Environmental Equipment, Inc.

IMR EX440 Portable SMART Sensor Gas Detector

User Manual

Read this manual carefully before using this device.

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1. Introduction

EX440 portable multi gas detector is an intrinsically safe instrument that can continuously detect the concentration of combustible gases and toxic gases. It is designed for use in explosion proof, toxic gas leak rescue, underground pipeline or mines and other hazardous locations. It effectively ensures the safety of staff life without being invasive, and prevents loss of production equipment.

The detector uses natural diffusion as the method to detect gas. It is constructed with high strength engineering plastics and composite with antiskid rubber housing. The detector is comfortable to hold, is water-proof, and dust-proof.

2. Main Features and Specification

2.1 Main features

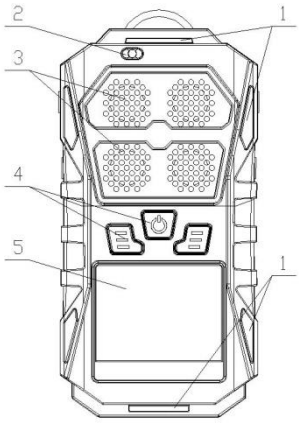
- Adjustable alarm level, high alarm and low alarm
- Adjustable calibration point
- High concentration protection for LEL gas sensor
- LEL sensor fault self-check
- Low battery indication
- Real-time clock
- Smart interchangeable modular sensor
- Auto calibration
- Two level three types alarm(visual, audible, vibrate)
- Data communication to PC
- STEL and TWA alarm for toxic gas
- Password management, to prevent unauthorized configuration
- Intrinsically safe

2.2 Specification

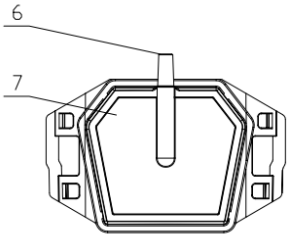
- Testing method: Natural diffusion
- Target gas: see appendix table 1
- Response: CO, H2S, CH4 T90＜30s；
- Accuracy：CH4：±5% FS；
  CO: absolute error:±5 PPM
  Relative error: ±10%；
  H2S：±5 ppm
- Alarm method: Visual, audible, vibrate alarm
- Working temperature: -20℃～50℃
- Working humidity: ＜95%RH no dews
- Power voltage: DC3.7V 2200mAh (Lithium battery)
- Charging time: ≤4h；
- Working time: ≥20h continuously (non-alarm status)
- Ex classification: ExiaIICT4 Ga/ExibD21T4；
- IP rate: IP66 ；
- Dimension: 147mm×76mm×37mm(L×W×H)；
- Weight: about 350g.

3. Structure and Function

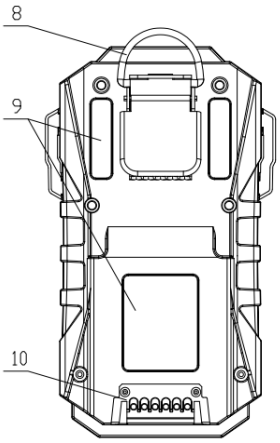
3.1 Appearance



Front



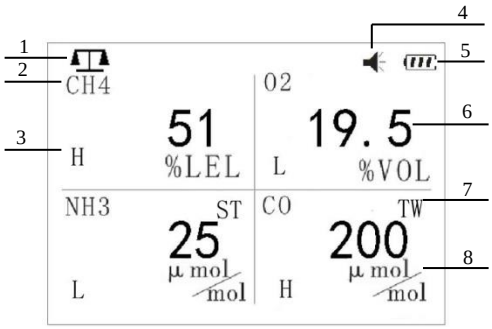
Calibration cover



Back

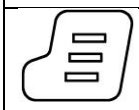
No.	Name
1	Alarm light
2	Buzzer
3	Sensor(s)
4	Button
5	LCD screen
6	Air intake
7	Calibration cover
8	Alligator clip
9	Label(s)
10	Charging contacts

3.2 Display



No.	Function
1	Calibration indicator
2	Gas name
3	High/Low alarm
4	Sound on/off
5	Battery voltage
6	Gas concentration
7	TWA(STEL)alarm
8	Gas unit of measure

