User Guide

Honeywell

MeshGuard IR

Contents

WARNINGS

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:

Use only the Lithium battery or external rechargeable battery provided by RAE Systems. This instrument has not been tested in an explosive gas/air atmosphere having an oxygen concentration greater than 21%. Substitution of components may impair suitability for intrinsic safety. Replace batteries only in non-hazardous locations.

STATIC HAZARD: Clean only with a damp cloth.
For safety reasons this equipment must be operated and serviced by qualified personnel only. Read and understand instruction manual completely before operating or servicing. Any rapid up-scale reading followed by a declining or erratic reading may indicate a gas concentration beyond upper scale limit, which may be hazardous.

Warning:

Do not allow condensation to take place within the sensor. Although the infrared sensor used in the product has a humidity range of 0% to 95% non-condensing, care must be used in transporting and using this sensor in higher humidity to prevent condensation from taking place inside the sensor during temperature changes. In some cases of extreme temperature change, the sensor may require a temperature conditioning period before the monitor is turned on.

Intrinsically safe marking:

IECEx TSA 09.0001X Ex ia I/IIC T4

CE 0575 ⟨Ex⟩ IM1/II 1G Ex ia I/II C T4
DNV 09 ATEX 55990 X

cCSAus Class I, Division 1, Groups A,B,C, D T4
$-40^{o}\ C \leq T_{amb} \leq 50^{o}\ C$

Entity Parameters: $U_i = 3.6V$, $C_i = 86\mu F$, $L_i/R_i = 3.5\mu H/ohm$

Warning:

cCSAus certification only applies for fixed installations.

1 Proper Product Disposal At End Of Life

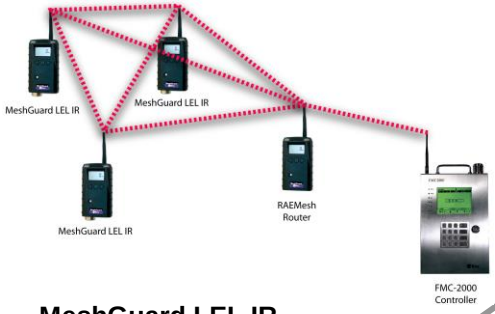
The Waste Electrical and Electronic Equipment (WEEE) directive (2002/96/EC) is intended to promote recycling of electrical and electronic equipment and their components at end of life. This symbol (crossed-out wheeled bin) indicates separate collection of waste electrical and electronic equipment in the EU countries.

2 Standard Kit

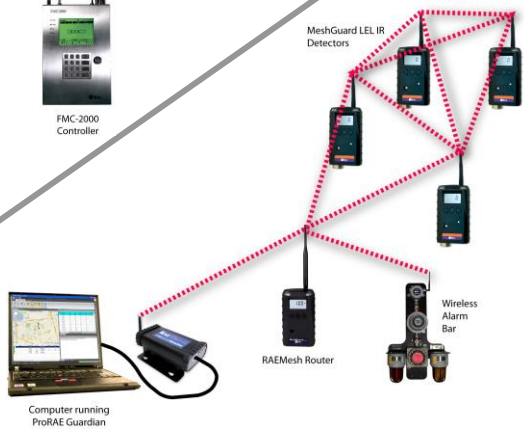
Monitor with antenna
User's Guide
CD with resources
Maintenance tool
Calibration certificate
Calibration adapter

3 General Information

MeshGuard LEL IR (FTD-3000) is a single combustible-gas LEL (Lower Explosive Limit) detector integrated with a wireless mesh network-enabled transmission radio module. The detector has the option of relaying the wireless signal to other MeshGuard LEL IRs as needed, to bypass obstacles. The MeshGuard LEL IR's built-in radio board operates on a frequency of 2.4GHz and complies with IEEE 802.15.4 standard. The MeshGuard LEL IR works with the FMC-2000 wireless controller on a flexible, robust wireless network to provide reliable, low-cost operation. It also works in a ProRAE Guardian network with a PC, and it supports point-to-point and point-to-multi-point networks.



MeshGuard LEL IR network with FMC-2000 controller



MeshGuard LEL IR network with ProRAEGuardian PC controller and Wireless Alarm Bar

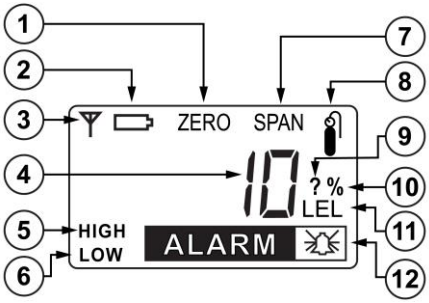
Key Features

- Up to 2 months continuous operation using internal battery and 4 months continuous operation using external BatteryPak.
- IEEE 802.15.4 Mesh network functionality with 64-bit MAC address
- Mesh network with auto network forming and configuration
- Operating distance: up to 300 m, line of sight
- Very low-cost installation − no hardwiring involved
- Large area coverage with multi-hop mesh network
- Field-replaceable battery and sensor
- Loud audio alarm, 90dB @ 30cm (12″)
- Large, easy-to-read continuous display of LEL in %
- User-adjustable high and low alarms
- Bright red flashing alarm
- Simple calibration
- Highly resistant to RFI interference
- IP-65 rated for outdoor use in harsh environments

4 Physical Description

1	LED alarm
2	LCD
3	Buzzer alarm
4	Sensor gas inlet
5	Battery cover (on bottom)
6	Y/+, MODE, and N/- keys
7	Antenna

4.1 LCD Display



1	Zero Calibration
2	Battery Indicator
3	Wireless Communication (if on continuously, the monitor is in STD; if blinking, the monitor is in RTR)
4	Reading Value
5, 12	High Alarm
6, 12	Low Alarm
7, 8	Span Calibration
9	Save Setting?
10	LEL Unit
11	LEL Percentage (%)
12	Alarm Indicator
Remark:	Concentration unit is shown as percentage of LEL.

4.2 Specifications

RF Certifications	FCC Part15 CE EN 300328 SRRC (Pending) Wireless Approval For UAE In Middle East (**TRA REGISTERED No:** ER36063/14 **DEALER No:** HONEYWELL INTERNATIONAL MIDDLE EAST - LTD - DUBAI BR Wireless Approval for QATAR In Middle East ictQATAR Type Approval Reg. No.: R-4465
Display	Customized LCD (1 x 1.5″) with backlight
Audible alarm	90dB @ 30cm
Visual alarm	2 super-bright red LEDs
Calibration	Two-point field calibration
RF	IEEE 802.15.4/Zigbee with mesh stack
Operating Range	Up to 300 meters, line of sight
Transmission Power	Up to 18dBm (63mw EIRP)
Receiver Sensitivity	Minimum -95dBm at 2.4GHz
User Interface	Three keys (Y/+, MODE, N/-)
Power Supply	Disposable lithium battery, +3.6V (optional re-chargeable external battery for extended run time)
Max Current Consumption	3.0mA@3.3V during sleep 0.5mA@3.3V while shut off <200mA@3.3V during RF transmission
Operation Time	Internal Battery (at normal temperature): STD* Mode: up to 2 months RTR** Mode: up to 10 days External Battery (at normal temperature): STD Mode: up to 4 months RTR Mode: up to 1.5 months *STD is standard-function device **RTR is router-function device

Specifications continue on next page

Specifications (continued)

Operating Temperature	With Internal Battery: -20° to +50° C (-4° to 122° F) With RAE PowerPak: -40° to +50° C (-40° to 122° F)
Humidity	10% to 95% relative humidity, non-condensing
Dimensions	26.5cm x 9.5cm x 5.5cm (10.5″ L x 3.7″ W x 2.1″ H)
Weight	0.6 kg (1.3 lbs)
Package	IP-65
Mounting	Optional stainless-steel bracket mount or magnetic mount; wall mount for external battery

Brazil Radio Specifications

Radio model: RM2400A
Frequency range: 2.400-2.4835GHz
Modulation: 802.15.4 DSSS BPSK
RF power(Tx): 20dBm
Data rate: 250kbps

5 Operating The MeshGuard LEL IR

Make sure the battery is installed before operating the MeshGuard LEL IR. Refer to page 37 for information on battery installation and replacement.

5.1 Turning The MeshGuard LEL IR On

Hold down the [MODE] key and release it when the MeshGuard LEL IR beeps. The monitor is now on, as indicated by the display:

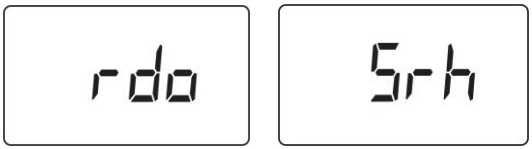
The MeshGuard LEL IR briefly shows the firmware version (for example, "F1.0" means firmware version 1.0, "F2.0" means firmware version 2.0, etc.):

Then the MeshGuard LEL IR displays "SOn" as the sensor comes on.

It begins a sensor warm-up and counts down by seconds from 60 to 1.

The MeshGuard LEL IR initiates network communication and shows these displays in alternation:

Note: If MeshGuard LEL IR is unable to find a radio network to connect with, it searches, and the display alternates between "rdo" and "Srh" (for "radio search").



Next, if a network is located, an antenna icon appears (if no network is found, then the icon is not shown; press [Y/+] to search for a network). The current gas concentration reading is also displayed:

The MeshGuard LEL IR is now operational.

