

NS115 Air Quality

Analog AQI eCO₂ TVOC Sensor

- Air Quality Index Monitor
- eCO₂ and TVOC Measurement
- 0-10V Analog or Digital Output
- Adjustable Sensitivity
- 12-24V DC Supply
- 3 Wire Screw Terminal



Overview

The NS115 Air Quality sensor is a simple low voltage analog metal oxide multi-gas detector. It can easily integrate into an existing building control system. Connect the sensor output signal to an analog input of a controller, gateway, or data acquisition unit. The air quality signal can be used to warn occupants and maintenance staff or adjust ventilation.

Operation

The sensor can detect various volatile organic compounds (VOCs) in an airspace. The device is suitable for ceiling or wall mount applications. Place the sensor in a suitable location where occupant respiratory health is critical.

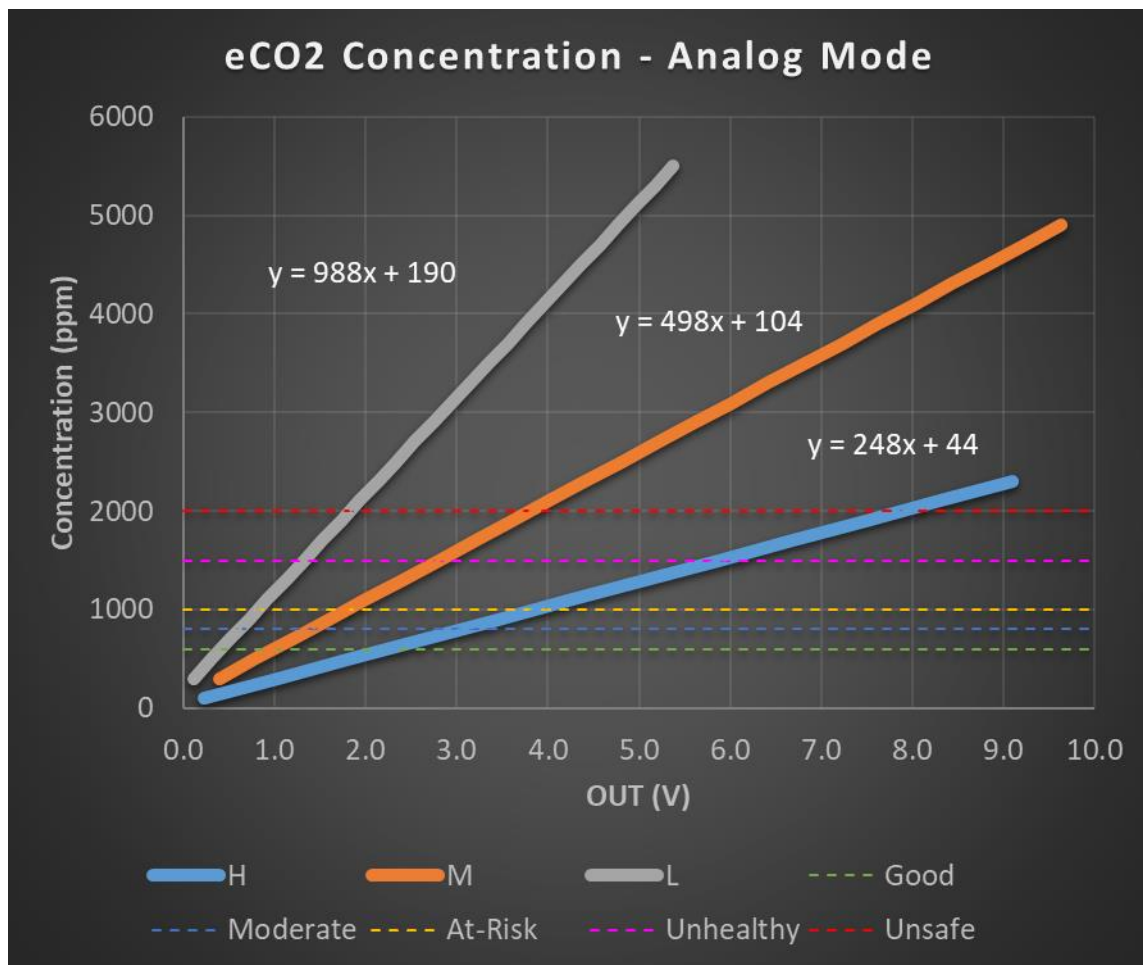
The sensitivity can be adjusted with a simple jumper position. This selection changes the gain of an analog amplifier. Choose a gain suitable for typical range of VOC concentration. A high gain will detect lower concentrations. Whereas a lower gain will minimize noise in the signal.

The output mode can be changed from a continuously varying analog signal to a digital signal. The digital signal is produced by a comparator with a threshold at half scale (i.e. 5V) or quarter scale (i.e. 2.5V). Use the analog mode to continuously monitor concentration or air quality index. Or use the digital mode to trigger actuators or notifications at a specific threshold.

