

Needlepoint Bipolar Ionization - Preparing Your Building for the Pandemic

Global Plasma Solutions

*Charlie Waddell
Founder & Chief Technology Officer*

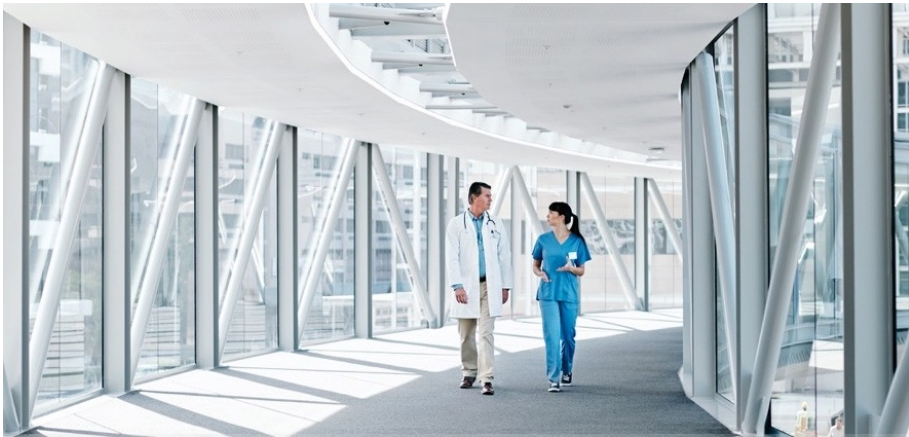
GASFA



September 2021

Markets Served by NPBI

NPBI technology works to improve the air inside industrial, commercial and residential buildings. There are over 250,000 NPBI installations across a wide variety of markets.



- Agriculture
- Airports
- Animal Care
- Arenas & Stadiums
- Banks

- Casinos
- Child Care
- Convention Centers
- Fitness
- Jails / Prisons / Courthouses

- Healthcare Facilities
- Institutions
- Manufacturing
- Office Buildings
- Retail

- Schools & Universities
- Senior Care
- Transportation
- Theater
- Worship

Here are some of the K-12 schools using NPBI to help deliver cleaner indoor air for their buildings:



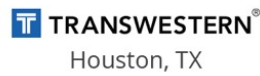
Here are some of the colleges and universities using NPBI to help deliver cleaner indoor air for their buildings:



Here are some of the health care facilities, physician offices and medical schools using NPBI to help deliver cleaner indoor air for their buildings:



Here are some of the offices using NPBI to help deliver cleaner indoor air for their buildings:



Preparing HVAC Systems Before Reoccupying A Building

BY JOHN MCCARTHY, SCD, CLIA, MEMBER ASHRAE; KEVIN COGILAN, CLIA

As states across the U.S. roll out new phases of reopening and ease social distancing restrictions instituted to “flatten the curve” of infection from SARS-CoV-2 (the virus that causes COVID-19), commercial building owners and facility managers are seeking direction in preparing their spaces to a return to near-normal levels of occupancy. World Health Organization (WHO) and Centers for Disease Control and Prevention (CDC) recommendations have focused on “de-densifying” spaces and disinfection of surfaces, while the ASHRAE Epidemic Task Force’s comprehensive Building Readiness guidance addresses strategies for preparing HVAC systems for buildings reopening after COVID-19 closures.¹ Still, facility engineers have been wondering whether disinfecting their facility’s HVAC system is a further protective step to take to prepare for reopening—and about what else they should do.

While no blanket answer exists to fit every scenario and every building type, the current science² indicates that, in general, disinfection of mechanical systems is not likely to be necessary. However, that doesn’t mean there isn’t work to be done—or risks to address before reopening or expanding the number of occupants in the space. To prepare buildings for a return to full occupancy, there are a number of steps to take with HVAC systems that have been operating at significantly

reduced loads or turned off as an energy-saving measure.

How SARS-CoV-2 Transmission Impacts Disinfection Recommendations

To understand why HVAC system disinfection may not be necessary to safely reopen or increase occupancy of your facility, it’s best to start with a clear understanding of the biological distinctions around the viral threat in question. Building owners and managers seeking to

John McCarthy, Sc.D., C.I.H., is president, and Kevin Coghlan, C.I.H., is principal scientist/chief operating officer at Environmental Health & Engineering, Inc. in Newton, Mass.

This peer-reviewed article does not represent official ASHRAE guidance. For more information on ASHRAE resources on COVID-19, visit ashrae.org/COVID19.

“The growing science around far-field aerosol transmission essentially negates the need for in-duct or air system control technologies such as UV lights. While these products and services may serve a useful function, in most applications, they may not meet the specific need that’s called for in mitigating the hazards of SARS-CoV-2”.

“Of course, specialized applications may exist where added levels of in-space or in-room protection may be useful, most notable in health-care and long-term of senior care facilities”.

Preparing HVAC Systems Before Reoccupying A Building
ASHRAE Journal January 2021

Simulations Show No Transfer of Aerosols Via Ducts

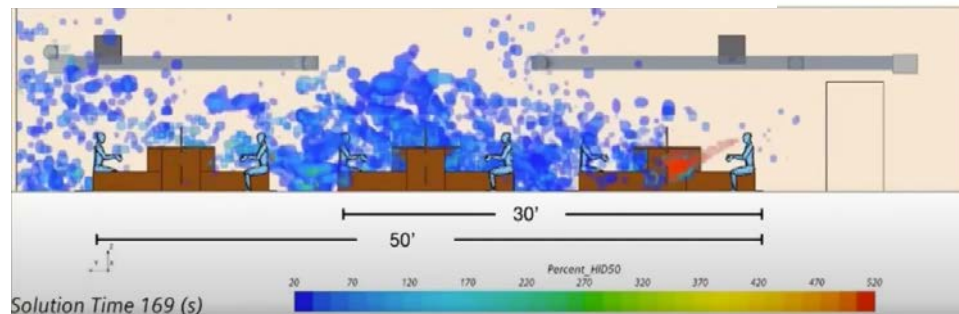


<https://www.youtube.com/watch?v=3I3G4HN2MEs>

“Finally, notice that the cloud of virus never reached the mechanical system where filters could be effective”



CFD study of infected person coughing 3-times in 10-minutes, a cloud of infective aerosols is carried > 50 feet



Steven W. Hugo, AIA
Principal
Sh@holt.com
607-273-7600

Virus Transmission and Mitigation in Buildings: Past, Present, and Future

<https://engineering.purdue.edu/Engr/rising-to-the-challenge/Events/covid19-impacts-and-strategies-for-buildings>

NEW information presented by [Purdue University](#) on how [COVID-19](#) is transmitted [indoors](#). Qingyan Chen, Professor of Mechanical Engineering presents his finding on how wearing [masks](#) may reduce infection risk by **50%**, and how implementing [Bipolar Ionization](#) may reduce the transmission rate by an **ADDITIONAL 20%-30%** (time mark 13:28 minutes). This is [exciting](#) information that may help buildings everywhere become better equipped to deal with the pandemic and keep occupants safer, healthier, and more productive.



Qingyan Chen
Professor of Mechanical
Engineering, Purdue
University



Bill Bahnfleth
Professor of
Architectural Engineering,
Pennsylvania State
University



Panagiota Karava
Jack and Kay
Hockema Professor in
Civil Engineering,
Purdue University



Brandon Boor
Assistant Professor of
Civil Engineering, Purdue
University



Jon Douglas
Director of Advanced
Development for the
Global Controls group,
Johnson Controls



Experts from specialties encompassing aerosol studies, ventilation, engineering, physics, virology and clinical medicine have joined together to present this review



Heating Air-conditioning & Refrigeration Distributors International.



Air-Conditioning, Heating, & Refrigeration Institute

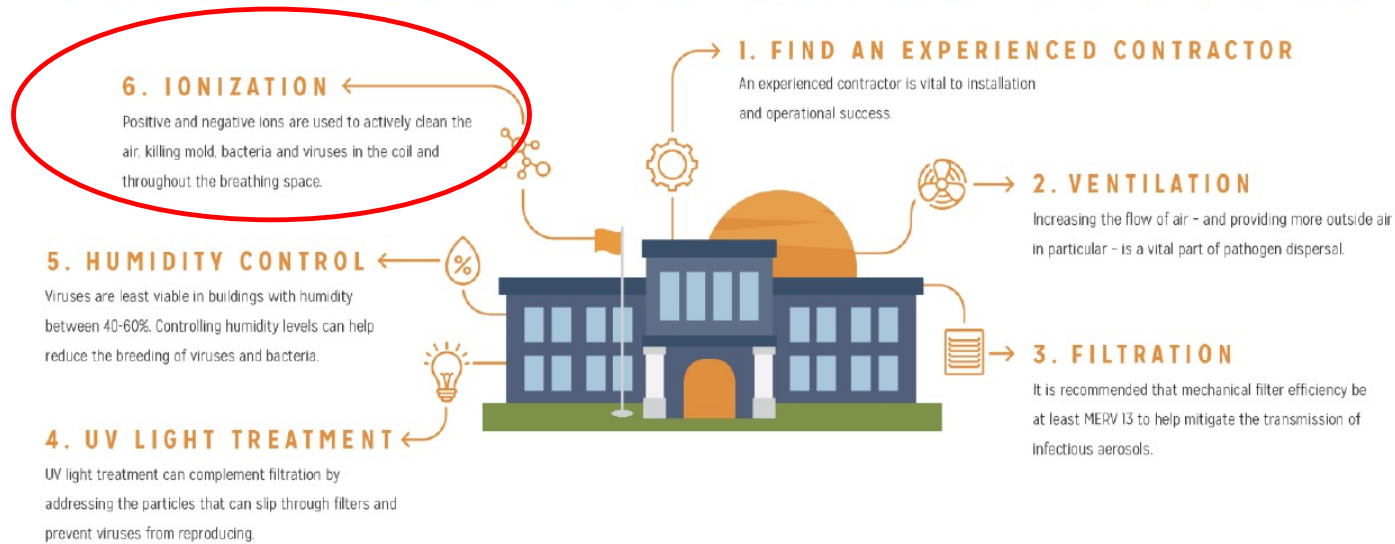
Anatomy of a Healthy School

BY AHRI
11/4/2020 - COVID-19

An HVAC Primer for safety, comfort, and productivity



FIVE STEPS FOR SAFER SCHOOLS



A Multi-Layered Air Defense Model to Protect Shared Air in Critical Infrastructure Sectors



July 2020

P.H. Nelson, M.D., M.P.H.

