UNI Lite

Single-Gas Detectors

MP112 & MP112RT

User's Guide

mPower Electronics
Making Powerful Senses

Rev. 0.5
November 2023

Contents

Read Before Operating

This manual must be carefully read by all individuals who have or will have the responsibility of using, maintaining or servicing this product. The product will perform as designed only if it is used, maintained and serviced in accordance with the manufacturer's instructions.

⚠ WARNING !

- Never operate the monitor when the cover is removed.
- Remove the monitor cover and battery only in area known as non-hazardous.
- Use only mPower's lithium battery part number M500-0038-000 (3.6 V, 1650 mAh, 2/3 AA size). or part No. ER14335 cell manufactured by EVE Energy Co., LTD
- This instrument has not been tested in an explosive gas/air atmosphere having an oxygen concentration greater than 21%.
- Substitution of components will impair suitability for intrinsic safety.
- Substitution of components will void warranty.
- It is recommended to bump test with a known concentration gas to confirm the instrument is functioning properly before use.
- Before use, ensure that the colorless ESD layer on the display is not damaged or peeling. (The blue protective film used for shipment may be removed.)

⚠ AVERTISSEMENT !

- N'utilisez jamais le moniteur lorsque le couvercle est enlevé.
- Retirer le couvercle du moniteur et la batterie uniquement dans une zone connue comme non dangereuse.
- Utilisez uniquement la batterie au lithium de mPower, pièce No. M500-0038-000 (3.6V, 1650 mAH, taille 2/3 AA) ou celle de EVE Énergie Cie., Lté, pièce No. ER14335.
- Cet instrument n'a pas été testé dans une atmosphère explosive gaz / air ayant une concentration en oxygène supérieure à 21%.
- La substitution de composants compromettra l'aptitude à la sécurité intrinsèque.
- La substitution des composants annulera la garantie.
- Il est recommandé de tester avec un gaz de concentration connu pour confirmer que l'instrument f onctionne correctement avant de l'utiliser.
- Avant l'utilisation, assurez-vous que la couche ESD incolore de l'écran n'est pas endommagée ou épluchée. (Le film protecteur bleu peut être enlevé.)

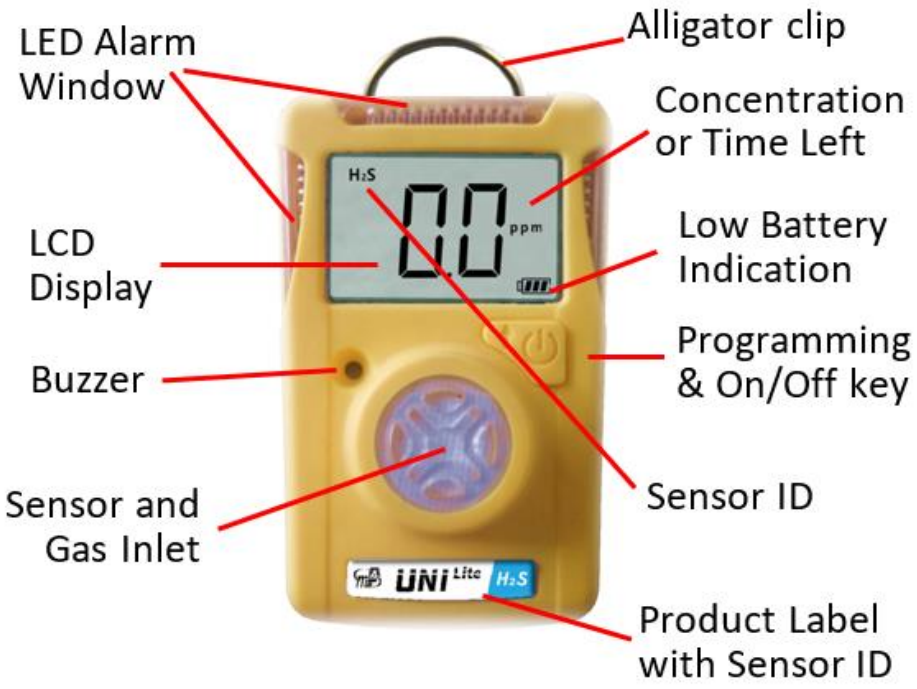
Proper Product Disposal at The End Of Life

