ToxiRAE Pro LEL
User's Guide

ToxiRAE Pro LEL User's Guide

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.

CAUTION!

Never operate the monitor when the cover is removed. Remove the monitor top cap, rear cover, or battery only in an area known to be non-hazardous.

Product Registration

Register your product online by visiting:

http://www.raesystems.com/support/product-registration

By registering your product, you can:

- Receive notification of product upgrades or enhancements
- Be alerted to Training classes in your area
- Take advantage of RAE Systems special offers and promotions

⚠️ WARNINGS ⚠️

Use only RAE Systems lithium-ion battery part number G02-3004-000 (3.7V, 1,800mAh). 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 to avoid damage from electrostatic discharge.

For safety reasons this equipment must be operated and serviced by qualified personnel only. Read and understand this instruction manual completely before operating or servicing.

All newly purchased RAE Systems instruments should be periodically bump tested by exposing the sensor(s) to known concentrations of calibration gas and confirming that the sensor is working and that the alarms are functional.

The monitor should be calibrated every time it does not pass a bump test, but no less frequently than every six months, depending on use and exposure to gas and contamination, and its operational mode.

The ToxiRAE Pro LEL monitor is factory-preconfigured to a 30-day calibration interval, so it will go into calibration alarm if it is not calibrated for 30 days or more.

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

• RAE Systems recommends using RAE calibration gas:

Part number 007-3171-000 - Methane (LEL), 34L Cylinder, Cal Gas and Regulator Kit, which includes:
   • Methane, 50% LEL (balance air), 34L cylinder
   • Constant-flow CGA-600 regulator with adapter
Part number 600-0071-000 - Methane, 50% LEL (balance air), 34L steel cylinder

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⚠ AVERTISSEMENT ⚠

Utiliser seulement la batterie Lithium-ion RAE Systems référence G02-3004-000 (3.7V, 1,800mAh). Cet instrument n'a pas été testé dans une atmosphère de gaz/air explosive ayant une concentration d'oxygène plus élevée que 21%. La substitution de composants peut compromettre la sécurité intrinsèque. Ne changer les batteries que dans un emplacement désigné non dangereux.

RISQUE D'ORIGINE ELECTROSTATIQUE: Nettoyer uniquement avec un chiffon humide.

Pour des raisons de sécurité, cet équipement doit être utilisé et entretenu uniquement par un personnel qualifié. Étudier le manuel d'instructions en entier avant d'utiliser, ou d'entretenir l'équipement.

Tout appareil neuf de RAE Systems doit préalablement passer le test de vérification d'étalonnage qui consiste à exposer le ou les capteurs a une concentration connue de gaz étalon.

Le ToxiRAE Pro LEL est configuré en usine avec une période de calibration de 30 jours, si il n'est pas calibré durant cette période , il passe en alarme.

Une vérification d'étalonnage est définie par une exposition du détecteur au gaz d'étalonnage qui doit déclencher le seuil d'alarmes bas.

Les périodes de calibration peuvent varier suivant les législations locales.

RAE Systems préconise d'utiliser les gaz d'étalonnage suivants:

 Numéro de pièce 007-3171-000 - Méthane (LIE), Bouteille de 34L, Kit gaz étalon et
 régulateur, comprenant:
   • Méthane, 50% LIE (reste air), bouteille de 34L
   • Régulateur à débit constant DGA-600 avec adaptateur
 Numéro de pièce 600-0071-000 - Méthane, 50% LIE (reste air), bouteille acier de 34L

1. General Information

The ToxiRAE Pro LEL is the world's first wireless personal combustible gas monitor. The ToxiRAE Pro LEL takes worker protection to the next level by providing safety professionals wireless access to real-time instrument readings and alarm status from any location for better visibility and faster response. The ToxiRAE Pro LEL promptly detects and accurately monitors explosives and combustibles in concentrations from 0 to 100% of the lower explosive limit (LEL). With an onboard library of 34 correction factors, the ToxiRAE Pro LEL can be programmed to automatically read in % LEL of the specified compound.

Key Features

Wireless. Personal. Proven.
• Wireless access to real-time instrument readings and alarm status from any location
• Unmistakable five-way local and remote wireless notification of alarm conditions
• 34 built-in LEL correction factors
• Largest display in its class
• Reliable, rugged, and intrinsically safe
• Continuous datalogging
• Easy to use

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[1] Wireless functionality is scheduled for availability in 2011 in North America and Europe. Contact RAE Systems for availability in other regions.

[2] Contact RAE Systems for availability.

[3] Wireless versions have a functioning wireless modem and are ready for wireless deployments. "Wireless-capable" versions can be upgraded to wireless after the purchase of the unit; an activation fee is required to enable the wireless functionality. "Non-wireless" versions cannot be upgraded to wireless in the future.

2. Specifications
ToxiRAE Pro LEL Specifications

Dimensions	118 mm x 60 mm x 30 mm (4.6" x 2.4" x 1.2")
Weight	235g (8.29 oz)
Sensor	Catalytic bead LEL sensor with 0 to 100% LEL range and 1% LEL resolution,. Response time (T_{90}) < 15 seconds
Detectable Gases	Combustible gases and vapors from paints, coatings, fuels, degreasers, adhesives, solvents, resins, etchers, inks, pesticides, herbicides, etc., using 34 onboard correction factors
Battery	Rechargeable Li-ion battery • Operating time > 12 hours (normal operation) • Recharge time < 4 hours through charging cradle
Display	Graphical LCD display with white LED backlighting (activated when monitor is in alarm or with a button press)
Display Readout	Real-time reading of % of lower explosive limit (LEL); battery status; datalogging on/off status; wireless on/off and reception quality; peak values; calibration and measurement gases; correction factors
Keypad	2 buttons for operation and programming
Sampling	Diffusion
Calibration	Automatic with AutoRAE 2 Test and Calibration Station or manual
Alarm Modes	Wireless remote alarm notification, audible (95dB @ 30cm), vibration, visible alarm (flashing bright red LEDs), and on-screen indication of alarm conditions • Additional diagnostic alarm and display message for low battery
Datalogging	• Continuous Datalogging with a three-month capacity (at one-minute intervals) • User-configurable datalogging interval (from 1 to 3,600 seconds)
Communication and Data Download	• Data download and instrument set-up on PC via charging and PC communication cradle • Data download via AutoRAE 2 Automated Test and Calibration Station • Wireless data and status transmission via built-in RF modem (optional)
Wireless Network	RAE Systems Dedicated Wireless Network
Wireless Frequency	ISM license-free bands
Wireless Range	300 feet (100 meters), typical
Operating Temperature	-4° to 22° F (-20° to 50° C)
Humidity	0 to 95% relative humidity (non-condensing)
Dust and Water Resistance	IP-65 rating for dust and water ingress protection (validated by an independent test laboratory)
Hazardous Location Approvals	US and Canada ℅ᵤₛ Class I, Div. 1; Groups A,B,C,D, T-code T4 Class I, Zone 0 A/Exia IIC T4 Europe ATEX: CE⟨Ex⟩ II 1G, Ex ia IIC Ga T4 IECEx: Ex ia IIC Ga T4 China Ex ia IIC T4
CE Compliance (European Conformity)	EMC directive: 2004/108/EC; R&TTE directive: 1999/5/EC ATEX directive: 94/9/EC
Performance Test Compliance	C22.2 No 152 ANSI/ISA-12.13.01
Warranty	Two years on LEL sensor and non-consumable components One year on battery and other consumable components

Specifications are subject to change.

3. Overview

The ToxiRAE Pro LEL is the world's first wireless personal combustible gas monitor. The ToxiRAE Pro LEL takes worker protection to the next level by providing safety professionals wireless access to real-time instrument readings and alarm status from any location for better visibility and faster response. The ToxiRAE Pro LEL promptly detects and accurately monitors explosives and combustibles in concentrations from 0 to 100% of the lower explosive limit (LEL). With an onboard library of 34 correction factors, the ToxiRAE Pro LEL can be programmed to automatically read in % LEL of the specified compound.

4. User Interface

The ToxiRAE Pro LEL's user interface consists of the display, four LEDs, an alarm buzzer, and two keys, [MODE] and [Y/+]. The LCD displays real-time readings in specified measurement units, sensor type, alarm type (when in alarm, including cal. overdue), battery status, datalog (if on), and radio and connection quality (if available).
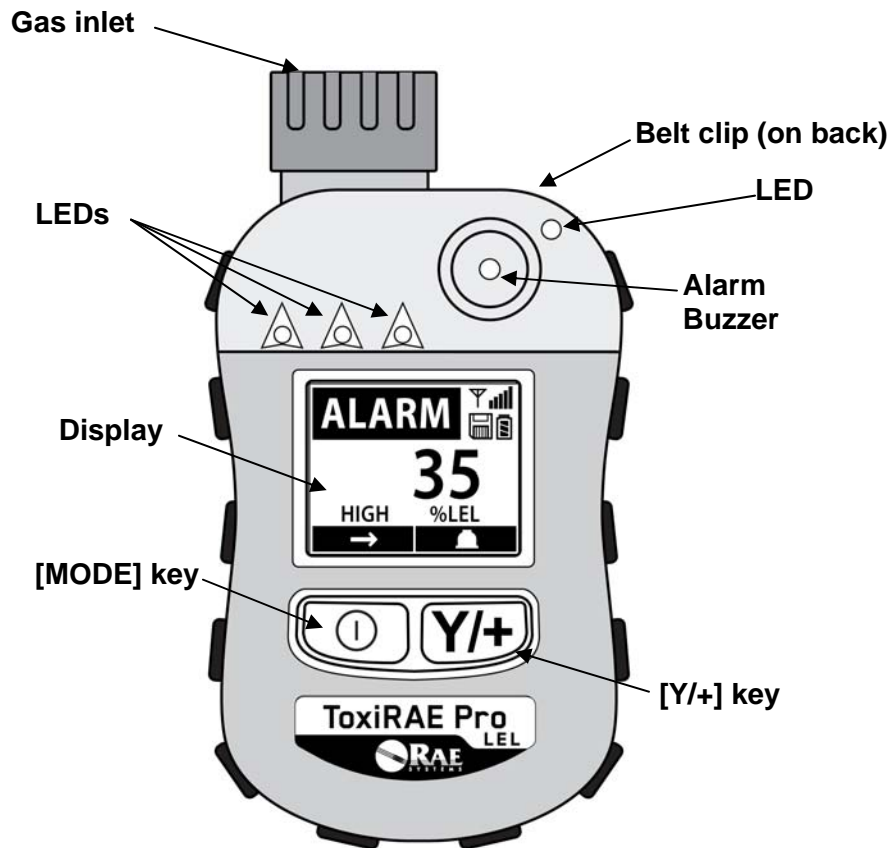
5. Charging The ToxiRAE Pro LEL

Always fully charge the battery before using the ToxiRAE Pro LEL. The ToxiRAE Pro LEL's Li-ion battery is charged by placing the ToxiRAE Pro LEL in its cradle. Contacts on the bottom of the ToxiRAE Pro LEL meet the cradle's contact pins, transferring power.

