

MRLDS-450

Calibration Instructions

General Calibration Procedure

WARNING

- The MRLDS-450 Gas Detector MAY NOT be in an alarm or fault condition during calibration. Acknowledge any alarms or faults BEFORE attempting to begin the calibration process.
- Except for CO₂ or O₂ sensors, calibration gas must be in a balance of air, not nitrogen (N₂).

NOTICE

- Calibration and/or bump testing requires the MRLDS-450 Calibration Adapter Kit (P/N 809-1190).
- At elevations higher than 6,500' (ft) (2,000 m), calibration will result in a lower reading. Above 6,560' (ft), the instrument should be calibrated in the environment of operation.

1. Fit calibration adapter to the gas detector lid.



Figure 1 - Calibration Adapter Fitting

2. If using a variable flow regulator, adjust the gas flow to approximately 0.3L/min.

Adjustments

Adjustment of the detector must be performed at regular intervals as required by national standards or regulations (for example, EN 378, ASHRAE 15, BREEAM).



WARNING

Breathing Hazard: Calibration gas *MUST NOT* be inhaled! See appropriate Safety Data Sheets. Calibration gas should be vented into a fume hood or to the outside of the building.

NOTICE

Zero First, Then Span: For proper operation, never adjust the span before completing a zero adjustment. Performing these operations out of order will cause faulty calibration.

NOTICE

- Copeland recommends calibrating detectors within the application-specific condition and with target gas. This method of zeroing the detector in the application environment and performing a target gas calibration is more accurate. A surrogate gas calibration may only be performed as an alternative if a target gas calibration is not possible.
- The sensor should be fully stabilized (at least 2 hours, preferably 24 hours).
- When entering the functions for zero or span adjustment, the detector will automatically enter OFFLINE mode, and will remain OFFLINE until either the OFFLINE mode is canceled by tapping the respective magnetic switch, or the OFFLINE mode times out within 6 minutes (typical) after the adjustment has ended.

Zero Adjustment



WARNING

- Except for CO₂ or O₂ sensors, ambient air may be used instead of zero gas if the area is known to be free of the target gas or any gases to which the sensor may be cross-sensitive.

1. Begin zero adjustment:
 - a. **MRLDS-400 App:** On the **Home** tab select **Calibrate** then scan the barcode on gas cylinder or manually enter values for zero gas.
 - b. **Manual:** Hold **MAG# 1** for more than five (5) seconds. The LED will blink GREEN-GREEN-RED when the instrument is ready.
3. Apply zero gas (or ambient air per warning above).
4. Confirm the start of calibration:
 - a. **MRLDS-400 App:** Press the **Start Zero** button.
 - b. **Manual:** Tap **MAG# 1** within 30 seconds or the instrument will time-out and return to normal operation.
3. Complete zero adjustment:
 - a. **MRLDS-400 App:** App will countdown to completion. If calibration is successful, proceed to **Step 5**. If calibration is unsuccessful, return to the Home screen and press the Acknowledge button to clear the zero calibration fault.
 - b. **Manual:** The LED will blink GREEN-RED, GREEN-RED-RED, GREEN-RED-RED-RED, etc. until calibration is complete. To abort, hold **MAG# 1** for >5-seconds, turn off gas flow and remove the calibration adapter. If calibration is successful (green LED), proceed to **Step 5**. If calibration is unsuccessful (LED blinks orange @ 2 Hz), tap **MAG# 1** to discard the calibration attempt.
3. Turn off gas flow from zero gas.
4. Replace zero gas with calibration gas in preparation for span adjustment.

Span Adjustment

NOTICE

- Except for CO₂ or O₂ sensors, calibration gas must be in a balance of air, not nitrogen (N₂).
- At elevations higher than 6,560' (ft) (2,000 m), calibration will result in a lower reading. Above 6,560' (ft) the instrument should be calibrated in the environment of operation.