3.3 Button Function

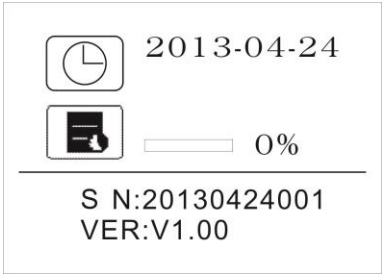
Button	Function
	• Power on, press for more than 3s • Cancel setup, press once • Calibration, in power off status, press and at the same time for more than 5s • Power off, press for more than 3s
	• Increase selected value, press • Enter selected item of setup, press • Enter setup menu, press and a the same time for more than 3s
	• Check the detector's status, including temperature, time, STEL and TWA①, maximum value ②, press • See next/different items, press • Confirm the set parameter, press • Turn off alarm sound and vibration in alarm status, press

Note: ① This function only available for toxic gases
② Oxygen gas has maximum expose value and minimum expose value

4. Operation

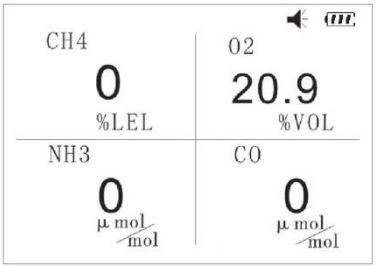
4.1 Power On

In power off status, press ⏻ for more than 3s, the detector will be power on, and then enter self-test interface as shown in below picture.



Self-test:

1) Power on beep, to test the buzzer
2) Vibration and light indication
3) After self-test completed, the detector will then cycle through the STEL and TWA set points for each sensor
4) After warm up complete, the detector will enter working status, see as below picture.



4.2 Power Off

In working status, press ⏻ and hold this button, the screen will show “shutting down…”, the buzzer will give out sound, after 3s, and the detector will be power off.

4.3 Stress Test

Every day before you use the detector preform a “stress test” to make sure that the detector is functioning correctly.

Test method: Power on, apply with target gas (gas concentration is higher than the detector’s high alarm), if detector’s reading is correct, then it could be used. If detector displays error is out of bounds, please recalibrate it. If detector does not have any response or display, please contact IMR.

4.4 Menu

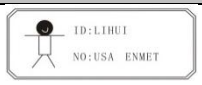
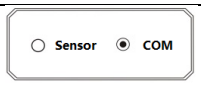
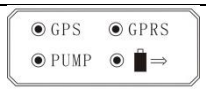
4.4.1 Basic Menu

In working status, press and to enter the menu setup interface, press to find different items, press to enter selected item. After enter a certain item, press to change the figure, press to confirm the figure, press can quit the item without saving.

Menu	Sub menu	Description
DATE/TIME	2013-04-24 11:14:23	back select or increase the value save and exit
ALARM MODE		back select save and exit
RECORDGAP	10 s	back change the figure save and exit
CAUTION MESSAGE	10 s	back change the figure save and exit
BATTERY MESSAGE	Voltage: 4.14V WorkTime: 29h	back save and exit
BACKLIGHT TIME	10 s	back change the figure save and exit

4.4.2 Advanced Menu

In the basic menu, press and at the same time twice, the detector will require password to enter next interface. Press to increase the figure, press to confirm the input, after input password, press to enter advanced menu, then press to change to see different items, press to enter selected item. The advanced menu setup is shown as below.

Menu	Sub menu	Description
STAFF DEPLOY		back change the setup save and exit
ZERO CALABRATION		back zero translation
DATA UPLOAD		back select save and exit
PERIPHIAL CONFIG		back select save and exit
POWER MANAGEMENT		back select save and exit
LANGUAGE SELECT		back select save and exit

Note: Default password for the advanced menu is: 0000

4.5 Check Status

In working status, press button once, the screen will in turn display current temperature, time, STEL①, TWA①, maximum concentration and minimum concentration since power on etc.

Note: ① This function is only available for toxic gases.

②This function is only available for Oxygen.

4.6 Zero Translation

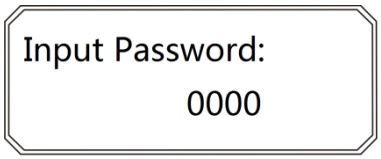
If the detector's reading in clean air is not zero, then you can use this function to reset the reading to zero.

In working status, press and at the same time for more than 1s, the detector will require password input to enter next interface, after input password, the detector will enter advanced menu, choose the function of , then press button to do a zero calibration, the detector will indicate if this succeed or not, if zero calibration is successful, there will be a "√" mark at the right side of the related gas name, otherwise, there will be a "×" mark.

