Bump Test/ Calibration of a QIRF

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Detectable Gases Currently: R134A, R123, R22, R11, R12, R23, R114, R116, R402A, R404A, R407A, R407B, R407C, R407D, R407E, R408A, R409A, R410A, R507A, R438A, R422A, R407F, R513A, R514A, R448A

To test the sensors you would need a calibration gas that has a known concentration of PPM of gas concentration, a .5 LPM regulator, and teflon tubing (see list of part numbers and links below under equipment). We recommend doing a bump test and calibration check with the calibration gas per the service agreement of the building maintenance schedule. If the service agreement doesn't determine how often they should be tested, we suggest at least once a year. The process we recommend for testing is a bump test and calibration check. You will need to take a cylinder of Refrigerant with a known percentage value of the content of gas. Attach the tubing to the barb fitting on the sensor and crack the regulator for a few seconds until the detector starts to read the gas. They will need to compare what is indicated on the display to what the calibrated gas is. For example, they would purchase a 500 PPM of R134A cylinder and confirm it is reading very close to 500 PPM on the display.

If you find the display is reading quite a bit off, we would recommend to calibrate it.

To calibrate the QIRF you will need all the material listed below with the addition of Zero calibration gas (clean air only). The gasses and the regulator can be purchased through Cal Gas Direct.

-A **"bump test" (function check)** is defined as a qualitative check in which the sensors are exposed to challenge gas for a time and at a concentration to activate all of the alarms to at least the lower alarm settings. It is important to understand what a qualitative test of this kind does not do. The test confirms that the gas is capable of reaching the sensors, that when they are exposed to gas the sensors respond, the response time (time to alarm) after gas is applied is within normal limits, and that the alarms are activated and function properly. However, a qualitative function test does not verify the accuracy of the readings or output of the sensors when exposed to gas.

-A **"calibration check"** is a quantitative test using a traceable source of known concentration test gas to verify that the response of the sensors is within the manufacturer's acceptable limits. For instance, a manufacturer might specify that readings in a properly calibrated instrument should be within ±10% of the value of the gas applied. If this is the pass / fail criterion, when 20 ppm H2S is applied to the instrument, the readings must stabilize between 18 ppm and 22 ppm in order to pass the test. It should be stressed that these pass / fail criteria are manufacturer guidelines. Different manufacturers are free to publish different requirements.

-A **"full calibration"** is defined as the adjustment of an instrument's response to match a desired value compared to a known traceable concentration of test gas. Once again, the calibration procedure, including the concentration of gas applied, method used to apply gas, and method used to adjust the readings are determined by the manufacturer.

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Bump / Calibration Check for QIRF series:

Note: All refrigerant gasses are 1000PPM span, except for R123 which is 100PPM. For all bump/calibration checks, you should order half of the span. All cal gas needs to be balanced with air, not nitrogen! Nitrogen will damage the sensor.

The cal test will depend on your refrigerant gas/sensor you have. Here are some examples below.

R123 = 50PPM R123 Balance Air. 34L
http://www.calgasdirect.com/gasco-r123-refrigerant-calibration-gas-50-ppm-balance-air-in-a-34-liter-steel-disposable-cylinder/

R134a= 500PPM R134a Balance Air. 34L
http://www.calgasdirect.com/gasco-r134a-calibration-gas-500-ppm-balance-air-in-a-34-liter-steel-disposable-cylinder/

407c= 500PPM 407C Balance Air
http://www.calgasdirect.com/gasco-r407c-refrigerant-calibration-gas-515-ppm-balance-air-in-a-34-liter-steel-disposable-cylinder/

-0.5lpm regulator -
http://www.calgasdirect.com/gasco-71-regulator-71-series-regulator-for-17-34-steel-cylinders-cga-600-connection/

- Teflon tubing

Actual Calibration equipment for QIRF series:

Note: All refrigerant gasses are 1000PPM span, except for R123 which is 100PPM. For all calibration, you need to order the max span. All cal gas needs to be balanced with air, not nitrogen!

