

GERMICIDAL DISINFECTION



PURGE VIRUS

STAY SAFE and HEALTHY



GERMICIDAL DISINFECTION – Presentation Contents

How It Works

- Overview
- What We Do
- Why Purge Virus
- Highlights on Disinfection

Support Info:

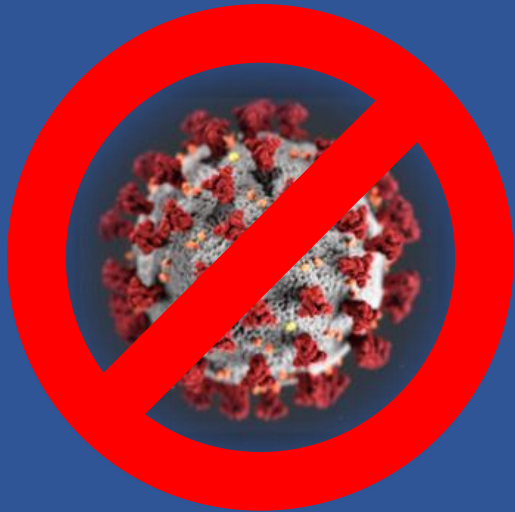
- Portable Ultraviolet Devices
- In-Duct Ultraviolet Devices
- Sample Track Record
- Bipolar Ionization
- Ductless HVAC Disinfection
- Mobile Disinfection
- Tabletop Disinfection
- Marketing
- Getting Started

Why Now?



Overview

COVID-19 has created a new normal, and we are here to help.



Cost-effective germicidal disinfection + personal protection and social distancing can collectively help reduce the spread of COVID-19. We help business owners navigate the complexity of disinfection and personal protection.

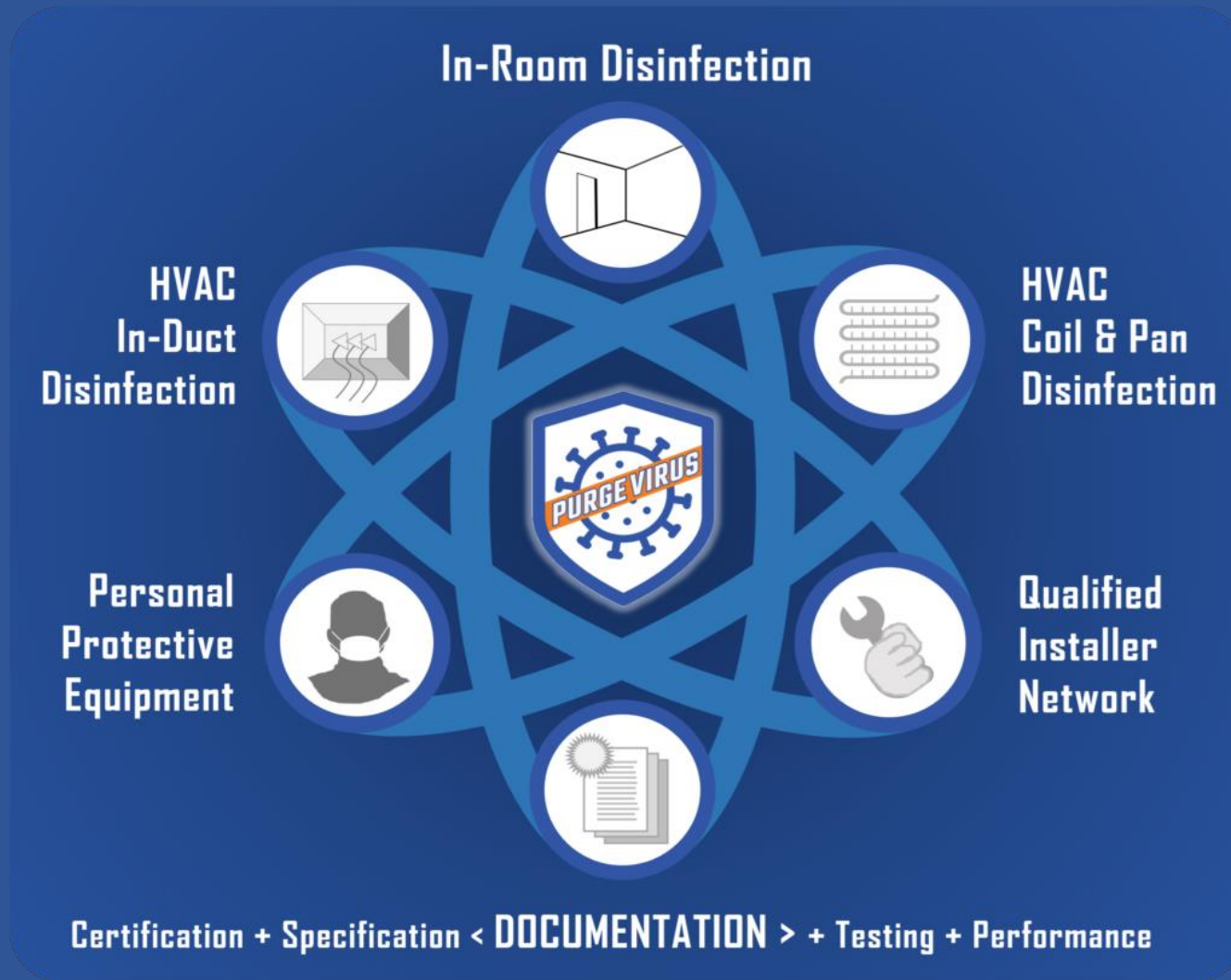


What We Do

Purge Virus LLC is your **“One-Stop-Shop”** for proven and cost-effective germicidal disinfection of air and surfaces across the commercial and residential landscape. We also provide Personal Protection Equipment through PPE Source International to further help reduce the spread of Covid-19 and future viruses.



What We Do - Continued



Sales Channel Support

In addition to advanced technology and installation, we provide training and continuing education on new technologies, along with custom-tailored marketing materials to ATTRACT, ENGAGE, and CONVERT prospects into customers.



Why Purge Virus

- We provide disinfection solutions for every type of facility.



- Alignment of the most appropriate technology to each facility
- Premier customer support and installation, upon request, via our national HVAC strategic installation partner:
- <http://pvbjinc.com/>
- Performance and Testing Reports
- **Proven technology:** Over 50,000 Ultraviolet (UV-C) disinfection devices installed via our manufacturing partner since the 1960s and 150,000 installations via our Bipolar Ionization (BPI) provider since 2008.



Highlights on Disinfection

- **Ultraviolet Light (UV-C)**
- **Bipolar Ionization (BPI)**

Both UV-C and BPI solutions leverage man-made technology to mimic naturally occurring disinfection found in nature.