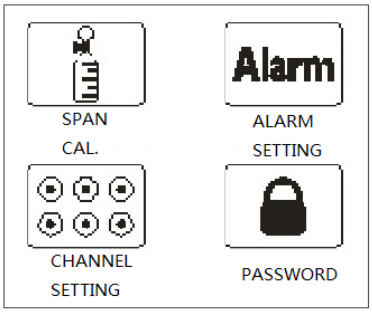
4.7 Calibration and Alarm Setup

Enter the setup interface.

In power off status, press and for more than 3s, the detector will power on and do a self-test, and then the password will be required to continue, see picture below.



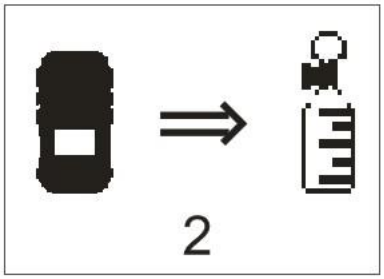
Press to change the figure (from 0 to 9). Press to change to the next digit. After last figure is completed press to confirm the input. The detector will go into the next interface as shown below if the password was correct.



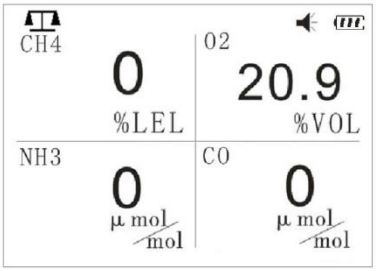
Press to move the cursor. The icon will be black if is currently selected. Then press to enter the selection.

4.7.1 Zero Calibration

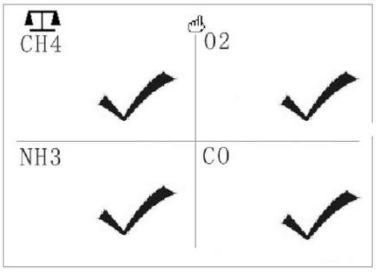
Press to move the cursor to and then press there will be a countdown as shown below.



The detector will then go to the auto-zero calibration interface after counting down finishes. You can also press twice to enter the auto-zero calibration interface directly, seen below.



If zero calibration is successful, there will be a ” √” mark at the right side of the related gas name, if it is not successful, there will be a “×” mark, seen below.



In the auto-zero calibration interface, you can press to enter manual zero calibration as shown below.

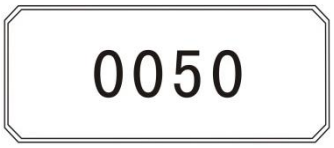
The screen will display the zero point A/D value of each gas sensor channel, after the A/D values are stable. Press and the detector will execute zero calibration. If successful there will be a "√" mark otherwise it will display an "×".

In the auto-zero calibration interface you can press to start the count down again, and after the countdown finishes. The detector will enter span calibration. If you press twice before the countdown finishes the detector will go to mixed gases calibration.

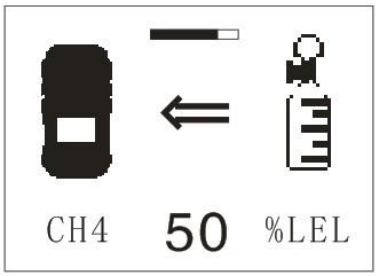
4.7.2 Span Calibration

The interface shown below will be displayed when you enter span calibration. It displays the calibration point. If you do not want to do calibrate for this gas channel press and it will change to next gas channel.

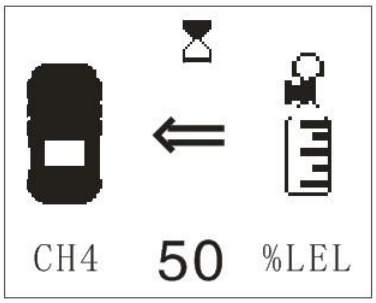
If you need to change the calibration point; then press and the screen below will be displayed.



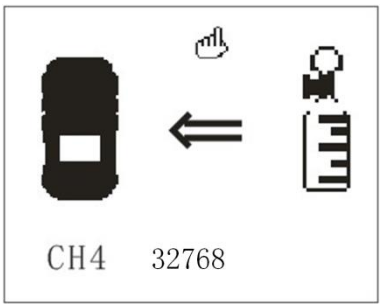
Press to move the selection. Press to change the figure. Press continuously to the last digit to confirm the input and save; the detector will go to the next interface (waiting for gas input)



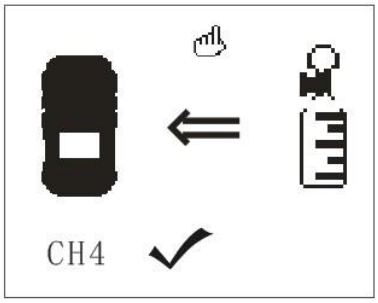
If there is gas input then the detector will enter auto span calibration as shown below.