The Waste Electrical and Electronic Equipment (WEEE) directive (2002/96/EC) is intended to promote recycling of electronic equipment and their components at end of life . This symbol (crossed-out wheeled bin) indicates separate collection of waste electrical and electronic equipment in the EU countries. This product may contain one or more Nickel-metal hydride (NiMH), Lithium-ion, or Alkaline batteries. Specific battery information is given in this user guide. Batteries must be recycled or disposed of properly. At the end of its life, this product must undergo separate collection and recycling from general or household waste. Please use the return and collection system available in your country for the disposal of this product.

1. General Information

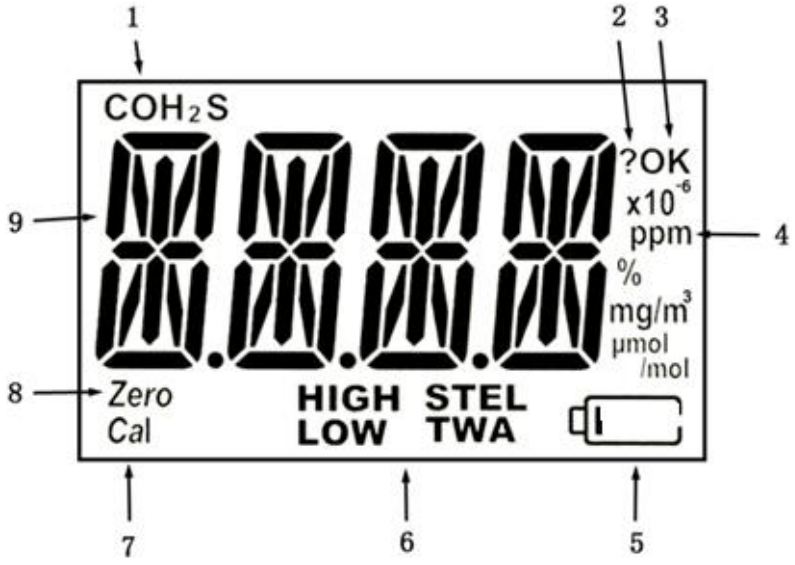
The UNI Lite (MP112 and MP112RT) is a low-cost, single-sensor, portable, personal monitor for CO or H_2S gas with a big-segment LCD display. These monitors are disposable after a fixed operating life of 2 years. The MP112 displays remaining operating time in months while the MP112RT displays gas concentration continuously for the first 21 months and then reverts to remaining operating time for the last 90 days of life. The unit alarms by buzzer, vibration and LED when the configurable Low or High alarm thresholds are exceeded, and Peak value is also stored. These values can be displayed on demand. The shell is made of high strength, durable material. The one-key operation is simple to use. Sensor and battery can be replaced easily. Calibration is also very convenient.

2. User Interface



3. Display

1. Gas name, CO or H_2S
2. Question mark (to confirm action)
3. Unit status indicator "OK" and to confirm entry
4. Gas unit, includes: $x10^{-6}$, ppm, mg/m^3, µmol/mol
5. Battery low charge warning
6. HIGH or LOW alarm indicator (when flashing)
7. Span calibration (in process or due) [MP112RT only]
8. Zero calibration (in process or due)
9. Concentration reading or other parameter



4. Operation

4.1 Turning the Unit On

⚠ NOTE: ONCE THE UNIT IS TURNED ON IT CANNOT BE TURNED OFF AND THE BATTERY/SENSOR LIFE COUNTDOWN TIMER BEGINS.

To turn on, press and hold the operation key (⇧⏻) for 3 seconds, until the red light, buzzer, and vibrator all trigger, and the LCD displays "On". The unit starts a self-test sequence, and then enters Normal Mode. Once the unit is turned on, it cannot be turned off and runs continuously until the remaining lifetime ends.

