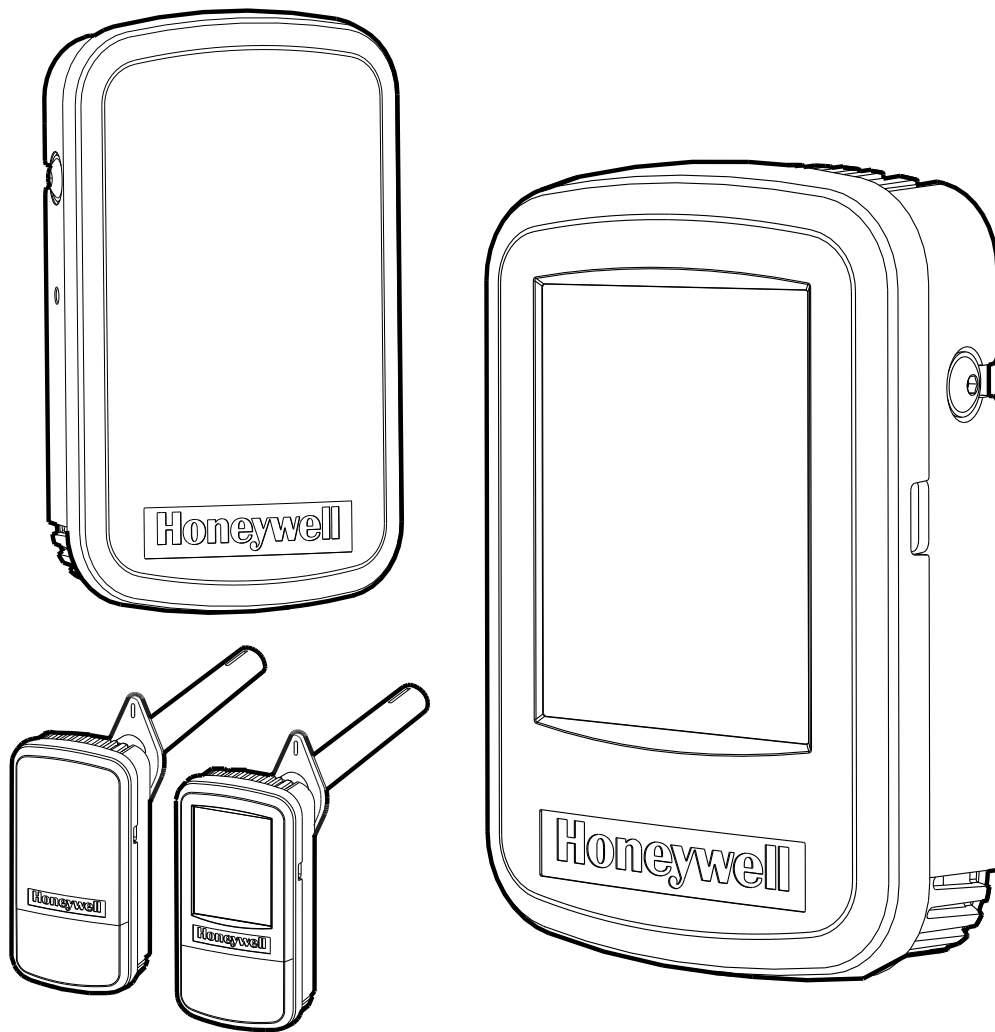


## IAQPoint2™ Indoor Air Quality Monitor



Technical Manual



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## Introduction

The IAQPoint2 indoor air quality monitor features a simple-to-use, customizable touchscreen display along with triple monitoring of indoor air quality parameters (carbon dioxide or volatile organic compounds, plus temperature and humidity) and facilitates demand-controlled ventilation. The IAQPoint2 monitor can increase energy efficiency in commercial buildings by triggering fan activation as a standalone solution or via a building automation system.

Honeywell Analytics' IAQPoint2 monitor replaces the IAQPoint and 90DM4 models. The monitor has been designed for ease of installation and versatility in use. CO<sub>2</sub> or volatile organic compound concentrations can be measured for demand-controlled ventilation. Temperature and relative humidity can also be monitored, eliminating the need for additional indoor air quality sensors. The display model features a highly-customizable graphical touchscreen display.

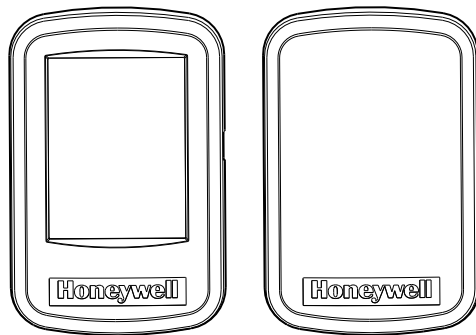


Figure 1. For wall-mounted applications: touchscreen display (left) and non-display models (right)

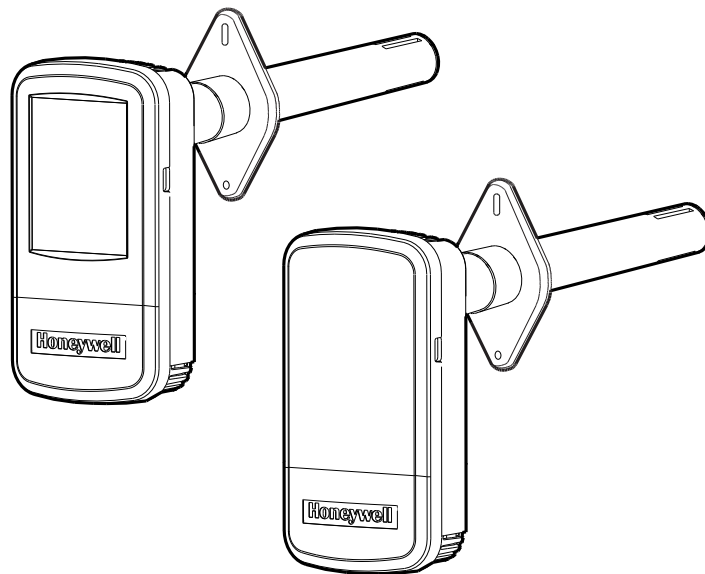


Figure 2. For duct-mounted applications: touchscreen display (left) and non-display models (right)

### Air Quality

Traditional carbon dioxide sensors do not respond to changes in air quality caused by odors, cigarette smoke, and other volatile organic compounds. This graph illustrates the relationship between CO<sub>2</sub> levels and concentrations of volatile organic compounds in a typical meeting room.

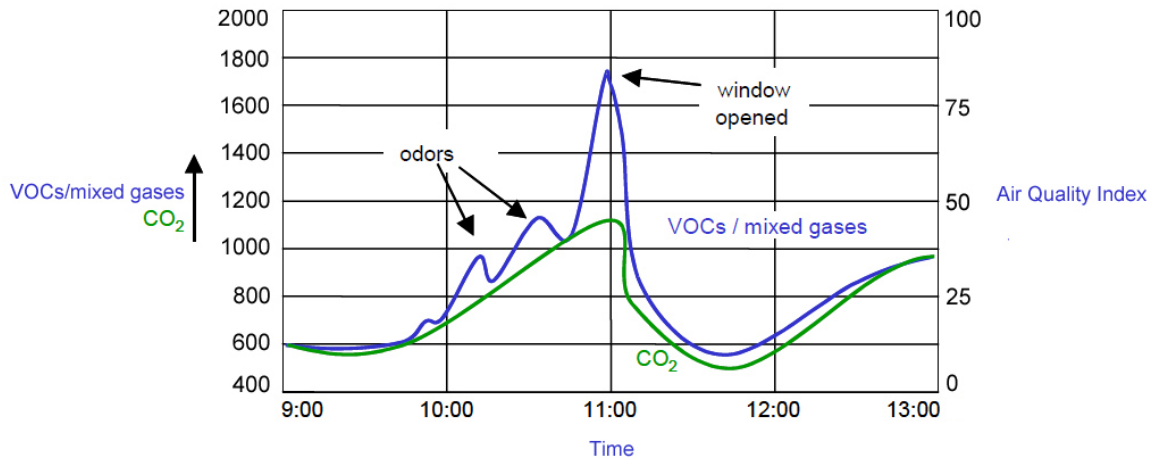


Figure 3. Air quality measurement in a meeting room

This chart shows common sources of indoor pollutants.

<i>VOC Concentrations Corresponding to 0-2,000 ppm CO<sub>2</sub></i>		
<i>Compound</i>	<i>Formula</i>	<i>Source</i>
Carbon monoxide	CO	Car exhaust, fuel-based heating, cooking appliance, smoking
Methane	CH <sub>4</sub>	Natural gas
Propane	C <sub>3</sub> H <sub>8</sub>	Fuel-based heating, cooking appliances, cleaners
Ethyl alcohol	C <sub>2</sub> H <sub>6</sub> O	Cosmetics, cleaners, disinfectants, detergents, paints, coatings, breath
Acetaldehyde	C <sub>2</sub> H <sub>4</sub> O	Adhesives, coatings, plastics, lubricants, ripening of fruits
Methylethylketone	C <sub>4</sub> H <sub>8</sub> O	Adhesives, coatings, plastics, lubricants
Toluene	C <sub>7</sub> H <sub>8</sub>	Paints, coatings, cleaners, detergents, smoking, polyurethane lacquers

## Danger/Warning/Caution/Notes

### **DANGER**

Danger messages address situations that could result in loss of life.

### **WARNING**

Warning messages address situations that could result in injury or critical damage to the monitor.

### **CAUTION**

Caution messages address situations that could result in damage to the monitor.

### **NOTE**

Notes relate helpful information.

## Contact information

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## Glossary

Term	Description
ABC	Automatic Baseline Correction
ASHRAE	American Society of Heating, Refrigeration, and Air Conditioning Engineers
aldehyde	a type of organic compound
AWG	American Wire Gauge; smaller numbers equate to larger wire diameters
BACnet	Building Automation and Control Networking Protocol
CA-24	California Code of Regulations, Title 24
CE	Conformité Européenne (“European Conformity”)
CO <sub>2</sub>	carbon dioxide
CSA	Canadian Standards Association
fpm	feet per minute
HVAC	Heating, Ventilation, and Air Conditioning
hysteresis	a lag in response to a system’s input
IAQ	indoor air quality
IEC	International Electro-technical Commission
IP rating	Ingress Protection Rating; the protection provided by an electrical enclosure
MS/TP	master/slave token passing
LED	light-emitting diode
LonMark	An organization created to promote multi-vendor control systems utilizing ISO/IEC 14908-1 (LonWorks)
LonWorks	A computer networking protocol promoted by Echelon corporation
LPM	liters per minute
PF	power factor, the ratio of real to apparent power
PICS	BACnet Protocol Implementation Conformance Statement
ppm	parts per million, a measure of concentration
rH	relative humidity
RTU	remote terminal unit, a type of Modbus digital communications
setpoint	the desired value in a closed-loop feedback system
SFPT	LonMark standard functional profile template
slide switch	a small rocker-type component capable of interrupting an electrical circuit that plugs into a dual in-line package (DIP) on a printed circuit board.
UFPT	LonMark user functional profile template
UL	Underwriters’ Laboratory
VOC	volatile organic compound

## Configurations

The base configuration of the IAQPoint2 monitor:

- CO<sub>2</sub> or VOC sensor
- analog output (4-20 mA or 2-10 V)
- wall mount
- no display

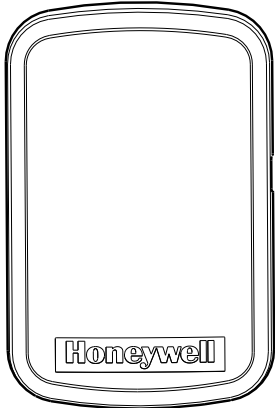


Figure 4. IAQPoint2 base configuration

The monitor is also available with an LCD touchscreen display with either analog output or digital output. The monitor can be configured with any combination of these features:

- Wall mounted or duct mounted,
- With or without an LCD touchscreen display,
- With a CO<sub>2</sub> sensor or a VOC sensor,
- With or without an rH/temp sensor,
- With or without a relay, and
- With one of these communication options:
  1. Analog output, 4-20 mA or 2-10 VDC (field selectable)
  2. Modbus/BACnet (field selectable)
  3. LonWorks

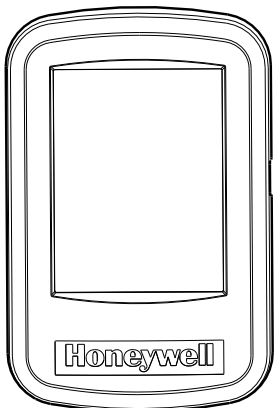


Figure 5. IAQPoint2 display configuration

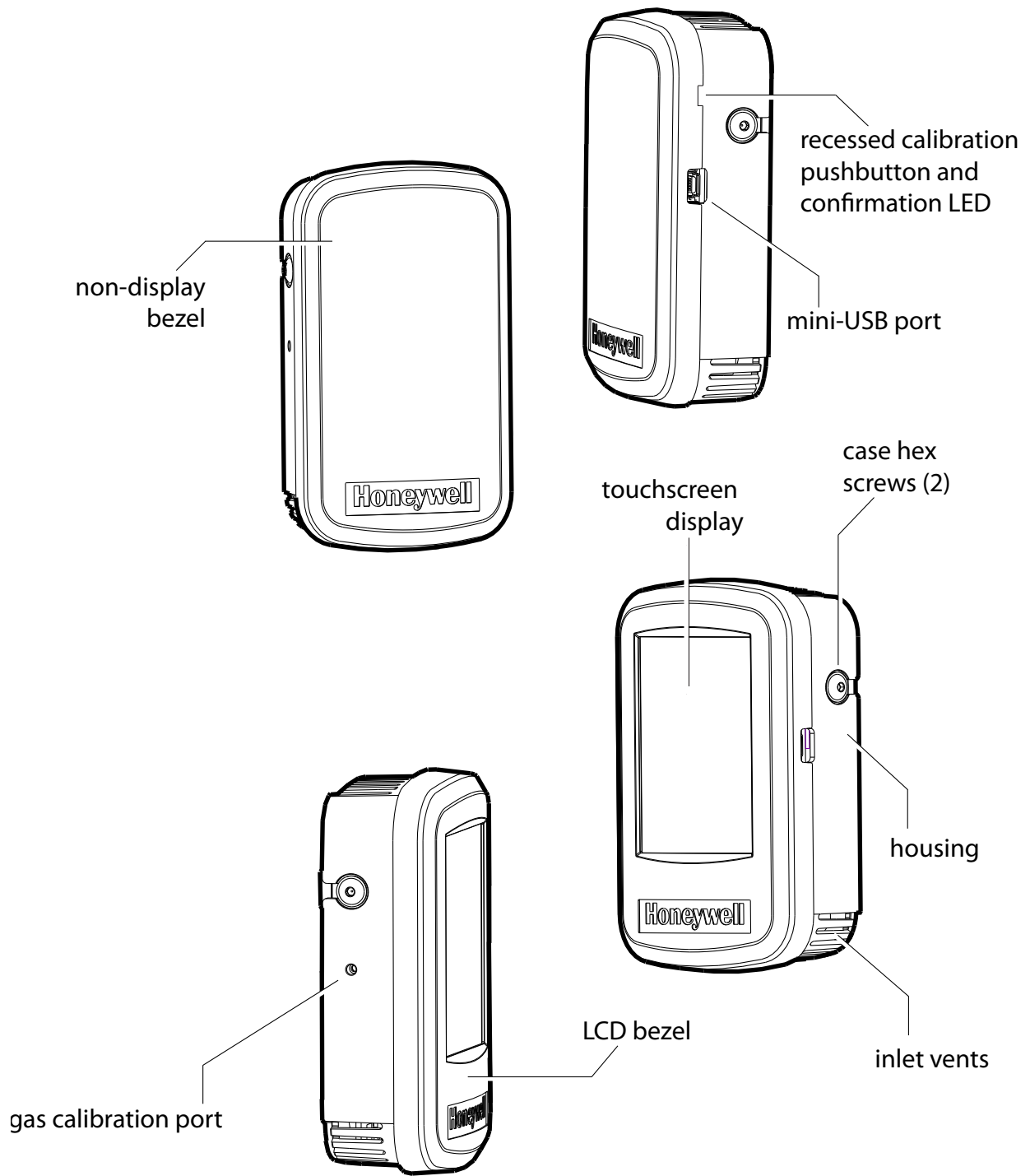


Figure 6. Parts of the IAQPoint2 wall-mount monitors

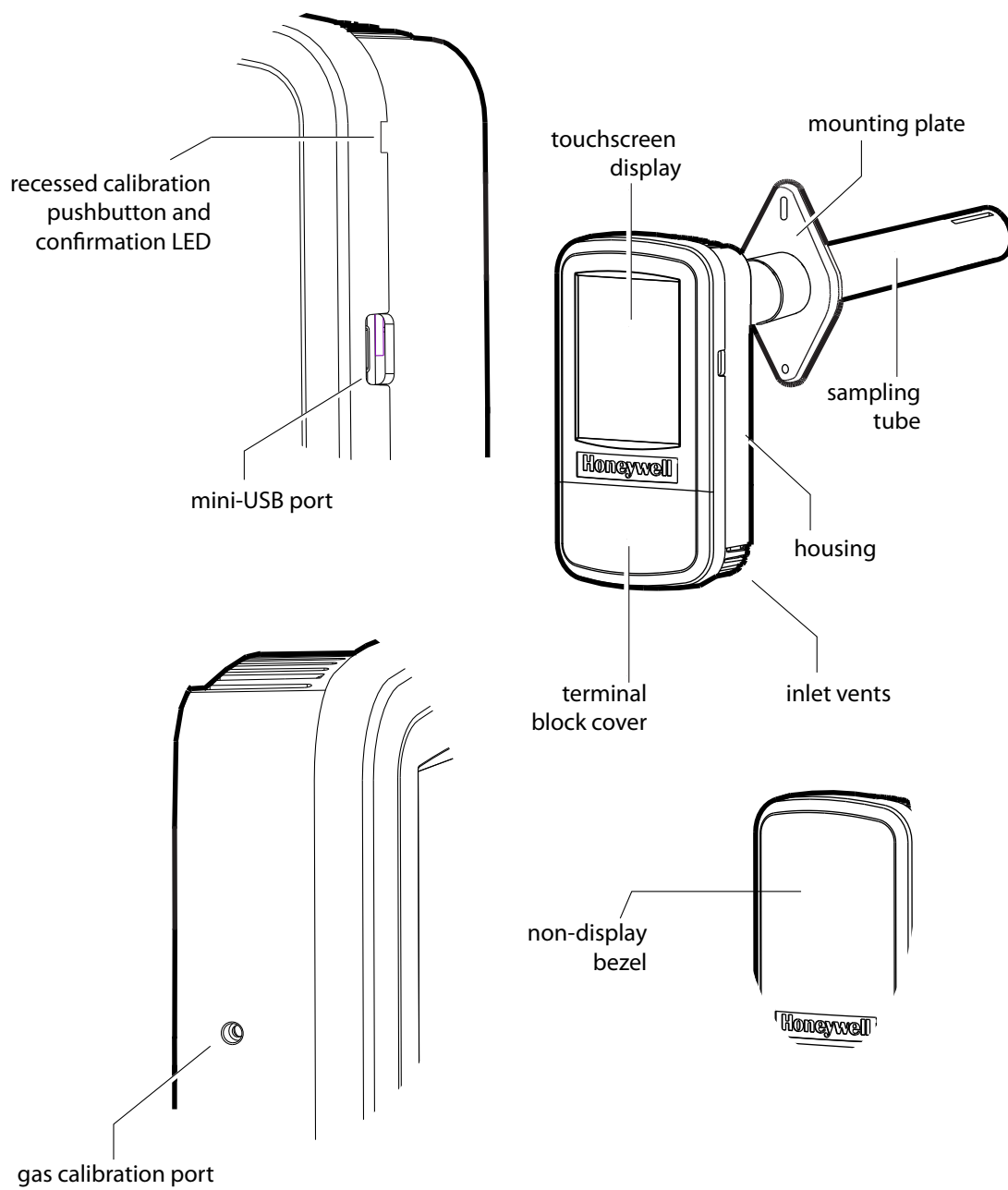


Figure 7. Parts of the IAQPoint2 duct-mount monitors

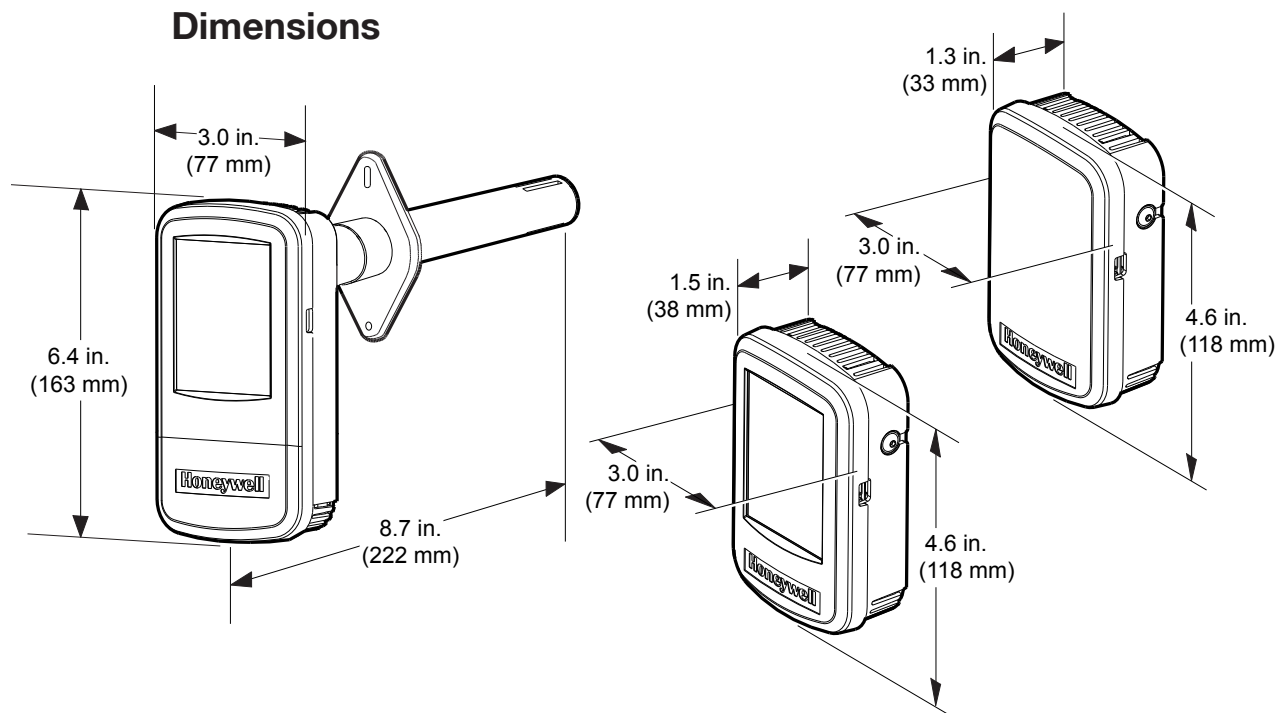


Figure 8. Monitors' dimensions

## Wiring and installation

IAQPoint2 models are available for wall-mounting or duct-mounting. Wall-mount units can be installed on standard single-gang junction boxes. Locate the monitor in an area easily accessible by a technician. Avoid locations in which the monitor will be subjected to vibration or rapid temperature fluctuations. Follow local regulations and site requirements. Position wall-mounted monitors at least 10 feet (3 meters) from any air outlets. Install duct-mounted monitors in return-air ducts (not in supply-air ducts).