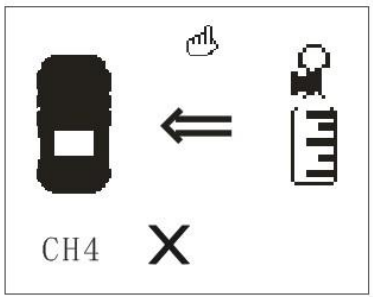
While preforming an auto span calibration, you can press to go into manual span calibration as shown below.



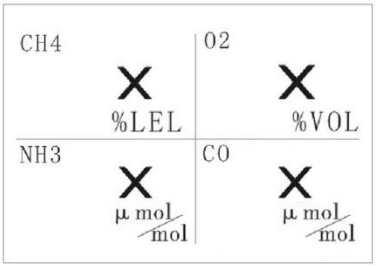
Press to confirm, and then if manual auto span calibration succeeds, the display below will be shown.



If manual calibration fails, the display below will be shown.

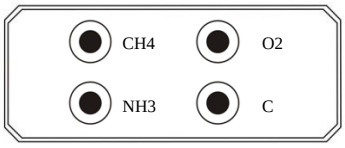


After span calibration is completed, the next gas channel can be calibrated. Follow the above instruction and finish calibration for all of the gas channels. Finally, after all calibration is finished you will see the display below for example.

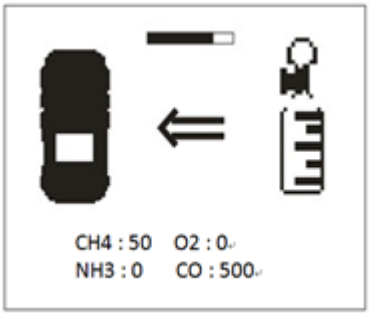


4.7.3 Mixed Gas Calibration

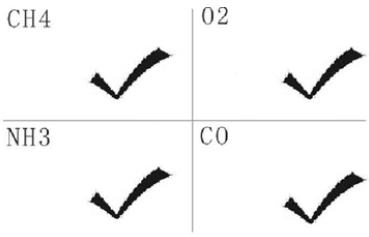
During the count down after zero calibration has finished press then you will be in the mixed gas calibration interface, shown below:



Press to change the selection. Press to select or unselect. A black dot means the sensor is enabled, and no dot means the sensor is disabled. After gas channel selection is done press continuously to confirm the selection. The detector will go to the next interface and will wait for gas input, shown below.



If there is gas input. The corresponding gas channel will start auto calibration. After calibration is completed the result will be shown below.



While waiting for gas input. If you press the interface will start a countdown. Then the interface will change to span calibration screen. If you press again before the countdown finishes. It will again return back to the mixed gas calibration interface.

While waiting for gas input, if you press the detector will return to working status, and the working interface. The selected gas channel displays as normal, the unselected gas channels will display only.

4.7.4 Alarm Level Setup

Press to move the selection to Alarm. Then press to enter. Then the screen below will be shown.

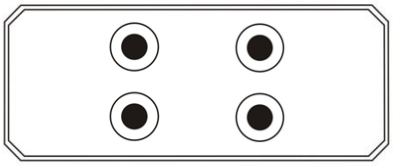
	H	L	ST	TW
CH4	50	20	----	----
O2	23.5	19.5	----	----
NH3	50	25	35	25
CO	200	35	200	35

Press to move the selection onto the numbers below “H”(High alarm), “L”(Low alarm), ST(STEL alarm),TW(TWA alarm). The corresponding number will begin to flash. Press and the screen below will be shown.

Press to change the figures, press to move the selection. After the last bit is set press and the value will be saved. The detector will then enter next alarm setup.

4.7.5 Channel Configuration

Press to move the selection to . Then press to confirm and enter the next interface shown below.



Press to move the selection. The corresponding channel will start to flash. Press to select or unselect. A black dot means the sensor is enabled, and no dot means the sensor is disabled. Continue pressing to save all channels' configuration and exit. After the detector returns to the working interface, the unselected gas channel(s) will display only. The enabled gas channel(s) will display readings normally.

4.7.6 Password Modification

Press to move the selection to . Then press to confirm and enter. The screen below will be displayed.

Press to change the password. Press to move the selection. After the last digit is entered press . The new password will be saved and the detector will return to working status.

5. Battery

When there is low battery indication show on the screen, or the detector will not power on due to low voltage charge the battery.