Air Force Surgeon General's Chair to Air University

R. A. Norton, Ph.D.

Professor, Veterinary Infectious Diseases, Biosecurity and Public Health,
Department of Poultry Science, Auburn University
Faculty Fellow, McCrary Institute, Auburn University

M. D. Ervin, M.D.

Chief of Operational Medicine, 59th Medical Wing
Joint Base San Antonio

S. M. Galvagno, D.O., Ph.D.

Professor, University of Maryland School of Medicine
Commander, 459th Aerospace Medicine Squadron
Joint Base Andrews

Lt Gen (ret) Douglas Robb, D.O., M.P.H.

Brig Gen Peter Bailey

Col (ret) Wm Jeffrey Long, M.D.

Col J L Allen

Col (ret) Brian Hastings

Col (ret) Dave Lewis

Lt Col (ret) Robert D'Amore

Lt Col (ret) Rick "Sonic" Johnson

Lt Col Michael Coghlan, M.D.

Lt Col Michael J. Cuomo, M.P.H.

Col (ret) James Powell

COL (ret) David Dinger

Col Glenn Donnelly, M.D., M.P.H.

Lt Col Oliver Wisco, M.D.

Lt Col Jamie Stowe

Maj Kristen DeWilde, M.D.

Maj Raymond Funke

Maj Linda Mansolillo

Maj Ricardo Sequeira, M.D.

Maj Megan Martin, Ph.D.

Mr Jim Mathews

Mr Alton Holt, M.S.

Mr David Park

Col (Dr) Lawrence Steinkraus, Jr, M.D., M.P.H.

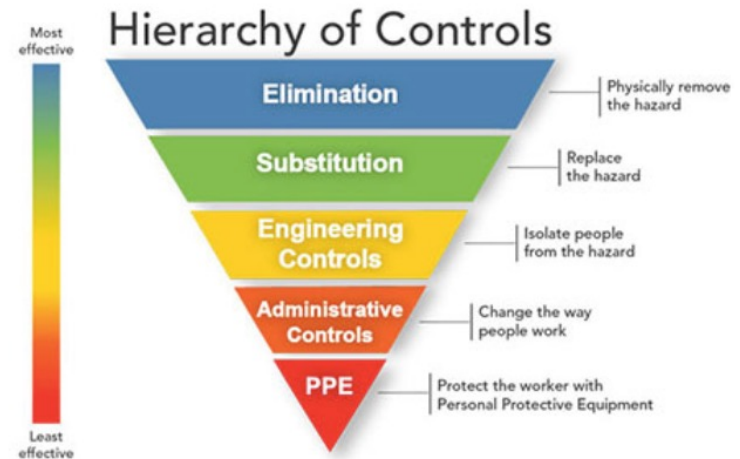
Brig Gen (ret) Klaus Schafer, M.D., M.P.H.

Dr Yan Chen, Ph.D.

A Multi-Layered Air Defense Model to Protect Shared Air in Critical Infrastructure Sectors



July 2020



Engineering Controls to consider for indoor/enclosed “shared air”:

- 1) Increasing air turnover with fresh outdoor air using open windows
- 2) Increasing air turnover with fresh air using HVAC room turnover
- 3) Installing physical barriers between people where they share air
- 4) Providing directional air flow as a virtual barrier between “shared” and “personal” air.
- 5) Surveying/mapping/mitigating air flow hazards in high risk public indoor spaces (bathrooms, elevators, etc)
- 6) Filtering shared indoor air with virus/bacteria/mold killing through UV or ceramic filtration
- 7) **Installing pathogen-scavenging (virus, but potentially also bacteria and mold) technology that provides a continuous level of protection using ionized compounds (vaporized low-level Hydrogen Peroxide, Hypochlorous Acid, etc.), repurposed to target aerosolized or vaporized COVID-19, as well as other pathogens that may be encountered in the future**

NPBI TARGETS PARTICLES

ISO 16890 classifications are based on where particles are deposited in the human lung.

Aerodynamic Diameter (μm) of particles and their likely region of deposit

ISO 16890 Filter Ratings

5–10 μm Nose and Pharynx

3–5 μm Trachea

2–3 μm Bronchia

1–2 μm Bronchioles

0,1*–1 μm Alveoli

PM₁₀

PM_{2,5}

PM₁

**Efficiency on particles smaller than 0,3 micron is not defined by the ISO*

PM₁ – The Smaller the More Dangerous!

A variety of studies are focusing on the health effects of PM₁ particles:



Efficiency of ionizers in removing airborne particles in indoor environments

Buddhi Pushpawela, Rohan Jayaratne, Aline Nguy¹, Lidia Morawska  

Show more 

<https://doi.org/10.1016/j.elstat.2017.10.002>

[Get rights and content](#)

We conclude that air ionizers are more suited than high-flow air filters in removing ultrafine particles from rooms larger than about 25 m³. The investigation also showed that small ions produced by the ionizer, placed in one room, were carried through the air conditioning system into other rooms, effectively removing particles from the air in these rooms in the process.

The

POWER

of

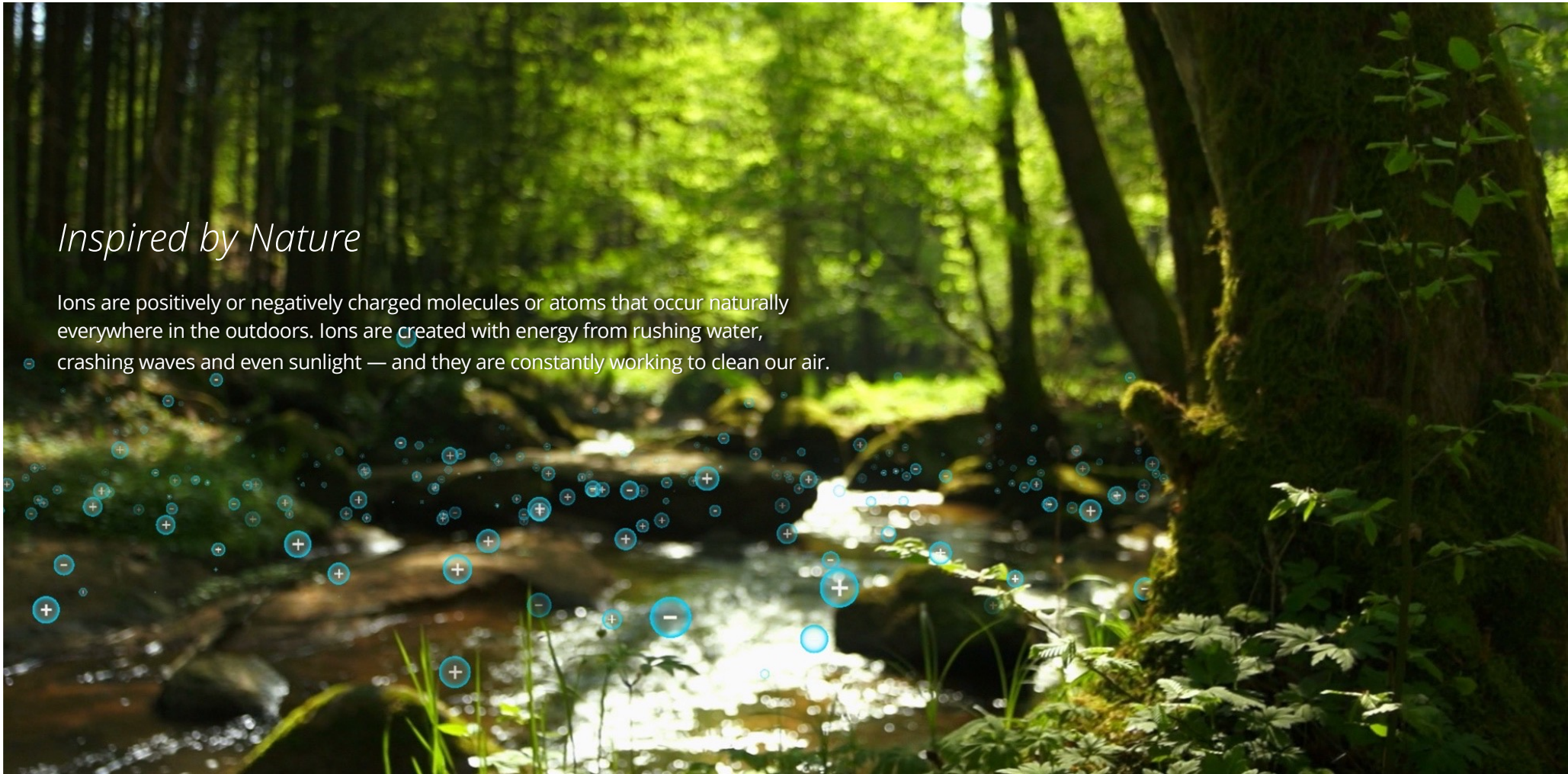
IONS

NPBI Technology

WHAT IS AN ION?

