

GG-VL2-R REFRIGERANT VENT LINE SENSOR



Installation and Operation Manual

Warning

**Use this product only in the manner described in this manual.
If the equipment is used in a manner not specified by Calibration Technologies, the protection provided by the equipment may be impaired.**

This equipment should be installed by qualified personnel.



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General Description

The GG-VL2-R Vent Line detector is a +24 VDC, three-wire, 4/20 mA sensor for CFC, HFC and HCFC refrigerant gases. It provides an industry standard linear 4/20 mA output signal compatible with most gas detection systems and PLCs.

The GG-VL2-R provides real-time continuous monitoring of refrigerant vapors in refrigeration system vent lines. Utilizing a rugged and long-life solid-state sensor, the GG-VL2-R sensor withstands continuous exposures to high concentrations of vapors, without shortening the life of the sensor.

The sensor element can be accessed from inside of the stainless steel enclosure, and is sealed from the vent line to prevent refrigerant from entering the enclosure.

The transmitter circuit board is sealed in potting compound, protecting sensitive electronic components and copper tracing from corrosion. The stainless steel enclosure protects the transmitter from chemical and UV damage.

Recommended alarm setpoints for refrigerant vent lines are typically 0.5 – 1.0% (12 – 20 mA). Setpoints lower than this may result in occasional false alarms due to inclement weather or interference gases (e.g. truck exhaust, condenser steam, etc.)

Installation

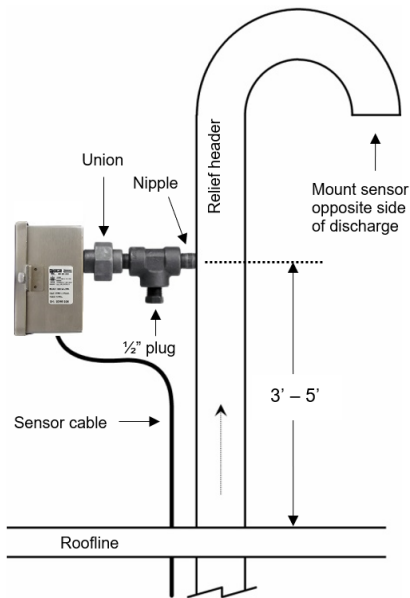
Locating the sensor

Warning: Outdoor installation only. Never install the sensor indoors (e.g. Engine Room)

Note: The ½" nipple of the supplied mounting kit should be welded to the relief header to allow airflow to the sensor.

Note: Removing the ½" plug from the mounting kit usually allows more fresh air to the sensor and prevents signal rise over time.

The GG-VL2-R sensor assembly should be installed outdoors three to five feet above the roofline, where the relief header discharges to the atmosphere (see Figure 1).



Installation Guidelines:

- Always assume system could discharge at any moment. Stay clear of discharge path and have escape route planned.
- Make sure refrigerant does not discharge onto sensor assembly or personnel working on sensor (i.e. mount sensor opposite side of discharge).
- Install sensor enclosure with conduit hole facing down.

Figure 1: Discharge to Atmosphere

Wiring

Electrical wiring must comply with all applicable codes.

Electrical Power: 24 VDC regulated, 85 mA.

Output: Linear 4/20 mA output. Monitoring equipment may have a maximum input impedance of 700 ohms.

Cable Recommendation: 20/3 shielded cable (General Cable C2525A or equivalent). Length of cable to sensor should be no greater than 1,500 ft.

Monitoring: Monitoring equipment must be configured to indicate a fault if the signal is below 1 mA. All signals over 20 mA must be considered high gas concentrations. Alarm setpoints should not be lower than 50% of full-scale range.

Wiring Guidelines:

- Use only the existing conduit hole for connections to the sensor.
- Always use three conductor, insulated, stranded, shielded copper cable.
- Do not pull detector wiring with AC power cables. This can cause electrical interference.
- If cable runs cannot be made without a splice, all splice connections should be soldered.
- Ground the shield at the main control panel. Connect the shield wire in the sensor terminal block labeled SHLD.
- Always disconnect power at the controller before performing any wiring at the sensor.



Figure 2: Wiring Diagram

Terminal Block Plug (Field Wiring):

SHLD: To case (earth) ground of monitoring equipment
GND: To ground terminal of power supply
+24V: To +24V terminal of power supply
SIG: To signal input of monitoring equipment

Operation

Start-up

Before applying power, make a final check of all wiring for continuity, shorts, grounds, etc. It is usually best to disconnect external alarms and other equipment from the detector until the initial start-up procedures are completed.