Rear view of ToxiRAE Pro LEL

Raised lip on rear of ToxiRAE Pro LEL locks into cradle's latch

Charging status LED

ToxiRAE Pro LEL Charging and PC Communications Cradle

Latch release

Rear view of charging cradle

Connect AC adapter to the charging cradle
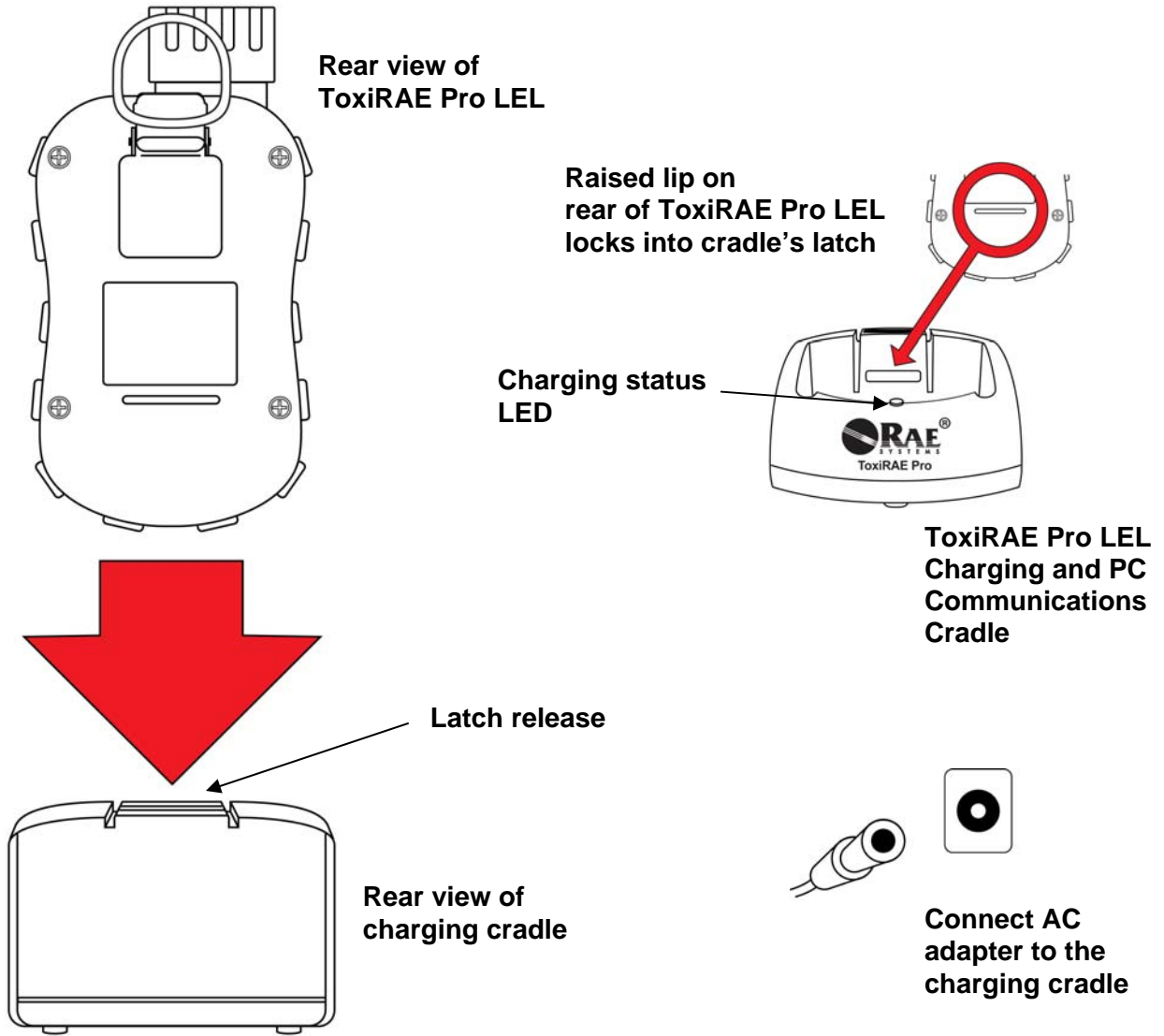
Note: Before setting the ToxiRAE Pro LEL into its charging cradle, visually inspect the contacts to make sure they are clean. If they are not, wipe them with a soft, dry cloth. Do not use solvents or cleaners.

Follow this procedure to charge the ToxiRAE Pro LEL:

1. Plug the AC/DC adapter into the ToxiRAE Pro LEL's cradle.
2. Plug the AC/DC adapter into the wall outlet.
3. Place the ToxiRAE Pro LEL into the cradle and press down until it is locked in place and the LED glows.

The ToxiRAE Pro LEL begins charging automatically. The LED in the cradle should glow red to indicate charging. When charging is complete, the LED in the cradle glows green.

WARNING!

To reduce the risk of ignition of hazardous atmospheres, recharge the instrument only in areas known to be non-hazardous. **Remove and replace batteries only in areas known to be non-hazardous.**

5.1. Removing The ToxiRAE Pro LEL From The Charging Cradle

To remove the ToxiRAE Pro LEL from its charging cradle, press down on the latch release on the back of the charging cradle while slightly tilting the ToxiRAE Pro LEL toward the front of the cradle, and lift it out.

Lift ToxiRAE Pro LEL out of charging cradle

Press on latch
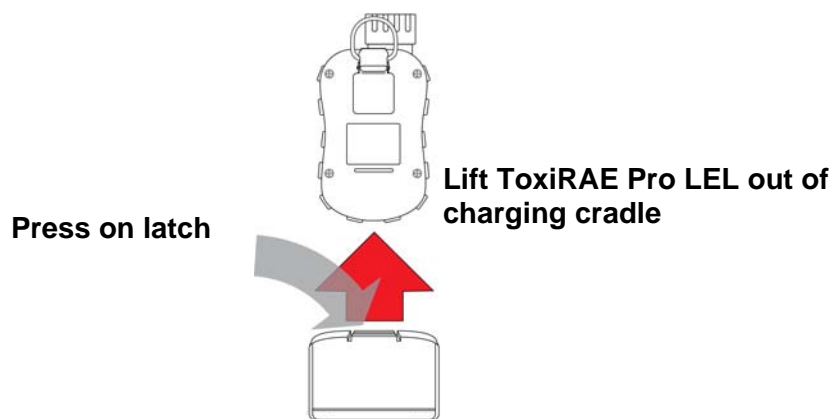
5.2. Low Voltage Shutoff

When the battery's charge falls below the shutoff voltage, the ToxiRAE Pro LEL then turns itself off. Recharge the battery by placing the ToxiRAE Pro LEL in its cradle (the cradle should be connected to the AC adapter).

6. Turning The ToxiRAE Pro LEL On

To turn the ToxiRAE Pro LEL on, press and hold [MODE] for 3 seconds.

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

Note: Never put tape over the alarm buzzer port to permanently mute it or otherwise limit the loudness of the buzzer.

1. When the ToxiRAE Pro LEL turns on, the buzzer, vibration alarm, and LEDs are tested. The firmware version is shown in the display (for example, "V1.00" indicates firmware version 1.00).
2. A battery test is performed. If the battery has sufficient charge, then the next step is a self test of the system.

   Note: If the battery is almost fully discharged, the message "Battery too low! Needs charging. Powering off!" shows in the display and the ToxiRAE Pro LEL shuts off. You must charge the battery before you can use the instrument.

3. Self-testing is performed by the ToxiRAE Pro LEL.

   Note: If one of the following error messages is displayed, shut off the ToxiRAE Pro LEL by pressing [MODE]:

   - Sensor error!
   - Wrong sensor!

   If any of the following error messages occurs, you can either shut off the instrument by pressing [MODE], or continue to the next startup test by pressing [Y/+]:

   - Real time clock error!
   - Memory error!
   - Sensor changed!

   For any of these error types, try restarting the instrument. If the error message appears again after five more attempts to restart the instrument, consult the distributor from whom the instrument was purchased for technical support.

4. After self-testing, two start-up options are available for the ToxiRAE Pro LEL: Normal and Fast Start-up. The following information is displayed in sequence under Normal Start-up and skipped under Fast Start-up:

    *   Sensor type
    *   Sensor serial number
    *   Date, time, and temperature
    *   Calibration gas
    *   Last calibration date
    *   Measurement gas
    *   Correction Factor
    *   User mode
    *   Battery type, voltage, and shutoff voltage
    *   Alarm mode
    *   Buzzer enabled/disabled status
    *   Light enabled/disabled status
    *   Vibration alarm enabled/disabled status
    *   Alarm settings for High and Low
    *   Datalog type and interval

5. Once the startup process is complete, a sensor warm-up screen is shown (with countdown). Then the main measurement screen is shown. The type of monitored hazard is displayed, with the current reading. The ToxiRAE Pro LEL is now ready for use.

7. Turning The ToxiRAE Pro LEL Off

Press and hold [MODE]. In 2 seconds, a 5-second countdown to shutoff begins, accompanied by one buzzer beep per second. 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 ToxiRAE Pro LEL continues normal operation.

