

# BROAD PURIFIER

A Knowledge Catalogue

## Functions:

- Air Purification
- Formaldehyde Elimination
- CO<sub>2</sub> Monitoring
- Dynamic Disinfection and Sterilization (when room is occupied)
- Static Disinfection and Sterilization (when room is unoccupied)

## Applications:

- Residences, schools, office buildings
- Hotels, shopping malls, meeting rooms
- Wards, operation rooms, aseptic factories
- Public transport, stations, airports



# BROAD Purifier Saves Our Family from Pollution

Fewer illnesses such as cough, cold and influenza.

Far less likely to catch chronic diseases such as rhinitis, laryngitis and pneumonia, and can lessen the effects of asthma.

The risk of cancer, diabetes and other major diseases can be reduced dramatically.

## Air Purification – Electrostatic Dust Cleaning

Electrostatic air purification technology is at the top of the pyramid of air purification technologies, and its super filtration efficiency is superior to other physical filtration methods (paper filter):

- Static electricity helps absorb infinitely tiny particles (10,000 times smaller than PM2.5).
- 6000V high-voltage static electricity kills microbes such as virus and bacteria, and clears away pollen.

However, two worldwide global challenges must first be faced:

- 1) The capacity of static electricity changes with air humidity level. Excessive ozone will be released at high humidity, while purification efficiency will be reduced at low humidity. BROAD's unique patented technology of constant current and voltage has successfully solved this problem.
- 2) The electrostatic tungsten filament and the electrode grid will short out when coming into contact with fibers in the air or mosquitos. A crackling sound will be heard, and the tungsten filament will even get burnt. BROAD's patented technology of an independent resistor circuit for every single tungsten filament has solved this problem.



# BROAD Purifier Makes Viruses and Germs Less Scary

During the novel coronavirus pneumonia crisis in China in 2020, we found ozone disinfection to be the most effective measure with the least side effects and lowest cost to prevent the virus from spreading.

Dozens of anti-epidemic hospitals, such as the Leishenshan Hospital, Huoshenshan Hospital, and several mobile cabin hospitals have used BROAD Purifiers. During the anti-epidemic period, we have also applied ozone at different concentration levels to hospital wards, work areas and living areas for 24-hour uninterrupted operation, effectively curbing the spread of viruses.

## Air Disinfection – Additional Ozone Function

Ozone molecules consist of 3 oxygen atoms ( $O_3$ ). About 95% of the ozone in the atmosphere comes from the photochemical reaction between the sun and plant volatiles, as well as the ionization between lightning and air. This product uses static electricity to simulate lightning to produce ozone.

**Full coverage:** When the disinfection function is activated, the ozone generator continuously generates ozone, which quickly penetrates into every corner and gap of the dwelling, overcoming the problem of ultraviolet sterilization which can only go straight up and down, leaving a dead zone of disinfection and the problem of eye injury.

**High efficiency:** A large number of scientific experiments have proved that the efficiency of ozone sterilization and antiviral is more than 200 times higher than that of chlorine.

**Ultra-cleanliness:** Ozone oxidizes microorganisms and organic matter in the air into carbon dioxide and water, and the excess is decomposed into oxygen without any residue. In contrast, chemical sanitizers such as 84 disinfectant (key component  $NaClO$ ) are toxic to the human body and have secondary pollution of residues, damaging the ecosystem.

**Low cost:** Using only small amounts of electricity and no consumables, the cost is much lower than chemical disinfection.

**Trustworthy:** Since the invention of electrostatic duct cleaning technology in 2005, BROAD Clean Air has been devoted to researching the benefits and harms of ozone, and carefully exploring the rational application of ozone in different places and epidemic situations to find an effective way to prevent the global outbreak of infectious diseases, pioneering the utilization of ozone for the benefit of mankind.

