Sensor Suite Sensors

Carbon Dioxide
Carbon Dioxide & Dewpoint Temperature

Sensor Suite Sensors

Sensor Suite Sensors enable the Aircuity system to cost effectively monitor a breadth of environmental parameters throughout a facility. Located within a Sensor Suite, the sensors evaluate an array of environmental conditions using a shared sensing architecture. In lieu of locating individual discrete sensors in each space, the Aircuity system gathers air samples from the spaces and multiplexes them across the Aircuity network back to the Sensor Suite for analysis.

Sensor Suite Sensors have unique performance specifications and product features to meet specific applications, such as demand controlled ventilation, Differential Energy™ economizer control; or for monitoring only purposes. The ability to sense a variety of conditions, combined with a specific level of sensor performance, optimizes an application's potential energy savings, control or monitoring capacity.

Features

- Sensor Suite Sensors are tailored to match specific monitoring and control needs.
- Calibration and maintenance of sensors is automatically and routinely scheduled through Aircuity's Calibration Laboratory and Assurance Services program.
- Flexible architecture for future sensor enhancements and technology updates.

55 Chapel Street
Newton, MA 02458

617.641.8800 tel
aircuity.com

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Creating Measurably Better Environments

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Carbon Dioxide

Carbon dioxide (CO2) is a colorless, odorless gas formed by metabolic activity, combustion activities, and motor vehicles. Although the indoor concentrations of CO2 resulting from usual occupant activities are rarely hazardous, the gas can serve as a proxy for room occupancy levels. CO2 concentrations in indoor air increase in inverse proportion to the amounts of outdoor air that is supplied to a room. Therefore the more outdoor air supplied to a room, the lower the CO2 concentration. Supplying adequate outside air is also important for diluting airborne concentrations of indoor contaminants that may build up due to materials in the space or as a result of occupant activities. Since carbon dioxide levels are predictable and an easily measured product of human occupancy, it is used as a marker for whether pollutants introduced from humans or other sources in the building are likely to become a nuisance or a hazard.

Dewpoint Temperature

The dewpoint is the temperature to which the air must be cooled, at constant barometric pressure, for water vapor to condense into liquid. The dewpoint is associated with relative humidity (RH). A high relative humidity indicates that the dewpoint is closer to the current air temperature. If the relative humidity is 100%, the dewpoint is equal to the current dry bulb temperature. Given a constant dewpoint, an increase in temperature will lead to a decrease in relative humidity. Humans tend to react with discomfort to high dewpoints, as a high dewpoint corresponds with a high ambient temperature and/or a high relative humidity.

The Aircuity system computes the relative humidity through the virtual sensing of dewpoint at the Sensor Suite and discrete dry bulb temperature sensing via a local room probe or duct probe.

Carbon Dioxide and Dewpoint Temperature Sensing Technologies (SEN-CO2-2A, 2B, 3) and (SEN-C2D-3)

All Aircuity carbon dioxide and combination carbon dioxide/dewpoint sensors use a dual wavelength Non-Dispersive Infrared (NDIR) technique for the measurement of CO2 and moisture. The main components of the sensor are the infrared source (lamp), the sample chamber, and infrared detector. The gas is drawn into the sample chamber and the concentration of the target gas is measured electro-optically by its absorption of a specific wavelength in the infrared (IR) range. The IR light is directed through the sample chamber towards the detector. An optical filter in front of the detector eliminates all light except the wavelength of the selected gas molecule (CO2 or H2O). The sensor utilizes a dual wavelength configuration where the ratio of the signals is used to calculate the absorbance of the measured wavelength due to the presence of the gas. The sensors exhibit minimal cross interference due to nearly monochromatic IR measurement energies and minimal drift due to the use of a reference wavelength.

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Ordering Guide

Sensed Parameter	Model Number	Element
Carbon Dioxide	SEN-CO2-2A	Dual Wavelength, NDIR
Carbon Dioxide	SEN-CO2-2B	Dual Wavelength, NDIR
Carbon Dioxide	SEN-CO2-3	Dual Wavelength, NDIR
Carbon Dioxide & Dewpoint Temp	SEN-C2D-3	Dual Wavelength, NDIR

All CO2 sensors require a 24 Vdc power supply. Make sure each Sensor Suite has one SEN-PWR to which a CO2 sensor is to be applied.

Sensor Specifications

Model Number	SEN-CO2-2A	SEN-C02-2B	SEN-C02-3	SEN-C2D-3
Typical Application	CO2 Based Demand Controlled Ventilation (DCV) or Monitoring	CO2 Based Demand Controlled Ventilation (DCV) or Monitoring	CO2 Based Demand Controlled Ventilation (DCV) or Monitoring	CO2 Based DCV or Monitoring/Dewpoint Temp, Relative Humidity*, Enthalpy*, Monitoring or Control
Sensor: Carbon Dioxide (CO2)				
Element	Dual Wavelength, Non-Dispersive Infrared Sensor	Dual Wavelength, Non-Dispersive Infrared Sensor	Dual Wavelength, Non-Dispersive Infrared Sensor	Dual Wavelength, Non-Dispersive Infrared Sensor
Range	0–3000 ppm	0–3000 ppm	0–2000 ppm	0–3000 ppm
Accuracy	± 60 ppm up to 1000 ppm	± 75 ppm up to 1000 ppm	± 45 ppm up to 1000 ppm	± 45 ppm up to 1000 ppm
Repeatability	± 5 ppm	± 9 ppm	± 2 ppm	± 3 ppm
Resolution	3 ppm	3 ppm	2 ppm	3 ppm
Response	25 seconds	10 seconds	10 seconds	10 seconds
Sensor: Dewpoint Temp (DPT)				
Element				Dual Wavelength, Non-Dispersive Infrared Sensor
Range				-58 to ambient DPT Degree F or 122°F, whichever is less
Accuracy				Dewpoint: ± 0.9°F (± 0.5°C) from 20 –65 Deg F DPT RH: @ 65°F and ± 0.5°F ± 3% RH @ 10–60% RH ± 4% RH @ 61–90% RH
Response				10 seconds

** Relative Humidity and Enthalpy measurements are computed from dewpoint and drybulb temperatures. Therefore, a local drybulb temperature sensor is required via a room probe, duct probe or outdoor air probe.*

Regulatory Compliance

UL 916 Accessory Energy Management Equipment

Part 15 Class A

CE

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