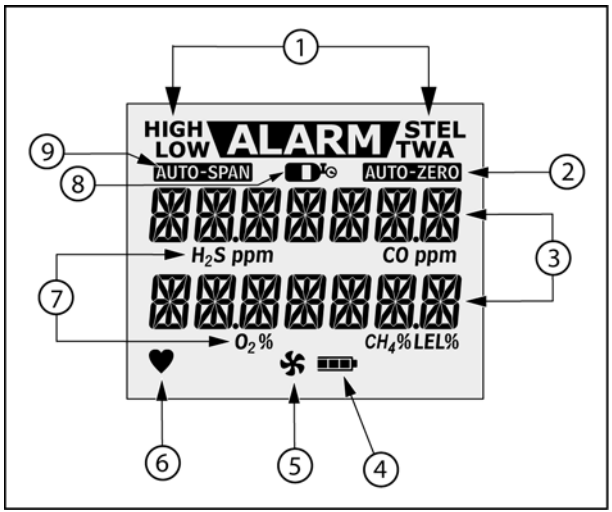


Figure 2. Display Elements

Table 4. Display Elements

Item	Description
1	Alarm condition
2	Automatically zero sensor indicator
3	Numeric values
4	Battery life indicator
5	Pump indicator
6	Heartbeat indicator
7	Gas type identifiers
8	Gas cylinder indicator
9	Automatically span sensor indicator

Table 5. Pushbutton

Pushbutton	Description
◯	• To activate the detector press ◯. • To deactivate the detector, press and hold ◯ until the **OFF** countdown is complete and the LCD deactivates. • To view the date/time, TWA, STEL, and maximum (MAX) readings, press ◯ twice rapidly. To clear the TWA, STEL, and MAX readings, press ◯ when the LCD displays **CLEAR ALL**. • To initiate calibration, press and hold ◯ as the detector performs the **OFF** countdown. Continue holding ◯ while the LCD briefly deactivates and then reactivates to begin the **CAL** countdown. Release ◯ when the **CAL** countdown is complete. • To activate the backlight, press ◯ and release. • To acknowledge the latched and pump alarms, press ◯. • To acknowledge a low alarm and disable the audible alarm temporarily, press ◯. The **Low Alarm Acknowledge** option must be enabled in Fleet Manager II. • To acknowledge any of the **Due Today** alarms (calibration, bump test, pump block test), press ◯.

Activating/Deactivating the Detector

Note

Ensure the diffusion cover is attached prior to activating the detector to verify the pump is working correctly.

To activate the detector, press ◯ in a safe area that is free of hazardous gas. Attach any pump accessories to the detector prior to activating the detector.

To deactivate the detector, press and hold ◯ until the **OFF** countdown completes.

⚠ Caution

The maximum hose length for sampling is 75 ft (22m).

Startup Tests

When the detector is activated, it performs several startup tests. Confirm the following tests occur.

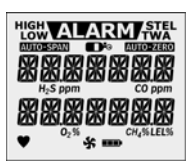
Battery Test

The detector performs a battery test during startup. If the battery has insufficient power to operate, the following screens displays before deactivating.

Recharge the battery for 6 hours and then reactivate the detector. Refer to Charging the Battery.

Audible/Visual Test

1. All of the LCD elements display simultaneously as the detector beeps, flashes, vibrates, and activates the backlight.



Firmware Version

2. The current firmware version installed on the detector displays on the LCD.

Startup Message

3. If enabled and data is entered in Fleet Manager II, a startup message (25 characters per line) displays or scrolls (depending upon length of message) on the LCD. If the startup message option is not enabled, it is bypassed during the startup test.

   Refer to Startup Message Top Line in User Options.

Location Logging

4. If the **Location Logging** option is enabled, the detector prompts for a number (**1**-**999**) to be entered that identifies the location (wells, plants, or other areas) where the detector is being used.

   Within 3 seconds, press and continue pressing ◯ until the desired number displays. To scroll rapidly, press and hold ◯.

Note

The site ID number that is entered does not reset when the detector is deactivated. If required, enter a new site ID when the detector is again activated.

Pump Test on Startup

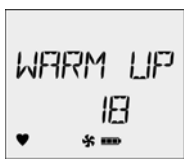
Note

The diffusion cover must be attached to the detector to activate the pump and initiate the pump test.

⚠ Caution

The maximum hose length for sampling is 75 ft (22m).

5. In cold temperatures, the pump may require a short period of time to warm up before operating. If this is required, the following screen displays.



The LCD displays a countdown of the time remaining (in seconds) for the pump to warm up.

If the **Force Block Test** option is enabled, the detector performs a pump test. The following screen displays.

Using your finger, block the end of the hose. The following screen displays.

Note

If the hose is not blocked and unblocked within 2.5 minutes, the detector will assume the pump has failed and deactivates.

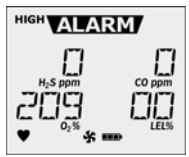
Successful Pump Test: If the pump test is successful, the following screen displays.

Unsuccessful Block Pump Test: If the pump is not operating correctly, the following screens display before the detector deactivates.

Activate the detector again. If the pump fails the startup again, refer to Troubleshooting.

If the diffusion cover is not attached, the detector beeps and the following screen displays before continuing with the startup tests.

When the diffusion cover is replaced, the detector activates the pump alarm.



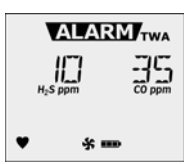
HIGH displays, and ALARM and flashes. Press ◯ to acknowledge the alarm and initiate the pump block test.

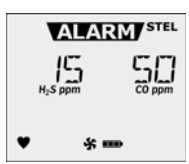
Alarm Setpoints

Note

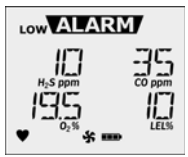
Alarm setpoints vary by region. Refer to Resetting Gas Alarm Setpoints.

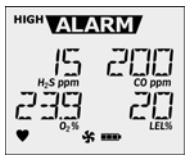
6. If the CO and/or H_2S sensor is enabled, the alarm setpoints for the time-weighted average (**TWA**) and the short-term exposure limit (**STEL**) display.





Next, the **LOW** and **HIGH** alarm setpoints display for all of the enabled sensors.





Self-Test

7. The detector then performs a self-test to ensure it is operating correctly. The following screen displays during the test.

Successful Self-Test: If the self-test is successful, the following screen displays.

Unsuccessful Self-Test

Lockout on Self-Test Error Option Enabled: If this option is enabled and a sensor fails, the following screens display before the detector deactivates.

If **Lockout on Self-Test Error** is enabled, the sensor must be replaced to activate and operate the detector. Refer to Replacing a Sensor or Sensor Filter.

Lockout on Self-Test Error Option Disabled: If this option is disabled and a sensor fails the self-test, the LCD displays an error message for the applicable sensor. The startup tests continue.

Note

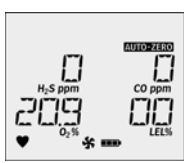
Enabled sensors are continually tested while the detector is operational.

Automatic Zero for H_2S, CO, O_2, and LEL

Reminder

Only activate the detector in a safe area that is free of hazardous gas to ensure an accurate auto zero.

8. To initiate auto zero during startup, the **Auto Zero on Startup** option must be enabled (sensors are enabled individually).



If the **Force Calibration** option is enabled and the sensor(s) is past due for calibration, the sensor will not auto zero during startup. The sensor must be calibrated.

Note

If the **Auto Zero on Startup** *option is not enabled in Fleet Manager II for any of the sensors, this startup test is bypassed.*

If ambient air is set to be measured as 20.8% vol., the automatic oxygen calibration screen displays **20.8***% instead of* **20.9***%.*

If Previous Calibration Failed

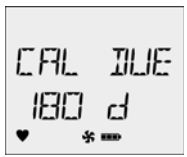
If the last calibration performed was unsuccessful, the following screens display.

Note

BW Technologies by Honeywell recommends the sensor(s) be calibrated immediately.

Calibration Due Date (optional)

9. The LCD displays the number of days remaining until the next calibration is due.



Note

If the **Calibration Interval** *field is set to* **0** *in Fleet Manager II, it disables the calibration due date function and this test is bypassed. Refer to Calibration Interval in the User Options.*

If any sensor is past the calibration due date, the detector beeps, flashes, and vibrates while the LCD displays the following screen.

Press ◯ to acknowledge the warning. If ◯ is not pressed within 2 minutes, the detector automatically deactivates.

Force Calibration Enabled (optional)

10. If the **Force Calibration** option is enabled in Fleet Manager II and a sensor is past due, the sensor(s) must be calibrated to continue and enter normal operation.

Press ◯ to acknowledge. Refer to Calibration Procedure to begin calibration. If ◯ is not pressed to enter calibration within 2 minutes, the detector automatically deactivates.

Cal IR Lock Enabled (optional)

11. If the **Cal IR Lock** option is enabled in Fleet Manager II, the following screen displays.

If **IR LOCK ENABLED** is enabled, the sensor(s) must be calibrated using the IR Link or the MicroDock II station. For more information, refer to Cal IR Lock in User Options.

If Previous Bump Failed

If the last bump test performed was unsuccessful, the following screens display.

Note

BW Technologies by Honeywell recommends the sensor(s) be bump tested immediately.

Bump Test

Note

BW Technologies by Honeywell recommends to bump test the sensors before each day's use to confirm their ability to respond to gas by exposing the detector to a gas concentration that exceeds the alarm setpoints.

12. The LCD next displays the number of days remaining until the next bump test is due.

Force Bump Enabled (optional)

If the **Force Bump** is enabled in Fleet Manager II and a sensor is overdue for a bump test, the sensor(s) must be tested to continue and enter normal operation. The following screen displays.

Apply gas while **BUMP DUE NOW** displays. Verify the visual, audible, and vibrator alarms activate. The detector must enter alarm to pass the bump test. For complete instructions, refer to Bump Test.

If **Force Bump** is disabled, press ◯ to acknowledge the warning and continue with the startup tests.

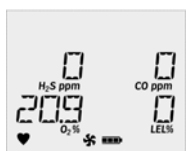
Note

If the bump test interval field is set to **0** *in Fleet Manager II, the startup bump test is bypassed. Refer to Bump Interval in the Device Configuration.*

The detector remains in alarm until the gas dissipates and clears from the sensors. Verify that the visual and audible alarms activate.

Startup Test Pass

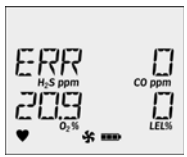
If the detector passes all of the startup tests, the detector enters normal operation and displays the ambient gas readings.



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

Startup Test Fail

After the detector enters normal operation, **ERR** displays if a sensor has failed the self-test. To determine the cause and solutions for a failed sensor, refer to Troubleshooting.



Installing Fleet Manager II

Fleet Manager II is required to configure the detector. To install Fleet Manager II, refer to the Fleet Manager II CD-ROM that includes the

- installation wizard, and
- *Fleet Manager II Operator's Manual*.

From the **User Options** tab in Fleet Manager II, two sections are provided to add data, enable/disable features, and to define settings for the sensors and the detector. They are as follows:

- Device Configuration
- Sensor Configuration

Using Fleet Manager II to Configure the Detector

When Fleet Manager II is installed, refer to Table 6., Figure 3., and the following procedures:

Table 6. Connecting the IR Link

Item	Description
1	IR and charger interface
2	GasAlertMax XT II
3	IR Link
4	USB cable

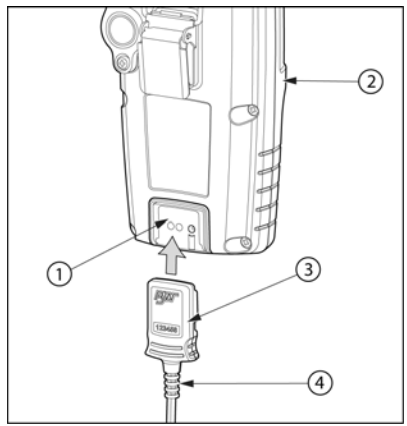


Figure 3. Connecting the IR Link

1. Activate the detector and wait for the startup tests to complete.
2. Connect the USB cable to the USB port on the computer.
3. Connect the USB cable to the IR Link.
4. Insert the IR Link into the IR interface on the back of the detector.
5. From the PC, open Fleet Manager II.
6. Click **Administration**.
7. From the **Administration** toolbar, click **Login / Logout** to access the **Enter Password** dialog box. Enter **Admin** and click **OK**.

8. From the **Devices** toolbar, click **Configure Device via IR Link** to access the GasAlertMax XT Configuration window.
9. From the configuration window, click **Retrieve from Device** at the bottom of the window.
10. Refer to the following sections in this guide for descriptions about how to enter data, enable/disable, and define settings.
11. When all settings are defined, click **Save to Device** at the bottom of the configuration window to save the configuration to the detector.

Device Configuration

The **Device Configuration** section displays data about the detector, allows for a startup message to be entered, and is used to enable/disable and define settings for the detector.

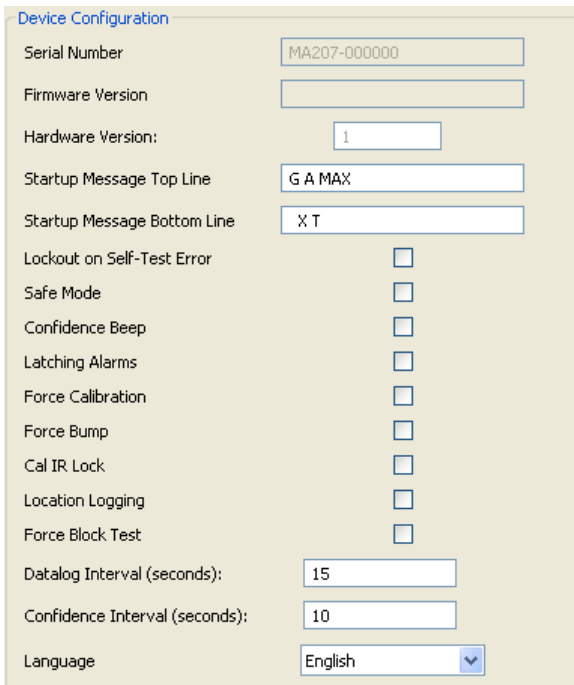


Figure 4. Device Configuration Section

Refer to the following options for descriptions and functionality.

Note

The **Serial Number***,* **Firmware Version***, and* **Hardware Version** *fields require no data entry. Settings for these fields are factory defined.*

Serial Number Field

This field displays the serial number (e.g. **MA110-001000**) of the detector.

Firmware Version

This field displays the current firmware version (e.g. **02_000**) that displays on the detector LCD during the startup tests. If new firmware is uploaded to the detector, the **Firmware Version** field automatically updates.