Inspired by Nature

Ions are positively or negatively charged molecules or atoms that occur naturally everywhere in the outdoors. Ions are created with energy from rushing water, crashing waves and even sunlight — and they are constantly working to clean our air.



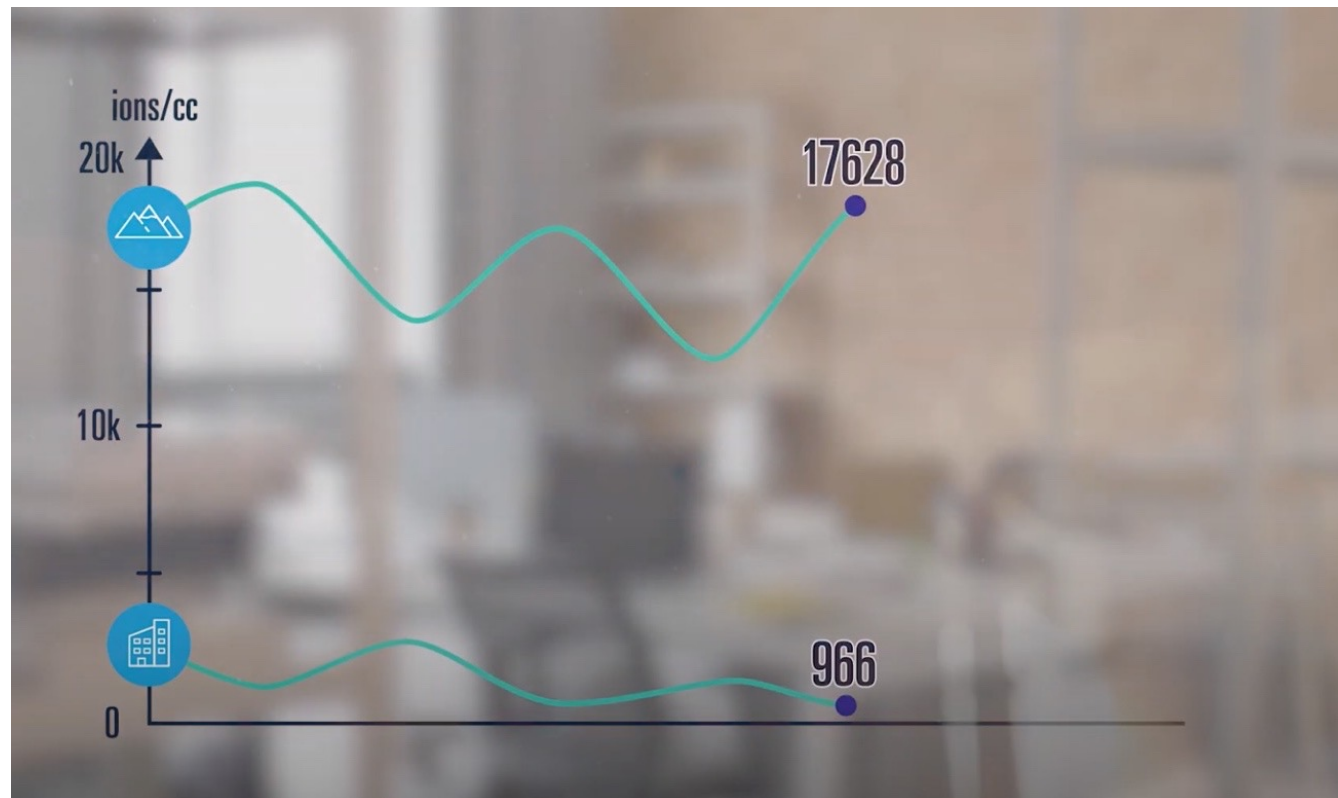
WHAT IS AN ION?

There are lower concentrations of ions indoors.

Ion levels tend to be higher outdoors than indoors and higher in natural settings than in urban areas. The highest naturally occurring ion levels are typically found near rushing water, at higher elevations or near waterfalls, and measurements can range in the tens of thousands of ions per cubic centimeter (cc). Indoor ion concentrations in buildings without ionizers are typically under 2,000 ions per cc.*

source: [AlphaLab Inc.](#)

Ionization is the process of using voltage to electrically charge air molecules.



*In-room ion density is dependent on a variety of factors, including ionizing equipment, proximity of the ionizing equipment to the occupied space, airflow rates and path of ductwork within the building.

NPBI technology helps to improve indoor air.

- NPBI technology introduces ions into your indoor airstream using the airflow in your existing ventilation system as a delivery method.
- No matter your existing ion concentration, employing NPBI technology can enhance your ion density. Post-installation density in real-world spaces range from 2,000–40,000+ ions/cc.

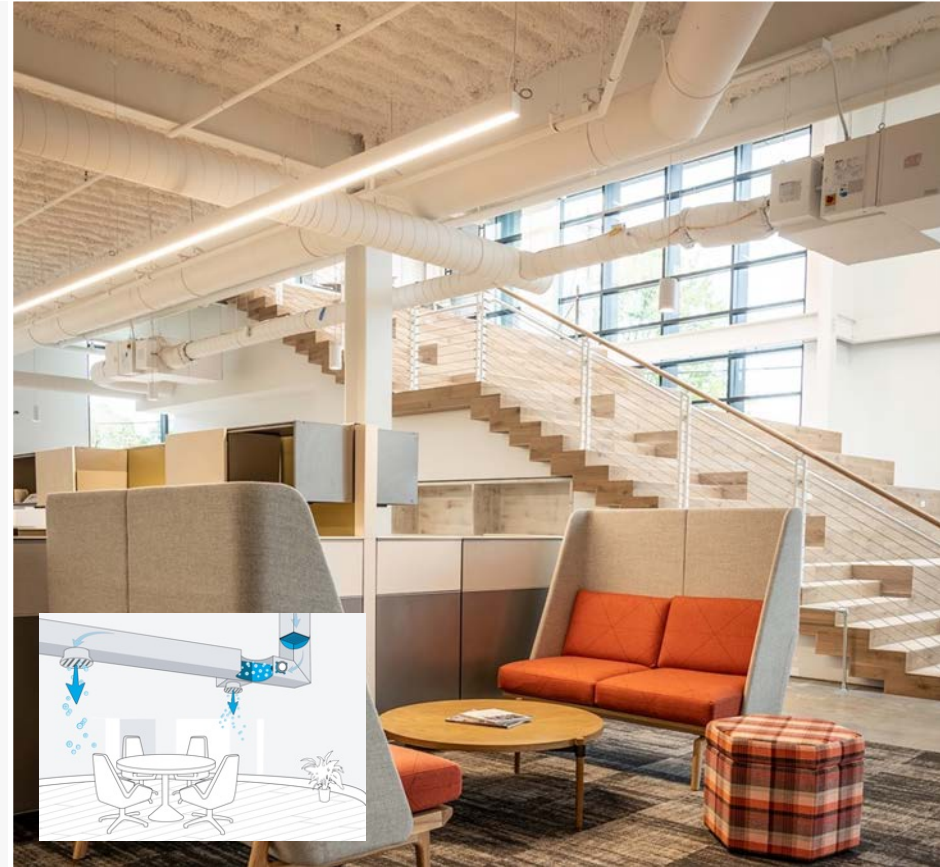


ION DELIVERY

To optimize in-room ion density, one must take into consideration a number of factors, including the proximity of the ionizer to the space it's treating, the amount of airflow within the HVAC system and the path of the ductwork within the building.