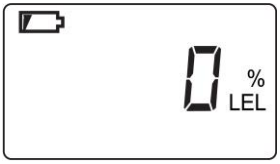
5.2 Turning The MeshGuard LEL IR Off

Hold down the [MODE] key through the "5…4…3… 2… 1… oFF" sequence. The monitor is off when the display is blank. Release the [MODE] key.

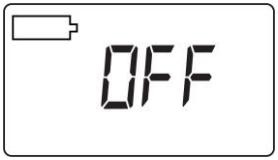
The MeshGuard LEL IR is now off.

5.3 Low Battery Indicator & Action

The MeshGuard LEL IR's internal battery is designed for up to 2 months' continuous operation in STD mode, and the external battery for up to 4 months. When the battery gets low, the MeshGuard LEL IR beeps once per minute. It is recommended that the battery be changed immediately, to minimize disruption.



When the battery is completely depleted, the LCD displays "OFF," and the LED and buzzer alarms activate once per second. The battery icon also blinks on and off. The MeshGuard LEL IR shuts down after you press any key, or shuts down automatically if you do not press a key for 60 seconds.



5.4 Over Range Alarm

When a gas concentration exceeds 100% of LEL, the MeshGuard LEL IR displays "OVR" and its buzzer and LED are activated.

5.5 Wireless Communication Indicator

When wireless communication is turned on, the LCD displays the wireless link status in the upper left corner:

If the MeshGuard LEL IR finds and joins a wireless network, an antenna icon is shown in the display. If no link or a weak link is established, no antenna icon is shown. Press [Y/+] to manually search for a network.

In RTR mode, the antenna icon flashes on and off, indicating that the modem is always active and transmitting. With an external RAE BatteryPak, it can run for up to 1.5 months.

In STD mode, the antenna icon is shown continuously (solid), indicating that the modem is active whenever alarm data is transmitted. This conserves battery power. With an external RAE BatteryPak, it can run for up to 4 months.

5.6 Operation Modes

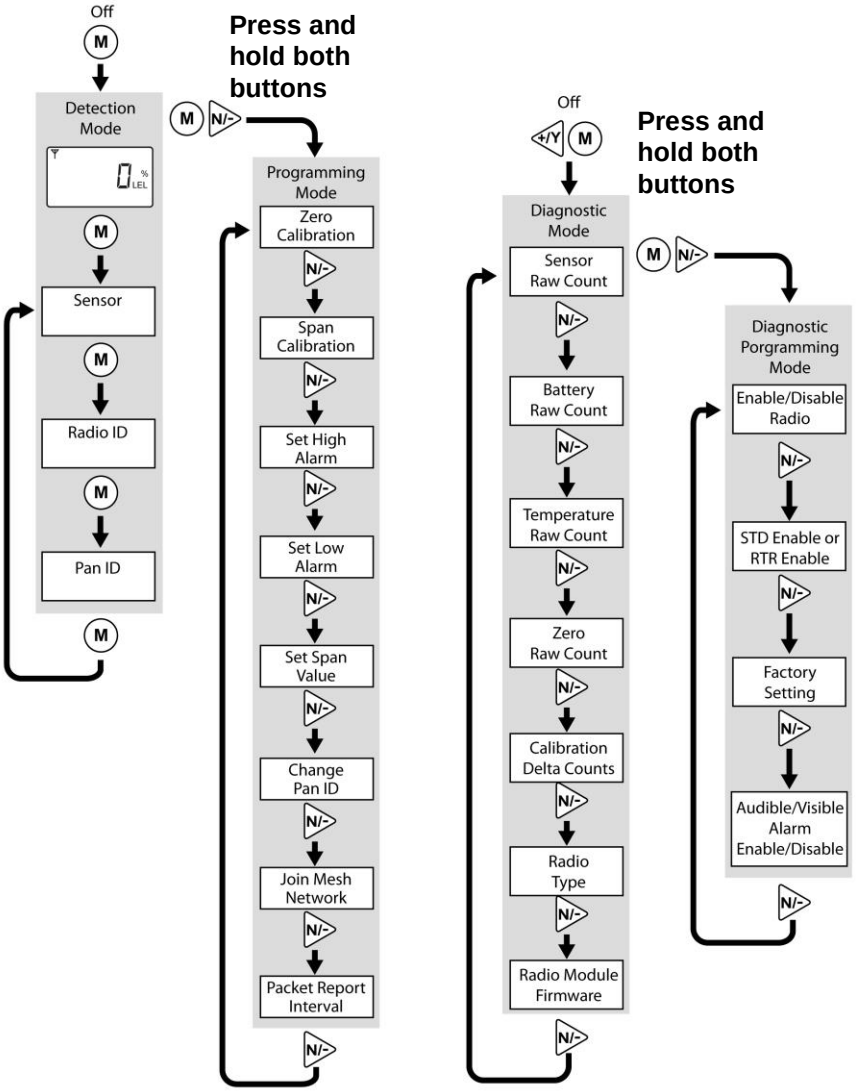
The MeshGuard LEL IR can operate in Standard (STD) or Router (RTR) mode. In STD mode, the MeshGuard LEL IR transmits data to the host at a set interval (the default is 30 seconds) or anytime an alarm occurs. In RTR mode, the MeshGuard LEL IR transmits data in real time, and it can also work as a router as needed to relay data from STD devices back to the host.

Note: Operating the MeshGuard LEL IR in RTR mode reduces battery life. The transmission interval can be changed in Programming Mode to extend battery life. See page 21 for details.

In addition, there is a Detection Mode for standard operation, Programming Mode for making changes to values (such as the High Alarm, etc.), Diagnostic Mode (for servicing and checking the sensor, etc.), and Diagnostic Programming Mode, which is for selecting between Standard (STD) & Router (RTR) modes, etc.

The diagram on the next page shows how to enter and step through the menus in each mode.

Enter Detection Mode by turning the MeshGuard LEL IR on. Enter Programming Mode from Detection Mode by holding down [MODE] and [N/-] together. To enter Diagnostic Mode, start with the MeshGuard LEL IR turned off and hold both [Y/+] and [MODE] to start it. Once Diagnostic Mode is on, enter Diagnostic Programming Mode by holding [N/-] and [MODE] together.

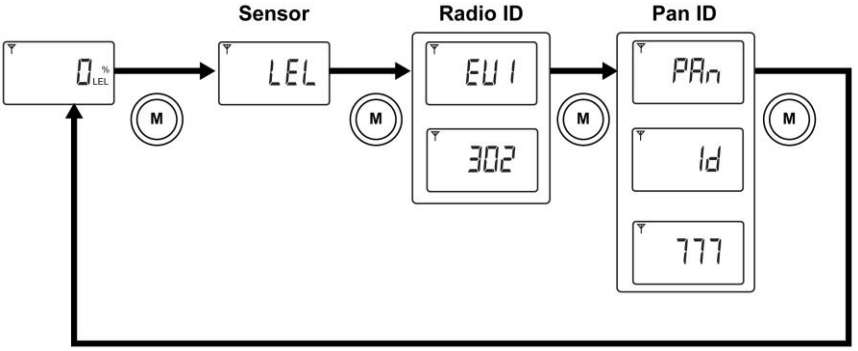


5.7 Detection Mode

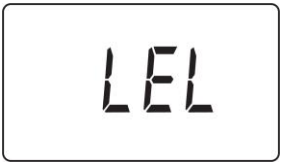
Whenever you start MeshGuard LEL IR by pressing and holding [MODE], it is automatically in Detection Mode.

The MeshGuard LEL IR displays the current reading:

Pressing [MODE] steps through the Detection Mode screens:

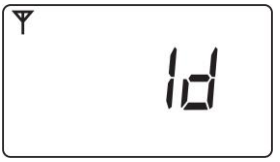


Press [MODE], and it displays the sensor type:

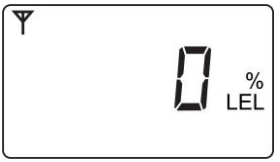


Press [MODE], and it alternates between EUI (Extended Unique Identifier) and its value; the EUI is a unique unit ID for each detector in a network:

Press [MODE], and it alternates between Pan and ID (Personal Area Network Identifier) and its value (all units in a network must have the same Pan ID):



Press [MODE] to return to the detector reading:



Note: If you do not press a button for 60 seconds, or if an alarm condition occurs, the MeshGuard LEL IR automatically returns to the main reading screen.

5.8 Manually Sending Data

While the MeshGuard LEL IR typically sends reading data to the network on a fixed interval, you can send the data anytime.

Press the [Y/+] key. The screen alternates between "Ini" and "nEt" one time, sends the current sensor data, and returns to the detector reading.