Hardware Version

This field displays the current version of hardware the detector is operating with.

Startup Message Top Line

Enter a line of text that will display on the detector LCD during startup (maximum 25 characters, spaces included). Enter any type of information such as employee name, plant, area, emergency number(s), etc.

Depending upon the length of the message, text will either display or scroll across the top line of the LCD.

Startup Message Bottom Line

Enter a line of text that will display on the detector LCD during startup (maximum 25 characters, spaces included). Enter any type of information such as employee name, plant, area, emergency number(s), etc.

Depending upon the length of the message, text will either display or scroll across the bottom line of the LCD.

The user options define the settings for the detector.

Note

When options are enabled/disabled, the checkbox displays with a red frame until the new settings are saved to the detector.

Lockout on Self-Test Error (failed sensor lock)

If enabled and a sensor fails during startup, the following screens display and the detector deactivates.

To enter normal operation, the sensor must be operating correctly. Refer to Troubleshooting and Replacing a Sensor or Sensor Filter.

The detector is shipped with the **Lockout on Self-Test Error** option disabled.

Safe Mode

If enabled, **SAFE** displays continuously on the LCD unless an alarm condition occurs.

If an alarm condition occurs, the LCD displays the real-time readings for each sensor.

Confidence Beep

If enabled, the confidence beep provides continuous confirmation that the detector is operating correctly. To define how often the detector beeps (every **1**-**120** seconds), enter the value in the **Confidence Interval** field.

Note

Confidence beep automatically disables during a low battery alarm.

The detector is shipped with the **Confidence Beep** option disabled.

Latching Alarms

If enabled, a detector alarm persists until the alarm is acknowledged and gas concentrations are below the low alarm setpoint. The audible alarm can be temporarily deactivated by pressing ◯, but the LCD continues to display the high peak concentration until the alarm condition no longer exists.

The detector is shipped with the **Latching Alarms** option disabled.

Force Calibration

Force Calibration Enabled: If enabled and a sensor(s) is past due for calibration, the following screen displays.

The sensor(s) must be calibrated to continue and enter normal operation. For complete instructions, refer to Calibration.

Note

If the calibration is unsuccessful for any of the sensors, the detector deactivates.

Force Calibration Disabled: If disabled, the **CAL DUE NOW** screen displays. Press ◯ to acknowledge the warning and enter normal operation.

The detector is shipped with the **Force Calibration** option disabled.

Note

If overdue for calibration, BW recommends the sensor(s) be calibrated immediately.

Force Bump

A bump test must be performed regularly to ensure the sensor(s) are responding correctly to test gas. If enabled and the sensor(s) is past due, a bump test must be performed and the overdue sensor must enter into alarm. If this option is enabled, the following screen displays during the startup tests.

If **Force Bump** is enabled, enter a value (**1**-**365**) in the **Bump Interval (days)** field located in the **Sensor Configuration** section.

If **0** is entered in the **Bump Interval (days)** field, the **Force Bump** option is automatically disabled.

Note

BW recommends to bump test the sensors before each day's use to confirm their ability and response to gas by exposing the detector to a gas concentration that exceeds the high alarm setpoints. Verify that the audible and visual alarms activate. Calibrate if the readings are not within the specified limits.

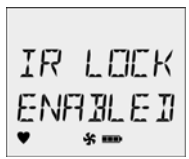
For complete instructions to perform a bump test, refer to Bump Test.

The detector is shipped with the **Force Bump** option disabled.

Cal IR Lock

If enabled, the sensor(s) can only be calibrated using the IR Link with Fleet Manager II or the MicroDock II station.

If the **Cal IR Lock** option is enabled, the following screen displays.



Note

The auto-zero function is not affected if the **CAL IR Lock** *option is enabled. The detector still performs the auto-zero function (if enabled).*

To calibrate using an IR device, refer to one of the following:

- Calibrating Using the IR Link
- *MicroDock II Base Station User Manual*

The detector is shipped with the **CAL IR Lock** option disabled.

Note

If the **Cal IR Lock** *option is enabled and a manual calibration is attempted, the sensor(s) will only auto zero. Calibration will not be performed.*

Location Logging

The **Location Logging** logs where the detector is being used such as a gas plant, well site, vehicle, etc.

If enabled, the detector prompts for a three digit value (**1**-**999**) to be entered during the startup tests.

To enter a number from **1**-**999**, continue pressing ◯ until the desired number displays. To scroll rapidly, press ◯ and hold.

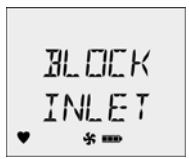
The location entries are recorded in the datalogs.

The detector is shipped with the **Location Logging** option disabled.

Force Block Test

The force block test verifies the pump is operating correctly by comparing the pump flow against the blocked flow. If the **Force Block** option is enabled, you will be prompted to manually block the pump inlet

- during the startup tests when the detector is activated, and
- when a pump alarm is acknowledged.



⚠ Caution

The diffusion cover must be attached for the pump to operate.

If the block pump test is unsuccessful, the detector deactivates.

For more information about the block test that is performed during startup, refer to Pump Test on Startup.

The detector is shipped with the **Force Block Test** option disabled.

Datalog Interval

The **Datalog Interval (seconds)** field defines how often the detector records a datalog sample (every **1**-**120** seconds). Enter the desired value.

Confidence Interval

The **Confidence Interval (seconds)** field defines how often the confidence beep occurs (detector beeps).

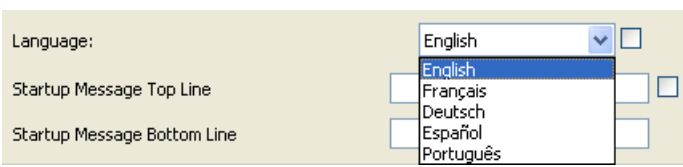
Enter the desired value (every **1**-**120** seconds). The **Confidence Beep** option must be enabled.

Language

The **Language** field provides a drop down menu that includes the following language options:

- English
- Français
- Deutsch
- Español
- Português

From the drop down menu, select the required language. When the settings are saved to the detector, the LCD displays all screens in the selected language.



The detector is shipped with **English** displaying as the default language.

Sensor Configuration

The **Sensor Configuration** tab adjusts settings for each individual sensor. A separate sensor tab is provided for each sensor. Figure 5. shows the available option settings for the H_2S sensor.

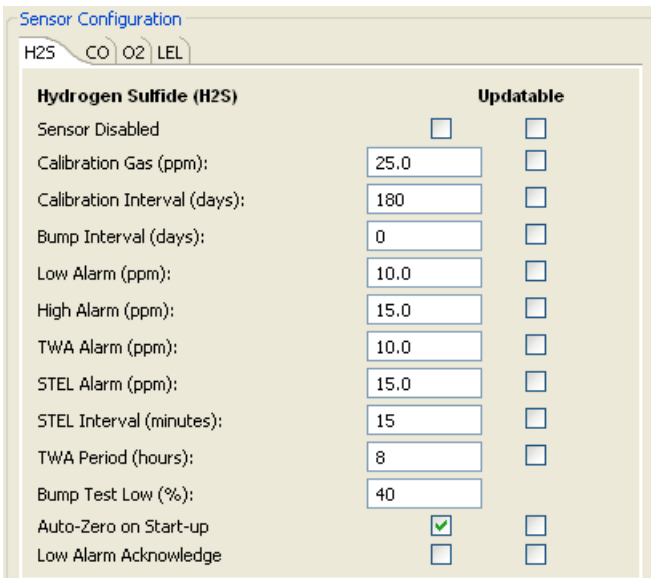


Figure 5. Sensor Configuration Tab (H_2S)

Note

Depending upon the sensor, the options may vary.

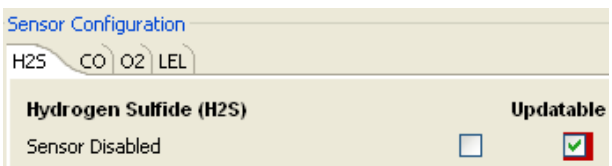
Sensor Disabled

⚠ Warning

Use extreme caution when disabling a sensor. The disabled sensor cannot detect and alarm against the applicable gas.

To disable a sensor, complete the following:

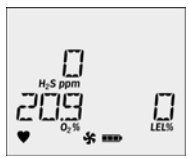
1. Click **Retrieve from Device** to populate the fields with the current detector settings.
2. Click the tab of the sensor to be disabled.
3. Click the checkbox for **Sensor Disabled**.



Note

When options are enabled/disabled, the checkbox displays with a red frame until the new settings are saved to the detector.

4. Click the **Save to Device** button located at the bottom of the window.
5. The LCD automatically updates. In the following example, the CO gas type and sensor readings no longer displays.



Calibration Gas (ppm)

⚠ Warning

The gas concentration value entered in Fleet Manager II must match the gas concentration value on the gas cylinder.

1. Select the applicable sensor tab.
2. Enter the gas concentration value in the **Calibration Gas (ppm)** field for H_2S and CO.
3. Enter the gas concentration value in the **Calibration Gas (%)** field for O_2 and LEL.

Note

The gas concentration value for the O_2 sensor must be calibrated with a %value other than 20.9 or 20.8%, such as 18%.

Calibration Interval

Define how often a sensor must be calibrated in the **Calibration Interval (days)** field. A different calibration interval can be set for each sensor.

1. Enter the value (**0**-**365** days) for each sensor.
2. Enter **0** to disable the calibration interval option. Entering **0** automatically deactivates the **Force Calibration** user option.

Note

BW recommends that the detector be calibrated at least once every 180 days (6 months).

The detector is shipped with the factory default set to **180** days.

Bump Interval

Define how often a bump test must be performed for each sensor in the **Bump Interval (days)** field. A different bump interval can be set for each sensor.

1. Enter the value (**1**-**365** days) for each sensor.
2. Enter **0** to disable the bump interval option. Entering **0** automatically deactivates the **Force Bump** user option.

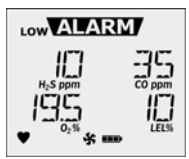
   The detector is shipped with the **Force Interval** option disabled.

Note

BW recommends to bump test the sensors before each day's use to confirm their ability and response to gas by exposing the detector to a gas concentration that exceeds the high alarm setpoints. Verify that the audible and visual alarms activate. Calibrate if the readings are not within the specified limits.

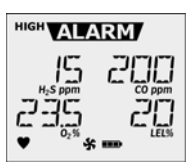
Low Alarm

Enter the low alarm setpoints for each sensor (applicable to all sensors). Refer to Resetting Gas Alarm Setpoints for factory defined alarm setpoints.



High Alarm

Enter the high alarm setpoints for each sensor (applicable to all sensors). Refer to Resetting Gas Alarm Setpoints for factory defined alarm setpoints.

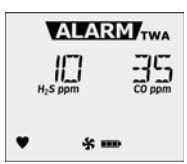


TWA Alarm

The time-weighted average (TWA) is a safety measure used to determine accumulated averages of gases. An average is determined using the Occupational Safety and Health Administration (OSHA) method to ensure the worker leaves an area when the maximum average is accumulated.

OSHA: The OSHA method is defined as a moving average that accumulates over an 8-hour average. If the worker is in the field longer, the oldest accumulated values (first hour) are replaced by the newest values (ninth hour). This continues for the duration of the work shift until the detector is deactivated.

1. Refer to Resetting Gas Alarm Setpoints for factory alarm setpoints.
2. Enter the TWA alarm setpoint for the H_2S and the CO sensor in the **TWA Alarm (ppm)** field. TWA is not applicable to O_2 and LEL.



3. Enter a value (**4**-**16** hours) in the **TWA Period (hours)** field to define the duration of the moving average. For more information, refer to TWA Period (hours).

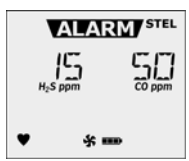
STEL Alarm

The short term exposure limit (STEL) is the maximum permissible gas concentration a worker can be safely exposed to for short periods of time (5-15 minutes maximum).

Note

Standard factory alarm setpoints vary by region. Refer to Resetting Gas Alarm Setpoints for OSHA factory settings.

1. Refer to the applicable regulatory requirements in your area for defining STEL alarm setpoints.
2. Enter the setpoint in the **STEL Alarm (ppm)** field.



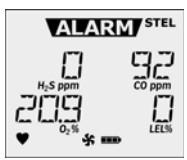
3. After entering the STEL setpoint, the STEL interval value (**5**-**15** minutes) must be entered. Refer to STEL Interval.

STEL Interval

The **STEL Interval** option provides protection for workers from over exposure to high concentrations of gas, and is based on user-defined 5-15 minute intervals. When the maximum STEL is reached, the detector alarms to notify the worker to leave the area immediately.

⚠ Caution

Follow all safety procedures as defined by your employer.



Enter the interval (**5**-**15** minutes) in the **STEL Interval (minutes)** field. The detector is shipped with the STEL interval set to 15 minutes.

TWA Period (hours)

The **TWA Period (hours)** option defines a time-weighted moving average of accumulated gases over a period of 4-16 hours, to ensure the worker leaves an area when the defined maximum average is accumulated.

Example: The **TWA Period option** is set to **6** hours. Therefore, the moving average accumulates over a 6-hour average. If the worker is in the field longer, the oldest accumulated values (first hour) are replaced by the newest values (seventh hour). This continues for the duration of the work shift until the detector is deactivated.

Note

Regulations vary depending upon region. Adhere to the regulations defined for your area.

Enter a value ranging from **4**-**16** hours. The detector is shipped with the default setting of **8** hours.

Correction Factor (%)

The **Correction Factor (%)** option is used to enter compensation factors for hydrocarbons other than methane. The correction factor is only applicable to LEL and can only be applied if the LEL sensor has been calibrated with methane.

⚠ Caution

Ensure the calculations are correct for the applicable gas to ensure the reading display as 100% LEL.

Enter a K-factor (industry standard decimal value) in the **Correction Factor (%)** field. Values can range from **0.50** - **4.00**.

Note

Not applicable to a % by vol CH_4 measuring mode.

The detector is shipped with the factory default set to **100%**.

50% LEL = (%CH4)

If the **LEL By Volume CH4** option is enabled, a percentage value can be entered in the **50% LEL = (%CH4)** field to display the LEL reading in %vol. assuming a methane environment.

Enter the equivalent methane concentration for 50% LEL as follows:

- North America = 2.5%
- Europe = 2.2%

This option is only applicable to the LEL sensor.

Auto Zero on Startup

When enabled, the sensors automatically zero during the startup tests. The **Auto Zero on Startup** option is available for the CO, H_2S, LEL, and O_2 sensors.

The detector is shipped with the Auto Zero on Startup option enabled for all sensors.