### ⚠ NOTE

Analog models are configured to source current only.<sup>1</sup>

### ⚠ NOTE

Non-display models cannot be configured by users. If the CO<sub>2</sub> sensor is fitted, the full scale value will be 2000 ppm. Additionally, if the relay is present, the setpoint will be 850 ppm. If the VOC sensor is fitted, the relay setpoint will be 50%.

The monitor is supplied as part of an installation kit containing:

- IAQPoint2 monitor
- backplate
- two plastic anchors w/screws
- Quick Start Guide (one page, paper)
- Resource CD

<sup>1</sup> Wiring labels are of EIA485 standard.

An optional calibration kit is also available. The kit contains:

- test gas
- M-502875: 0.5LPM Regulator for 58 & 103L Cylinders
- M-502585: 0.5LPM Regulator for 17L Cylinders
- M-501038: CAL GAS 17L CYLINDER NITROGEN (N2)
- M-501011: CAL GAS 103L CYLINDER NITROGEN (N2)
- M-501010: CAL GAS 103L CYLINDER 1,000 PPM CO2 BAL N2
- M-500989: CAL GAS 103L CYLINDER 2,000 PPM CO2 BAL N2
- M-512438: CALIBRATION ADAPTER IAQPOINT
- M-508808: CAL KIT TUBING 6 FEET 1/8 I.D. X 1/4 O.D.

Tools needed:

- drill
- drill bit
- #2 Phillips and 1/8 inch (3 mm) straight screwdrivers
- wire strippers

### CAUTION

The IAQPoint2 Air Quality Monitor is not designed for industrial applications or for use in hazardous locations.

Digital models of the IAQPoint2 monitor should be wired as indicated on the label. Note that the meaning of the A and B symbols for EIA/RS-485 wiring varies among vendors. Terminal 6 corresponds to BACnet '+', the Modbus 'D1' and the EIA/RS-485 'B'. Terminal 5 corresponds to BACnet '-', the Modbus 'D0', and EIA/RS-485 'A'.

### DANGER

Line voltages may be present on the relay terminals.

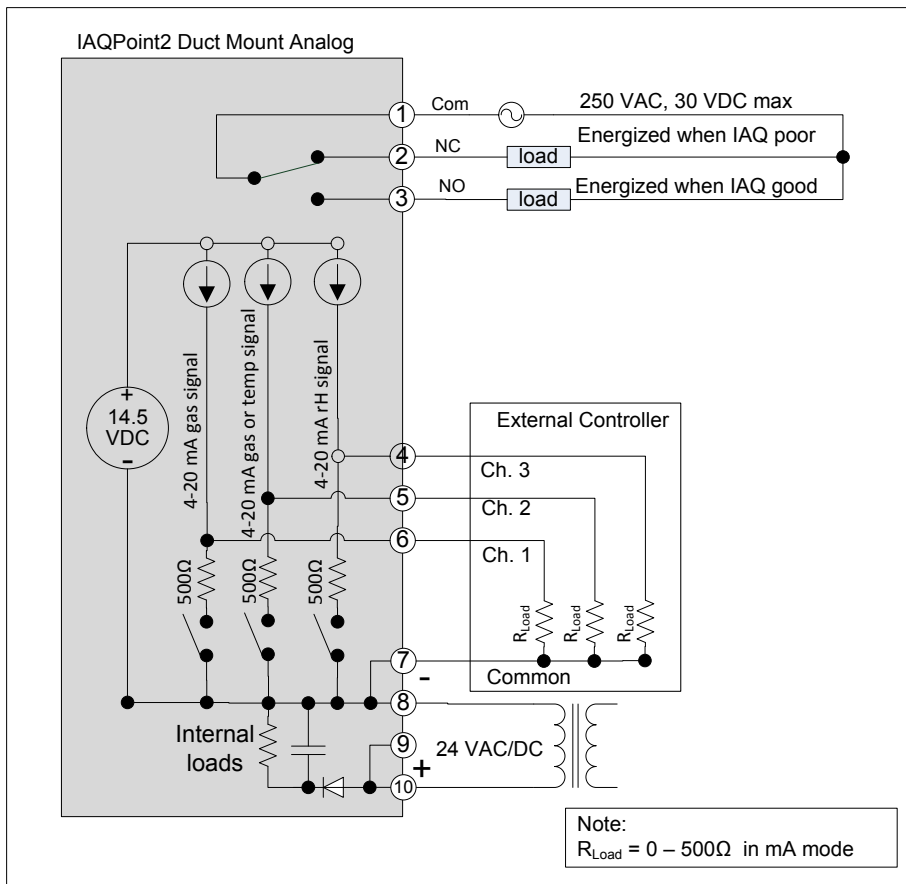


Figure 9. Wiring schematic for analog duct-mount units

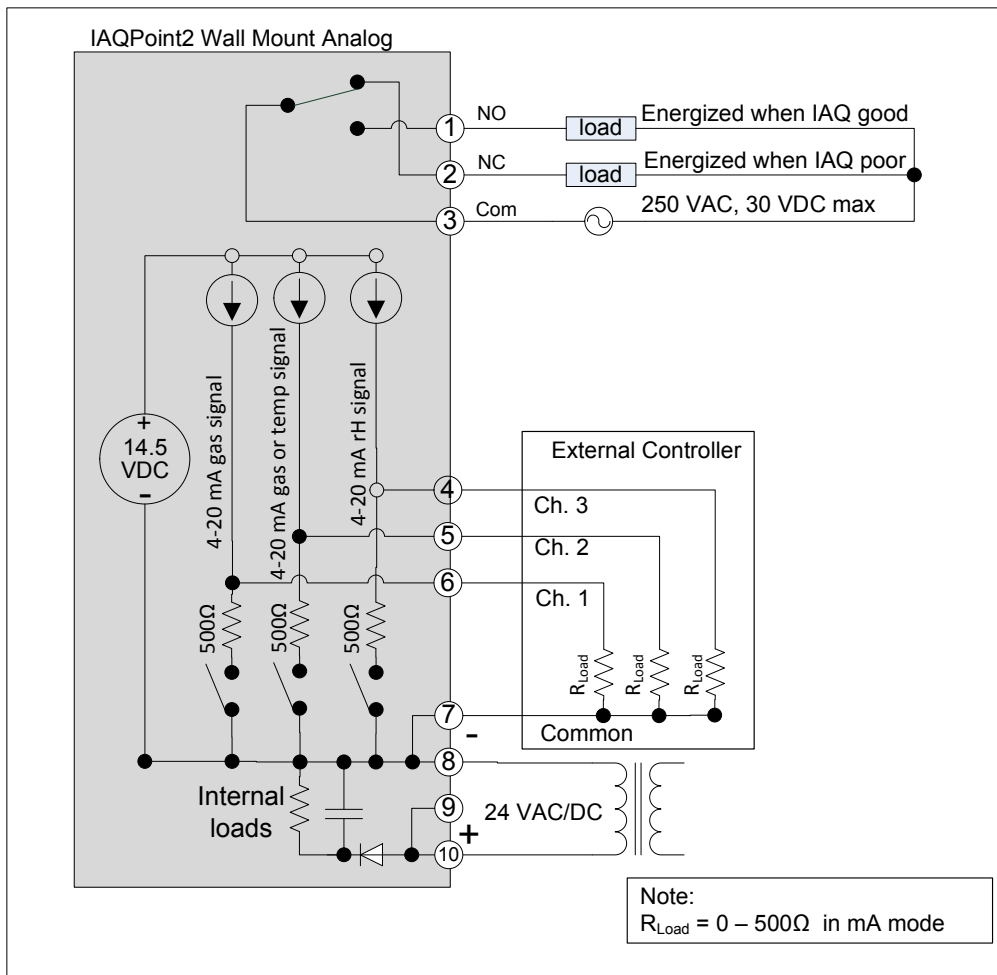


Figure 10. Wiring schematic for analog wall-mount units

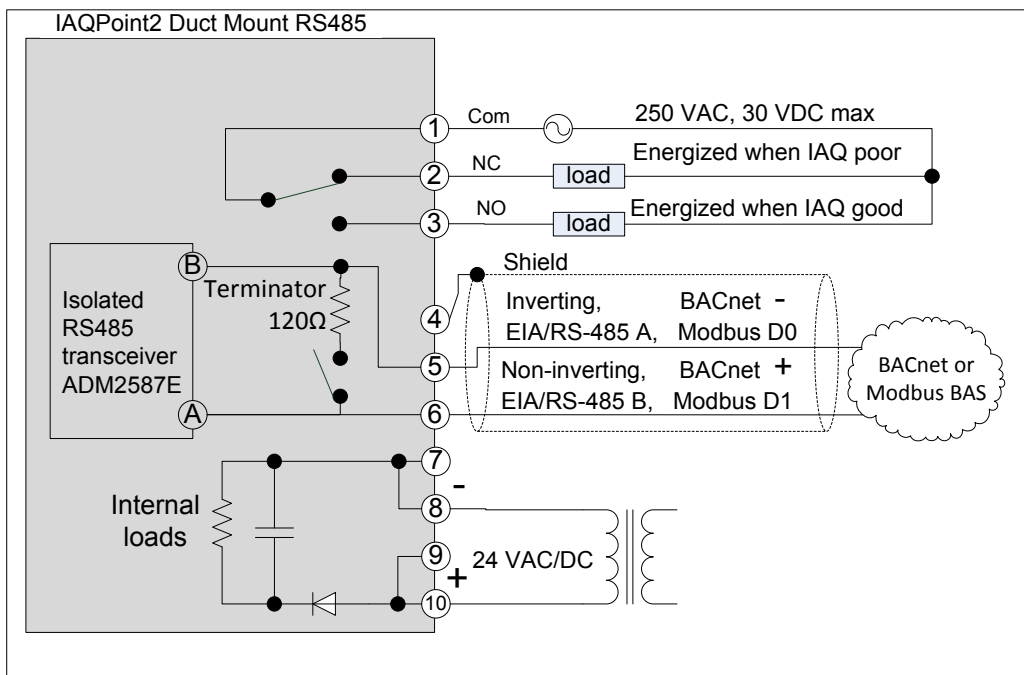


Figure 11. Wiring schematics for RS-485 duct-mount units



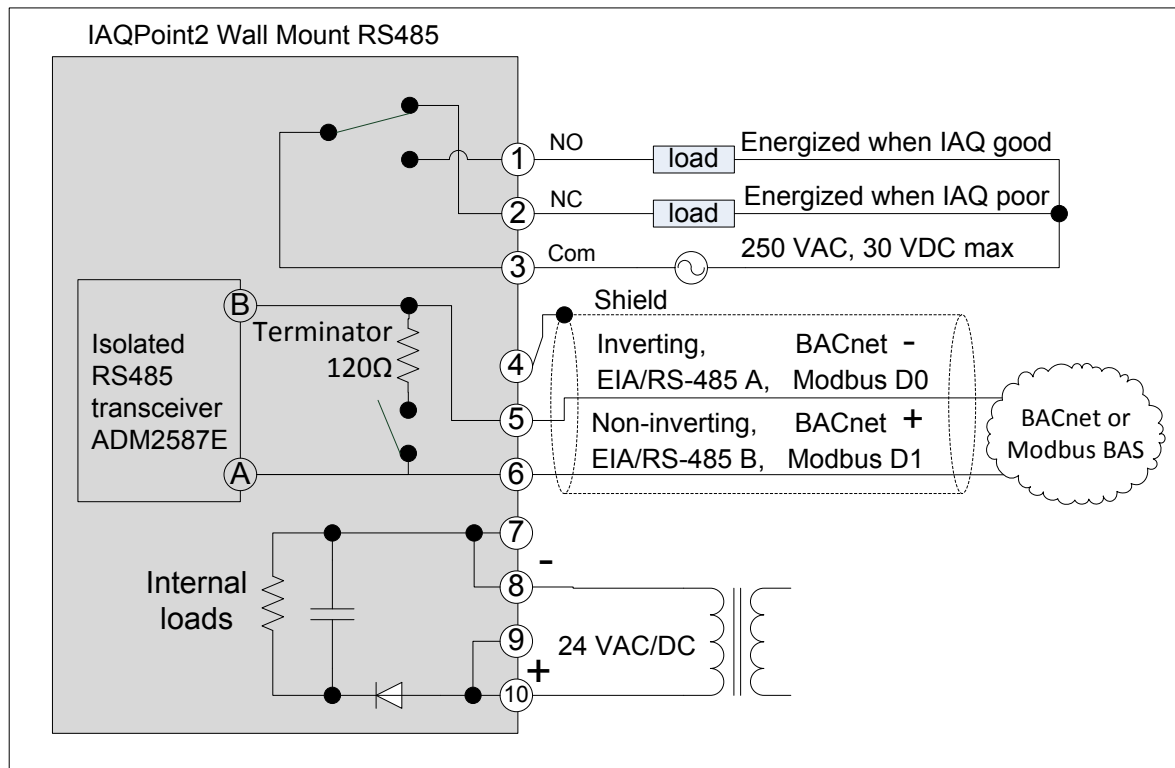


Figure 12. Wiring schematics for RS-485 wall-mount units

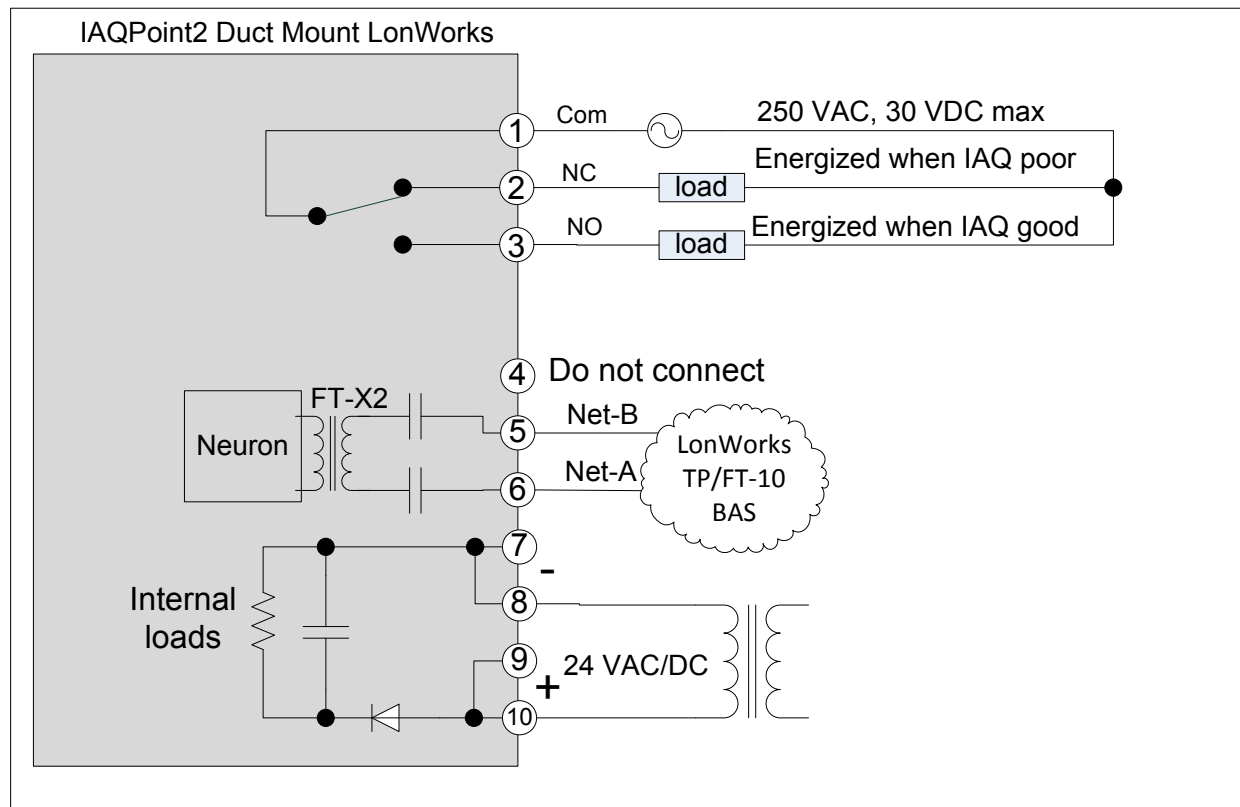


Figure 13. Wiring schematics for LonWorks duct-mount units

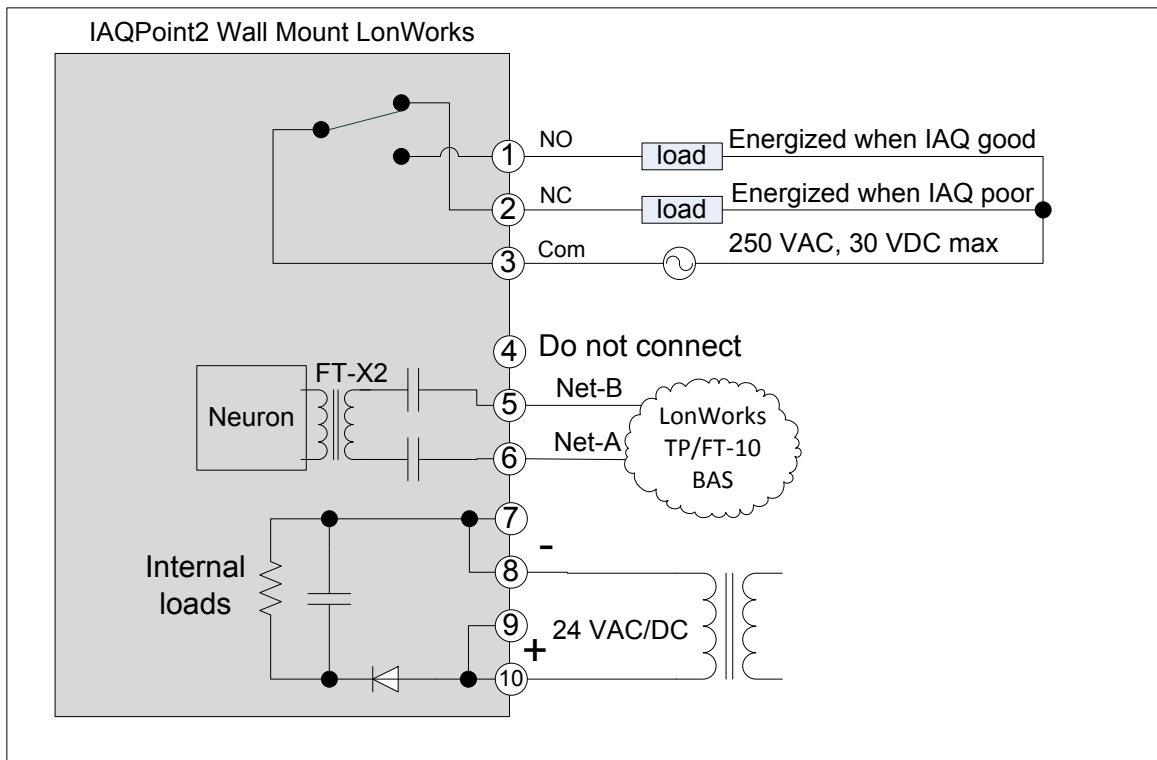


Figure 14. Wiring schematics for wall-mount LonWorks units

## Wall-mounting procedure

The monitor can be mounted onto a wall by following this procedure. Monitors with the optional temperature sensor must be mounted in a location with relatively still air.