1. Begin span adjustment:
 - a. **MRLDS-400 App:** Scan barcode on gas cylinder or manually enter values for zero gas.
 - b. **Manual:** Hold **MAG#2** for more than five (5) seconds. The LED will blink GREEN-GREEN-ORANGE when the instrument is ready.
3. Apply calibration gas at the concentration listed on the calibration gas concentration label (located on top of the instrument).
 - Part Number
 - Serial Number
 - Sensor Type
 - Maximum Range
4. Confirm the start of calibration:
 - a. **MRLDS-400 App:** Press the **Start Span** button.
 - b. **Manual:** Tap **MAG#2** within 30 seconds or the instrument will time-out and return to normal operation.
3. Complete zero adjustment:
 - a. **MRLDS-400 App:** App will countdown to completion. If calibration is successful, proceed to **Step 5**. If calibration is unsuccessful, return to the Home screen and press the Acknowledge button to clear the zero calibration fault.
 - b. **Manual:** The LED will blink GREEN-ORANGE, GREEN-ORANGE-ORANGE, GREEN-ORANGE-ORANGE-ORANGE, etc. until calibration is complete. To abort, hold **MAG#2** for >5-seconds, turn off gas flow and remove the calibration adapter. If calibration is successful (LED blinks green-orange-red), proceed to **Step 5**. If calibration is unsuccessful (LED blinks orange @ 2 Hz), tap **MAG#2** to discard the calibration attempt.
3. Turn off gas flow from calibration gas and remove the calibration adapter.
4. Allow sensor to recover/stabilize before the instrument returns to normal operation (green LED).

System Bump Test

A bump test is a live test of the system to verify that the detector responds to gas and all connected alarm devices, BMS are operating accordingly. It is recommended that all involved persons are informed about the test and certain alarms might have to be inhibited (for example, shutdown valves, notification of authorities).

NOTICE

The manufacturer of this product requires that a bump test or calibration be performed following installation to verify instrument functionality.

1. Connect adapter and gas cylinder according to the instructions in the General Calibration Procedure.
1. If desired, disable/silence external annunciators (for example, shutdown valves, notification of authorities):
 - a. **MRLDS-400 App:** On the **Home** tab select **Calibrate** then **Bump**. Toggle **TAKE OFFLINE** to disable communications to external devices.
 - b. **Manual:** Inform building personnel of test so that external devices can be disabled/silenced.
3. Apply a sufficiently high concentration of the target gas to trigger alarms, but NOT pure refrigerant or hydrocarbons (for example, do not use a butane lighter).

4. Once thresholds have been exceeded, relays should activate, digital outputs should transmit the gas concentration and:
 - a. **MRLDS-400 App:** Gas concentration should be displayed, the instrument status should be **LOW ALARM** or **HIGH ALARM** and alarms states should be **ON**.
 - b. **Manual:** LED status should display **LOW ALARM** or **HIGH ALARM**.
3. Turn off gas flow and remove the calibration adapter.
4. Allow sensor to recover/stabilize before the instrument returns to normal operation (green LED).

Maintenance Intervals

Table 1 - Maintenance Intervals and Functions

Interval	Function
During Commissioning	Check calibration
	Check LEDs for proper operation*
	Check for proper buzzer and relay operation*
	Check signal transmission to the BMS/BAS (central controller) if connected*
Every 6-12 Months**	Inspection by trained service personnel
	Check LEDs for proper orientation*
	Check for proper buzzer and relay operation*
	Check signal transmission to the BMS/BAS (central controller) if connected*
	Calibrate the sensor or contact Technical Support for sensor exchange with factory-calibrated sensor
As Required	Replace sensor module(s)

*These can be achieved via MODBUS commands or via MRLDS-400 Series App.

** Typical maintenance frequency can vary by sensor type

Table 2 - Maintenance Intervals and Functions

Sensor Type	Recommended Maintenance Interval	Typical Sensor Lifetime
Electrochemical*	12 months	2-3 years
Catalytic Bead	Zero calibration - 1 to 3 months Span calibration - 6 months	5-7 years
Semiconductor*	6 months after commissioning 12 months thereafter	4-6 years
Infrared	12 months	5-7 years

*Sensors should be checked after exposure to significant concentration of gas, which can shorten the sensor lifetime and/or reduce its sensitivity.

Sensor Maintenance



This product uses semiconductors that can be damaged by electrostatic discharge (ESD). When handling the PCB, care must be taken so that the electronics are not damaged.