LEL by Volume CH4

If enabled, the detector LCD displays the LEL value as %vol. assuming a methane environment.

If **LEL by Volume CH4** is enabled, a percentage value must be entered in the **50% LEL = (%CH4)** field. Refer to 50% LEL = (%CH4).

10% (of reading) Over-span

When enabled, the detector automatically over-spans the LEL sensor by 10% of the span concentration to ensure the span meets CSA standards. After enabling this option in Fleet Manager II, a calibration (manual or using the MicroDock II) must be completed to fully enable this option.

20.8 Base Reading

If the **20.8 Base Reading** option is enabled, the detector assumes 20.8 % O_2 as ambient air (factory default is 20.9% O_2).

The detector is shipped with this option disabled.

Low Alarm Acknowledge

If enabled, the audible alarm can be disabled during a low alarm condition. The LED and visual alarm indicators remain active until the the alarm condition changes or the detector deactivates.

Press ◯ to acknowledge the low alarm and deactivate the audible alarm.

Note

The **Low Alarm Acknowledge** *option is not applicable to* O_2.

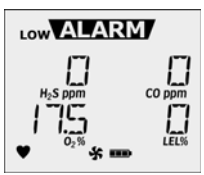
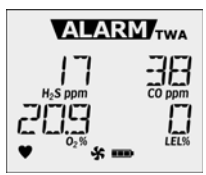
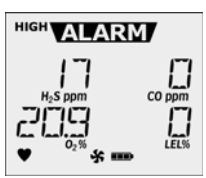
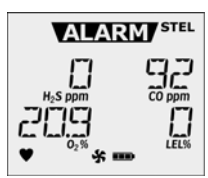
The detector is shipped with the **Low Alarm Acknowledge** disabled.

Alarms

Table 7 describes the detector alarms and corresponding screens. During an alarm condition, the detector activates the backlight, audible/visual/vibrator alarms, and displays the current ambient gas reading. If more than one type or level of alarm exists simultaneously, a multi-gas alarm results.

To change the factory-defined alarm setpoints, refer to Low Alarm, High Alarm, TWA Alarm, and STEL Alarm in Device Configuration.

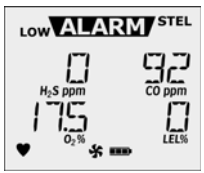
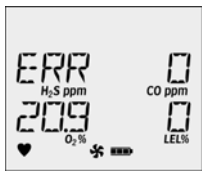
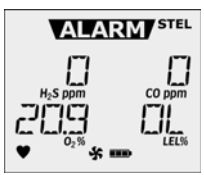
Table 7. Alarms

Alarm	Screen	Alarm	Screen
Low Alarm • Slow siren • Slow alternating flash • ALARM and target gas bar flash • Vibrator alarm activates		**TWA Alarm** • Fast siren • Fast alternating flash • ALARM and target gas bar flash • Vibrator alarm activates	
High Alarm • Fast siren • Fast alternating flash • ALARM and target gas bar flash • Vibrator alarm activates		**STEL Alarm** • Fast siren • Fast alternating flash • ALARM and target gas bar flash • Vibrator alarm activates	

Note

If the **Low Alarm Acknowledge** *option is enabled, the audible alarm can be disabled during a low alarm condition. The LED and visual alarm indicators remain active until the alarm condition changes or the detector deactivates. Press ◯ to acknowledge the low alarm and deactivate the audible alarm. If the alarm escalates to a high, TWA, or STEL alarm, the audible alarm reactivates.*

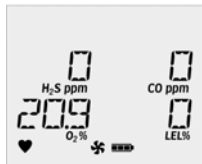
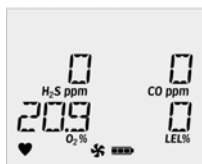
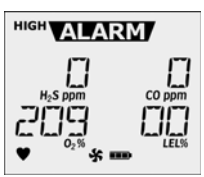
Table 7. Alarms

Alarm	Screen	Alarm	Screen
Multi-Gas Alarm • Alternating low and high alarm siren and flash • ALARM and target gas bar flash • Vibrator alarm activates		**Sensor Alarm** • **ERR** displays	
Over Limit (OL) Alarm • Fast siren and alternating flash • ALARM and target gas bar flash • Vibrator alarm activates		**Low Battery Alarm** • Sequence of 10 rapid sirens and alternating flashes with 7 seconds of silence in between (continues for 10 minutes) • and ALARM flashes • **LOW BATTERY** displays and the vibrator alarm activates • After 10 minutes, a sequence of 10 rapid sirens and alternating flashes with 1 second of silence in between (reactivates seven times) • **TURNING OFF** displays before the detector deactivates	

Note

If enabled, during an alarm condition the **Latched Alarms** *option causes the low and high gas alarms (audible, visual, and vibrator) to persist until the alarm is acknowledged (by pressing ◯) and the gas concentration is below the low alarm setpoint. The LCD displays the peak concentration until the alarm condition no longer exists. Enable/disable* **Latching Alarms** *in Fleet Manager II. Local regulations may require* **Latching Alarms** *be enabled.*

Table 7. Alarms

Alarm	Screen	Alarm	Screen
Automatic Deactivation Alarm • Sequence of 10 rapid sirens and alternating flashes with 1 second of silence in between (reactivates seven times) • ALARM flashes and the vibrator alarm activates • **TURNING OFF** displays before the detector deactivates		**Confidence Beep** • One beep every 1-120 seconds (user-defined) *Note* *Confidence beep automatically deactivates during a low battery alarm.*	
Normal Deactivation • Four beeps and flashes • Vibrator alarm activates briefly • Countdown initiates		**Heartbeat** • ♥ flashes once every second	
Pump Alarm • Two beeps and flashes • and ALARM flashes • **HIGH** displays • Vibrator alarm activates			

Computed Gas Exposures

⚠ Warning

To prevent possible personal injury, do not deactivate the detector during a work shift. TWA, STEL, and MAX readings reset when the detector is deactivated.

Table 8. Computed Gas Exposures

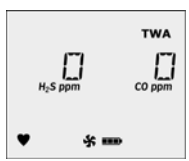
Gas Exposure	Description
TWA (H_2S and CO only)	Time-weighted average (TWA) based on accumulated exposure to toxic gases averaged over a work-day according to OSHA method. Default: OSHA 8 hour moving average. User-defined: 4-16 hour moving average.
STEL (H_2S and CO only)	Short-term exposure limit (STEL) to gas based on a 5-15 minute user-defined period.
Maximum* (peak)	Maximum (MAX) concentration encountered during work shift.

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

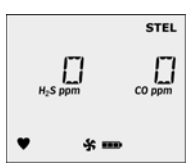
Viewing and Clearing Gas Exposures

To view the TWA, STEL, and maximum (MAX) readings, press ◯ twice rapidly. The LCD first displays the current time and date.

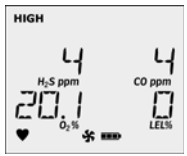
Then, the TWA gas exposures display.



Next, the STEL gas exposures display.



Next, the MAX readings display.



Last, the **CLEAR ALL** readings screen displays.

To clear the TWA, STEL, and MAX exposure readings, press ◯ when the following screen displays.

⚠ Warning

Follow all safety procedures as defined by your employer.

Deactivating the detector clears all readings. Confirm with your supervisor before clearing TWA and STEL alarms.

Gas Alarm Setpoints

The alarm setpoints trigger the gas alarms and are described Table 9.

Table 9. Gas Alarm Setpoints

Alarm	Condition
Low alarm	*Toxics and combustibles:* Ambient gas level above low alarm setpoint. *Oxygen:* Ambient gas level may be set above or below 20.9% (or 20.8%).
High alarm	*Toxics and combustibles:* Ambient gas level above high alarm setpoint. *Oxygen:* Ambient gas level may be set above or below 20.9% (or 20.8%).
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 simultaneously.

Resetting Gas Alarm Setpoints

Table 10. lists alarm setpoints as defined by Occupational Safety and Health Association (OSHA).

Note

Standard factory alarm setpoints vary by region.

Table 10. 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

Note

To disable an alarm, set the alarm setpoint to **0** *(zero) in Fleet Manager II.*

To change the factory-defined alarm setpoints, refer to the following in User Options:

- Low Alarm
- High Alarm
- TWA Alarm
- STEL Alarm

Stopping a Gas Alarm

The low and high alarms stop when the ambient gas concentrations returns to a concentration below the low alarm setpoint.

Note

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

The detector computes the TWA value based on OSHA standards and the STEL value based on a user-defined 5 to 15 minute interval. Refer to STEL Interval.

The TWA and STEL alarms can be stopped either by

- deactivating and then reactivating the detector, or
- clearing the TWA/STEL/MAX exposure readings. Refer to Viewing and Clearing Gas Exposures.

⚠ Caution

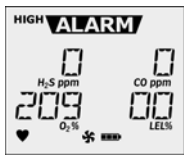
Follow all safety procedures as defined by your employer. Confirm with your supervisor before clearing TWA and STEL alarms.

Sensor Alarm

The detector tests for missing or defective sensors during the startup self-test and continuously thereafter. If a sensor fails the self-test, **Err** displays above the gas type of the failed sensor. If a sensor fails, refer to Troubleshooting.

Pump Alarm

The pump draws air over the sensors continually. If the pump stops operating or becomes blocked, the detector activates the pump alarm.



During a pump alarm, **HIGH** and ALARM display, and flashes.

Note

The pump alarm displays the same as a high alarm, except that flashes. Verify that a pump alarm is occurring before clearing the hose.

The pump alarm continues until the alarm is acknowledged by pressing ◯.

1. Clear the blockage and press ◯ to acknowledge. If **Force Block Test** is enabled, the detector automatically launches a pump test to verify the pump is operating correctly.
2. If the pump test is successful, the detector returns to normal operation.

   If the pump test is unsuccessful, refer to Troubleshooting for possible causes and solutions.

Low Battery Alarm

The detector tests the battery 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 10 minutes. If the battery voltage drops too low, the detector activates the automatic deactivation alarm.

Automatic Deactivation Alarm

If the battery is depleted below the minimum operating voltage, a sequence of ten sirens and alternating flashes activates with 1 second of silence in between. The sequence repeats seven times. The following screens displays and the detector deactivates.

To charge the detector, refer to Charging the Battery.

Bump Test

A bump test is the process of applying a small amount of test gas to force the detector into alarm.

Perform a bump test to validate that the sensors are responding correctly to gas, and that the audible and visual alarms activate during an alarm condition.

To perform a bump test, complete the following:

1. Activate the detector. A bump test can be performed either during startup when the **BUMP DUE NOW** screen displays or when in normal operation.

2. Attach the calibration hose to a 0.5 l/min regulator or a demand flow regulator.
3. Connect the hose quick connector to the pump quick connector on the pump inlet to apply gas.
4. The detector should enter alarm. Verify the audible and visual alarms activate, and that the LCD readings match the span gas concentrations of the gas cylinder being used.
5. Disconnect the calibration hose from the detector. The detector briefly remains in alarm until the sensors clear of the test gas.

Note

A MicroDock II station (automated bump test) is required to log bump tests as an event. A manual bump test will not be logged as an event.

Bump Test Using the MicroDock II Station

To perform an automated bump test, refer to the *MicroDock II User Manual*.

Calibration

Guidelines

Recommended gas mixture:
CO: 100 ppm balance N_2
H_2S: 25 ppm balance N_2
LEL: 50% LEL or 2.5% by vol. methane balance air
O_2: clean air, 18%

- To ensure accurate calibration, use a premium-grade calibration gas. Gases approved by the National Institute of Standards and Technology (NIST) improve the validity of the calibration.
- Do not use a gas cylinder past its expiration date.
- Calibrate a new sensor before use. Install the sensor, activate the detector, and allow the sensor to stabilize before starting calibration or a bump test.
  Used sensor: 60 seconds / new sensor: 5 minutes.
- Calibrate the detector at least once every 180 days, depending upon use and sensor exposure to poisons and contaminants.
- Calibrate the detector if the ambient gas varies during startup.
- Calibrate only in a safe area that is free of hazardous gas.
- Do not calibrate the detector during or immediately after charging is complete.
- The H_2S, CO, LEL and O_2 sensors can be automatically zeroed each time the detector is activated if the **Auto-Zero on Startup** option is enabled. Activate the detector in a normal (20.9%/20.8% O_2) atmosphere.
- If a certified calibration is required, contact BW Technologies by Honeywell.
- Calibration can be performed using either a 0.5 l/min regulator or a demand flow regulator.
- The maximum hose length for calibration is 3 ft (0.9 m).

⚠ Warning

Calibration cylinders that are used with a demand flow regulator must meet the following maximum inlet pressure specifications:

- **Disposable cylinders 0-1000 psig/70 bar**
- **Refillable cylinders 0-3000 psig/70 bar**

BW recommends using premium grade calibration gases and cylinders that are certified to National Standards. The calibration gases must meet the accuracy of the detector.

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. Auto-zero sets the zero-gas level of the sensor. If the target gas is present, the zero level will be incorrect.

If excessive target gas is present, the sensor(s) will fail and an error message displays.

In auto span, an error message displays if the target gas does not meet the expected values.

Sensor(s) that fail to span retain the previous span value and do not continue the calibration process.

Connecting the Gas Cylinder to the Detector

Refer to the following procedures and Figure 6. to connect the gas cylinder to the detector for calibration.

Note

Read all of the following procedures before beginning calibration.

⚠ Caution

The maximum hose length for calibration is 3 ft (0.9 m).

1. Verify the calibration gas being used matches the span concentration value(s) that are set for the detector.
2. Attach a 0.5 l/min regulator or a demand flow regulator to the gas cylinder.
3. Connect the calibration hose to the regulator on the gas cylinder.
4. Begin the calibration procedures. Refer to the Calibration Procedure section.

5. When calibration is complete, disconnect the hose from the detector and the regulator.
6. Ensure the gas cylinder is stored according to the manufacturer's specifications.

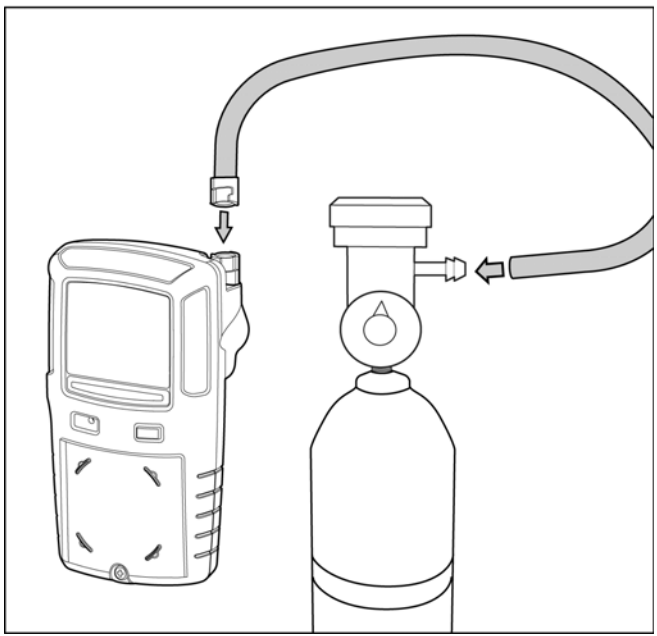


Figure 6. Connecting the Gas Cylinder to the Detector

Calibration Procedure

⚠ Caution

Calibrate only in a safe area that is free of hazardous gas. Do not calibrate the detector during or immediately after charging.