The adage “*Sunlight is the best disinfectant*” and “*Go outside for some fresh air*” are both applicable.

UV-C uses specialized 253.7 nanometer wavelength light to disrupt the pathogen RNA and prevent replication.

BPI dramatically increases the density of indoor ions/cubic centimeter to create microbial clusters and destroy virus surface structures.



GERMICIDAL DISINFECTION

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Portable Ultraviolet Devices

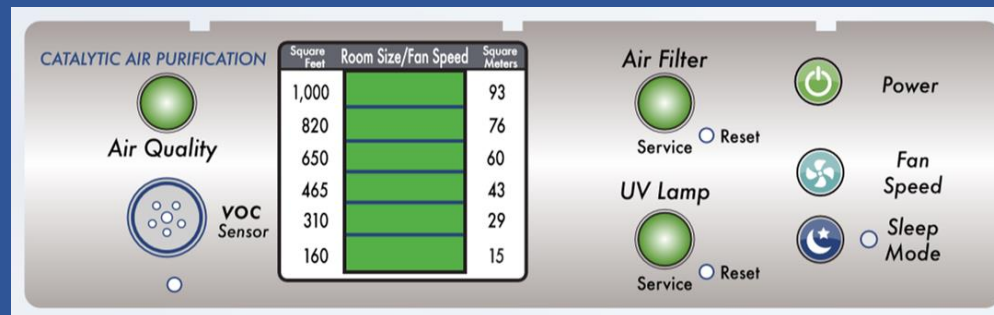
Disinfection + Portability



These devices come ready for instant use with plugs for standard outlets.

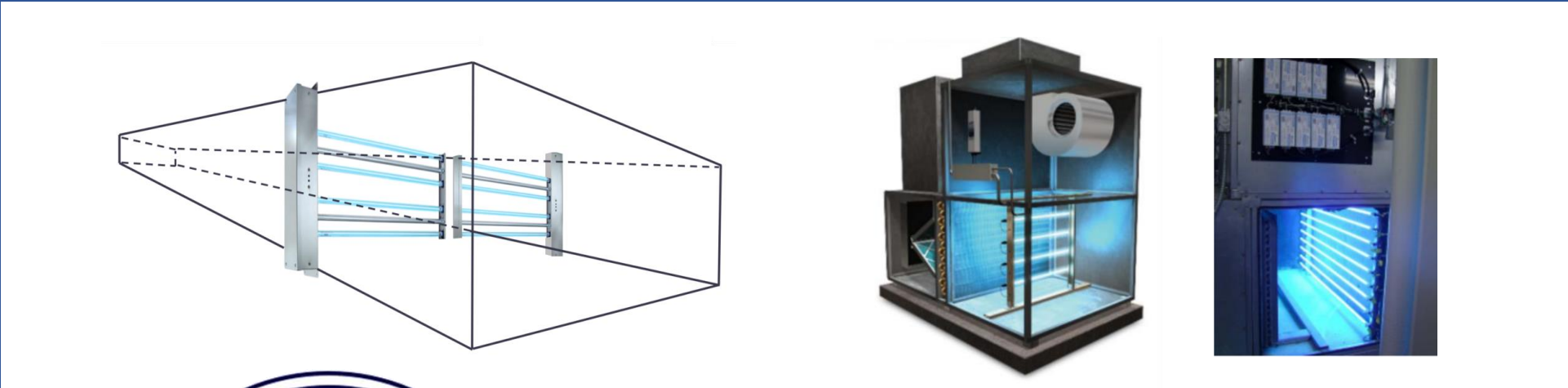
Small Device: Size: 10.6" W x 8.6" H x 4.0" D
Coverage area: 142 sq ft at ACH 6
Typical placement: Counter, shelf, or wall mount

Larger Device: 21.5" W x 18.5" H x 8" D
Coverage area: 160 sq ft up to 1,000 sq ft
Typical placement: Floor



In-Duct Ultraviolet Devices

Along with the safety measures that you may already be undertaking, clean air is becoming the “new normal.” Just as sprinkler systems help prevent the spread of fires, ultraviolet light is proven to help prevent the spread of viruses. Leveraging the systemic advantages of HVAC duct work is a powerful means to purge COVID-19



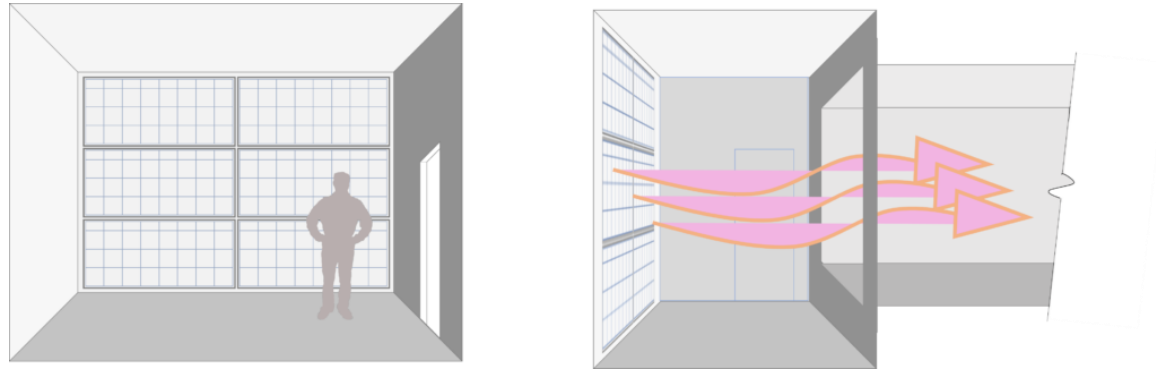
**50,000 Devices
Produced Over
50 Years**



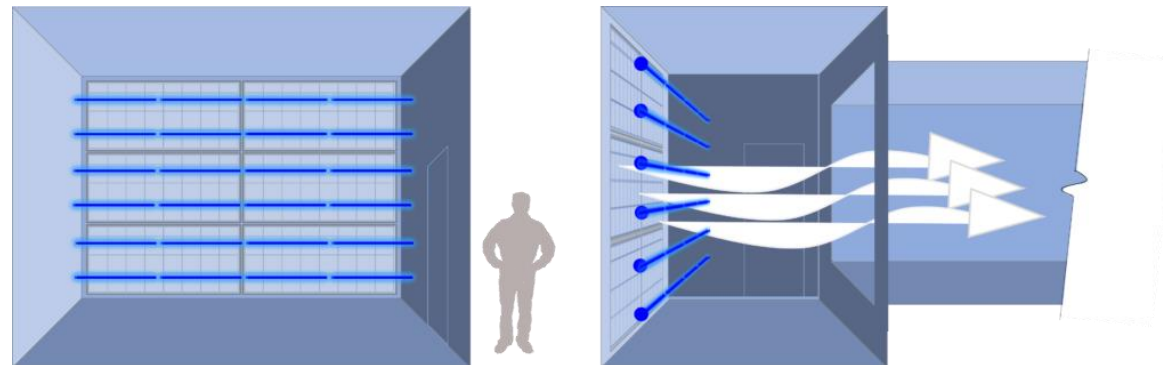
In-Duct Ultraviolet Devices – large scale

In-Duct SAMPLE: For properties with large scale Air Handling Units (ACHs) with large Cubic feet per Minute (CFM) of indoor air distribution.