5.9 Programming Mode

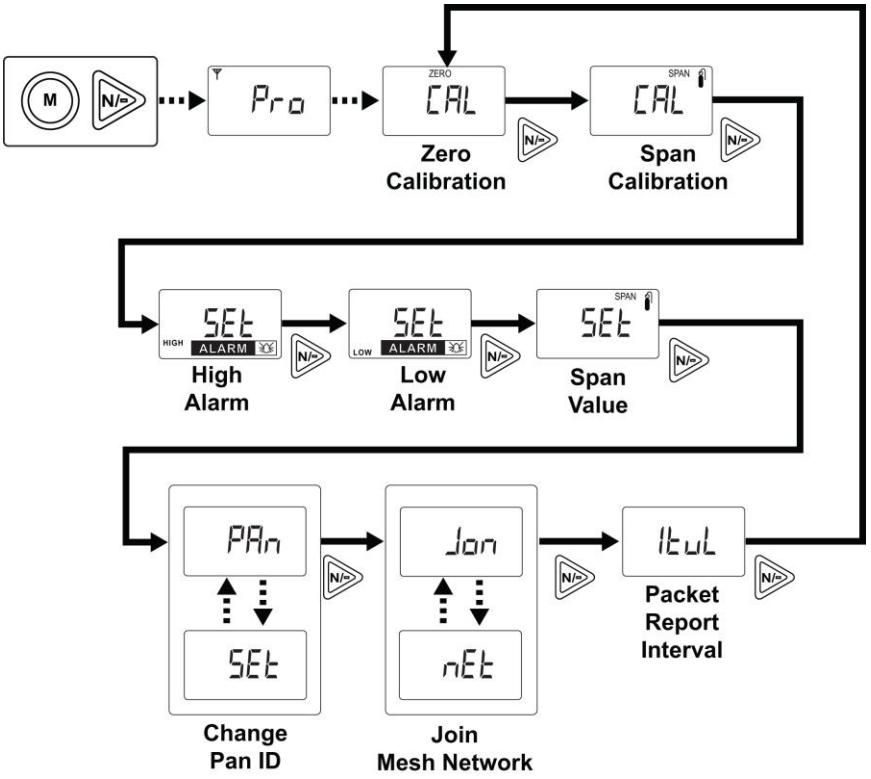
Programming Mode allows you to perform any of the following actions (listed in order of appearance):

- Zero Calibration
- Span Calibration
- High Alarm
- Low Alarm
- Change Span Value
- Change Pan ID
- Join Mesh Network
- Communication interval

5.9.1 Entering Programming Mode

To enter the Programming Mode, press [MODE] and [N/-] for 3 seconds while the MeshGuard LEL IR is on. "Pro" appears in the display:

Pressing [N/-] steps you through all the screens and then returns to the first programming display:

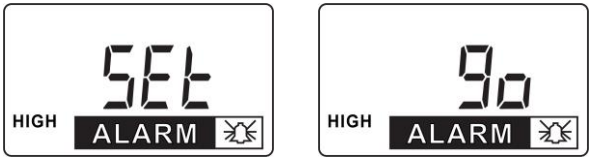


Each display alternates between its name and a status message or value.

Note: You can exit Programming Mode at any time by pressing [MODE]. Also, if you do not make a change within one minute, the MeshGuard LEL IR exits Programming Mode and returns to Detection Mode.

Settings can be changed as follows:

1. When a menu is selected, it flashes between two screens. For example:



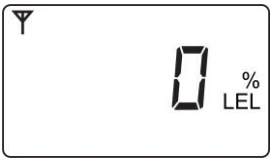
2. Press [MODE] to exit Program Mode and return to Detection Mode, or press [N/-] to advance to the next menu.

3. Press [Y/+] to enter. The LCD displays "go."

5.9.2 Exiting Programming Mode

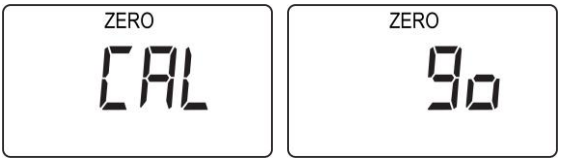
You may exit Programming Mode anytime and return to Detection Mode in either of these two ways:

1. Press [MODE]. MeshGuard LEL IR exits Program Mode and shows the current reading in Detection Mode.
2. Do not press any buttons for 1 minute. MeshGuard LEL IR automatically exits Programming Mode and returns to Detection Mode, showing the current reading.

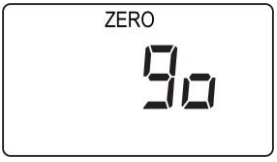


5.9.3 Zero Calibration

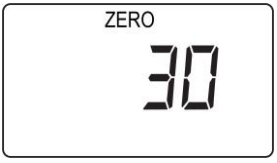
When "CAL" and "go" are displayed in alternation, and "ZERO" is shown, the MeshGuard LEL IR is ready to perform a zero calibration.



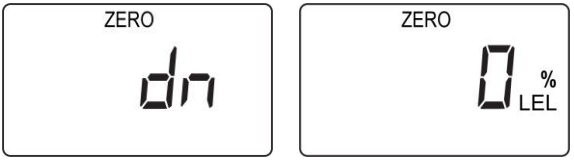
Press [Y/+]. The LCD displays "go."



The display counts down from 60 to 0.

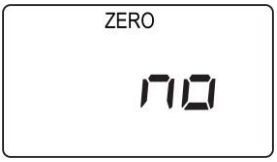


After the countdown reaches 0, the LCD displays "dn," for "done." The reading should show 0 (zero). Otherwise, repeat the zero calibration.



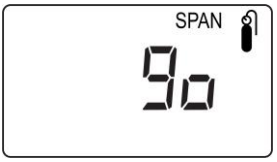
Note: When performing Zero Calibration, always make sure you do so in an environment with clean air.

Note: To stop zero calibration before the countdown reaches 0, press any key. The LCD displays "no" and advances to the next programming menu, Span calibration.

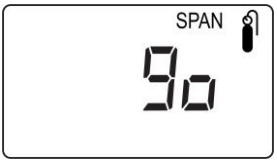


5.9.4 Span Calibration

"CAL" and "go" flash in alternation, and "SPAn" is shown. The MeshGuard LEL IR is now ready to perform a span calibration.

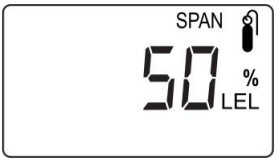


To start calibration, press [Y/+]. The LCD displays "go."



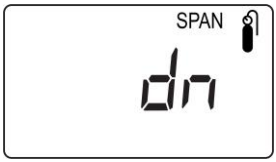
The MeshGuard LEL IR waits for 10 seconds so that you have time to connect the span gas. Connect the calibration gas adapter to the MeshGuard LEL IR, and connect the gas cylinder to the adapter. Start the flow of gas.

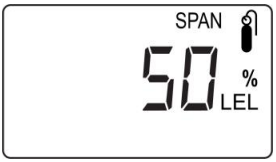
When the gas flow starts, the LCD displays "gAS" and the span concentration value.



The MeshGuard LEL IR now counts down to 0.

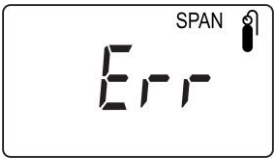
After counting down and reaching 0, the LCD displays "dn." The reading should be the span concentration value. Otherwise, the span calibration should be repeated.





If the MeshGuard LEL IR does not detect gas after counting down to 0, the LCD displays "Err" (for "error"). The LED glows red and the buzzer sounds to provide extra warning. The MeshGuard LEL IR automatically returns to the span calibration display.

Note: This could mean the sensor is contaminated or expired.



Note: To stop span calibration before the countdown reaches 0, press any key. The LCD displays "no" and advances to the next programming menu, Change High Alarm.

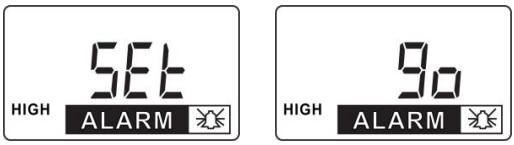
If the sensor fails, try to recalibrate it again. If calibration fails again, replace the sensor.

IMPORTANT!

Due to certification requirements, the High Alarm and Low Alarm values cannot be set above 60% LEL.

5.9.5 Change High Alarm

At the menu for changing the High Alarm setting, " Set" and " go" flash in alternation, and both "HIGH" and "ALARM" are shown.



Press [Y/+] to enter and change the setting. Press [MODE] to go back to Detection Mode or [N] to advance to the next menu.

The LCD displays the current value. Change the value if necessary.

To change the value:

1. Press [Y/+] to increase the number and [N/-] to decrease it.
2. Press [MODE] to advance to the next digit.
3. After moving to the last digit and making changes, press [MODE]. A question mark (?) is shown in the display, asking if you want to save the change.
    - Press [Y/+] for yes. The message "dn" means the change is done.
    - Press [N/-] for no. A "no" message means that the change was abandoned.
    - Press [MODE] to return to the first digit.

Note: Due to certification requirements for this product, the maximum value you can set for High Alarm is 60. If you set a value above 60 and try to save it, the MeshGuard LEL IR's display shows "no" and it does not accept your change, plus it retains the current stored value.

5.9.6 Change Low Alarm

At the Change Low Alarm menu, "Set" and "go" flash in alternation, and "LOW" and "ALARM" are visible in the display.

Press [Y/+] to enter and change the setting. Press [MODE] to exit and return to Detection Mode or [N] to advance to the next menu.

The LCD displays current value. Change the value if necessary.

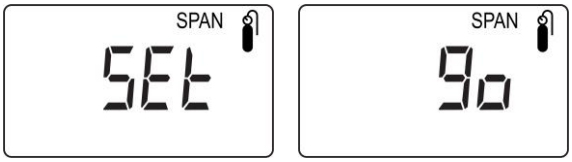
To change the value:

1. Press [Y/+] to increase the number and [N/-] to decrease it.
2. Press [MODE] to advance to the next digit.
3. After moving to the last digit and making changes, press [MODE]. A question mark (?) is shown in the display, asking if you want to save the change.
    - Press [Y/+] for yes. The message "dn" means the change is done.
    - Press [N/-] for no. A "no" message means that the change was abandoned.
    - Press [MODE] to retur to the first digit.