After power-up, allow at least 1 hour for the system to stabilize before testing the detectors. Because detectors are normally located at a distance from the main unit, the test time required and accuracy of the response checks will be improved if two people perform the start-up procedures and use radio contact.

Response Test:

1. One person exposes each sensor to 1% R507a calibration gas.
2. The second person stays at the control panel to determine that each sensor, when exposed to the gas, is connected to the proper input and responds, causing appropriate alarm functions.

Calibration

The GG-VL2-R detector has a similar response to most common halocarbon gases. For ease of bump testing and calibration, we recommend using 1% R507a for bump gas and calibration gas. If target gas is preferred or required, please inquire with CTI sales staff for help obtaining specific calibration gases.

The GG-VL2-R detector comes factory calibrated and should not require any adjustments after installation. If any adjustments are required, there are two pots on the preamp that are used for calibration.

Note: Never measure sensor output in mA. Always use mVDC or VDC voltmeter settings.

Zero Calibration: After the unit is installed and powered up, the unit can be zero calibrated by the following:

- Be sure the unit is in clean air. This can be accomplished by applying zero air calibration gas or removing the detector from the mounting kit into fresh air.
- Adjust the zero pot until the detector outputs 40 mV from Test [-] to Test [+] (see **Figure 3**).

Span Calibration: It is recommended that the GG-VL2-R sensor be response tested only, every six months. Refer to the Response Test procedure on this page.

If span calibration is required, the following procedure will span the unit:

- Unscrew calibration port cover and connect cal gas hose to hose barb fitting (see **Figure 3**).
- Apply 1% R507a span gas at 0.5 - 0.8 L/min.
- Once the output signal has peaked (or two minutes maximum) adjust the span pot until the sensor outputs 200 mV from Test [-] to Test [+] (see **Figure 3**).

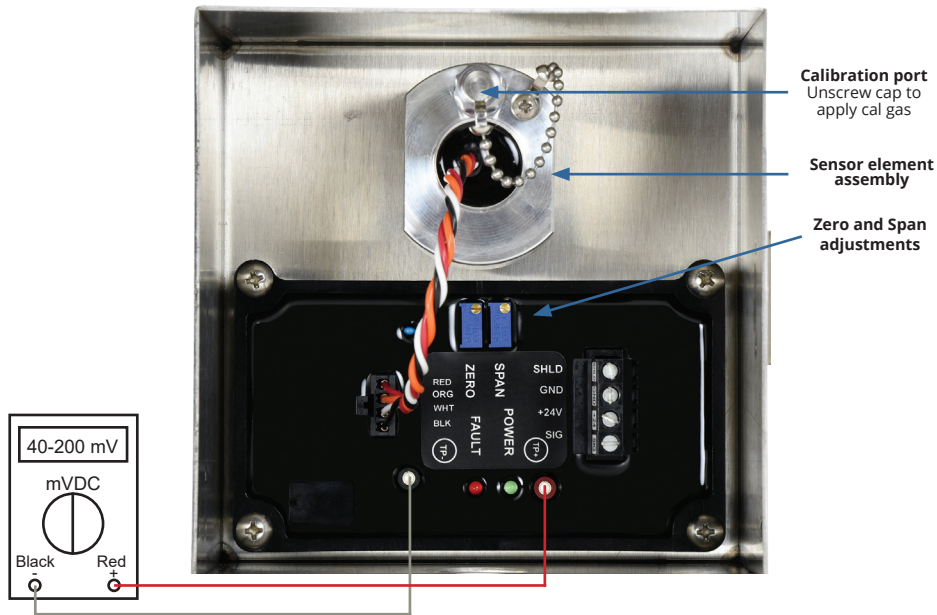


Figure 3: Sensor Output and Zero/span Adjustments

Maintenance

The GG-VL2-R sensor was designed for long life and minimal maintenance. Calibration Technologies recommends the following maintenance schedule:

Maintenance Guidelines:

- The sensor is shipped with a factory calibration and should be response-tested every 6 months.
- Response-test the sensor at least once every 6 months with 1% R507a calibration gas.
- All tests and calibrations must be logged.
- Always disconnect power at the controller before performing any wiring at the detector.

Sensor Life: Typical sensor element life of the GG-VL2-R detector is five to seven years. A few conditions can cause the sensor element to become faulty, including:

- a long period of time
- exposure to liquid

Sensor Element Replacement: When the sensor element becomes faulty, a replacement sensor element can be obtained from CTI. To replace the sensor element, refer to **Figure 3** and the following procedure.

Caution: Always assume the system could discharge at any moment. Stay clear of discharge path and have an escape route planned.