NPBI at work

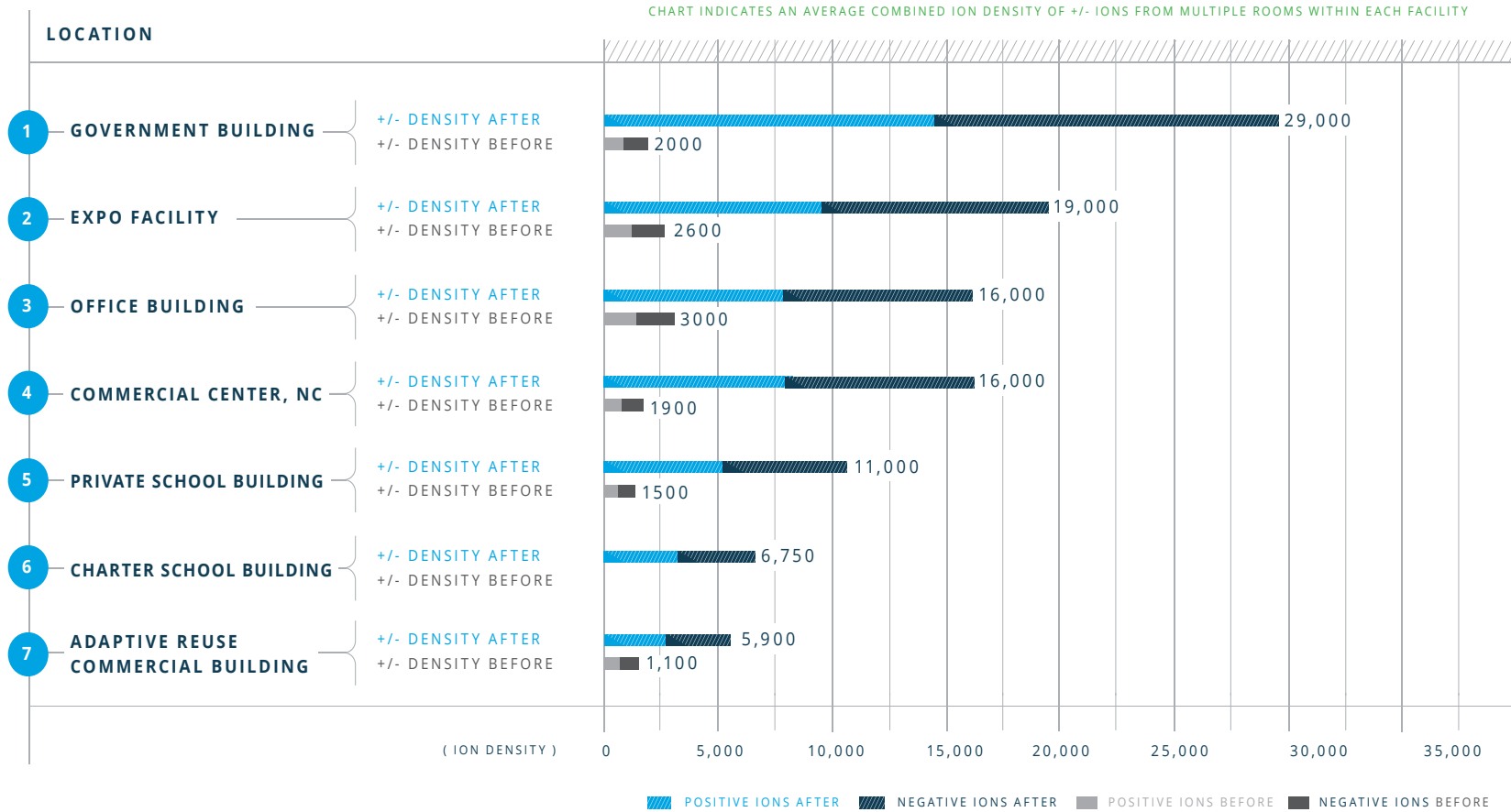
1. Air passes through your existing duct system, towards the NPBI device.
2. The ionizer produces positive and negative ions that are carried by the airstream through the ductwork and into the room.
3. These ions seek out and combine with particles, forming larger clusters that are more effectively captured by the HVAC system's filter.
4. This helps reduce airborne particles for better indoor air quality.



See what the data shows.



field testing



Data collected from Handheld AIC2

Ozone (O₃) is a natural gas that can be helpful or harmful depending on its location in the atmosphere.

In the upper atmosphere, ozone is protective, reducing the amount of harmful UV radiation reaching the Earth's surface. Ozone in the lower atmosphere, however, is linked to respiratory damage that increases with frequency and duration of exposure. ASHRAE's Environmental Health Committee advises that "the introduction of ozone to indoor spaces should be reduced to as low as reasonably achievable."



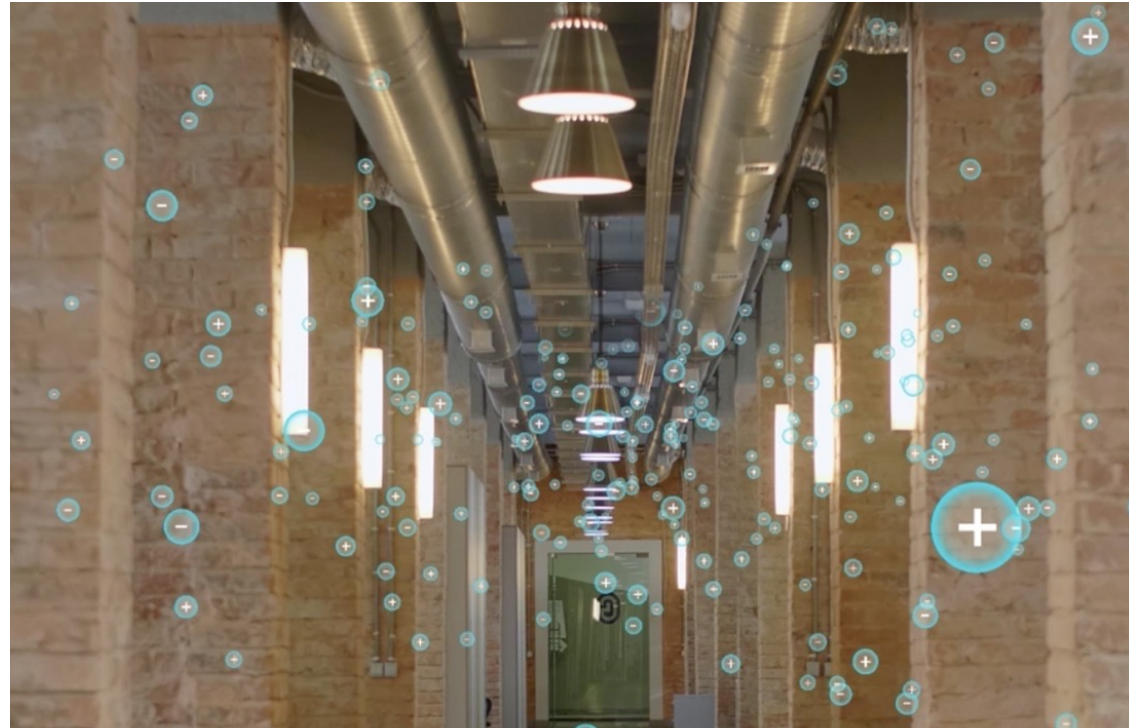
sources:
[EPA.gov/Indoor Air Quality \(IAQ\)](https://www.epa.gov/indoor-air-quality-iaq)
[ASHRAE Filtration/Disinfection](https://www.ashrae.org/technical-resources/indoor-air-quality)

NPBI GENERATES IONS WITHOUT PRODUCING HARMFUL OZONE

Raising the bar for air safety standards.

Ionization technology has existed for a long time and has evolved tremendously with research and testing. Older technologies emit harmful levels of ozone, while NPBI technology relies on the physics of lower voltage applications to deliver benefits without harmful levels of ozone.

Third-party testing by Intertek Laboratories also confirmed that NPBI technology did not increase measured VOC products.



A NOTE ON BPI VS. NPBI

A common misconception is that all bipolar ionization is one technology. But **NPBI is NOT the same as traditional BPI. They are two very different technologies.** NPBI operates at lower voltages from traditional BPI and is therefore able to deliver the benefits of ionization while complying with zero ozone emissions standards. We are working to improve the industry's understanding of NPBI as we continue our development, testing and validation.

UL 2998 - UL's stringent Zero Emissions Certification

UL 2998 is an environmental claim validation standard created by Underwriters Laboratories (UL), the global safety science leader, that helps people make informed choices when selecting systems.

Indoor air quality solutions that meet this strict standard are considered to have zero ozone emissions. CDC, EPA* and ASHRAE** guidance suggest using products with UL 2998. According to ASHRAE, the CDC position on Bipolar Ionization is, "... While bipolar ionization has been around for decades, the technology has matured and many of the earlier potential safety concerns are reportedly now resolved."

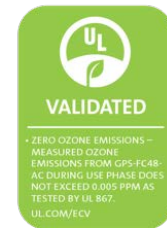
*The EPA states, "If you decide to use a device that incorporates bipolar ionization technology, EPA recommends using a device that meets UL 2998 standard certification (Environmental Claim Validation Procedure (ECVP) for Zero Ozone Emissions from Air Cleaners."

**According to ASHRAE, "If you are considering the acquisition of bipolar ionization equipment, you will want to be sure that the equipment meets UL 2998 standard certification (Environmental Claim Validation Procedure (ECVP) for Zero Ozone Emissions from Air Cleaners) which is intended to validate that no harmful levels of ozone are produced."