Note: Due to certification requirements for this product, the maximum value you can set for Low Alarm is 60. If you set a value above 60 and try to save it, the MeshGuard LEL IR's display shows "no" and it does not accept your change, plus it retains the current stored value.

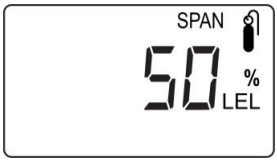
5.9.7 Change SPAN value

"Set" and "go" flash in alternation, and "SPAN" and a gas cylinder icon are shown.



Press [Y/+] to enter and change the setting, [MODE] to exit and return to Detection Mode, or [N/-] to advance to the next menu.

The LCD displays the current value. Change the value if necessary.



To change the value:

1. Press [Y/+] to increase the number and [N/-] to decrease it.
2. Press [MODE] to advance to the next digit.
3. After moving to the last digit and making changes, press [MODE]. A question mark (?) is shown in the display, asking if you want to save the change.
    - Press [Y/+] for yes. The message "dn" means the change is done.
    - Press [N/-] for no. A "no" message means that the change was abandoned.
    - Press [MODE] to return to the first digit.

5.9.8 Change Pan ID

Note: All MeshGuards (including MeshGuard Routers) in a network must have the same Pan ID.

Press Y/+ to enter the menu to make changes to the value.

1. Press [Y/+] to increase the number and [N/-] to decrease it.
2. Press [MODE] to advance to the next digit.

3. After moving to the last digit and making changes, press [MODE]. A question mark (?) is shown in the display, asking if you want to save the change.
    - Press [Y/+] for yes. The message "dn" means the change is done.
    - Press [N/-] for no. A "no" message means that the change was abandoned.
    - Press [MODE] to return to the first digit.

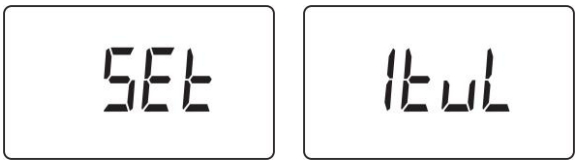
5.9.9 Join Mesh Network

Press [Y/-] to initiate joining a network. Three bars flash in sequence while it searches. When it is done, it alarms once and displays "dn" for "done."

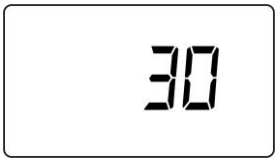
5.9.10 Change Communication Interval

This menu allows you to change the interval between wireless transmissions. "SET" and "ItUL" flash, to indicate that you can change the interval. The interval can be set to 10, 30, 60, 300, or 600 seconds.

Note: The default interval is 30 seconds.



Press [Y/+] to enter and change the setting, [MODE] to exit and return to Detection Mode, or [N/-] to advance to the next MENU.



6 Diagnostic Mode

Diagnostic Mode provides raw data from sensors and about settings.

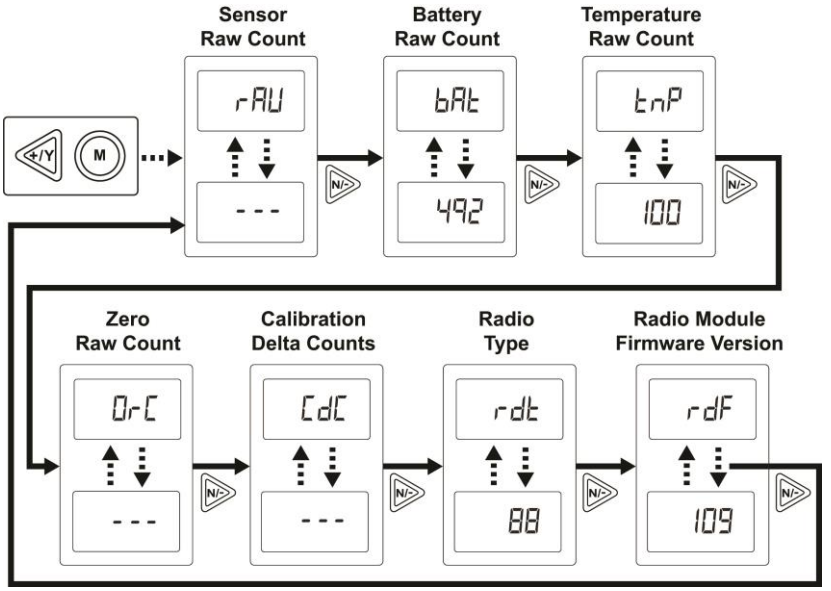
6.1 Entering Diagnostic Mode

Note: To enter Diagnostic Mode, you must begin with the MeshGuard LEL IR turned off.

Press and hold [Y/+] and [MODE] until the MeshGuard LEL IR starts.

The instrument goes through a brief startup, and then displays "dIA" to indicate it is in Diagnostic Mode. It then switches to showing raw data for the sensor (the display shows "rAU" followed by a number, or "- - -" if there is no diagnostic information).

The following chart shows how to navigate Diagnostic Mode (pressing N/- repeatedly steps through the screens):



6.2 Exiting Diagnostic Mode

Note: You can exit Diagnostic Mode and enter Programming Mode and calibrate the MeshGuard LEL IR as usual by pressing both [MODE] and [N/-] for three seconds. When entering Programming Mode from Diagnostic Mode, additional menu options are available. Refer to the diagram on page 36 for more details.

Note: You can exit Diagnostic Mode and enter Detection Mode by pressing [MODE] and [Y/+] together for three seconds, or by turning it off and on again.

6.3 Diagnostic Mode Readings

In Diagnostic mode, you can step through readings by pressing [N/-].

6.3.1 Sensor Raw Count

Sensor Raw Count is indicated by "rAU" followed by three dashes (- - -). This indicates that the sensor has digital output that does not produce a raw count.

- Press [N/-] to advance to the next reading.
- Press [MODE] and [Y/+] together for three seconds to exit Diagnostic Mode and enter Detection Mode.

6.3.2 Battery Raw Count

Battery Raw Count is indicated by "bAt" followed by a number.

- Press [N/-] to advance to the next reading.
- Press [MODE] and [Y/+] together for three seconds to exit Diagnostic Mode and enter Detection Mode.

6.3.3 Temperature Raw Count

Temperature Raw Count is indicated by "tNp" followed by a number.

- Press [N/-] to advance to the next reading.
- Press [MODE] and [Y/+] together for three seconds to exit Diagnostic Mode and enter Detection Mode.

6.3.4 Zero Raw Count

Zero Raw Count is indicated by "0rC" followed by three dashes (- - -). This indicates that the sensor has digital output that does not produce a raw count.

- Press [N/-] to advance to the next reading.
- Press [MODE] and [Y/+] together for three seconds to exit Diagnostic Mode and enter Detection Mode.

6.3.5 Calibration Delta Counts

Calibration Delta CTS is indicated by "CdC" by three dashes (- - -). This indicates that the sensor has digital output that does not produce a raw count.

- Press [N/-] to return to the first raw count.
- Press [MODE] and [Y/+] together for three seconds to exit Diagnostic Mode and enter Detection Mode.

6.3.6 Radio Type

The radio module type is indicated by "rdt" followed by a number.

- Press [N/-] to advance to the next reading.
- Press [MODE] and [Y/+] together for three seconds to exit Diagnostic Mode and enter Detection Mode.

6.3.7 Radio Module Firmware Version

Radio Module Firmware Version is indicated by "rdF" followed by a number (for example, "109" stands for version 1.09).

- Press [N/-] to return to the first raw count.
- Press [MODE] and [Y/+] together for three seconds to exit Diagnostic Mode and enter Detection Mode.

