

GEN²

Model OI-2400 TOCSIN Multi Gas Personal Monitor

Operation Manual

Revision 2.1w



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Introduction

This document is an Operation Manual containing diagrams and step-by-step instruction for proper operation of the Otis Instruments, Inc. Gen II Model OI-2400 TOCSIN Multi Gas Personal Monitor. This document should be read before initial operation of the product.

Should a question arise during the use of the product, this document will serve as a first reference for consultation. If further questions arise, or if the device is not working properly, please contact the sales representative of this product.

Warnings Statements/Avertissement

- Do not substitute components as this may interfere with the intrinsic safety of the device.
- Ne remplacez pas les composants car cela pourrait interférer avec la sécurité intrinsèque de l'appareil.
- DO NOT substitute any other battery type than specified and supplied by Otis Instruments.
- Only use Otis Instruments parts in the detector. Non approved parts will void the warranty and are considered unsafe.
- Before daily use check that all sensor and audio ports are clear of any obstructions i.e. debris or blockage
- The detector contains a lithium battery that must be disposed of by a qualified recycler. Check local regulations for proper disposal
- DO NOT charge the instrument in a hazardous location.
- DO NOT use IR communications when an explosive atmosphere may be present.
- If you suspect any malfunction or have any technical problems, contact Otis Instruments at 903-566-1300
- Warning: The battery may present a fire or chemical burn hazard if mistreated. Do not disassemble, heat above 100°C (212°F), or incinerate. Contact Otis Instruments for replacement instructions. Use of another battery may present a risk of fire or explosion.
- DO NOT charge the instrument in temperatures above or below the specified range of 0°C to 40°C
- Keep new and used batteries away from children
- DO NOT expose the detector to known combustible sensor poisons such as but not limited to alcohol and citrus based cleaners, silicones, lead compounds (eg: tetraethyl lead), sulfur compounds, phosphorus, halogenated hydrocarbons, and aerosols
- If suspected combustible sensor poisoning has occurred, recheck the instrument (both calibrate and bump test).
- The detector should be bump tested before use with a known concentration of methane to confirm its ability to respond to gas. Calibrate the detector if the readings are not within the specified limits.
- Le détecteur doit être testé avant utilisation avec une concentration connue de méthane pour confirmer sa capacité à répondre à gaz. Calibrer le détecteur si les relevés ne sont pas dans les limites spécifiées.
- 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.
- Toute rapide haut de gamme lecture suivie d'une lecture erratique baisse ou peut indiquer une concentration de gaz supérieure à la limite supérieure de l'échelle qui peut être dangereux.
- Strong Electromagnetic Interference (EMI) may cause incorrect operations.
- Only the combustible gas detection portion of this instrument has been assessed for performance by CSA International.

Basic Operation

Button Usage

Operation of the detector is driven by a single button located on the front of the instrument:

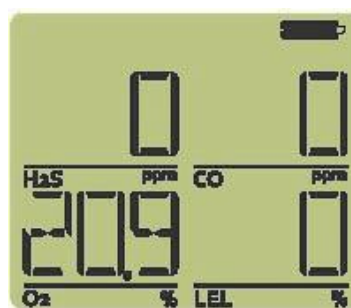
- Turn On/Off
- Menu Navigation (Status and Options)
- Latched Alarm acknowledgement
- Backlight activation
- Calibration

Turning On the Detector

To activate the detector, press and hold down the button. If the battery is too low for activation the detector will display “LOW BAT” and then turn off again. Once activated, the unit will begin to display gas readings immediately. Each sensor will show a chasing “O” for the sensor reading while it is stabilizing and being self-tested:



“Chasing O”