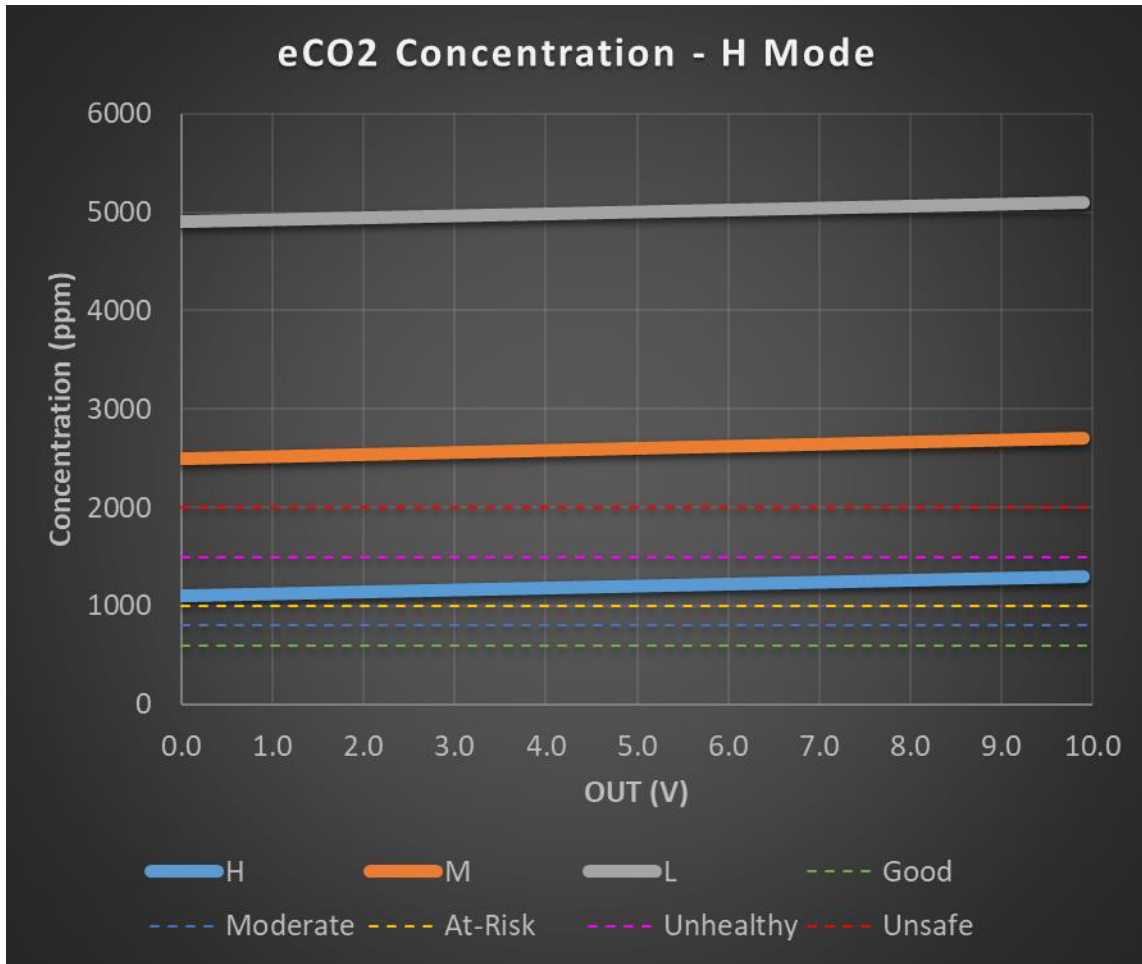
Changing the sensitivity and choosing the digital output scale can adjust the event threshold. Setting sensitivity high and digital scale low will reduce the event threshold to a minimum and detect the smallest concentrations. Whereas, setting sensitivity low and digital scale high will increase the threshold to a maximum and detect only the most severe air quality hazards.

eCO2 Detection

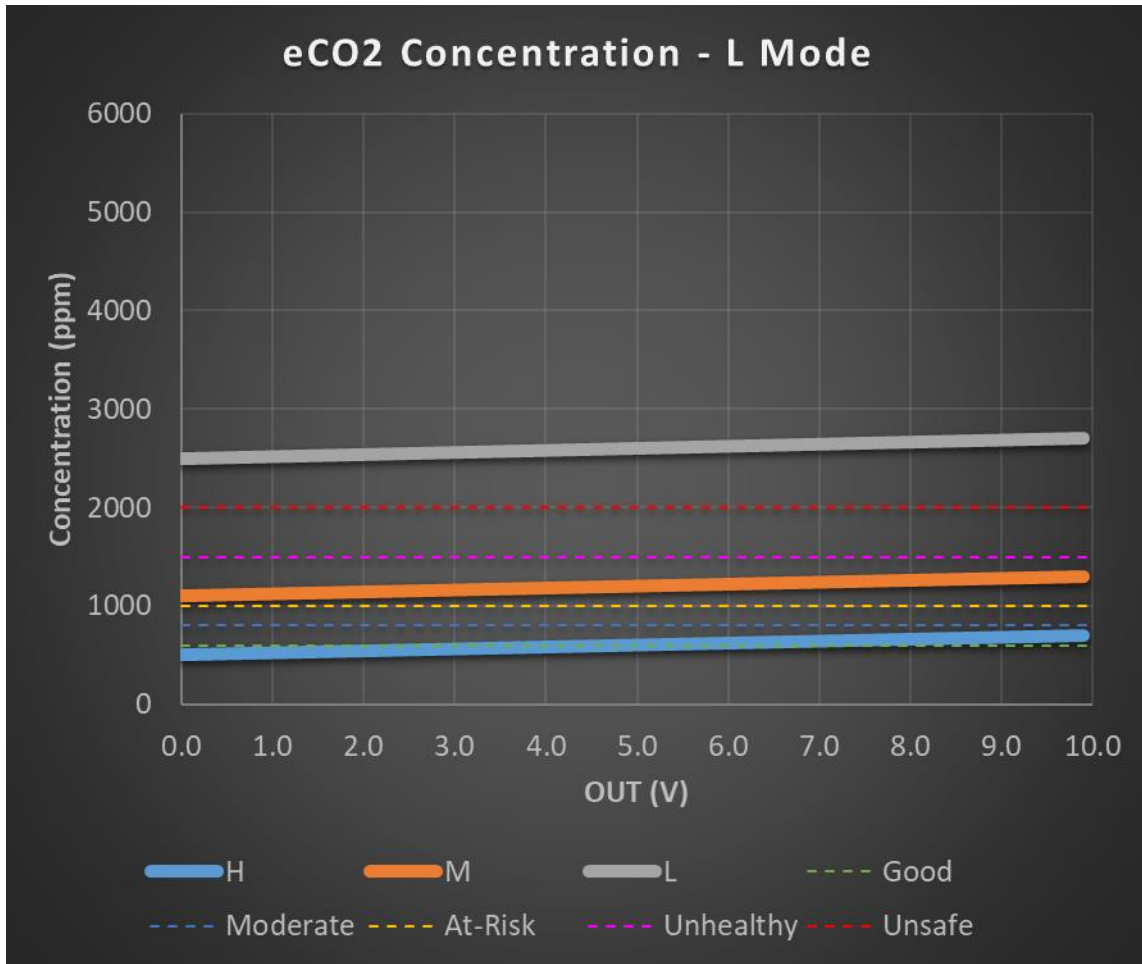
In human occupied spaces CO2 produced by respiration and transpiration can deteriorate indoor air quality. It is recommended to continuously monitor CO2 levels. If the concentration exceeds healthy or safe levels immediate corrective actions is required. Warn occupants, seek less polluted air, increase ventilation, and remediate the problem.