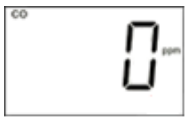
If the **Bump Due** (both versions) or **Cal Due** (MP112RT only) setting is enabled (requires an MP311 CaliCase docking station) and the due date has passed, the display will alternate between  or  and  . The key must be pressed to acknowledge, otherwise the instrument will turn itself off automatically after 30s. Enter Configuration Mode or use a CaliCase (see below) to perform bump or calibration. If the battery has been removed or replaced, be sure to use mPower Suite to reset the instrument clock before bump or calibration.

4.2 Normal User Mode

4.2.1 MP112 vs MP112RT Displays

In Normal Mode the MP112 shows lifetime remaining starting at 24 months, while the MP112RT displays real-time concentrations for the first 21 months and then switches to time remaining for the last 90 days. Both units alarm and display the alarm type if any pre-set limit is exceeded. The display returns to normal values from any screen if there is no key action for 60 seconds.

NOTE: It is possible to switch between MP112 and MP112RT displays, but only through an authorized service center before the unit is turned on. The end user must select the type of display at the time of purchase.

From Normal Mode:  MP112 Display  MP112RT Display

1) Short press to show the Peak reading and Event Log
2) Press 2 seconds to initiate a Daily Alarm Test and cycle through the High & Low Alarm settings, Bump Due days remaining and User ID. The MP112RT also shows Cal Due days and remaining life.
3) Press 4 seconds to go to Configuration Mode.

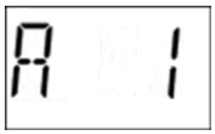
4.2.2 Peak and Alarm Event Log

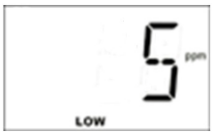
The Peak screen shows the highest value since the unit was turned on.

Long-press the key to enter the Clear Peak screen and long-press again to acknowledge and clear the Peak value.

Short-press from the Peak screen to enter the Alarm Event Log.

From the EVT LOG screen, long-press until the beep to show the latest alarm event A1 and then short-press repeatedly to cycle through the last 10 alarm events lasting ≥5 seconds. Up to 50 alarm events are logged into memory.





Values preceded by a "--" with no alarm label indicate a negative concentration alarm event. To view all 50 alarm events along with date and time stamps, it is necessary to use a CaliCase connected to a computer with mPower Suite software (check availability).

4.2.3 Alarm Test

From Normal User Mode, press the key for 2 seconds to enter an alarm test (recommended daily):

- Test function of the LED, buzzer and vibration alarms
- Test that all LCD display segments are operative
- Show remaining operating life (MP112RT only)
- Show High Alarm setting
- Show Low Alarm setting
- Show Cal Due days remaining (MP112RT only)
- Show Bump Due days remaining
- Show User ID

4.3 Configuration Mode

From Normal Mode, press the key for 4 seconds to enter a password to access Configuration Mode containing the following menus:

- AIR (Zero) Calibration
- SPAN Calibration (MP112RT only)
- SET High Alarm
- SET Low Alarm

Default Alarm and Span Settings (ppm)

Sensor	Low	High	Span
CO	35	200	100
H_2S	10	20	25

In general, long-press the key to enter the menu item and short-press to scroll to the next menu item or confirm an operation. To enter numbers or password, short-press to increase a number and long-press until the beep to move the cursor to the next digit. After all digits are entered, long-press to move to "OK?" and short-press to accept and save the value.

4.3.1 Entering and Exiting Configuration Mode

From Normal Mode, press the key for 4 seconds to access password entry with the first digit flashing. Short-press the Key to increase the number, and long-press until the beep to move the cursor to the next digit. After all four digits are entered, long-press to move to "OK" and short-press to accept and enter Configuration Mode.

NOTE: The default password is 0000.

To exit Configuration Mode, short-press repeatedly until  is displayed, and long-press to return to Normal Mode. Alternatively, just wait for one minute and the unit will automatically revert to Normal Mode. To re-enter Configuration Mode it is necessary to turn the unit off, double-click, and re-enter the password.

4.4 Sensor Calibration and Bump Test

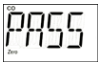
Before the unit can monitor gas correctly, it needs to be calibrated using zero and span gas. Calibration and Bump Tests are recorded in the instrument datalog for compliance purposes.