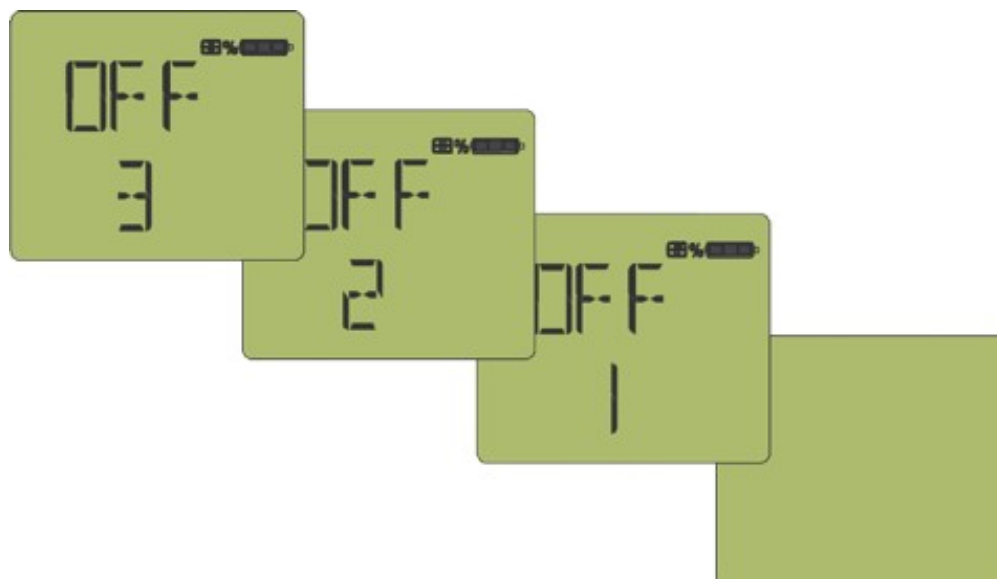


Fully operational

Once all sensors have completed the warm up sequence the detector is ready to detect all gases.

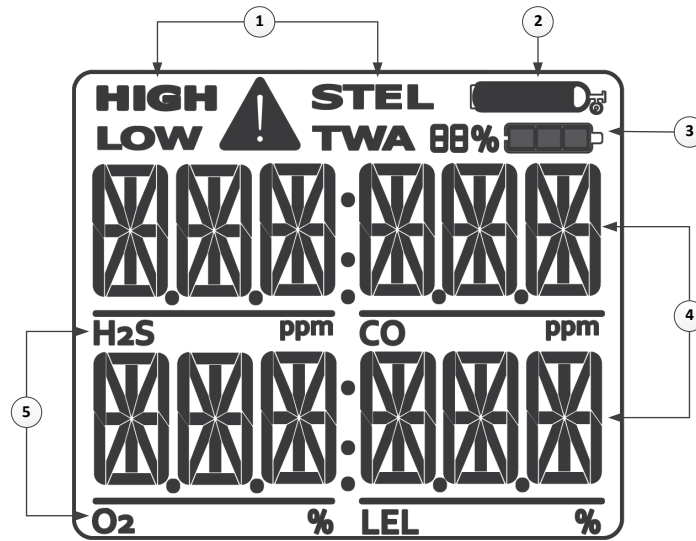
Turning Off the Detector

Press and hold the button to start the shutdown sequence. The LCD will display OFF along with a countdown. Release the button after the countdown and the unit will turn off.



Display Components

Display Layout



Entry	Description
1	Alarm Condition
2	Calibration Bottle
3	Battery Level
4	Gas Readings
5	Gas Identifiers

Display Details

When a gas is reading at, or above its alarm thresholds, the gas identifier icon will flash and the associated alarm condition icon will display.

During calibration or bump test, the calibration bottle will be displayed when it is time to apply gas.

The battery is displayed in 3 bars as well as a percentage. The percentage calculation is approximate and can be used to provide a rough estimation of the time remaining.

WARNING: Users must familiarize themselves with the icons in both non-alarm and alarm states.

WARNING: If the display is missing icons or cannot be clearly read, discontinue use and contact Otis Instruments.