1 eCO2 Concentration Analog Mode for H, M, and L Sensitivities



2 eCO₂ Concentration H Digital Mode for H, M, and L Sensitivities

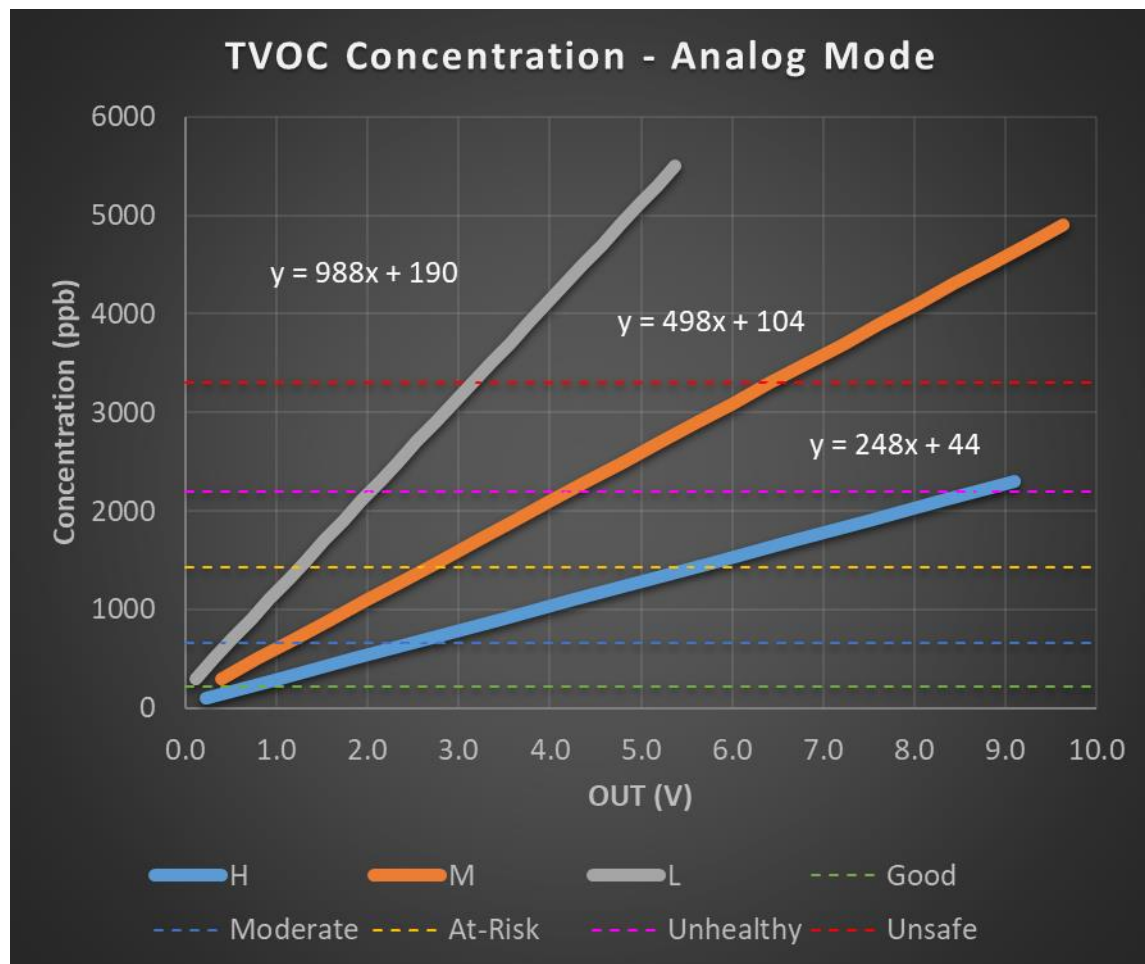


3 eCO₂ Concentration L Digital Mode for H, M, and L Sensitivities

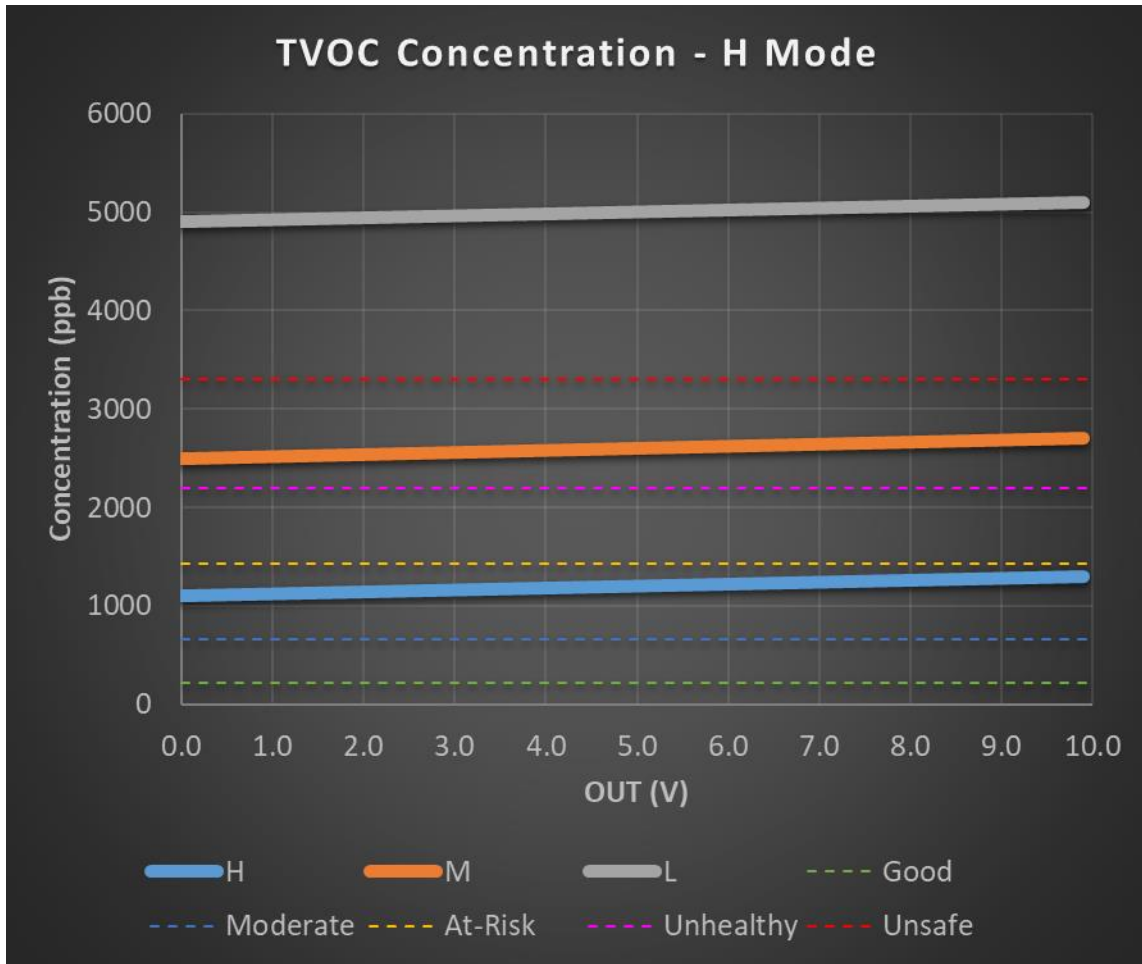
TVOC Detection

Volatile organic compounds (VOCs) are up to five times more concentrated indoors than outdoor airspaces. These compounds are caused by human occupant's respiration, transpiration, and other metabolic processes. Additionally, common building materials such as furniture, flooring, wall coverings can out-gas VOCs. Most commonly these compounds include ethanol, toluene, acetone among other solvents. These compounds can cause eye irritation, headache, drowsiness, dizziness, and other irregularities. Continuous monitoring and ventilation are recommended.