The cal test will depend on your refrigerant gas/sensor you have. I list some examples below.

R123 = 100PPM R123 Balance Air. 34L
http://www.calgasdirect.com/gasco-r123-refrigerant-calibration-gas-100-ppm-balance-air-in-a-34-liter-steel-disposable-cylinder/

R134a= 1000PPM R134a Balance Air. 34L
http://www.calgasdirect.com/gasco-r134a-calibration-gas-1000-ppm-balance-air-in-a-34-liter-steel-disposable-cylinder/

407c= 1000PPM 407C Balance Air. 34L
http://www.calgasdirect.com/gasco-r407c-refrigerant-calibration-gas-1000-ppm-balance-air-in-a-34-liter-steel-disposable-cylinder/

-0.5lpm regulator
http://www.calgasdirect.com/gasco-71-regulator-71-series-regulator-for-17-34-steel-cylinders-cga-600-connection/

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- Teflon tubing

- zero gas (20.9% Oxygen in Nitrogen for zero calibration only. http://www.calgasdirect.com/zero-air-calibration-gas-20-9-o2-in-a-34-steel-liter-cylinder-cga-600-connection/

Calibrating a QIRF can be done using one Freon. For instance, if a jobsite has multiple gas sensors that monitor different Freon gases, one freon can be used to calibrate all by going into the programming of each sensor and change the gas to the same calibration gas. For instance, QIRF's (except R123) can be calibrated using R410A as long as 1) the sensor are changed in the programming to R410A, 2) after the sensor is calibrated, the QIRF is changed back to the target Freon.

Actual Calibration

This procedure is found in QIRF Operation Manual, Page 21. Find full menu options in manual.

The QIRF smart sensor is calibrated using a two-point calibration process. First, use a "Zero Gas", then use a "CAL Gas" containing a known concentration of a standard reference gas, to set the second point of reference.

Zeroing Calibration Procedure

Zeroing Calibration Flow Chart

Note: No adjustments or calibration should be performed within 24 hours stabilization.

Note: Zeroing Calibration must be performed before Span Calibration.

1. Connect tubing to barb fitting on QIRF

2. Turn on the gas flow and press Key [YES] to display current reading

This screen is displaying the current reading and asking if you want to perform Zeroing Calibration.

3. Waiting for about 3 minutes or till the reading is stable.

4. Press Key [YES] to perform Zeroing Calibration.

5. During Zeroing Calibration, the LCD will display the digital pot positions and calibration statuses. It will take 3 to 10 minutes to perform Zeroing Calibration, then the zero calibration data is saved and LCD displays "Accepted".

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6. If the LCD displays "Cal Error" that means something is wrong in the procedure, repeat procedure 4 to try again. If the "Cal Error" is still displayed in the end, the unit needs to be repaired in factory, otherwise, Zeroing Calibration has succeeded, go to next step.

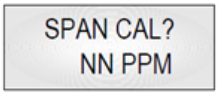
7. Turn off the gas flow and remove it.

Menu "3_Span Calibration"

Span Calibration Flow Chart

1. Connect tubing to barb fitting on QIRF

2. Turn on the gas flow and press Key [YES] to display current reading.



This screen is displaying the current reading and asking if you want to perform Span Calibration.

3. Waiting for about 3 minutes or till the reading is stable.

4. Press Key [YES] to perform Span Calibration.

5. During Span Calibration, the LCD will display the digital pot positions and calibration statuses. It will take about 1 minute to perform Span Calibration, then the span calibration data is saved and LCD displays "Accepted".

6. If the LCD displays "Cal Error" that means something is wrong in the procedure, repeat procedure 4 to try again. If the "Cal Error" is still displayed in the end, the unit needs to be repaired in factory, otherwise, Span Calibration has succeeded, go to next step.

7. Turn off the gas flow and remove it.

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