1. Be prepared for fault/alarm conditions during this process.
2. Remove power from detector. This can be done by simply unplugging the 4-position power plug from the transmitter.
3. Unplug sensor element cable from transmitter.
4. Unscrew the sensor element assembly and discard old sensor element.
5. A replacement O-ring is included in case existing O-ring is damaged or lost.
6. Screw in new replacement sensor element assembly (do not overtighten).
7. Plug in sensor element cable to transmitter.
8. Re-apply power to detector.
9. The detector can be response-tested immediately after replacement but allow 1-hour warm-up time before performing zero/span calibration.

Sensor Element:

For all halocarbons, use part #: **GG-VL2-R-RS**

Troubleshooting

Sensor Fault: (low signal reading)

Indications: (any or all)

- Red LED on transmitter lit.
- Voltage signal at testpoints is 5 mVdc (.5 mA output).
- PLC displays negative value (e.g. -2150 ppm).
- Controller indicates sensor fault or sensor failure

Possible Cause / Solution:

- Sensor exposed to liquid. Replace sensor element (see page 9 for more info).
- Loose connection. Check and tighten sensor wires.

Constant or Intermittent high signal or alarms:

Indications:

- Erratic or constant high concentration reading at controller or PLC.

Possible Cause / Solution:

- Weeping relief valve. Check valve by drawing a sample from the header with an accurate portable refrigerant detector. Be sure to sample 1' to 3' from inside the header to ensure a good reading.
- or loosen union nut and remove sensor assembly from header. If signal returns to normal in fresh air, investigate relief valve(s) and replace if necessary.
- Condenser steam. Re-install the ½" plug or install pipe in its place, lowered below the condenser steam level to allow a fresh-air vent to the sensor.
- Sensor aged beyond its useful life (hypersensitive). Replace sensor element (see page 9 for more info).

Specifications

Input Power: +24 VDC, 85 mA

Detection Principle: Solid-state

Detection Method: Diffusion

Gas: CFC / HFC / HCFC refrigerants (R11, R12, R22, R134a, R404a, R410a, R434a, R507a, etc.)

Range: 0/1% (10,000 ppm)

Output Signal:

Linear 4/20 mA (max input impedance: 700 Ohms)

Deadband: 12 mA or 50% full-scale

Response Time: T90 = less than 30 seconds

Accuracy: +/- 5% of full-scale

Zero Drift: Less than 1% per month

Span Drift: Less than 1% of full-scale per month

Linearity: +/- 5% of full-scale

Repeatability: +/- 5% of full-scale

Wiring Connections:

3-conductor, shielded, stranded, 20 AWG cable (General Cable C2525A or equivalent) up to 1500 ft.

Terminal Block Plug (Field Wiring): 26-16 AWG, torque 4 lbs-in.

Enclosure: 18 gauge stainless steel housing. Captive screw in hinged lid. For non-classified areas.

Mounting Kit: Schedule 80 NPT pipe fittings

Temperature Range: -46°F to +140°F (-46°C to +60°C)

Dimensions: 5.48" high x 4.90" wide x 2.93" deep

Weight: 4 lbs (includes mounting kit)

Certification:

SGS Listed:

Conforms to UL 61010-1

Certified to CSA C22.2 No. 61010-1

Limited Warranty & Limitation of Liability

Calibration Technologies, Inc. (CTI) warrants this product to be free from defects in material and workmanship under normal use and service for a period of 2 years (including sensor element), beginning on the date of shipment to the buyer. This warranty extends only to the sale of new and unused products to the original buyer. CTI's warranty obligation is limited, at CTI's option, to refund of the purchase price, repair, or replacement of a defective product that is returned to a CTI authorized service center within the warranty period. In no event shall CTI's liability hereunder exceed the purchase price actually paid by the buyer for the Product.

This warranty does not include:

- a) gas sensors that have been wetted by liquid refrigerant, oil or water
- b) routine replacement of parts due to the normal wear and tear of the product arising from use;
- c) any product which in CTI's opinion, has been misused, altered, neglected or damaged by accident or abnormal conditions of operation, handling or use;
- d) any damage or defects attributable to repair of the product by any person other than an authorized dealer or contractor, or the installation of unapproved parts on the product

The obligations set forth in this warranty are conditional on:

- a) proper storage, installation, calibration, use, maintenance and compliance with the product manual instructions and any other applicable recommendations of CTI;
- b) the buyer promptly notifying CTI of any defect and, if required, promptly making the product available for correction. No goods shall be returned to CTI until receipt by the buyer of shipping instructions from CTI; and
- c) the right of CTI to require that the buyer provide proof of purchase such as the original invoice, bill 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 OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. CTI 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 OR ANY OTHER THEORY.



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