6.4 Diagnostic Mode Programming

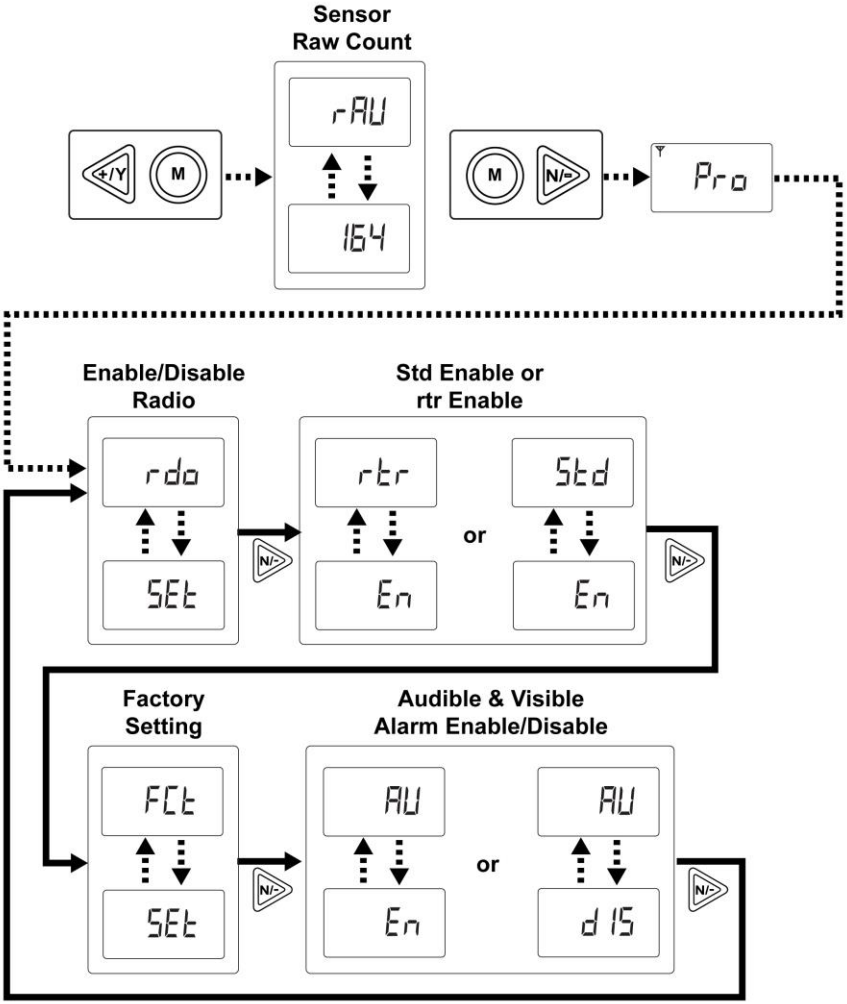
You can enter a special programming mode from Diagnostic Mode in order to perform advanced programming functions. These include:

- Enable/disable radio
- Enable STD or RTR
- Return the MeshGuard LEL IR to original factory settings
- Enable/disable audible and visible alarms

Note: When the MeshGuard LEL IR is in this programming mode, if you do not make a change or press a key for 60 seconds, it reverts to the standard Diagnostic Mode.

Important! After you make changes in Diagnostic Mode, it is recommended that you turn off the MeshGuard LEL IR and turn it on again before using it.Enter this programming mode by first entering Diagnostic Mode. This requires starting the MeshGuard LEL IR while holding [Y/+] and [MODE]. When you see the Sensor Raw Count screen, hold [MODE] and N/- until you see "Pro" in the display, indicating that you are in Programming Mode.

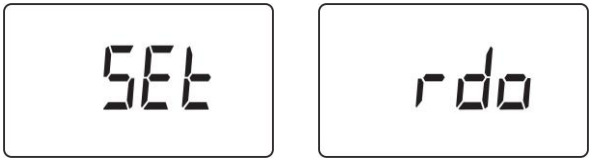
Step through the menus by pressing [N/-]. Exit by pressing [MODE], and then shutting off the MeshGuard LEL IR and restarting it.



6.4.1 Radio Enable/Disable

The next menu is for turning the MeshGuard LEL IR's radio on or off.

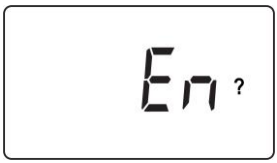
"SEt" and " rdo" flash in alternation, to indicate that the MeshGuard LEL IR radio can be turned on (enabled) or off (disabled). The default value is "on."



Press [Y/+] to enter and change the setting, [MODE] to exit and return to Detection Mode, or [N/-] to go to the next menu.

The LCD displays the current value (enabled or disabled). Change the value if necessary.

Note: "dIS" means disabled (radio off) and "En" means on (radio on).



6.4.2 Enable STD or RTR

Press [Y/+] to toggle the setting from STD to RTR, and vice versa. For details on STD and RTR modes, see page 17.

6.4.3 Factory Setting

Press [Y/+] to return the MeshGuard LEL IR to its original factory settings.

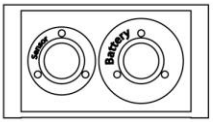
6.4.4 Audible & Visible Alarm Enable/Disable

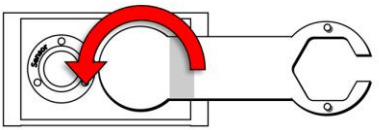
Press [Y/+] to toggle between the MeshGuard LEL IR's audible and visible alarms turned on and off.

7 Sensor And Battery Replacement

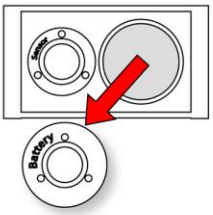
7.1 External Battery Usage

An external battery unit, the RAE Systems RAE PowerPak, is used to power the MeshGuard LEL IR in situations where extended battery life is necessary. The connector from the external battery screws into the MeshGuard LEL IR's battery compartment. Bottom views of the MeshGuard LEL IR in its steel enclosure are shown in the procedure below.

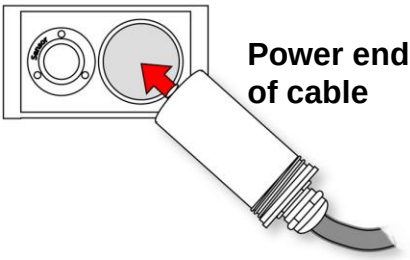




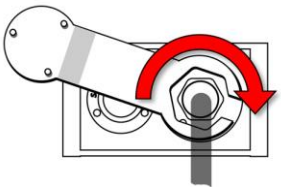
1. Remove battery cover with the 3-pin end of the sensor and battery removal tool by turning counterclockwise.

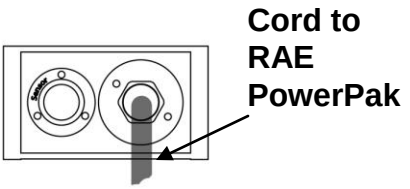


2. Lift off the cover.



3. Insert the power end of the cable connected to the PowerPak.

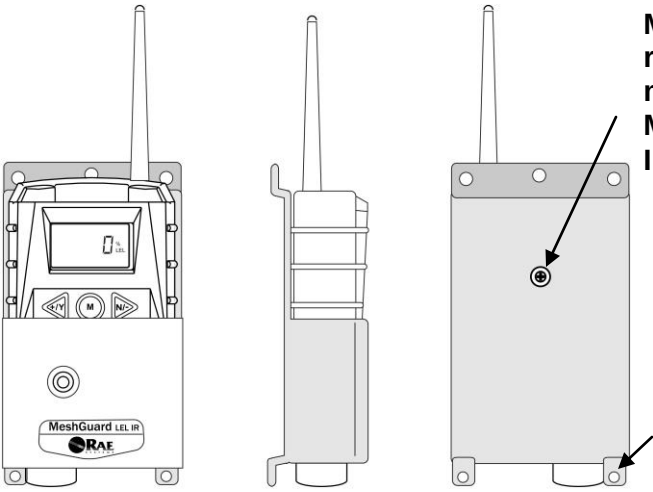




4. Use the open hex end of the wrench, and with both pins mated with the two holes on the power end, tighten by turning clockwise until it is snug. Do not overtighten.

Consult the RAE PowerPak User's Guide for further connection and charging information.

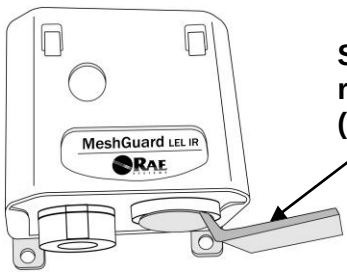
The MeshGuard LEL IR is permanently mounted to a solid surface by first securing it in its steel enclosure (a screw through the back mates with the MeshGuard LEL IR) and then securing the enclosure to a solid surface such as a wall or the metal mounting plate.



Front, side, and rear views of the steel enclosure show how the MeshGuard LEL IR is secured for mounting.

7.2 Replacing The Internal Battery

With the MeshGuard LEL IR securely in its housing, you can remove the cover over the battery compartment so that you can replace the internal battery in the MeshGuard LEL IR. Use the sensor and battery removal tool as shown.

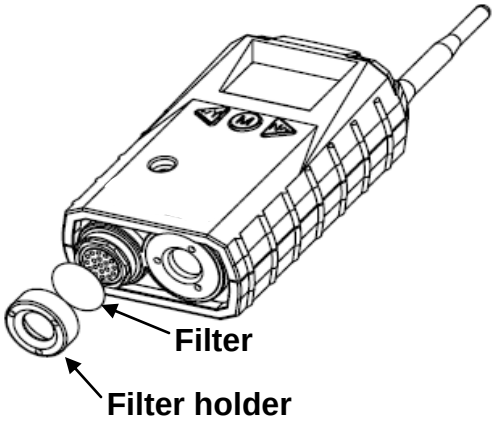


WARNING: Use only RAE Systems battery P/N 500-0111-000 (EVE ER34615 or XENO XL-205F) for the internal battery. The internal battery must be replaced under a Hot Work Permit, where the atmosphere is determined to be non-hazardous while the battery is being replaced.

7.3 Sensor Filter Replacement

The filter should be replaced when it is visibly dirty. If readings fluctuate up even after a zero calibration, this may indicate a dirty filter.