Status Quo Pathogens pass through the Coil into the Plenum and Ducts. Elevation of Coil (left) Cross Section of Plenum (right) feeding into Ducts



Upgraded System with (24) high power UVC lamps installed downstream from the Coil (This cleans the COIL for energy savings and cleans the AIR by maximizing pathogen irradiation in the DUCTS.)



Our disinfection solutions for these size systems have an order of magnitude for installed cost between \$0.23 / sq ft to \$0.33 / sq. ft. of the indoor floor coverage area.



Sample Track Record

Ultraviolet (UVC) Disinfection:

Since the 1960s, one of our Purge Virus US production partners has manufactured more than **50,000 germicidal UV light devices**. The client list is extensive, and here are just a few examples of major accounts:

US Government: US Army, Air Force and Naval Hospitals, US Veterans Administration Hospitals, US Department of Agriculture, US Food & Drug Administration

Institutions: Infectious Disease Research Institute

Healthcare: New York State Department of Health, Albert Einstein Medical Center, Burbank Hospital, Children's Hospital Medical Center of Boston, Methodist Healthcare of San Antonio

Food/Beverage: Safeway Stores, Anheuser-Busch, Campbell Soup, Coca-Cola, Pepsi Cola, Del Monte, Dr. Pepper/7-Up, General Foods, Gerber Products, Guinness, Heinz, Hershey's, Kraft, M&M/Mars, Minute Maid, Ralston Purina, Pepperidge Farms

Education: Princeton University, Cornell University, Johns Hopkins University, Ohio State University

Pharma: Merck, Bristol-Myers Squibb, Eli Lilly

Other customers you may recognize IBM, 3-M, Dupont, Union Carbide, Proctor & Gamble

Bipolar Ionization (BPI) Disinfection:

Since 2008, another one of our US production partners has over **150,000 installations worldwide**. Over 1,000 K-12 Schools, and many healthcare applications including hospitals ranging from Duke Medical in North Carolina to the Cleveland Clinic in Ohio. The next set of pages focus on BPI.



BIPOLAR IONIZATION

FIVE KEY ADVANTAGES to Bipolar Ionization (BPI)



**REDUCE
PARTICLES**



**REDUCE
PATHOGENS**



**NEUTRALIZE
ODORS**



**SAVE
ENERGY**



**SAVE
TIME**

HOW IT WORKS:



CLEAN THE AIR NATURALLY

Ions are present naturally in the air and are found in the highest concentrations where the ocean meets the shore and high elevation in the mountains.

The ionization plasma process artificially creates the ions found in these desirable locations and supply them into the building, enhancing the indoor air quality. Process has been around since the late 1800's.

Units of Measure = ions/cc (cubic centimeter)

Waterfalls/High Elevation = 5,000 i/cc

City = 200 i/cc

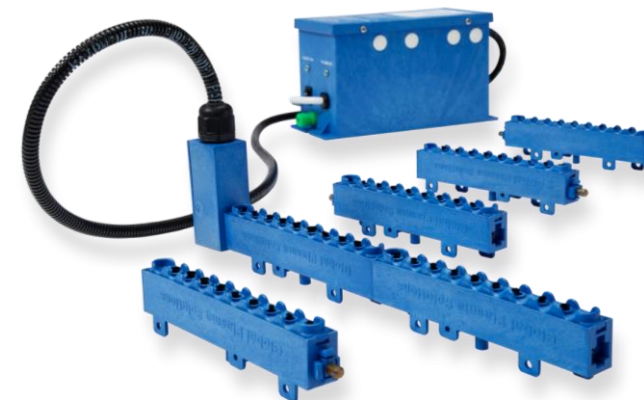
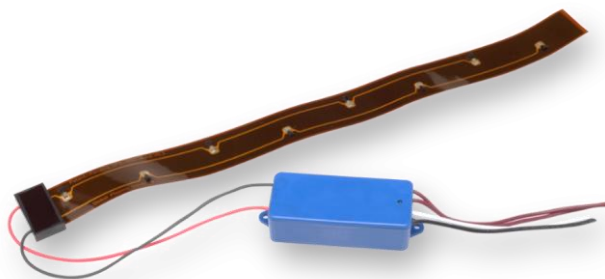
Inside Buildings = <100 i/cc



BPI – Sample Devices



carbon fiber
ion emitters



The special carbon fiber ion emitters are soldered into the circuit traces for the ribbon devices (ideal for ductless HVAC) and the emitters are mounted on the other devices for ducted HVAC

Designed for
3,200 CFM or 8 tons.
(e.g. PTACs) This ribbon system
comes in 18" and 36" lengths

Ion Production:

> 35 Million +/- Ions/cc /ft.

Designed for
4,800 CFM or 12 tons
ideal for mid sizer HVAC
systems.

Ion Production:

> 400 Million +/- Ions/cc

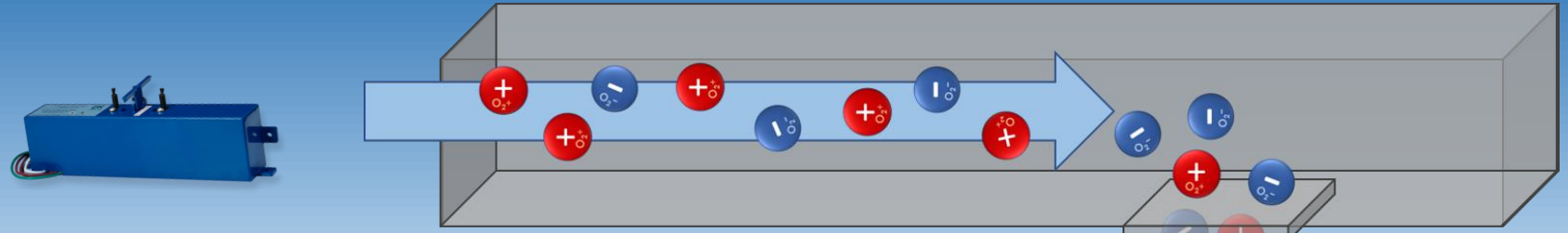
Designed for large HVAC e.g.
8,000 CFM / 20 tons or larger
(any length up to 240 inches in 6-inch
increments: 50-250 CFM per inch of bar.)