Note

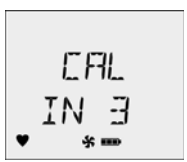
Calibration can be aborted at any time. To abort calibration, press ◯. The following screen displays.

To calibrate the sensor(s), complete the following:

1. Activate the detector.
2. Ensure the sensor(s) to be calibrated is enabled in Fleet Manager II.
3. Verify the calibration gas being used matches the span concentration value(s) that are set for the detector.

4. Press and hold ◯ while the detector performs the **OFF** countdown. Continue to hold ◯ as the detector briefly deactivates.

The detector then reactivates and performs the calibration countdown. Continue to hold ◯ until the countdown is complete.



Note

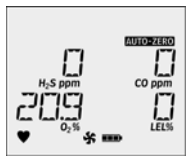
If ◯ is not held for the entire countdown, the detector will deactivate.

Auto Zero Sensor

Note

Do not apply calibration gas until **Apply Gas** *displays, otherwise the auto zero function will fail.*

AUTO ZERO flashes while the detector automatically zeroes the combustible and toxic sensors, and calibrates the oxygen sensor.



When auto zero is complete, the detector beeps two times.

Auto Zero Successful: If the sensor(s) successfully zeroes, the detector automatically proceeds to the Auto Span function.

Auto Zero Unsuccessful: If a sensor(s) fails auto zero, an error message and which sensor(s) failed displays.

To determine the cause and solutions for the failed sensor(s), refer to Troubleshooting.

Auto Span

When auto zero is complete, **APPLY GAS** and AUTO-SPAN display, and flashes.

5. Connect the calibration hose to the regulator on the gas cylinder (Figure 6.).
6. Attach the hose quick connector to the pump quick connector to apply gas.

   After 50% of the gas is detected on all sensors (within 30 seconds), AUTO-SPAN continues to flash while the detector completes the span (approximately 2 minutes).

Successful Span

7. If the sensors have successfully passed the span, the audible alarm beeps and continues with calibration. Proceed to Calibration Due Date.

Unsuccessful Span

If the sensor(s) fails the span, the following screen displays.

Refer to the following for possible causes and solutions.

The detector will not span a sensor if

- gas is not applied to the sensor,
- 50% of the expected gas concentration is not detected within the first 30 seconds, or
- the gas concentration drops below 50% of the expected gas level during the 2-minute span.

If gas is applied to a sensor and the detector fails to span the sensor, perform the following:

- Repeat the calibration using a new gas cylinder.
- Repeat the calibration using a new 0.5 l/min regulator or a new demand flow regulator.
- If the sensor fails the span a second time, replace the sensor. Refer to Replacing a Sensor or Sensor Filter.

If a sensor(s) fails any step of the calibration, the following screen displays.

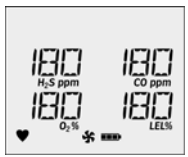
Note

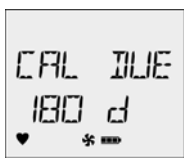
If calibration is unsuccessful for a sensor(s), the calibration due date cannot be set for the failed sensor(s).

Calibration Due Date

If a sensor(s) does not successfully span, the calibration due date for that sensor(s) will not reset.

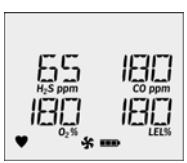
After the span is complete, the following calibration due date screens display before returning to normal operation.



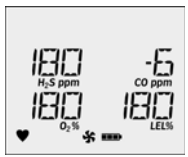


The number of days that displays in the **CAL DUE XXX DAYS** screen is the earliest date (overall of all sensors) a calibration must be performed.

Example: The H_2S sensor has the earliest date. The H_2S sensor must be calibrated in **65** days.



If a sensor fails to span successfully and it is past the calibration due date, the following screens display.



The example above shows the CO sensor is **6** days past due.

8. Press ◯ to acknowledge the warning before returning to normal operation. Refer to Troubleshooting and calibrate the failed sensor again.

Verification

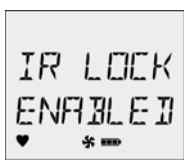
1. After calibration is complete and the detector returns to normal operation, verify the calibration using a gas cylinder other than the one used for calibration.
2. The gas concentration should not exceed the sensor's detection range. Confirm that the LCD shows the expected concentration values.

3. To ensure the readings are accurate, apply the verification gas for the same amount of time as was applied to the sensor when it was calibrated.

   Example: H_2S span time 2 minutes therefore, apply verification gas for 2 minutes.

Calibrating Using the IR Link

If the **Cal IR** option is enabled, the sensors must be calibrated using either the IR Link or MicroDock II station.



To calibrate using the IR Link, complete the following:

1. From the PC, open Fleet Manager II.
2. Click **Administration**.
3. From the **Administration toolbar**, click **Login / Logout** to access the **Enter Password** dialog box. Enter **Admin** and click **OK**.
4. From the **Devices** toolbar, click **Detector Configuration**.
5. Activate the detector.

   Calibration can be performed during the startup tests when **CAL DUE NOW** displays, or when the detector in normal operation.
6. From Fleet Manager II, click the **Calibrate** button located at the bottom of the window.

   The **Calibrate Device** dialog box displays.

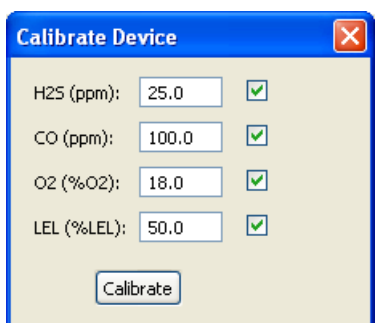


Figure 7. Calibrate Device Dialog Box

7. Enter the span gas concentration values. The values entered in the Calibrate Device popup must match the span concentration values on the gas cylinder.
8. Click inside the checkbox for each sensor that will be calibrated, and then click **Calibrate**.

   The following screen displays.

9. Refer to Auto Span to complete calibration.

Note

To calibrate using the MicroDock II, refer to the MicroDock II User Manual and the Fleet Manager II Operator's Manual.

Event Logs

The detector records the thirty most recent gas alarm events. Information that is recorded from an event is as follows:

- Serial number of the detector
- Start time of alarm
- Type, level, and duration of alarm
- Status of sensor
- Peak exposure level (ppm or %)
- Status of the detector
- Detector user
- Supervisor
- Location
- Definables (employee information)

Datalogs

The detector records datalog samples that can be compiled to create a report using Fleet Manager II. From Fleet Manager II, define how often the detector records a datalog sample (**1**-**120** seconds) in the **Datalog Interval (seconds)** field.

The detector is capable of storing 6 hours to 5 years of information, depending upon the datalog interval and what information is stored. When the memory is full, the detector replaces the oldest datalogs with the most recent datalogs.

The following information is recorded in a datalog:

- Serial number of the detector
- Date and time
- Type of datalog
- Detector status
- Detector user
- Type of gases the detector monitors
- Gas readings
- STEL and TWA readings (H_2S and CO only)
- Alarm setpoints
- Options enabled/disabled
- Sensor status
- Pump status
- Logging intervals
- Language detector is set to display
- Calibrations performed
- Bump tests performed
- Battery readings
- Temperature readings

Bump and Calibration Results

The detector records the bump test and calibration results. The results can then be imported into Fleet Manager II to create detailed reports. The following information is recorded in the Bump/Calibration datalogs:

- Date/time bump tests and calibrations were performed
- Serial number of the detector
- Test performed
- Test results
- Detector user
- Supervisor
- Detector status
- Detector configuration updated during bump test/calibration
- Type of detector
- Location detector was used
- MicroDock II serial number
- MicroDock II location
- Last calibration performed
- Next calibration due date
- Last bump test performed
- Next bump test due date
- Datalog interval
- STEL period
- Pump enabled/disabled
- Audible and visual indicator status
- Sensor type and sensor status
- Alarm status
- Sensor status
- Inlet(s) used
- Definables (employee information)

Downloading Datalogs and Event Logs

The datalog and event log files can only be downloaded to a PC using the IR Link or the MicroDock II Base Station. Refer to the *Fleet Manager II Operator's Manual*.

Software Requirements

Fleet Manager II and Excel software are required to create spreadsheet reports of the event logs, datalogs, and bump and calibration results.

Maintenance

To maintain the detector in good operating condition, perform the following basic maintenance as required.

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

Maximum Hose Length for Sampling

The maximum hose length for sampling is 75 ft (22m).

Battery Maintenance and Cautions

⚠ Warning

To avoid personal injury and/or property damage, adhere to the following:

- **The detector must be deactivated to charge the battery.**
- **Charge the battery immediately when the detector emits a low battery alarm. Refer to Charging the Battery.**
- **Charge the battery using the GasAlertMax XT II or the GasAlertMicroClip charger adapter only. Do not use any other charger adapters. Failure to adhere to this precaution can lead to fire and/or explosion.**
- **Do not calibrate the detector during or immediately after charging the battery.**
- ***Warning:* The GasAlertMax XT II uses a lithium battery (MX-BAT01) that may present a risk of fire or chemical burn hazard if misused. Do not disassemble, heat above 212° (100°C), or incinerate.**
- ***Warning:* Lithium polymer cells exposed to heat at 266°F (130°C) for 10 minutes can cause fire and/or explosion.**
- **If replacing the battery, use only approved lithium polymer cells that are available through BW Technologies by Honeywell. Use of any other cell can cause fire and/or explosion. To order and replace the MX-BAT01 lithium battery, refer to Replacement Parts and Accessories.**
- **Replace the battery only in a safe area that is free of hazardous gas.**
- **Dispose of used lithium cells immediately. Do not disassemble and do not dispose of in fire. Do not mix with the solid waste stream. Spent batteries must be disposed of by a qualified recycler or hazardous materials handler.**
- **Keep lithium cells away from children.**

Charging the Battery

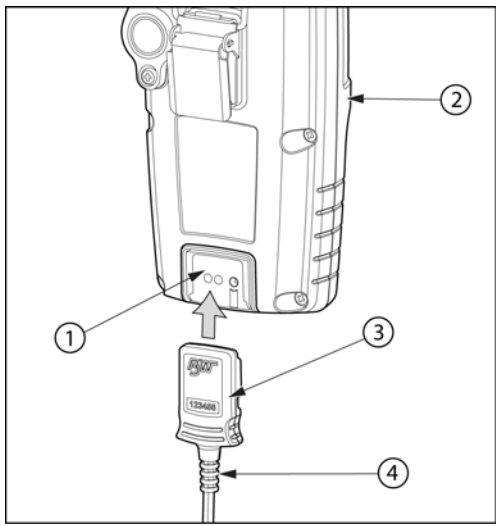


Figure 8. Connecting the Charger Adapter

Table 11. Connecting the Charger Adapter

Item	Description
1	IR and charger interface
2	GasAlertMax XT II
3	Charger adapter
4	Charger cable

⚠ Warning

The detector must be charged in a safe area that is free of hazardous gas in temperatures of 32°F to 113°F (0°C to 45°C).

To charge the battery, refer to Figure 8., Table 11. and the following procedures:

1. Deactivate the detector.
2. Plug the charger into a AC outlet.

⚠ Caution

The charging adapter is voltage specific to your region. Use of the charging adapter outside your region will damage the charger and the detector.

3. Attach the charging adapter (Figure 8.) to the charger interface.

4. Allow the battery to charge for 6 hours. The charging indicator flashes (low, mid, and full charge repeatedly) on the LCD while the battery is charging.

low mid full

5. When charging is complete, the charging indicator stops flashing and displays  to indicate a full charge. Remove the adapter and activate the detector.

   If the battery indicator does not display, refer to Troubleshooting.

Note

To preserve the life of the battery, deactivate the detector when not in use.

The detector may be warm immediately after charging. This is normal.

Optimum Battery Operation

To ensure maximum use of the battery, perform the following:

- To obtain full operating capacity, allow the battery to fully charge and discharge three times.
- To achieve the maximum number of charges, ensure the battery is charged between 32°F and 113°F (0°C and 45°C). Do not charge the battery in temperatures above 113°F (45°C).

Replacing the Battery

To replace the lithium battery, refer to Replacement Parts and Accessories to order the (XT-BAT-K1) kit that includes the *Replacing the GasAlertMax XT Battery Operator's Manual*.

Replacing a Sensor or Sensor Filter

⚠ Warning

To avoid personal injury and/or property damage, use only sensors that are specifically designed for the detector. Refer to Replacement Parts and Accessories.

- Each sensor has a high degree of resistance to common vapors and gases. To clear a sensor, move the detector to a clean environment and wait 10 to 30 minutes.
- Do not expose a sensor to vapors from inorganic solvents such as fumes from paint thinners, or organic solvents such as benzoic acids and acrylic acids).

To replace a sensor or sensor filter, refer to

- Table 12.,
- Figure 9.,
- Figure 10., and
- the following procedures.