1. Use the 3-pin end of the tool to unscrew and open the filter holder by turning it counterclockwise.



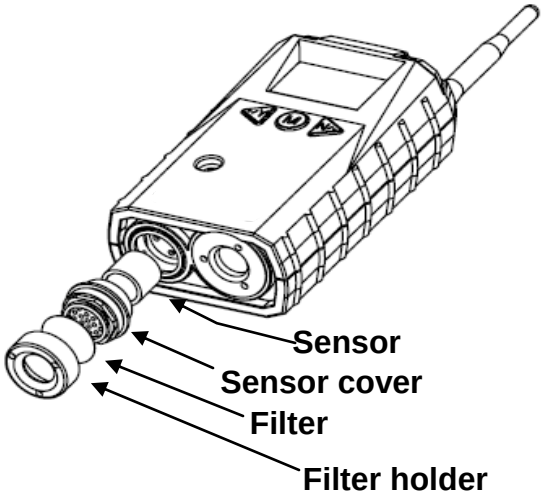
2. Remove and discard the filter.

3. Place a new filter inside the monitor.

4. Replace the filter holder by turning it clockwise with the 3-pin end of the tool.

7.4 Sensor Replacement

1. Use the 3-pin end of the sensor and battery tool to unscrew and open the filter holder at the bottom of the monitor.



2. Use the hexagonal end of the tool to open the remove the sensor cover, turning counterclockwise.

3. Pull the old sensor out.

4. Gently push a new sensor into the compartment.

   Important! Ensure that the RAE Systems part number matches the sensor that was removed.

   WARNING! Use only the same sensor model as the one installed when the monitor was purchased.

5. Replace the sensor compartment cover using by turning it clockwise, using the hexagonal end of the tool.

6. Replace the filter holder by turning it clockwise, using the 3-pin end of the tool.

Note: Always recalibrate the MeshGuard LEL IR after service to ensure functionality.

8 Appendix A

Warnings

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:

Use only the Lithium battery provided by RAE Systems. This instrument has not been tested in an explosive gas/air atmosphere having an oxygen concentration greater than 21%. Substitution of components may impair suitability for intrinsic safety. Replacement of batteries only in non-hazardous locations.

STATIC HAZARD: Clean only with a damp cloth.
For safety reasons this equipment must be operated and serviced by qualified personnel only. Read and understand instruction manual completely before operating or servicing. Any rapid up-scale reading followed by a declining or erratic reading may indicate a gas concentration beyond upper scale limit, which may be hazardous.

FCC Part 15 statement and CE

This device complies with Part15 of the FCC rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

9 Appendix B: Controlled Part Of MeshGuard LEL IR (FTD 3000) Manual

Intrinsic Safety: IECEx TSA 09.0001X Ex ia I/IIC T4

CE 0575 Ex IM1/II 1G Ex ia I/II C T4
DNV 09 ATEX 55990 X

cCSAus Class I, Division 1, Groups A,B,C, D T4
$-40^{o}\ C \leq T_{amb} \leq 50^{o}\ C$
Entity Parameters: $U_i = 3.6V$, $C_i = 86\mu F$, $L_i/R_i = 3.5\mu H/ohm$
EM Immunity: No effect when exposed to $0.43mW/cm^2$ RF interference (5-watt transmitter at 12").
Temperature: -40° C to 50° C (-40° F to 122° F)
Humidity: 0% to 95% relative humidity (non-condensing)

WARNING! (cCSAus only)

CERTIFICATION ONLY APPLIES FOR FIXED INSTALLATIONS.

WARNING!

ONLY THE COMBUSTIBLE GAS DETECTION PORTION OF THIS INSTRUMENT HAS BEEN ASSESSED FOR PERFORMANCE.

UNIQUMENT, LA PORTION POUR DETECTOR LES GAZ COMBUSTIBLES DE CET
INSTRUMENT A ÉTÉ ÉVALUÉE.

CAUTION!

HIGH OFF-SCALE READINGS MAY INDICATE AN EXPLOSIVE CONCENTRATION OF GAS.

Note: Users are recommended to refer to ISA -RP12.13, Part II-1987 for general information on installation, operation, and maintenance of combustible gas detection instruments.

- Only the combustible gas detection portion of this instrument has been assessed for performance.
- Any rapid up-scale reading followed by a declining or erratic reading may indicate a gas concentration beyond upper scale limit which may be hazardous.

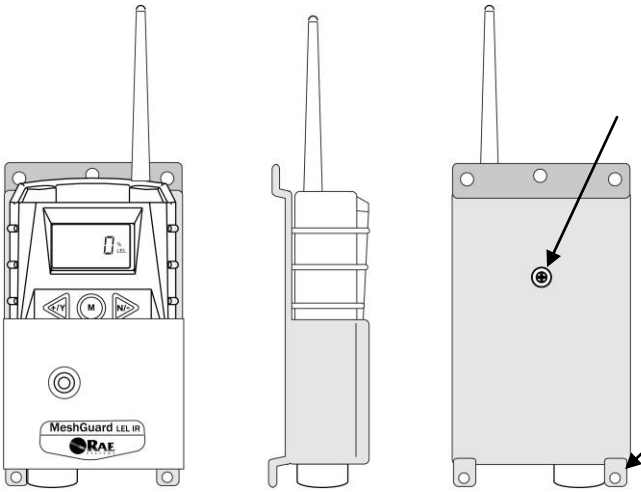
WARNING (cCSAus only): WIRELESS COMMUNICATION IS INTENDED FOR USE AS A SECONDARY REMOTE ALARM STATUS NOTIFICATION ONLY. PRIMARY ALARMING OF COMBUSTIBLE GAS HAZARDS IS PROVIDED LOCALLY BY THE DETECTOR.

WARNING: SUBSTITUTION OF COMPONENTS MAY IMPAIR INTRINSIC SAFETY.

Range, Resolution & Response Time:
Range: 0 to 100% LEL
Resolution: 1% LEL
Response Time (T_{90}): <30 seconds

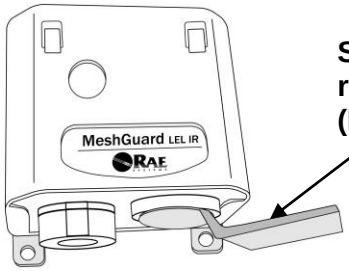
Sensor And Internal Battery Replacement

The MeshGuard LEL IR is permanently mounted to a solid surface by first securing it in its steel enclosure (a screw through the back mates with the MeshGuard LEL IR) and then securing the enclosure to a solid surface such as a wall or the metal mounting plate.



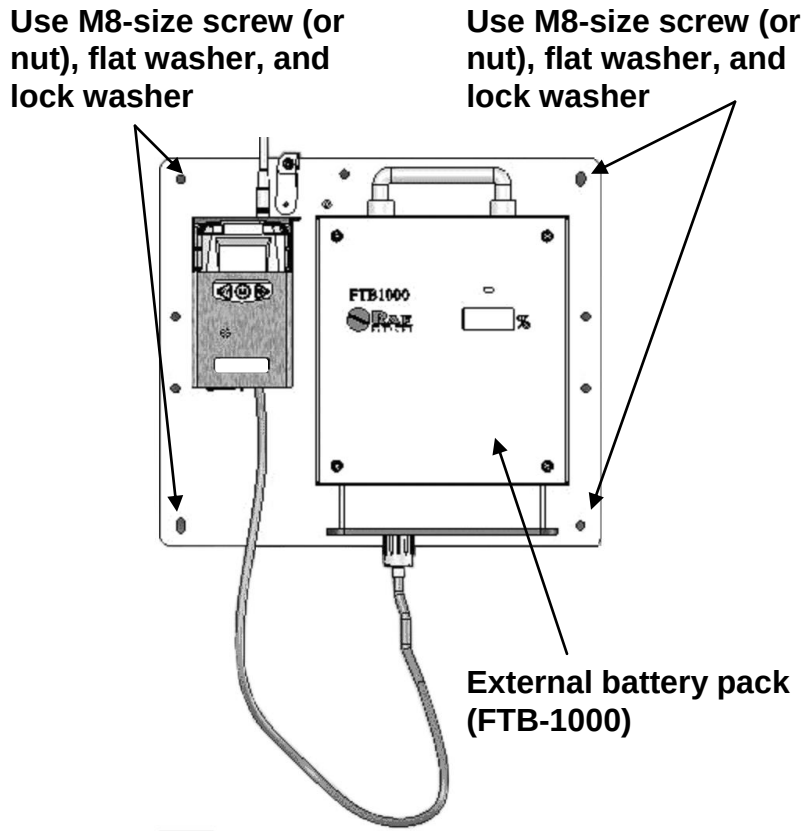
Front, side, and rear views of the steel enclosure show how the MeshGuard LEL IR is secured for mounting.

With the MeshGuard LEL IR securely in its housing, you can remove the cover over the battery compartment so that you can replace the internal battery in the MeshGuard LEL IR. Use the sensor and battery removal tool as shown.



WARNING: Use only RAE Systems battery P/N 500-0111-000 (EVE ER34615 or XENO XL-205F) for the internal battery. The internal battery must be replaced under a Hot Work Permit, where the atmosphere is determined to be non-hazardous while the battery is being replaced.

MeshGuard LEL IR Installation With External Power Battery Pack (FTB-1000)



Note: The plate holding the battery pack and MeshGuard LEL IR must be mounted on a solid, flat surface.

Turning The MeshGuard LEL IR On

To turn the MeshGuard LEL IR on, hold down [MODE] for 2 seconds.

Caution: The alarm is very loud. During startup, you can mute most of the sound by holding a finger over the alarm port.

Note: Do not put tape over the alarm port to permanently mute it.

