VOC (CO2e) Room Sensor in a BAPI-Stat Quantum

Installation & Operating Instructions

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Overview and Identification

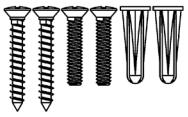
The quality of the air that we breathe is essential to our health and knowing the air quality level is the first step to improving it. BAPI's VOC sensors provide that critical air quality information.

The CO_2 equivalent (CO2e) units combine the benefits of VOC sensors and the common application of CO2 sensors into one unit. It provides a VOC reading that correlates to a typical indoor CO_2 level of 0 to 2,000 ppm. This allows the sensor's output to be used for ASHRAE's CO_2-based VRP ventilation schedule.

Additional information on VOCs and using the CO2e units in your ventilation strategy is available on our website and in the Air Quality section of our catalog.

A 60mm mounting base is available to fit European style junction boxes.

The BAPI-Stat "Quantum" VOC Room Sensor features 0 to 5 or 0 to 10 VDC output. The VOC level is indicated as "Good, Fair or Poor" by three discrete green, yellow and red LED's on the front of the unit. If the output reaches 2,000 PPM, the red LED will begin to flash because it has hit its maximum output.



Included Screw Pack

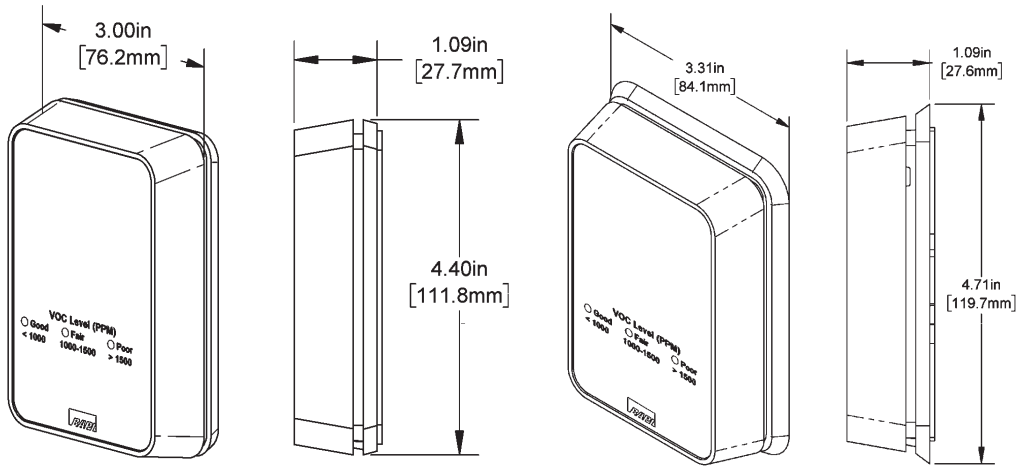


Fig. 1: BAPI-Stat "Quantum" VOC Sensor
(standard mounting base at left and 60mm mounting base for European wall boxes with 60mm mounting centers at right)

Specifications

Power: (Half-wave rectified) 12 to 24 VDC, 35 mA max • 18 to 24 VAC, 4 VAmax

CO2e Unit Detection Range: 0 to 2,000 ppm CO_2 equivalent

Sensing Element: Micro-machined metal oxide

Start-Up Time: 15 minutes

Response Time: <60 sec (after start-up time)

Cover LEDs:
Good, Green < 1,000 PPM
Fair, Yellow = 1,000 to 1,500 PPM
Poor, Red > 1,500 PPM

Selectable Output: 0 to 5 or 0 to 10 VDC > 4KΩ impedance

Wiring: 3 wires, 16 to 22 AWG

Operating Environment: 32 to 122°F (0 to 50°C) • 5 to 95%RH non-condensing

Enclosure Material: ABS plastic, UL94, V-0

Mounting: Standard 2"x4" junction box, European junction box or drywall (screws provided)

Agency: CE EN 61326-1:2013 EMC, UL, RoHS

Specifications subject to change without notice.

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Mounting

JUNCTION BOX

1. Pull the wire through the wall and out of the junction box, leaving about six inches free.
2. Pull the wire through the hole in the base plate.
3. Secure the base to the box using the #6-32 x 1/2 inch mounting screws provided.
4. Terminate the unit according to the guidelines in the **Termination** section.
5. Attach Cover by latching it to the top of the base, rotating the cover down and snapping it into place.
6. Secure the cover by backing out the lock-down screw using a 1/16” Allen wrench until flush with the bottom of the cover.