When you see "Unit Off," release your finger from the [MODE] key. The ToxiRAE Pro LEL is now off.

8. Testing The Alarms (Manually)

Under normal non-alarm conditions, the buzzer, vibration alarm, and LEDs can be tested at any time by pressing and holding [Y/+].

Important! If any of the alarms does not respond to this test, check the Alarm Settings. It is possible that any or all of the alarms have been turned off. If all the alarms are turned on, but one or more of them (buzzer, LED lights, or vibration alarm) does not respond to this test, do not use the instrument; contact your RAE Systems distributor for technical support.

9. Low Battery Warnings

If, during operation, the battery's charge is low, the battery icon in the display screen turns empty and blinks once every second. At the same time, the following notifications occur every minute: the buzzer beeps and LEDs blink once, followed by a vibration and a screen message "Battery low! Shut off in X minutes." The countdown to shutoff starts 10 minutes prior to automatic shutoff.

10. Dead Battery Warning & Shutoff

If you turn on the ToxiRAE Pro LEL and the battery's charge is below its lowest threshold, the display shows this message:

Battery too low!
Needs charging.
Powering off!

It then automatically shuts off. You must charge the ToxiRAE Pro LEL's battery before you can continue to use this instrument.

Important! Do not operate the ToxiRAE Pro LEL again until its battery has been charged.

WARNING!

To reduce the risk of ignition of hazardous atmospheres, charge the battery only in areas known to be non-hazardous.

11. Operating The ToxiRAE Pro LEL

11.1. Overview

The ToxiRAE Pro LEL has two operational modes:

- **Normal** — see page 14 for detailed instructions.
- **Diagnostic** — see page 34 for detailed instructions.

The following is an overview of the two modes:

Normal Mode is the default mode. It is accessed when you turn on the ToxiRAE Pro LEL. Two sub-modes are available: Basic User and Advanced User. In Basic User, some restrictions are applied, including password protection that guards against entering Programming Mode by unauthorized personnel. In Advanced, there are no such access restrictions (you do not need a password), and it provides the indications and data you need most for typical monitoring applications.

Diagnostic Mode is primarily intended for technicians to use during troubleshooting, although it also offers access to a few changeable parameters that you may rarely (if ever) need to change. A password is required to enter Diagnostic Mode (the password is the same as (and automatically kept in sync with) the one used to enter Programming Mode). The default password is 0000. To enter Diagnostic Mode, power the instrument off and then turn it back on by pressing and holding both the buttons. In Diagnostic Mode, ToxiRAE Pro LEL displays readings in raw counts instead of units such as %LEL.

It is not possible to switch to Programming from Diagnostic Mode without turning off the instrument first and then restarting it in the desired mode.
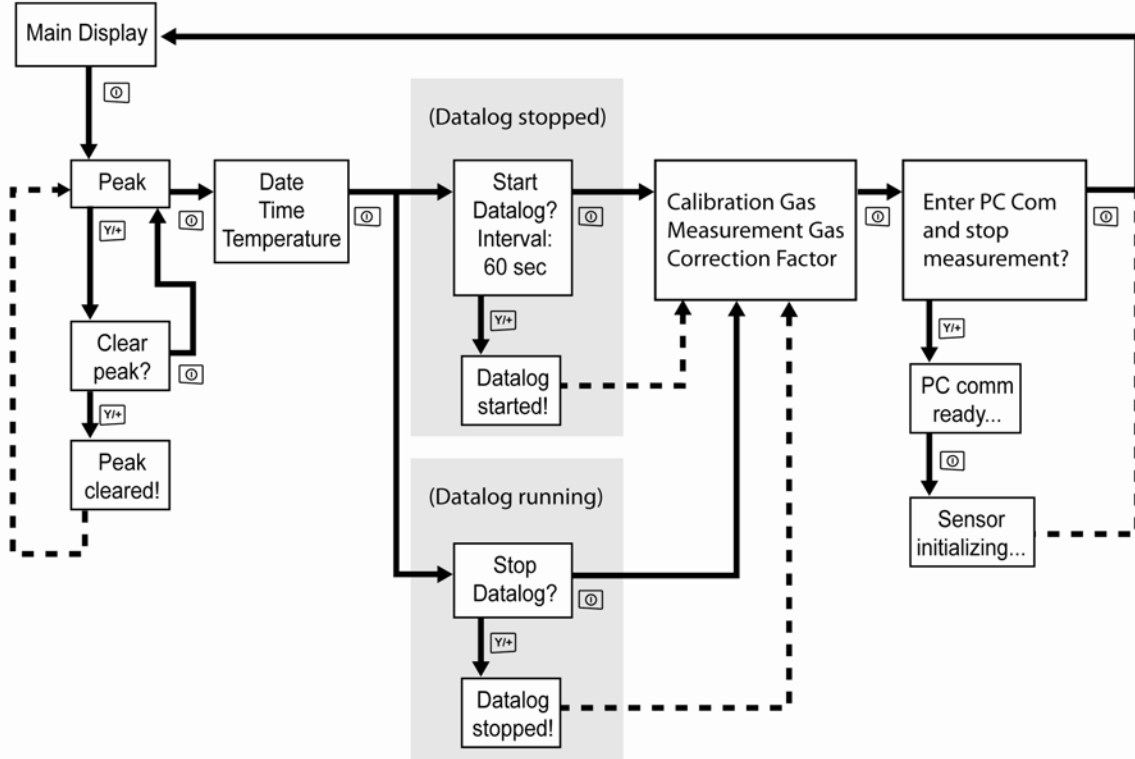
11.1.1. Normal Mode

Normal Mode is the default mode of the ToxiRAE Pro LEL when it is turned on. The selected sub-mode (Basic or Advanced) determines the number of screens that are accessible.

11.1.2. Basic User Mode

When the ToxiRAE Pro LEL is in Basic User Mode, pressing [MODE] allows you to step through the screens in the following fashion:

Note: The gray boxes indicate the datalog functions when datalogging is in Manual mode. When datalogging is in Automatic mode, these screens do not appear. Refer to page 23 for information on selecting Automatic or Manual datalogging.

11.1.3. Advanced User Mode

Note: To enter Advanced User mode from Basic User mode, you must enter Programming mode on an instrument that is running in Basic User mode by simultaneously pressing and holding both the buttons for 3 seconds and supply a password.

To exit Programming Menu and return to the measurement screen (in Advanced User mode), press the [MODE] button repeatedly to highlight the Exit icon in Programming Menu and press Y to exit to the measurement screen.

When the ToxiRAE Pro LEL is in Advanced User mode, pressing [MODE] steps through the same screens, but with the addition of a screen that allows for selection of different measurement gases from the internal library. Also, once in Advanced User mode, you may enter Programming without using a password.

Note: In Advanced User Mode, you may select different measurement gases from the internal library.
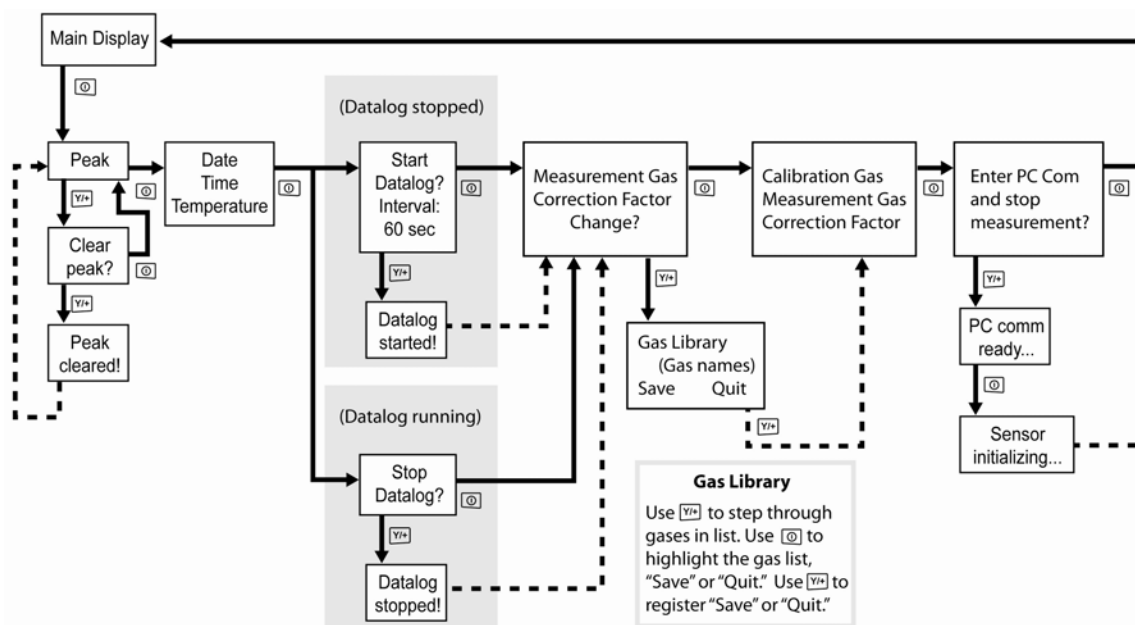
Note: The gray box indicates the datalog functions when datalogging is in Manual mode. When datalogging is in Automatic mode, these screens do not appear. Refer to page 23 for information on selecting Automatic or Manual datalogging.

11.2. Navigation In Normal Mode

Step through the screens in Normal Mode by pressing [MODE]. Some screens allow actions on your part, such as clearing the data. In these instances, pressing [Y/+] performs the action.

11.2.1. Peak

The first screen includes a readout for Peak readings.

Peak   The Peak value tells you the highest reading for the sensor since the ToxiRAE Pro LEL was turned on. Press [Y/+] twice to clear the Peak value.

Note: If you do not press a key within 1 minute, the display reverts to the normal reading.

Press [MODE] to advance from screen to screen.

11.2.2. Date, Time, And Temperature

The current Date is expressed as Month/Day/Year, with two digits for month and day, and four digits for the year. Below the date is the time, which is expressed as Hours/Minutes/Seconds, with two digits for each. The time is in 24-hour (military) format. Below the time is the internal temperature, which can be in degrees Fahrenheit or Celsius (settable in Programming Mode).