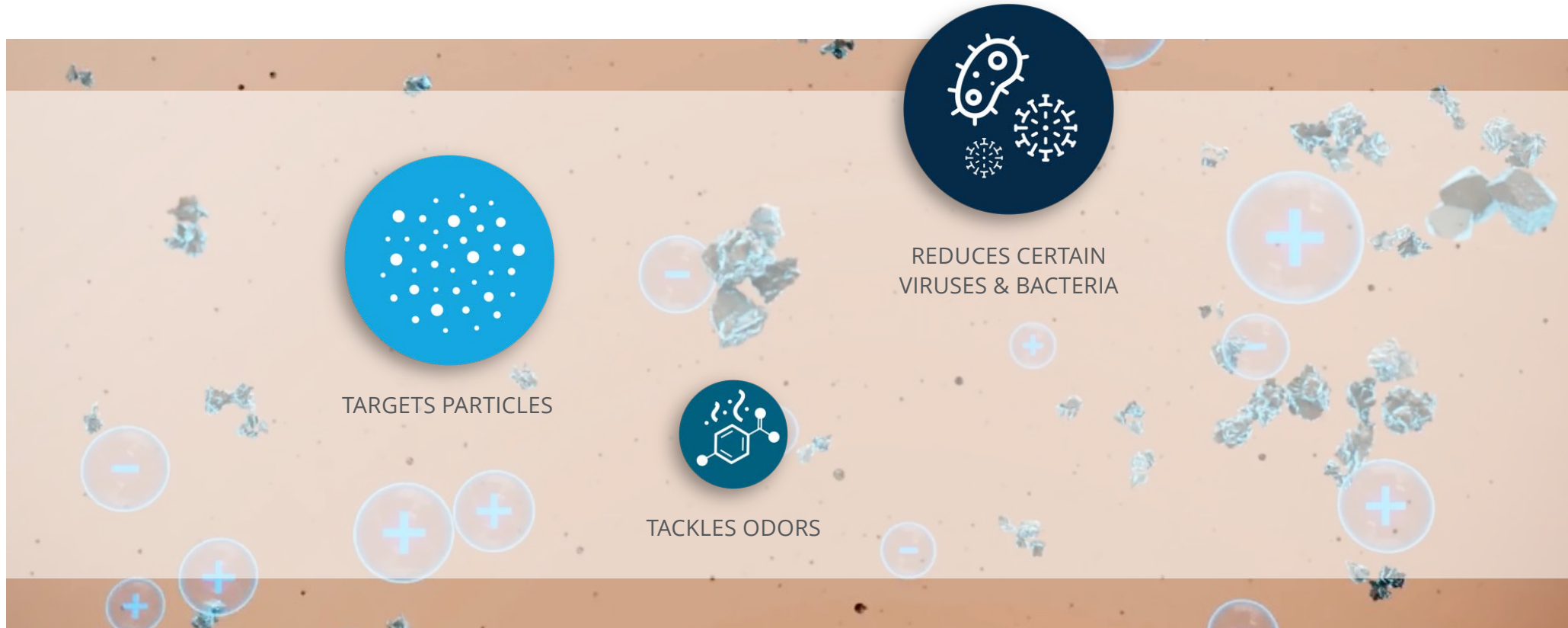
*** All GPS products comply with UL 867 or are certified to UL 2998. The products currently listed on the GPS website are all UL 2998 certified.

ALL PRODUCTS SHOULD
COMPLY WITH UL 867 AND
BE CERTIFIED TO UL 2998***

Visit the [UL SPOT website](#) to
view certified products.



HOW DOES NPBI WORK?



TARGETS PARTICLES



targets particles



reduces certain viruses and bacteria



tackles odors

Dust, dander, smoke, viruses and bacteria often go unseen in the air. Various studies have demonstrated the potential benefits of reduced airborne particles, which could include improved air quality, diminished HVAC strain, and decreased exposure to dust and allergens.



NPBI technology reduces particulate matter by introducing ions into the airstream, causing particles to cluster together for easier filtration by your HVAC system.

TARGETS PARTICLES



targets
particles



reduces
certain viruses
and bacteria



tackles
odors

NPBI technology so effectively removes particles from the air that it can make a MERV 8 filter perform like a MERV 13 filter.

MERV measures a filter's ability to capture particles of varying sizes. It stands for Minimum Efficiency Reporting Value and ranges from 1 to 20. The higher a system's MERV rating, the more effective — and more expensive — a particular filter is.

NPBI is verified by Blue Heaven Labs, a third-party laboratory, to enable MERV 13 efficiency using only MERV 8-level filtration.

Buying replacement MERV 13 filters would cost substantially more than MERV 8 filters ... in perpetuity.



REDUCES CERTAIN VIRUSES AND BACTERIA



targets
particles

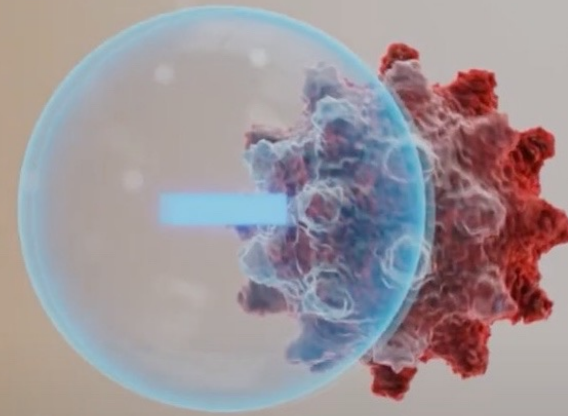


reduces
certain viruses
and bacteria



tackles
odors

Using a sealed, unoccupied testing chamber, NPBI has been tested to obtain data that is relevant to real world applications. This includes using a large chamber for testing to approximate an office space and introducing ionized air in a similar way to how an HVAC system would deliver ions in an actual room.



REDUCES CERTAIN VIRUSES AND BACTERIA



targets particles



reduces certain viruses and bacteria



tackles odors



IN-AIR TESTING

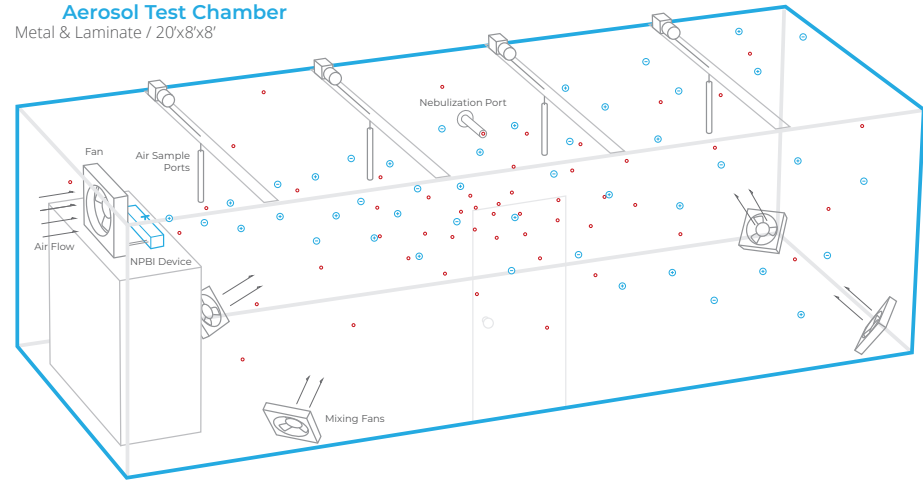
NPBI products are designed to work with air handling systems to deliver the benefits of ionization. These tests measure the reduction of certain airborne viruses and bacteria by aerosolizing a test specimen into a large biosafety test chamber (BSL2 or BSL3) and suspending it in the air using mixing fans. Measurements of the specimen are taken at regular intervals and compared to a control without the introduction of ionization.



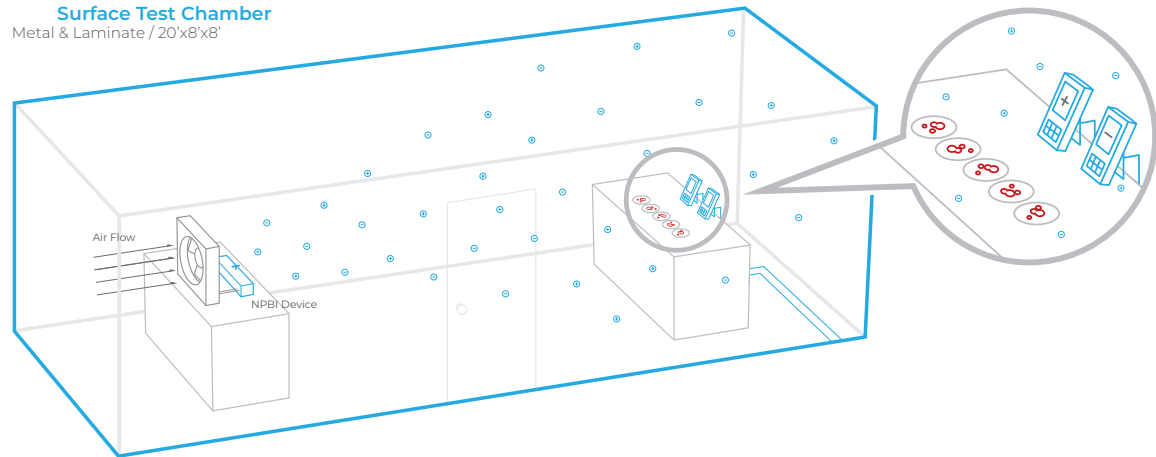
SURFACE TESTING

NPBI products are designed to work with air handling systems to deliver the benefits of ionization. These tests measure the reduction of certain viruses and bacteria on surfaces by applying a specimen to glass slides, petri dishes or coupons and placing them on a table within a large biosafety test chamber (BSL2 or BSL3). Measurements of the specimen are taken at regular intervals and compared to a control without the introduction of ionization.