1. Center the mounting plate over the wires from the wall with the mounting holes.
2. With a pencil, mark the locations for the two mounting holes. Typical mounting hole distances are shown in this illustration.

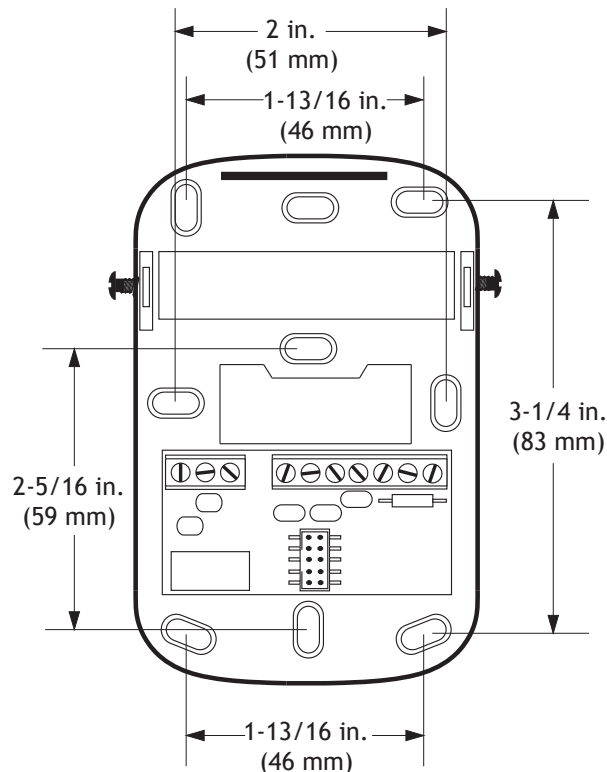


Figure 15. Various mounting distances of the nine backplate mounting holes

3. Drill a hole in the wall at each of the marks.
4. Insert a plastic anchor into each of the holes until they are flush with the wall.
5. Thread the wires through the back of the backplate. Refer to the wiring illustrations on the following pages for various configurations.
6. Attach the backplate to the wall by screwing the supplied metal screws into the plastic anchors. Torque installation screws to 11 in-oz (79 Nmm).
7. Connect each of the wires to the corresponding terminals on the backplate, as shown in the following illustration.
8. Set the slide switches according to the configuration of the monitor. (Slide the switches up for milliamps or down for volts.)<sup>1</sup>
9. Align the bottom of the bezel with the mounted assembly and rotate the top into place. Press firmly until it snaps.
10. Torque the case hex screws to 7-10 oz-in (0.59-0.85 Nm).

<sup>1</sup> The monitor has an internal 500 ohm termination resistor. Default output is mA..

**NOTE**

The image does not auto-rotate. Mount the monitor so that the image is displayed right-side up.

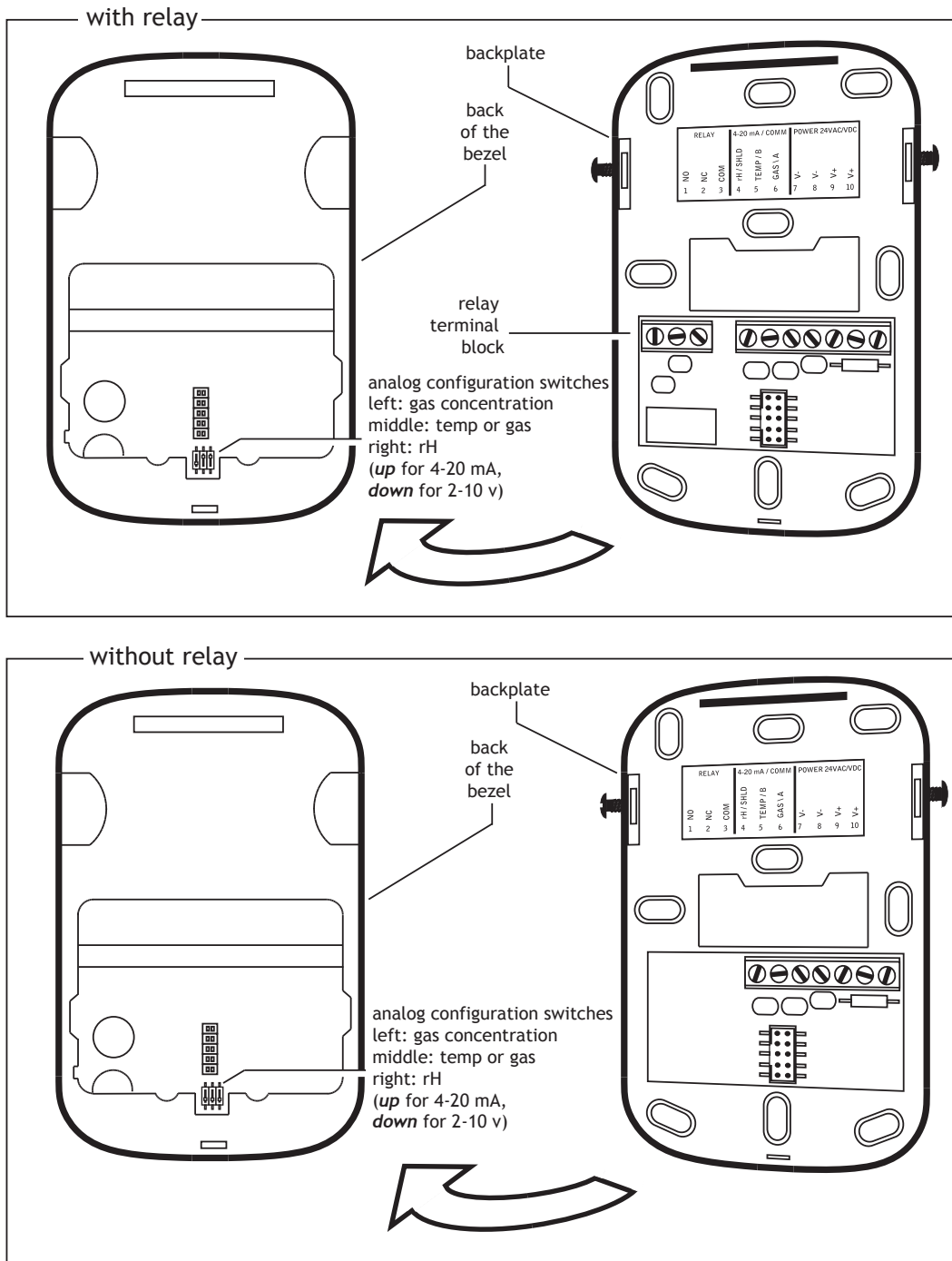


Figure 16. Wiring the analog wall-mounted monitor

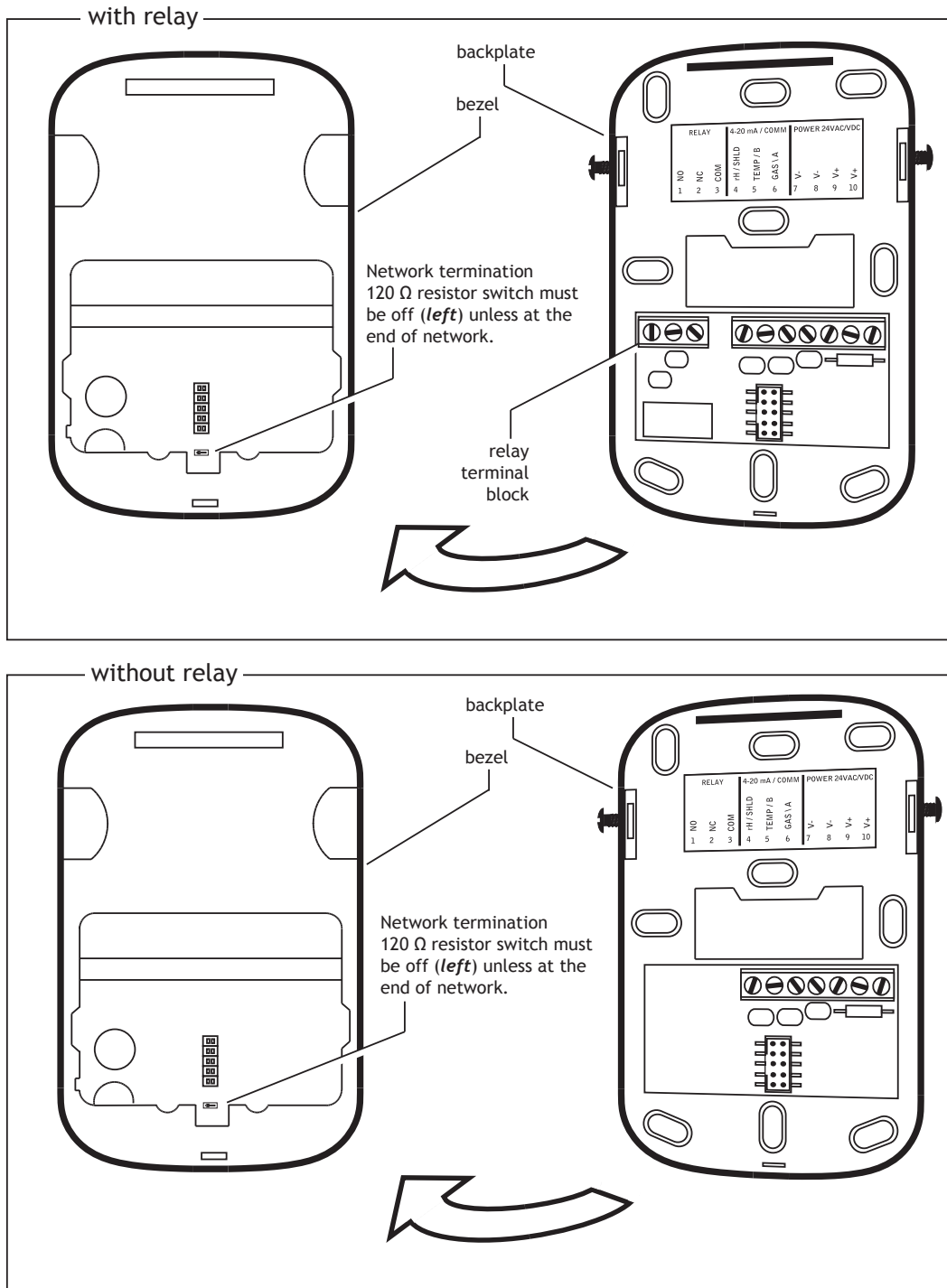


Figure 17. Wiring the digital wall-mounted monitor

## Duct-mounting procedure

The monitor can be mounted on a rectangular duct at least 7 in. × 7 in. (18 cm × 18 cm) or a round duct at least 24 inches (61 cm) in diameter by two sheet metal screws which are supplied in the installer's kit. Do not mount the monitor on the top or bottom of a duct. (The sampling tube is designed for horizontal installation.)

### Installation kit:

- IAQPoint2 monitor
- backplate
- Two metal screws
- Quick Start Guide (one page, paper)
- Resource CD

Optional calibration kit (see page 11 for details)

### Tools needed:

- drill
- hole saw
- drill bit
- #1, #2 Phillips, and 1/8 inch (3 mm) straight screwdrivers
- wire strippers

### Procedure:

1. Make a  $1\frac{1}{16}$ -inch (27 mm) hole in the duct at the desired sampling location.
2. Position the duct-mount bracket over the hole.
3. With a pencil, mark the locations for the two mounting holes.
4. Drill a hole in the duct at each of the marks.
5. Attach the mounting plate to the duct with the supplied sheet metal screws. Torque the screws to 11 in-oz (79 Nmm).
6. Slide the sampling tube through the mounting bracket up to the collar (shown in the following illustration).

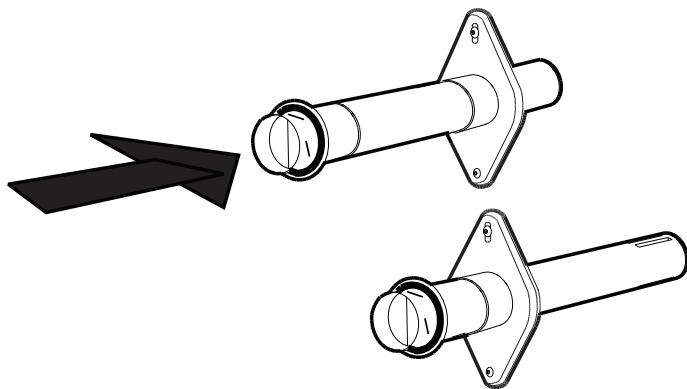


Figure 18. Positioning the sampling tube in the mounting plate

7. Torque the case hex screws to screws to 7-10 oz-in (0.59-0.85 Nm).

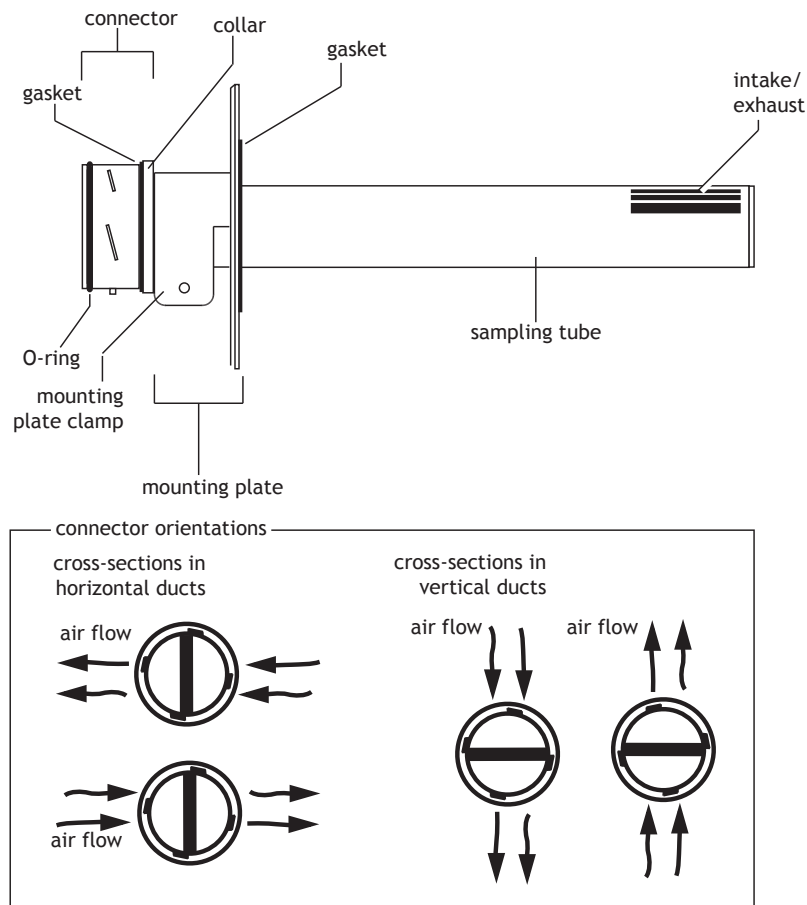


Figure 19. Sampling tube and mounting plate

8. Rotate the sampling tube until the divider shown in the cross-section illustration above is perpendicular to the flow of air in the duct.
9. Lightly lubricate the connector O-ring with water to facilitate installation.
10. Position the connector on the back of the monitor on the sampling tube connector and twist a quarter-turn counter-clockwise. A tight fit is normal (the O-ring on the sampling tube provides a snug seal with the monitor). The monitor will snap into position when it is securely attached to the sampling tube.

### **NOTE**

The display does not auto-rotate. Mount the monitor so that the display is right-side up and wires enter the two conduit holes from the bottom.

11. Tighten the mounting plate clamp screws.
12. Conduit is attached to the bottom of the monitor in the same manner as standard electrical junction boxes. Refer to the wiring illustrations on the following pages for various configurations.
13. Install the terminal block cover.

**NOTE**

For accurate measurements, there must be air movement in the duct.

