

Reducing pathogens, air pollutants & odors in agriculture



Agriculture companies manage complex airborne and surface challenges.

Agricultural operations face many problems originating from pathogens, air pollutants, and odors. These issues often exist together, creating unique challenges for producers, such as poor animal health, lower production yields, product spoilage, unscheduled shutdowns and sanitation, unwanted odors, and in some cases, product recalls. Many agricultural facilities face one or more of the following issues: viral, bacterial, and fungal control; accelerated ripening from elevated ethylene levels; pests; high levels of hydrogen sulfide, ammonia, and other odor-causing volatile organic compounds.

Pyure Dynamic Protection® offers active air purification solutions that can be easily installed into buildings and barns, providing significantly cleaner air and surfaces in any size of facility.

Pyure can resolve many issues in agriculture:



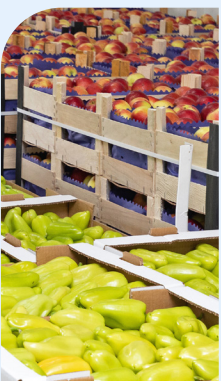
Livestock

- Poultry production losses due to avian flu, bronchitis, microbes
- Hog and egg production losses due to poor air quality
- Offsite fugitive odors



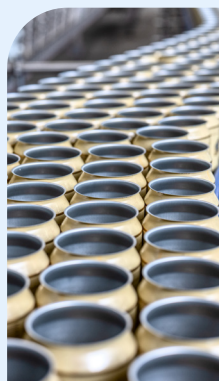
Indoor farming

- Loss of yield due to microbial contamination
- Longer turnaround times due to extra cleaning
- Poorer plant quality



Fruit & vegetable storage

- Losses due to microbial contamination
- Accelerated ripening due to ethylene
- Pest problems



Food & beverage processing

- Risk of recalls and reputational damage
- Production losses due to sanitation downtime
- Cost increases due to extra cleaning protocols

Replicating nature to deliver safe and effective cleaning.

Pyure produces the same natural cleansers present outdoors in the same concentrations — ensuring effective purification of air and cleaning of surfaces in occupied spaces.

Pyure treats:

Bacteria & viruses

Fungus & mold

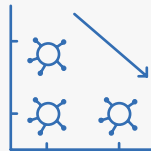
Hydrogen sulfide

Ammonia

Volatile organic compounds (VOC), including ethylene

Odors

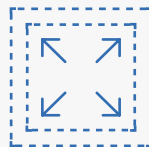
How Pyure works:



Provides superior performance in reducing microbial loads in the air and on surfaces.



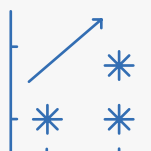
Runs continuously 24/7 while treated spaces are occupied.



Treats any size space with the same efficacy.



Delivered through an existing air handling system or installed as a stand alone solution.



Increases the effectiveness of existing cleaning and sanitation protocols, and HVAC systems.

Proven to reduce microorganisms in the air and on surfaces.

Reduction in air

| PATHOGEN | REDUCTION | TIME |
|--|------------------|-------------|
| MS2 (simulant of RNA viruses ie. Corona) | 99.9% | 30 mins |
| | 99.999% | 90 mins |
| Phi-X174 (simulant for DNA viruses ie. Smallpox) | 99.9% | 30 mins |
| | 99.99% | 90 mins |
| Staphylococcus epidermis (Gram-positive bacterium) | 99% | 30 mins |
| | Undetectable | 90 mins |
| Erwinia herbicola (Gram-negative bacterium) | 99% | 30 mins |
| | 99.99% | 120 mins |
| Aspergillus niger (black mold) | 99.9% | 30 mins |
| | Undetectable | 90 mins |
| SARS-CoV-2 (COVID-19 virus) | 99% | 20 mins |
| | Undetectable | 80 mins |

Reduction on surfaces

| PATHOGEN | REDUCTION | TIME |
|--|------------------|-------------|
| Escherichia coli | 99.99% | 180 mins |
| Salmonella enterica | 99.97% | 180 mins |
| Staphylococcus aureus | 99.98% | 360 mins |
| Vancomycin-resistant enterococcus (VRE) | 99% | 360 mins |
| Bacillus Subtilis | 99.99% | 48 hrs |
| Candida Albicans | 99.99% | 48 hrs |
| Aspergillus Niger | 99.99% | 48 hrs |
| H1N1 Influenza virus | 99.999% | 360 mins |
| Murine norovirus | 99.99% | 360 mins |
| SARS-CoV-2 virus | 99.999% | 120 mins |

Proven to reduce airborne pollutants.