NOTE: *In a wall-mount application, the mixing of room air and air from within the wall cavity can lead to erroneous readings, condensation, and premature failure of the sensor. To prevent this condition, plug the conduit hole with insulation in the junction box.*

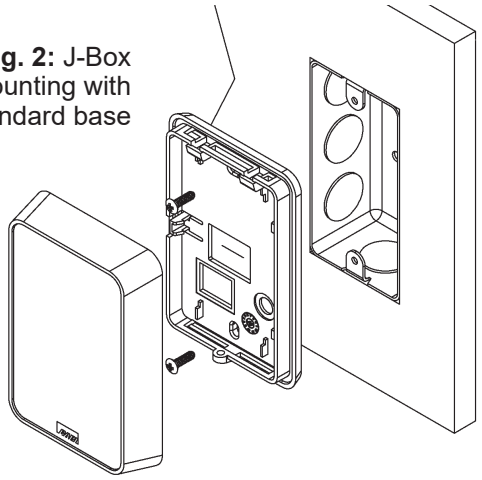

Fig. 2: J-Box mounting with standard base

DRYWALL MOUNTING

1. Place the base plate against the wall where you will mount the sensor.
2. Using a pencil, mark out the two mounting holes and the area where the wires will come through the wall.
3. Drill two 3/16” (5mm) holes in the center of each marked mounting hole. Insert a drywall anchor into each hole.
4. Drill one 1/2” (13mm) hole in the middle of the marked wiring area.
5. Pull the wire through the wall and out of the 1/2” hole, leaving about six inches free.
6. Pull the wire through the hole in the base plate.
7. Secure the base to the drywall anchors using the #6 x 1 inch mounting screws provided.
8. Terminate the unit according to the guidelines in the **Termination** section.
9. Attach Cover by latching it to the top of the base, rotating the cover down and snapping it into place.
10. Secure the cover by backing out the lock-down screws with a 1/16” Allen wrench until flush with the bottom of the cover.

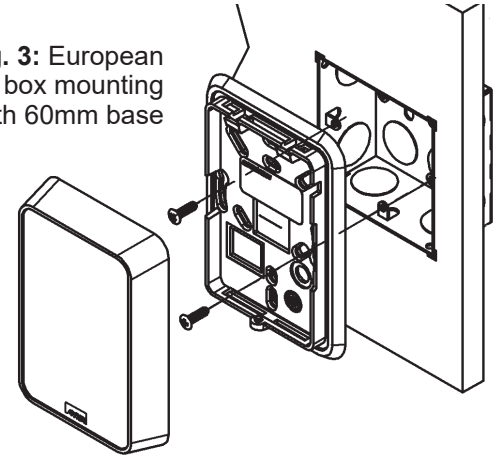

Fig. 3: European wall box mounting with 60mm base

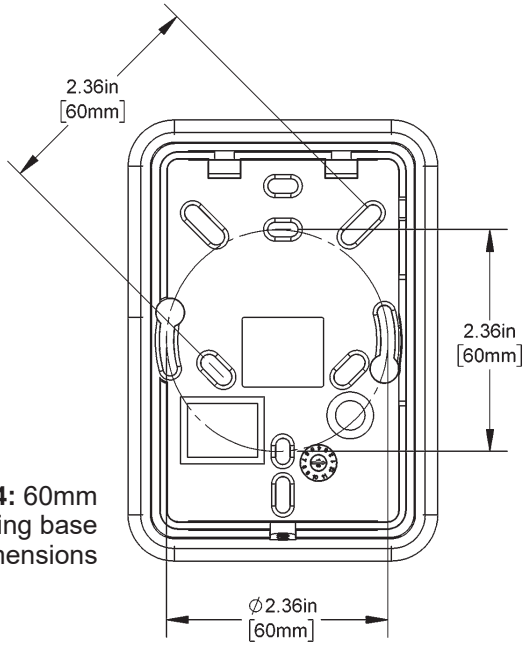

Fig. 4: 60mm mounting base dimensions

Termination

BAPI recommends using twisted pair of at least 22AWG for all wire connections. Larger gauge wire may be required for long runs. All wiring must comply with the National Electric Code (NEC) and local codes. Do NOT run this device's wiring in the same conduit as AC power wiring of NEC class 1, NEC class 2, NEC class 3 or with wiring used to supply highly inductive loads such as motors, contactors and relays. BAPI's tests show that fluctuating and inaccurate signal levels are possible when AC power wiring is present in the same conduit as the signal lines. If you are experiencing any of these difficulties, please contact your BAPI representative.

STOP BAPI recommends wiring the product with power disconnected. Proper supply voltage, polarity, and wiring connections are important to a successful installation. Not observing these recommendations may damage the product and will void the warranty.