11.2.3. Calibration Gas/Measurement Gas/Correction Factor

This screen shows calibration gas (Cal. Gas) and its concentration, measurement gas (Meas. Gas), and correction factor (CF).

11.2.4. Enter PC Comm and stop measurement?

Before communicating with a PC running ProRAE Studio II Instrument Configuration and Data Management software (for downloading datalogs, configuring the instrument, or uploading new firmware), the ToxiRAE Pro LEL must be set to communicate with the computer. Press [MODE] repeatedly until you reach the "Enter PC Comm and stop measurement?" screen. Then press [Y/+]. Measurement and datalogging are stopped, and the instrument is now ready to communicate with the PC.
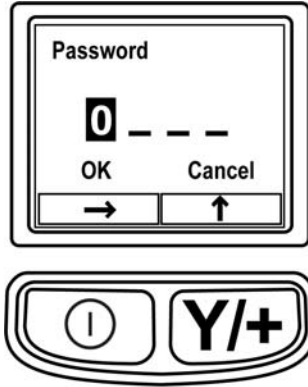
11.3. Programming

You must provide a 4-digit password to enter Programming Mode, unless the ToxiRAE Pro LEL is already running in Advanced User mode. The default password is 0000.

11.4. Entering Programming Mode

1. Press and hold [MODE] and [Y/+] simultaneously until the Password screen appears.

2. Input the 4-digit password:

  • Press [Y/+] repeatedly to select a desired number. Numbers increase from 0 to 9. Once 9 is reached, pressing [Y/+] again "wraps" around back to 0.
  • Step from digit to digit using [MODE].
  • When you are done, continue pressing [MODE] until OK or Cancel is highlighted.
  • Press [Y/+] to register the password (if OK is highlighted) or to exit without entering the password (if Cancel is selected)

If you make a mistake, you can cycle through the digits by pressing [MODE] repeatedly and then using [Y/+] to change the number in each position.

Note: The default password is 0000.

When you have successfully entered Programming Mode, the following screen appears:
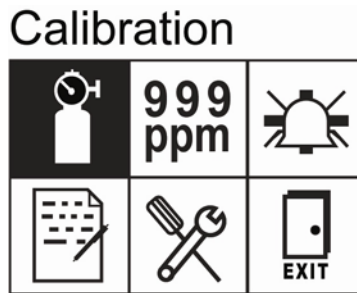
Note: The password can only be changed by connecting the instrument to a PC running ProRAE Studio II software. Follow the instructions in ProRAE Studio II to change it.

The Calibration icon is highlighted first by default, but you can press [MODE] to step from one programming menu item to the next, with the name of the menu shown at the top of the display and the corresponding icon highlighted. As you repeatedly press [MODE], the selection moves from left to right, and the following screens appear in sequence:
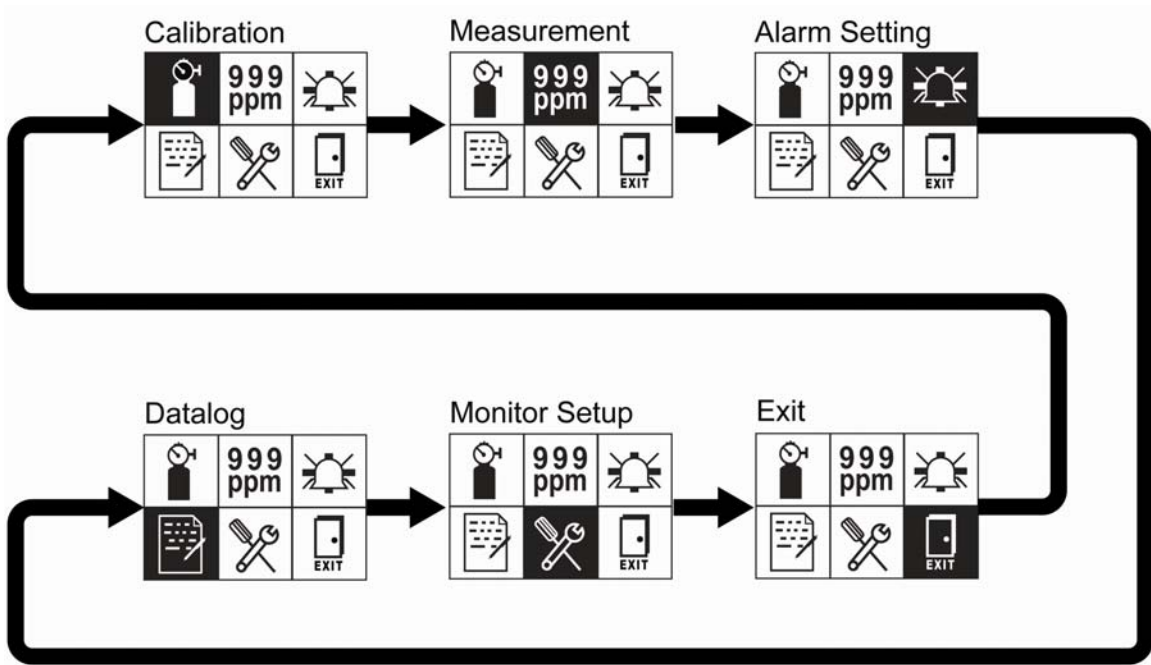
Note: When you reach Exit and press [MODE], the menu cycles back to Calibration.

To exit the Programming Menu, highlight Exit by pressing the [MODE] button, and press the [Y/+] key

11.4.1. Navigating Programming Menus

Navigating through the Programming menus is easy and consistent, using a single interface format of a "forward arrow" and "Select," controlled by the [MODE] key and [Y/+] key, respectively.

In the submenus, the functions of a "down arrow" and "Select" are controlled by the [MODE] key and [Y/+] key, respectively.

Also in submenus, the functions of the keys may correspond to the instruction directly above each key. Therefore, if it says "OK" above the [MODE] key, pressing [MODE] selects "OK." When setting numerical data, the [MODE] key typically selects which digit is highlighted, while each press of [Y/+] increases the digit by 1.

11.5. Programming Menus

Programming allows anyone with the password to change the instrument's settings, calibrate the instrument, enter user information, etc. Programming has five menus. Each menu includes several submenus to perform additional programming functions.

This table shows the menus (and their icons) and submenus:

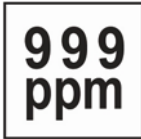| Calibration	Measurement	Alarm Setting	Datalog	Monitor Setup
Zero Calibration	Meas. Gas	High Alarm	Clear Datalog	Site ID
Span Calibration		Low Alarm	Interval	User ID
		Alarm Mode	Data Selection	User Mode
		Buzzer & Light	Datalog Type	Date
				Time
				Temp. Unit
				Language
				Zero At Start
				LCD Contrast

Note: There is also an "Exit" icon. It has only one function. When you select it, the instrument exits Programming Mode, updates the settings, and returns to monitoring.

Once you enter Programming, the LCD displays the first menu, Calibration. Each subsequent menu is accessed by pressing [MODE] repeatedly until the desired menu is displayed. To enter a submenu of a menu, press [Y/+].

11.5.1. Calibration

Two types of calibration are available: Zero (fresh air) and Span.

In the Calibration submenu, select Zero or Span Calibration by pressing [MODE]. Once your choice is highlighted, press [Y/+].

Zero Calib
The procedure for performing a zero calibration is covered on page 29.

Span Calib
The procedure for performing a basic span calibration is covered on page 32.

Exit
Press [Y/+] to exit. Calibration is exited, and Measurement is highlighted in the Programming Menu screen.

11.5.2. Measurement
The submenu for Measurement is Measurement Gas.

Meas Gas
Measurement gases are organized in a list called Gas Library:

The Gas Library consists of 34 compounds found in RAE Systems' Technical Note TN-106 (available online at www.raesystems.com).

1. Scroll through the Gas Library by pressing [Y/+] until you find the gas you want as your measurement gas.
2. When you are on the gas of your choice, press [MODE] to highlight "Save."
3. To save your choice, press [Y/+]. Otherwise, press [MODE] to highlight "Quit," followed by [Y/+]; the newly selected gas will not be saved.

Exit
Press [Y/+] to exit. Measurement is exited, and Alarm Setting is highlighted in the Programming Menu screen.

11.5.3. Alarm Setting

High Alarm
Set the High Alarm as follows:

1. In the High Alarm submenu, press [Y/+] repeatedly to select a desired number. Numbers increase from 0 to 9. Once 9 is reached, pressing [Y/+] again "wraps" around back to 0.
2. Press [MODE] to move to the next digit.
3. When you are satisfied with the number, press [MODE] until "OK" is highlighted.
4. To save the new value, press [Y/+]. The value is saved, and the menu advances to Low Alarm.

To exit without saving the new value:

1. Press [MODE] to advance to Cancel.
2. Press [Y/+] to exit the High Alarm submenu and advance to the Low Alarm submenu.

Low Alarm

Set the Low Alarm as follows:

1. In the Low Alarm submenu, press [Y/+] repeatedly to select a desired number. Numbers increase from 0 to 9. Once 9 is reached, pressing [Y/+] again "wraps" around back to 0.
2. Press [MODE] to move to the next digit.
3. When you are satisfied with the number, press [MODE] until "OK" is highlighted.
4. To save the new value, press [Y/+]. The value is saved, and the menu advances to the Alarm Mode submenu.

To exit without saving the new value:

1. Press [MODE] to advance to Cancel.
2. Press [Y/+] to exit the Low Alarm submenu and advance to the Alarm Mode submenu.

Alarm Mode

There are two selectable alarm types:

Auto Reset   When an alarm is triggered and after the alarm condition is no longer present, the alarm stops and resets by itself.

Latch   When the alarm is triggered, it will not cease until you manually turn it off.

The latched setting controls alarms for High Alarm and Low Alarm.

Note: To clear an alarm when the instrument is set to "Latched," press [Y/+] when the main (measurement) display is shown.