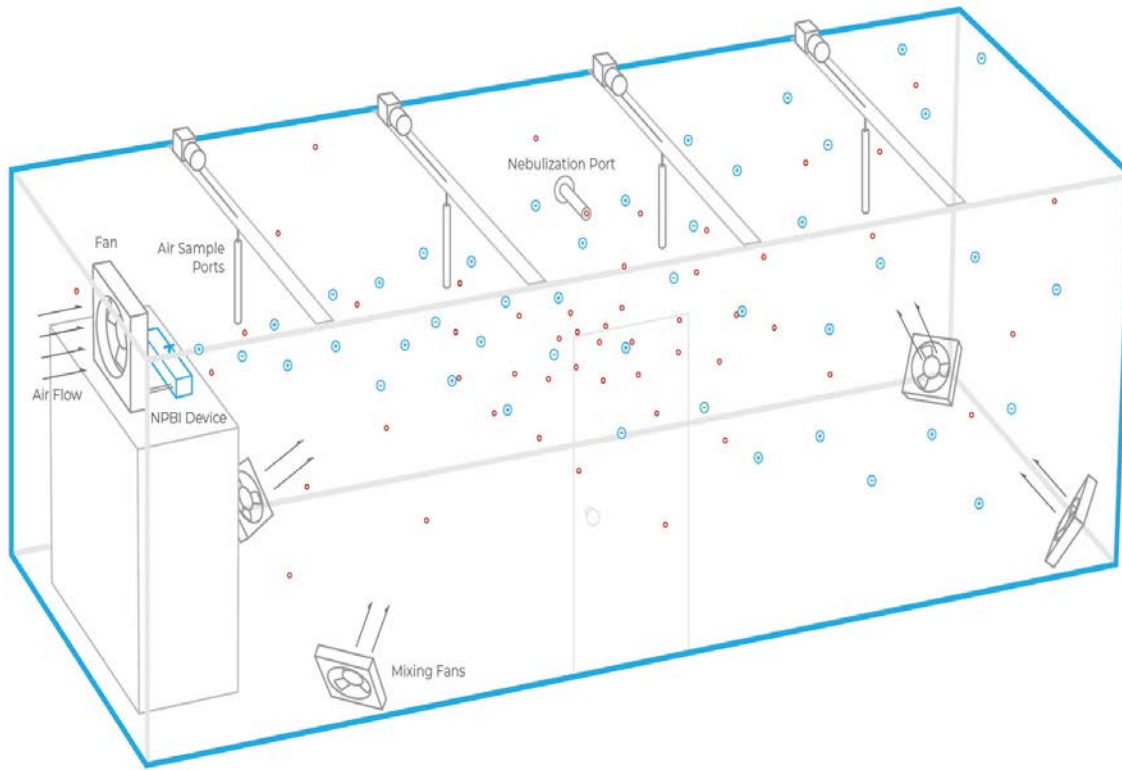
Aerosol Test Chamber
Metal & Laminate / 20'x8'x8'



Surface Test Chamber
Metal & Laminate / 20'x8'x8'

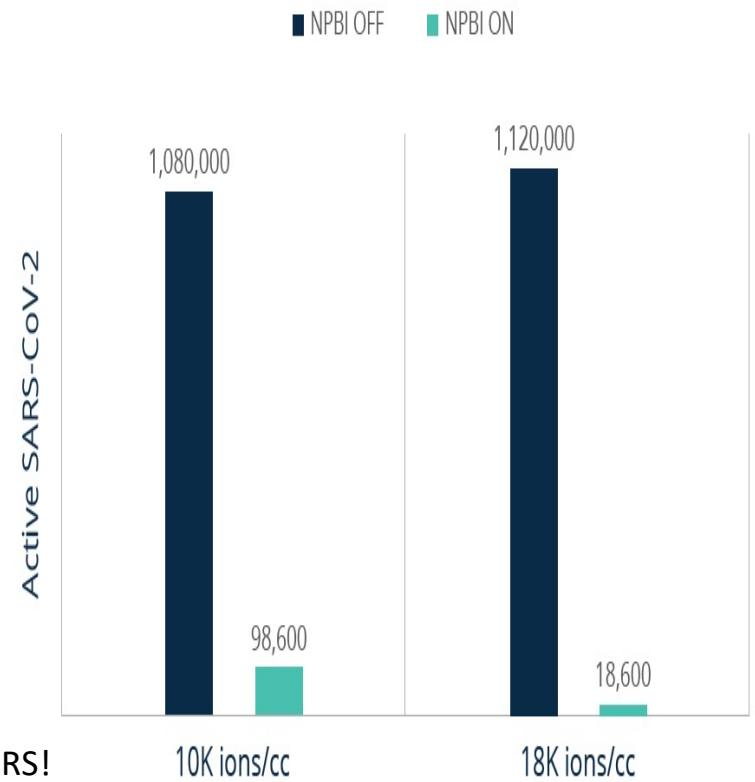


NPBI – AEROSOL TESTING of SARS-CoV-2



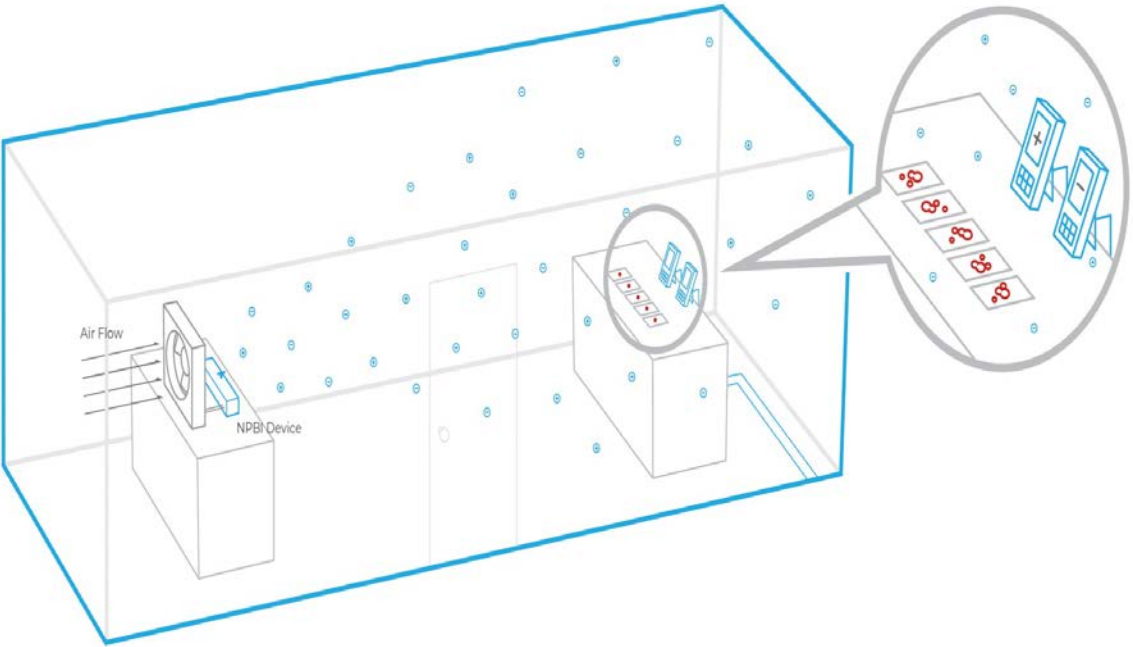
The test stage can be seen in the design diagram and consisted of a metal and laminate safety test chamber measuring 20' w x 8' h x 8' d with sealed seams.

REMAINING ACTIVE AIRBORNE SARS-COV-2 VIRUS IN BSL3 ROOM AFTER 60 MINUTES WITH IONIZER OFF VERSUS ON.



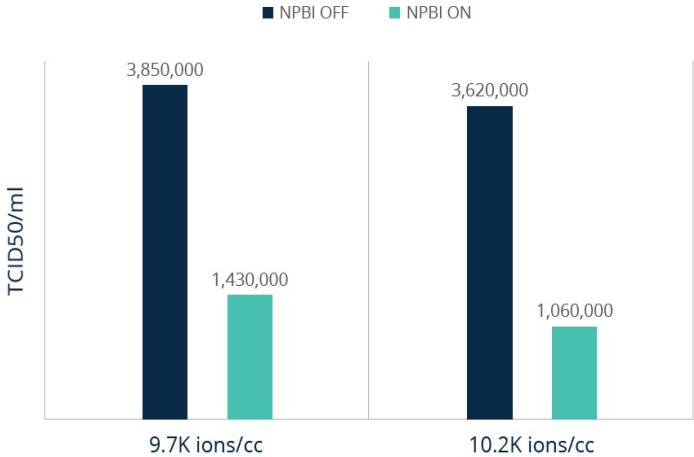
ION DENSITY MATTERS!