Ion Production:

> 840 Million +/- Ions/cc per 6 in.



HVAC BLOWER (enhancement)

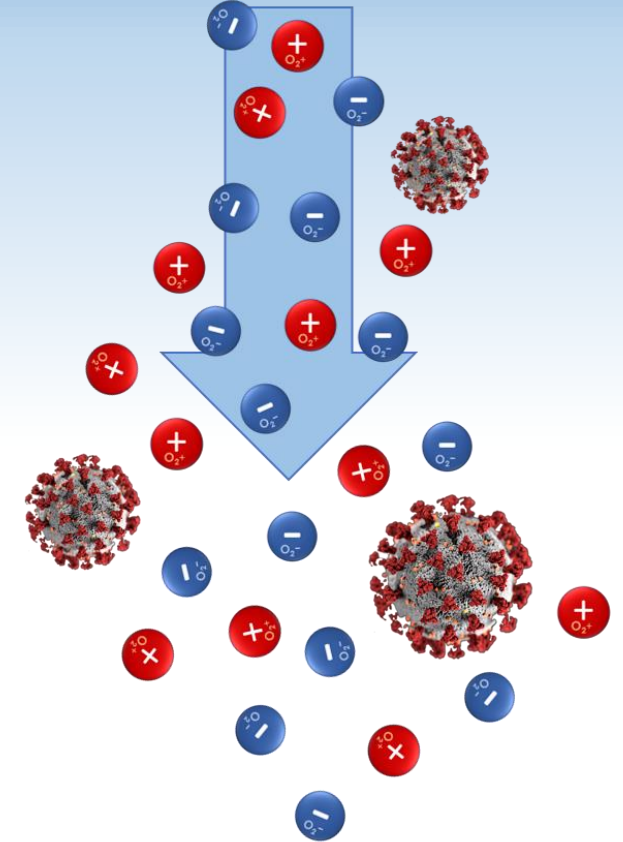


Ionizer devices are sized to the
HVAC cubic feet per minute (CFM)

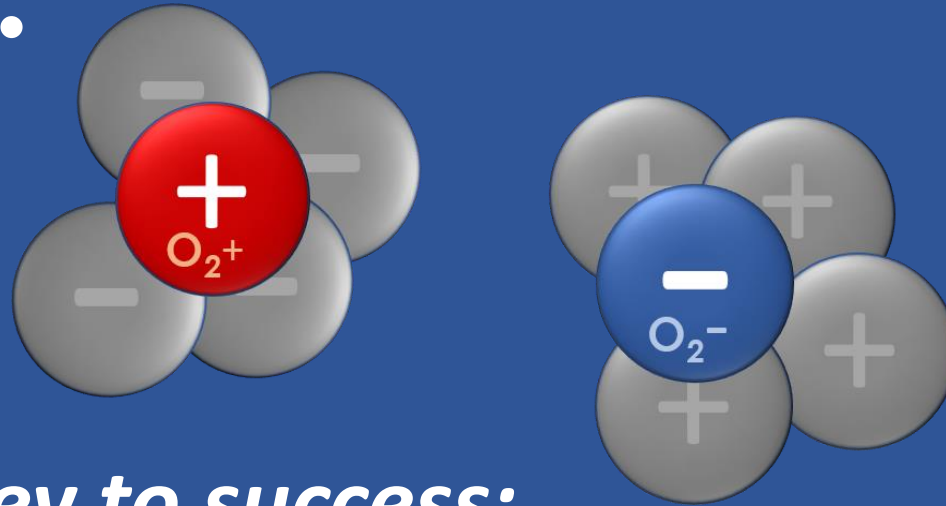
TARGET ION DENSITY

Bipolar Ionization effectiveness is
based on the number of ions in the
space.

**For viruses: target air purifying ion
density is 1,000 ions/cc in the
space.**



CLUSTERS:



Clusters are the key to success:

The charged ions combine with oppositely-charged airborne elements forming clusters, which are more easily trapped in filters.



STEP by STEP

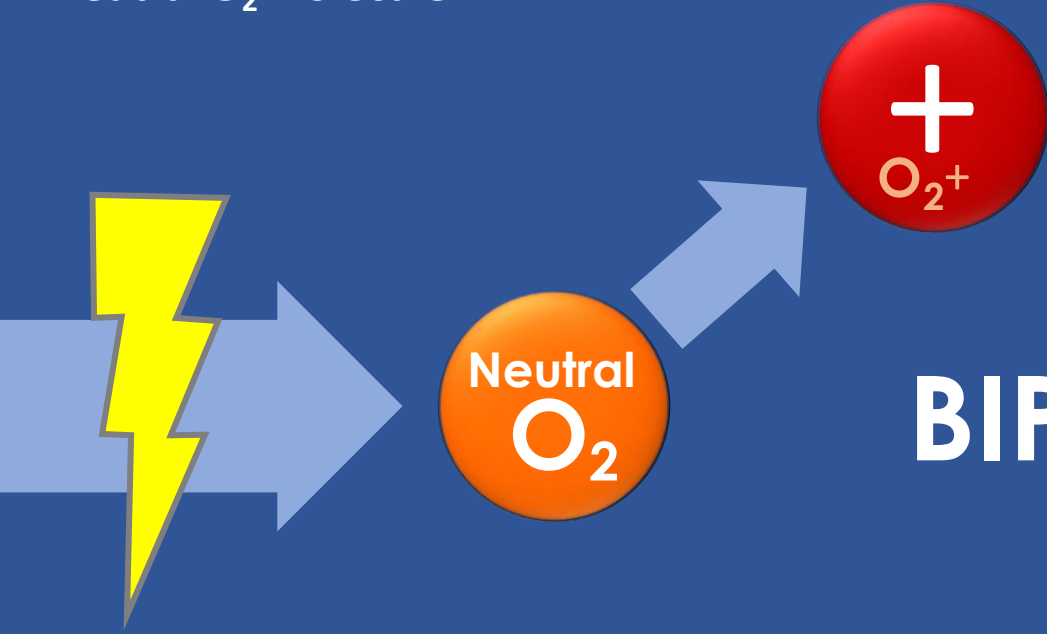
How it Works

(molecular level)



1. Ionization starts by imparting energy to a neutral O₂ molecule

2(a). The O₂ molecule becomes a POSITIVE ION



BIPOLAR IONIZATION



1. Ionization starts by imparting energy to a neutral O₂ molecule

2(a). The O₂ molecule becomes a POSITIVE ION

3(a). The POSITIVE ION “seeks” pathogens and VOCs, and has a head start over the negative ion counterpart