1. Press [MODE] to step from one alarm type to the other.
2. Press [Y/+] to select an alarm type.
3. When you have completed your selection, press [MODE] until "Exit" is highlighted. Then press [Y/+] to save the change and exit to "Buzzer and Light."

Buzzer & Light

The buzzer, light, and vibration alarms can be programmed so that any combination, all, or none of them are activated when the ToxiRAE Pro LEL goes into alarm.

Important! If you program the ToxiRAE Pro LEL so that no alarms are activated in an alarm condition, you may put yourself or your workers at risk of being exposed to a hazardous atmosphere and being unaware of it, as the indication of a dangerous condition will be limited to the concentration shown in the display and the name of the type of alarm flashing on the display.

1. Choose an alarm combination setting by pressing [MODE] until your choice is highlighted.
2. Press [Y/+] to select it.
3. Press [MODE] repeatedly until "Exit" is highlighted.
4. Press [Y/+] to register your selection and exit.

To exit without saving the new value:

1. Make sure your previous setting is selected.
2. Press [MODE] repeatedly to advance to Exit.
3. Press [Y/+] to exit.

Exit (the Alarm Settings Submenu)
Press [Y/+] to exit the Alarm Settings submenu. Alarm Settings is exited, and Datalog is highlighted.

If you want to cycle through the Alarm Setting submenus, press [MODE] instead of [Y/+].

11.5.4. Datalog

Clear Datalog
This operation erases all data stored in the datalog.

Note: Once the datalog is cleared, the data cannot be recovered.

Press [Y/+] to clear the datalog. The display asks, "Are you sure?"

- Press [Y/+] if you want to clear the datalog. When it has been cleared, the display shows "Datalog Cleared!"
- Press [MODE] if you do not want to clear the datalog.

You are taken to the next submenu, Interval.

Interval
Intervals are shown in seconds. The default value is 60 seconds. The maximum interval is 3600 seconds, and the minimum is 1 second.

1. Press [Y/+] repeatedly to select a desired number. Numbers increase from 0 to 9. Once 9 is reached, pressing [Y/+] again "wraps" around back to 0.

2. Press [MODE] to advance to the next digit.

3. Repeat this process until the desired value is entered.

Repeat this process until the desired value is entered.

When you have completed your selections, press [MODE] repeatedly until "OK" is highlighted.

- To save the new value, press [Y/+].
- To cancel the changes and keep the settings as they were, press [MODE] to highlight "Cancel." Then press [Y/+].

You are taken to the next submenu, Data Selection.

Data Selection
Data Selection allows you to select which types of data are recorded and made available when you download your datalog to a computer via ProRAE Studio II software.

You can choose any or all of four types of data (you must choose at least one):

- Minimum
- Average
- Maximum
- Real Time

1. Press [MODE] to step from one option to the next. The highlighter indicates your choice.
2. Press [Y/+] to toggle your selection on or off (the check box indicates "on" with an "X").
3. When you have completed your selections, press [MODE] repeatedly until "Exit" is highlighted.
4. Press [Y/+] to save the changes and exit.

Datalog Type
The instrument has two datalog types:

Auto   Collects datalog information when the instrument is sampling until the datalog memory is full.

Manual   Datalogging occurs only when you manually initiate datalogging (see below for details).

1. Press [MODE] to step from one option to the next.
2. Press [Y/+] to make your selection (the dark circle in the "radio button" indicates that an option has been selected).
3. When you have completed your selection, press [MODE] until "Exit" is highlighted.
4. Press [Y/+] to save your selection and exit.

About Manual Datalog

When the instrument is set to Manual Datalog, you can turn datalogging on and off from the main measurement display in the Normal Mode by pressing the [MODE] key three times.

- When you reach the screen that says "Start Datalog?" press [Y/+] to start it. You see "Datalog Started," confirming that datalogging is now on.
- When you reach the screen that says "Stop Datalog?" press [Y/+] to stop it. You see "Datalog Stopped," confirming that datalogging is now off.

Exit (the Datalog Submenu)
Press [Y/+] to exit. Datalog is exited, and Monitor Setup is highlighted.

11.5.5. Monitor Setup

Site ID
Choose and enter an 8-digit alphanumeric Site ID to uniquely identify the particular site where the instrument is to be used. This Site ID is included in the datalog report.

1. Press [Y/+] and the display shows the current Site ID. Example: "SITE0001." The left-most digit is highlighted.

2. Press [Y/+] repeatedly to select a desired character. Letters increase from current value to Z followed by digits from 0 to 9. Once 9 is reached, pressing [Y/+] again "wraps" around to the letter A. For the last four characters that must be numerical, numbers increase from 0 to 9. Once 9 is reached, pressing [Y/+] again "wraps" around back to 0.

   Note: The last four characters must be numerals.

3. Press [MODE] to advance to the next character.

   Repeat this process until all eight characters of the new Site ID are entered.

To save your new Site ID and exit, press [MODE] repeatedly until "OK" is highlighted. Then press [Y/+].

User ID
Enter an 8-digit alphanumeric User ID to uniquely identify a user. This User ID is included in the datalog report.

1. Press [Y/+] and the display shows the current User ID. Example: "USER0000." The left-most character is highlighted.

2. Press [Y/+] repeatedly to select a desired character. Letters increase from current value to Z followed by digits from 0 to 9. Once 9 is reached, pressing [Y/+] again "wraps" around to the letter A. For the last four characters that must be numerical, numbers increase from 0 to 9. Once 9 is reached, pressing [Y/+] again "wraps" around back to 0.

   Note: The last four characters must be numerals.

3. Press [MODE] to advance to the next character.

   Repeat this process until all eight characters of the new User ID are entered.

To save your new User ID and exit, press [MODE] repeatedly until "OK" is highlighted. Then press [Y/+].

User Mode
The ToxiRAE Pro LEL has two user modes:

Basic   Basic users can only see and use a basic set of functions.

Advanced   Advanced users can see all screens and take advantage of all available functions.

Note: The default value for User Mode is Basic.

To change the User Mode:

1. Press [MODE] to step from one option to the other. The highlighting changes each time you press [MODE].
2. Press [Y/+] to make your selection (the dark circle in the "radio button" indicates the option has been selected).
3. When you have completed your selection, press [MODE] repeatedly until "Exit" is highlighted.
4. Press [Y/+] to register your selection, exit the User Mode submenu and advance to Date.

Date
The Date is expressed as Month/Day/Year, with two digits for each (MM/DD/YY).

The left-most digit is highlighted to indicate it is selected when you enter the Date submenu.

1. Press [Y/+] repeatedly to select a desired number. Numbers increase from 0 to 9. Once 9 is reached, pressing [Y/+] again "wraps" around back to 0.

2. Press [MODE] to advance to the next digit.

    Repeat this process until all six digits of the new date are entered.

3. Press [MODE] repeatedly until "OK" is highlighted.

4. Press [Y/+] to save your selection and advance to Time.

    Note: If you do not want to save the change, press [MODE] repeatedly until "Cancel" is highlighted. Press [Y/+] to exit to Time without saving the changes.

Time

The Time is expressed as Hours/Minutes/Seconds, with two digits for each. The time is in 24-hour (military) format of HH:MM:SS.

The left-most digit is highlighted to indicate it is selected.

1. Press [Y/+] repeatedly to select a desired number. Numbers increase from 0 to 9. Once 9 is reached, pressing [Y/+] again "wraps" around back to 0.

2. Press [MODE] to advance to the next digit.

    Repeat this process until all six digits of the new time are entered.

3. Press [MODE] repeatedly until "OK" is highlighted.

4. Press [Y/+] to save your selection, exit the Time submenu and advance to Temp. Unit.

    Note: If you do not want to save the change, press [MODE] until "Cancel" is highlighted. Press [Y/+] to exit to Temp. Unit without saving the changes.

Temp. Unit

The display unit of the internal temperature sensor can be switched between Fahrenheit and Celsius.

To change the Temp. Unit:

1. Press [MODE] to step from one option to the other. The highlighted option changes each time you press [MODE].
2. Press [Y/+] to make your selection (the dark circle in the "radio button" indicates the option has been selected).
3. When you have completed your selection, press [MODE] repeatedly until "Exit" is highlighted.

Press [Y/+] to save your selection, exit the Temp. Unit menu, and advance to Language.

Language

English is the default language, but other languages can be selected for the instrument.

1. Press [MODE] to step from one option to the next. The highlighted option changes each time you press [MODE].

2. Press [Y/+] to make your selection (the dark circle in the "radio button" indicates this option has been selected).
3. When you have completed your selection, press [MODE] repeatedly until "OK" is highlighted.
4. Press [Y/+] to save your selection, exit the Language submenu, and advance to Zero At Start.

Zero At Start

When Zero At Start is turned on, the instrument starts with zero calibration every time it is turned on.

1. Press [MODE] to choose between "Off" and "On."
2. Press [Y/+] to make your selection (the dark circle in the "radio button" indicates your selection).
3. When you have completed your selection, press [MODE] repeatedly until "Exit" is highlighted.
4. Press [Y/+] to save your selection, exit the Zero At Start submenu, and advance to LCD Contrast.

LCD Contrast

The display's contrast can be increased or decreased from its default setting. You may not need to ever change the default setting, but sometimes you can optimize the display to suit extreme temperature and ambient brightness/darkness conditions.

1. Press and hold [Y/+] to select a desired level of contrast. The range is 1 to 100. Once 100 is reached, pressing [Y/+] again "wraps" around back to 1.
2. When you have completed your selection, press [MODE] repeatedly until "Exit" is highlighted.
3. Press [Y/+] to save your selection, and exit the LCD Contrast.

   Note: If you do not want to save the change, press [MODE] repeatedly until "Cancel" is highlighted. Press [Y/+] to exit without saving the changes.

Exit (Monitor Setup Submenu)

Press [Y/+] to exit. Monitor Setup is exited. Exit (to exit Programming Mode) is highlighted.

11.6. Exit (Exit Programming Mode)

To exit Programming Mode and return to normal operation, press [MODE] until the Exit icon is highlighted. Press [Y/+] to exit. You will see "Updating Settings…" as changes are registered and the mode changes to normal operation.