Table 12. Replacing a Sensor or Sensor Filter

Item	Description
1	Front shell
2	LEL sensor
3	PCB
4	PCB screws (2)
5	Pump
6	Rear shell
7	Machine screws (6)
8	Pump inlet
9	Pump filter (particulate)
10	Moisture filter
11	CO sensor
12	H_2S sensor
13	O_2 sensor
14	Sensor filter

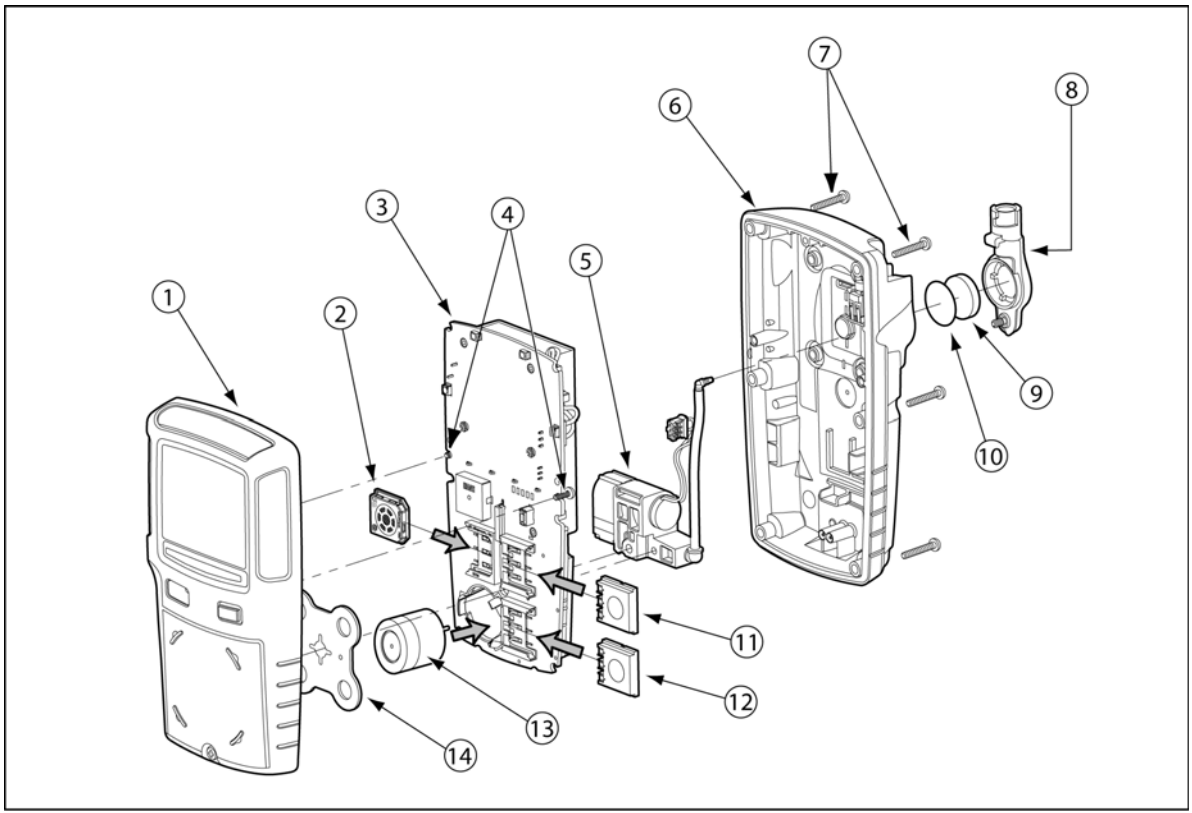


Figure 9. Replacing a Sensor or Sensor Filter

1. Deactivate the detector.
2. Remove the pump inlet screw and the pump inlet. Refer to Figure 13.
3. Remove the six machine screws from the rear shell.
4. Because the pump hose is connected to the rear shell and front shell pump, carefully remove the rear shell by lifting upward and tilting to the left. The front and rear shells are laying flat side by side (Figure 10.).

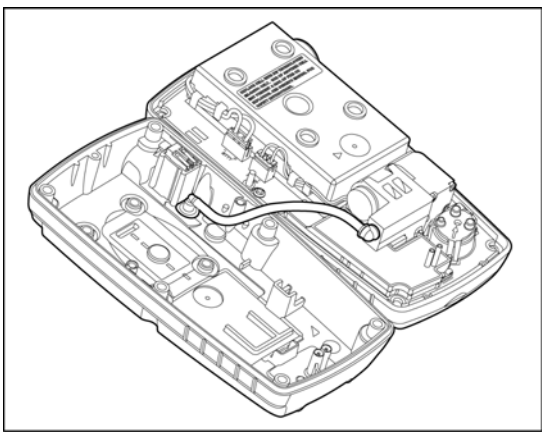


Figure 10. Front and Rear Shells Side by Side

5. Remove the two PCB screws.
6. Lift the PCB upward and tilt to the left. Lay the PCB (sensors facing up) onto the rear shell.
7. For CO, H_2S, and LEL sensors, slide outward to remove.

   To remove the O_2 sensorgently insert a screwdriver to the back of the oxygen sensor to push out the sensor. Refer to Figure 11.

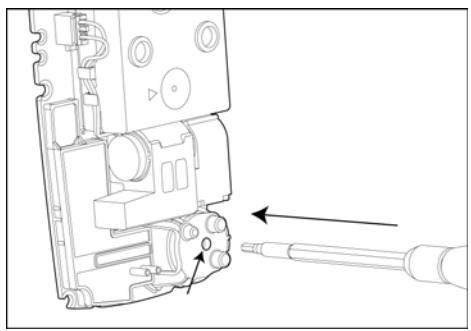


Figure 11. Remove the O_2 Sensor With a Scredriver

Note

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

8. Insert the new sensor(s).
9. If required, replace the sensor filter.

Note

When inserting a new sensor filter, ensure the white side is facing the sensors and the black side is facing the front shell.

10. Replace the particulate and/or moisture filter if required. Refer to Replacing the Pump Filters.
11. Re-assemble the detector and replace the PCB screws.
12. Replace the machine screws using 3-4 in-lbs. torque. Tighten the screws using a crisscross pattern to ensure a proper seal.
13. Replace the pump inlet and the pump inlet screw.
14. Activate the detector and calibrate the sensor(s). Refer to Calibration.

Replacing the Pump Filters

Filters are inserted into the pump inlet to prevent dust particulates and moisture from entering the pump module.

Particulate Filters

The particulate filter will require frequent changes if the detector is being used in heavy particulate areas. If a pump alarm occurs and there is no blockage in the tubing, replace the particulate filter.

Moisture Filters

The moisture filter will not typically require frequent changes. If moisture is drawn through the tubing, replace both the moisture filter and the particulate filter immediately.

To change the particulate or the moisture filter, refer toTable 13., Figure 12., and the following procedures.

Table 13. Replacing the Pump Filters

Item	Description
1	Rear shell
2	Moisture filter
3	Pump quick connector
4	Pump inlet
5	Machine screw (1)
6	Particulate filter

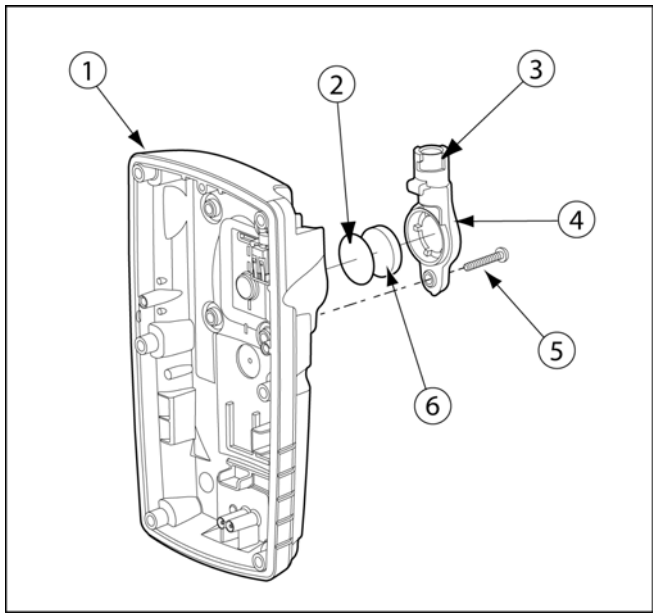


Figure 12. Replacing the Pump Filters

1. Remove the one machine screw from the pump inlet and gently lift the bottom of the inlet outward at a 45° angle.

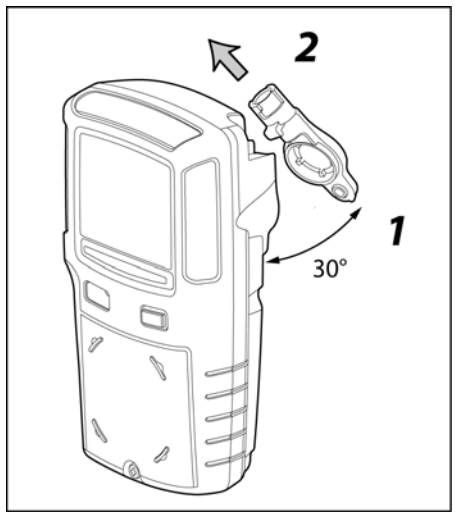


Figure 13. Removing the Pump Filters

2. Gently lift the pump inlet upwards to remove. Ensure the hook on the pump inlet clears the housing.

   The particulate filter is located inside the pump inlet and the moisture filter is located on the rear shell.

3. Depending upon the circumstance, replace either just the particulate filter or both. Refer to Particulate Filters and Moisture Filters.
4. Reattach the pump inlet and replace the screw. Tighten the screw using 3-4 in-lbs. torque. Do not overtighten.
5. Activate the detector to begin the startup test and the pump block test. Depending upon the result, one of the following screens display.

Successful: If the block test is successful, the detector completes the startup test and enters normal operation.

Unsuccessful: If the block test is unsuccessful, the detector deactivates. For causes and possible solutions, refer to Troubleshooting.

Replacing the Pump

To obtain a new pump (XT-RPUMP-K1) and the *Pump Replacement Operator's Manual*, refer to Replacement Parts and Accessories.

Troubleshooting

If a problem occurs, refer to the solutions provided in Table 15. If the problem persists, contact BW Technologies by Honeywell.

Figure 14. Troubleshooting

Problem	Possible Cause	Solution
The detector does not activate.	Depleted battery	Charge the battery. Refer to Charging the Battery.
	Damaged or defective detector	Contact BW Technologies by Honeywell.
Detector automatically deactivates.	Automatic deactivation due to depleted battery	Charge the battery. Refer to Charging the Battery.
	Lockout on Self-Test Error is enabled and a sensor(s) has failed the startup self-test	Refer to Lockout on Self-Test Error and Replacing a Sensor or Sensor Filter.
The detector enters alarm immediately when activated.	Sensor needs to stabilize	Used sensor: Wait 60 seconds New sensor: Wait 5 minutes
	Low battery alarm	Charge the battery. Refer to Charging the Battery.
	Sensor(s) requires calibration	Calibrate the sensor(s). Refer to Calibration.
	Hazardous environment	Leave the area immediately. Deactivate and reactivate the detector in a safe area that is free of hazardous gas.
The activation startup self-test fails.	General fault	Contact BW Technologies by Honeywell.
	Sensor error	Replace the sensor. Refer to Replacing a Sensor or Sensor Filter.

Table 7. Troubleshooting

Problem	Possible Cause	Solution
Detector does not display normal ambient gas reading after startup tests.	Sensors not stabilized	Used sensor: Wait 60 seconds New sensor: Wait 5 minutes
	Sensor(s) requires calibration	Calibrate the sensor(s). Refer to Calibration.
	Target gas is present	Detector is operating properly. Use caution in suspect areas.
Detector does not respond to pushbutton.	Battery is depleted	Charge the battery. Refer to Charging the Battery.
	Detector is performing operations that do not require user input	Pushbutton operation restores automatically when the operation ends.
Detector does not accurately measure gas.	Sensor(s) requires calibration	Calibrate the sensor(s). Refer to Calibration.
	Detector is colder/hotter than gas temperature	Allow the detector to attain ambient temperature before use.
	Sensor filter is blocked	Replace the sensor filter. Refer to Replacing a Sensor or Sensor Filter.
Detector does not enter alarm.	Alarm setpoint(s) are set incorrectly	Reset the alarm setpoints. Refer to Resetting Gas Alarm Setpoints.
	Alarm setpoint(s) set to zero	Reset the alarm setpoints. Refer to Resetting Gas Alarm Setpoints.
	Detector is in calibration mode	Complete the calibration procedure.

Table 7. Troubleshooting

Problem	Possible Cause	Solution
Detector intermittently enters alarm without 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 are set incorrectly	Reset the alarm setpoints. Refer to Resetting Gas Alarm Setpoints.
	Sensor(s) requires calibration	Calibrate the sensor(s). Refer to Calibration.
	Missing or faulty sensor(s)	Replace the sensor(s). Refer to Resetting Gas Alarm Setpoints.
Battery has been charging for 6 hours. Charging indicator on LCD shows the battery is still charging.	Battery is trickle charging	Battery is fully charged and is ready for operation.
Battery indicator does not display when charging.	Battery is depleted below normal levels	Charge the battery for 8 hours. If the battery indicator does not light after charging, contact BW Technologies by Honeywell.
Pump is not operating.	Diffusion cap is off or not attached correctly.	Attach diffusion cap. Ensure seal is tight.
	There is a blockage in the tubing.	Clear the blockage.
	Particulate and/or moisture filter requires replacement	Replace the filter(s). Replacing the Pump Filters.
Features and options not operating as expected.	Changes in Fleet Manager II	Verify that the settings in Fleet Manager II are correct.

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 the following table, contact BW Technologies by Honeywell.

Table 14. Replacement Parts and Accessories

Model No.	Description	Qty
SR-W-MC75C	Combustible (LEL) sensor	1
SR-X10-C1	Oxygen (O_2) sensor	1
SR-M-MC	Carbon monoxide (CO) sensor	1
SR-H-MC	Hydrogen sulfide (H_2S) sensor	1
REG-DF-1	Demand flow regulator	1
REG-0.5	0.5 l/min regulator	1
CG-Q58-4	Quad gas cylinder: 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 gas cylinder: CH_4-2.5%, O_2-18.0%, H_2S-25 ppm, CO-100 ppm, bal. N_2 (34 l)	1
CG-T34	Dual gas cylinder: 50% LEL (CH_4-2.5%) O_2-20.9%, bal. N_2 (34 l)	1
G0042-H25	Single gas cylinder: H_2S 25 ppm, bal. N_2 (58 l)	1
CG2-M-200-103	Single gas cylinder: CO 200 ppm, bal N_2 (103 l)	1
CG-BUMP1	Bump alarm gas aerosol (CH_4-2.5%, O_2-10%, H_2S-40 ppm, CO-200 ppm)	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
XT-SS-1	Sensor filter for GasAlertMax XT II, Kit of 2	2
GA-PFMAX	Particulate filters (kit of 5)	5
GA-PFMAX-50	Particulate filters (kit of 50)	50
GA-PFMAX-100	Particulate filters (kit of 100)	100
XT-RF-H5	Hydrophobic (moisture) filters (kit of 5)	5
XT-RF-H50	Hydrophobic (moisture) filters (kit of 50)	50
XT-C01-MC5	GasAlertMax XT multi-unit charger	1
GA-PA-1*	Charging adapter	1
DOCK2-0-1 C1M-00-N	GasAlertMax XT docking module (for use w/ MicroDock II) and charging cable	1
GA-USB1-IR	IR connectivity kit (includes USB cable and Fleet Manager II CD-ROM)	1

Model No.	Description	Qty
XT-SCREW-K1	Replacement screw kit (40 screws and screw-driver)	1
XT-BAT-K1	Battery replacement kit	1
XT-RPUMP-K1	Pump replacement kit	1
GA-HXT	GasAlertMax XT carrying holster	1
GA-BXT	GasAlertMax XT rubber boot	1
XT-AG-1	Alligator clip (stainless steel)	1

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

Specifications

Instrument dimensions: 13.1 x 7.0 x 5.2 cm (5.1 x 2.8 x 2.0 in.)