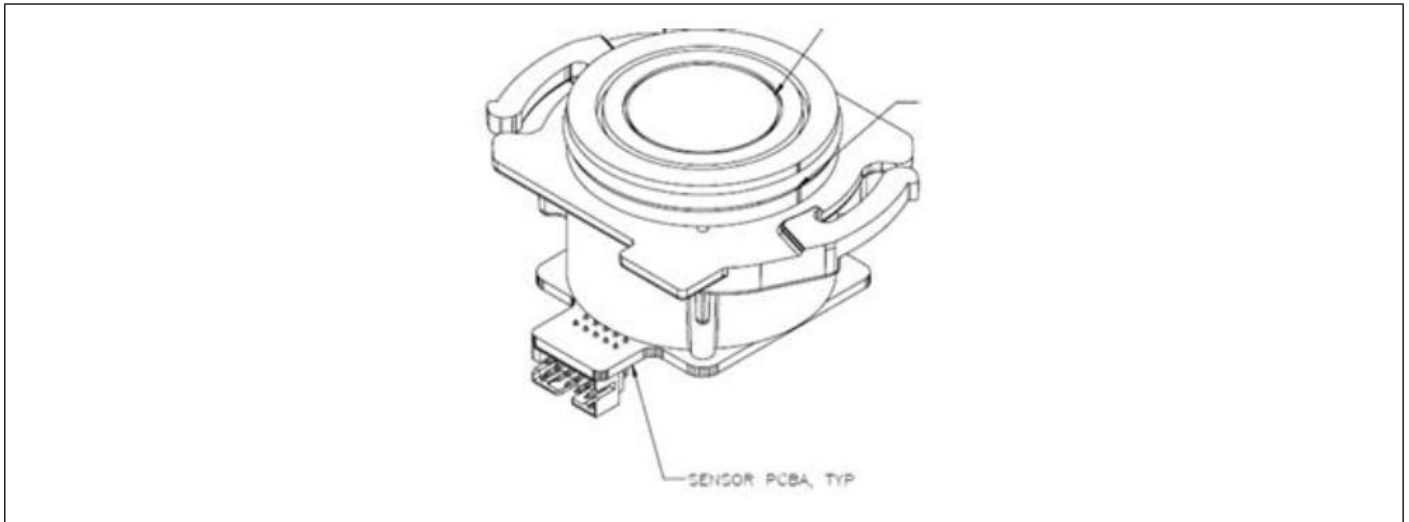


Figure 2 - MRLDS-450 Components

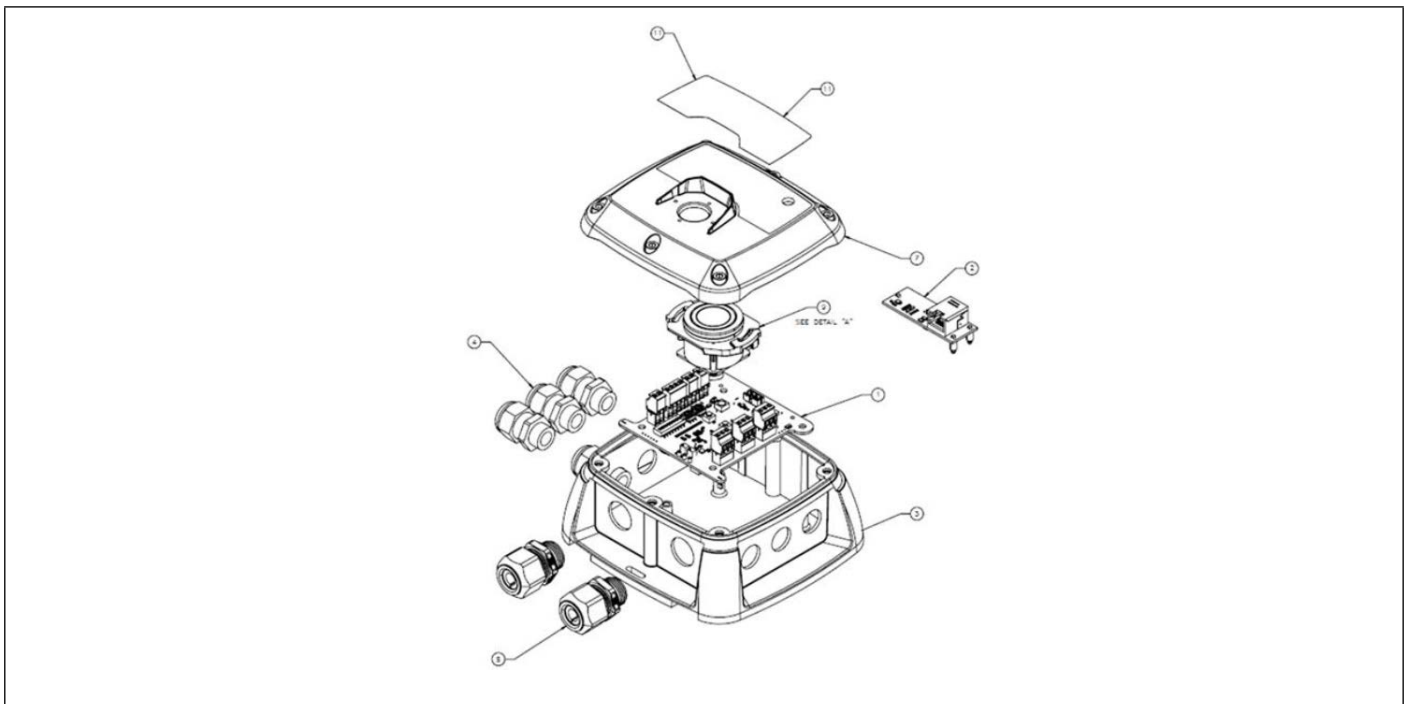


Figure 3 - IP66 Sensor Configuration

IP66 Product arrangement shown for reference; Remote Daughterboard PCB shown (used for Remote IP66 Sensor Configurations). Note: Cable Glands and labeling are factory installed.

Replacing Sensor Module



CAUTION

This product uses semiconductors that can be damaged by electrostatic discharge (ESD). When handling the PCB, care must be taken so that electronics are not damaged.

To replace the gas detector's sensor module:

1. Power-down the gas detector.
2. Using a 5/32" (4mm) hex key/allen wrench (not included), remove the lid and disconnect the ribbon cable from the sensor module.
3. Remove installed sensor module from the lid by holding onto the housing and turning counter-clockwise 90°. Take care not to apply excessive force to the sensor module's circuit board. When the square tab of the sensor housing is aligned with the lock icon, firmly pull the module to remove it from the housing.
4. Install the new sensor module by aligning the square tab with the lock icon before firmly pressing it into the enclosure. Taking care not to apply excessive force to the sensor module's circuit board, rotate the sensor module clockwise 90° (or until the triangle icon aligns with the lock icon on the lid).
5. Connect the ribbon cable (to the sensor module and transmitter) and close the lid.
6. Ensure gasket is aligned correctly and tighten the lid using the supplied hardware in an "X" pattern. Tightening torque should be limited to hand tight and should be uniform.