12. Bump Testing & Calibrating The ToxiRAE Pro

Note: Calibration intervals and bump test procedures may vary due to national legislation.

12.1. Bump Testing & Calibrating With An AutoRAE 2™

Bump testing and calibrating a ToxiRAE Pro LEL can be done with an AutoRAE 2 Automatic Test And Calibration Station. Follow all instructions in the AutoRAE 2 User's Guide for successful bump testing or calibration.

12.1.1. Bump (Functional) Testing

RAE Systems recommends periodic bump testing to confirm that the sensor is working and that the alarms are functional.

With the ToxiRAE Pro LEL in Normal Mode:

1. Connect the calibration gas cylinder, flow regulator, and calibration adapter to the ToxiRAE Pro LEL and start the gas flow.
2. Make sure the unit goes into alarm and that the buzzer produces at least two beeps per second, the LED lights flash on and off, and the vibration alarm functions. The display backlight should illuminate and an alarm message should be shown in the display.
3. Turn off the gas flow.
4. Remove the calibration adapter.

Note: Bump testing and calibration can also be performed by using the RAE Systems AutoRAE 2 Automatic Test And Calibration Station. Refer to the AutoRAE 2 User's Guide for instructions.
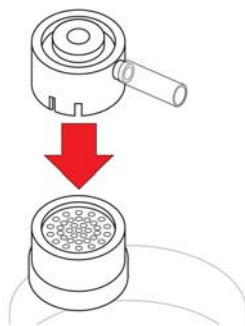
12.2. Calibration Adapter

The ToxiRAE Pro LEL must be calibrated using a fixed-flow regulator with a flow rate between 0.5 and 1.0 liters per minute. The ToxiRAE Pro LEL is supplied with a special calibration adapter that covers the gas inlet. If the local air has impurities that might interfere with zero (fresh air) calibration, the calibration adapter and a cylinder of clean zero air should be used.

12.2.1. Connecting The Calibration Adapter

The supplied Calibration Adapter has a removable insert to allow bump testing and calibration to be performed on the instrument regardless of whether it has a rubber boot installed. Use the Calibration Adapter without the insert to calibrate the instrument in the rubber boot, and with the insert to calibrate the instrument without the rubber boot on it.

1. Place the Calibration Adapter on the top cap of the ToxiRAE Pro LEL by pressing it into place.

2. Attach the hose from the regulator/calibration gas cylinder to the Calibration Adapter's inlet.

Caution! After calibration is complete, remove the Calibration Adapter. When monitoring, never operate the ToxiRAE Pro LEL with the Calibration Adapter attached. If the Calibration Adapter is attached during normal operation, inconsistent and lower-than-normal readings will occur because of decreased concentration of the gas being monitored.

12.2.2. Disconnecting The Calibration Adapter

After calibrating the ToxiRAE Pro LEL, you must remove the Calibration Adapter by lifting it off the ToxiRAE Pro LEL.

12.3. Zero Calibration

This operation sets the zero point of the sensor calibration curve for clean air. Expose the ToxiRAE Pro LEL to a clean air source with 20.9% oxygen and without any organic, toxic, or combustible gas impurities. This "Zero Air" can come from a cylinder or clean ambient air.

Note: If you use a zero air cylinder, you must use the ToxiRAE Pro Calibration Adapter. Using a calibration adapter is not necessary for calibration in fresh air.

Turn on the ToxiRAE Pro LEL. Once it has been through its startup, enter Programming Mode:

 1. Press and hold [MODE] and [Y/+] until you see the Password screen.
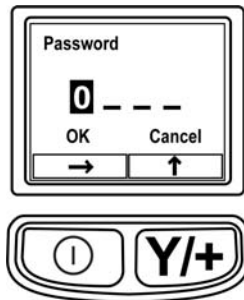
 2. Input the 4-digit password:

 * Press [Y/+] repeatedly to select a desired number. Numbers increase from 0 to 9. Once 9 is reached, pressing [Y/+] again "wraps" around back to 0.
 * Step from digit to digit using [MODE].
 * When you are done, press [MODE] until OK or Cancel is highlighted.
 * Press [Y/+] to register the password (if OK is highlighted) or to exit without entering the password (if Cancel is selected).

If you make a mistake, you can cycle through the digits by pressing [MODE] and then using [Y/+] to change the number in each position.

Note: The default password is 0000.

If you do not know the password, do not enter anything. Just press [MODE] repeatedly to highlight OK, and then press [Y/+].

Note: If the ToxiRAE Pro LEL is in Programming Mode and you do not press a key within 60 seconds, it exits Programming Mode and re-enters Normal Mode.

 1. At the Calibration screen, press [Y/+].

2. "Zero Calib" is highlighted. Make sure the ToxiRAE Pro is in clean air. Otherwise attach a cylinder of zero gas to the Calibration Adapter installed on the instrument.
3. Press [Y/+]. The message "Apply zero gas…" is displayed.
4. Start the flow of the zero gas (if used) and press [Y/+] to start the zero calibration.
5. There is a 60-second countdown, during which time the screen shows the word "Zeroing…" and the countdown.
6. Upon completion, it says "Zero is done! Reading = 0%LEL" along with the reading (it should be 0%LEL or very close to it).
7. "Span Calib" is highlighted.

Note: You can abort the zero calibration during its countdown by pressing the [MODE] key.

Important! If you used the Calibration Adapter and a zero air cylinder, you must remove the Calibration Adapter from the ToxiRAE Pro LEL. If the Calibration Adapter is attached during normal operation, inconsistent and lower-than-normal readings will occur because of decreased concentration of the gas being monitored.

12.4. Span Calibration
This procedure determines the second point of the sensor calibration curve for the sensor.

To begin calibration, connect the calibration gas cylinder, flow regulator, and calibration adapter to the ToxiRAE Pro LEL.

With the ToxiRAE Pro in Programming Mode, and with Span Calib highlighted, follow this procedure:

1. Press [Y/+]. The screen displays the current (or default) calibration gas and its concentration. For example:

   Cal. Gas: Methane
   Span=50%LEL
   Change?

   * Press [MODE] if you do not want to change it.
   * Press [Y/+] if you want to change it.

   If you entered the Calibration Menu without supplying the correct password, or supplied the correct password but chose not to change the Cal.Gas, you will see a message like this:

   Cal.Gas: Methane
   Span=50%LEL
   Apply gas…

2. Press [Y/+] to start calibration.
3. Press [MODE] if you want to quit without calibrating.

During calibration, the calibration gas name, its concentration, and the countdown are displayed. Depending upon the device alarm settings, the monitor may go into low and then high alarm once span calibration is complete, which is expected in response to the test gas.

Note: You can abort span calibration during its countdown by pressing [MODE].

Upon completion, the screen "Span is done!" appears along with the reading (it should be within 10% of the span gas concentration).

Important! After calibration is complete, you must remove the Calibration Adapter from the ToxiRAE Pro LEL. If the Calibration Adapter is attached during normal operation, inconsistent and lower-than-normal readings will occur because of decreased concentration of the gas being monitored.

12.4.1. Changing Span Gas Concentration

If you selected "Change" for span gas concentration, the following screen appears:
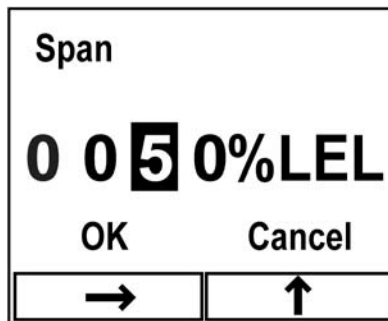
1. Press [Y/+] repeatedly to select a desired number. Numbers increase from 0 to 9. Once 9 is reached, pressing [Y/+] again "wraps" around back to 0.
2. Step from one digit to the next by pressing [MODE].
3. When you are done, press [MODE] until either "OK" or "Cancel" is selected. Press [Y/+] to register your selection (if "OK" is highlighted) or to exit without registering it (if "Cancel" is selected).

13. Diagnostic Mode

The ToxiRAE Pro LEL's Diagnostic Mode can only be accessed at startup time. In Diagnostic Mode, ToxiRAE Pro LEL displays readings in raw counts instead of units such as %LEL.

13.1. Entering Diagnostic Mode

1. With the ToxiRAE Pro LEL turned off, press and hold both [MODE] and [Y/+].
2. When the display turns on and the password screen appears, release the keys.
3. Enter the 4-digit password (the password is the same as the one for the Programming Mode):

   - Step from one position in the four-character string to the other by pressing [MODE].
   - Press [Y/+] repeatedly to select a desired number. Numbers increase from 0 to 9.
   - Once 9 is reached, pressing [Y/+] again "wraps" around back to 0.

4. When you are done, press [MODE] until either OK or Cancel is selected. Press [Y/+] to register the password (if "OK" is highlighted) or to exit without entering the password (if "Cancel" is selected).

13.2. Navigating Diagnostic Mode

In Diagnostic Mode, the ToxiRAE Pro LEL provides raw counts for sensor, battery, and other readings. Most of these screens are useful only to service technicians. Therefore, if you require information on Diagnostic Mode, refer to the ToxiRAE Pro LEL Service Guide.

The ToxiRAE Pro LEL's Diagnostic Mode can only be accessed at startup time. In Diagnostic Mode, ToxiRAE Pro LEL displays readings in raw counts instead of units such as %LEL.

13.3. Exiting Diagnostic Mode

1. Turn off the ToxiRAE Pro LEL by pressing and holding [MODE]. There will be a standard shutoff countdown.
2. When the instrument shuts off, you will be alerted. Release your finger.

Note: The next time you start ToxiRAE Pro LEL, hold only [MODE], and it will automatically start in Normal Mode.