Weight: 328 g (11.6 oz.)

Operating temperature: -20°C to +50°C (-4°F to +122°F)
Storage temperature: -40°C to +60°C (-40°F to +140°F)

Operating humidity: 10% to 100% relative humidity (non-condensing)

Dust and moisture ingress: IP66/67

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

Detection range:
H_2S: 0 – 200 ppm (1 ppm increments)
CO: 0 – 1000 ppm (1 ppm increments)
O_2: 0 – 30.0% vol. (0.1% vol. increments)
LEL (combustible): 0 – 100% LEL (1% LEL increments) or
0 – 5.0% v/v methane

Sensor type:
H_2S, CO, O_2: Single plug-in electrochemical cell
LEL (combustibles): Plug-in catalytic bead

O_2 measuring principle: Capillary controlled concentration sensor

Alarm conditions: TWA alarm, STEL alarm, low alarm, high alarm, multi-gas alarm, over limit (OL) alarm, low battery alarm, confidence beep, automatic deactivation alarm, pump alarm

Audible alarm: 95 dB+ at 30 cm variable pulsed beeper with full battery charge

Visual alarm: Red light-emitting diodes (LEDs)

Display: Alphanumeric liquid crystal display (LCD)

Backlight: Activates upon startup and when the pushbutton is pressed; deactivates after 10 seconds. Activates during an alarm condition and remains lit until alarm ceases

Self-test: Initiated during activation, self-test runs continuously while detector is operational

Calibration: Automatic zero and automatic span

User field options: Startup message, lockout on self-test error, safe mode, confidence beep, latching alarm, force calibration, cal IR lock, force bump, location logging, force block test, set datalog interval, set confidence interval, language selection.

Sensor options: Sensor enable/disable, set span concentration values, set calibration interval, set bump interval, set alarm setpoints, set STEL interval, set TWA period, auto zero at startup enable/disable, 5% over-span, low alarm acknowledge, oxygen measurement, and combustible gas measurement

Maximum hose length for sampling: 75 ft (22 m)

Maximum hose length for calibration: 3 ft (0.9 m)

Battery operating time: One rechargeable lithium polymer battery at 20°C provides 13 hours operating runtime

Year of manufacture: The detector's year of manufacture is determined from the serial number. The first and second number after the first two letters determines the year of manufacture.

Example: MA1<u>10</u>-001000 = 2010 year of manufacture

Approved battery for GasAlertMax XT II product:
Lithium-ion polymer (MA-BAT01) as per standards EN50020, UL913, CSA C22.2 No. 157

Rechargeable battery	**(MX-BAT01)**	**Temperature Code**
Lithium Polymer	-20°C ≤ Ta ≤ +50°C	T4

Battery charger: GasAlertMax XT II Charging Adapter

First-time charge: 6 hours

Normal charge: 6 hours

Warranty: 2 years including sensors

Approvals:

Approved by CSA to both U.S. and Canadian Standards
CAN/CSA C22.2 No. 157 and C22.2 152
ANS/UL – 913 and ANSI/ISA – S12.13 Part 1

CSA Class 1, Division 1, Group A, B, C, and D

ATEX CE 0539 Ⓔx II 1 G Ga Ex ia IIC T4
KEMA 08 ATEX 0001

IECEx Ex ia IIC T4 Ga

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 Datalogger Specifications

Storage: 375 hours at 15-second intervals (75% redundancy)

Memory type: Wraparound memory ensures most recent data is always saved

Sample rate: One reading every 1-120 seconds

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

Operation: Requires no user intervention (automatic)

Compatible with: Desktop PC computer or laptop

Operating system: Windows XP and Windows Vista

Download via: IR device (IR Link adapter or MicroDock II Base Station)

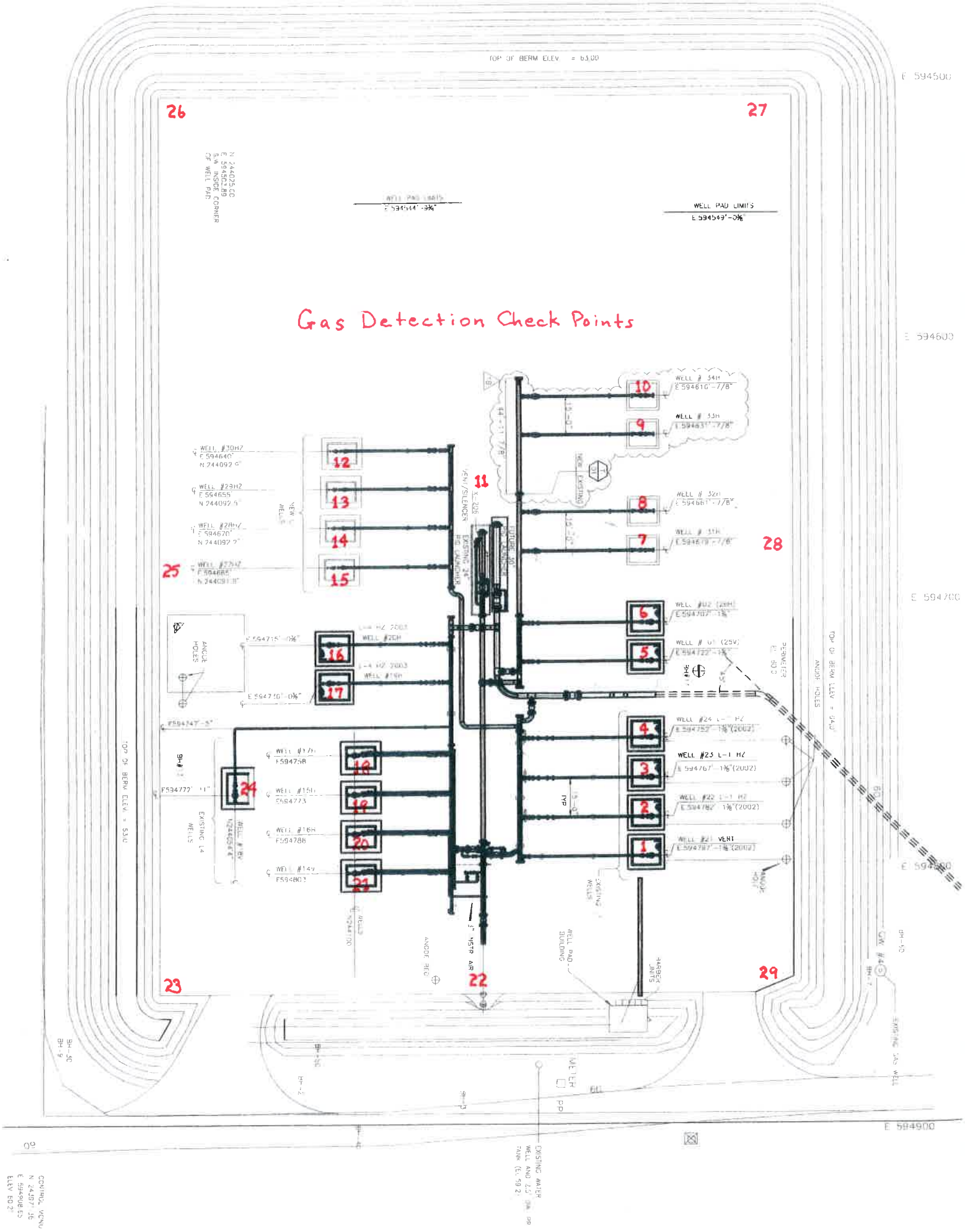
Software required: Fleet Manager II and Microsoft Excel

Wild Goose Storage Well Pad
Gas Detection Check List

Inspected by: _____

Gas Detector # **Bump Test Y / N**

	Check Point	Reading	Date	Time	Comments
1	21 V Caisson				
2	22 H Caisson				
3	23 H Caisson				
4	24 H Caisson				
5	25 V Caisson				
6	26 H Caisson				
7	31 H Caisson				
8	32 H Caisson				
9	33 H Caisson				
10	34 H Caisson				
11	West End of Pig Launchers				
12	30 H Caisson				
13	29 H Caisson				
14	28 H Caisson				
15	27 H Caisson				
16	20 H Caisson				
17	19 H Caisson				
18	17 H Caisson				
19	15 H Caisson				
20	16 H Caisson				
21	14 V Caisson				
22	East End of 18"				
23	SE Corner at Berm				
24	18 V Caisson				
25	South Center at Berm				
26	SW Corner at Berm				
27	NW Corner at Berm				
28	North Center at Berm				
29	NE Corner at Berm				


Gas Detection Check Points
TOP OF BERM ELEV = 63.00
26
27
28
29
25
23
22
WELL PAD LIMITS
E 594544'-3⅜"
WELL PAD LIMITS
E 594549'-0⅜"
E 594500
E 594600
E 594700
E 594800
E 594900
WELL #30H2
E 594640'
N 244092'
WELL #29H2
E 594655'
N 244092.9'
WELL #28H2
E 594670'
N 244092.7'
WELL #27H2
E 594685'
N 244091.8'
WELL #26H
WELL #25H
WELL #24 L-1 HZ
E 594752' -1⅜"(2002)
WELL #23 L-1 HZ
E 594767' -1⅜"(2002)
WELL #22 L-1 HZ
E 594782' 1⅜"(2002)
WELL #21 VERT
E 594797' -1⅜"(2002)
WELL #34H
E 594610'-7⅞"
WELL #33H
E 594631'-7⅞"
WELL #32H
E 594667'-7⅞"
WELL #31H
E 594678'-7⅞"
WELL #17H
E594758
WELL #15H
E594773
WELL #16H
E594788
WELL #14H
E594803
NEW 8" HDPE
NEW 6" HDPE
EXISTING 24" HDPE
FUTURE 30" HDPE
VENT/SILENCER
ANODE HOLES
PERIMETER RD 60'
EXISTING WELLS
WELL PAD BUILDING
HARBEX UNITS
ANODE BED
5" NSTP AIR
TOP OF BERM ELEV = 63.00
BH-5
BH-6
BH-7
BH-10
EXISTING GAS WELL
EXISTING WATER WELL AND 2.5" GAS PP
TANK EL 59.2'
WELL
PP
BH-2
BH-3
BH-4
CENTRAL VENT
N 244971.16
E 594908.65
ELEV 60.2'

Appendix D – Method 21 Monitors Specifications

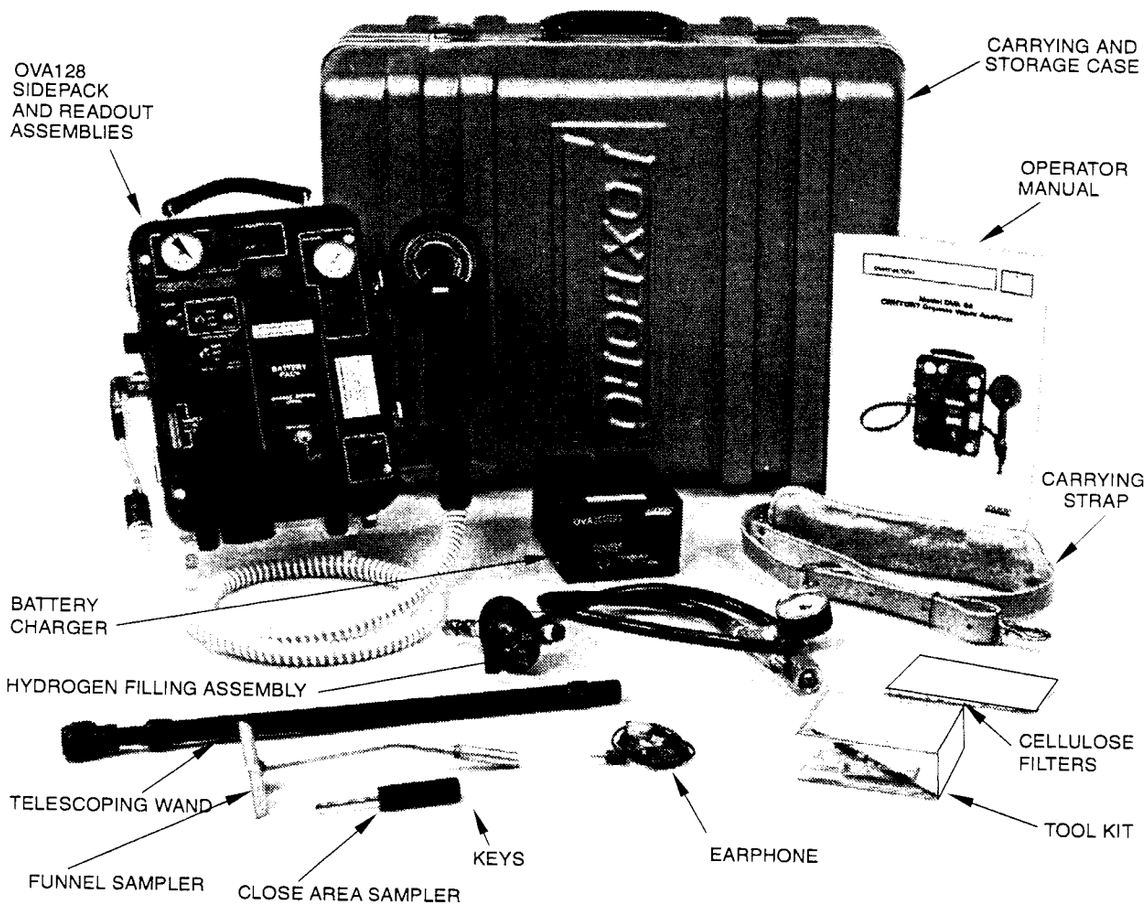


Figure 1-2. OVA 88 Analyzer Components

Standard Specifications

Readout

1 to 100,000 ppm (logarithmic)

Sample Flow Rate

Approximately 1 L/min at 22 °C and 760 mm (72 °F and 29.92 in) using Close Area Sampler

Response Time

Approximately 2 seconds for 90% of final reading.

Primary Electrical Power

12 Volt (nominal) lead, acid gel battery pack.

Fuel Supply

Approximately 75 mL volume tank of pure hydrogen, maximum pressure 15.9 MPa (2300 psig), fillable in case.

Hydrogen Supply Pressure Range

55 to 83 kPa (8 to 12 psig).