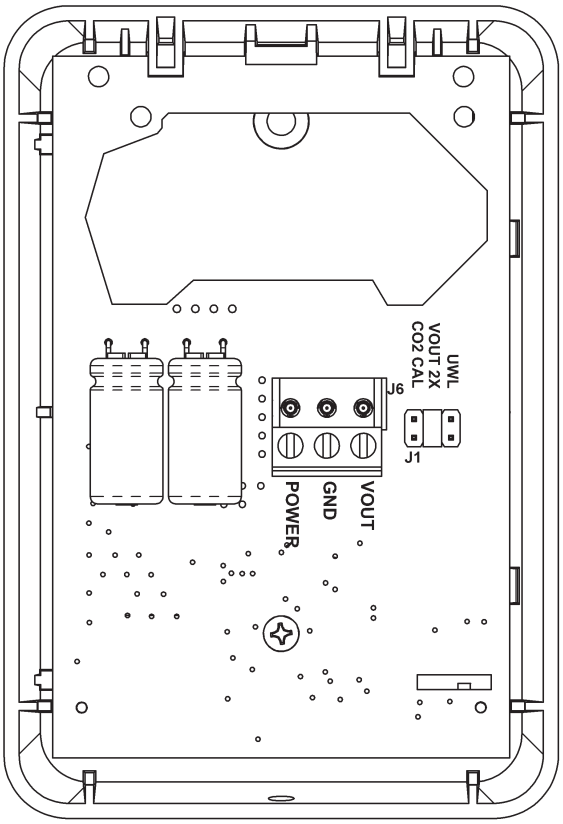

Fig. 5: Circuit Board

Terminal	Description
POWER	Power, referenced to GND 12 to 24 VDC, 35 mA Max 18 to 24 VAC, 4 VA Max
GND	To controller Ground [GND or Common]
VOUT	Voltage Output, VOC Signal (0 to 2,000 ppm CO2e), referenced to GND

The VOC outputs may be field configured for 0 to 5 VDC or 0 to 10 VDC outputs at any time. Set the VOUT 2X Jumper on J1 as shown in Figs 6 and 7.

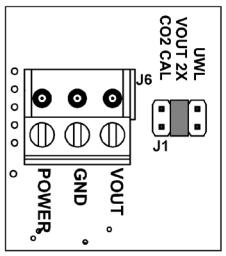

Fig. 6: J1 set for 0 to 10 VDC output

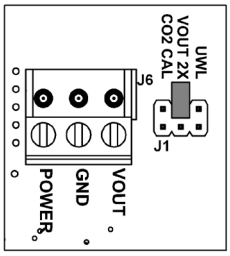

Fig. 7: J1 set for 0 to 5 VDC output

Sensor Start-Up

At each power up, the sensor enters a 15 minute start-up period. During this time, the sensor warms up, stabilizes to its environment, and then begins normal operation.

For units with LEDs. All 3 LEDs on the face of the sensor will flash for 25 seconds at start-up. Then the green LED will be solid and the red LED will flash for the next 8 minutes. For the last 6 minutes and 30 seconds, the sensor stabilizes to its environment and only the LED equivalent to the environment will be solid.

Do not set the building control system's VOC limit parameter until the VOC sensor has been installed for a week. The sensor uses the first few days after install to baseline and normalize its CO2e output algorithm.

Optional Sensor Performance Verification and Commissioning

A simple bump test is performed to verify that the sensor responds to elevated VOC levels.

1. Ensure that the sensor has been powered on for at least 15 minutes.
2. Apply a stimulus gas to the sensor as described in Stimulus Preparation and Application.
3. That amount of alcohol vapor will normally exceed the sensor's max output. If so, the output voltage should read 5 or 10 volts depending on the jumper setting. The red LED should flash since the reading is greater than 2,000 ppm (CO2e).
4. As the vapor dissipates, the output voltage will decrease and the LEDs will turn on and off as the ppm level changes.
5. It may take more than 10 minutes to return to normal VOC levels.

Stimulus Preparation and Application

Place 50ml of the Isopropyl Alcohol (70% minimum) into a 200ml bottle (2oz in an 8oz bottle) with a cover and allow it to reach room temperature.

1. Remove the cover from the alcohol bottle, place the tip of the syringe at least half-way into the bottle and withdraw a 60 ml sample of the alcohol vapor. (No liquid)
2. Place the end of the syringe under, or into the bottom ventilation slot of the VOC sensor's housing.
3. Empty the syringe into the sensor using one continuous motion to flood the sensor with vapor.

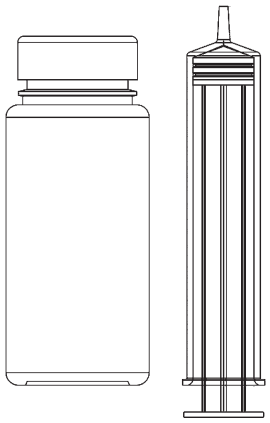

Fig. 8: Alcohol Bottle and Syringe included in the VOC Verification Kit (BA/VOC-KIT)

Diagnostics

Possible Problems:	**Possible Solutions:**
General Troubleshooting	- Determine that the input is set up correctly in the controller and BAS software. - Check wiring at the sensor and controller for proper connections. If there is corrosion on any terminations, clean off the corrosion, re-strip the interconnecting wire and reapply the connection. In extreme cases, replace the controller, interconnecting wire and/or sensor. - Label the VOC sensor wire terminals at the sensor and controller ends. Disconnect the wires and measure the resistance from wire-to-wire with a multimeter. The meter should read greater than 10 Meg-ohms, open or OL depending on the meter. Short the wires at one end and measure the resistance from wire-to-wire at the other end. The meter should read less than 10 ohms for 22 gauge or larger wire at a distance of 250 feet (76m) or less. If either test fails, replace the wire. - Check the power supply and controller voltage supply. - Disconnect sensor and check power wires for proper voltage (see power specs on pg 3).
Incorrect VOC Reading	- Wait 15 minutes after a power interruption. - Check all software parameters. - Determine if the sensor is exposed to an external environment different from the room (conduit draft).