14. Alarm Signal Summary

Alarm types include:

Alarm Message/ Priority	Condition	Alarm Signal
MAX	Gas exceeds electronics' maximum range	3 beeps/flashes per second
OVER	Gas exceeds measurement range	3 beeps/flashes per second
HIGH	Gas exceeds "High Alarm" limit	3 beeps/flashes per second
LOW	Gas exceeds "Low Alarm" limit	2 beeps/flashes per second
NEG	Gas reading measures less than zero	1 beep/flash per second
CAL	Calibration failed, or needs calibration	1 beep/flash per second
Bat	Low battery	1 flash, 1 beep per minute plus battery icon flashes on display

The alarm priority is as follows (in the event of multiple simultaneous alarms):

Max > Over > High > Low > Neg > Cal > Bat

15. Downloading Datalogs And Performing PC-Based Instrument Configuration and Firmware Upgrades

The ToxiRAE Pro LEL communicates with a PC running ProRAE Studio II Instrument Configuration and Data Management software (version 1.03 or higher) to download datalogs, configure the instrument, or upload new firmware.

The ToxiRAE Pro LEL must be connected to a PC through the supplied Charging / PC Communications Cradle and must be in the PC communications mode.

1. Make sure the Charging/PC Communications Cradle has power from its AC adapter (the LED on the front of the cradle should be illuminated).
2. Use the supplied PC Communications Cable (USB to mini-USB cable) to connect the Cradle to a PC.
3. Turn on the ToxiRAE Pro LEL. Make sure it is running in Normal mode (with the main measurement screen with its reading showing).
4. Insert the ToxiRAE Pro LEL in the cradle.
5. Activate the PC communications mode on the ToxiRAE Pro LEL by pressing [MODE] repeatedly, starting from the main measurement screen until you reach the "Enter PC Comm and stop measurement?" screen.
6. Press [Y/+]. Measurement and datalogging stop, and the instrument is now ready to communicate with the PC. The display now says "PC comm ready…"
7. Start up the ProRAE Studio II software, enter a password, and detect the instrument following the directions provided in the ProRAE Studio II User's Manual.
8. Follow the instructions in the ProRAE Studio II User's Manual to download the datalog, configure the instrument settings, or update the ToxiRAE Pro LEL's firmware.
9. When you are done, press [MODE] to exit the PC communications mode on the ToxiRAE Pro LEL. The screen displays "Sensor initializing," after which the instrument returns to operating in Normal mode.

16. Maintenance

⚠ **WARNING!** ⚠

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

The following guidelines should be followed when changing the battery:

1. Turn off the unit before changing the battery.

2. When replacing the battery, take note of its orientation. The connectors on the circuit board should go into the matching slots in the battery.

WARNING

To reduce the risk of ignition of hazardous atmospheres, replace the battery only in areas known to be non-hazardous.

16.1. Replacing the ToxiRAE Pro LEL Li-Ion Battery

Caution: Turn off the ToxiRAE Pro LEL before removing or replacing the battery.

1. If the rubber boot is on the ToxiRAE Pro LEL, remove it (refer to page 41 for details).
2. Remove the cap by unscrewing it.
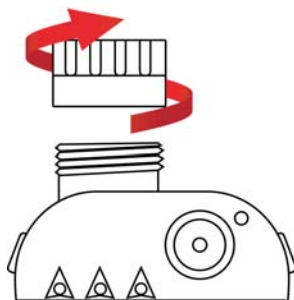
3. Remove the sensor module by gripping it with your fingers and pulling it out. Do not use tools, which could damage the sensor module.
4. Place the ToxiRAE Pro LEL face-down on a soft surface.

5. Remove the four screws on the back of the instrument by turning them counterclockwise.

5. Hold the ToxiRAE Pro LEL down and separate the rear cover from the front by pulling from the top and tilting it open without disconnecting the ribbon cable connecting the two halves.
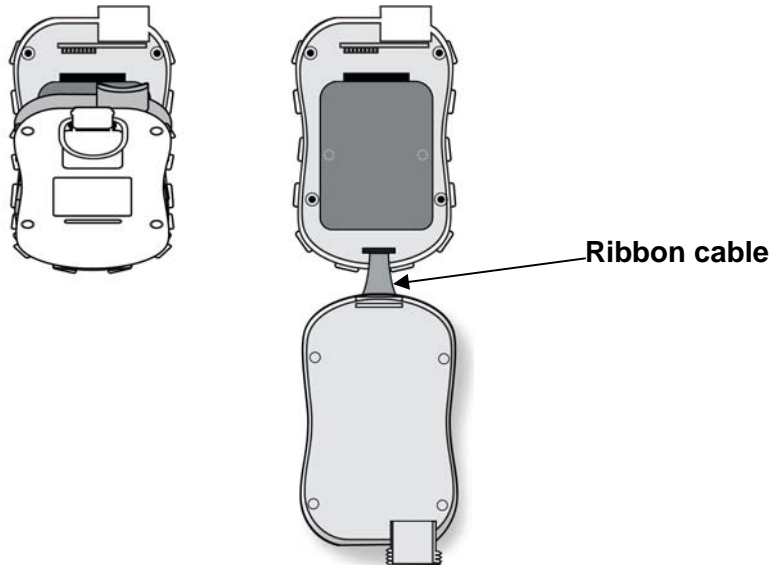
Ribbon cable

6. Carefully disconnect the battery from the battery connectors on the circuit board by pulling it toward the bottom of the instrument. Be careful not to damage the ribbon cable.

7. Before installing a new battery, visually inspect the contact pins on the ToxiRAE Pro LEL circuit board to make sure they are not bent. If they are, carefully straighten them before installing the battery. Install the new battery (part number

G02-3004-000), making sure it is inserted fully. Make sure the battery connectors on the circuit board go all the way into the connector slots in the battery.
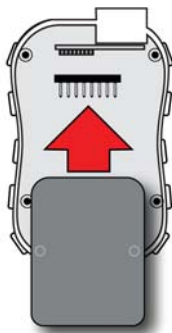

8. Inspect to make sure the ribbon connector is still connected, and plug it back in if it has come unplugged.
9. Place the cover over the compartment by tilting it up and then fitting it in place.
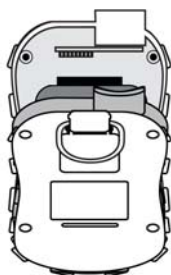
10. Tighten all four screws by turning them clockwise with a torque-limiting screwdriver (preferably an electric one). Tighten them in the numerical order shown here, to a torque rating of 3.54 to 4.43 lbf-in (4.08 to 5.10 kgf-cm).

   Note: Incorrectly tightening the screws may compromise the instrument's IP rating.
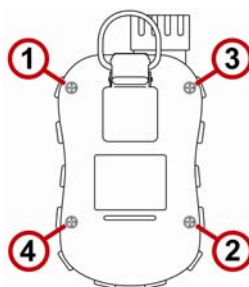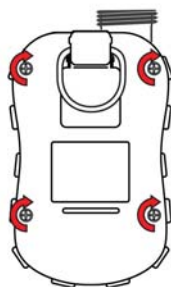
11. Inspect the filter in the top cap and replace if necessary.
12. Replace the sensor module.
13. Screw on the top cap.

Important! Charge the battery completely before using the ToxiRAE Pro LEL, and check the calibration before placing the instrument in service.

16.2. Proper Battery Disposal

This product may contain one or more sealed lead-acid, nickel-cadmium (NiCd), nickel-metal hydride (NiMH), lithium (Li), or lithium-ion batteries. Specific battery information is given in this user guide. Batteries must be recycled or disposed of properly.

This symbol (crossed-out wheeled bin) indicates separate collection of waste electrical and electronic equipment in the EU countries. Please do not throw the equipment into the domestic refuse. Please use the return and collection systems available in your country for the disposal of this product.

16.3. Removing And Installing The Rubber Boot

The protective rubber boot on the ToxiRAE Pro LEL must be removed before the sensor top cap or back of the instrument can be removed. When removing the boot, follow these steps outlined here.

1. Flip up the tab on the belt clip on the rear of the instrument.
2. Remove the Philips screw that holds the clip in place.
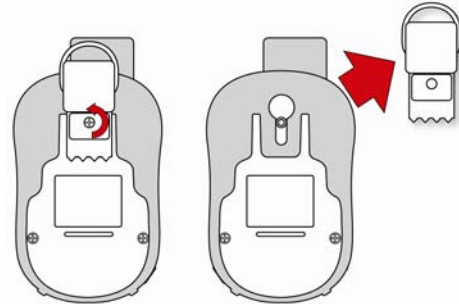
3. Stretch the bottom corners of the boot and gently slide the bottom of the boot over the rear of the ToxiRAE Pro LEL.
4. Slide the boot up until it comes off of the instrument. Make sure that you do not force it to move if it sticks against the top cap. Gently nudge it.
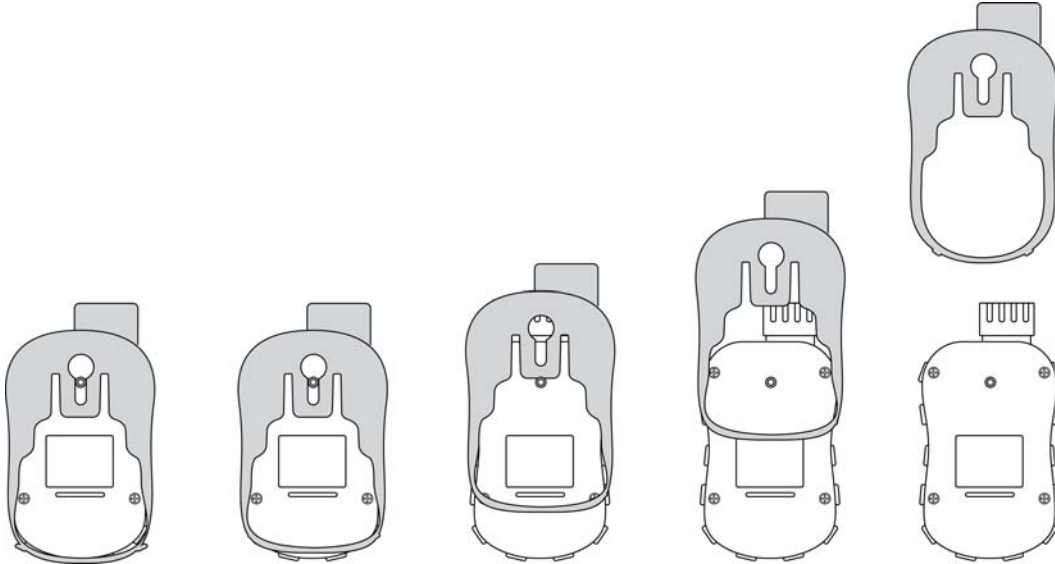
5. Inspect the rubber boot for damage, and replace it if it is cracked or torn.