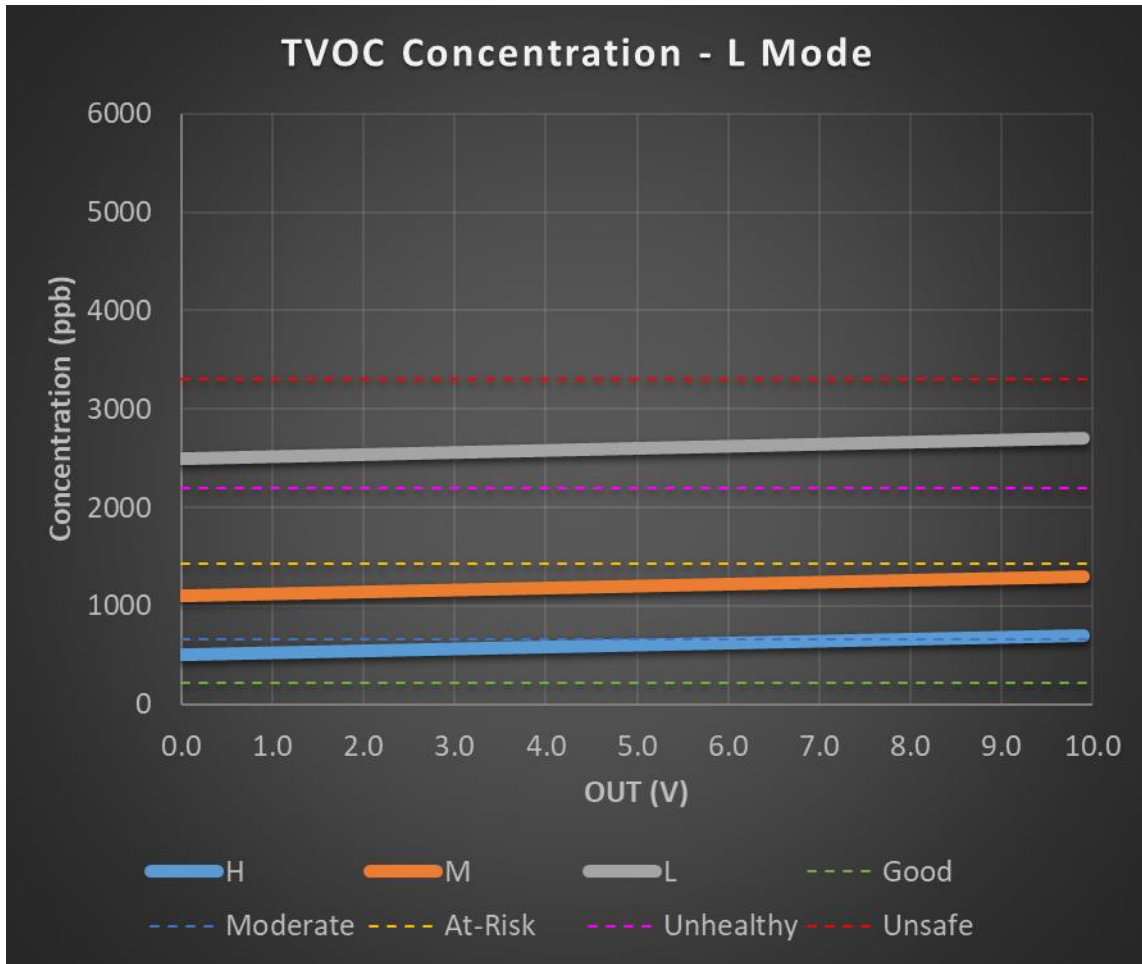
Total volatile organic compound (TVOC) is the summation of various gas species. The metal-oxide detector has different sensitivities to various species. For example, it is significantly more sensitive to smaller molecules like CO and H₂ than larger molecules like ethanol. Be advised that TVOC is an index of all pollutants and not a selective sensor for a particular gas species. If it is known that a particular gas species dominates an airspace, then selectivity might be significant. Use this sensor to detect the level of concern. But additional detection with more selective sensors might be necessary to find root cause.



4 TVOC Concentration Analog Mode for H, M, and L Sensitivities



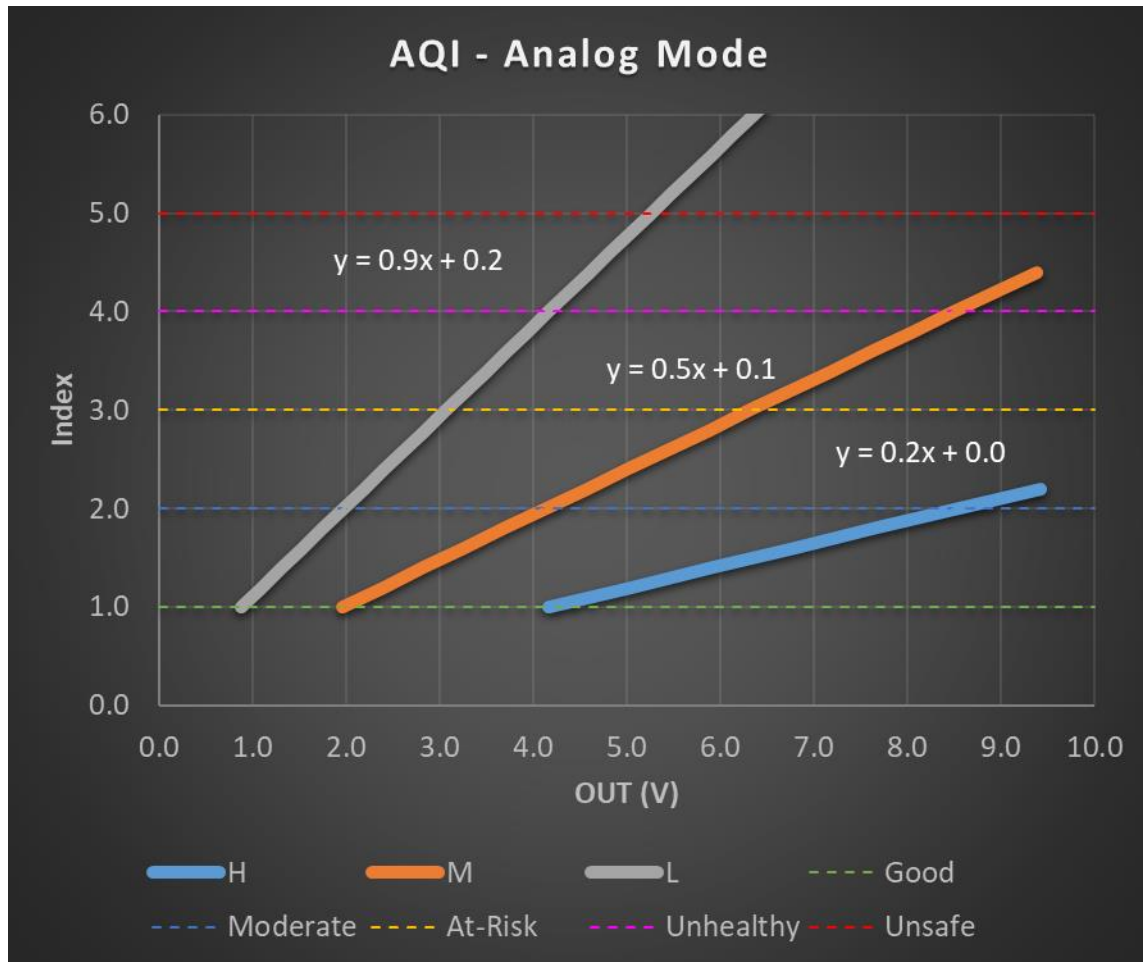
5 TVOC Concentration H Digital Mode for H, M, and L Sensitivities