When starting up, the MeshGuard LEL IR simultaneously turns the backlight on and off, beeps once and blinks once. The screen shows:

On...
Firmware version
Count down from 60 to 0

The MeshGuard LEL IR performs a final checkout and the screen shows a countdown to full operational functionality.

Turning The MeshGuard LEL IR Off

Press and hold [MODE]. In 2 seconds, a 5-second countdown to shutoff begins. You must hold your finger on the key for the entire shutoff process. If you remove your finger from the key during the countdown, the shutoff operation is canceled and the MeshGuard LEL IR continues normal operation.

The countdown proceeds as follows, accompanied at each step with an alarm beep and light flash. The display shows the countdown in sequence:

5
4
3
2
1
off

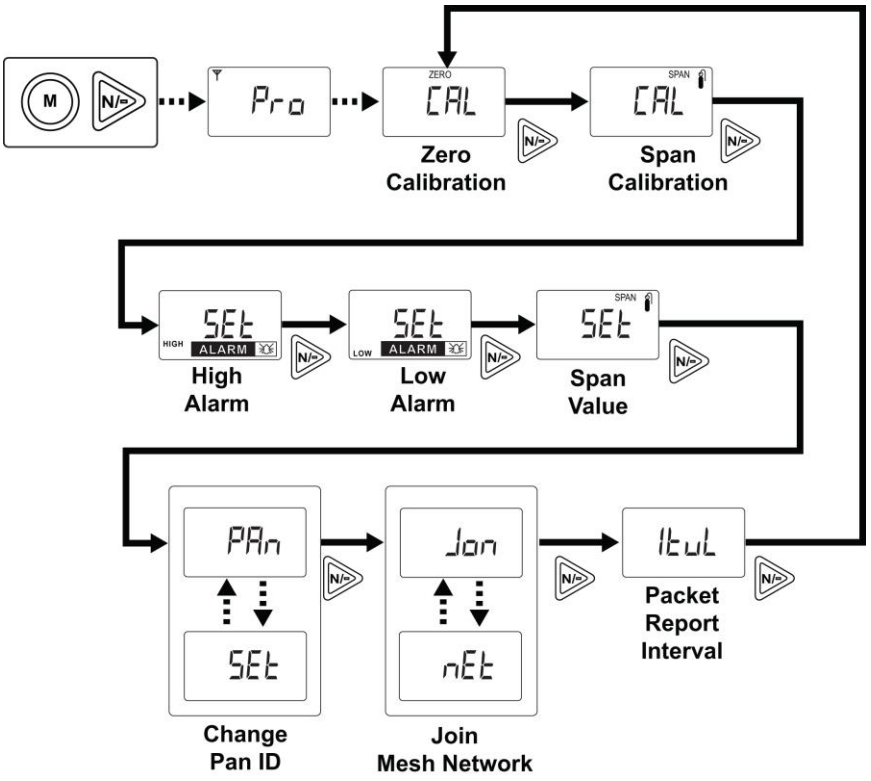
When you see "off," release your finger from the [MODE] key. The MeshGuard LEL IR is now off.

Caution: The alarm is very loud. During shutdown, you can mute most of the sound by holding a finger over the alarm port.

Programming Mode

Programming Mode can be entered from Normal Mode or Diagnostic Mode. This mode contains most adjustable settings for the MeshGuard LEL IR. It is organized into four submenus:

The following diagram shows how to enter Programming Mode from Normal Mode:



Modify Span Gas Value. This function allows selection of the gas concentration to the settings, press [MODE] to repeat stepping through the choices.

Back. Press [MODE] to return to the top of the Calibrate Monitor menu, or press [Y/+] to return to the top of the Normal Mode menu.

Change Alarm Limits

The high and low alarm limits, the points at which alarms are triggered, can be modified in this set of menus.

Alarm Signals. During each measurement period, the gas concentration is compared with the programmed alarm limits (gas concentration alarm limit settings: Low and High). If the concentration exceeds any of the preset limits, the loud buzzer, and red flashing LED are activated immediately to warn of the alarm condition. In addition, the MeshGuard LEL IR alarms if the battery voltage falls below a preset voltage level.

When the low battery alarm occurs, there will be approximately 20 to 30 minutes of operating time remaining. When the battery voltage falls below the low threshold, the MeshGuard LEL IR turns off automatically.

Over Range Alarm

When a gas concentration exceeds 100% of LEL, the MeshGuard LEL IR displays "OVR" and its buzzer and LED are activated.

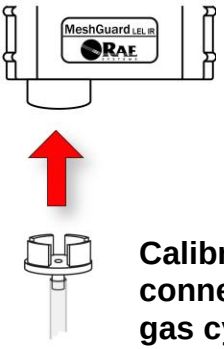
Calibrating MeshGuard LEL IR

• Calibration intervals and procedures may vary due to national legislation.

• Calibration gas flow should be verified and be between 400 cc/mn and 800 cc/min.

Connecting Calibration Gas

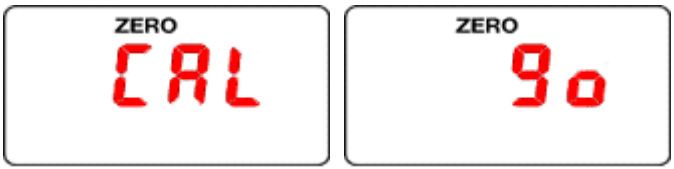
1. Connect the calibration gas to the MeshGuard LEL IR as shown.



Calibration adapter connected to calibration gas cylinder

9.1 Zero Calibration

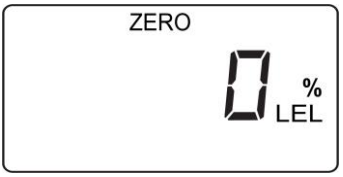
When "CAL" and "go" are displayed in alternation, and "ZERO" is shown, the MeshGuard LEL IR is ready to perform a zero calibration.



Press [Y/+]. The LCD displays "go."

The display counts down from 10 to 0.

After the countdown reaches 0, the LCD displays "dn," for "done." The reading should show 0 (zero). Otherwise, repeat the zero calibration.



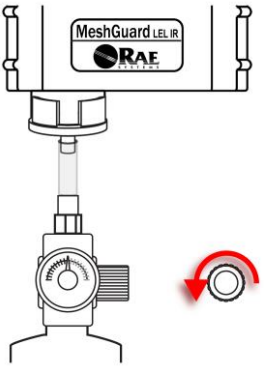
Note: To stop zero calibration before the countdown reaches 0, press any key. The LCD displays "no" and advances to the next programming menu, Span calibration.

9.2 Span Calibration

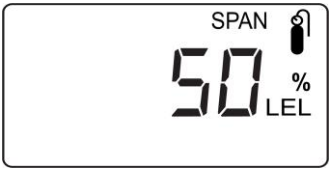
"CAL" and "go" flash in alternation, and "SPAn" is shown. The MeshGuard LEL IR is now ready to perform a span calibration.

To start calibration, press [Y/+]. The LCD displays "go."

The MeshGuard LEL IR waits for 10 seconds so that you have time to connect the span gas. Connect the calibration gas adapter to the MeshGuard LEL IR, and connect the gas cylinder to the adapter. Start the flow of gas.



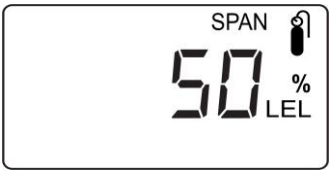
When the gas flow starts, the LCD displays "gAS" and the span concentration value.



The MeshGuard LEL IR now counts down to 0.

Note: The countdown time varies according to the type of sensor used in the MeshGuard LEL IR.

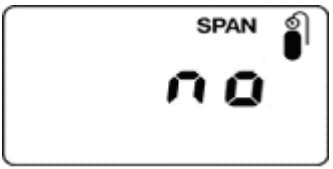
After counting down and reaching 0, the LCD displays "dn." The reading should be the span concentration value. Otherwise, the span calibration should be repeated.



If the MeshGuard LEL IR does not detect gas after counting down to 0, the LCD displays "Err" (for "error"). The LED glows red and the buzzer sounds to provide extra warning. The MeshGuard LEL IR automatically returns to the span calibration display.

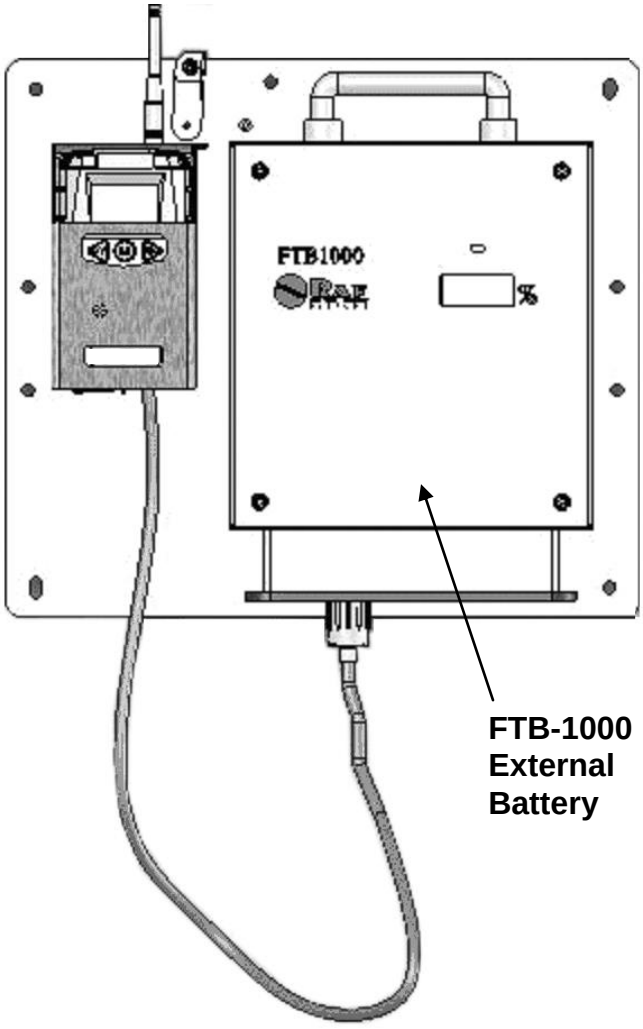
Note: This could mean the sensor is contaminated or expired.