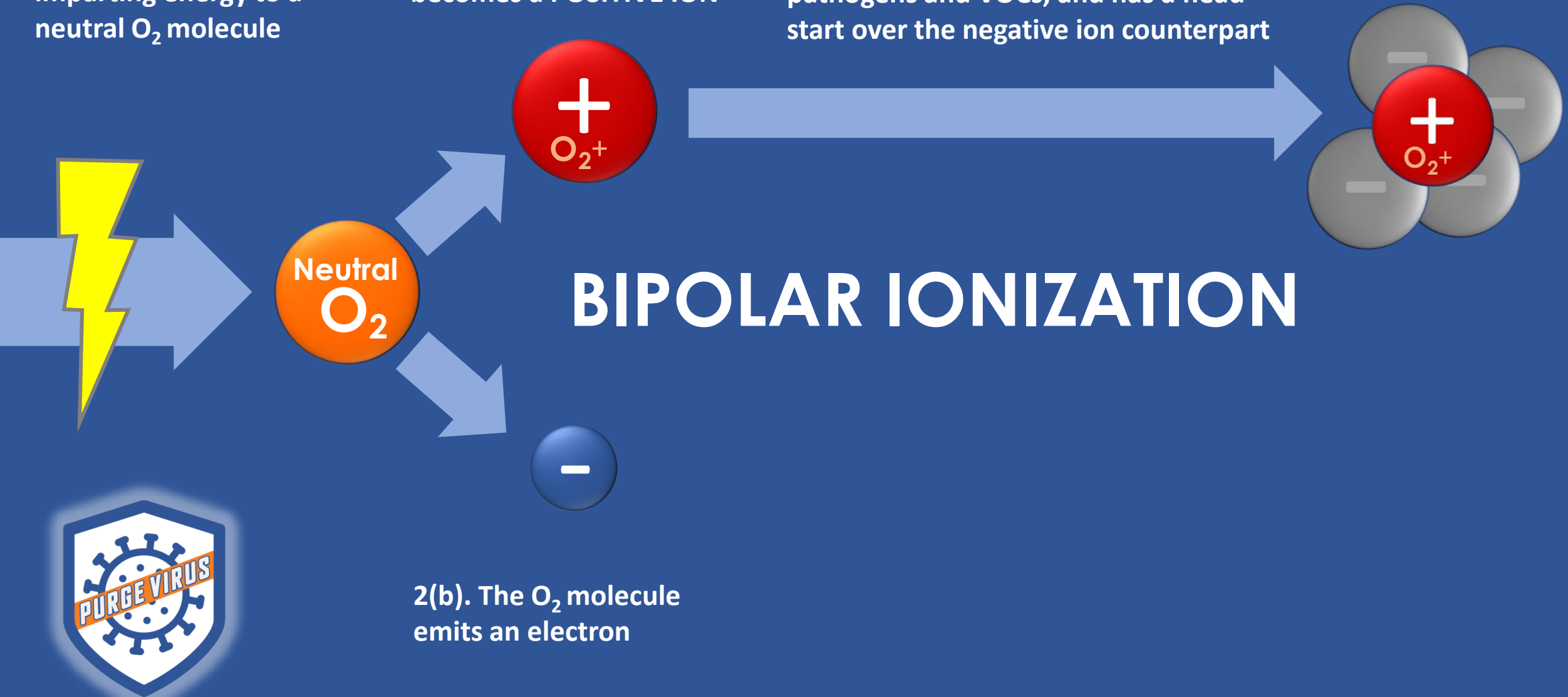
BIPOLAR IONIZATION



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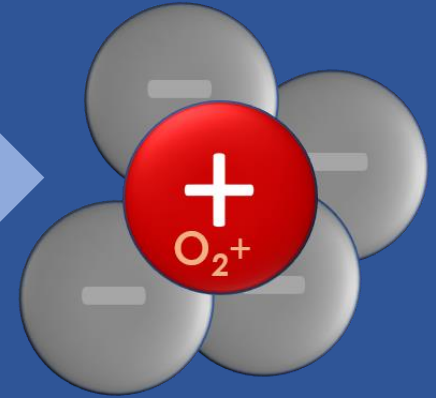
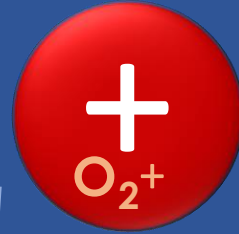
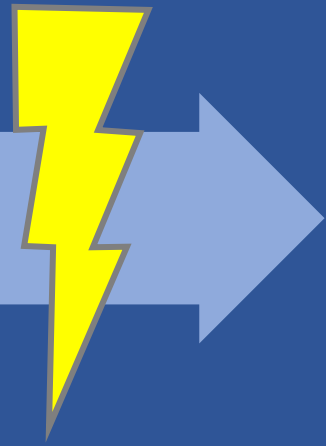


2(b). The O₂ molecule emits an electron

1. Ionization starts by imparting energy to a neutral O₂ molecule

2(a). The O₂ molecule becomes a POSITIVE ION

3(a). The POSITIVE ION “seeks” pathogens and VOCs, and has a head start over the negative ion counterpart



BIPOLAR IONIZATION



2(b). The O₂ molecule emits an electron

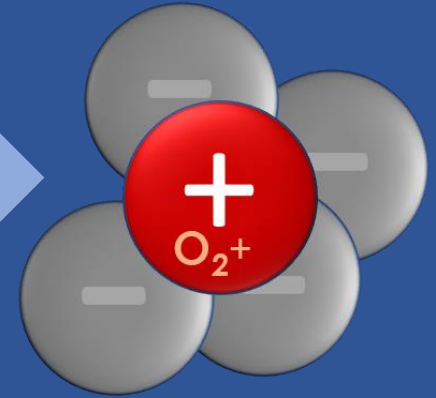
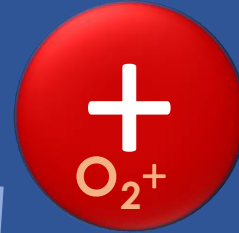
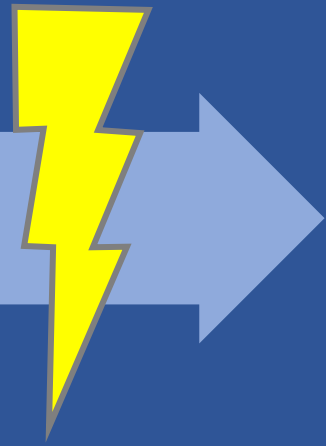
3(b). The electron is captured by another O₂ molecule creating a NEGATIVE ION