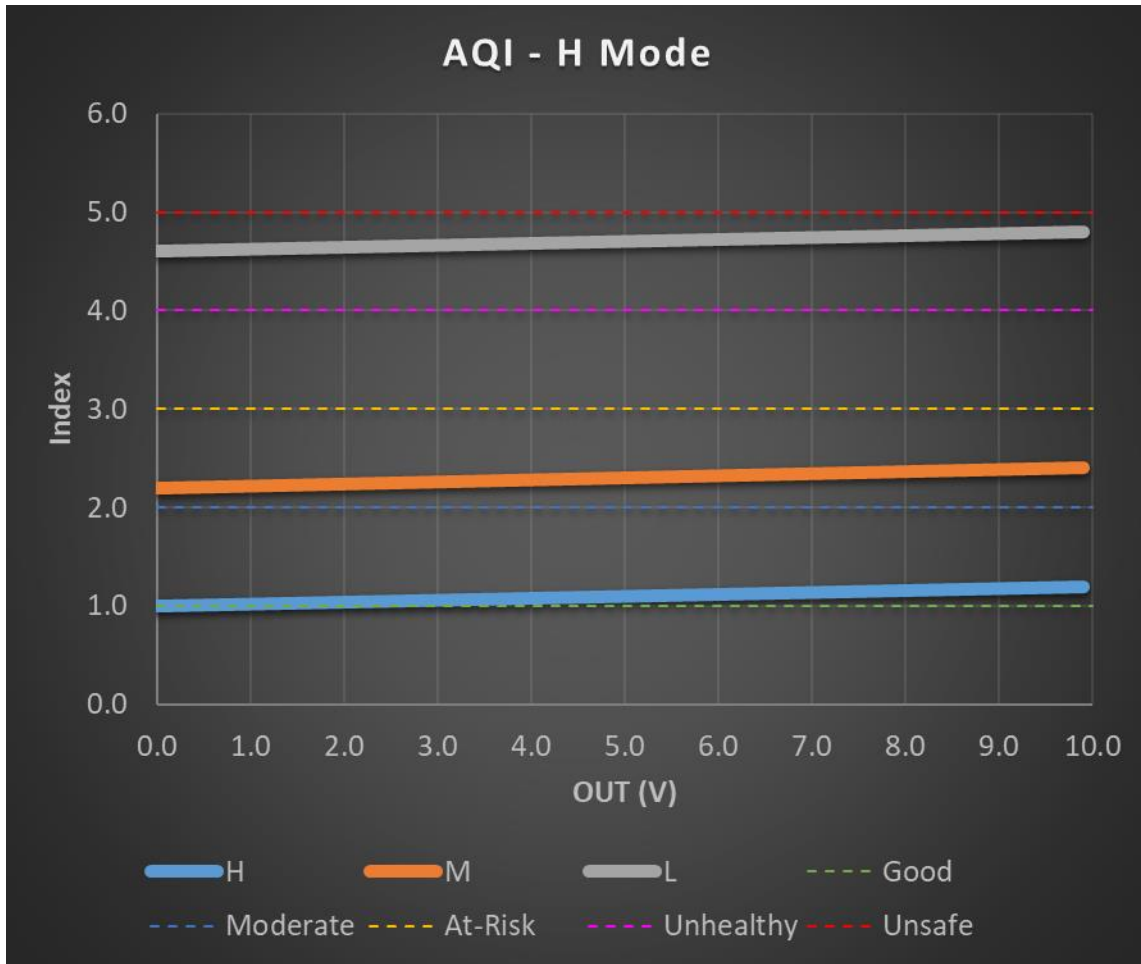
6 eCO2 Concentration L Digital Mode for H, M, and L Sensitivities