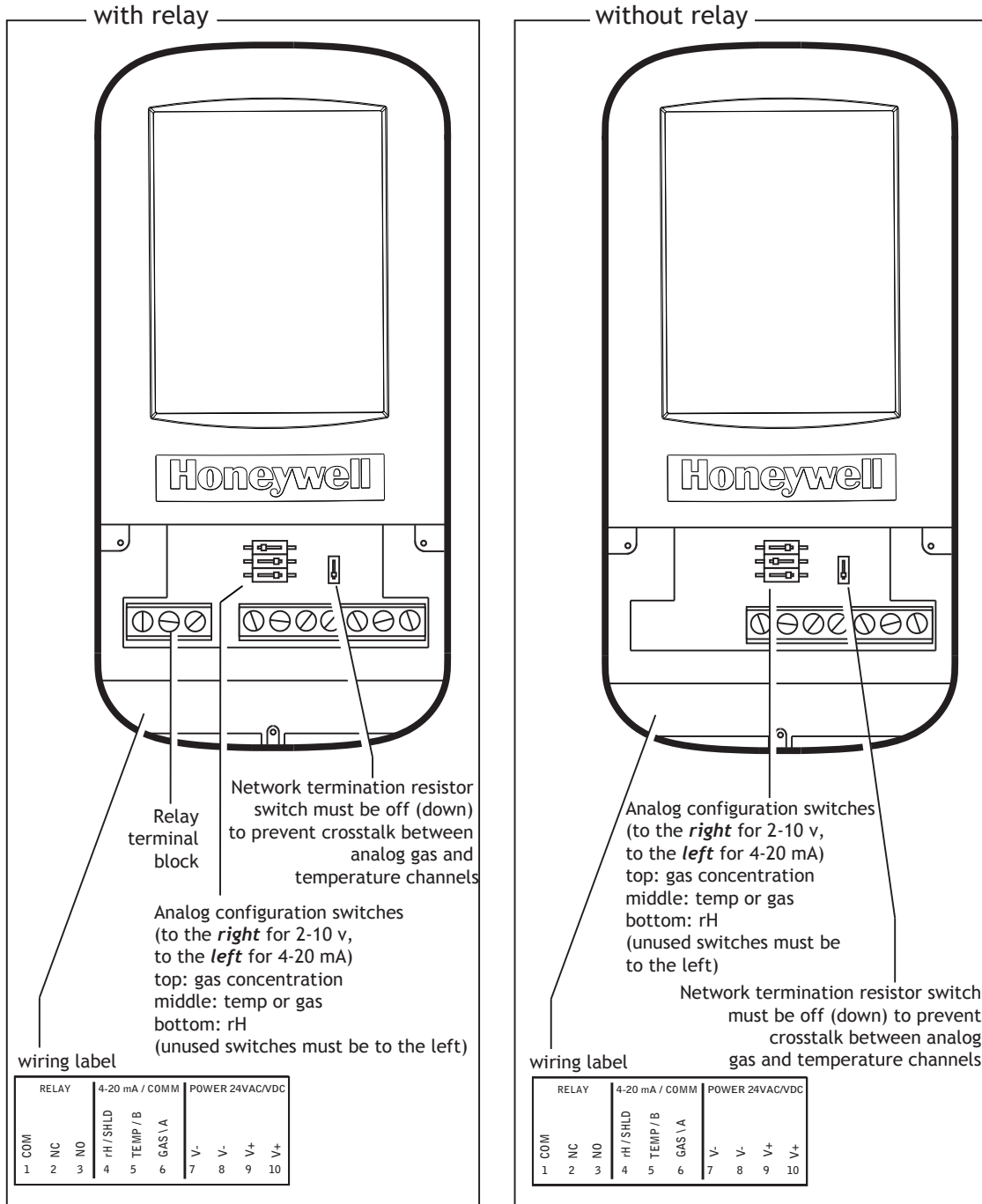


Figure 20. Wiring the analog duct-mounted monitor



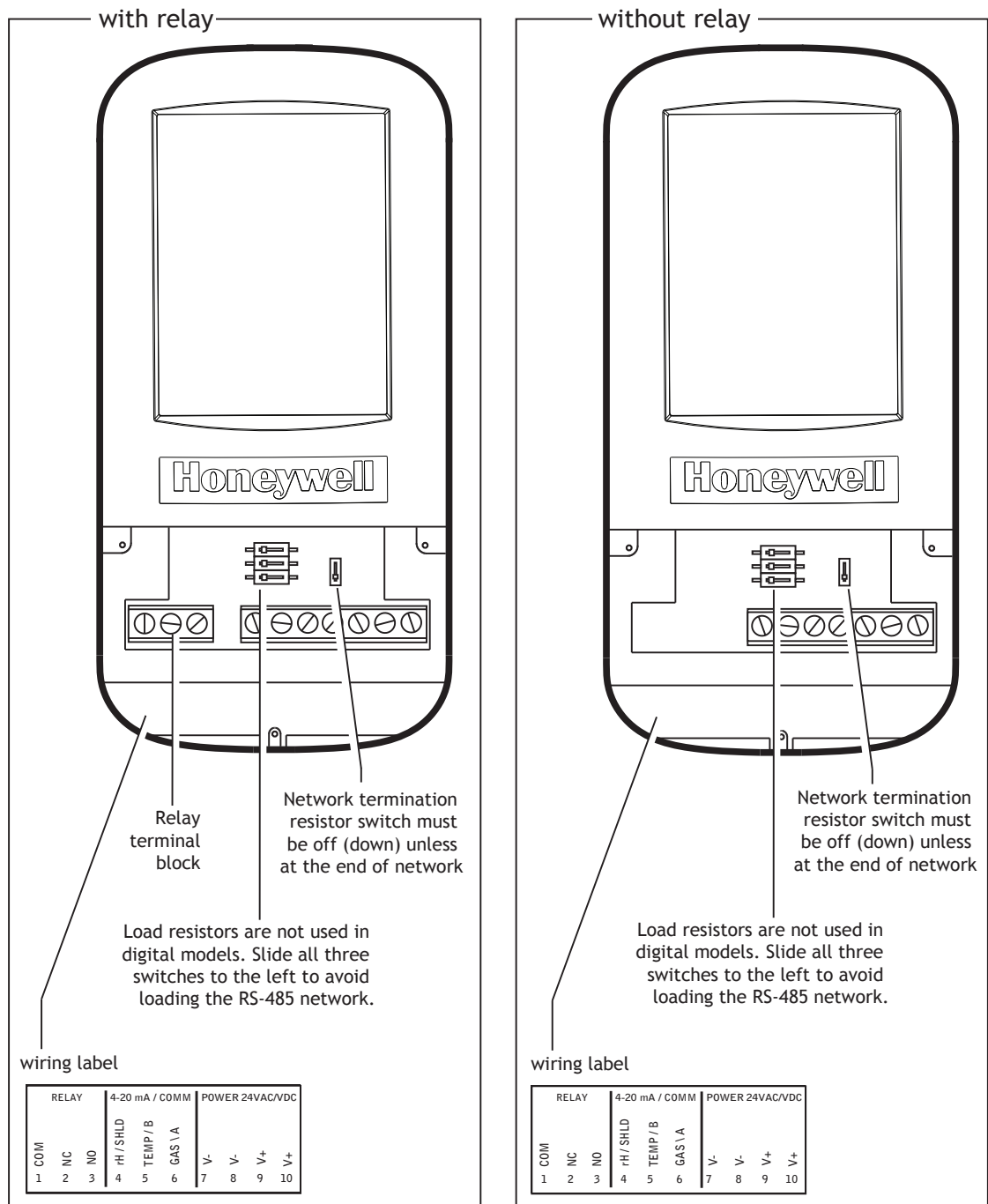


Figure 21. Wiring the digital duct-mounted monitor

## Operation

### First power-up

No calibration of the CO<sub>2</sub> or VOC sensors is required at startup. The monitor will immediately begin operation with the default parameters discussed in the *Menus* section. If desired, the monitor can be calibrated, however. Calibration procedures are described beginning on page 44.

#### **NOTE**

Expect some slight variability in the monitor's output when initially powered up. The sensors will fully stabilize after two to three weeks.

## Commissioning

### *CO<sub>2</sub> Configurations*

#### **With Automatic Baseline Correction (ABC) enabled**

When the monitor is first powered up with ABC enabled (the default is ABC on), no calibration is required. ABC monitors the background CO<sub>2</sub> levels and makes adjustments to the baseline calibration once every 24 hours. Within three weeks, the CO<sub>2</sub> sensor will adjust to the environment and be performing at the specified accuracy. No further adjustment or calibration of the CO<sub>2</sub> sensor is required.

#### **With ABC disabled**

This section applies to display models only. For applications in which ABC is disabled, the monitor must be calibrated at least annually to accommodate any drift due to the environment in which it is installed and to compensate for the sensor electronics.

When the monitor is first powered up with ABC disabled, allow it to operate for 24 hours in the environment in which it will be used. If necessary, check the accuracy of the sensor by applying a known concentration of test gas, following the instructions in this manual for proper calibration procedures.

#### **Temperature and relative humidity**

The monitor's internal temperature will stabilize about twenty minutes after first being powered up. The monitor provides the capability to calibrate temperature and humidity sensor readings. If, after the system has stabilized, it is determined that a temperature offset is required, follow the instructions in this manual for proper calibration procedures.

#### **VOC Configurations**

The VOC sensor used with the IAQPoint2 monitor requires no calibration but allow it fifteen minutes to warm up each time power is applied. The sensor will use the air in which it is powered up as the baseline. The VOC sensor will adapt to the environment in which it is installed.

**⚠ NOTE**

If the monitor is installed in an area with a chronically high level of VOCs, it will use that level to establish its baseline. It will then report a high VOC level only when the concentration rises above this baseline. It will recalibrate the baseline when chronic VOCs are abated.

***LCD touchscreen monitors***

The user will be presented with one of two interfaces, depending on the password that is entered. Figure 25 in the *Menus* section is a map of all of the IAQPoint2 monitor's interface options. Exact options will vary depending on the configuration of the unit.

**⚠ CAUTION**

Do not use excessive pressure on the touchscreen.

**Warm-up**

Monitors equipped with CO<sub>2</sub> sensors require a warm-up period at room temperature and 30-70% relative humidity. Typically, this takes about 1 minute and is never more than 15 minutes. They will self-calibrate in two to three weeks. VOC sensors also require warm-up periods of up to 15 minutes after an initial baselining with clean air. They will self-calibrate in a week.

**The ABC algorithm**

ABC (Automatic Baseline Correction) keeps track of the sensor's lowest reading over a 7½-day interval and slowly adjusts for any long-term drift that is detected as compared to the expected fresh air value of 400 ppm CO<sub>2</sub>.

Do not perform delivery inspections or performance verification tests concerning sensor reading accuracy immediately after installation. Rough handling and transportation can result in a reduction in the accuracy of sensor readings. Over time, however, the ABC function will adjust the readings back to the accurate numbers.

The non-display unit is configured with ABC enabled. No calibration is required.

Contact a Honeywell Analytics representative for advice regarding a proper calibration strategy.

## Output levels

Models without the optional temperature/humidity sensor will report gas concentrations on channel 2 identically to channel 1.

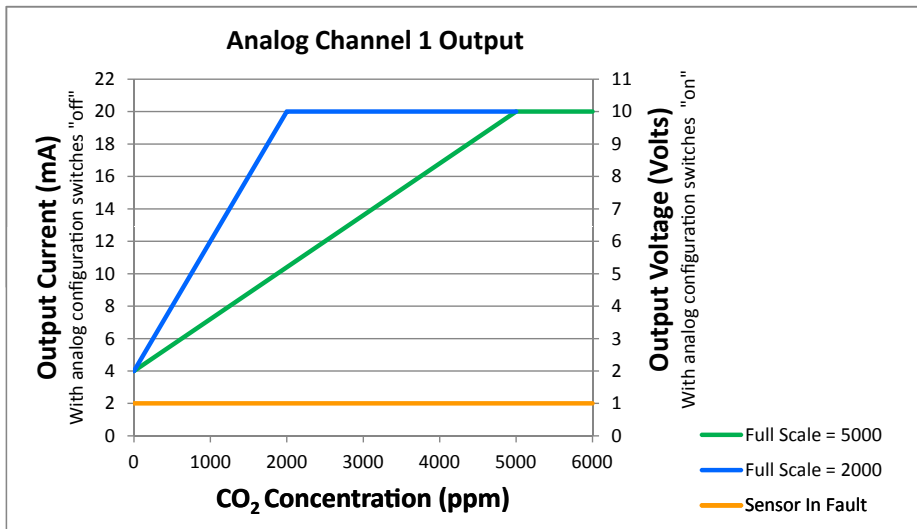


Figure 22. CO<sub>2</sub> current and voltage output levels

Models with the TRH sensor can be configured to do this via the *Configure\Configure Outputs\mA Ch2 Function* menu. The analog current output will go to 2.0 mA or 1.0V if a fault occurs. External equipment should be configured to respond to this signal by providing maximum ventilation.

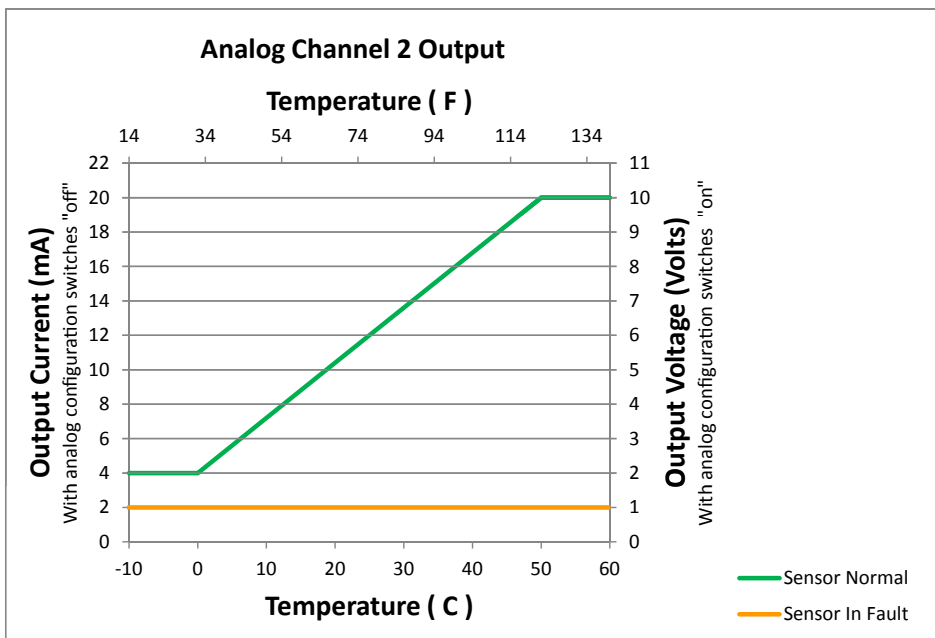


Figure 23. Temperature current and voltage output levels

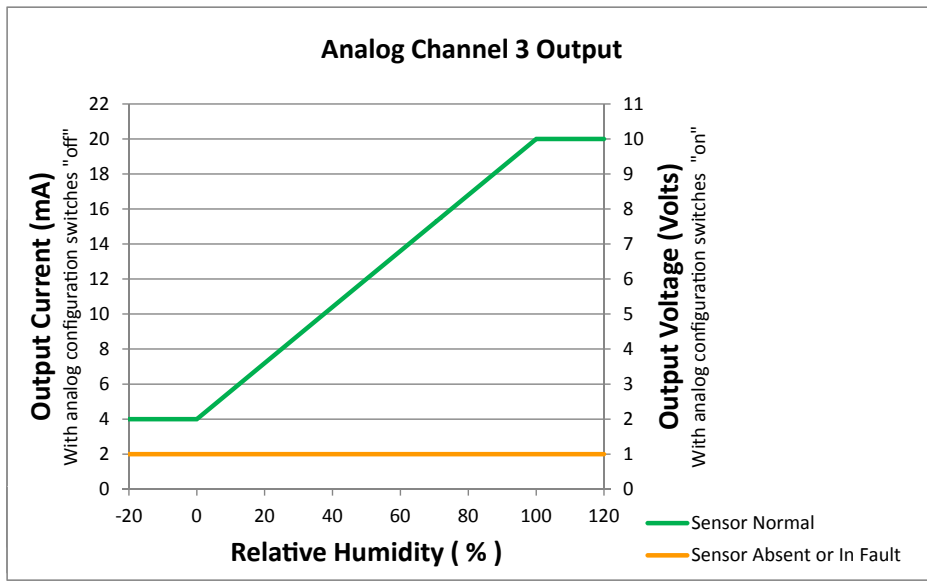


Figure 24. Relative humidity current and voltage output levels

## Configuration of Display Units

The IAQPoint monitor's menus can be navigated using this menu map. Each of the screens is discussed in detail on the following pages.



Figure 25. The IAQPoint2 Air Quality Monitor menu map

The contents of some menus vary depending on the configuration of the monitor and on which password was entered. Those variations are noted in the appropriate sections.

**Menu naming conventions**

Menus are navigated by pressing the appropriate buttons. Active buttons are indicated by yellow borders. These buttons will be identified by placing them in brackets, for example, if the instruction is “Select [Configure]”, press the button which contains the word “Configure”.

**Default display**

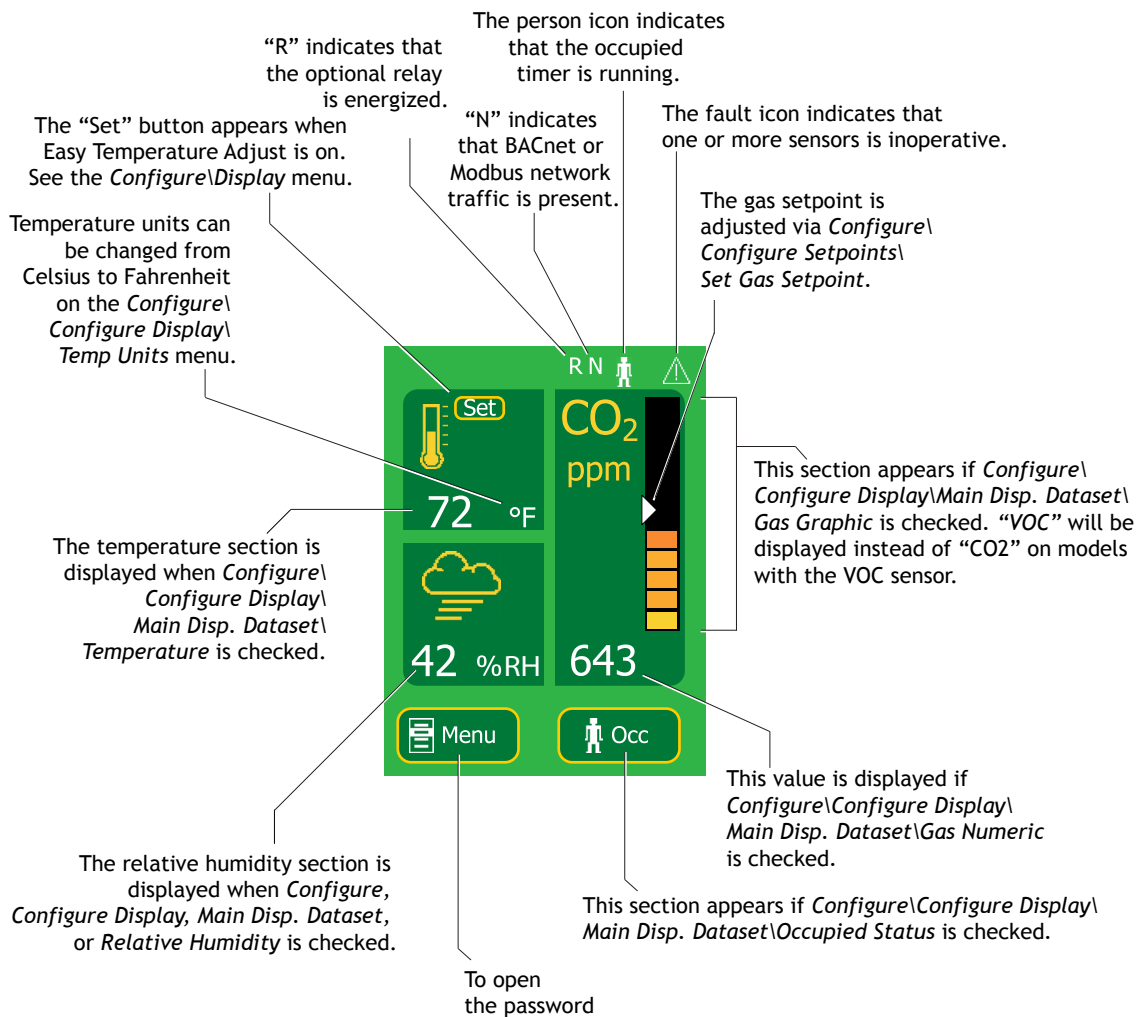


Figure 26. IAQPoint monitor home screen

In the Default Display, the user will see information about the conditions being detected by the monitor. A typical display is shown here but the exact combination of data can be customized extensively. Press [Menu] to advance to the password entry screen or [Occ] (for “Occupied”) to override the monitor’s programmed functions. This will allow the building’s current status to be maintained for a period of between one minute to two hours.<sup>2</sup>

<sup>2</sup> The [Occ] function can also be configured to activate a relay or receive fieldbus input from a BACnet network.

### Navigation

Most screens include three navigation buttons at the bottom of the display:



Press the Accept button [✓] to accept displayed entries or values and return to the previous menu.

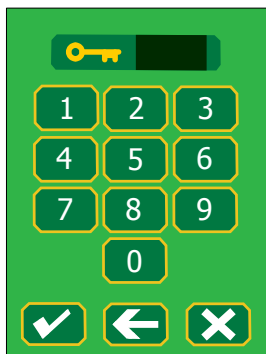


Press the Delete button [←] to delete values (one character at a time).



Press the Cancel button [✕] to return to discard any input and return to the previous menu.

### Password entry

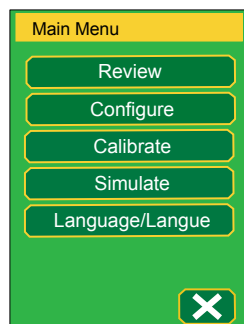


The user's password, a four-digit number, is entered by pressing the appropriate numbers on the touchscreen. As each number is selected, it is shown near the top of the display. After the four numbers are displayed, press [✓] to proceed to the main menu. Press [←] to delete the last digit entered (repeat to delete more digits). Press [✕] to return to the Default Display screen without entering a password.

The monitor will accept two passwords. A level 1 password (0000 by default) will allow the user to, for example, modify the monitor's temperature setpoints. A level 2 password (2967 by default) will give the user access to additional functions such as constraining those setpoints to a certain range, customizing the default display, or changing passwords.

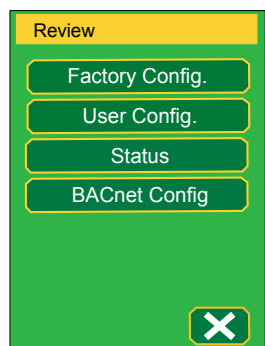


### Main menu



Access to the main menu is gained after an accepted password (either level 1 or level 2) has been entered. The Calibrate option is available only with level 2 access.

### Review menu



All of the operational parameters of the monitor can be viewed through the Review menu.

#### *Review\Factory Config.*

This screen shows the factory settings of the IAQPoint2 monitor (serial numbers, software version number, and time stamp). Below the time stamp is an indication of the IAQPoint2 hardware output type. This can be either “Analog” or “RS-485” for the BACnet/Modbus version. The bottom line shows whether the optional temperature and relative humidity sensor is fitted. This can have the value “Y” or “N”.

