# Combustible Sensor Calibration for QTS-1710

**Phone:** 1-888-967-5224
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To test the sensors you would need a calibration gas that has a known concentration of LEL (Lower Explosive Limit) of gas concentration, a 0.5 LPM regulator, a calibration adapter, 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. Most combustible sensors will use Methane to test and calibrate. Some combustibles are not available in concentrated cans, so we recommend Methane because it is more common. You will need to convert Methane gas to your sensor using a correlation formula when calibrating and bump testing. This is done by multiplying methane LEL by the corresponding gain adjustment.

-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.

All combustible sensors will use Methane to test and calibrate. Some combustibles are not available in concentrated cans. You will need to convert Methane to your sensor combustible.

This is done by multiplying methane LEL by the corresponding gain adjustment listed in the Table below.

**C** = %LEL of Methane Test Gas
**R** = Equivalent % LEL of Target Gas
**S** = Signal in milliamps

**J** = number from the table above

Example: Propane
Methane concentration of 2.5%V (50%LEL)
Propane Gain adjustment = 1.67

**R = C * J**

83.5 Propane = 50%LEL Methane X 1.67 gain adjustment

**To find the equivalent mA output:**

mA Signal = 4 + (16 x R mA) / 100

17.36mA = 4+ (16 x 83.5) / 100

Applying 50%LEL Methane will be equal to 83.5% Propane, and the mA output will be 17.36mA.

Some target gases such as n-Propanol and Benzene will need to use 1.25%LEL Methane because the gain adjustment is high and will read over 100%LEL using 50%LEL Methane. Check gain adjustment below and calculate before for correct Methane concentration.



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| GAS/VAPOUR | LEL (CENELEC STANDARDS) | RELATIVE RESPONCE (WITH RESPECT TO METHANE) | GAIN ADJUSTMENT |
|---|---|---|---|
| Acetic Acid | 5.4% | 0.20 | 5.00 |
| Acetone | 2.6% | 0.35 | 2.86 |
| Ammonia | 15% | 0.65 | 1.54 |
| Butyl Acetate | 1.4% | 0.30 | 3.33 |
| Cyclo-hexane | 1.3% | 0.45 | 2.22 |
| Cyclo-pentane | 1.4% | 0.50 | 2.00 |
| Decane | 0.75% | 0.20 | 5.00 |
| Dioxane | 2% | 0.50 | 2.00 |
| Ethane | 3% | 0.85 | 1.18 |
| Ethanol | 3.3% | 0.45 | 2.22 |
| Ethyl Acetate | 2.2% | 0.35 | 2.86 |
| Ethylene | 2.7% | 0.65 | 1.54 |
| Hydrogen | 4% | 0.95 | 1.05 |
| Iso-Butane | 1.8% | 0.55 | 1.82 |
| Iso-butyl Alcohol | 1.7% | 0.30 | 3.33 |
| Iso-Octane | 0.95% | 0.35 | 2.86 |
| Iso-Pentane | 1.4% | 0.45 | 2.22 |
| Iso-Propyl Alcahol (IPA) | 2.2% | 0.35 | 2.86 |
| Methane | 5% | 1.00 | 1.00 |
| Methanol | 6.7% | 0.70 | 1.43 |
| Methyl Ethyl Ketone (MEK) | 1.9% | 0.35 | 2.86 |
| n-Butane | 1.8% | 0.55 | 1.82 |
| n-Heptane | 1.05% | 0.40 | 2.50 |
| n-Hexane | 1.02% | 0.45 | 2.22 |
| Nonane | 0.85% | 0.25 | 4.00 |
| n-Pentane | 1.4% | 0.50 | 2.00 |
| n-propanol | 2.2% | 0.40 | 2.50 |
| n-Propyl Alcahol | 2.2% | 0.40 | 2.50 |
| Propane | 2.1% | 0.60 | 1.67 |
| Propylene | 2.4% | 0.70 | 1.43 |
| Styrene Monomer | 1.1% | 0.30 | 3.33 |
| Toluene | 1.2% | 0.40 | 2.50 |
| Benzene | 1.3% | 0.35 | 2.86 |
| Iso-Butyl Methyl Ketone | 1.2% | 0.25 | 4.00 |



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**Equipment:**

-Digital Multimeter c/w Pos and Neg probes with:
a) 20.0 mA scale
b) 200 mV scale

**-**Part: 79030-103 (Calibration Adapter for QTS-1710))

-Part: CAL GAS KIT (Includes – 1ea C10 0.5lpm regulator, 1ea C10 to CGA600 adapter, Carry case, and ten feet of 1/4" tubing.)

-Calibration Gas
Part: H1971125LA (25% LEL Methane, (1.25%), 34L, Certified)
Or
Part: H197150LA (50% LEL Methane, (2.50%), 34L, Certified)

- Zero gas for zero calibration only
Part: H1066 (100% Nitrogen, 34L, Certified)
Or
Part: H107220.9VN (20.9% Oxygen, 34L, Certified)

Note: Zero gas can be 20.9% by Volume Oxygen or 100% Nitrogen.

**Calibration:**

**Clean air adjustments:**
1. If sensor is NEW, pull out electronics module slightly and measure voltage between NULL testpoints TP3 & TP5 (use 200 mV scale) and adjust NULL to get 000.0 mV.

2. Set multimeter to 20 mA scale, attach probes, and insert Pos probe to "POS" jack, Neg probe to "SIG" jack. If Transmitter is connected to a QEL controller, insert Neg probe into "COM" jack to avoid fault condition. Adjust Zero to get 4.00 mA in clean air.

**Span Adjustments:**
3. Multimeter still attached as in (2) apply appropriate calibration gas to sensor and adjust SPAN to read appropriate signal on the multimeter.

4. Wait 2 or 3 hours and check (2) and (3) again, if required.



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