AQI Monitor

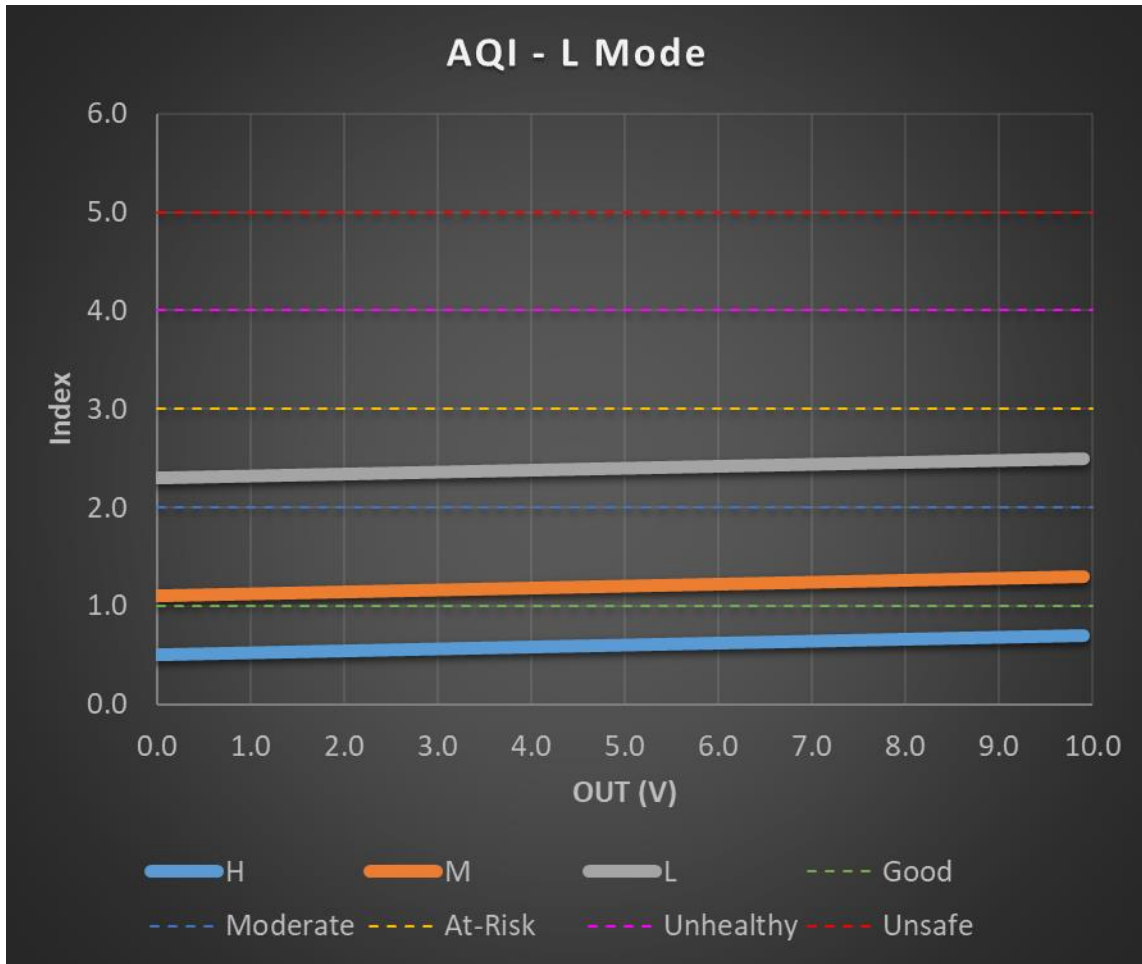
Air quality index (AQI) is a normalized value based on TVOC. This index can be easier to recognize than the actual concentration. Generally, exposure limits should be enforced for at-risk, unhealthy, and unsafe levels. At-risk exposure for up to a year can increase symptoms for chronic conditions such as respiratory diseases and asthma. Whereas unhealthy and unsafe levels can have more acute harm to even healthy populations in weeks and months if not hours or sooner. Continuous monitoring is recommended, and immediate corrective action is necessary.



7 AQI Analog Mode for H, M, and L Sensitivities



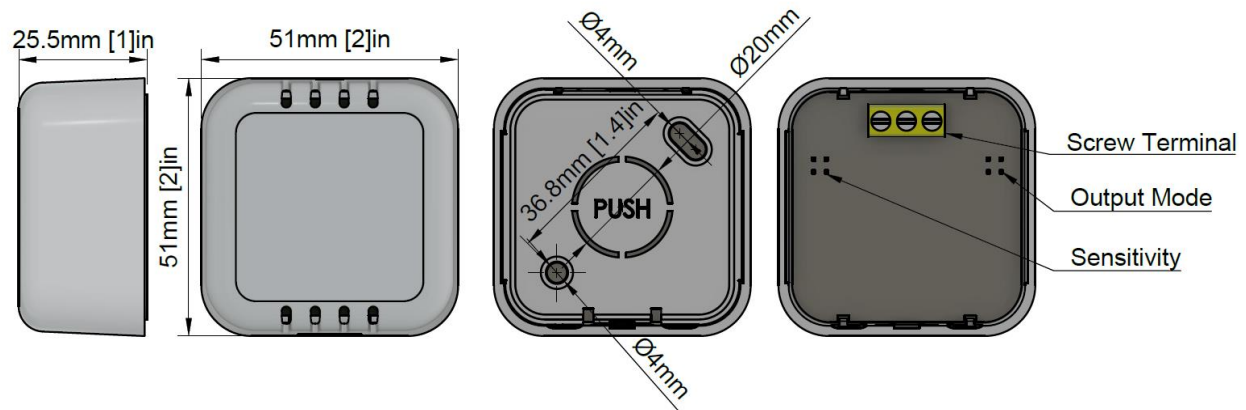
8 AQI H Digital Mode for H, M, and L Sensitivities



9 AQI L Digital Mode for H, M, and L Sensitivities

Product Features and Installation

The product is a small plastic enclosure that can be wall or ceiling mounted. The back mounting plate is removable. Separate the front housing from the back mounting plate. Then use screws or adhesive to secure the plate to the ceiling or wall surface. Reattach the front housing to the back mounting plate. The two pieces snap together without extra screws.



10 Product Dimensions and Features

Sensitivity, Output Mode and Type

The sensitivity and output modes can be changed by moving a jumper between header pins. There are 3 options for sensitivity.