#### *Review\User Config.*

This screen summarizes how the IAQPoint2 has been configured. The top two lines convey the communications settings for the digital fieldbus (protocol name, baud rate, addresses, and parity). On analog versions of the product, this line will simply contain “Analog” because there is nothing to configure. The third line contains the configuration of the gas sensor including the setpoint and hysteresis.

The fourth line conveys the configuration of the optional temperature sensor. The numbers include the setpoint and the minimum and maximum settings. The min/max settings can be adjusted in *Configure\Set Max Temp Setpoint* and *Configure\Set Min Temp Setpoint* below. The fourth row contains calibration information. The fifth line contains the settings of the optional relative humidity sensor. On IAQPoint2

units without the optional temperature and humidity sensor, lines three through five contain “TRH Sensor Not Fitted.”

Line six conveys the period of the occupied timer and the relay source. The occupied timer period can be set from 1 minute to 2 hours in six steps. The relay source indicates the function of the optional relay. It can be configured to respond to the gas level, to the digital fieldbus, or to the occupied timer.

### ***Review\Status***

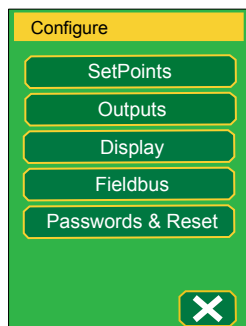
The Status screen shows temporary information about the IAQPoint2 monitor. The first line shows how many seconds the monitor has been running since the last power interruption. The second shows whether the optional relay has been detected. If the monitor is configured with a VOC sensor, line three displays the raw signal from it. This number decreases when volatile organic compounds are detected and can be useful for sensor verification.

### ***Review\BACnet Config.***



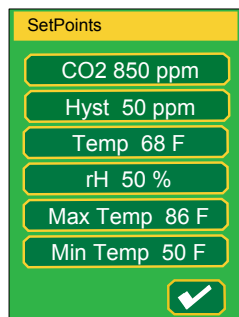
This screen displays the names of the ten BACnet objects and the device location. These are writable over the network.

### ***Configure menu***



The monitor’s customization begins with the Configure menu. The setpoints option is available only with digital monitors and monitors equipped with relays. The fieldbus option is available only with digital monitors.

### *Configure\Configure Setpoints submenu*



Setpoint submenus for up to six parameters can be selected from this menu.

### *Configure\Configure Setpoints\Set Gas Setpoint*

The setpoint for CO<sub>2</sub> or VOCs is changed at this screen. This affects the position of the white triangle indicator on the main screen. This value is reported over BACnet and Modbus. It is compared to the actual gas readings and can be used to drive the relay and the binary outputs in BACnet and Modbus. This screen will not be visible in models containing neither the relay nor the fieldbus outputs.

### *Configure\Configure Setpoints\Hyst. Setpoint*

The hysteresis range settings effectively serve as a damping feature. They determine a system's sensitivity, controlling how often the the monitor activates the HVAC system. A narrow hysteresis range would cause an HVAC system to react to minor changes. If the range is extremely narrow, the HVAC equipment will cycle excessively and, therefore, undergo unnecessary wear. A wide hysteresis range would require large deviations from the setpoint before responding to changes in the gas concentration. If the range is too wide, occupants will experience discomfort before the HVAC system responds.

Hysteresis determines how quickly the digital outputs (relay or fieldbus) respond to decreasing gas concentration. The digital output will activate when the concentration is greater than the setpoint. It will de-activate when the concentration is less than the setpoint minus the hysteresis. This sets a hysteresis value.

The binary outputs (relay, BACnet, and Modbus) go false only when the gas concentration drops below the setpoint less hysteresis. This screen will not be visible in models containing neither the relay nor the fieldbus outputs.

### *Configure\Configure Setpoints\Set Temp Setpoint*

The setpoint is the value at which the monitor will cause the building's HVAC system to respond. Any number between 32 and 106°F (0-50°C) can be chosen at this screen. The default setting is 68°F (20°C). The temperature setpoint is reported over BACnet and Modbus. This screen will not be displayed on analog models or on models that lack the temperature sensor.

### ***Configure\Configure Setpoints\rH Setpoint***

The rH setpoint is the value at which the monitor will cause the building's HVAC system to respond to changes in humidity. Relative humidity values from 1% to 99% can be selected. The default setting is 50%.

This screen will not be displayed on analog models or on models without the temperature sensor. The rH setpoint is reported over BACnet and Modbus.

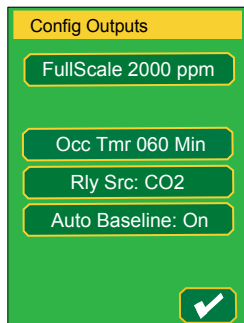
### ***Configure\Configure Setpoints\Set Max and Min Temp Setpoint***

A level 2 password is required to change the maximum temperature setpoint. This feature constrains the highest temperature which can be selected at the "Set Temp Setpoint" screen, which requires only a level 1 password. The maximum value in the range can be any temperature between 32 and 122°F (0-50°C). It must be higher than the minimum temperature setpoint. The default temperature is 86°F (30°C).

The minimum temperature setpoint is changed in the same manner. The minimum value in the range can be any temperature between 32 and 122°F (0-50°C). It must be lower than the maximum temperature setpoint. The default setting is 50°F (10°C).

These two screens are visible only on models with the optional temperature sensor and fieldbus outputs. Both screens will be greyed out until the level 2 password is entered.

These parameters affect the Configure\Configure Setpoints\Set Temp Setpoint and the Temperature Adjust screens.



### ***Configure\Configure Outputs\Set CO2 Full Scale***

The Set CO2 Full Scale screen is visible only on models with the CO<sub>2</sub> sensor. Two settings are available, 2000 or 5000 ppm. Setting the CO<sub>2</sub> full scale allows the CO<sub>2</sub> value to be displayed on the vertical "thermometer" bar. It also affects the analog output. This setting does not affect the numeric gas concentration display or the fieldbus outputs. Thus in an environment that contains 3000 ppm of CO<sub>2</sub>, this setting determines whether the vertical "thermometer" bar shows 100% full or 60% full. It also determines whether the analog output contains 20 mA/10 V or 13.6 mA / 6.8 V. It does not affect the numeric display; it will show 3000 ppm. It does not affect BACnet or Modbus, either; these will report 3000 ppm.

The default setting is 2000 ppm.

### ***Configure\Configure Outputs\Set mA Ch2 Function***

The IAQPoint monitor has three channels. Channels 1 and 2 report gas values. Channel 2 can be configured to measure temperature (voltage) instead. Channel 3 measures humidity when the optional rH sensor is installed. Report Temperature is the default when the monitor is configured with a temperature/humidity sensor, otherwise Report Gas Conc. is the default.

The operation of the middle of the three analog outputs is determined at this screen. (It will not be visible on digital models.) Models without the optional temperature sensor route the gas signal to channel 2 by default and so do not show this screen. Thus this screen is visible only on models with analog output and a temperature sensor.

This screen permits changing the function of channel two. For example, a certain monitor might be in an environment with a CO<sub>2</sub> concentration of 5000 ppm (full scale) and a temperature of 77°F (half scale). If the channel 2 function is set to temperature, the 12 mA/6 V (temperature) signal will be produced by channel 2.

But if the channel 2 function is set to CO<sub>2</sub>, the 20 mA/10 V (the CO<sub>2</sub> signal) will be produced by channel 2. This feature works in a similar fashion if a VOC sensor is fitted. It has no effect on the operation of channels 1 or 3. This facilitates getting from a single monitor both current and voltage signals that are proportional to the CO<sub>2</sub> concentration.

### ***Configure\Configure Outputs\Set Occupied Timeout***

Set Occupied Timeout controls the delay between when the HVAC system is given the command to deactivate and when it actually shuts down. Available values vary from one minute to two hours in six steps. The occupied timer starts running whenever the [Occ] button on the main screen is pressed. (The [Occ] button is hidden by default but can be shown via *Configure\Configure Display\Main Display Dataset*.) The timer drives the “occupied” icon (🏠) on the main screen, a fieldbus output, and can be configured to drive the relay. (The relay is configured via the *Configure\Configure Outputs\Set Relay Source* screen.)

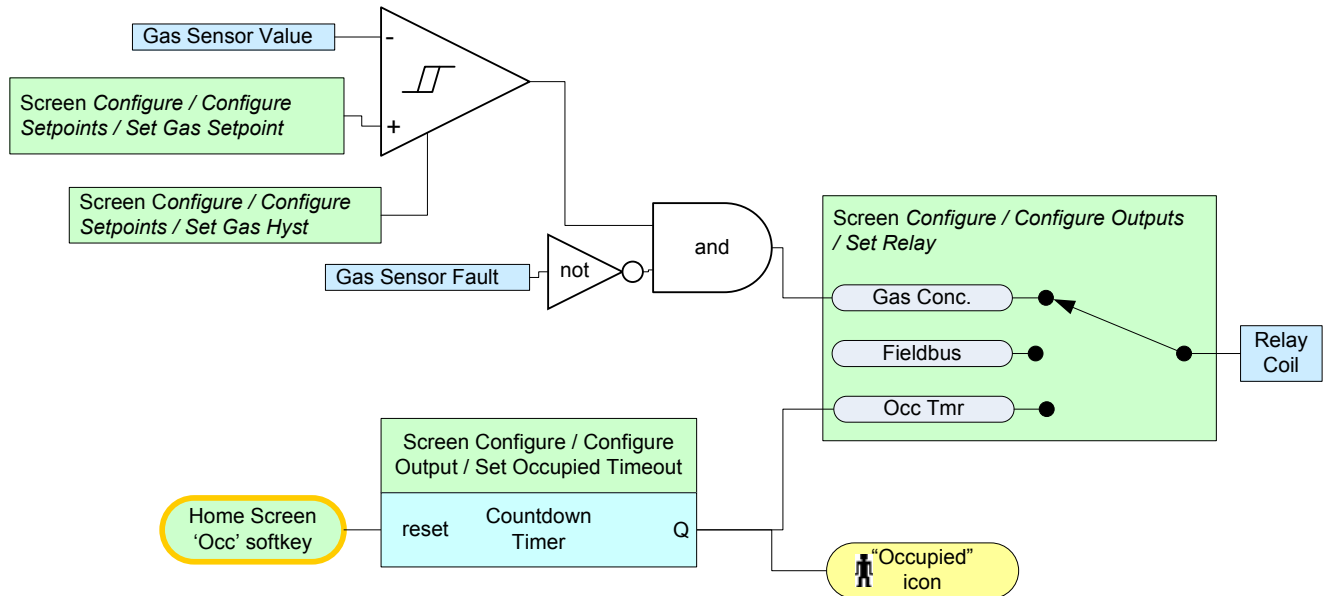


Figure 27. IAQPoint2 relay flow

### ***Configure\Configure Outputs\ Set Relay Source***

The functions of the relay are adjusted at this screen. The monitor normally responds to gas concentrations (i.e., the air quality level). The Set Relay Source feature allows a relay to respond to the occupied timer or, for digital versions, to the network (fieldbus, for example, in BACnet systems). The default selection is air quality level.

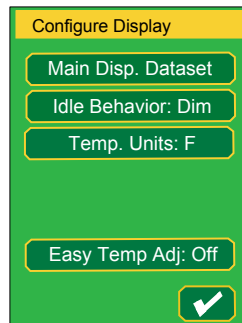
By default, the relay energizes when the gas concentration is lower than the setpoint. However, this screen also facilitates configuring the relay to respond to fieldbus inputs (and thus become a general purpose output). This screen can configure the relay to energize whenever the occupied timer is running as well. In this mode the button plus relay function as a classic “override” input –the relay can be hardwired to a universal input on a building automation controller. Figure 27 illustrates the operation of the relay.

### ***Configure\Outputs submenu\Automatic Baseline***

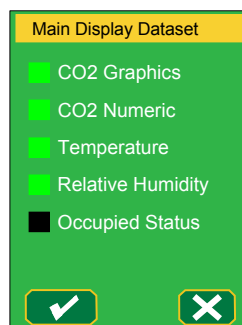
The internal CO<sub>2</sub> sensor can apply continuous, slow fine-tuning so that the minimum observed concentration is reported as 400 ppm, which is the approximate atmospheric concentration of carbon dioxide. This automatic baseline feature is enabled by default and, in most situations, eliminates the need for periodic calibration. However, it requires that the environment be unoccupied regularly so that the internal CO<sub>2</sub> concentration falls to atmospheric levels. (This would make the automatic baseline feature inappropriate for buildings such as hospitals or greenhouses which have CO<sub>2</sub> generation around the clock.)

After the automatic baseline setting is changed, power to the monitor must be removed briefly for correct operation (a soft reboot is insufficient). This can be accomplished by loosening the screws and briefly disconnecting the monitor from the backplate.

The Automatic Baseline screen is not accessible if the monitor has a VOC sensor.

**Configure\Configure Display**

Temp Units is available only for monitors with temperature/humidity sensors. Easy Temp Adj is available for digital monitors and those fitted with temperature/humidity sensors.

**Configure\Display\Main Display Dataset**

How much information is displayed on the home screen is determined at this screen. For example, some users may choose to disable the display of some information for simplicity and less distraction. In some installations, it may be preferable to disable the CO<sub>2</sub> reading. Any combination of the five outputs is permissible (including, if desired, none of them). The default selections are Gas Graphic, Gas Numeric, Temperature, Relative Humidity, and Occupied Status. (Temperature and Relative Humidity are available in monitors with the temperature/humidity sensor.)

**Configure\Display\Idle Display Behavior**

To conserve energy, if the screen has not been touched for five minutes, the monitor will revert to the home screen and, depending on the selection made at the Idle Display Behavior screen, will either dim or go off. Off is the default selection.

There is no setting to keep the display at full brightness or to persist on the menu screen without touching.

**Configure\Display\Temp. Units**

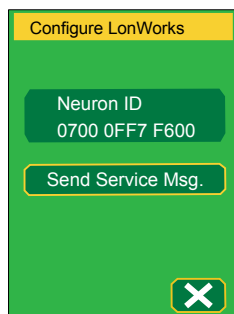
Whether temperatures are displayed in degrees Fahrenheit or degrees Celcius is controlled from this screen. The default is Fahrenheit. This screen is available only on models with the optional temperature/humidity sensor.

***Configure\Configure Display\Easy Temp Adj***

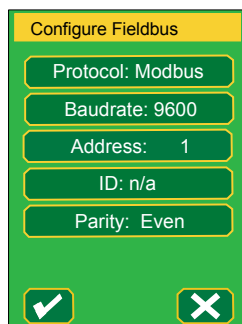
If desired, a “Set” button can be displayed on the main menu, allowing the temperature setpoint to be changed without entering a password. By default, this feature is disabled. This feature is disabled by default and is only available on models with the temperature sensor and the BACnet/Modbus interface.

***Configure\Configure LonWorks [or] Configure Fieldbus***

Models with the LonWorks interface will display this screen:



The following screen is available only on models with the BACnet/Modbus interface. The monitor’s fieldbus configuration options apply only to RS-485-enabled units.



The monitor will reboot whenever the [✓] button is pressed so that the new communication parameters will be implemented correctly.

***Configure\Configure Fieldbus\Set Protocol***

The monitor can be configured for either BACnet or Modbus from the Set Protocol screen. The default is Modbus.

If the monitor is to communicate with the Honeywell Analytics 301C controller, this screen should be configured for Modbus, 9600 baud, and no parity. The address must be unique. If the monitor contains the optional temperature/humidity sensor, the next two higher addresses should not be used.

***Configure\Configure Fieldbus\Set Fieldbus Speed***

The data rate of the fieldbus (from 4800 to 115200 baud) is selected at this screen. This value must match all of the other devices on the segment.



### ***Configure\Configure Fieldbus\Set Address***

If the BACnet protocol is selected, this screen facilitates setting the BACnet MAC address from 1 to 127. If the Modbus protocol is selected, it facilitates setting the Modbus ID from 1 to 247. The address must be unique within the segment.

### ***Configure\Configure Fieldbus\Set BACnet ID***

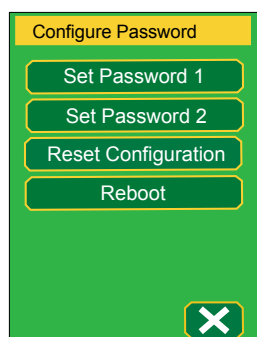
The BACnet ID can be adjusted to any value between 1 and 4,194,302 with the numeric keyboard. The default value is 1. The Set BACnet ID menu applies only if the BACnet protocol is selected. This number must be unique within the entire network. A network may consist of multiple segments separated by routers. Values from 0 to 4194302 may be entered.

### ***Configure\Fieldbus\Set Parity***

Parity value selections apply only to monitors configured with the Modbus communications protocol. Even parity is the default.

This parity screen is available only if the Modbus protocol is selected. (BACnet always uses no parity.) The monitor will use one stop bit unless the parity is set to “none” in which case it will use two stop bits.

### ***Configure\Configure Passwords & Reset\Set Password 1 or 2***



Password options are available through the Configure Passwords menu. The Password Level 1, Password Level 2, and Reset to Factory Settings options are described below. The Reboot option will force the monitor to shut down and then restart.

This screen allows two passwords to be set. Passwords must be four digits long.

### ***Configure\Configure Passwords & Reset\Reset all configuration***

The Reset All Configuration option allows existing passwords to be deleted and returns all of the monitor's options to the default values.

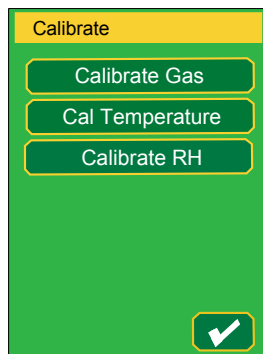
This function resets all user configuration information to factory defaults. This includes setpoints, passwords, fieldbus configuration, and custom milliamp output calibrations. The monitor will reboot after selections from this menu have been made.

**Configure\Configure Passwords & Reset\Reboot**

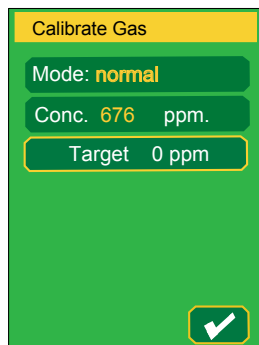
This will force the monitor to reboot.

 **NOTE**

There is no confirmation screen after pressing the [Reboot] button.

**Calibrate menu**

Calibration procedures are initiated at the Calibrate menu. Refer to local regulations for calibration requirements. Calibrate the monitor at least once a year to maintain the highest level of accuracy.

**Calibrate\Calibrate Gas**

This screen is visible only on models with the CO<sub>2</sub> sensor and only after the level-2 password has been entered. Calibration cannot be performed if Automatic Baseline is enabled, as it is by default (see Configure\Configure Outputs\Automatic Baseline above).

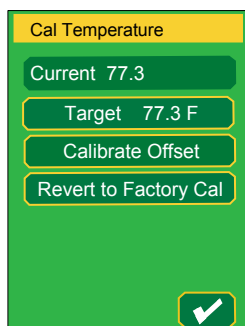
The top line shows the current state of the gas sensor. Possible values include:

- normal
- in base cal
- base cal pass
- base cal fail
- in fault

The gas sensor must be in the “normal” state for a calibration to be performed. The second line shows the current CO<sub>2</sub> concentration reading from the sensor. The third line is a button that facilitates setting the target or actual concentration. Leave this at zero if pure nitrogen is being used for calibration.

The fourth line is the [Base Cal Now] button. This causes the sensor to execute a calibration function to make its output match the target concentration. Calibration takes about 15 seconds. Another calibration cannot be performed without leaving and returning to this screen.

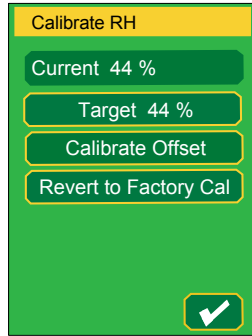
### *Calibrate\Cal Temperature*



This screen is available only on models with the optional temperature humidity sensor and after the level 2 password has been entered. This feature allows the monitor to be installed in an area that is known to be characteristically cooler or warmer than the rest of the space (e.g., near a photocopier). This requires that a desired value (“target temperature”) be entered.

The monitor is precalibrated so calibration is unnecessary.