Alarms

Default Alarms

Each detector comes preprogrammed with the factory default Low, High, Time Weighted Average (TWA) and Short Term Exposure Limit (STEL) alarms:

Sensor	Low	High	TWA	STEL
H2S	10 ppm	15 ppm	10 ppm	15 ppm
CO	35 ppm	200 ppm	35 ppm	35 ppm
O2	19.50%	23.50%		
LEL	10.00%	20.00%		

Alarm Behavior

The following table describes the detector's behavior under various alarm conditions:

Alarm Condition	Audible Alarm	Vibration Alarm	Visual Alarm
Low	Slow sweep	Slow vibration	Slow LED Flash
High	Fast sweep	Fast vibration	Fast LED Flash
TWA	Slow sweep	Slow vibration	Slow LED Flash
STEL	Fast sweep	Fast vibration	Fast LED Flash
Multi	Slow/Fast sweep	Slow/Fast vibration	Slow/Fast LED Flash
Sensor Error	Fast sweep	Fast vibration	Fast LED Flash
Low Battery	20 minutes: single beep/flash; battery icon on 10 minutes: single beep/flash; battery icon flashing 5 minutes: continuous beep/flash every 5 seconds Expired: 5 long beeps;flashes and then OFF is displayed		

Detector Maintenance

Bump Testing

The detector can be configured to keep track of regular bump testing intervals. When the detector has exceeded the bump interval, it will display “BUMP DUE” until it has been successfully bump tested. To bump test the unit, either insert the detector into the Clip Dock test station, or manually apply gas from the bump test screen described below.

Manual Bump Test Instructions

To activate the manual bump test press the button twice rapidly to enter the user menu. When the screen displays “Show Status” press the button once more.



The detector will flash between “BUMP DUE” and “APPLY GAS”. Apply gas to the unit at a flow rate of 0.25 to 0.5LPM using the calibration cap provided. Once all sensors have gone into alarm, the unit will return to normal operation (in alarm) and the bump due date will be reset.

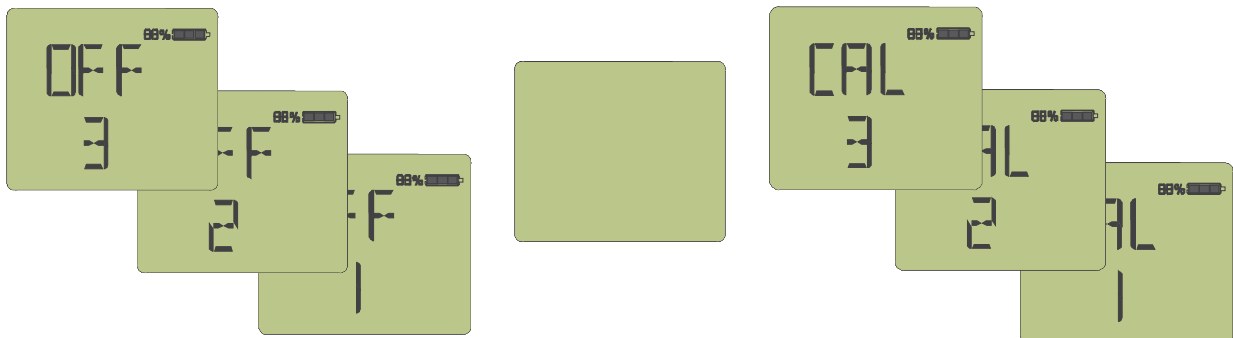
If a bump test interval has not been programmed into the unit, users may simply apply gas to the instrument during normal operation. However this will not be recognized as a bump test by the detector and therefore it will be recorded into the event log as an event.

Calibration

The detector can be configured to keep track of regular calibration intervals. When the detector has exceeded the calibration interval, it will display “CAL DUE” until it has been successfully calibrated. To calibrate the detector, either insert the detector into the Clip Dock test station, or manually calibrate the detector as described below.

Manual Calibration Instructions

To enter calibration mode, manually press and hold the button down as in the turn off sequence. Continue holding the button down until the CAL screen appears and finishes the countdown.



The detector will first automatically zero the sensors at the current baseline reading. Then the detector will prompt to “APPLY GAS”:



Once the screen displays “APPLY GAS”, apply gas to the detector at a flow rate of 0.25 to 0.5LPM using the calibration cap provided. As the detector detects gas, the sensor readings will be displayed as the detector adjusts the calibration parameters. Once calibration is complete the detector will display the next calibration date before returning to normal (alarming) operation. If a sensor fails to calibrate, the detector will display an error for the failed sensor. Check your gas connections and concentration before attempting a second calibration. If a sensor fails to calibrate after a second attempt, contact Otis Instruments for either warranty replacement or replacement sensor(s).