1. Ionization starts by imparting energy to a neutral O_2 molecule

2(a). The O_2 molecule becomes a POSITIVE ION

3(a). The POSITIVE ION “seeks” pathogens and VOCs, and has a head start over the negative ion counterpart



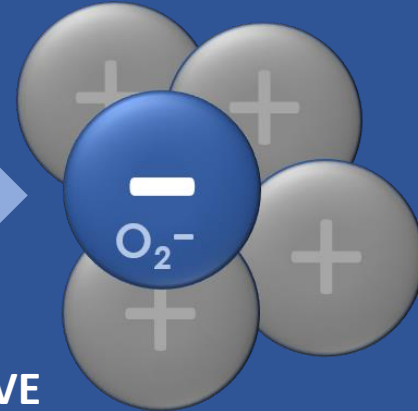
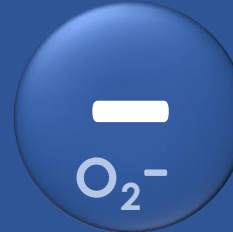
BIPOLAR IONIZATION



plus



equals



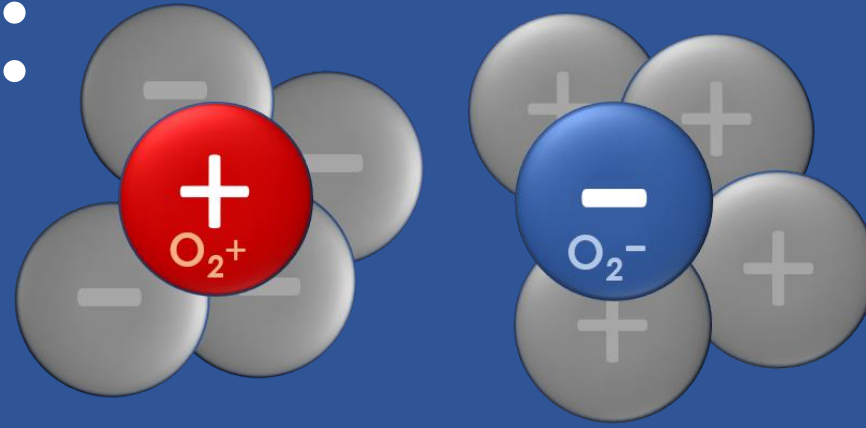
2(b). The O_2 molecule emits an electron

3(b). The electron is captured by another O_2 molecule creating a NEGATIVE ION

3(c). The NEGATIVE ION “seeks” pathogens and VOCs



CLUSTERS:



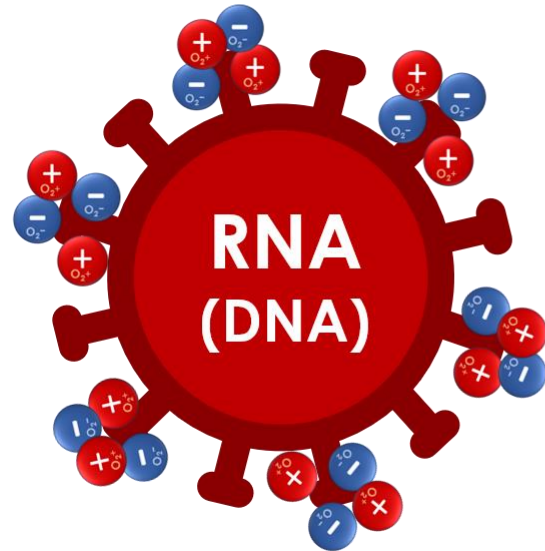
4. The charged ions combine with oppositely-charged airborne elements forming clusters, which are more easily trapped in filters



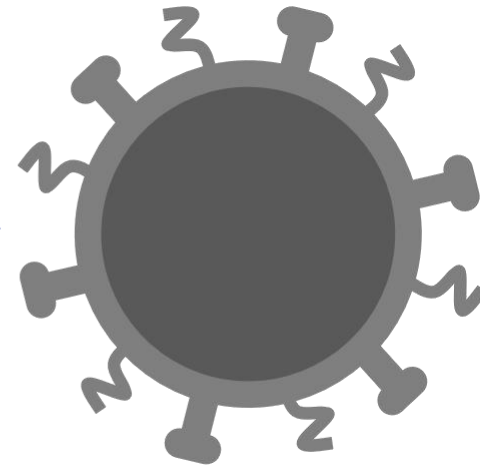
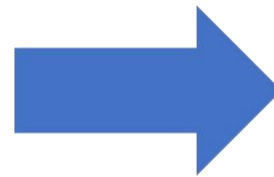
BPI / VIRUS SCIENCE: BPI inactivates airborne viruses. The bipolar ions surround the hemagglutinin (surface proteins that form on organisms and trigger infections) and change into highly reactive hydroxyl radicals.

The ions **destroy the virus surface structure**, in the case of coronavirus the spikes, on a molecular level. As a result, the virus cannot cause infection, even if it enters the body.

envelope spikes
(viruses differ in structure)



ions destroy the molecules of the
surface proteins of the virus



THE RESULTS:

Cleaner indoor air and surfaces without harmful ozone production.

A) As the clusters divide to reproduce, bacteria and VIRUS cells are robbed of life-sustaining hydrogen and are destroyed.

B) Odorous gases and aerosols are neutralized on contact with oxygen ions

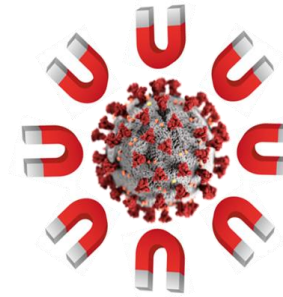
C) Oxygen ions create a chemical reaction with VOCs breaking down their molecular structure.



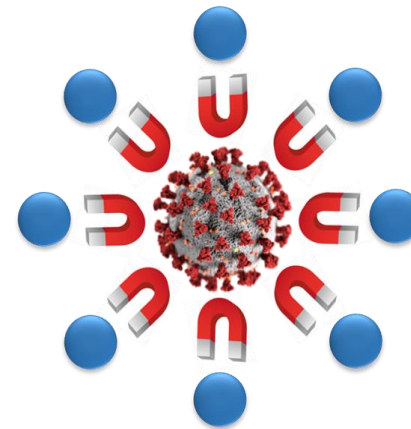
TESTING:

TESTING COUNTS: **99.4%** reduction rate on a SARS-CoV-2 (COVID-19) surface strain within 30 minutes, the first instance in which an air purification company has effectively neutralized SARS-CoV-2 in this manner.