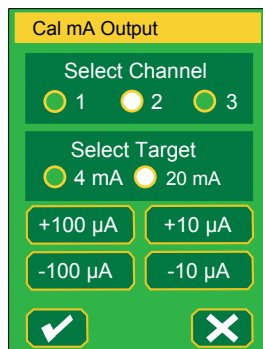
Press the “Target” button to enter the target temperature through the numeric keyboard, within a range from 32 to 122°F (0 to 50°C). The default value is 68°F (20°C). Press [✓] to return to the Cal Temperature menu, then press the “Calibrate Offset” button. The monitor will then calculate the difference between the room temperature and the desired temperature. This difference is the offset. When the calibration has been completed, “Calibration Done” will be displayed. Press [X] to return to the Cal Temperature screen.

**Calibrate\Cal rH**

This screen is available only on models with the optional temperature humidity sensor and only after the level-2 password has been entered. The monitor is precalibrated so calibration is not necessary.

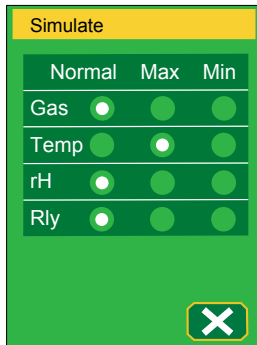
Current value unit displays the current relative humidity.

The target relative humidity can be entered through the numeric keyboard within a range from 0 to 100%. The default value is 45%. Calibrate offset allows the monitor to be installed in an area that is known to be characteristically more or less humid than the rest of the space, much like the temperature offset described in the previous section.

**Calibrate\Calibrate mA Output**

The monitor's mA output for each of three channels can be calibrated to match that of a site's external HVAC equipment. Channel 1 measures gas levels, channel 2 can be configured to measure either a gas or temperature. In monitors with the optional rH sensor, channel 3 measures humidity. Adjustments are made in 10-unit increments with the +10 and -10 buttons and in 1-unit increments with the +1 and -1 buttons.

### Simulate

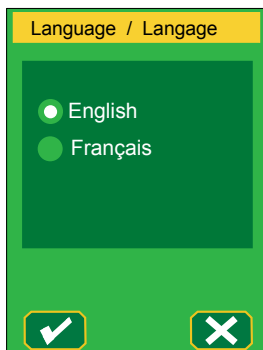


Simulated output permits creating high or low outputs on the three sensors, allowing the operator to verify that the system will respond as planned to changes in the gas level, temperature, or humidity level. Any combination of minimum, maximum, or normal values of gas, temperature, and humidity can be simulated. Default simulation selections are normal for all three parameters.

Additionally, the relay can be forced on or off from this screen. This can be useful to confirm the operation of external equipment. For example, a service person can simulate a high CO<sub>2</sub> concentration to confirm that an external fresh air damper moves to the full open position.

None of the monitor's configured values is affected by changes in the Simulate menu.

### Language



The IAQPoint2 monitor can be configured for English or French (Français). The default language selection is English.

## Calibration

For the highest possible accuracy when the ABC function is off, the sensor can be recalibrated by a qualified operator. ABC cannot be disabled on a unit without a display.

### CO<sub>2</sub> Calibration

By default, the CO<sub>2</sub> sensor uses an Automatic Baseline Calibration (ABC) algorithm to maintain accuracy. However, ABC is inappropriate for environments with continuously elevated concentration and should be disabled. With ABC disabled, the CO<sub>2</sub> sensor can be manually calibrated. The sensor's response coefficient is fixed during manufacture. The baseline calibration affects only the offset, not the slope of the sensor's response. This calibration can be performed at any CO<sub>2</sub> concentration level. However, calibration with 1,000 ppm CO<sub>2</sub> calibration gas is simplest and is recommended. For non-ABC applications, the unit should be calibrated in the environment in which it will be used.

The calibration procedure (possible only if ABC is disabled):

1. Enter the level 2 password. By default, this is 2967.
2. Navigate to Calibrate\Calibrate Gas. This screen will flash every second to indicate calibration mode.
3. A message may be displayed indicating that ABC is enabled and calibration is not possible. If ABC is not desired, it can be disabled in the Configure\Configure Outputs\Auto Baseline menu.
4. Connect a cylinder of a test gas of known concentration (e.g. Honeywell part M-501010, 1,000 ppm CO<sub>2</sub>) to a 0.5 lpm regulator (e.g. Honeywell part M-502585).
5. Connect the regulator's tube into the calibration port on the side of the IAQPoint2 monitor.
6. The top line of the display shows the mode of the CO<sub>2</sub> sensor. Verify that this is "normal" and not some other message.
7. The second line of the display shows the current concentration. Verify that this shows a reasonable number. Since the calibration gas flow has not yet been started, this should show an ambient CO<sub>2</sub> concentration. It is normally greater than 500 ppm in a room.
8. Open the regulator's valve to start the flow of gas.
9. Wait three minutes for test gas to purge all of the ambient air out of the sensor.
10. Verify that the concentration reading stabilizes to match the cylinder CO<sub>2</sub> concentration within  $\pm 200$  ppm.
11. Verify that the "Target" concentration matches the concentration of the cylinder of test gas. If pure nitrogen is used, this should be zero. If needed, enter the correct concentration by pressing [Target].
12. Press [Base Cal Now].
13. The mode display should show "in base cal" for about ten seconds.
14. Verify that the mode display shows "base cal pass".

15. Verify that the concentration reading matches the target concentration  $\pm 30$  ppm.
16. Turn off the valve on the regulator.
17. Verify that the test gas concentration rises to a reasonable value after about one minute, reflecting the ambient concentration.
18. Press [√] and navigate back to the main menu. The main display may show a fault for up to four seconds when exiting calibration mode. This is normal and is not an indication of trouble.
19. Disconnect the regulator from the gas cylinder.
20. **IMPORTANT:** On duct mount models, confirm that the calibration port plug is reinstalled. If this step is neglected, the sensor's sampling of duct CO<sub>2</sub> concentration may be contaminated by ambient CO<sub>2</sub> levels.

The monitor should be calibrated only by a qualified operator. The level 2 password is required. Non-display models cannot be calibrated.

## VOC Calibration

The VOC sensor automatically calibrates itself over a period of about a week. This automatic calibration requires that the VOC sensor be exposed to fresh air for at least an hour of each day. No manual calibration for VOCs is possible. A bump test of wall-mount models may be performed by simply breathing on IAQPoint2.

## Temperature Calibration

The optional IAQPoint2 temperature sensor is pre-calibrated and usually does not shift with age. Thus, periodic temperature calibration is usually not necessary. With wall-mount models, accurate temperature measurement requires at least 20 minutes of uninterrupted power, vertical mounting and still air.

However, an offset calibration can be useful in areas that are known to be characteristically cooler or warmer than the rest of the space (e.g., near a photocopier). The procedure for performing a temperature offset calibration is as follows:

1. Determine the true temperature of the space by use of a reference thermometer.
2. Enter the level 2 password. By default, this is 2967.
3. Navigate to Calibrate\Calibrate Temperature.
4. Press [Target] to navigate to "Set Tgt Temp". Enter the temperature reported by the reference thermometer.
5. Press [Calibrate Offset].
6. Verify that the message "in base cal" is displayed. This lasts about two seconds.
7. Verify that the message "Calibration Done" is displayed.
8. Press [X].
9. Verify that the Current temperature agrees with the reference thermometer. Note that this screen does not automatically update. If desired, an update can be forced by exiting and re-entering this screen.
10. If desired, the factory calibration may be restored by pressing [Revert to Factory Cal]
11. When satisfied, with the temperature reading, navigate to the main screen.

## rH Calibration

The optional IAQPoint2 relative humidity sensor is pre-calibrated. However, exposure to certain chemicals may cause the reading to shift over time. The humidity reading can be recalibrated using the following procedure:

1. Determine the true rH level by use of a reference hygrometer.
2. Enter the level 2 password. By default, this is 2967.
3. Navigate to Calibrate\Calibrate rH.
4. Press [Target] to navigate to “Set Target rH”. Enter the relative humidity reported by the reference instrument.
5. Press [Calibrate Offset].
6. Verify that the message “in base cal” is displayed. This lasts about two seconds.
7. Verify that the message “Calibration Done” is displayed.
8. Press [X]
9. Verify that the Current rH agrees with the reference hygrometer. Note that this screen does not automatically update. If desired, an update can be forced by exiting and re-entering this screen.
10. If desired, the factory calibration may be restored by pressing [Revert to Factory Cal]
11. When satisfied, with the humidity reading, navigate to the main screen.



## Troubleshooting

### Faults and warning messages

Faults are handled in different ways, depending on the configuration of the unit. 4-20 mA loops will drop below 2.0 mA. The relay will de-energize.

IAQPoint2 Troubleshooting Guide									
Affected Models				Version		Symptom	Diagnostic Tests	Cause	Solution
Analog Non-display	Analog with Display	BACNet/Modbus	LonWorks	Wall-mount	Duct-mount				
●	●			●	●	All analog outputs produce 0 mA or 0 VDC	Measure voltage between terminals T9 and T7 and confirm that 20-30 VAC or 18-28VDC is supplied.	External wiring has an error.	Provide 24 V AC/DC power.
							(Non-display models only) Confirm that the LED on the right side flashes for 5 seconds after power is applied.		
								IAQPoint2 is defective.	Replace.
●	●			●	●	One or more analog outputs are lower than expected.	Confirm that switches for volt/milliamp mode are in the desired position as described in Figures 16 and 20.	Internal 500 Ω load resistors are improperly switched in circuit.	Slide switches to the correct position as described in Figures 16 and 20.
							Confirm continuity in the external loop with an ohmmeter.	External equipment does not share a common ground.	Rearrange external circuit to have loops as shown in Figure 9 or 10.
							Confirm voltage between terminals T7 and each of T4, T5 and T6 is less than 10.0 VDC while the monitor is connected.	External impedance is too high.	Rearrange external current loop to have $R \leq 500 \Omega$ .

IAQPoint2 Troubleshooting Guide									
Affected Models				Version		Symptom	Diagnostic Tests	Cause	Solution
Analog Non-display	Analog with Display	BACNet/Modbus	LonWorks	Wall-mount	Duct-mount				
●	●			●	●	One or more analog outputs produces high voltage. (Typically 14.5 VDC)	Confirm that switches for volt/ milliamp mode are "on" as described in Figure 16 and 20.	The monitor is configured for mA output; internal 500 Ω load resistors are switched out of circuit.	If voltage output is desired slide switches down (for wall mount) or right (duct mount) to close switches.
●	●			●		Apparent crosstalk between Ch1 and Ch2 in	Confirm that the switches for digital network termination are "off" as described in Figure 20.	120 Ω termination resistor (for digital networks) is connected between Ch1 and Ch2.	Slide switch up.
							Check part number to determine if temperature sensor fitted.	Ch2 reports gas signal if temperature sensor not purchased.	Purchase a model with optional temperature sensor.
●	●			●	●	Ch1 analog output produces 2 mA or 1 VDC for longer than 10 seconds after powerup.		Gas sensor is defective.	Replace.
●	●			●	●	Ch1 analog output produces 4 mA or 2 VDC even when breathing on sensor.		If fitted, VOC sensor is in warmup mode.	Wait until 15 minutes after powerup.
●	●			●	●	Ch2 analog output produces 2 mA or 1 VDC for longer than 10 seconds after powerup.		Ch2 is configured to report temperature and temperature sensor is defective.	Replace.
●	●			●	●	Ch3 analog output produces 2 mA or 1 VDC for longer than 10 seconds after powerup.	Check part number to determine if humidity sensor fitted.	Humidity sensor is not fitted.	Purchase a model with optional humidity sensor.
								Humidity sensor is defective	Replace.

IAQPoint2 Troubleshooting Guide									
Affected Models				Version		Symptom	Diagnostic Tests	Cause	Solution
Analog Non-display	Analog with Display	BACNet/Modbus	LonWorks	Wall-mount	Duct-mount				
	●	●	●	●	●	Display is black.	Touch display.	The monitor has gone into sleep mode because the display was not touched for 5 minutes.	Touch display to wake up or reconfigure for dim display while sleeping.
	●	●	●	●	●	Display is dim.	Touch display.	The monitor has gone into sleep mode because the display was not touched for 5 minutes.	Touch display to wake up or reconfigure for black display while sleeping.
	●	●	●	●	●	Numeric display is replaced by "-- --"		Associated sensor is defective	Replace.
	●	●	●	●	●	Warning symbol (▲) is shown at top of screen.		One or more sensors is defected	Replace.
	●	●	●	●	●	Calibration menu is not visible.		Calibration is only possible with level 2 password.	Enter the level 2 password.
●	●	●	●	●		Temperature reading is higher than an accurate reference instrument.		The monitor is not mounted vertically as required.	Remount vertically, according to installation instructions.
●	●	●	●		●	Temperature reading is higher than an accurate reference instrument.		Air velocity is less than 7 ft/sec (2 m/sec) as required.	Reposition the monitor for a location with adequate air velocity. Use an alternate sensor for temperature measurement.
●	●	●	●	●		Temperature reading is lower than an accurate instrument.		The monitor is not located in still air as required.	Remount according to installation instructions, away from air vents.

IAQPoint2 Troubleshooting Guide									
Affected Models				Version		Symptom	Diagnostic Tests	Cause	Solution
Analog Non-display	Analog with Display	BACNet/Modbus	LonWorks	Wall-mount	Duct-mount				
	●	●	●	●	●	Temperature set-point adjustment range is restricted to narrower than 50 - 95F (10 - 35C)	Check configuration via Review\User Config line 4.	The monitor has been configured for narrower temperature limits	Enter level 2 password and navigate to Configure \ Configure SetPoints \ MaxTemp or MinTemp.
	●	●	●	●	●	Features absent from main display screen	Navigate to Configure \ Configure Display \ Main Display Dataset. Check the settings	The monitor is set for simple display.	Change the settings under Configure \ Configure Display \ Main Display Dataset.
	●	●	●	●	●		Navigate to Configure \ Configure Display \ Easy Temp Adj.	The easy temperature adjust screen is disabled by default	Enter level 2 password and change the setting under Configure \ Configure Display \ Easy Temp Adj.
	●	●	●	●	●		Check part number to determine if temperature and humidity sensors are fitted.	Some software features are not available in basic versions of the product.	Purchase a model with all of the desired features such as relay and temperature / humidity sensor.
●	●	●	●		●	Gas reading seems inaccurate.	Confirm that the gas calibration port (as shown in Figure 7) is plugged.	The monitor is sampling air from outside the duct.	Plug gas calibration port.

IAQPoint2 Troubleshooting Guide									
Affected Models				Version		Symptom	Diagnostic Tests	Cause	Solution
Analog Non-display	Analog with Display	BACNet/Modbus	LonWorks	Wall-mount	Duct-mount				
●	●	●	●	●	●	Gas reading seems inaccurate.	If CO <sub>2</sub> sensor is fitted, check if ABC feature is turned "ON"	ABC feature is disabled unintentionally, thus preventing automatic baseline correction.	Turn on ABC. (Allow 3 weeks for automatic corrections.)
								If ABC is disabled intentionally, unit is in need of calibration	Calibrate as described on page 44.
								if ABC is enabled, the environment may not be suitable for ABC. ABC requires an environment with atmospheric CO <sub>2</sub> concentration for several hours per day.	Disable ABC and use periodic manual calibration as described on page 44.

IAQPoint2 Troubleshooting Guide									
Affected Models				Version		Symptom	Diagnostic Tests	Cause	Solution
Analog Non-display	Analog with Display	BACNet/Modbus	LonWorks	Wall-mount	Duct-mount				
●	●	●	●	●	●	Gas Calibration operation reports "base cal fail"	Confirm that the monitor's reported concentration responded when the calibration gas flow started.	Calibration gas was not delivered to the sensor.	Confirm that a regulator for 0.5 l/min flow is used such as Honeywell part number M-502585. Confirm that the gas delivery tube is connected to the side calibration port shown in Figures 6 and 7.
							Confirm that the reported concentration is within 200 ppm of the target concentration	Wrong calibration gas cylinder used	Confirm that the correct calibration gas is used such as Honeywell part M-501038
								The sensor was previously mis-calibrated to be far in error. This can happen if a zero calibration is performed without gas.	Change the calibration is two smaller steps by setting the target concentration midway between the current reading and the cylinder's true CO2 concentration.
								The monitor is defective	Contact Honeywell Service.

IAQPoint2 Troubleshooting Guide									
Affected Models				Version		Symptom	Diagnostic Tests	Cause	Solution
Analog Non-display	Analog with Display	BACnet/Modbus	LonWorks	Wall-mount	Duct-mount				
		●		●	●	The monitor does not communicate.	Look for 'N' at top of main display. Check configuration via Review\User Config lines 1 and 2.	Network polarity is incorrect.	Review wiring and installation instructions..
								Protocol is wrong.	Configure for Modbus or BACnet.
								Baud rate is wrong.	Configure for same speed as other devices on the network.
								Address is wrong.	Configure for a unique address.
								Parity is wrong	Configure to same value as Modbus master.
								Unsupported command (e.g. Modbus Write Multiple Registers)	Use a supported command.
			●		●		Examine termination resistor switches as described in Figure 17 (wall-mount) and Figure 20 (duct-mount)	Termination is wrong.	Each network segment should have exactly two 120 Ω termination resistors.
		●	●	●	●		Examine the analog slide switches as shown in Figure 20.	The analog termination resistors are across the digital network.	Slide the switches to the left.
		●		●	●	Unexpected data values read on Modbus.	Read Modbus holding registers with a PC tool such as ModbusPoll.	Incorrect interpretation.	See Modbus register table on page 58.
		●		●	●	Unexpected data values read on BACnet.	Read BACnet objects with a PC tool such as CAS BACnet Explorer.	Incorrect interpretation.	See BACnet properties table on page 64..

IAQPoint2 Troubleshooting Guide									
Affected Models				Version		Symptom	Diagnostic Tests	Cause	Solution
Analog Non-display	Analog with Display	BACNet/Modbus	LonWorks	Wall-mount	Duct-mount				
			●			The monitor does not communicate		The wiring is not compliant with the rules for TP/FT-10 networks as described by the Echelon Series 5000 Chip Data Book chapter 5.	Rewire for compliance.
			●			Network variable seem to have stale data		Configuration properties set wrong	set "MaxSend-Time", "MinSend-Time", or "MinDelta" smaller.
			●				LonMaker "Manage/Test"	LonMark Object "offline"	Set "online"
			●					LonMark Object "disabled"	Set "enabled"
			●			Data seems inaccurate	Send "wink" command.	Incorrect device addressed	Change node addressing.



## Maintenance

The built-in ABC algorithm makes maintenance unnecessary in normal environments.

## Cleaning

Clean the case and the touchscreen by wiping gently with a soft cloth dampened only with water. Do not allow water to enter the monitor's case. Do not spray any liquids on the touchscreen or the case. Do not use harsh or abrasive cleaning solutions on the touchscreen or the case.

## Sensor accuracy test

To test the CO<sub>2</sub> sensor, apply 1000 ppm of CO<sub>2</sub> test gas<sup>3</sup>. The sensor should read  $\pm 30$  ppm  $\pm 5\%$  of the test gas specification. This equates to 1000 ppm  $\pm 80$  ppm  $\pm$  of the test gas specification.

There is no accuracy test for VOC sensors.

## Sensor poisons/inhibitors

Silicone is one of the major chemicals that has an adverse effect on VOC sensors. It forms a layer on top of the sensitive material, thus limiting the accessibility of the sensor surface. When this happens, sensitivity can be reduced drastically. The effect of this on the monitor's performance could be severe. The monitor would be unable to recover from this condition. There are no poisons or inhibitors for the CO<sub>2</sub> sensor.

VOC sensors can be affected by rapid transitions in relative humidity.