- MP112 allows only Zero calibration directly on the instrument
- MP112RT allows both Zero and Span calibration directly on the instrument
- MP112 and MP112RT both can use an MP311 CaliCase for Bump tests, and Zero & Span calibrations. (The MP311 is under development – check for availability)

It is recommended that the unit be calibrated every 3 to 6 months or according to the user's company policy. See TA Note 3 on the mPower website (www.mpowerinc.com) for more details on calibration frequency.

4.4.1 Zero (Fresh Air) Calibration

Zero calibration sets the baseline for the sensor. It is preferably done in fresh air at the same ambient temperature and humidity as will be used for measurements. However, nitrogen, dry cylinder air, or other gas source known to be free of detectable compounds can also be used.

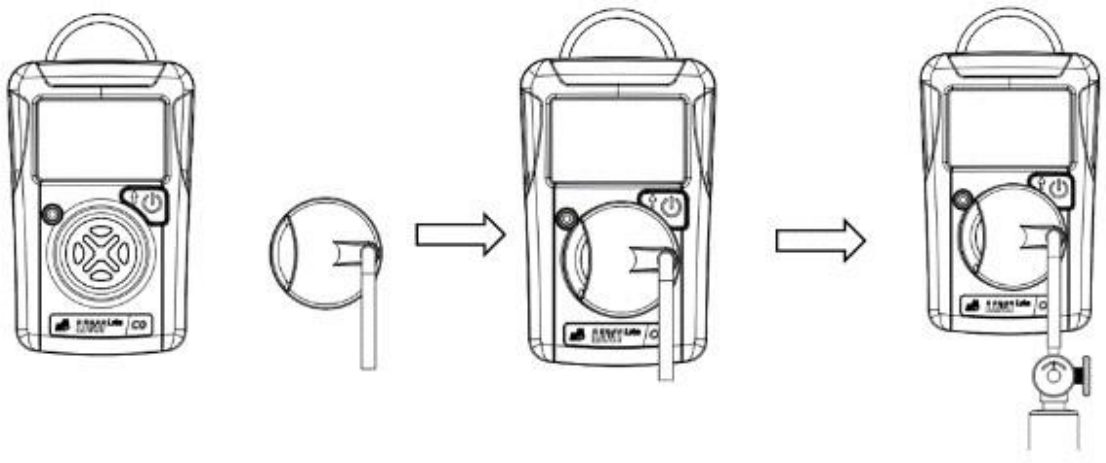
From the  menu, long-press to start a zero calibration. The unit displays a 15-second count-down followed by the calibration result as either  or  . The user can abort the zero calibration during the count-down by long-pressing, after which  is displayed.

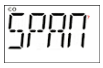
4.4.2 Span Calibration

Span calibration determines the sensitivity of the sensor to the gas. Default calibration concentrations are 25 ppm for H_2S and 100 ppm for CO. We recommend using a fixed flow regulator of preferably 0.3 LPM, but no more than 0.5 LPM. Use as short tubing connections as possible.

Span Calibration Procedure

1. Connect the Calibration Adapter to the span gas cylinder's regulator and snap it into place over the UNI Lite sensor.



2. Check that the SET Cal value (see below) is the same concentration as on the gas cylinder and adjust if they do not match.
3. Enter the  menu, start the gas flow, and long-press to start the calibration count-down. The calibration time is typically 70 seconds but may be shorter or longer depending on the sensor type.
4. To abort the span calibration during count-down, long-press and  is displayed.
5. After count-down, the span calibration result  or  is displayed.
6. Turn off the gas supply and remove the Calibration Adapter.

⚠ CAUTION

During normal monitoring, never operate the MP112 or MP112RT with the Calibration Adaptor attached because it will block diffusion of gas into the sensor.

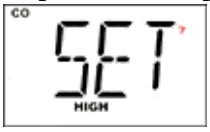
4.4.3 Bump Test

A Bump Test is a quick check that the sensor and alarms are functioning, without performing a full calibration. Bump testing requires an MP311 CaliCase Docking Station.

This feature is currently under development. Check for updates of this manual on the mPower website when the UNI Lite CaliCase becomes available.