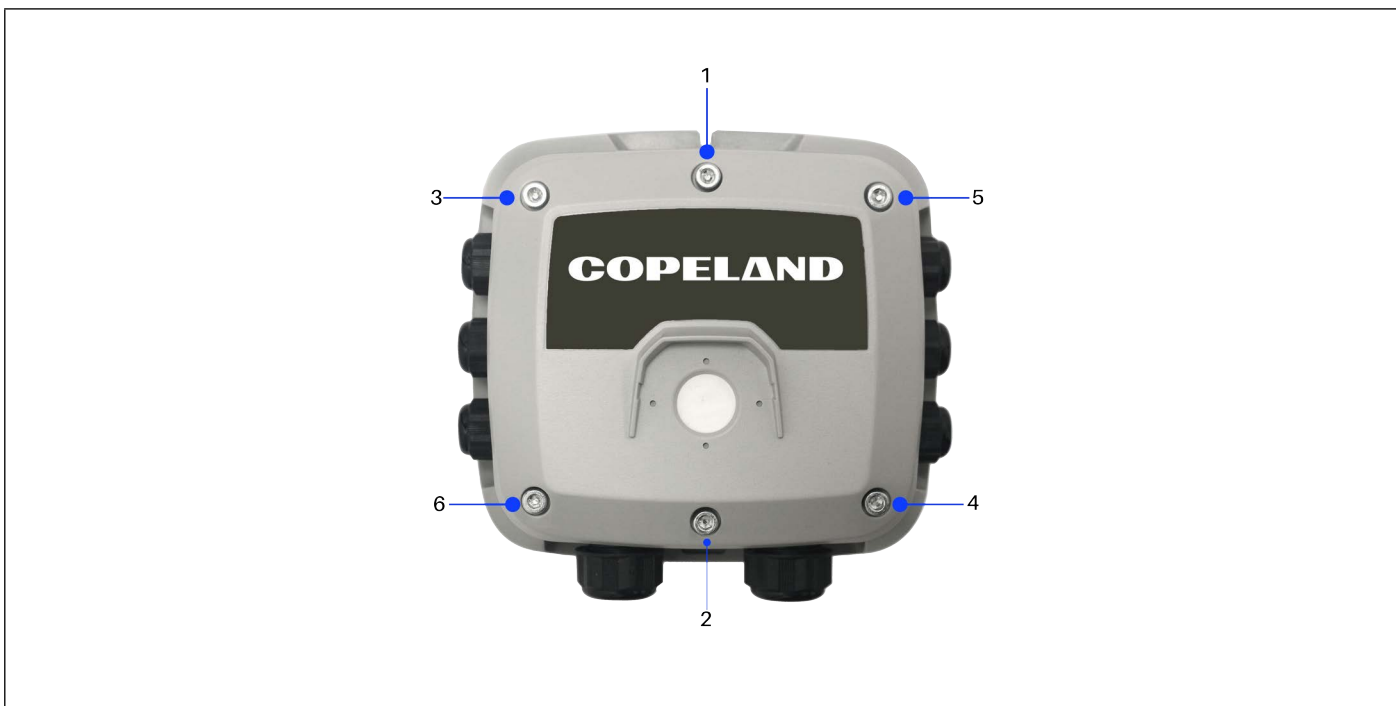


Figure 4 - Tightening Pattern

1. Power-up the gas detector.
2. After the start-up sequence has finished, check sensor response (bump test).

Cleaning the Instrument

Clean the detector with a soft cloth using water and a mild detergent (*This is for the exterior of the device only*). Rinse with water. Do not use any alcohols, cleaning agents, sprays, polishes, or harsh detergents.

Part Number and Ordering Information

Table 3 - Product Ordering Information

Copeland P/N	Ordering Information
809-0080	MRLDS Calibration Bottle, R-22 Gas, 5/8" - 18 UNF 1000 ppm
809-0081	MRLDS Calibration Bottle, R404a Gas, 5/8" - 18 UNF 1000 ppm
809-0082	MRLDS Calibration Bottle, R407a Gas, 5/8" - 18 UNF 1000 ppm
809-0083	MRLDS Calibration Bottle, R422d Gas, 5/8" - 18 UNF 1000 ppm
809-0084	MRLDS Calibration Bottle, R448A Gas, 5/8" - 18 UNF 1000 ppm
809-0085	MRLDS Calibration Bottle, R449A Gas, 5/8" - 18 UNF 1000 ppm
809-0086	MRLDS Calibration Bottle, R513A Gas, 5/8" - 18 UNF 1000 ppm
809-0087	MRLDS Calibration Bottle, Pure Nitrogen, 5/8" - 18 UNF
809-0088	MRLDS Calibration Bottle, R422A Gas, 5/8" - 18 UNF 1000 ppm
809-0089	MRLDS Calibration Bottle, R290 Gas, 5/8" - 18 UNF 1000 ppm
809-0091	MRLDS Calibration Equipment, 2 Cylinder Carrying Case
809-0093	MRLDS Calibration Equipment, Regulator, 1 LPM, 5/8" - 18 UNF
809-0094	MRLDS-450 Calibration Equipment, Regulator, 0.3 LPM, 5/8" - 18 UNF
MRLDS-450 Accessories	
809-1190	Calibration Adapter Kit

Visit our website at copeland.com/en-us/products/controls-monitoring-systems for the latest technical documentation and updates. For Technical Support call **833-409-7505** or email ColdChain.TechnicalServices@Copeland.com

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