Note: To stop span calibration before the countdown reaches 0, press any key. The LCD displays "no" and advances to the next programming menu, Change High Alarm.



If the sensor fails, try to calibrate it again. If calibration fails again, replace the sensor.

10 External Battery Replacement



10.1 External battery replacement

1. Unplug the battery connector
2. Loosen the safety screw holding the battery
3. Mount a new battery on the mounting bracket
4. Tighten the safety screw
5. Connect the MeshGuard LEL IR to the battery.
6. Switch on the MeshGuard LEL IR.

Note: Always recalibrate the MeshGuard LEL IR after service.

10.2 Sensor And Internal Battery Replacement (ATEX/IECEx Only)

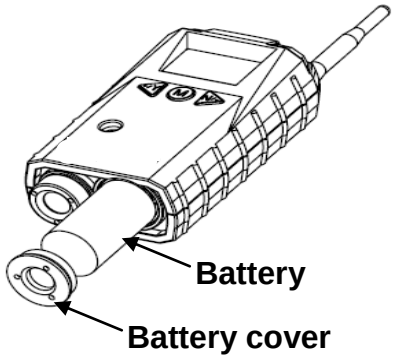
10.3 Battery Replacement

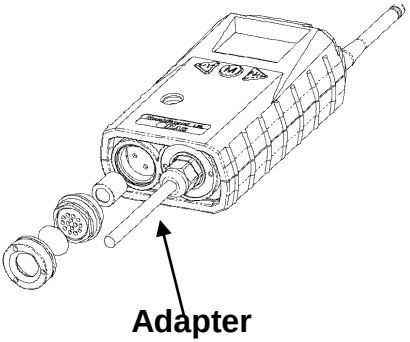
RAE Systems offers two types of batteries: internal battery and external battery pack.

1. Use the 3-pin end of the tool to unscrew and open the battery cover by turning it counterclockwise.
2. Remove the battery.
3. Insert the new battery with its positive ("+") pole towards inside of the unit.

4. Replace the battery cover by turning it clockwise with the 3-pin end of the tool.

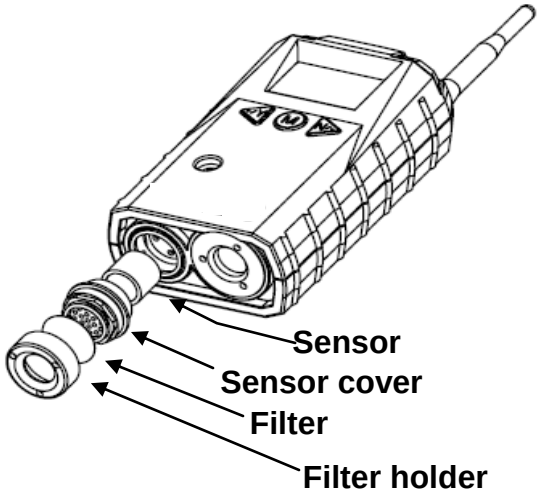
Note: Only change the battery in non-hazardous locations, and use the battery RAE Systems provides, part number 500-0111-000 (EVE model ER34615 or XENO XL-205F). Only remove the external battery adapter in non-hazardous locations.





10.4 Sensor Replacement

1. Use the 3-pin end of the tool to unscrew and open the filter holder at the bottom of the monitor.



2. Use the hexagonal end of the tool to open the remove the sensor cover, turning counterclockwise.

3. Pull the old sensor out.

4. Gently push a new sensor into the compartment.

5. Replace the sensor compartment cover using by turning it clockwise, using the hexagonal end of the tool.

6. Replace the filter holder by turning it clockwise, using the 3-pin end of the tool.

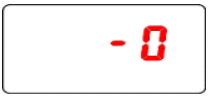
   WARNING: Only replace the sensor in non-hazardous locations.

11 Troubleshooting

Failure Symptom	Cause	Solution
Cannot turn on	Battery charge too low	Replace battery
	Battery has been changed	Wait at least 60 seconds to turn on MeshGuard LEL IR
	New battery needs to be discharged before use	Check RAE Systems web site for inform-ation on batteries
OVR (over range) alarm	Over 100% LEL	Move monitor to a clean environment and allow sensor to clear
	Condensation inside	Move monitor to a dry environment, remove sensor filter, and allow sensor to dry out
"—0" Alarm	Sensor zero drift	Perform zero calibration
Controller cannot receive the MeshGuard LEL IR's signal	Too much distance between the MeshGuard LEL IR and the controller.	The distance should be 300 m, line of sight. Deploy RTR MeshGuard LEL IR or MeshGuard Router(s).
	There is an obstruction between the MeshGuard LEL IR and the controller.	Relocate the MeshGuard LEL IR or deploy RTR MeshGuard LEL IR or MeshGuard Router(s).
	Controller does not receive completed data packet	Press [Y/+] on the detector to force it to send data packets

	Battery is low MeshGuard LEL IR and controller have different Pan ID numbers	Replace battery Set both units to have the same Pan ID number
No Antenna Icon	There is no reader or controller nearby. The controller or reader's network has changed. The MeshGuard LEL IR is out of its RF range. Battery is low	Move the MeshGuard LEL IR closer to a working controller or reader. Perform the network searching function in diagnostic mode. Move the MeshGuard LEL IR close to a working controller or reader and Press [Y/+] Replace battery
Others		Turn MeshGuard LEL IR off and on again. Consult RAE Systems Customer Service.

12 Alarm Signal Summary

Alarm Mode	When	LCD	Buzzer & LED
Over Range	100% LEL		3 beeps per second
High Alarm	> high alarm setting		3 beeps per second
Low Alarm	> low alarm setting		2 beeps per second
Zero Drift	< 0 ppm		1 beep per second
Battery Low	< 3.2V		1 beep per minute
Battery Exhausted	< 3.1V		1 beep per second

13 Technical Support

To contact RAE Systems Technical Support:

Monday through Friday, 7:00AM to 5:00PM Pacific (US) Time
Phone (toll-free): +1 888-723-4800
Phone: +1 408-952-8461
Email: RAE-tech@honeywell.com

Outside the Americas:
E-Mail: HAexpert@honeywell.com

Honeywell Analytics Ltd.
4 Stinsford Road
Nuffield Industrial Estate
Poole, Dorset, BH17 0RZ
United Kingdom
Tel: +44 (0) 1202 645 544
Fax: +44 (0) 1202 645 555

Honeywell Analytics
Elsenheimerstrasse 43
80687 München
Germany
Tel: +49 89 791 92 20
Fax: +49 89 791 92 43

Honeywell Analytics
ZAC Athélia 4 – 375 avenue du Mistral
Bât B, Expace Mistral
13600 La Ciotat
France
Tel: +33 (0) 4 42 98 17 75
Fax: +33 (0) 4 42 71 97 05

Honeywell Analytics
P.O. Box-45595
6th Street
Musaffah Industrial Area
Abu Dhabi
UAE
Tel: +971 2 554 6672
Fax: +971 2 554 6672

Find out more

www.honeywellanalytics.com

Contact Honeywell Analytics:

Europe, Middle East, Africa

Life Safety Distribution AG
Javastrasse 2
8604 Hegnau
Switzerland
Tel: +41 (0)44 943 4300
Fax: +41 (0)44 943 4398
gasdetection@honeywell.com

Customer Service:

Tel: +800 333 222 44 (Freephone number)
Tel: +41 44 943 4380 (Alternative number)
Fax: +800 333 222 55
Middle East Tel: +971 4 450 5800 (Fixed Gas Detection)
Middle East Tel: +971 4 450 5852 (Portable Gas Detection)
India Tel: +91 124 4752700

Americas

Honeywell Analytics Inc.
405 Barclay Blvd.
Lincolnshire, IL 60069
USA
Tel: +1 847 955 8200
Toll free: +1 800 538 0363
Fax: +1 847 955 8210
detectgas@honeywell.com

Asia Pacific

Honeywell Analytics Asia Pacific
#701 Kolon Science Valley (1)
43 Digital-Ro 34-Gil, Guro-Gu
Seoul 152-729
Korea
Tel: +82 (0)2 6909 0300
Fax: +82 (0)2 2025 0328
India Tel: +91 124 4752700
analytics.ap@honeywell.com

Technical Services

EMEAI: HAexpert@honeywell.com
US: ha.us.service@honeywell.com
AP: ha.ap.service@honeywell.com

www.honeywell.com

Honeywell

Rev. B
April 2015
P/N D01-4027-000