4.5 Setting Instrument Configurations

4.5.1 Alarm Limits

MP112/112RT toxic gas monitors alarm with 2 beeps & flashes per second when concentrations are over the Low Alarm setpoint, and 3 beeps & flashes per second when over the High Alarm setpoint. The preset HIGH and LOW alarm limits can be changed. From these menus 

or 

, long-press the Key to enter the corresponding alarm limit menu, and adjust it using the same process as for entering a password (Section 4.3.1):
The current setting value is displayed, with the first digit flashing:

Short-press to increase the current digit, cycling from 0 to 9:

Long-press to move the cursor to the next digit:

After all digits are entered, long-press to move to the "OK" symbol, and short-press to save the entry. The unit will display SAVE for a few seconds while storing the value; it is not necessary to press OK to initiate saving.

NOTE 1: The MP112/112RT will show an error message "FAIL" if:

- The Low alarm is attempted to be set higher than the High alarm setting.
- The High alarm is attempted to be set lower than the Low alarm setting.
- The entered value is outside the measuring range.

4.5.2 Span Value, Bump/Cal Intervals, Gas Concentration Unit, Etc.

- The Span Gas setting should match the calibration gas cylinder concentration.
- The Bump and Cal Interval is the number of days between required bump or calibration.
- Concentration unit options include $x10^{-6}$, ppm, mg/m^3 and µmol/mol for toxic gas sensors.

These features and others require an MP311 CaliCase docking station and are currently under development. Check for updates of this manual on the mPower website when the UNI Lite CaliCase becomes available.

5. Computer Interface

Computer interface requires a UNI Lite CaliCase Docking Station connected to a PC fitted with mPower Suite software. mPower Suite can be used to 1) download logged alarm and calibration events, 2) print calibration certificates, 3) upload configuration parameters to the instrument and 4) upgrade the instrument firmware. mPower Suite and instrument firmware can be downloaded from the website at https://www.mpowerinc.com/software-downloads/ .

These features are currently under development. Check for updates of this manual on the mPower website when the UNI Lite CaliCase becomes available.

6. CaliCase Docking Station (MP311) Calibrations

6.1 4-Bay CaliCase Set-up

Before a docking station can be used for calibrations, it must be set up for the desired gas type and span concentration.

1. Connect the USB cable to both the docking station and the PC.

   ⚠**WARNING!** Connect only in non-hazardous environments!

These features are currently under development. Check for updates of this manual on the mPower website when the UNI Lite CaliCase becomes available.

7. Maintenance and Specifications

⚠ CAUTION!

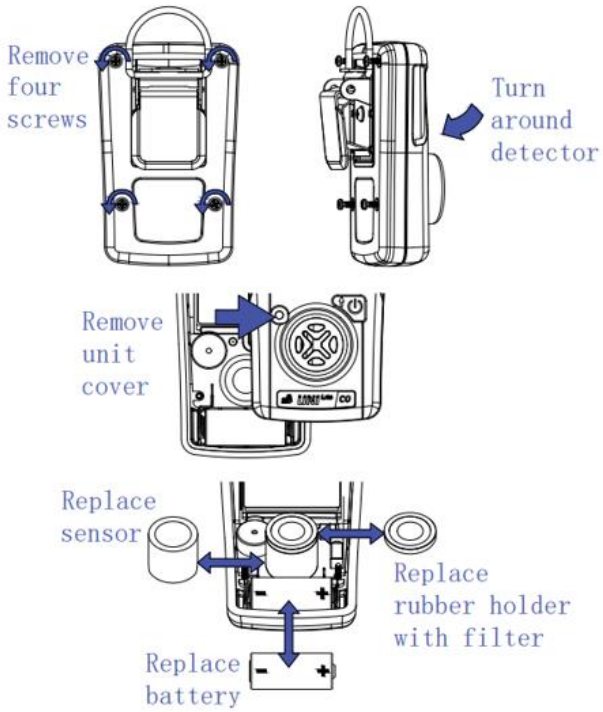
Maintenance should be performed only by a qualified person who has proper training and fully understands the contents of the manual.