Controlled atmospheric studies assessed the impact of Pyure on VOCs and the possible accumulation of chemical intermediates.

TVOC reduction
after 15 hours:

↓ 59%

No accumulation of intermediates above background levels, including:

- Formaldehyde
- Acetaldehyde
- Other aldehydes



Pyure has demonstrated significant reductions of other airborne pollutants in real-world settings:

- Hydrogen Sulfide
- Ammonia
- Ethylene
- Methane
- Non-methane hydrocarbons
- Nicotine
- Chemicals produced by fires

Case studies

Poultry operation

Problem

A large poultry processing plant near a dense urban area emanated odors from many areas, including the kill floor, processing, coolers, rendering, and waste treatment facilities. Previous efforts to neutralize odors, including misting (masking agents/scents), enzymes, electronic purifiers, ozone generators, and air scrubbers, were unsuccessful.

Pyure impact

A Pyure controlled solution was installed in the plant, and the impact was immediate. Odors were dramatically reduced both inside the plant and in neighboring communities. Staff in the plant found working conditions to be much improved, and neighbor odor complaints fell close to zero. Inside the plant, there was a significant reduction in pests, bacteria, and mold.

Customer benefit

The company secured expansion permits and increased the size of the facility while fines fell to zero. The facility subsequently added a retail outlet adjacent to the plant, attracting consumers without risking off-putting odors. The odor problem was solved and the payback period was less than two years.



Hog operation

Problem

A hog breeding facility was dealing with animal health issues, including pale pigs with distended veins in their head and runny noses. Some animals were skittish, hyperactive in nature, and aggressive. Their food and water intake were below average, and the air in the barn was foggy due to the ammonia and hydrogen sulfide gas. The hog death rate was also above average.

Pyure impact

Pyure was installed into a barn's air handling system, providing airflow via the subfloor. There was a progressive reduction in ammonia and hydrogen sulfide levels, easily ascertained by the drop in odor levels and the elimination of the haze.

Customer benefit

Pig health improved (skin tone became pink, animals were more relaxed, distended veins were minimized), and their appetite improved. The hogs put on more weight, and the death rate fell dramatically. The net increase in output (number of hogs and weight) generated a rapid return for the Pyure system deployed.



Case studies

Dairy farm

Problem

A large dairy farm with state-of-the-art equipment had a conference center adjacent to the production facility. The center had a reception area, kitchen, bar, restrooms, and business offices with 16 foot ceilings. Though the conference center had its own air handling system, it was plagued with a persistent, pungent manure smell.

Pyure impact

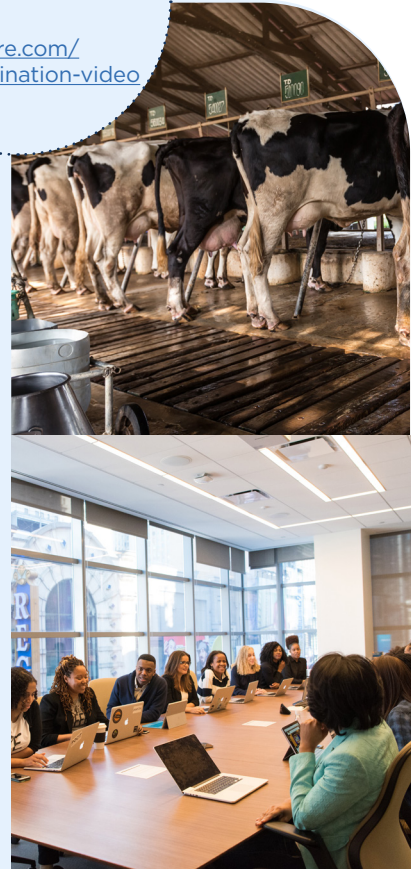
Pyure induct devices were installed in the air handling unit to treat the entire center. Following the installation, the manure smell disappeared. While the smell outside was strong, the conference center had a fresh and odor-free smell, resulting in high guest satisfaction.