Battery

The battery is displayed as both a percentage and a 3-bar battery icon. The percentage calculation is approximate and can be used to provide a rough estimation of the time remaining.

When the detector determines that only 20 minutes of run time remains, it will beep, flash, and display “LOW BAT” on the screen. This will repeat with 10 minutes remaining, and then continuously for the last 5 minutes of run time. When the battery has expired, the detector will give 5 long beeps and flashes, display “OFF” and then shut down.

To charge the detector, connect it to the provided charging adapter and plug it into an AC outlet. The detector will cycle the battery icons in a charging fashion until the battery is fully charged.

WARNING: DO NOT charge the instrument in a combustible atmosphere.

WARNING: DO NOT charge the instrument in temperatures above or below the specified range of 0°C to 40°C

WARNING: DO NOT substitute any other battery type than specified and supplied by Otis Instruments.

Instrument Options/Menus

To access the user menus press the button two separate times in quick succession (“double tap”). The detector will display:

1. Current date/time
2. User-programmed text message
3. Status menu prompt
4. Options menu prompt

If the status menu is accessed by pressing the button during the prompt, the detector will display:

1. Last calibration date
2. When calibration is due
3. Last bump test date
4. When bump test is due
5. Current Time Weighted Average (TWA) readings
6. Current Short Term Exposure Limit (STEL) readings
7. Peak sensor readings
8. Prompt to clear the TWA, STEL and Peak sensor readings (if the button is pressed)

If the Options menu is accessed by pressing the button during the prompt, the detector will display:

1. The detector’s firmware revision
2. The TWA alarm limits
3. The STEL alarm limits
4. The LOW alarm limits
5. The HIGH alarm limits

Main Menu

Date/Time: Set every time the instrument is communicated via an OI-TOCSIN-LINK IR Link or Docking Station.

User Message: If the message is empty, the detector will skip ahead. If the startup message does not fit on one screen, it will scroll right-to-left twice.

Sub-Menu Prompts: Pressing the button during a sub-menu prompt will cause the detector to show more information. If the button is not pressed, the detector will immediately return to normal operation.

Status Menu

Calibration Information: The date of the last calibration along with the number of days remaining until the next calibration is due will be displayed. If calibration is due, the detector must be calibrated (refer to the Calibration section)

Bump Test Information: The date of the last bump test along with the number of days remaining until the bump test is due will be displayed. If a bump test is due, the detector must be bump tested (refer to the Bump Testing section)

Peak Levels: The detector will display the current TWA and STEL readings, followed by the peak concentrations recorded for each sensor. Each time the unit is turned off these values will be reset.

Clear Peak Levels: Pressing the button during the “CLEAR ALL” prompt will cause the TWA, STEL and peak readings to be cleared.

NOTE: This does not remove the information from the internal memory logs of the detector.

Options Menu

Firmware Version: The current firmware revision on the detector will be displayed

Alarm Set Points: The current alarm limits for TWA, STEL, LOW and HIGH will be displayed in sequence.

Adjustable Options

The detector's options are configured using the OI-TOCSIN-LINK IR Link and the IR Link software.

User Message: An optional, user-programmable text message can be used to show company branding, a unit identifier, or any other pertinent information. The detector will display this message every time the button is double-tapped.

Alarm Limits: Each sensor contains separate alarm threshold values that tell the detector when to go into alarm. Alarm limits may be disabled by setting them to zero.

CAUTION: Confirm alarm levels with local laws/regulations before operation

SAFE Display: "SAFE" will be displayed if there are no gas or instrument alerts.

Self-Test Lock: When a sensor self-test fails, the detector shows "ERR" on the display and goes into high alarm. The self-test lock option specifies whether a button press can silence the alarm.

Maintenance Notification: If maintenance notification is enabled, the detector will periodically flash the maintenance LED. Otherwise, if the option is disabled, the detector will only show the maintenance text on the display.

Dock Lock: Dock Lock prevents calibrations and bump tests without the use of the OI-TOCSIN-LINK IR Link or the OI-2400-Dock.