7.1 Battery Replacement

The battery typically lasts 2 years but may be drained faster if the unit has frequently gone into alarm. When the charge is low, the unit displays a red battery icon and a battery low alarm is triggered once per minute. When the battery is dead, 

is displayed and the battery dead alarm triggers every second. The battery needs to be replaced, as follows:

1） Turn off the MP112/112RT and place it face down on a soft surface.
2） Use a Phillips head screwdriver to loosen each of the four screws.
3） Remove the top cover after carefully unplugging the buzzer connector.
4） Slide the battery out of its compartment.
5） Place the new battery into the compartment with its "+" end oriented toward the "+" on the printed circuit board.
6） Plug in the buzzer connector and reinstall the top cover.
7） Re-install the screws through the back cover. Be careful to not overtighten the screws.



⚠ WARNING !

- Never operate the monitor when the cover is removed.
- Remove the monitor cover and battery only in area known as non-hazardous.
- Use only mPower's lithium battery part number M500-0038-000 (3.6 V, 1650 mAh, 2/3 AA size). or part No. ER14335 cell manufactured by EVE Energy Co., LTD.

⚠ AVERTISSEMENT !

- N'utilisez jamais le moniteur lorsque le couvercle est enlevé.
- Retirer le couvercle du moniteur et la batterie uniquement dans une zone connue comme non dangereuse.
- Utilisez uniquement la batterie au lithium de mPower, pièce No. M500-0038-000 (3.6V, 1650 mAH, taille 2/3 AA) ou celle de EVE Énergie Cie., Lté, pièce No. ER14335.

7.2 Sensor Filter Replacement

The sensor gas inlet should be cleaned regularly (purged with compressed air) to avoid dust and other impurities blocking the air access and reducing the sensitivity of the detector. If this does not help, replace the internal filter whenever it appears dirty, is clogged with particles, has contacted liquid, or when sensor response becomes weak and/or slow.

1) Turn off the MP112/RT and remove the top cover as described above for battery replacement.
2) Peel off the old filter, and gently press a new filter onto the sensor.
3) Reconnect the buzzer and reinstall the top cover as described above for battery replacement. Be careful to not overtighten the screws.

7.3 Sensor Replacement

MP112 models are designed for easy sensor replacement. CO and H_2S sensors have typical operating lives of a few years.

1) Turn off the MP112 and remove the top cover as described above for battery replacement.
2) Replace the old sensor with a new one. Make sure the pins are not bent or corroded. Align the pins to the corresponding holes and push the sensor straight in. The sensor should fit flush against the printed circuit board.
3) Check the instrument filter and, if needed, replace as described in the previous section.
4) Reconnect the buzzer and reinstall the top cover as described above for battery replacement. Be careful to not overtighten the screws.

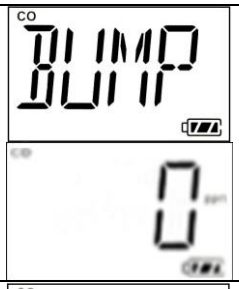
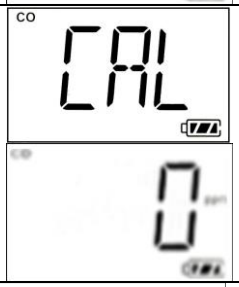
⚠ CAUTION!

Sensors are not interchangeable. Use only mPower sensors and use only the sensor type specified for your MP112/112RT monitor. Use of non-mPower components will void the warranty and can compromise the safe performance of this product.

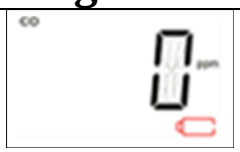
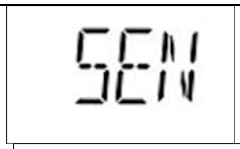
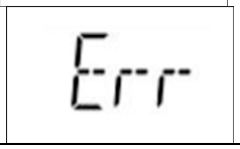
7.4 Troubleshooting