The laboratory study was designed to mimic ionization conditions like that of a commercial aircraft's fuselage. Based on viral titrations, it was determined that at 10 minutes, 84.2% of the virus was inactivated. At 15 minutes, 92.6% of the virus was inactivated, and at 30 minutes, 99.4% of the virus was inactivated.



Without Bipolar Ionization = CONTAMINATION
(attraction to cells)



With Bipolar Ionization = PROTECTION
(rejection from cells)

Measurement and Verification



Our field teams have ion meters to measure and verify the performance of the installed bipolar ionization devices.

ION METER:

The Air Ion Counter Model AIC2 is a handheld meter designed to measure ion density– the number of ions per cubic centimeter (ions/cc) in air. It measures this number separately for positive and negative ions (+ and – ions are usually present simultaneously).

This instrument is a true ion density meter, based on a Gerdien Tube Condenser design, and it contains a fan which draws air through the meter at a calibrated rate. The unit comes as a dual-range model; AIC2-R1 has selectable maximum ranges of both 2 million and 200 million ions/cc. For comparison, a typical outdoor environment has 100 to 1000 ions/cc



Ductless HVAC Disinfection



PTAC Units

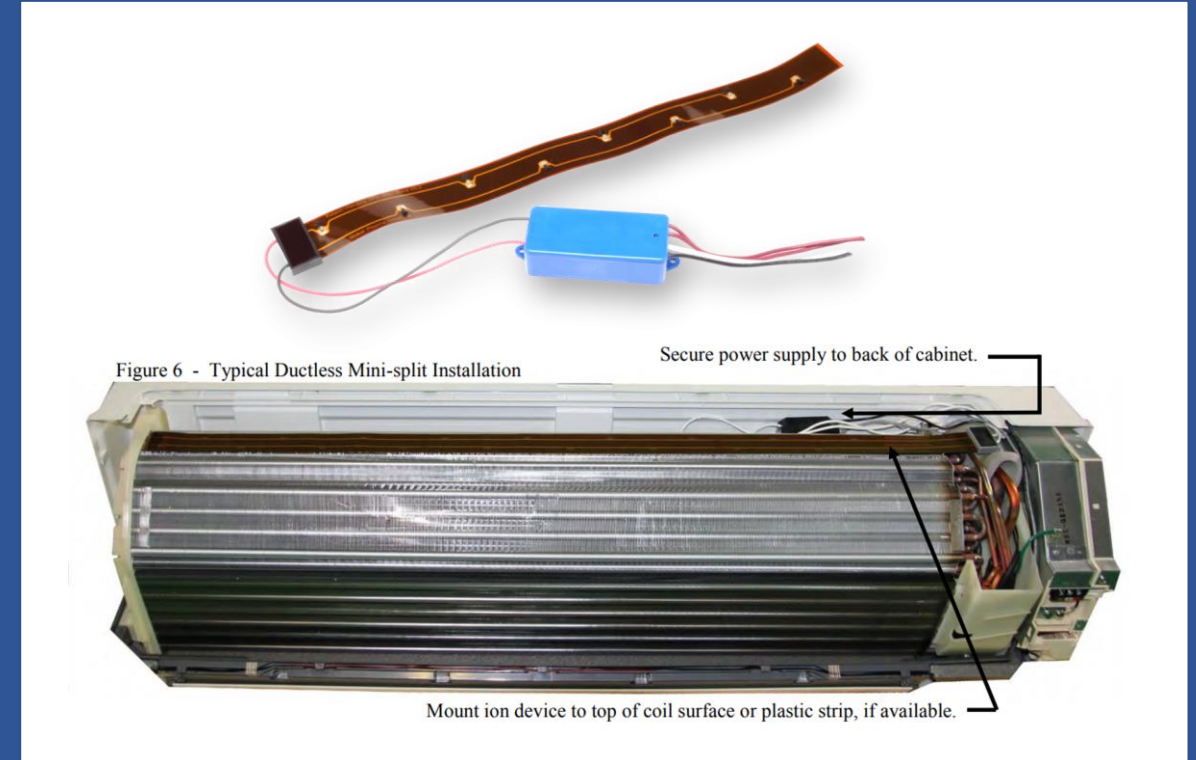
Mini Split Systems



Ceiling Cassettes



Ductless HVAC Disinfection – Package Terminal Air Conditioner



PTAC upgrade Installation: less than one (1) hour per unit



Mobile Disinfection



PURGE VIRUS
MOBILE DISINFECTION

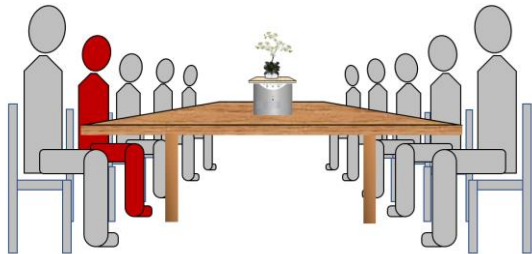
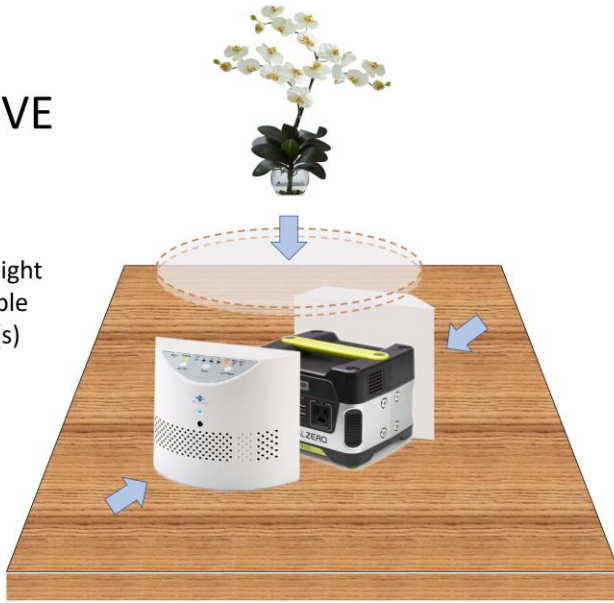


Tabletop Disinfection – with rechargeable battery

EASY + EFFECTIVE DISINFECTION

No Tools Needed:

- Charge the battery overnight
- Set the battery on the table with Disinfection Device(s)
- Place a “top” (optional)
- Add some flowers (also optional)



For Round or Square Tables



Overhead (plan view)



Side (elevation)



Front (elevation)

For Oval or Rectangular Tables



Overhead (plan view)