Customer benefit

The customer could use the center more extensively and rent it out for events. Visitors commented on the absence of odors, contributing to a more positive guest experience.

Watch this customer's video testimonial:

pyure.com/odor-elimination-video



Indoor farming

Problem

An indoor farming operation was experiencing fungal contamination. The high humidity, temperature, and nutrient-rich environment used in hydroponic crops were believed to be the cause. The contamination was proving to be a vector for other forms of contamination and required extensive additional sanitation practices.

Pyure impact

A Pyure controlled solution was installed into the air handling system's ductwork to treat the growing rooms and other areas of the facility. Pyure treatment significantly reduced the quantity of fungus found on plant surfaces, in the media and on the roots, such that the fungus was barely visible.

Customer benefit

The customer found that there was a small increase in yield, improvement in the overall quality of the crop, and much lower microbial levels at the end of the growing process. This, in turn, allowed the customer to reduce the intensity and duration of its sanitation activities between growth cycles, leading to substantial cost savings. The reduction in fungus levels lowered the risk of another contaminant being introduced into the facility and causing a catastrophic loss of production.



Case studies — Meat processing plant

Watch this
customer's video
testimonial:

[pyure.com/
meat-plant-video](https://pyure.com/meat-plant-video)

Problem

Periodic testing of various surfaces revealed elevated levels of microorganisms, which meant a potential threat to the spread of foodborne illness. With subsequent increases in the number of recalls, they put in place additional sanitation measures requiring longer and more frequent shutdowns. The addition of third-party sanitation services was costly and provided inconsistent results that left the company with higher cleaning costs and minimal reduction to the problem.

The company was looking for a cost-effective way of reducing microbial levels in air and surfaces to ensure food safety and reduce business risk and shutdown time. It had considered fogging with peracetic acid and treating with chlorine dioxide gas but felt both approaches had significant drawbacks: (i) they could not be deployed in occupied spaces, so they were not 24/7 solutions and required production shutdowns; and (ii) they degraded materials (plastics, rubbers, metal, electronic components) used in the facility.

Pyure impact

A Pyure controlled solution was installed into the ductwork of the air handling system to treat the entire building (265,000 sq ft). Wall mounted units were installed in spaces that did not have ducted air supply. The system provided 24/7 treatment of air and surfaces.

Up to 2-log reduction of microorganisms was detected on various surfaces (swabs and Petri dishes), including inside the ductwork. Employees reported that the facility smelled fresher and that there was a significant reduction in bothersome odors.

The consistency and effectiveness of in-house sanitation efforts vastly were improved, resulting in consistently low levels of microorganisms detected, even in hot spots.

Customer benefits

The addition of the Pyure solution allowed the company to stop using supplemental, third-party sanitation services and decrease the amount of time and labour dedicated to the cleaning process.

No recalls were experienced after implementation, and fewer are anticipated due to the lowered levels of microorganisms — saving direct and reputational costs.

Ten yearly production days were added by eliminating unscheduled sanitation shutdowns from elevated microbial counts and lower frequency cleaning of air ducts.

The payback was estimated to be less than 6 months, based solely on cost reductions and increased production time, without factoring in the value and benefits of reduced business and reputational risk.