Problem	Possible Reason	Solution
Cannot turn on unit	Battery not installed	Install battery.
	Depleted or defective battery.	Replace battery.
Unit shows "Cal Due" or "Bump Due" and shuts off after 30 seconds	Calibration or bump due date passed	Press Left key to prevent shut off. Access program menu and perform bump or calibration. Or use mPower Suite to update to later Cal or Bump Due date. If battery has been replaced, re-set clock in Suite before calibration.
Reading abnormally low (or Fails Calibration)	Incorrect calibration or zeroed when detectable gas is present.	Zero and Span calibrate. Ensure clean air when zeroing.
	Calibration gas flow > 0.5 LPM	Use flow between 0.3 and 0.5 LPM
	On-board filter plugged.	Replace filter. Use external filter clip in dusty environments.
	Weak sensor.	Have Service Technician check raw counts and replace sensor as needed.
	Calibration Adapter is attached.	Remove Calibration Adapter.
Reading abnormally high (or Fails Calibration)	Incorrect calibration or degraded span gas used or tubing absorbs span gas	Zero and Span calibrate instrument. Ensure span gas is not expired. Used short, inert (PTFE) tubing
	Calibration gas flow < 0.3 LPM	Use flow between 0.3 and 0.5 LPM
	Environment contains cross-sensitive substances	Check TA Note 4 for possible cross-sensitivities.
Reading abnormally noisy (or Fails Calibration)	Incorrect calibration or degraded span gas used or tubing absorbs span gas	Zero and Span calibrate instrument. Ensure span gas is not expired. Used short, inert (PTFE) tubing
	Weak sensor.	Have Service Technician check raw counts and replace sensor as needed.
Buzzer, LED, or vibration alarm inoperative	Bad buzzer, LEDs, or vibration alarm.	Call authorized service center.
	Blocked alarm port	Unblock alarm port.

7.5 Alarm Signal Summary

Display	Reason
	**Over Range alarm:** Buzzer 3 beeps per second LED 3 flashes per second 1 Vibration per second "OVER" and "500" ("sensor range") 1 flash per second
	**High alarm:** Buzzer 3 beeps per second LED 3 flashes per second 1 Vibration per second "HIGH" 2 flashes per second
	**Low alarm:** Buzzer 2 beeps per second LED 2 flashes per second 1 Vibration per second "LOW" 2 flashes per second
	**Bump Overdue alarm:** Buzzer 1 beep per minute LED 1 flash per minute 1 Vibration per minute
	**Cal Overdue alarm:** Buzzer 1 beep per minute LED 1 flash per minute 1 Vibration per minute
	**Battery Low alarm:** Buzzer 1 beep per second LED 1 flash per second "bAT LoW"1 flash per second

Alarm Signal Summary (continued)

	**Battery Empty alarm:** Buzzer 1 beep per minute LED 1 flash per minute 1 Vibration per minute 1 flash per minute
 	**Sensor Error alarm:** Buzzer 1 beep per second LED 1 flash per second "SEN Err"1 flash per second

7.6 Instrument Specifications

Detector Specifications

Size	3.4 x 2.2 x 1.1 in (87 x 55 x 28 mm)
Weight	3.4 oz. (95 g)
Sensors	4-size electrochemical sensors: CO and H2S
Response Time	15s t_{90}
Temperature	-4° to +122°F (-20° to +50°C)
Humidity	5% to 95% Relative Humidity (non-condensing)
Pressure	86 to 106 kPa (0.85 to 1.05 atm)
Alarm Type	• High, Low, STEL & TWA alarms adjustable • Over range alarm • Low battery alarm
Alarm Signal	• 95 dB @ 30 cm • Bright red LEDs • Built in vibrator
Calibration	2-point calibration: zero and span
Event Log	Up to 50 alarm events (Requires separate docking station to download – check availability)
IP Rating	IP-67
EMI/RFI	Compliant with EMC Directive 2014/30/EU
Safety Certifications	**IECEx** Ex ia IIC T4 Ga **CNEX** Ex ia IIC T4
Battery	2/3 AA Lithium battery replaceable
Docking Station for Cal & Bump	Check Availability
Warranty	2 Years

Sensor Options

Sensor	Range	Resolution
CO (Carbon Monoxide)	0-1000 ppm	1 ppm
H_2S (Hydrogen Sulfide)	0-100 ppm	0.1 ppm

Technical Support and mPower Contacts

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