Latching Alarms: Latched alarms will hold the detector and its display in its peak alarm condition until the button is pressed.

Auto-Zero: The detector can optionally zero the sensors with every power-up.

TWA Method: The algorithm used to calculate the TWA can be set to either an average over a moving window (OSHA) or as a cumulative average (ACGIH).

TWA Interval: The TWA interval defines the timeframe over which the long-term average is calculated. Default is 8 hours.

STEL Interval: The STEL interval defines the timeframe over which the short-term average is calculated. Default is 15 minutes.

Sensor Enable/Disable: Individual sensors can be disabled. A disabled sensor is completely removed from the detector's display for sensor readings, alarm limits and calibrations.

CAUTION: A disabled sensor will not measure gas or detect alarm conditions

Bump Interval: The bump interval controls how often the detector notifies the user to bump test the sensors. The interval can be individually adjusted for each sensor from 1 to 360 days. Default is 0 (disabled).

Calibration Interval: The calibration interval controls how often the detector notifies the user to calibrate the sensors. The interval can be individually adjusted for each sensor from 1 to 180 days. Default is 180 days.

Calibration Gas: When the detector is calibrated, it scales the sensor readings to match the concentrations of the applied gases. The calibration gas concentrations can be adjusted to match the respective levels contained within the gas bottle. Default is: 25ppm H₂S, 100ppm CO, 18% O₂ and 50%LEL (2.5%vol CH₄)

Language: The detector will display all of its text prompts in any of English, German, French, Spanish, Italian or Portuguese.

NOTE: OL, Err and sensor icons remain the same for all languages.

Instrument Records (Logs)

During operation the detector records all usage activity. These records can be downloaded from the instrument via the IR Link software and an OI-TOCSIN-LINK IR Link or from the OI-2400-DOCK.

The Event, Bump, and Calibration Logs are always downloaded. The user may also choose to download different amounts of the data log to reduce the transfer time. Partial data logs contain approximately 1 weeks' worth of data. New data log downloads will only contain the data since the last download. Full log downloads will download the entire data log, typically at least 2 months' worth of data.

Event Log

The detector stores the last 25 alarm events. These are organized by first in first out (FIFO) so the 26th event will replace the first event, and so on. The detector records the alarm conditions for each event:

- Date and time at start of event
- Duration of the alarm condition
- Each sensor's peak alarm status and reading

Bump Log

The detector stores the last 25 alarm events. These are organized by first in first out (FIFO) so the 26th event will replace the first event, and so on. Bump tests are differentiated from normal events when the alarm condition occurs inside of a Clip Dock test station, or when the instrument is manually bump tested according to the Bump Testing section. The detector records the bump status for each test:

- Date and time of bump test
- Whether the test was performed manually or in a Clip Dock
- Each sensor's peak alarm status and reading
- The result of each sensor's bump test

Calibration Log

The detector records the last 25 calibration attempts. These are organized by first in first out (FIFO) so the 26th calibration will replace the first calibration and so on. Each calibration attempt will be recorded:

- Date and time of calibration
- Each sensor's gas concentration calibrated to
- Each sensor's calibration success status

Data Logs

The detector records its current operational status every second. The logging interval cannot be adjusted, but the detector compresses the data to reduce the storage and transfer times of redundant records. The typical logging capacity is at least 2 months of data. The following items are recorded into the log:

- Date and time
- Sensor readings and status conditions
- All user and sensor options
- Events (i.e. turn on or off)

Failures/FAQ's

Err: If a sensor is displaying “Err” this sensor has failed and is therefore disabled. Contact Otis Instruments for either warranty replacement or replacement sensor(s).

BUMP DUE: If the detector is displaying “BUMP DUE”, the detector is either due for a bump test because of a scheduled test or has failed its last bump test. Refer to the Bump Testing section for more details.

CAL DUE: If the detector is displaying “CAL DUE” the detector is due for a calibration because of a scheduled interval. Refer to the Calibration section for more details.