NPBI – SURFACE TESTING of SARS-CoV-2

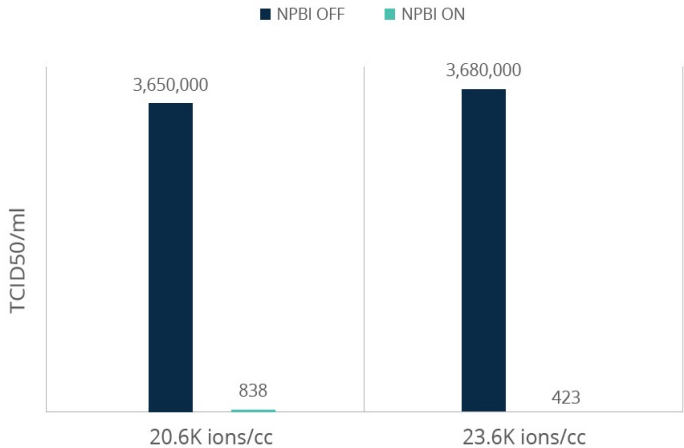


The test stage can be seen in the design diagram and consisted of a metal and laminate safety test chamber measuring 20' w x 8' h x 8' d with sealed seams.

REMAINING ACTIVE SURFACE SARS-COV-2 VIRUS IN BSL3 ROOM AFTER 60 MINUTES WITH IONIZER OFF VERSUS ON.



REMAINING ACTIVE SURFACE SARS-COV-2 VIRUS IN BSL3 ROOM AFTER 60 MINUTES WITH IONIZER OFF VERSUS ON.



TACKLES ODORS



targets
particles



reduces
certain viruses
and bacteria



tackles
odors

NPBI works with your ventilation system to introduce ions into your space, reducing airborne particles including odors and VOCs to improve indoor air quality.



What are VOCs ...

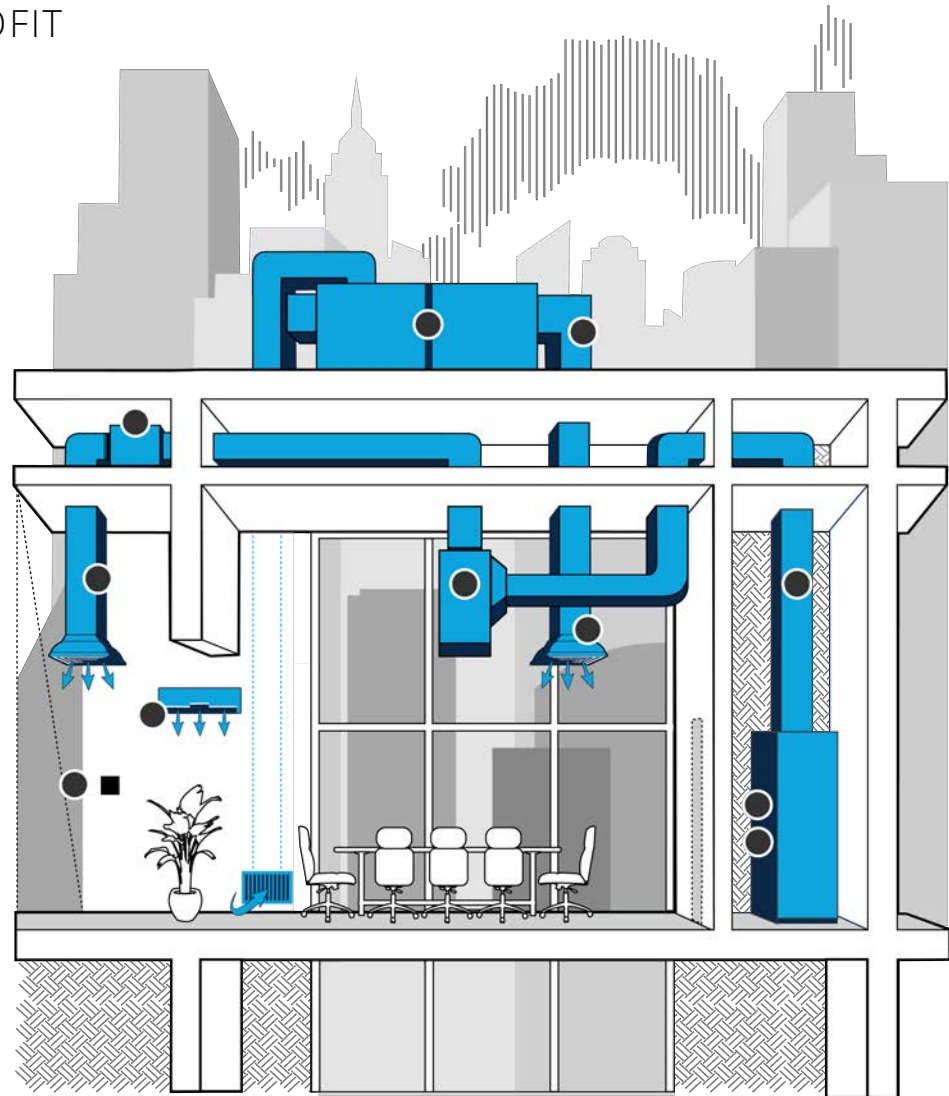
VOLATILE ORGANIC COMPOUNDS

We come in contact with hundreds of VOCs each day.



NPBI FITS ANY HVAC SYSTEM, NEW OR RETROFIT

Cleaner indoor air isn't one-size-fits-all, which is why most OEMs offer a wide range of products to ensure they can cover just about any specific client need or application.



NPBI QUICK SELECTION GUIDE – VARIES BY OEM

ASSORTMENT SUMMARY – FEATURES WILL VARY BY OEM

Product Model	Install Locations	Cooling Capacities	Input Voltage	Auto-Clean
1	Duct, Supply Airstream, Between Evaporator Coil and Filter	0–4,800+ CFM / 1–15+ Tons	24/120/208-240 VAC	
2	Duct, Supply Airstream	0–4,800 CFM / 1–12 Tons	24–240 VAC	✓
3	Fan Inlet, Supply Airstream, Zone Diffuser	0–4,800 CFM / 1–12 Tons	24–240 VAC	✓
4	Fan Inlet, Supply Airstream, Zone Diffuser	0–2,400 CFM / 1–6 Tons	24–240 VAC	✓
5	Duct, Supply Airstream	0–2,400 CFM / 1–6 Tons	110–240 VAC	
6	Duct, Supply Airstream	0–3,200 CFM / 1–8 Tons	110–240 VAC	
7	Fan Inlet, Supply Airstream	0–3,200 CFM / 1–8 Tons	24 VAC	



INTERNAL MOUNT

An automatic self-cleaning, lightweight NPBI system that handles up to 4,800 CFM or 12 tons. Designed for multiple mounting options including fan inlet, interior duct walls or floors.

Input Voltage	24-240 VAC
Amps	0.41-0.041 A
Power Consumption	10 watts
Frequency	50/60 Hz
Total Ion Output	> 400M ions/cc
Airflow Capacity	0-4,800 CFM or up to 12 tons
Temperature Range	-20°F to 200°F
Humidity Range	0-100% RH
Unit Dimensions	11.10"L × 1.84"W × 3.52"H
Unit Weight	1.32 lbs
Electric Listings	UL, cUL
Alarm Contact Rating	250 VAC / 1 A
Compliance & Certifications	UL 2998, UL 867, OSHPD Seismic (OSP), IAQP, CE, CARB



CEILING CASSETTE & INTERNAL MOUNT

An automatic self-cleaning, lightweight NPBI system that handles up to 2,400 CFM or 6 tons. Designed for multiple mounting options including fan inlet, interior duct walls or floors.

Input Voltage	24-240 VAC
Amps	0.170-0.017 A operating / 0.33-0.03 A cleaning cycle
Power Consumption	8 watts
Frequency	50/60 Hz
Total Ion Output	> 300M ions/cc
Airflow Capacity	0-2,400 CFM or up to 6 tons
Temperature Range	-20°F to 200°F
Humidity Range	0-100% RH
Unit Dimensions	7.9"L × 1.1"W × 5.0"H
Unit Weight	1.25 lbs
Electric Listings	UL, cUL
Alarm Contact Rating	250 VAC / 1 A
Compliance & Certifications	UL 2998, UL 867, OSHPD Seismic (OSP), IAQP, CE, CARB



DUCT MOUNTED NPBI

Automatic self-cleaning, duct-mounted, NPBI device. This maintenance-free unit is designed for indoor or outdoor duct mounting and can handle up to 4,800 CFM or 12 tons.

Input Voltage	24-240 VAC
Power Consumption	12 watts
Frequency	50/60 Hz
Total Ion Output	>400M ions/cc
Airflow Capacity	4,800 CFM or up to 12 tons
Temperature Range	-20°F to 140°F
Humidity Range	0-100% RH
Unit Dimensions	3.75" Dia. x 7"L
Unit Weight	2.31 lbs
Electric Listings	UL, cUL
Alarm Contact Rating	250 VAC/1 A
Compliance & Certifications	UL 2998, UL 867, OSHPD Seismic (OSP), IAQP, CE, CARB



DUCTLESS MINI-SPLITS

This NBPI device is made from a flexible chemical, heat and cold-resistant Kapton® material containing a circuit with special, carbon fiber ion emitters soldered into the circuit traces. This mechanism is engineered to deliver the highest level of ionization with the least amount of energy in the most compact size. Designed for 3,200 CFM or 8 tons.