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<sup>3</sup> part no. M-501010

## Specifications

Description		Value	
Monitor with CO <sub>2</sub> sensor	Gas	CO <sub>2</sub>	
	Detection method	Non-dispersive infrared (NDIR) with automatic background calibration (ABC) algorithm	
	Ranges	0-2,000 ppm, 0-5,000 ppm	
	Accuracy	±30 ppm ±3% of reading at 25°C from 0 to 2,000 ppm <sup>1, 2, 3</sup>	
	Response Time	T <sub>90</sub> <60 seconds	
	Calibration	Not required	
Monitor with VOC sensor	Gases	Volatile organic compounds (VOCs)	
	Detection method	Metal oxide semiconductor (MOS)	
	Range	0-100 air quality index	
	Calibration	Not required	
System Operations	Temperature Range	32°F to 122°F (0°C to 50°C), 32°F to 104°F (0°C to 40°C) for wall-mount	
	Temperature Accuracy	±0.5°C at 25°C and 50% rH ±1.5°C over range <sup>4</sup>	
	Humidity Range	0 to 95% rH, non-condensing	
	Humidity Accuracy	±5% at 25°C and 50% rH <sup>4</sup>	
	Duct-mount Air Velocity	440 ft/min (2.2 m/s) minimum, 1760 ft/min (9 m/s) maximum	
	Power in	20 to 30 VAC; 18 to 28 VDC	
	Consumption	Analog	typical: 188 mA @ 24 VAC (150 mA minimum, 281 mA maximum) typical: 87 mA @ 24 VDC (75 mA minimum, 174 mA maximum)
		RS-485	typical: 174 mA @ 24 VAC (135 mA minimum, 215 mA maximum) typical: 83 mA @ 24 VDC (75 mA minimum, 120 mA maximum)
		LonWorks	typical: 174 mA @ 24 VAC (135 mA minimum, 215 mA maximum) typical: 83 mA @ 24 VDC (75 mA minimum, 120 mA maximum)
	Dimensions	3.0 in. W x 4.6 in. H x 1.5 in. D (77 mm x 118 mm x 37 mm)	
	Weight	wall-mount: 0.44 lbs (0.20 kg); duct-mount: 0.70 lbs (0.32 kg)	
	Enclosure	ABS	
	Display	TFT, multicolor graphical touchscreen, 1.9 in. W x 2.6 in. H (49 mm x 65 mm); optional with analog units	
	Languages	English, French	
Software class	B		
Hardware circuitry	Class 1		
Impulse withstand voltage	2 kV		
Storage temperature	to 122°F (-10°C to 50°C)		
Outputs	Analog	4-20 mA or 2-10 VDC (field selectable)	
	Digital	Modbus RTU, BACnet MS/TP, BTL listed, LonWorks FTT-10	
	Relay	3 amps, 250 VAC resistive, and 30 VDC SPDT; field configurable setpoint and hysteresis	
Mounting options	Wall mount	IP22	
	Duct mount	IP54	
Certifications	US	ANSI/UL 61010-1	
	Canada	CAN/CSA C22.2 No. 61010-1	
	Europe	EN 61010:2010	
	International	IEC 61010:2010	
Warranty	One year		

<sup>1</sup> allow an additional ±2% of reading for calibration gas cylinder

<sup>2</sup> self-calibration period: 2-3 weeks; warm-up time to spec precision: 1 minute

<sup>3</sup> additional uncertainty of 2% of the reading for readings greater than 2,000 ppm

<sup>4</sup> in still air after calibration

## Modbus

### Data Flow

The IAQPoint2 can be configured to meet a variety of needs. There are up to three sensors, each with a setpoint and fault indication. With the gas sensor, a comparison is made between the concentration and setpoint to compute a bit. A timer responds to an occupied button. There is a relay which can be made to respond to three possible inputs: the gas level, the fieldbus, or the occupied timer. Most of the data is available over each of the three fieldbuses. This is shown graphically in Figure 28. All of the fieldbus data is colored yellow.

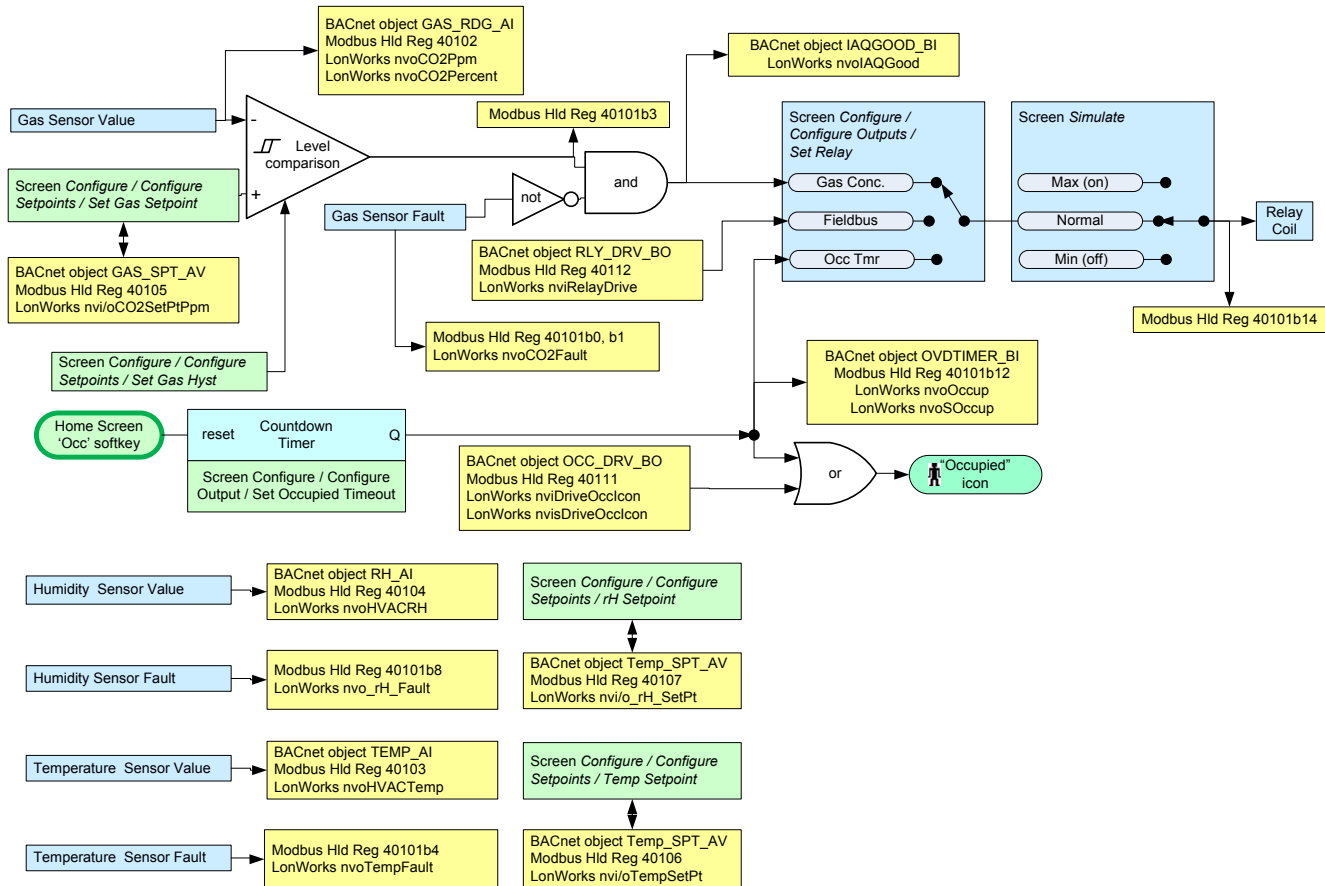


Figure 28. IAQPoint2 relay flow with fieldbus and simulation elements

## Modbus registers

Some models of the IAQPoint2 contain a digital interface for communicating over RS-485 networks. This interface can be switched in software to use either the Modbus RTU or BACnet MS/TP protocols. It can communicate at any speed from 4800 to 115,200 baud. When configured for Modbus and 9600 baud, the IAQPoint2 is compatible with the Honeywell 301C controller. The IAQPoint2 can directly replace an IAQPoint1 in Modbus or analog applications.

More information on Modbus can be obtained at [www.modbus.org](http://www.modbus.org). The IAQPoint2 contains 12 Modbus holding registers. These are numbered from 40101 to 40112 – it skips over the first 100. There are no input registers, output registers, or coils. Holding register 40101 provides a concise summary of essential status. Two holding registers are writable via command 06.

Modbus Registers			
Holding Register Address	Bit	Summary	Detail
40101	b0	CO2 sensor good	This is true if the CO2 sensor is fitted and has no faults.
	b1	VOC sensor good	This is true if the VOC sensor is fitted and has no faults.
	b2	Heartbeat	This bit alternates between true and false every 10 seconds.
	b3	Gas Conc low	This bit is true if the gas reading is less than the setpoint.
	b4	Temp sensor good	This bit is true if the temperature sensor is fitted and reading correctly.
	b5	Temp sensor fitted	This bit is true if the temperature sensor is fitted.
	b6		Reserved for future enhancements.
	b7		Reserved for future enhancements.
	b8	Humidity sensor good	This bit is true if the humidity sensor is fitted and reading correctly.
	b9	Humidity sensor fitted	This bit is true if the humidity sensor is fitted.
	b10		Reserved for future enhancements.
	b11		Reserved for future enhancements.
	b12	Occupied Timer Running	This bit is true if the occupied timer inside the IAQPoint2 is running.
	b13	Relay Fitted	This is true if the backplate contains the optional relay.
	b14	Relay Energized	This bit is true if the relay is energized.
b15		Reserved for future enhancements.	
40102		Gas displayed reading.	This reports gas concentration. If the CO2 sensor is fitted this will report in ppm from 0 to 5000. If the VOC sensor is fitted this will report the air quality index from 0 to 100. If the gas sensor is faulty this will report 32767.
40103		Temperature C observed	This reports temperature in tenths of a degree Celcius. (For example, the temperature of a human body would be reported as 370.) If the temperature sensor is faulty or absent this will contain -2730.
40104		rH reading, observed	This reports the relative humidity in percent from 0 to 100. If the humidity sensor is faulty or absent this will contain -1.
40105		CO2/VOC setpoint	This contains the gas setpoint. The scaling is the same as register 40102.
40106		Temperature C Setpoint	This contains the temperature setpoint. The scaling is the same as register 40103.
40107		RH setpoint	This contains the relative humidity setpoint.
40108		Heartbeat	This counts forever up from 1 to 10000 and then repeats. Some Modbus masters may need this to confirm the communication is working.
40109			Reserved for future enhancements.
40110			Reserved for future enhancements.
40111		Write Occupied	Writing a 1 to this will cause the "Occupied" icon to appear on the LCD. Writing anything other than 0 or 1 is illegal.
40112		Write Relay	Writing a 1 or 0 to this will activate the relay when appropriately configured. Writing anything other than 0 or 1 is illegal.

## BACnet

### Introduction

When configured for BACnet, the IAQPoint2 contains ten BACnet objects. The reading from each of the three sensors is conveyed by a analog input objects while the setpoints are conveyed by an analog value objects. Additionally, two binary inputs provide a simple indication of relative air quality and the occupied timer status. Finally, two binary outputs facilitate manipulation of the relay and the occupied icon by BACnet. Each object has several properties which can be read and sometimes written. All of the objects and properties of the IAQPoint2 BACnet device are listed in the table at the end of this section. A BACnet protocol implementation conformance statement (PICS) is included in this section, as well. More information about BACnet can be found at [www.bacnet.org](http://www.bacnet.org).

### ANNEX A - PROTOCOL IMPLEMENTATION CONFORMANCE STATEMENT (NORMATIVE)

(This annex is part of this Standard and is required for its use.)

#### BACnet Protocol Implementation Conformance Statement

Date: 2012 Dec 12

Vendor Name: Honeywell International Inc

Product Name: IAQPoint2

Product Model Number: Sixteen variations of the product are offered:

IAQ-WNC-D, IAQ-WNC-R-D, IAQ-WNC-TRH-D, IAQ-WNC-TRH-R-D,

IAQ-WNV-D, IAQ-WNV-R-D, IAQ-WNV-TRH-D, IAQ-WNV-TRH-R-D,

IAQ-DNC-D, IAQ-DNC-R-D, IAQ-DNC-TRH-D IAQ-DNC-TRH-R-D,

IAQ-DNV-D, IAQ-DNV-R-D, IAQ-DNV-TRH-D, IAQ-DNV-TRH-R-D

Application Software Version: v1.05b4 Firmware Revision: v1.05b4

BACnet Protocol Revision: 7

**Product Description:** The IAQPoint2 smart sensor measures three indoor air quality parameters: carbon dioxide or volatile organic compounds, plus temperature and humidity. Both wall mount and duct mount versions are available with a customizable touchscreen. The IAQPoint2 facilitates energy efficiency, productivity, health and comfort by facilitating demand controlled ventilation.

**BACnet Standardized Device Profile (Annex L):**

- BACnet Operator Workstation (B-OWS)
- BACnet Advanced Operator Workstation (B-AWS)
- BACnet Operator Display (B-OD)
- BACnet Building Controller (B-BC)
- BACnet Advanced Application Controller (B-AAC)
- BACnet Application Specific Controller (B-ASC)
- BACnet Smart Sensor (B-SS)
- BACnet Smart Actuator (B-SA)

**List all BACnet Interoperability Building Blocks Supported (Annex K):**

BIBB	Service
DS-RP-B	Data Sharing - ReadProperty-B
DS-RPM-B	Data Sharing - Read Property Multiple-B
DS-WP-B	Data Sharing - Write Property-B
DM-DDB-B	Dynamic Device Binding
DM-DOB-B	Dynamic Object Binding

**Segmentation Capability:**

- Able to transmit segmented messages      Window Size \_\_\_\_\_
- Able to receive segmented messages      Window Size \_\_\_\_\_

**Standard Object Types Supported:**

An object type is supported if it may be present in the device. For each standard Object Type supported provide the following data:

- 1) Whether objects of this type are dynamically creatable using the CreateObject service
- 2) Whether objects of this type are dynamically deletable using the DeleteObject service
- 3) List of the optional properties supported
- 4) List of all properties that are writable where not otherwise required by this standard
- 5) List of proprietary properties and for each its property identifier, datatype, and meaning
- 6) List of any property range restrictions

Object	Dynamically Creatable	Dynamically Deletable	Optional Properties Supported	Writable Beyond Standard	Range Restrictions
device	N	N			
			description	description	1 - 50 characters, default "CO2 or VOC Sensor"
			location	location	1 - 22 characters, default "location"
			max_master	max_master	1 to 127, default 127
			max_info_frames		
analog_input 0	N	N	reliability		
				present_value	if CO2 sensor fitted 0 to 5000 ppm, else 0 to 100 %
				out_of_service	
				object_name	1 - 22 characters, default "GAS_RDG_AI"
analog_input 1	N	N	reliability		
				present_value	0 to 50 C or 32 to 122 F
				out_of_service	
				object_name	1 - 22 characters, default "TEMP_AI"
				units	Fahrenheit (64) or Celcius (62)
analog_input 2	N	N	reliability		
				present_value	0 to 100%
				out_of_service	
				object_name	1 - 22 characters, default "RH_AI"
analog_value 3	N	N	reliability		
				present_value	if CO2 sensor fitted 400 to 5000 ppm, else 0 to 100 %
				object_name	1 - 22 characters, default "GAS_SPT_AV"
analog_value 4	N	N	reliability		
				present_value	if Celcius, 10 to 35 if Fahrenheit 50 to 95
				object_name	1 - 22 characters, default "TEMP_SPT_AV"
				units	Fahrenheit (64) or Celcius (62)

Object	Dynamically Creatable	Dynamically Deletable	Optional Properties Supported	Writable Beyond Standard	Range Restrictions
analog_value 5	N	N			
			reliability		
				present_value	0 to 100%
				object_name	1 - 22 characters, default "RH_SPT_AV"
binary_input 6	N	N			
			reliability		
				present_value	
				out_of_service	
				object_name	1 - 22 characters, default "IAQ-GOOD BI"
binary_input 7	N	N			
				present_value	
				out_of_service	
				object_name	1 - 22 characters, default "OVD-TIMER BI"
binary_output 8	N	N			
			reliability		
				object_name	1 - 22 characters, default "RLY_DRV BO"
binary_output 9	N	N			
			reliability		
				object_name	1 - 22 characters, default "OCC_DRV BO"

### Data Link Layer Options:

- BACnet IP, (Annex J)
- BACnet IP, (Annex J), Foreign Device
- ISO 8802-3, Ethernet (Clause 7)
- ATA 878.1, 2.5 Mb. ARCNET (Clause 8)
- ATA 878.1, EIA-485 ARCNET (Clause 8), baud rate(s) \_\_\_\_\_
- MS/TP master (Clause 9), baud rate(s): 9600, 19200, 38400, 57600, 76800, 115200
- MS/TP slave (Clause 9), baud rate(s): \_\_\_\_\_
- Point-To-Point, EIA 232 (Clause 10), baud rate(s): \_\_\_\_\_
- Point-To-Point, modem, (Clause 10), baud rate(s): \_\_\_\_\_
- LonTalk, (Clause 11), medium: \_\_\_\_\_
- BACnet/ZigBee (ANNEX O) —
- Other:



**Device Address Binding:**

Is static device binding supported? (This is currently necessary for two-way communication with MS/TP slaves and certain other devices.)  Yes  No

**Networking Options:**

- Router, Clause 6 - List all routing configurations, e.g., ARCNET-Ethernet, Ethernet-MS/TP, etc.
- Annex H, BACnet Tunneling Router over IP
- BACnet/IP Broadcast Management Device (BBMD)
  - Does the BBMD support registrations by Foreign Devices?  Yes  No
  - Does the BBMD support network address translation?  Yes  No

**Network Security Options:**

- Non-secure Device - is capable of operating without BACnet Network Security
- Secure Device - is capable of using BACnet Network Security (NS-SD BIBB)
  - Multiple Application-Specific Keys:
  - Supports encryption (NS-ED BIBB)
  - Key Server (NS-KS BIBB)

**Character Sets Supported:**

Indicating support for multiple character sets does not imply that they can all be supported simultaneously.

- ISO 10646 (UTF-8)  IBM™/Microsoft™ DBCS  ISO 8859-1
- SO 10646 (UCS-2)  ISO 10646 (UCS-4)  JIS X 0208

If this product is a communication gateway, describe the types of non-BACnet equipment/networks(s) that the gateway supports:

This is not a gateway \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

BACNet Objects and Properties						
Group	Property	Data Type	Required	Storage Type	Read Value	Writable Values
Device	object_identifier	unsigned	R	N	1	0 to 4,194,302
	object_type	enumerated	R	C	device (8)	not writable
	vendor_identifier	enumerated	R	C	Honeywell Inc. (17)	not writable
	apdu_timeout	unsigned	R	C	0	not writable
	application_software_version	character string	R	C	v1	not writable
	description	character string	O	C	Honeywell Indoor Air Quality Sensor	not writable
	firmware_revision	character string	R	C	v1	not writable
	location	character string	O	N	"location"	Any unique string 1-22 bytes
	max_apdu_length_accepted	unsigned	R	C	480	not writable
	max_info_frames	unsigned	O	C	1	not writable
	max_master	unsigned	O	N	127	1 to 127
	model_name	character string	R	C	IAQPoint2	not writable
	number_of_apdu_retries	unsigned	R	C	0	not writable
	object_name	character string	R	C	""IAQPoint2." + lower 12 bytes of serial number"	not writable
	protocol_object_types_supported	bit string	R	C	"analog_input, analog_value, binary_input, binary_output, device"	not writable
	protocol_services_supported	bit string	R	C	"readProperty, readPropertyMultiple, writeProperty, who_Has, who_Is,"	not writable
	protocol_version	unsigned	R	C	1	not writable
	segmentation_supported	enumerated	R	C	no_segmentation (3)	not writable
	system_status	enumerated	R	C	operational_read_only (1)	not writable
	vendor_name	character string	R	C	Honeywell	not writable
protocol_revision	unsigned	R	C	7	not writable	
database_revision	unsigned	N	C	default 0 - will increment on changes of object names	not writable	