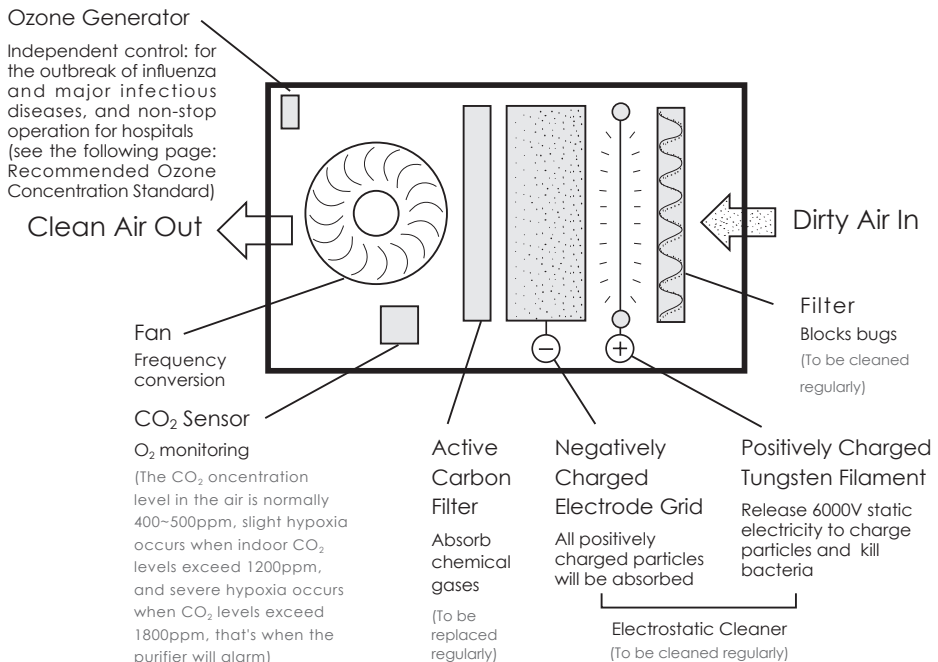




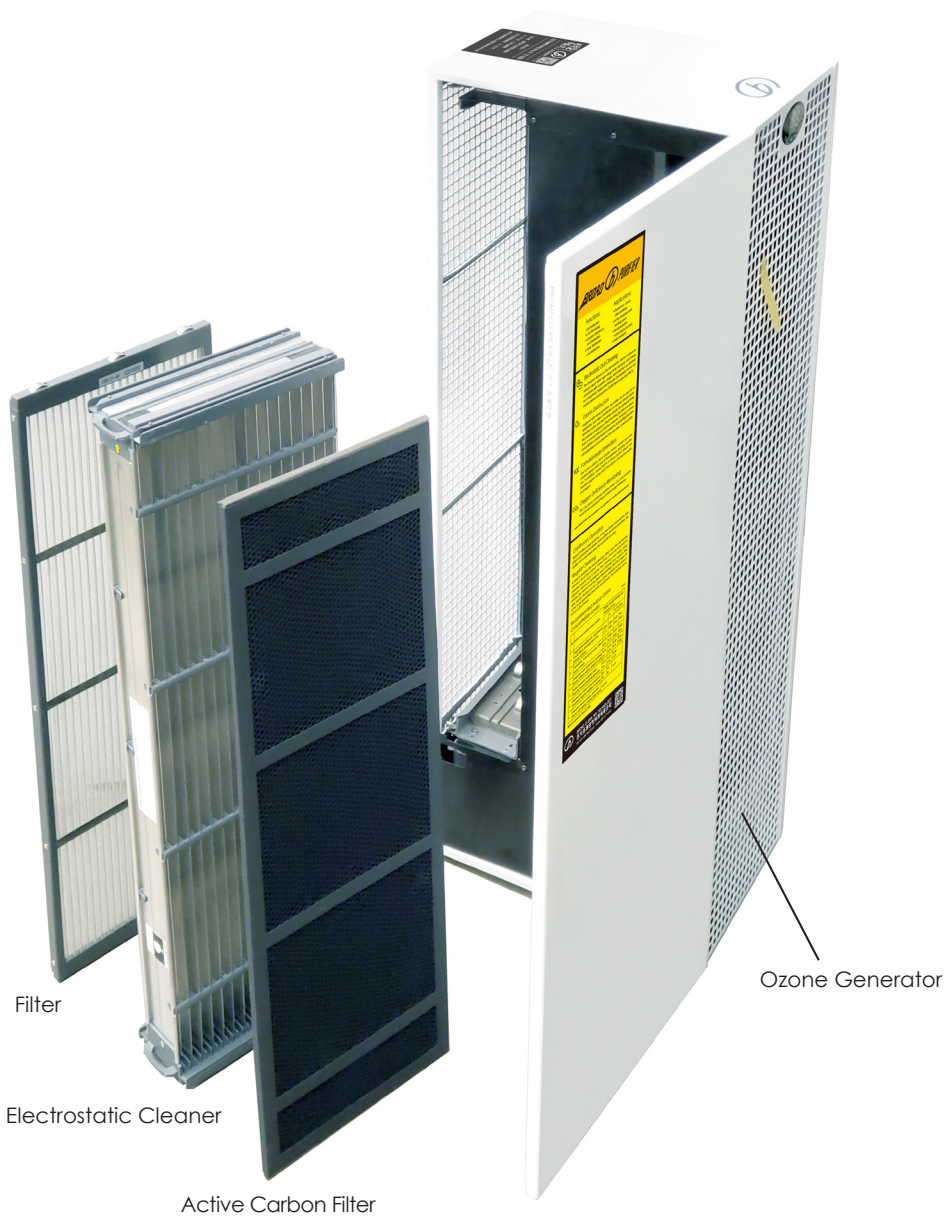
# 4 in 1 Function

BROAD Purifier is the only product in the world with 4 in 1 function (BROAD patented).