In power off situation, connect the charger head with AC 100~230V power. Then connect the charging cable with the detector. The detector will power on automatically and display as charging status. Battery charging is completed when the battery indication icon is full and not changing. Then you can unplug the charger and disconnect the detector. Then the detector can be put into use.

Warning: It is not possible to power on the detector when charging the battery while powered off. Please do not charge the battery in the field. In case the plugging/unplugging of the charger head may cause sparks and then lead to fire or explosion. Charging the battery while the detector is powered on will have a reduced charging speed.

6. Sensor Replacement

The detector uses smart modular sensors. Be aware of the sensor's life and replace with new sensor regularly. It is suggested to calibrate the sensor every half year in order to maintain accuracy.

7. Common Faults and Solutions

Faults	Possible reason	Solution
Unable to power on	Battery voltage too low	Charge the battery
	System halted	Contact IMR
	Circuit problem	Contact IMR
No response to target gas	Response delay	Wait for response
	Circuit problem	Contact IMR
Reading's not accurate	Sensor overdue	Contact IMR or replace the sensor
	Long time no calibration	Calibrate the sensor
Time error	Battery voltage run out	Charge the battery and then set the time
	EMI	Set the time again
Zero translation is not available to use	Sensor drift too much	Calibrate the sensor or replace the sensor
Screen display"-0"	Sensor drift	Zero translation

8. Warnings

- Do not drop the detector from high locations.
- You may not be able to power on the detector in high concentration gas environments.
- Please operate the detector only as outlined in this operation manual. Otherwise the detection results may not be accurate. The detector may be damaged if used outside of the recommended guidelines.
- The detector should not be used in environments that contain corrosive gases (such as High concentrations of chlorine gas). Do not use in other harsh environment (such as over-high/low temperature, over-high humidity, magnetic and intense daylight).
- If the detector needs to be cleaned use a soft cloth dipped in water to wipe the detector gently. Do not use corrosive solvents or abrasive substances to clean the detector. It may cause damage the detector.
- It is prohibited to disassemble, replace or repair the detector privately.
- It is prohibited to charge the detector or download data from the detector in hazardous area.
- In order to ensure the detector's accuracy. Calibrate the detector in regularly. The calibration frequency should be less than one year.
- Any application or operation errors beyond this manual. Contact IMR for further information.
- The third sensor channel can be set as a Bias voltage channel; sensors with high power consumption should not be used in this sensor channel.

9. Warranty

IMR Environmental Equipment, Inc. states the following:

IMR, as manufacturer hereby grants the following worldwide IMR warranty for an IMR analyzer purchased from an authorized dealer.

1. The IMR warranty shall entitle every IMR customer to demand a free replacement or repair of the defective parts from any IMR dealer authorized for the respective IMR unit.

2. The IMR warranty shall be granted on the factory new unit and shall commence on the date of the delivery of the original IMR unit to the customer. It shall last for a period of twelve months regardless of the type and the intensity of use and regardless of any change of owner, which may occur during this warranty period.

3. The IMR warranty shall refer to absence of faults with respect to the state of the art nature of the sold unit in terms of material and finish. The warranty for all parts fitted during the twelve-month warranty period shall end with the unit warranty.

4. After the establishment of a material or production fault by IMR or the authorized IMR dealer, the faults will be eliminated by means of free repair or replacement. Replaced parts shall become the property of IMR.

5. No warranty claims may be made for maintenance and setting work, cleaning or other utility materials required for the function of the unit and other wear parts unless they have a direct bearing on work performed under the warranty.

6. The terms and conditions for the acknowledgement of this warranty shall be the presentation of the fully completed warranty card, which must contain the confirmation from the authorized IMR dealer on its delivery and, if applicable, the prescribed maintenance work.

7. The IMR warranty shall only be applicable if

7.1 The analyzer has been maintained in accordance with the instructions issued by the manufacturers and the operating instructions by an authorized IMR dealer.

7.2 Only original IMR spare parts have been used for any repairs.

7.3 The unit has been used properly, the operating instructions observed and the unit has not been used for a purpose other than the one for which it has been designed.

7.4 The IMR unit has been left in its original design and meets the original IMR specifications.

7.5 The fault is not due to external influences or use for a purpose other than the one for which it has been designed.

7.6 Exclusively authorized IMR dealers have made repairs to the IMR unit.

7.7 The IMR unit has been sent to an authorized IMR dealer immediately after the fault was discovered.

8. Warranty time for the analyzer, including electrochemical sensors is 12 months.

10. Contact Information

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