Service Life

Eight hours minimum with battery fully charged, hydrogen pressure at 12.4 MPa (1800 psig).

Detection Alarm

Audible alarm plus meter indication. User preset to desired level.

Flame-out Alarm

Audible alarm plus meter indication (needle drops off scale in negative direction).

Battery Test

Battery charge condition indicated on readout meter.

Filters

In-line sintered bronze and cellulose particle filters. Filters remove particles larger than 10 microns.

Operating Temperature Range

10 to 40 °C (50 to 104 °F).

Minimum Ambient Temperature

15 °C (59 °F) for Flame Ignition (cold start).

Accuracy

±20% of full scale.

Relative Humidity

5 to 95%.

Flame Ionization Detector (FID)

Century Organic Vapor Analyzer Style C, Model OVA 88

Minimum Detectable Limit (Methane)

1 ppm.

Recorder Output

0 to 5 V dc.

Nominal Dimensions

229 x 305 x 127 mm (9 x 12 x 5 in) Sidepack Assembly only.

Approximate Mass

5.5 kg (12 lb) Sidepack Assembly and Hand-Held Readout Assembly.

Bascom-Turner Instruments

CCD-201 VOC Monitoring Instruments Specifications for Method 21

This document references:

- Method 21 – Determination of Volatile Organic Compound Leaks
  Title 40 / Chapter I / Subchapter C / Part 60 / Appendix A-7 to Part 60

CCD-201 Equipment and Supplies Specifications for Method 21

Per Method 21 Section 2.1, a portable instrument is used to detect VOC leaks from individual sources. The instrument detector type is not specified, but it must meet the specifications and performance criteria contained in Section 6.0. Section 6.0 and select Section 8.0 specifications are listed below:

Section	Method 21 Equipment and Supplies Specifications	CCD 201 Specifications
6.1	The VOC instrument detector shall respond to the compounds being processed.	Responds to wide range of combustible gases and vapors. See the response factor table for specific details
6.1	Detector types that may meet this requirement include, but are not limited to, catalytic oxidation, flame ionization, infrared absorption, and photoionization.	Catalytic oxidation
6.2	The instrument shall be capable of measuring the leak definition concentration specified in the regulation.	Instrument range covers the EPA leak definition, 0-40,000 ppm of Methane.
6.3	The scale of the instrument meter shall be readable to ±2.5 percent of the specified leak definition concentration.	The CCD-201 is a ±1 ppm unit (for CH4). This resolution exceeds the requirements: 2.5% of leak definition (±12.5 ppm for 500 ppm leak definition of CH4)
6.4	The instrument shall be equipped with an electrically driven pump to ensure that a sample is provided to the detector at a constant flow rate. The nominal sample flow rate, as measured at the sample probe tip, shall be 0.10 to 3.0 l/min (0.004 to 0.1 ft3/min) when the probe is fitted with a glass wool plug or filter that may be used to prevent plugging of the instrument.	The CCD-201 has a pump flow rate of 0.5 l/min
6.5	The instrument shall be equipped with a probe or probe extension or sampling not to exceed 6.4 mm (1/4 in) in outside diameter, with a single end opening for admission of sample.	The probe diameter is 3/16'' OD
6.6	The instrument shall be intrinsically safe for operation in explosive atmospheres as defined by the National Electrical Code by the National Fire Prevention Association or other applicable regulatory code for operation in any explosive atmospheres that may be encountered in its use. The instrument shall, at a minimum, be intrinsically safe for Class 1, Division 1 conditions, and/or Class 2, Division 1 conditions, as appropriate, as defined by the example code. The instrument shall not be operated with any safety device, such as an exhaust flame arrestor, removed.	The CCD-201 is Intrinsically Safe – Class 1, Division 1
8.1.1	Response Factor. A response factor must be determined for each compound that is to be measured, either by testing or from reference sources. The response factor tests are required before placing the analyzer into service, but do not have to be repeated at subsequent intervals.	A full list of CCD-201 response factors is listed in the table that follows. This information meets the requirements described in Method 21 Section 8.1.1.3.
8.1.3.2	The instrument response time shall be equal to or less than 30 seconds. The instrument pump, dilution probe (if any), sample probe, and probe filter that will be used during testing shall all be in place during the response time determination.	The response time for the CCD-201 is ≤6s to 90% for methane.

Response Factors

Per Section 8.1.1, a response factor must be determined for each compound that is to be measured, either by testing or from reference sources. The response factor tests are required before placing the analyzer into service, but do not have to be repeated at subsequent intervals. As response factors for the CCD-201 have been published for the compounds of interest, the response factor determination test is not required. The table below describes the CCD-201 response factors and thus meets the Method 21 response factors test requirement (described in Section 8.1.1.3.)

CCD-201 sensor responds to a wide range of combustible gases but cannot distinguish between them. However, response of the sensor varies for different combustible gases. If the sensor is calibrated using CH4, then the reading of the sensor needs to be multiplied with appropriate response factor, Rf, to get the correct concentration of the target gas. For example, if the response factor of a target gas is 0.8 and the reading shows 1250ppm, then the concentration of the target gas is 1000ppm (1250 x 0.8 = 1000).

To obtain the response factor the instrument is first calibrated using methane, then a known concentration of the target gas is measured. The response factor, Rf, is then given by:

$$R_f = \frac{Known\ Gas\ Concentration}{Instrument\ Reading}$$

If the measured gas is known, then the device should be calibrated using the target gas. The readings of the instrument will then match the actual concentration of the measured gas.

The table below provides the measured values of response factor, R_f, for different types of gases.

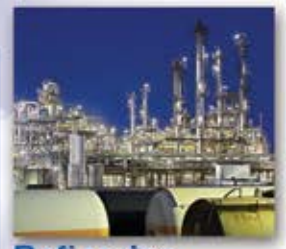
Chemical	LEL (%)	MW	Rf
Hydrogen	4	1	**0.83**
methane	5	16.04	**1.00**
Acetylene	2.5	26.04	*1.27*
Ethylene	2.7	28.1	*0.75*
Ethane	3	30.07	**0.80**
Methanol	6	32.04	*1.59*
Propene	2.4	42.08	*0.65*
propane	2.1	44.1	**0.73**
iso-butylene	1.8	56.11	*0.64*
n-Butane	1.6	58.1	**0.70**
n-propanol	2.2	60.1	*0.78*
iso-propanol	2	60.1	**0.81**
Ethylene Glycol	3.2	62.1	*1.33*
i-pentane	1.4	72.2	*0.64*
Neo-pentane	1.4	72.2	*0.64*
n-pentane	1.5	72.2	**0.67**
n-hexane	1.1	86.2	**0.69**
Toluene	1.1	92.14	*0.69*
n-heptane	1.05	100.2	*0.66*
Xylene	1	106.16	*0.74*
n-Octane	1	114.2	*0.69*
n-nonane	0.8	128.3	*0.68*

Bold: Measured
Italics: Predicted

Detailed Description and Typical Performance			
Gases Detected	*Combustible Gases in Air*	**Warm-Up Time**	*60 seconds*
Sensors	*Dual Catalytic Combustion Thermal Conductivity*	**Operating Temperature**	*-20°C to 40°C (0°F to 105°F)*
Range	*0 to 40,000 ppm by volume*	**Storage Temperature**	*-40°C to 60°C (-40°F to 140°F)*
Accuracy (5° to 45°C)	*±2% (20PPM) for PPM scale*	**Operating Time per Battery Set**	*10 hours, typical (25°C)*
Flow Rate	*0.5L/min*	**Humidity**	*0 to 95% RH (non-condensing)*
Response Time	*0.6s for methane*	**Power Supply**	*Two C-size rechargeable Batteries (NiMH)*
Resolution	*1 ppm from 0 to 40,000 ppm*	**Instrument Weight**	*1.5 lb (0.68 kg)*
GPS	*Horizontal resolution 2.5m Max update rate 10Hz*	**Bluetooth**	*Transmit Class 2, 10m Certified to FCC regulation*
Intrinsic Safety	*Class 1, Division 1*		

Soaring To New HEIGHTS

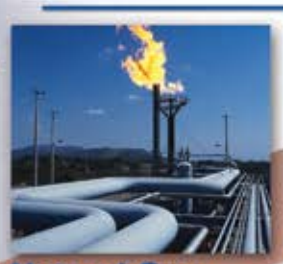
The Legacy Continues



Refineries

Fire & Hazmat

Landfills



Natural Gas

RKI INSTRUMENTS

EAGLE 2

EAGLE 2

Inlet fitting

Loud buzzer (95dB)

IrDA communication port

Low flow shutoff and alarm

Alarm LED's with wide visibility

Internal / external hydrophobic filters

3 Display modes:
- Display all gases
- Single gas view large type-auto scroll
- Single gas view large type-manual scroll

Self healing polyurethane protective overlay

Powerful internal sample pump with 125' range

Programmable gas channel positions

3 Operating modes:
- Normal operating
- Leak check
- Bar hole sampling

4 button operation with glow in the dark text

Glove friendly handle and buttons

Chemical, water, and dust resistant, RFI / EMI protected high impact case

PID sensor for low ppm VOC detection

Smart plug & play sensors for toxic gases

PPM, % LEL, or % Vol. auto-ranging combustible detection

Combine catalytic and IR sensors for combustible detection

Methane elimination for environmental use

Multi lingual (5 languages)

Standard 4 Gas Channels

Combustible •
O2 •
H2S •
CO •

6 Channel Capacity

Option 1
Option 2
Option 3

3 Specialty Channels

- **PID (VOC)**
- **Toxics**
  NH3, ASH3, HCN, PH3, SO2
- **Infrared (IR)**
  CO2, CH4, HC
- **Thermal Conductivity**
  CH4, H2

* Some combinations NOT compatible

Interchangeable Alkaline / NiMH removable battery compartment

Battery compartment thumbscrew

Specifications

Enclosure	Weatherproof, chemical resistant, anti RFI / EMI coated high impact polycarbonate - PBT blend. Can operate in rain or be set into 2.0" of water without leakage. Ergonomically balanced with rugged top mounted handle.
Dimensions	9.5" L x 5.25" W x 5.875" H (241mm L x 140mm W x 149mm H)
Weight	3.8 Lbs (1.72kg) (standard 4 gas with batteries)
Detection Principle	Catalytic combustion, electrochemical, galvanic, infrared, photo ionization, and thermal conductivity.
Sensor Life	2 Years under normal conditions.
Sampling Method	Powerful, long-life pump (over 6,000 hours) can draw samples over 125 feet. Flow rate approximately 2.0 SCFH
Display	Backlit 128 x 64 graphics display. Viewed through window in case top. Displays readings & status of all 6 channels simultaneously. Backlight, illuminates for alarms and on demand with adjustable time. Optional mode allows automatic or manual scrolling display of just one gas at a time with very large characters.
Language	Readout can display in 5 languages (English, French, German, Italian, or Spanish).
Alarms	2 Alarms per channel plus TWA and STEL alarms for toxics. The two alarms are fully adjustable for levels, latching or self reset, and silenceable.
Alarm Method	Buzzer 95 dB at 30 cm, four high intensity LED's.
Controls	4 External glove friendly push buttons for operation, demand zero, and autocalibration. Buttons also access LEL/ppm, % Vol. alarm silence, peak hold, TWA/STEL values, battery status, conversion factors, and many other features.
Continuous Operation	At 70°F, (21°C) 16 hours using alkaline batteries, or 18 hours using Ni-MH.
Power Source	4 Alkaline or Ni-MH, size C batteries (Charger has alkaline recognition to prevent battery damage if charging is attempted with alkalines).
Operating Temp. & Humidity	-4°F to 122°F (-20°C to 50°C) 0 to 95% RH, non-condensing.
Response Time	30 Seconds to 90% of range (for most gases) using standard 5 ft hose.
Safety Rating	Intrinsically Safe, Class I, Division 1, Groups A, B, C, D.
	Approvals:
Standard Accessories	Shoulder strap, alkaline batteries, hydrophobic probe, 5 foot hose, and internal hydrophobic filter
Optional Accessories	• Dilution fitting (50/50) • Ni-MH batteries • Battery charger, 115 VAC, 220 VAC, or 12 VDC (charge time 4 hours)/ continuous operation adapter, 115 VAC or 12 VDC • Extension hoses
Warranty	Two year material and workmanship, one year for PID sensor

Specifications subject to change without notice

Sensor Technologies

Standard 4 Gas

Catalytic

Gas	Range	Accuracy
Hydrocarbons (CH_4, standard)	0 - 100% LEL	± 5% of reading or ± 2% of full scale (*)
	0 - 5% Vol. (CH_4)	
	0 - 50,000 ppm (CH_4)	± 50 ppm or ± 5% of reading (*)

Combustible level detection displayed in % LEL, PPM, or % volume. Methane is the standard configuration. Other combustible gases available.

Galvanic

Gas	Range	Accuracy
Oxygen (O_2)	0 - 40% Vol. 0 - 100% Vol.	± 0.5% O_2

A specific electrochemical sensor for oxygen monitoring.

Standard Electrochemical

Gas	Range	Accuracy
Carbon Monoxide (CO)	0 - 500 ppm	± 5% of reading ± 2 ppm (*)
Hydrogen Sulfide (H_2S)	0 - 100 ppm	

Extra long-life CO and H_2S sensors.

Specialty Sensors

Photo ionization Detection (PID)

Gas	Range
Volatile Organic Compound (VOC)	0 - 50 ppm 0 - 2,000 ppm

Monitor low ppm VOC gases.

Infrared

Gas	Range	Accuracy
Carbon Dioxide (CO_2)	0 - 10,000 ppm 0 - 5% Vol. 0 - 60% Vol.	± 5% of reading or ± 2% of full scale (*)
Methane (CH_4)	0 - 100% LEL 0 - 100% Vol.	
Hydrocarbons	0 - 100% LEL 0 - 30% Vol.	

Monitor combustible gases in inert environments. Monitor wide range of CO_2.

Thermal Conductivity

Gas	Range	Accuracy
Methane (CH_4)	0 - 100% Vol.	± 5% of reading or ± 2% of full scale (*)
Hydrogen (H_2)	0 - 10% Vol. 0 - 100% Vol.	

Monitor % volume methane or hydrogen.

Smart Toxic Sensors

Smart Electrochemical

Gas	Range	Accuracy
Ammonia (NH_3)	0 - 75 ppm	± 10% of reading or ± 5% of full scale (*)
Arsine (AsH_3)	0 - 1.5 ppm	
Chlorine (Cl_2)	0 - 3 ppm	
Hydrogen Cyanide (HCN)	0 - 15 ppm	
Phosphine (PH_3)	0 - 1 ppm	
Sulfur Dioxide (SO_2)	0 - 6 ppm	

Monitor a wide variety of toxic gases. Smart plug and play sensors are auto recognized and can be remotely calibrated.

