

A photograph of a modern office interior. A large, multi-layered green wall is the central focus, covered in various types of green plants. In the foreground, a person is seen from the side, working at a desk. The ceiling features a grid of linear lights. A large yellow diagonal shape is overlaid on the bottom right of the image.

# Data-driven indoor air quality insights

for smarter business decisions

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# Why indoor air quality matters

We spend most of our lives indoors, where the air we breathe can have a profound impact on our health, well-being, and productivity.

Despite its importance, indoor air quality is often overlooked. In fact, the World Health Organization (WHO) estimates that almost the entire global population (99%) breathes air that exceeds WHO air quality limits and threatens their health\*. In areas where outdoor air quality is poor, indoor environments can also become unhealthy without proper filtration or ventilation systems.

Indoor air quality can be affected by a range of sources, including:

- > Outdoor pollutants infiltrating buildings through ventilation systems or open windows
- > Indoor sources such as cooking, cleaning products, building materials, and furniture
- > Dust, pollen, and smoke
- > Mold and bacteria growth due to high humidity or water damage
- > Radon gas from soil and building materials
- > Climate change and extreme weather events

Poor indoor air quality can have serious consequences, from mild discomfort and allergies to severe health issues like respiratory and cardiovascular diseases. In addition, poor indoor air quality can harm cognitive performance, affect mood, and reduce overall quality of life.

\*Source: Billions of people still breathe unhealthy air: new WHO data (published 4 April 2022)

# Air quality sensors provide valuable insights

In recent years, there's been growing awareness of the importance of indoor air quality, driven in part by technological advances and a greater focus on the need for healthier buildings.

One key tool in addressing this need is an air quality sensor, a type of environmental sensor that can detect and measure various pollutants and parameters, providing valuable insights into indoor air quality.

It's essential to ensure the air we breathe is clean and healthy because it supports mental well-being, reduces healthcare costs, and ensures safer indoor and environmental conditions. Air quality index (AQI) is a standardized tool used to measure and communicate the level of air pollution in a specific area. This index is used to determine the general quality of air in a building or room without having to consider all parameters that the air quality sensor measures individually. These measurements are taken over time, ensuring a fairer assessment compared to only looking at momentary numbers. Air quality sensors can help organizations maintain good indoor air quality.



## Air quality sensors measure a wide range of pollutants and parameters that affect indoor air quality. Some common parameters measured by air quality sensors include:

### Particulate Matter (PM)

PM refers to tiny particles suspended in the air, such as dust, pollen, and smoke. Exposure to high levels of PM can cause respiratory problems, aggravate asthma, and increase the risk of heart disease.

### Nitrogen Dioxide (NO<sub>2</sub>)

NO<sub>2</sub> is a toxic gas emitted by fossil fuels, industrial processes, and vehicle exhausts. Prolonged exposure to NO<sub>2</sub> can lead to respiratory issues, lung damage, and increased chance of infection.

### Nitrogen Oxide (NO)

NO is a colorless, odorless gas produced by combustion engines, industrial processes, and natural sources. Exposure to NO can cause respiratory problems, headaches, and dizziness.

### Ozone (O<sub>3</sub>)

O<sub>3</sub> is a highly reactive gas formed when nitrogen oxides and volatile organic compounds react with sunlight. High ozone levels can irritate the lungs, exacerbate respiratory conditions, and damage crops and vegetation.

### Carbon Monoxide (CO)

CO is a colorless, odorless gas produced by incomplete combustion of fossil fuels, wood, and other materials. Exposure to CO can cause headaches, dizziness, nausea, and, at high concentrations, can even be deadly.

### Carbon Dioxide (CO<sub>2</sub>)

CO<sub>2</sub> is a naturally occurring gas present in exhaled breath, but elevated levels can indicate poor ventilation. High CO<sub>2</sub> levels can cause drowsiness, headaches, and decreased cognitive performance.

### Volatile Organic Compounds (VOCs)

VOCs are chemicals released by paints, cleaning products, furniture, and other household items. Exposure to VOCs can trigger allergies, irritate eyes and skin, and contribute to respiratory problems.

### Temperature

Temperature affects human comfort, productivity, and health. Extreme high temperatures can lead to heat stress, cardiovascular strain, and discomfort.

### Humidity

Humidity influences mold growth, dust mite populations, and human comfort. Low humidity can dry out mucous membranes, while high humidity can foster mold and bacterial growth.

### Vape and cigarette smoke

Vaping and smoking pose serious health risks, including respiratory problems, cardiovascular issues, and increased cancer risk, as well as neurological problems and reproductive complications. Secondhand exposure to vape and cigarette smoke also puts others at risk, in particular vulnerable people like children and those with pre-existing conditions. Nicotine exposure during adolescence can have long-term effects on brain function, including impairments in attention, learning, and memory.

By measuring these parameters, air quality sensors provide a comprehensive picture of indoor air quality, helping organizations identify areas for improvement and take proactive steps to maintain healthy environments.