Specifications

Size:	4.7 x 2.4 x 1.2 in. (118.6 x 61.6 x 31.7 mm)
Weight:	7.7 oz (240 g)
Temperature:	-4 to +122 F (-20 to +50 C)
Humidity:	5% to 95% RH (non-condensing)
Battery Life:	IR = 60 days continuous Catalytic Bead = 25 hours (typical)
Charge Time:	4-6 hours
Alarms:	Visual, Vibrating, Audible (minimum 95dB) Low, High, STEL, TWA, and Over Limit (OL)
LEDs:	4 red bar LEDs Yellow backlight (activated on button press) Red backlight (activated on alarm condition) Yellow maintenance notification LED
Display:	Alphanumeric Liquid Crystal Display (LCD)
Logs:	25 bump tests 25 events 25 calibrations Continuous 1 second data-logging (>2 months typical capacity)
Tests:	Full function self-test upon activation; sensors, battery, and circuitry continuous
Ingress Protection:	IP66/67
Gases:	H2S = 0-100 ppm (0.1 ppm increments) CO = 0-500 ppm (1 ppm increments) Combustible – 0-100 % LEL (1 % LEL increments) O2 – 0-30 % vol. (0.1 % vol. Increments)
Sensor Type:	H2s, CO, O2 = Single plug-in electrochemical cell Combustible = plug-in Infrared (IR) or catalytic bead
User Options:	User Message, Language, Low Alarm, High Alarm, STEL Alarm, TWA Alarm, TWA Method, TWA Interval, STEL Interval, SAFE, Maintenance Notification, Self-test Lock, Dock Lock, Sensor Enable, Calibration Interval, Bump Interval, Calibration Gas
Certifications:	CSA = Class 1, Division 1, Group A, B, C, and D Class 1, Zone 0, AEx ia IIC T4 Ga ATEX (pending) = CE 0359 II 1 G Ex ia IIC T4 Ga EN 60079-0, EN 60079-11, EN 60079-26 EN 50270 IECEX = Ex ia Iic T4 Ga

Certifications: Standards = C22.2 No.'s 0, 152, 157, 60079-0, 60079-11
UL-913
UL-60079-0, UL-60079-11
ANSI/ISA S12.13.01

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

Warranty: 2 years

Warranty Statement for **Gen II Model OI-2400 TOCSIN**

Otis Instruments, Inc. warrants this product to be free from defects in material and workmanship under normal use and service for a period of two years beginning upon the date of activation for all Otis Instruments products. This warranty extends only to the sale of new and unused products to the original buyer. Otis' warranty obligation is limited, at Otis Instruments' option, to refund of the purchase price, repair, or replacement of a defective product that is returned to a Otis Instruments authorized service center within the warranty period. In no event shall Otis Instruments' liability hereunder exceed the purchase price actually paid by the buyer for the product. This Warranty does not include: (1) Fuses, disposable batteries, or routine replacement of parts due to the normal wear and tear of the product arising from use. (2) Any product which in Otis Instruments' opinion, has been misused, altered, neglected or damaged by accident or abnormal conditions of operation, handling, or use. (3) Any damage or defects attributable to repair of the product by any person other than the authorized dealer, or installation of unapproved parts on the product. The obligations set forth in this warranty are conditional on: (1) Proper storage, installation, calibration, use, maintenance, and compliance with the user's manual instructions and any other applicable recommendations of Otis Instruments. (2) The buyer promptly notifying Otis Instruments of any defect and, if required, promptly making the product available for correction. No goods shall be returned to Otis Instruments until receipt by the buyer of instructions from Otis Instruments. (3) The right of Otis Instruments to require that the buyer provide proof of sale or packing slip to establish that the product is within the warranty period. The buyer agrees that this warranty is the buyer's sole and exclusive remedy and is in lieu of all other warranties, express or implied, including but not limited to any implied warranty or merchantability or fitness for a particular purpose. Otis Instruments shall not be liable for any special, indirect, incidental, or consequential damages or losses, including loss of data, whether arising from breach of warranty or based on contract, tort, or reliance on any other theory. Some countries or states do not allow limitation of the term of an applied warranty, or exclusion or limitation of incidental or consequential damages, the limitations and exclusions of this warranty may not apply to every buyer. If any provision of this warranty is held invalid or unenforceable by a court of competent jurisdiction, such holding will not affect the validity or enforceability of any other provision.



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