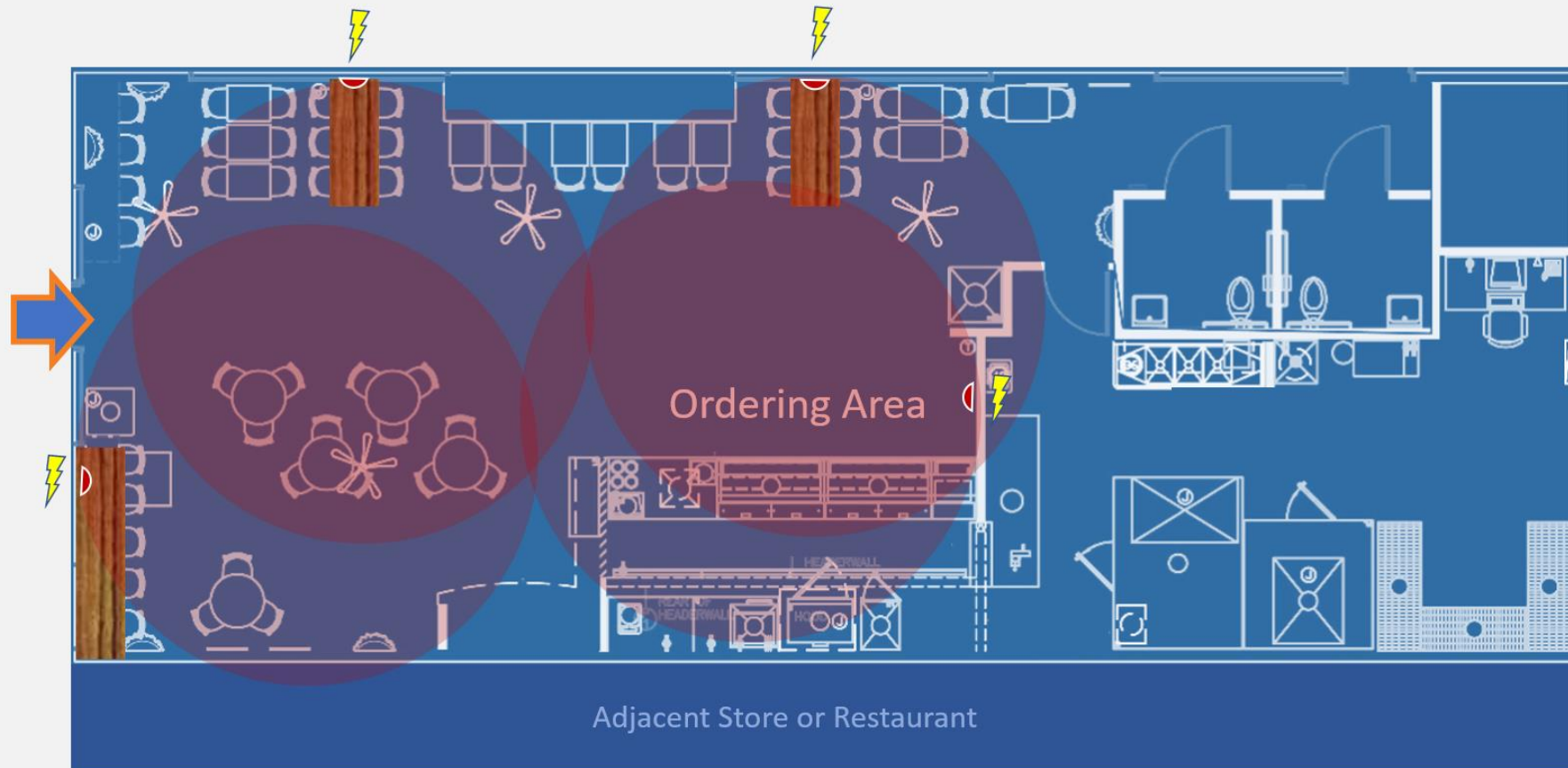
Side (elevation)



Front (elevation)



Tabletop Disinfection – layout with wall power (no batteries needed)



Ceiling Fans (often existing) help increase air flow for UVC disinfection



Tabletop Disinfection Devices plugged into wall outlets



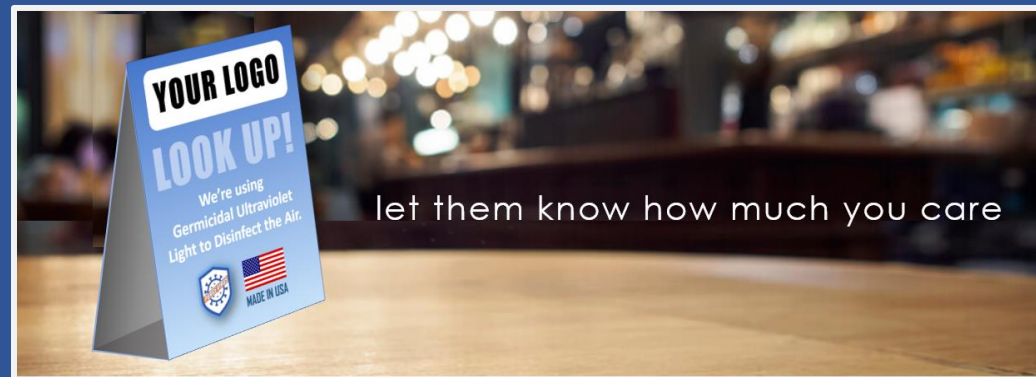
Marketing

Let people know what has been done to help keep them safe:

1 Door Stickers



2 Table Tent/Signage



let them know how much you care



Getting Started

We learn as much as we can about each facility to then align the applicable technology to the needs.

Property Owners or Managers let us know about their current HVAC system

See:
<https://purgevirus.com/wp-admin/PURGE-VIRUS-Data-Sheet-2020.08.24.xlsx>

We then provide the free Preliminary Disinfection Recommendations.



 PURGE VIRUS Data Sheet	HVAC Ducts
www.PurgeVirus.com	610-551-5224
Please return this Data Sheet to:	Charlie.Szoradi@PurgeVirus.com
#1: Germicidal UV Light in HVAC Ducts	
Variability is extensive given duct sizes and air flow to determine appropriate dosages of UV light. The currently available standard size technology is sized at 16", 24", 33", and 45", and we offer the assemblies in either two (2) or four (4) module configurations. The longer the straight run of a trunk duct the better. As an example, for 10' length ducts, we recommend placing the assembly at the center, so that the UV light irradiates pathogens 5' to either side creating a 10' "Purge Zone".	
<i>To help us size the system and provide a quote, LET US KNOW:</i>	
Duct Width:	
Duct Height:	
Duct Length:	
Cubic Feet / Minute (CFM):	
Electric supply voltage:	
Approx sq ft of room area serviced by this duct:	

THANK YOU



PURGE VIRUS

STAY SAFE and HEALTHY

