

Application Note: Improving Indoor Air Quality in Fitness Clubs

People who go to fitness clubs and gyms to work out are typically searching for ways to establish or maintain a healthy lifestyle. This doesn't include exposure to unhealthy air.

And while they may come to sweat, they don't want to be overwhelmed by the odor of perspiration when they walk in the door.

Some facilities address this problem by installing air quality monitors activated by sound or motion to control ventilation. Unfortunately, these monitors can actually increase energy costs, as fans don't necessarily need to run whenever the club is occupied. Plus, motion detectors can signal lights to turn off, inadvertently stranding a stationary patron in a dark room.

Another type of air quality monitor signals fans to operate when a large amount of carbon dioxide (CO₂) is detected in the air. However, these CO₂-based monitors cannot detect the unpleasant odors that can occur in fitness clubs and gyms.

Intelligent Air Quality Beyond CO₂

In comparison, AppliedSensor's iAQ-2000 Indoor Air Quality Module detects a broad range of volatile organic compounds (VOCs), such as bio-effluents, smoke, cooking odors and cleaning supplies, while correlating directly with CO₂ levels in an indoor environment.

Figure 1 shows the sources of the most common chemical groups of mixed gases found in indoor air. These gases can be released into a facility's air from building materials, furnishings, exercise equipment, adhesives and human metabolism.

According to the Environmental Protection Agency, VOCs are two to five times more likely to be found inside enclosed environments than in the outside air.



The **iAQ-2000 Indoor Air Quality Module** operates by signaling fans to turn on when VOCs are present, and off when air quality returns to normal. The module includes features such as low power consumption and maintenance-free auto-calibrating sensing technology. The iAQ-2000 can also reduce utility costs and optimize proper ventilation, thus ensuring the highest air quality in fitness clubs and gyms.

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	glues
Aromatics	xylol	paints and glues

Module Reduces Energy Consumption, Improves Visitor Satisfaction

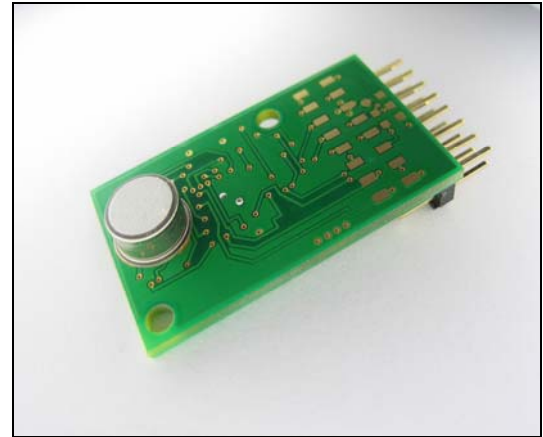
AppliedSensor's iAQ-2000 Indoor Air Quality Module was installed in a fitness club's HVAC system to monitor air quality and control fan speed. For comparison, an infrared-absorption CO₂ sensor logged the concentration of CO₂. Figure 2 compares the data collected from the facility, confirming that the concentrations of predicted and measured CO₂ were consistent.

Before the iAQ-2000 module was installed, the HVAC system was time-controlled, so the fitness club was ventilated even when it was unoccupied. By switching to demand-controlled ventilation, the iAQ-2000 reduced operating time by 24 percent and cut energy consumption by 60 percent. In addition to cost savings, in post-installation surveys, visitors to the facility gave the air quality good ratings.



This installation demonstrates the advantage of VOC sensors in odorous environments where CO₂ sensors fail to serve as indicators for poor air quality.

Equipped with a micro-machined metal oxide semiconductor (MOS) sensor element, the iAQ-2000 alerts the facility's climate control system to increase ventilation within seconds of detecting threshold levels for target gases. Once VOC levels are minimized, ventilation is decreased.



iAQ-2000 Indoor Air Quality Module



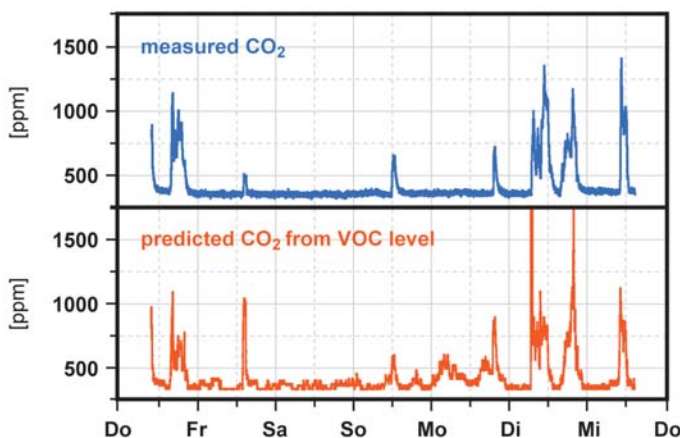
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Figure 2 – Measured CO₂ compared to predicted CO₂ from the fitness club's VOC levels



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