Input Voltage	110-240 VAC
Power Consumption	5 watts
Frequency	50/60 Hz
Output Voltage	2kV
Total Ion Output	>35M ions/cc per foot
Airflow Capacity	0-3,200 CFM or 8 tons
Alarm Contact Rating	250 VAC / 1 A, N.O. "dry" contact
Compliance & Certifications	UL 867, UL 2998, IAQP, OSHPD Seismic (OSP), CE, CARB
Temperature Range	-40°F to 140°F
Power Unit Dimensions	1.00"H × 1.75"W × 3.75"L
Ionizer Strip Dimensions	18: 1.50"W × 18.00"L × 0.05"H 36: 1.50"W × 36.00"L × 0.05"H
Combined Weight	18: 0.50 lbs 36: 0.54 lbs
Electric Listings	UL, cUL



NPBI DEVICE FOR COIL CLEANING

This is a modular NPBI system that is field-assembled to any length up to 240 inches in 6-inch increments. The fiberglass composite and carbon fiber NPBI device can be mounted in various environments. It can treat 50–250 CFM per inch of bar, depending on the application.

Input Voltage	24/120/208–240 VAC
Amps	0.500 A/0.120 A/0.065 A
Frequency	50/60 Hz
Output Voltage	5 kV RMS
Output Frequency	50/60 Hz
Total Ion Output	>140M ions/cc per inch of bar
Temperature Range	-40°F to 200°F
Humidity Range	0–100% RH
Power Entry	UL Listed, Plenum-Rated Line Cord with 3-Prong Plug
Electric Listings	UL, cUL
Compliance & Certifications	UL 2998, UL 867, IAQP, OSHPD Seismic (OSP), CE, CARB
Power Unit Dimensions	9.00"L × 3.25"W × 4.75"H
Ionizer Bar Dimensions	1.60"H × 0.75"W = 6.00" per 6 Section + 1.20" (240.00" Max)
Power Unit Weight	4.63 lbs
Ionizer Bar Weight	0.24 lbs per 6" section

EASILY RETROFITS TO ANY HVAC SYSTEM

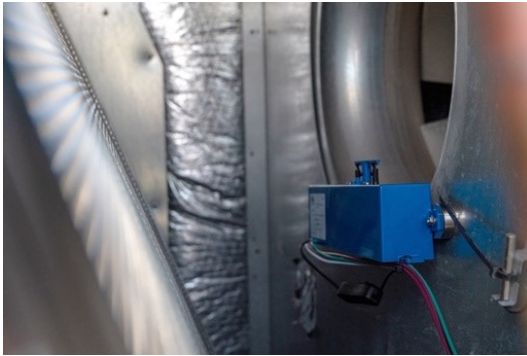
DUCT MOUNTED



COOLING COIL MOUNTED



FAN INLET MOUNTED



DUCTLESS MINI-SPLIT MOUNTED



Some NPBI systems provide auto-cleaning AND zero maintenance.

Auto-Cleaning

- Auto-cleaning, lightweight systems are designed for easy use, ultimate convenience and optimal long-term performance.
- Programmable auto-cleaning systems clean the carbon fiber brush emitters on your desired schedule, ranging from every day to every five days.
- For products that are not auto-cleaning, buildup will form over time without regular cleaning, potentially diminishing performance. Auto-cleaning products clean themselves for hassle-free maintenance and reliable performance, which means fewer replacements.

Maintenance-Free

- Unlike UV lights or traditional BPI, NPBI technology does not require any replacement parts over the lifetime of the product.

AUTO-CLEANING FEATURE



Ion Measurement

Ionization sensors can be integrated with a building automation system. Through integration, you can view live IAQ metrics within your system's dashboard and optimize your system as needed.





WALL MOUNT AIR ION SENSOR

Commercially available ion sensor that can be permanently mounted in the space to measure ion levels in real time and report back to a BAS via an analog signal.

Input Voltage	12-24 VDC
Amps	100 mA
Power Consumption	2.4 watts
Unit Dimensions	2.00"L × 4.25"W × 3.25"H
Unit Weight	0.49 lbs
Output Voltage	0-10 VDC
Ion Sensing Range	0-1,000,000 ions (-)
Output Impedance	1,000 ohms
BAS Scaling	Adjustable
Humidity Range	0-90% RH non-condensing
Internal Jumper	Adjusted in field to desired ion range
Compliance	OSHDP Seismic (OSP)



DUCT MOUNT AIR ION COUNTER

This ion detector is permanently mounted in the duct downstream of any ionization device. It measures ion levels in real time and reports back to a BAS. It includes three sensitivity levels: 20,000/200,000/2,000,000 ions/cc that can be set based on the application and in-duct location.

Input Voltage	12-24 VDC or VAC
Current	20 mA
Power Consumption	2.4 watts
Output Impedance	1 Kohm
Unit Dimensions	Housing: 3.25"L × 6.20"W × 1.60"H Sensing Rod: 10.5"L × 2.0"Dia.
Output Voltage	0-10 VDC; scaled to selected ion sensing range
Ion Sensing Range	0-20K, 0-200K, 0-2M ions/cc (+/-)
Polarity	Field selectable positive or negative
Humidity Range	0-95% RH non-condensing
Temperature Range	0°F to 148°F
Duct Airflow	1,000-100,000 CFM
Duct Velocity	300-1,100 FPM

Devices

- You can test the ion concentration in your indoor environment before and after employing NPBI technology with **third-party** air ion counters, available for purchase through [AlphaLab Inc.](#), [Senseware](#) or some makers of NPBI devices.
- Ion counters may be set to measure + or – ions.

How to Use

- To measure, position the handheld air ion counter approximately 2 inches from the register, directly within the airstream, while the HVAC system is active.
- Ensuring the grounding wire is plugged in, hold for at least 30 seconds to determine the range of ions per cc. Measurements will continuously fluctuate.



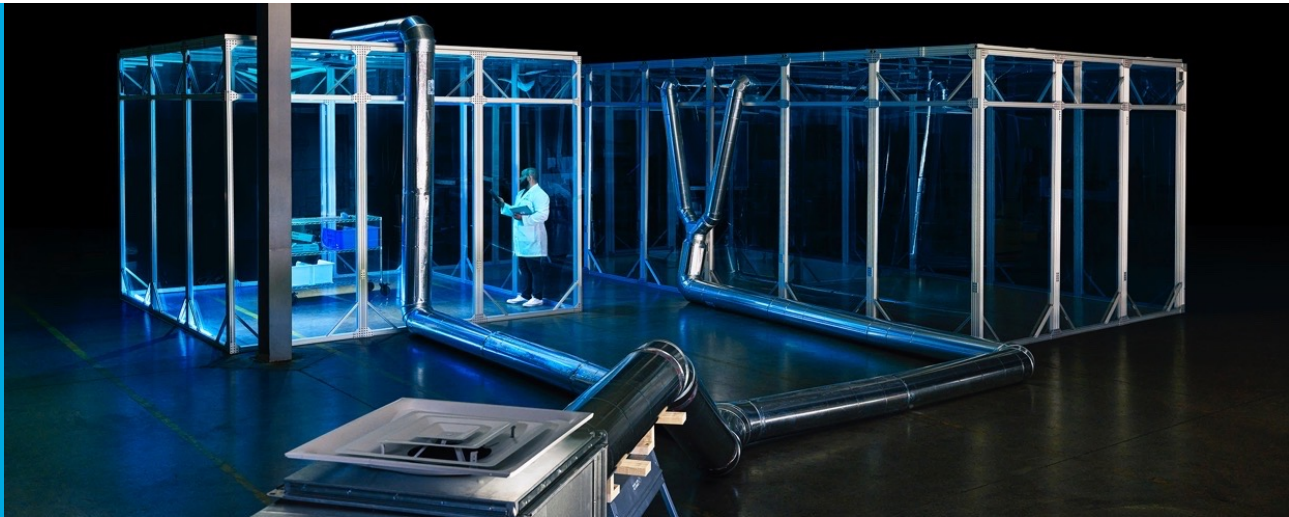
Model: AIC2
Accurate within 20%

Model: AIC
Accurate within 25%

THANK YOU FOR YOUR TIME!

You're invited to visit GPS' headquarters.

Hear our plans for the future of indoor air quality and learn why we're so enthusiastic about NPBI technology.



Your visit will include learning the key differentiators of NPBI technology, experiencing the performance of our products firsthand in our state-of-the-art test chambers, monitoring equipment and dashboarding, plus meeting with our leadership team, including members of our scientific advisory board. We'll also share our vision for the future and why it matters, as well as reveal plans for our future product road map.

Global Plasma Solutions (GPS) uses multiple data points to formulate performance validation statements. GPS technology is used in a wide range of applications across diverse environmental conditions. Since locations will vary, clients should evaluate their individual application and environmental conditions when making an assessment regarding the technology's potential benefits. The GPS products have not been evaluated by the FDA as medical devices and, therefore, are not intended to treat, cure, or prevent infections or diseases caused by certain viruses or bacteria.

The use of this technology is not intended to take the place of reasonable precautions to prevent the transmission of disease. It is important to comply with all applicable public health laws and guidelines issued by federal, state, and local governments and health authorities as well as official guidance published by the Centers for Disease Control and Prevention (CDC), including but not limited to social distancing, hand hygiene, cough etiquette, and the use of face masks.