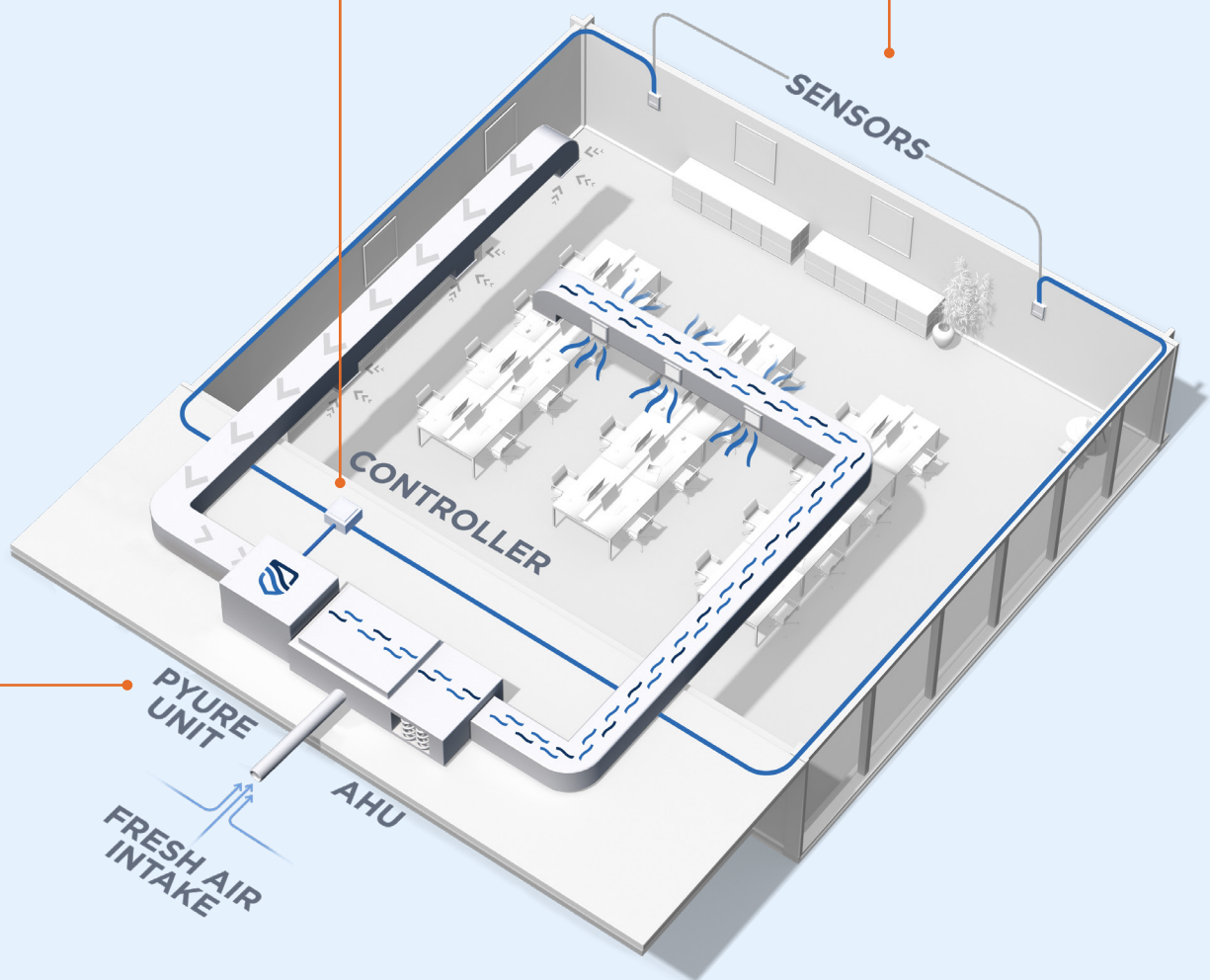


Optimized air quality.

Our completely scalable and sensor driven systems offer customizable controls and helpful data analysis to measure and optimize performance. The Pyure system continuously adjusts as the demand for purification changes over time, ensuring optimal safety, performance, and energy efficiency.

Controller responds to sensor readings and modulates the Pyure device to treat the real-time air quality.

Sensors provide real-time reading to controller.



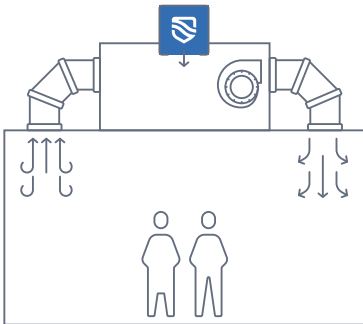
Pyure unit works with single or multiple air handling systems.

Hassle free installation and upkeep.

Pyure solutions can be installed with or without an air handling system.

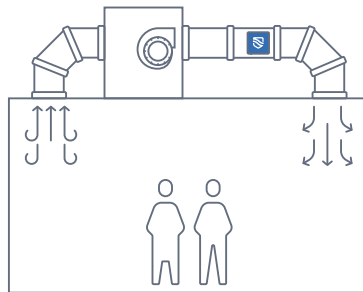
Centralized air handling

- Large rooftop units
- Large indoor units



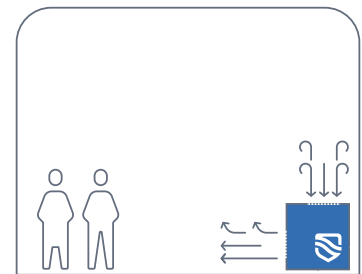
Decentralized air handling

- Smaller units inserted in ducts throughout the building
- Wall mounted units where there is no ductwork



No or limited air handling

- Large stand alone units with blowers
- Portable, stand alone units
- Wall mounted units



Pyure makes maintenance easier.