When replacing the boot, simply reverse the procedure, sliding the boot onto the instrument and then carefully stretching it over the bottom portion of the instrument. Do not forget to replace the belt clip.

16.4. Filter Replacement

A filter is permanently attached inside the ToxiRAE Pro LEL's top cap, which helps to keep debris and moisture out. This filter should be inspected periodically, and the cap and rubber insert should be inspected for damage. If the filter is dirty or the cap shows signs of damage, replace the entire instrument cap assembly, including the cap and filter (part number G02-0307-003, package of three).

To replace the cap assembly:

1. Remove the top cap by unscrewing it:
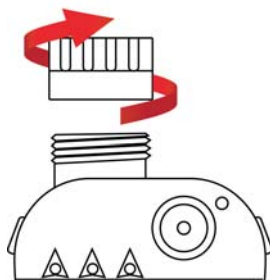
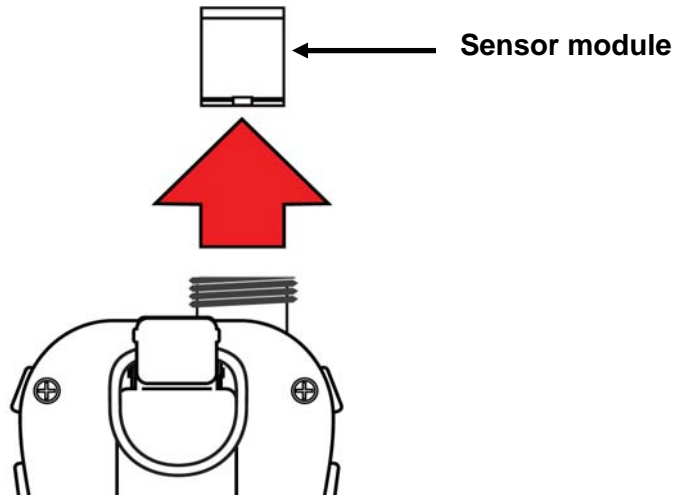2. Discard the cap/filter and replace it with a new one by screwing it on:
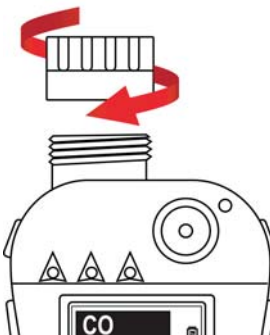
16.5. Replacing The Sensor
Follow the instructions for removing the cap in the previous section.

1. Gently lift out the sensor module with your fingers:

Sensor module

2. The sensor can only go into its slot one way. The connector inside the ToxiRAE Pro LEL and the indexing guides are good visual indicators of how to set the sensor into position.

Match indexing keys on sensor module with ToxiRAE Pro LEL enclosure

Sensor indexing key
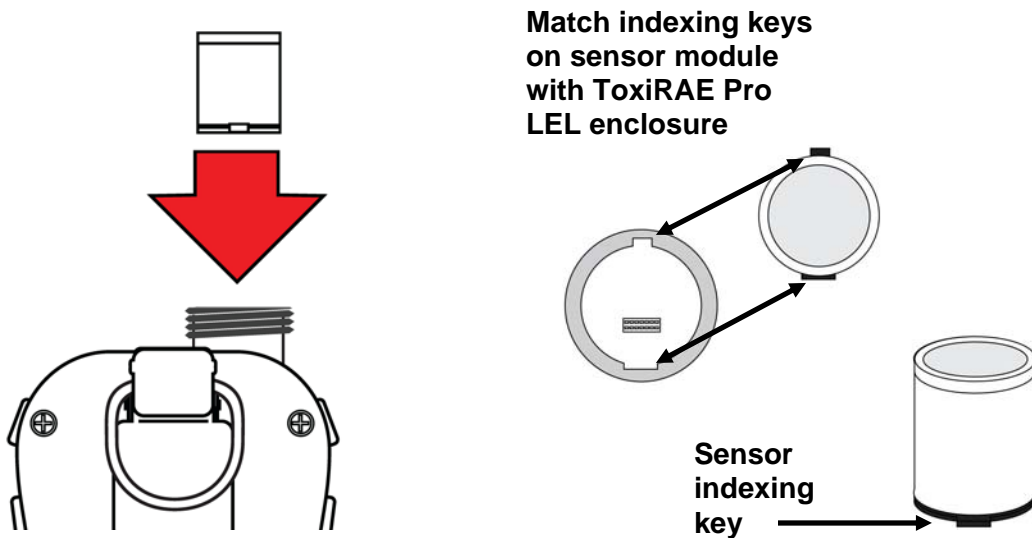
3. Place the sensor module into the ToxiRAE Pro LEL. Make sure the indexing keys are aligned (the sensor can only go in one way) and that it is seated firmly.

4. Carefully place the cap back onto the ToxiRAE Pro LEL by screwing it on.

Note: Always calibrate the ToxiRAE Pro LEL after replacing the sensor module.

16.6. Cleaning The Exterior

Occasional external cleaning of the instrument with a soft cloth is recommended. Do not use detergents or chemicals. If necessary, you can use a damp cloth (water only). It is a good idea to install the Calibration Adapter before cleaning the ToxiRAE Pro LEL's housing, to keep dirt, dust, or moisture away from the sensor openings and to keep the filter clean.

Visually inspect the contacts at the base of the ToxiRAE Pro LEL and on the charging cradle to make sure they are clean. If they are not, wipe them with a soft, dry cloth. Never use solvents or cleaners.

16.6.1. Ordering Replacement Parts

If you need replacement parts, contact your local RAE Systems distributor. A list of authorized distributors is available online:

  http://www.raesystems.com

17. Troubleshooting

Problem	Possible Reasons & Solutions	
Cannot turn on power	**Reasons:**	Depleted battery. Defective battery.
	Solutions:	Replace battery.
Lost password	**Solutions:**	Use ProRAE Studio II software to change the password. Call Technical Support at +1 408-752-0723 or toll-free at +1 888-723-4800
Reading abnormally Low	**Reasons:**	Calibration Adapter is attached. Incorrect calibration.
	Solutions:	Remove Calibration Adapter. Calibrate the ToxiRAE Pro LEL.
Buzzer, LEDs, or vibration alarm Inoperative	**Reasons:**	Alarms may be turned off. Blocked alarm port. Bad buzzer, LEDs, or vibration alarm.
	Solutions:	Enable alarms in the Buzzer & Light section of the Alarm Settings sub-menu in the Programming menu. Unblock alarm port. Call authorized service center.

18. Technical Support

To contact RAE Systems Technical Support Team:

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

Critical after-hours support is available:

+1 408-952-8200 select option 9

19. RAE Systems Contacts

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20. Appendix A: Regulatory Information

SAFETY INSTRUCTIONS

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. The user should understand how to set the correct parameters and interpret the obtained results.

CAUTION!

Only use RAE Systems battery pack P/N: G02-3004-000. Do only charge the battery pack using RAE Systems charger outside hazardous area. Use of non-RAE Systems components will void the warranty and can compromise the safe performance of this product. Warning: Substitution of components may impair intrinsic safety.

ToxiRAE Pro LEL Marking

The ToxiRAE Pro LEL is certified according to the IECEx scheme, ATEX and CSA for US and Canada as protected by intrinsic safety.

The ToxiRAE Pro LEL is marked with the following information:
RAE SYSTEMS
3775 N. 1st. St., San Jose
CA 95134, USA
ToxiRAE Pro LEL
Type PGM-1820.
Serial No/barcode: XXXX-XXXX-XX

IECEx SIR 10.0096X Ex ia IIC T4 Ga	$C \epsilon$ 0575 ⟨Ex⟩ II 1G SIRA 10 ATEX 2189X Ex ia IIC T4 Ga	⟨CSA⟩ 2010 2360054 I.S. for Cl.I Dv 1, Grps A,B,C,D T-Code T4. Class I, Zone 0 A/Exia IIC T4 Only as to intrinsic safety for use in hazardous loc. Intrinsically safe/ Securite Intrinseque/Exia

-20º C < Tamb < +50º C
Um: 20V
Warning: Read User's Manual for Intrinsic Safety Precautions
Warning: Substitution of components may impact intrinsic safety

Operation Area and Conditions

Hazardous Areas classified by Zones
ToxiRAE Pro LEL (PGM1820) are intended to be used in hazardous areas classified zone 0, zone 1 or zone 2, where gases of explosion groups IIA, IIB or IIC and T4 may be present.
For North America and Canada the equipment can further be used in Class I, Zone 0

Hazardous Areas classified by Divisions
ToxiRAE Pro LEL is intended to be used in hazardous areas classified for Class I Div. 1 or 2, within the temperature range of -20º C to +50º C, where gases of explosion groups A, B, C or D and temperature clode T4 may be present.

Instruction For Safe Use

Strictly follow the instructions for safe use. Application of the ToxiRAE Pro LEL requires full understanding and strict observation of the instructions.

Only use RAE Systems battery pack P/N: G02-3004-000

Do only charge the battery pack using RAE Systems charger outside hazardous area (Um: 20V).

Use In Hazardous Areas

Equipment which is intended for use in explosive atmospheres and which has been assessed and certified according to international regulations may be used only under specified conditions. The components may not be modified in any way.

The appropriate regulations for service and repair must be properly observed during such activities.

Year of manufacture

To identify the year of manufacture, refer to the serial number of the instrument.

The second to last digit in the serial number indicates the year of manufacture. For example, "M" indicates the manufacturing year is 2010.

First digit	Year
J	2008
K	2009
M	2010
N	2011
P	2012
Q	2013
R	2014
S	2015
T	2016
U	2017
V	2018
W	2019

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