# Smarter buildings

Air quality sensor data can be integrated with smart building management systems to create a comprehensive view of building performance. This enables:

## Real-time monitoring and alerts

Receive instant notifications when air quality levels exceed set thresholds, enabling prompt action to maintain a healthy indoor environment.

## Automated adjustments

Integrate sensors with HVAC systems to automatically adjust ventilation rates, temperature, or humidity levels based on real-time air quality data.

## Reach sustainability goals

Use air quality data to optimize heating, cooling, and ventilation systems, reducing energy waste and lowering costs.

## Space utilization based on air quality

Combine air quality data with occupancy sensors to optimize space allocation and improve resource usage.

## Meet air quality standards

Provide a healthier and more comfortable indoor environment by maintaining optimal air quality, increasing occupant satisfaction and well-being.

**Smarter buildings can increase productivity, reduce energy consumption, and ensure a comfortable environment for occupants.**

# Benefits of collecting data over time

Collecting data from air quality sensors over time helps you:

## Identify air quality trends

Analyze historical data to recognize recurring air quality issues, such as peak pollutant hours or seasonal variations, providing insights for targeted improvements.

## Pinpoint sources of pollution

Use data to identify specific sources of pollutants, like nearby industrial sites or internal activities, allowing for focused mitigation strategies.

## Monitor ventilation system performance

Track how well ventilation systems perform over time, identifying areas for improvement and ensuring they operate efficiently.

## Optimize maintenance schedules

Use data to schedule maintenance during periods of low occupancy or when air quality is poor, minimizing disruptions and maximizing system performance.

## Enhance occupant comfort and productivity

By understanding how air quality affects occupants, organizations can implement targeted improvements to boost comfort, health, and productivity, ultimately benefiting their bottom line.

Analyzing historical data allows organizations to make data-driven decisions to improve indoor air quality and reduce costs.



# Air quality data for business intelligence

Using air quality data for business intelligence involves collecting, analyzing, and interpreting data from air quality sensors to inform decision-making and drive business value. Here are some ways to leverage air quality data for business intelligence:

## Occupancy and space utilization

Analyze air quality data to understand air quality patterns in different areas in a building. This can help optimize workspace design and improve employee comfort.

## Energy efficiency

Use air quality data to identify opportunities for energy efficiency improvements, such as optimizing HVAC systems, reducing energy consumption during unoccupied periods, and identifying areas for retrofitting.



## Predictive maintenance

Leverage air quality data to predict equipment failures, schedule maintenance, and reduce downtime. This can help minimize disruptions, extend equipment lifespan, and reduce maintenance costs.

## Employee health and productivity

Correlate air quality data with employee health and productivity metrics, such as absenteeism, turnover rates, and self-reported health surveys. This can help identify areas for improvement and inform wellness programs.

## Facilities management

Integrate air quality data with facilities management systems to optimize cleaning schedules, waste management, and pest control services.

## Tenant satisfaction and retention

Analyze air quality data to identify areas for improvement and prioritize upgrades, renovations, or repairs to maintain high occupant satisfaction and retention rates.

## Cost-benefit analysis

Conduct cost-benefit analyses to evaluate the economic impacts of air quality-related investments, such as HVAC upgrades or air purification systems.

## Data-driven decision making

Use air quality data to inform strategic decisions, such as site selection, building design, and operational policies.





# Get started

To get started, consider the following steps:

- 1 **Identify relevant air quality metrics:** Determine which air quality parameters are most relevant to your business needs, such as particulate matter, nitrogen dioxide, or carbon dioxide.
- 2 **Select suitable air quality sensors:** Choose sensors that accurately measure the desired parameters and easily integrate with your existing infrastructure. Sensors that include a data insights dashboard put all the information you need at your fingertips, enabling smarter decision-making.
- 3 **Develop a data collection plan:** Establish a data collection protocol, including frequency, duration, and sampling methods.
- 4 **Analyze and interpret data:** Apply statistical models, machine learning algorithms, or data visualization techniques to extract insights from the collected data.
- 5 **Integrate with existing systems:** Combine air quality data with other relevant datasets, such as energy usage, occupancy, or maintenance records.
- 6 **Communicate findings and recommendations:** Present results to stakeholders, highlighting opportunities for improvement and proposing data-driven solutions.

Remember to consult with experts in air quality monitoring, data analysis, and business intelligence to ensure accurate interpretation and actionable insights.

# Endless opportunities

Air quality sensors provide valuable insights that help organizations make smarter decisions using business intelligence. By integrating air quality sensors with existing systems, organizations can create a healthier, more productive, and sustainable indoor environment. And with data-driven decision-making, it's possible to transform indoor environments, improve well-being, reduce energy waste, boost occupant satisfaction, and drive significant business growth.

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# About Axis Communications

Axis enables a smarter and safer world by improving security, safety, operational efficiency, and business intelligence. As a network technology company and industry leader, Axis offers video surveillance, access control, intercoms, and audio solutions. These are enhanced by intelligent analytics applications and supported by high-quality training.

Axis has around 5,000 dedicated employees in over 50 countries and collaborates with technology and system integration partners worldwide to deliver customer solutions. Axis was founded in 1984, and the headquarters are in Lund, Sweden.