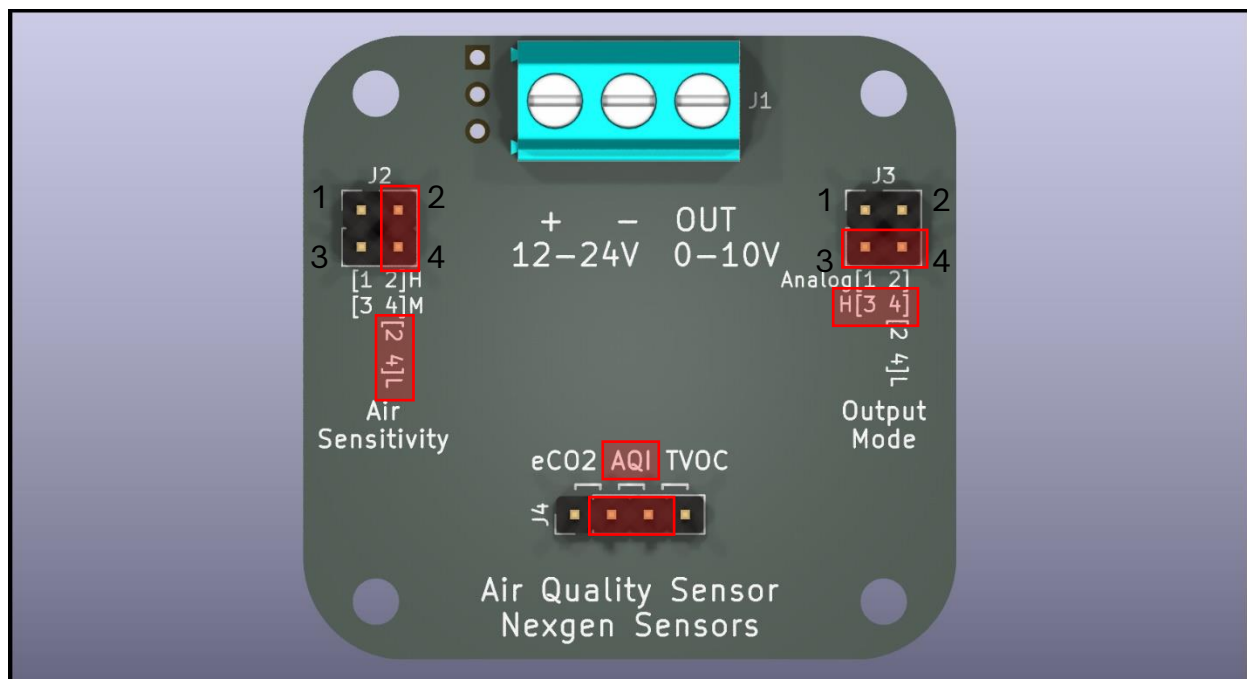
H	High sensitivity
M	Medium
L	Low

And there are 3 options for output mode. In analog mode the output varies continuously in proportion to the motion speed. For digital modes the signal is active high which would be 10V when motion is detect and 0V without motion.

Analog	continuously varying output signal between 0 and 10V
H	Digital high threshold, trigger at half scale (i.e. 5V)
L	Digital low threshold, trigger at quarter scale (i.e. 2.5V)

And there are 3 options for output measurement type.

eCO2	Equivalent carbon dioxide
AQI	Air quality index
TVOC	Total volatile organic compounds



11 Sensitivity and Output Mode Adjustment and Measurement Type

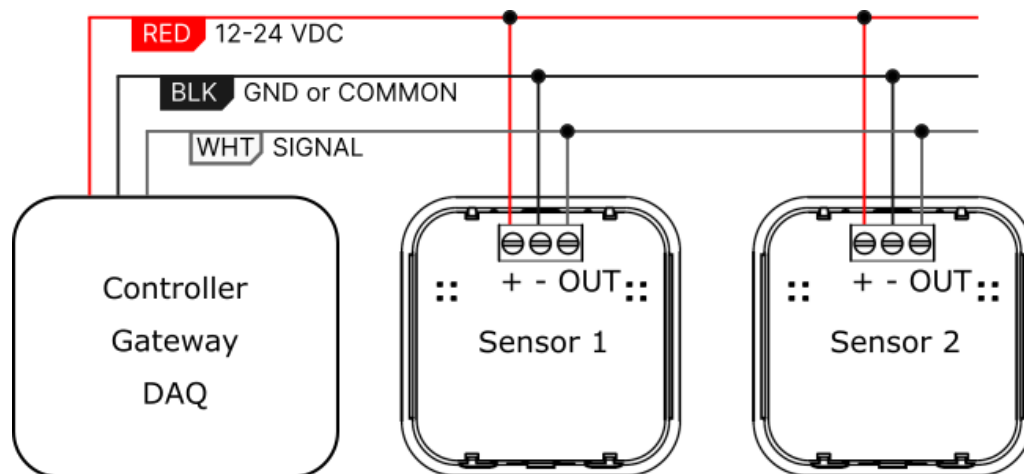
Usage and Wiring

Connect the sensor to an existing controller, gateway, or data acquisition unit (DAQ). Provide a DC supply of 12-24V with at least 50mA. Use appropriate wires or cabling. Conductors can be solid or stranded 14-26 AWG. Secure the conductors to the 3 pins of the screw terminals.

- + Positive Supply, connect to 12-24V
- Negative Supply and signal return, connect to ground or common

OUT Sensor Signal, connect to input of controller, gateway, or DAQ

Multiple sensors can be wired in parallel. Each output has a series blocking diode. The largest signal is detected by the controller. This is useful for extending the sensing range or observing a larger area.



12 Sensor Wiring Diagram