Little impact on existing air handling system

- Minimal increase in airflow resistance
- Virtually no extra wear and tear
- Marginal impact on energy consumption

Low frequency maintenance and a system that helps clean

- Annual replacement of UV optics and sensors
- Periodic cleaning of filters (frequency depends on the dust and oil concentrations in the air)
- Reduces the frequency and intensity of duct decontamination

Controlled solutions.

Designed to treat even the largest of spaces, our controlled solutions work with new and existing air-handling systems. Sensor-driven with customized controls that respond to real-time data.



Pyure IDI™ Purifier

A versatile solution that fits into the ductwork of any air handling system. Connect with more IDI units to increase the treatment area.

TYPE: Indoor, inline with HVAC

NOMINAL TREATMENT AREA: 3,000* sq ft



Pyure MVP16™ Purifier

Integrates into a new or existing air-handling system where space is limited and provides more cleansing power than induct systems.

TYPE: Indoor, inline with HVAC

NOMINAL TREATMENT AREA: up to 85,000* sq ft

BLOWER: optional



Pyure MVP24™ Purifier

A heavy-duty unit built with a reinforced shell suitable for outdoor applications.

TYPE: Rooftop, inline with HVAC

NOMINAL TREATMENT AREA: up to 200,000* sq ft

BLOWER: optional



Pyure MVP48™ Purifier

Our most powerful system, the MVP48™ purifier is ideal for the largest installations.

TYPE: Indoor, inline with HVAC

NOMINAL TREATMENT AREA: up to 450,000* sq ft

BLOWER: optional



Insight™ Edge Controllers

Controllers modulate purifiers based on feedback from the sensor system, creating an efficient method of treating pollutants in the space.



Sensor system

Air sensors placed throughout the environment send readings to the sensor system which provides constant real-time feedback to the control system.

Non-controlled solutions.

The simplest to install, our non-controlled products can be added to air ducts, wall mounted or plugged into a standard outlet. Switch them on for instant air purification and surface cleaning in small to medium size environments.



Pyure Mini® Purifier

The Mini series is designed to fit in with its small proportions, modern design and low noise levels. This makes it ideal for cleaning and deodorizing air in offices, waiting rooms or any other small commercial space.

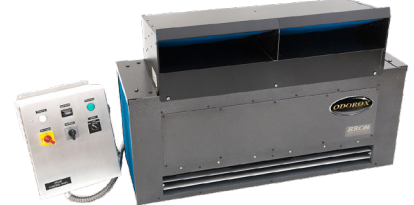
TREATMENT AREA: up to 500* sq ft



Pyure IDU™ Purifier

The IDU purifier is a duct mounted purifier that is easy to install and requires only an electrical connection for operation.

NOMINAL TREATMENT AREA:
2,000* sq ft (model dependant)



Odorox® HRC06™ Air Purifier

The HRC06 purifier is wall mounted and can modulate its output to purify and deodorize commercial and industrial applications.

TREATMENT AREA: up to 6,600* sq ft



Odorox® Slimline™ Purifier Family

Rugged purifiers with a durable exterior beneficial for public spaces and commercial or industrial installations that require a portable unit.

TREATMENT AREA:
up to 900 - 1,500* sq ft



Odorox® Boss™ Purifier

Designed for tough environments, the Boss purifier is suited to applications like remediation following fire or water damage. It's also ideal for areas with frequent movement and contact.

TREATMENT AREA: up to 2,500* sq ft



Odorox® Boss XL3™ Purifier

By adding an external fan to provide greater air movement, the Boss XL3 purifier is ideal for spaces that have been affected by smoke, flooding, wastewater, and other air pollutants.

TREATMENT AREA: up to 3,250* sq ft

Let's discuss a solution tailored to your needs or plan a trial.

At Pyure, we're dedicated to finding the right solution for solving your challenges and delivering the outcomes you need.

Get in touch to find out more about how we can help.

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