

Intelligent Indoor Air Quality Monitors in Offices and Meeting Rooms Improve Productivity, Save Energy, Lower Utility Costs

Many office buildings have polluted indoor air due to ventilation systems that are poorly designed, inadequately maintained, or operated inefficiently. According to the NBC Digital Health Network, an increasing number of employees who work indoors are reporting medical symptoms related to their environment. These health problems are often exacerbated by inadequate ventilation.

“In the ‘70’s, we had the energy crisis. One way to deal with it was to tighten up the buildings. So we saved on energy, but started breathing higher concentrations of pollutants that can be found indoors. But you can have both an energy-efficient building and excellent ventilation,” said Helen Tsiapas, an environmental protection specialist with the US Environmental Protection Agency (EPA).

No matter whether employees work in a cubicle, corner office or crowded meeting room, they don’t want to breathe polluted air or be subjected to foul odors. In addition to being a health risk, poor indoor air has been found to reduce employee productivity significantly.

Demand controlled ventilation (DCV) systems can reduce air pollution. Some systems use sound or motion detectors to control fans and lighting. However, these detectors also have the disadvantage of inadvertently stranding a stationary occupant in a dark room.

Other DCV systems signal fans to operate when the air quality monitor detects a large amount of carbon dioxide (CO₂) in the air. However, these CO₂-based monitors cannot detect unpleasant odors or harmful volatile organic compounds (VOCs) that may also be present.

VOCs a concern of indoor occupants

The National Institute of Occupational Safety and Health’s (NIOSH) Science notes the importance of investigating the chemistry and health effects of VOCs found indoors and the result of increased exposure on occupants. Figure 1 shows the sources of the most common chemical groups of VOCs (mixed gases) found in indoor air. These gases can be released into a facility’s air from building materials, furnishings, office equipment, adhesives and human metabolism.

According to the EPA, VOCs are two to five times more likely to be found in the air in enclosed environments than in the outside air. As nearly 70 percent of the employees in the U.S. work indoors, proper ventilation is essential to supporting good health and productivity.



AppliedSensor’s intelligent Indoor Air Quality (iAQ) Modules detect a broad range of VOCs, such as bio-effluents, smoke, food odors and cleaning supplies, and correlate these measurements with CO₂ levels to provide easy-to-interpret results compatible with most DCV systems. The modules feature low-power consumption, maintenance-free auto-calibrating sensing technology and reduce utility costs by signaling fans to turn on when VOCs are present and off when air quality returns to normal.

Figure 1 – Examples of VOCs and Sources

Substance Group	Example	Sources
Alkanes	heptane, methane	human breath, bio-effluents
Alcohols	alcohol, mineral spirits	cleaning supplies
Aldehydes	formaldehyde	building materials
Ketones	butanone	paints
Esters	methyl acetate	glues
Terpenes	pinene	perfumes and glues
Aromatics	xylol	paints and glues

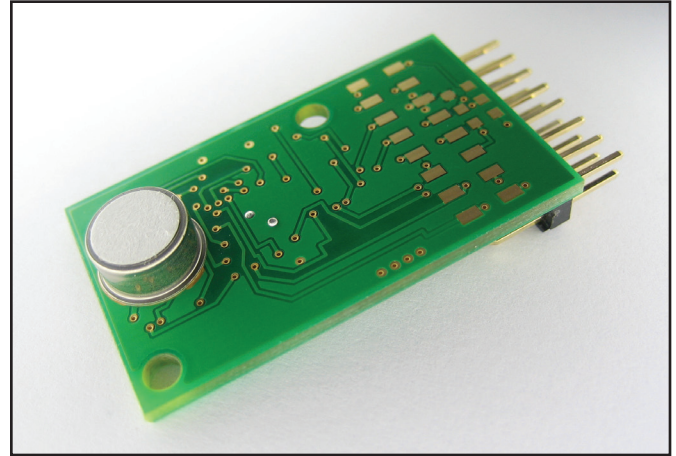
Lower Utility Costs and Intelligent Air Quality Beyond CO₂

In the following application, an AppliedSensor iAQ 2000 Indoor Air Quality Module was installed in a meeting room along with an infrared-absorption CO₂ sensor to log the concentration of CO₂. Figure 2 compares the data collected from the room. Note that the concentration of predicted and measured CO₂ was accurately correlated throughout the meeting. This clearly demonstrates that iAQ modules can be used for occupancy monitoring based on VOC detection.

Another advantage of monitoring indoor air quality “beyond CO₂” is also illustrated in Figure 2. Note the significant odorous event detected by AppliedSensor’s iAQ module, but not by the CO₂ sensor. In this installation, VOC sensors demonstrate that they are a better indicator of poor air quality than are CO₂ sensors.

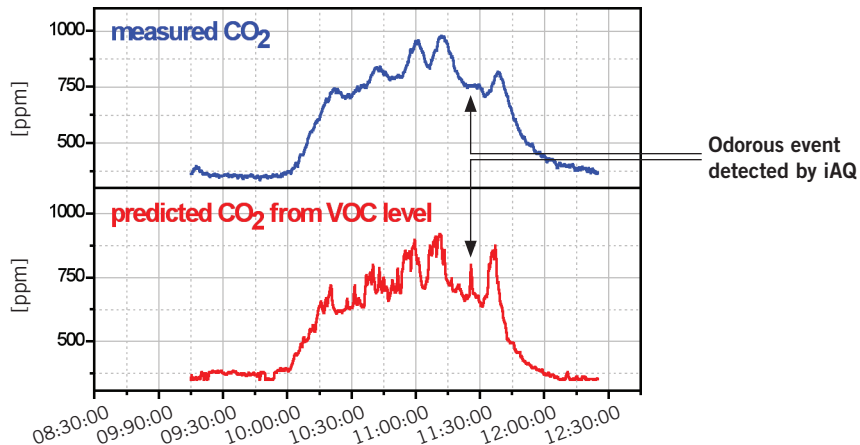
AppliedSensor iAQ modules are particularly effective when integrated with demand-controlled ventilation (DCV) systems. The iAQ Module’s micro-machined metal oxide semiconductor (MOS) sensor element alerts the DCV system to increase

ventilation within seconds of detecting threshold levels for target gases. Once VOC levels are minimized, ventilation is decreased. The result is increased productivity from clean air that helps employees stay healthy and productive, and reduced fan operation that saves energy and lowers utility costs.



iAQ-2000 Indoor Air Quality Module

Figure 2 – Measured CO₂ compared to predicted CO₂ from the meeting room VOC level



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