Note: (*) = Whichever is greater

CONFINED SPACE ENTRY

- Monitor LEL, O2, CO, and H2S
- Internal sample pump
  - ◊ *Pull samples up to 125'*
  - ◊ *Maintain steady sample flow to sensors*
- Audible and visual alarms
  - ◊ *2 Ways to communicate with workers*
- Ideal for refinery applications

LEAK INVESTIGATION

- Provides ppm detection of combustible gas
- Barhole mode for tracking leak migration
- Leak check with changing blink / pulsing rate
  - ◊ *LED's and alarm tones increase in frequency as gas concentration increases*
- Audible alarm silence
  - ◊ *Perform leak investigations without alarming residents*

LINE PURGE TESTING

- Thermal conductivity sensor
  - ◊ 0 to 100% volume Methane / Hydrogen range
- Autoranging IR
  - ◊ *Automatically changes from % LEL to % Vol.*
  - ◊ *Displays appropriate unit of measure*

VOC MONITORING

- Robust photo ionization detector (PID)
- Two ranges available,
  - ◊ *0-50 ppm or 0-2,000 ppm*
- Can be combined with other sensors to maximize capability
- Method 21 compliant

TRANSFORMER TESTING

- Determine transformer health by sampling head space
- Measure Hydrogen (and other flammable gases) and Oxygen in nitrogen blanket
- Increasing flammable gas levels in head space indicates failing transformer

LANDFILL MONITORING

- LEL / PPM and 0-100% volume Methane
- 0-60% Carbon Dioxide range
- Can be combined with other sensors (O2/H2S/CO) to maximize capability

Accessories

A. Calibration station

B. Battery charger / continuous operation adapter, AC and DC versions

C. Variety of sample hose lengths

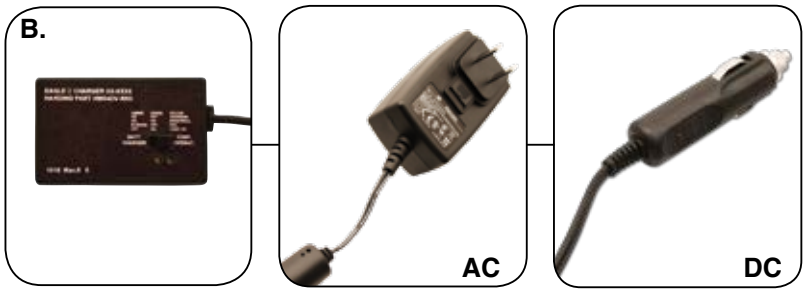
D. Float probe, auto shut off when probe contacts water

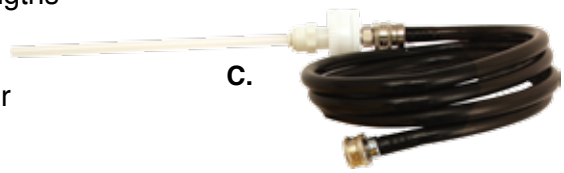
E. PID service kits

F. Calibration kits

G. Carrying cases

H Rechargeable Ni-MH batteries





User Selectable Options

Date and Time	Data Log Overwrite
Date Format	Data Log Memory
Battery Type	LCD Contrast
Configuring Channels	Calibration Reminder
Combustible Gas Selection	Calibration Past Due Action
Catalytic Detection Units	Calibration Interval
Relative Response On or Off	Leak Check / Bar Hole Mode
Alarm Points	Bar Hole Measurement Time
Alarm Latching	Operation Confirmation Alert
Alarm Silence	Password Function On or Off
User and Station ID	Factory Default
Autocal Values	Lunch Break
Backlight Delay	Language
Auto Fresh Air	Span Factor
Data Log Interval	

Made in USA

Authorized Distributor:

RKI INSTRUMENTS

Toll Free: (800) 754-5165 • Phone: (510) 441-5656 • Fax: (510) 441-5650

www.rkieagle2.com

World Leader In Gas Detection & Sensor Technology

ONE TO SIX GAS PORTABLE MONITOR

Gas Detection For Life

EAGLE 2 Model

Features

- **Monitor up to 6 different gases**
- **PPM, % LEL, or % Vol. auto-ranging combustible detection**
- **Specialty Sensors**
  - **PID (Photoionization Detector)**
    - Low or high range for VOC detection
    - Fence Electrode Technology for humidity and contamination resistance
  - **Infrared (IR)**
    CO2, % LEL CH4, % Vol. CH4, % LEL HC, % Vol. HC
  - **Thermal Conductivity (TC)**
    % Vol. H2, % Vol. CH4
  - **Smart toxic, plug and play sensors**
    NH3, AsH3, Cl2, HCN, PH3, & SO2
- **Multilingual (5 languages)**
- **Powerful long-life pump up to 125' range**
- **Low flow pump shut off and alarm**
- **Methane elimination for environmental use**
- **Alkaline 18 hours or NiMH 20 hours capability**
- **Password protection**
- **Datalogging standard**
- **Autocalibration / single gas calibration**
- **Internal hydrophobic dust filter**
- **External probe with hydrophobic filter**
- **Ergonomic RFI / EMI / chemical / weather resistant enclosure**
- **Intrinsically safe design, CSA approval**

RKI is proud to offer the next generation of our popular EAGLE portable gas detector. Equipped with features that are not available on competitive units, the EAGLE 2 is a powerful instrument that does more than just offer the standard confined space protection for LEL, O2, H2S and CO.

The EAGLE 2 available features include a PID sensor for detecting high or low ppm levels (0-50 & 0-2,000) of VOC gases; % volume capability for CH4 and H2 using a TC (thermal conductivity) sensor; PPM or LEL hydrocarbon detection at the push of a button; infrared sensors for CO2 (ppm or % volume), methane or hydrocarbons in LEL and % volume ranges; methane elimination feature for environmental applications; and a variety of super toxic gases. The EAGLE 2 has a strong internal pump with a low flow auto pump shut off and alarm, which can draw samples from up to 125 feet. This allows for quick response and recovery from distant sampling locations. The EAGLE 2 will continuously operate for over 18 hours on alkaline batteries or 20 hours on NiMH. A variety of accessories are also available to help satisfy almost any application such as long sample hoses, special float probes for tank testing, and dilution fittings, just to name a few. Datalogging is a standard feature for all sensors on all versions.

With its ergonomic design and large glove friendly buttons, the EAGLE 2 offers easy access to controls such as autocalibration, alarm silence, demand zero, peak hold, methane elimination, and a wide variety of other features. Each channel has two alarm levels plus TWA and STEL alarms for toxic channels. The two alarm levels are user adjustable and can be latching or self resetting. Rugged, reliable, easy to operate and maintain, the EAGLE 2 is the solution for just about any portable gas monitoring situation. Also, the display can be set to any of 5 languages: English, French, German, Italian, or Spanish.

RKI Instruments, Inc. • 33248 Central Ave. Union City, CA 94587 • Phone (800) 754-5165 • (510) 441-5656 • Fax (510) 441-5650

EAGLE 2 Model

Enclosure	Weatherproof, chemical resistant, RFI / EMI coated high impact polycarbonate-PBT blend. Can operate in 2.0" of water without leakage. Ergonomically balanced with rugged top mounted handle. Water & dust resistant equivalent to IP64.
Dimensions	9.5" L x 5.25" W x 5.875" H
Weight	3.8 Lbs (standard 4 gas with batteries).
Detection Principle	Catalytic combustion, electrochemical cell, galvanic cell, infrared, Photoionization detector, and thermal conductivity.
Sampling Method	Powerful, long-life internal pump (over 6,000 hours) can draw samples over 125 feet. Flow rate approximately 2.0 SCFH.
Display	3 display modes: display all gases, large font-autoscroll, or large font-manual scroll. Polyurethane protected overlay. Backlight, illuminates for alarms and by demand, with adjustable time.
Language	Readout can display in 5 languages (English, French, German, Italian, or Spanish).
Alarms	2 Alarms per channel plus TWA and STEL alarms for toxics. The two alarms are fully adjustable for levels, latching or self reset, and silenceable.
Alarm Method	Buzzer 95 dB at 30 cm, four high intensity LED's.
Controls	4 External glove friendly push buttons for operation, demand zero, and autocalibration. Buttons also access LEL/ppm, alarm silence, peak hold, TWA/STEL values, battery status, conversion factors, and many other features.
Continuous Operation	At 70°F, 18 hours using alkaline batteries, or 20 hours using NiMH.
Power Source	4 alkaline or NiMH, size C batteries (Charger has alkaline recognition to prevent battery damage if charging is attempted with alkalines).
Operating Temp. & Humidity	-20°C to 50°C (-4°F to 122°F), 0 to 95% RH, non-condensing.
Environmental	IP-64
Response Time	30 Seconds to 90% (for most gases) using standard 5 ft hose.
Safety Rating	Intrinsically Safe, Class I, Groups A, B, C, D. Approvals: CSA / CE
Standard Accessories	Shoulder strap, alkaline batteries, hydrophobic probe, and 5 foot hose, internal hydrophobic filter.
Optional Accessories	• Dilution fitting (50/50) • NiMH batteries • Battery charger, 115 VAC, 220 VAC, or 12 VDC (charge time 4 hours) • Continuous operation adapter, 115 VAC or 12 VDC • Extension hoses
Warranty	Two year material and workmanship, one year for PID sensor.

Gas	Measuring Range	Accuracy * Which ever is greater
Gases & Detectable Ranges		
Standard Confined Space Gases		
Hydrocarbons (CH_4, std)	0 - 100% LEL	± 5% of reading or ± 2% LEL (*)
	0 - 5% Vol. (CH_4)	
	0 - 50,000 ppm	± 50 ppm or ± 5% of reading (*)
Oxygen (O_2)	0 - 40% Vol.	± 0.5% O2
Carbon Monoxide (CO)	0 - 500 ppm	± 5% of reading or ± 5 ppm CO (*)
Hydrogen Sulfide (H_2S)	0 - 100 ppm	± 5% of reading or ± 2 ppm H2S (*)
Toxics		
Ammonia (NH_3)	0 - 75 ppm	± 10% of reading or ± 5% of full scale (*)
Arsine (AsH_3)	0 - 1.5 ppm	
Chlorine (Cl_2)	0 - 3 ppm	
Hydrogen Cyanide (HCN)	0 - 15 ppm	
Phosphine (PH_3)	0 - 1 ppm	
Sulfur Dioxide (SO_2)	0 - 6 ppm	
IR Sensors		
Carbon Dioxide (CO_2)	0 - 10,000 ppm 0 - 5% Vol. 0 - 60% Vol.	± 5% of reading or ± 2% of full scale (*)
Methane (CH_4)	0 - 100% LEL/ 0 - 100% Vol.	
Hydrocarbons	0 - 100% LEL/ 0 - 30% Vol.	
PID Sensors		
VOC	0 - 2,000 ppm 0 - 50 ppm	–
TC Sensors		
Methane (CH_4)	0 - 100% Vol.	± 5% of reading or ± 2% of full scale (*)
Hydrogen (H_2)	0 - 10% Vol. 0 - 100% Vol.	

The EAGLE 2 can be configured with up to 6 gas sensors from the above list.

Specifications subject to change without notice.

Made in the USA

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Gas Detection For Life

FAQ

June 5, 2013

Do the RKI Eagle and Eagle 2 Portable Gas Monitors Conform to EPA Method 21 Performance Criteria?

The Eagle and Eagle 2 Portable Gas Monitors were designed with EPA Method 21 in mind. EPA Method 21- Determination of Volatile Organic Compound Leaks, is a test method used for the determination of leaks of VOCs from process equipment. The performance requirements for portable instruments used for this purpose are outlined in Sections 6 and 8 of Method 21. Basic requirements from Method 21 are as follows:

> *Section 6.1 The VOC instrument detector shall respond to the compounds being processed. Detector types that may meet this requirement include, but are not limited to, catalytic oxidation, flame ionization, infrared absorption, and photoionization.*

The Eagle and Eagle 2 use a catalytic oxidation sensor that will respond to virtually all VOCs.

> *Section 6.2 The instrument shall be capable of measuring the leak definition concentration specified in the regulation.*

The range of detection for both the Eagle and Eagle 2 is 0-50,000 parts per million (ppm) for methane, which covers most currently defined or published leak rates.

> *Section 6.3 The scale of the instrument meter shall be readable to + 2.5 percent of the specified leak definition concentration.*

With a minimum resolution of 5 ppm, the Eagle monitors will meet this requirement for leak rates defined as 200 ppm or greater. With optional PID sensor even higher resolution is available.

> *Section 6.4 The instrument shall be equipped with an electrically driven pump to ensure that a sample is provided to the detector at a constant flow rate. The nominal sample flow rate, as measured at the sample probe tip, shall be 0.10 to 3.0 l/min (0.004 to 0.1 ft³/min)…*

The Eagle and Eagle 2 use a high-performance electric pump that samples at a nominal flow rate of approximately 0.7 to 1.0 l/min, and sounds an alarm if the flow rate drops below 0.3 l/min.

> *Section 6.5 The instrument shall be equipped with a probe or probe extension for sampling not to exceed 6.4 mm (1/4 in) in outside diameter, with a single end opening for admission of sample.*

The Eagle and Eagle 2 probe is 1/4 OD, and includes a hydrophobic element to prevent intrusion of water or other liquids into the sample system.

> *Section 6.6 …The instrument shall, at a minimum, be intrinsically safe for Class I Division 1 conditions, and/or Class II Division 1 conditions, as appropriate…*

The Eagle and Eagle 2 are certified to be intrinsically safe for Class I Division 1 Group A, B, C, and D hazardous locations by CSA (Canadian Standards Association.

> *Section 8.1.1.2 The instrument response factors for each of the individual VOC to be measured shall be less than 10 unless otherwise specified in the applicable regulation…*

Response factors for various VOCs can be supplied, and a list of commonly encountered materials is included in the Eagle and Eagle 2 Instruction Manual. None of the published factors is greater than 10, in fact none are greater than 3.

> *Section 8.1.2.2 The calibration precision shall be equal to or less than 10 percent of the calibration gas value.*

The Eagle and Eagle 2 can be calibrated anywhere in its range, and calibration precision is better than 5 % of the span gas value.

> ***Section 8.1.3.1 …measure the time required to attain 90 % of the final stable reading…***
>
> ***Section 8.1.3.2 The instrument response time shall be equal to or less than 30 seconds…***

Eagle and Eagle 2 response to 90% of full value is less than 30 seconds.

Note: All information referenced to currently available EPA Method 21 as of January 1, 2003.