BACNet Objects and Properties							
Group	Property	Data Type	Required	Storage Type	Read Value	Writable Values	
Analog Inputs	GAS_RDG_AI	object_identifier		R	C	analog_input (0)	not writable
		object_type	enumerated	R	C	analog_input (0)	not writable
		event_state	enumerated	R	R	"if gas sensor fault Fault (1), else normal (0)"	not writable
		object_name	character string	R	N	"GAS_RDG_AI"	Any unique string 1-22 bytes
		out_of_service	boolean	R	R	FALSE	"true" or "false"
		present_value	real	R	R	"Gas reading if CO2 fitted, 0 to 5000 if VOC fitted, 0 to 100"	"Only if out_of_service is TRUE. If CO2 fitted, 400 to 5000 if VOC fitted, 10 to 100"
		reliability	enumerated	O	R	"As appropriate reports no_fault_detected (0) or no_sensor (1) or unreliable other (7) Fault is detected within 60 seconds"	not writable
		status_flags					
		in_alarm	boolean	R	R	"if faulty "true" (1) else "false" (0)"	not writable
		fault	boolean	R	R	"if faulty "true" (1) else "false" (0)"	not writable
		overridden	boolean	R	R	"false" (0)	not writable
		out_of_service	boolean	R	R	Reports the OOS state	not writable
		units	enumerated	R	N	"if CO2 fitted, ppm (96) if VOC fitted, % (98)"	not writable
	TEMP_AI	object_identifier		R	C	analog_input (1)	
		object_type	enumerated	R	C	analog_input (0)	
		event_state	enumerated	R	R	"if temp sensor fault, fault (1), else normal (0)"	
		object_name	character string	R	N	"TEMP_AI"	Any unique string 1-22 bytes
		out_of_service	boolean	R	R	FALSE	"true" or "false"
		present_value	real	R	R	"Temperature reading if Celcius, 0 to 50 if Fahrenheit 32 to 122"	"Only if out_of_service is TRUE if Celcius, 10 to 35 if Fahrenheit 50 to 95"
		reliability	enumerated	O	R	"if not purchase "no_sensor" (1) else if in fault "unreliable_other" (7) else no_fault_detected (0)"	not writable
		status_flags					
		in_alarm	boolean	R	R	"if not purchased or faulty "true" (1) else "false" (0)"	not writable
		fault	boolean	R	R	"if not purchased or faulty "true" (1) else "false" (0)"	not writable
		overridden	boolean	R	C	False (0)	not writable
		out_of_service	boolean	R	R	Reports the OOS state	not writable
		units	enumerated	R	N	"Celcius (62) (Units here independent of UI and AV4)"	"Fahrenheit (64) or Celcius (62)"
	RH_AI	object_identifier		R	C	analog_input (2)	not writable
		object_type	enumerated	R	C	analog_input (0)	not writable
		event_state	enumerated	R	R	"if humidity sensor fault, fault (1), else normal (0)"	not writable
		object_name	character string	R	N	"RH_AI"	Any unique string 1-22 bytes
		out_of_service	boolean	R	R	FALSE	"true" or "false"
		present_value	real	R	R	"rH reading 0 to 100"	"Only if out of service 0 to 100"
		reliability	enumerated	O	R	"if not purchase "no_sensor" (1) else if in fault "unreliable_other" (10) else no_fault_detected (0)"	not writable
		status_flags					
		in_alarm	boolean	R	R	"if not purchased or faulty "true" (1) else "false" (0)"	not writable
		fault	boolean	R	R	"if not purchased or faulty "true" (1) else "false" (0)"	not writable
overridden		boolean	R	C	False (0)	not writable	
out_of_service		boolean	R	R	Reports the OOS state	not writable	
units		enumerated	R	N	percent_relative_humidity (29)	not writable	

BACNet Objects and Properties							
Group	Property	Data Type	Required	Storage Type	Read Value	Writable Values	
Analog Values	GAS_SPT_AV	object_identifier		R	C	analog_value (3)	not writable
		object_type	enumerated	R	C	analog_value (2)	not writable
		event_state	enumerated	R	R	normal (0)	not writable
		object_name	character string	R	N	"GAS_SPT_AV"	Any unique string 1-22 bytes
		out_of_service	boolean	R	R	FALSE	not writable
		present_value	real	R	N	"Gas threshold if CO2 fitted, 850 if VOC fitted, 50 (Copy of setpoint on UI)"	"If CO2 fitted, 400 to 5000 if VOC fitted, 10 to 100"
		reliability	enumerated	O	C	no_fault_detected (0)	not writable
		status_flags					
		in_alarm	boolean	R	C	always false (0)	not writable
		fault	boolean	R	C	always false (0)	not writable
		overridden	boolean	R	C	always false (0)	not writable
		out_of_service	boolean	R	C	always false (0)	not writable
	units	enumerated	R	C	"if CO2 fitted, ppm (96) if VOC fitted, % (98)"	not writable	
	TEMP_SPT_AV	object_identifier		R	C	analog_value (4)	not writable
		object_type	enumerated	R	C	analog_value (2)	not writable
		event_state	enumerated	R	C	normal (0)	not writable
		object_name	character string	R	N	"TEMP_SPT_AV"	Any unique string 1-22 bytes
		out_of_service	boolean	R	C	FALSE	not writable
		present_value	real	R	N	"20 C Copy of setpoint on UI"	"if Celcius, 10 to 35 if Fahrenheit 50 to 95"
		reliability	enumerated	O	C	no_fault_detected (0)	not writable
		status_flags					
		in_alarm	boolean	R	C	always false (0)	not writable
		fault	boolean	R	C	always false (0)	not writable
		overridden	boolean	R	C	always false (0)	not writable
		out_of_service	boolean	R	C	always false (0)	not writable
	units	enumerated	R	N	"Celcius (62) (Units here independent of UI and AI1)"	"Fahrenheit (64) or Celcius (62)"	
	RH_SPT_AV	object_identifier		R	C	analog_value (5)	not writable
		object_type	enumerated	R	C	analog_value (2)	not writable
		event_state	enumerated	R	C	normal (0)	not writable
		object_name	character string	R	N	"RH_SPT_AV"	Any unique string 1-22 bytes
		out_of_service	boolean	R	C	FALSE	not writable
		present_value	real	R	N	"50 % rH (Copy of setpoint on UI)"	0 to 100%
		reliability	enumerated	O	C	no_fault_detected (0)	not writable
		status_flags					
		in_alarm	boolean	R	C	always false (0)	not writable
		fault	boolean	R	C	always false (0)	not writable
overridden		boolean	R	C	always false (0)	not writable	
out_of_service		boolean	R	C	always false (0)	not writable	
units	enumerated	R	C	percent_relative_humidity (29)	not writable		

BACNet Objects and Properties							
Group	Property	Data Type	Required	Storage Type	Read Value	Writable Values	
Binary Input	IAQGOOD_BI	object_identifier		R	C	binary_input (6)	not writable
		object_type	enumerated	R	C	binary_input (3)	not writable
		event_state	enumerated	R	C	normal (0)	not writable
		object_name	character string	R	N	"IAQGOOD_BI"	Any unique string 1-22 bytes
		out_of_service	boolean	R	R	FALSE	"true" or "false"
		polarity	enumerated	R	C	always Normal (0)	not writable
		present_value	enumerated	R	R	"if no faults and Conc <SP, True (1) else False (0)"	"only of out_of_service, "true" or "false""
		reliability	enumerated	O	C	no_fault_detected (0)	not writable
		status_flags					
		in_alarm	boolean	R	C	always "false" (0)	not writable
		fault	boolean	R	C	always "false" (0)	not writable
		overridden	boolean	R	C	always "false" (0)	not writable
	out_of_service	boolean	R	C	reports true OOS state	not writable	
	OVDTIMER_BI	object_identifier		R	C	binary_input (7)	not writable
		object_type	enumerated	R	C	binary_input (3)	not writable
		event_state	enumerated	R	C	normal (0)	not writable
		object_name	character string	R	N	"OVDTIMER_BI"	Any unique string 1-22 bytes
		out_of_service	boolean	R	R	"false"	"true" or "false"
		polarity	enumerated	R	C	always Normal (0)	not writable
		present_value	enumerated	R	R	"if override timer running, "true" (1) else "false" (0)"	"only of out_of_service, "true" or "false""
		reliability	enumerated	O	C	no_fault_detected (0)	not writable
		status_flags					
		in_alarm	boolean	R	C	always "false" (0)	not writable
		fault	boolean	R	C	always "false" (0)	not writable
overridden		boolean	R	C	always "false" (0)	not writable	
out_of_service	boolean	R	R	reports true OOS state	not writable		

BACNet Objects and Properties							
Group	Property	Data Type	Required	Storage Type	Read Value	Writable Values	
Binary outputs	RLY_DRV_BO	object_identifier		R	C	binary_output (8)	not writable
		object_type	enumerated	R	C	binary_output (4)	not writable
		event_state	enumerated	R	C	normal (0)	not writable
		object_name	character string	R	N	"RLY_DRV_BO"	Any unique string 1-22 bytes
		out_of_service	boolean	R	C	FALSE	not writable
		polarity	enumerated	R	C	always Normal (0)	not writable
		present_value	enumerated	R	R	last value written	"true" or "false"
		priority_array		R	R	last value written	"true" or "false"
		reliability	enumerated	0	C	no_fault_detected (0)	not writable
		relinquish_default		R	C	"false" (0)	not writable
		status_flags					
		in_alarm	boolean	R	C	always "false" (0)	not writable
		fault	boolean	R	C	always "false" (0)	not writable
		overridden	boolean	R	R	"if Relay configured to respond to fieldbus, "false" (0). If relay configured to respond to gas or occupied timer or relay absent, "true" (1)"	not writable
	out_of_service	boolean	R	R	always "false" (0)	not writable	
	OVRTIMER_BI	object_identifier		R	C	binary_output (9)	not writable
		object_type	enumerated	R	C	binary_output (4)	not writable
		event_state	enumerated	R	C	normal (0)	not writable
		object_name	character string	R	N	"OCC_DRV_BO"	Any unique string 1-22 bytes
		out_of_service	boolean	R	C	FALSE	not writable
		polarity	enumerated	R	C	always Normal (0)	not writable
		present_value	enumerated	R	R	last value written	"true" or "false"
		priority_array		R	R	last value written	"true" or "false"
		reliability	enumerated	0	C	no_fault_detected (0)	not writable
		relinquish_default		R	C	"false" (0)	not writable
		status_flags					
in_alarm		boolean	R	C	always "false" (0)	not writable	
fault	boolean	R	C	always "false" (0)	not writable		
overridden	boolean	R	C	always "false" (0)	not writable		
out_of_service	boolean	R	C	always "false" (0)	not writable		

Notes:

- 1 -- 'R' indicates that this property is required by ASHRAE Standard 135
- 'O' indicates that the property is optional in ASHRAE Standard 135
- 2 -- 'C' indicates the property is hard-coded as a constant
- 'N' indicates the property is stored in non-volatile memory
- 'R' indicate the property is computed constantly and stored in RAM.

**LonWorks Interface**

Some models of the IAQPoint2 gas detector have interfaces for the LonWorks computer networking protocol. More information on LonWorks is available at [www.echelon.com](http://www.echelon.com) and [www.lonmark.org](http://www.lonmark.org). The IAQPoint2 is a LonMark Certified product.

The LonWorks interface contains LonMark objects. Echelon’s LonMaker software presents the device as shown in Figure 29. Greater detail is provided in Table YY.

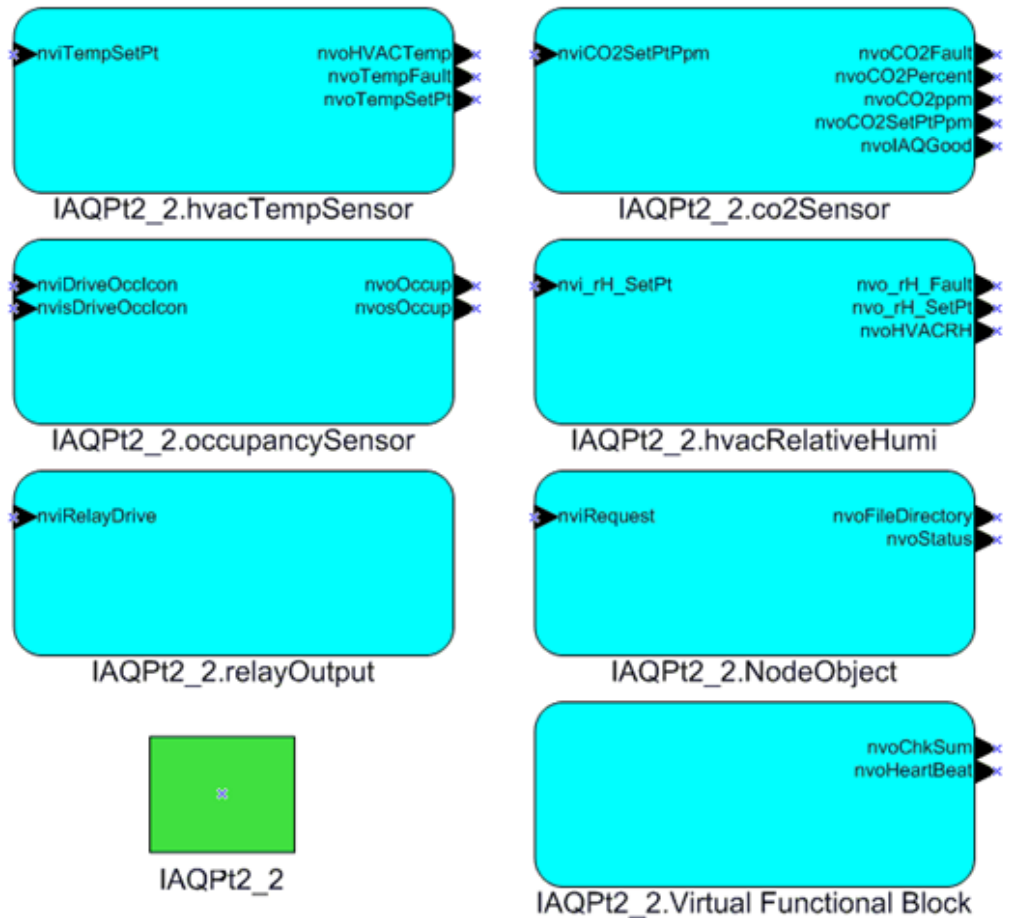


Figure 29. Echelon LonMaker software graphical presentation

**Common Characteristics**

Each of the three sensor function blocks implements a LonMark “user functional profile template” or UFPT. In each case, this UFPT is a thin wrapper around the “standard functional profile template” SFPT. The UFPT inherits all of the mandatory network variables from the SFPT and adds more.

The LonWorks interface has seven network variables of type SNVT\_switch. These are each used simply as a bit. Thus the only output values that will ever be produced are a LonMark “on” or “off”, which are (100.0; 1) and (0.0; 0) respectively. Similarly, the only input values that will be accepted are “on” and “off”. Other values will be ignored.

Each of the three sensor functional blocks has a network variable output for faults of type SNVT\_switch. This will hold the value “off” if the IAQPoint2 is working correctly or “on” if there is some fault. These are provided to facilitate a simpler alternative to nvoStatus which external controllers can read.

Finally each of the three sensor function blocks has an NVI and an NVO for setpoints. Writes of illegal or out-of range values to the NVI will be ignored. Valid writes to the NVI will be reflected on both the local user interface and the NVO. Whenever contradictory values are written via the local UI and the NVI, the value of whichever interface writes last will be retained.

The behavior of these functional blocks is a listed below.

### ***CO2 Sensor Functional Block***

CO2 concentration is conveyed both as SNVT\_ppm and as SNVT\_lev\_percent. This percentage is computed using 2000 ppm as full scale. On models with a VOC sensor, the concentration is reported both as an equivalent ppm reading and as an air quality index. The variable nvoIAQGood provides the simplest output -- this takes the value “on” if the gas level is less than the setpoint and there is no fault; otherwise, it takes the value “off”. Note that when the VOC sensor is fitted the value of nvoCO2SetPtPpm may have a rounding error of up to 16 ppm.

### ***Temperature and Humidity Sensor Functional Blocks***

These functional blocks report the temperature and humidity and are present on all LonWorks interfaces. However, in models without the necessary sensor the nvoFault variables will always be “on” and the LonMark block will always “fail self test”.

### ***Occupancy Sensor Functional Block***

The IAQPoint2 does not contain hardware so sense actual occupancy. Instead, this block reports the status of the occupancy timer via SNVT\_occupancy and as SNVT\_switch. The timer is started by pressing the [Occ] button as shown in Figure 27 and Figure 28. Additionally, the NVI can be used to force the “occupied” icon to appear at the top of the main screen as shown in Figure 21. The two instances of SNVT\_occupancy use the values OC\_OCCUPIED and OC\_UNOCCUPIED. All other values will be ignored.



### ***Relay Output Functional Block***

This facilitates controlling the internal relay as a binary output. LonMark calls this an open loop actuator. Note that this input is only effective if the optional relay is present and the local user interface is appropriately configured to listen via the menu `Configure\Output\Set Relay Source`.

### ***Virtual Functional Block***

This object is a catchall for network variable that don't belong to any of the LonMark functional blocks. This has two NVOs. `nvoHeartBeat` increments every two seconds to facilitate confirmation that the IAQPoint2 device is working properly. `nvoChkSum` is for internal Honeywell use.

### ***Node Object***

This LonMark object is required by LonMark. It is used by Echelon's LonMaker software to control the LonMark functional blocks. Most other software packages will not use this.

### ***Network Commissioning***

Commissioning a LonWorks network generally requires knowing the neuron ID of each device. There are two ways of finding the neuron ID of the IAQPoint2. Both start with the `Configure\Fieldbus` menu. Pressing the button [Send SERVICE Msg] causes the IAQPoint2 to broadcast a packet containing its neuron ID. Network management tools such as Echelon LonMaker can detect this packet. Alternatively, the `Fieldbus` menu also displays the neuron ID. This may be typed into the network management tool directly.

### ***“Wink”***

The LonWorks protocol defines a “Wink” packet. This is typically used to confirm that the correct device is being addressed. Network management tools such as Echelon LonMaker can transmit winks. LonWorks devices are to respond by identifying themselves. An IAQPoint2 will respond to a wink by displaying the wink screen for four seconds as shown in Figure 30. This feature is inhibited during simulation or gas calibration.



Figure 30. LonWorks “wink”

**Summary of LonMark Objects, Variables, and Configuration Properties**

All of the network variables and configuration properties are listed in this table. Items marked in green in the UFPT are inherited from the SFPT.

Functional Block	Network Variable	LonMark Configuration Property	Root Data Type	Self-Documentation String	Default	Min	Max	unit
co2Sensor			SFPTco2Sensor (1070)					
		SCPTmaxSendTime	SNVT_time_sec		300	2	300	seconds
		SCPTminSendTime	SNVT_time_sec		5.0	2	300	
	nvoCO2Ppm (principal)		SNVT_ppm			0 (CO2) 450 (VOC)	5000 (CO2) 2000 (VOC)	ppm or equivalent
		SCPTminDeltaCO2	SNVT_ppm		10	0	5000	
	nviCO2SetPtPpm		SNVT_ppm			400 (CO2) 605 (VOC)	5000 (CO2) 1999 (VOC)	
	nvoCO2SetPtPpm		SNVT_ppm		850			
	nvoCO2Percent		SNVT_lev_percent	percent of 2000 ppm		0.0	100.0	percent of 2000 ppm
		SCPTminDeltaRH	SNVT_lev_percent		1	0.0	100.0	
	nvoIAQGood		SNVT_switch	if(no fault and conc < sp) On, else Off				bit
	nvoCO2Fault		SNVT_switch	if (gas sensor fault) On, else Off				
hvacTempSensor			SFPTHvacTempSensor(1040)					
		SCPTmaxSendTime	SNVT_time_sec	(standard)	300	2	300	seconds
		SCPTminSendTime	SNVT_time_sec	(standard)	5	2	300	
	nvoHVACTemp (principal)		SNVT_temp_p			0	50	Celsius on wire, translated by LonMaker
		SCPTminDeltaTemp	SNVT_temp_p		0.3	0	50	
	nviTempSetPt		SNVT_temp_p			10, can config.	30, can config	
	nvoTempSetPt		SNVT_temp_p		68			
	nvoTempFault		SNVT_switch	if(sensor fault) On, else Off				bit
hvacRelativeHumiditySensor			SFPTHvacRelativeHumiditySensor(1050)					
		SCPTmaxSendTime	SNVT_time_sec		300	2	300	seconds
		SCPTminSendTime	SNVT_time_sec		5	2	300	
	nvoHVACRH (principal)		SNVT_lev_percent					percent
		SCPTminDeltaRH	SNVT_lev_percent		1	0	100	
	nvi_rH_SetPt		SNVT_lev_percent					
	nvo_rH_SetPt		SNVT_lev_percent		50			
	nvo_rH_Fault		SNVT_switch	if(sensor fault) On, else Off				bit
occupancySensor			SFPToccupancySensor					
		SCPTmaxSendTime	SNVT_time_sec	(standard)	300	2	300	seconds
	nvoOccup (principal)		SNVT_occupancy	if(Internal timer running) OC_OCCUPIED, else OC_UNOCCUPIED.				bit
	nvosOccup		SNVT_switch	if(Internal timer running) On, else Off				
	nviDriveOcclcon		SNVT_occupancy	if(OC_OCCUPIED) force white stick man to appear at top of LCD				
	nvisDriveOcclcon		SNVT_switch	if(On) force white stick man to appear at top of LCD				
relayOutput			SFPTOpenLoopActuator					
	nviRelayDrive (principal)		SNVT_switch	Ignored unless set in Config/Outputs/Rly Src.				bit
Node			SFPTnodeObject					
	nviRequest		SNVT_obj_request					
	nvoFileDirectory		SNVT_address					
	nvoStatus		SNVT_obj_status					
Virtual Functional Block								
	nvoChkSum		SNVT_count					
	nvoHeartBeat		SNVT_count	Counts every 2 seconds to confirm communication.		0	10000	

## Limited Warranty

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