- **Electrostatic Dust Cleaning:** The tungsten filament of the electrostatic cleaner continuously releases about 6000V high-voltage static electricity, and charges all particles with a positive charge, which will then be absorbed by a negatively charged electrode grid. Electrostatic cleaner can absorb infinitely small particles (10,000 times smaller than PM2.5).
- **Ozone Disinfection:** Equipped with ozone generator, the purifier can be used for air disinfection and object disinfection in infectious disease wards, operation rooms and places where people are gathered during the outbreak of epidemics, effectively killing bacteria and viruses. Even in seasons without infectious diseases, keeping a certain concentration of ozone indoors is conducive to preventing harm from microorganisms such as influenza virus and mites, as well as pollen.
- **Formaldehyde Elimination:** The active carbon sheet absorbs various volatile and toxic chemical gases (VOC) such as formaldehyde, benzene, nicotine, etc. In addition, ozone itself is a strong oxidant, which can transform organic matter (VOC) into carbon, and itself into water and oxygen. For newly decorated or renovated rooms, use high concentration of ozone for fumigation for 1~2 days to completely eliminate formaldehyde.
- **Oxygen Deficiency Monitoring:** The CO<sub>2</sub> sensor constantly monitors indoor CO<sub>2</sub> concentration levels to alert customers if there is indoor oxygen deficiency.







Filter

Electrostatic Cleaner

Active Carbon Filter

Ozone Generator

# Parameters

- 1. Applicable area depends on the degree of environmental pollution, etc.
- 2. Since there is nearly no filtration resistance for electrostatic dust cleaning, the power consumption is extremely low. It is economical to work continuously 24 hours unless there is no one in the room.
- 3. The filtration energy efficiency for BROAD Purifier is 9. China's National standard as per GB/T 18801-2015: 2~5 is qualified, ≥5 is highly efficient.
- 4. Warranty: 2 years from the date of purchase.



Model		TD400	TD1000	TD2000	TD4000	TD5000
Applicable Area	m²	15~30	25~50	40~80	90~180	110~220
Purified Air Flow	m³/h	400	1000	2000	4000	5000
Power Consumption	W	13~30	28~62	61~126	80~360	110~500
Dimension	mm	250×170 ×750	320×230 ×850	320×230 ×1560	500×380 ×2590	500×380 ×3200
Weight	kg	9	24	55	144	176











## Operation & Cleaning

BROAD Purifier is plug-and-play. It has low power consumption (see product parameters for details), and is suitable for 24-hour operation. The purifier can be shut down when the occupants are away.

In order to maintain the highest purification efficiency, the electrostatic cleaner must be cleaned if it has collected over 1.5 mm (0.06 inches) of dust. The washing is very simple. Using ultrasonic cleaner or detergent, each washing only needs a few minutes (the cleaner must be dried after washing). Clean carbon deposits on the surface of the ozone generating sheet with alcohol pads after 100 hours of use. Pay attention not to leave a cotton thread.

Active carbon is a consumable material (to be replaced every 1~2 month).It's not expensive and can be supplied indefinitely.

You can also entrust BROAD's service team with the cleaning and maintenance work.

When we wash out a big basin of water as black as ink, we feel amazed at how dirty the air is, but we are thankful how lucky our family is.

## Filtration Efficiency Test

1. Use a piece of sturdy paper or plastic to block most of the air outlet of the purifier, so that the air outlet does not stir in unfiltered air (note that it will inevitably allow a bit to enter).
2. Align the dust detection port of the detection device with the air outlet, and obtain the post-purification data (you can use the BROAD Air Monitor or other dust detection devices).
3. Put the detection device to the air inlet of the purifier to test and obtain the pre-purification data. Purification efficiency= pre-purification data minus post-purification data, and the be divided by pre-purification data.
4. Normal filtration rate for RM2.5 should be  $\geq 95\%$  (considering the mixed dirty air, actual filtration rate has reached 99%), otherwise the cleaner needs to be cleaned).







Take out the electrostatic cleaner



Use ultrasonic cleaner



Or use detergent (commercially available)



Wuhan Leishenshan Hospital



A mobile cabin hospital in Wuhan



A mobile cabin hospital in Wuhan

# Experimental Results of Ozone Sterilization and Disinfection

Ozone is a broad-spectrum and highly efficient bactericide. Ozone was first used for water disinfection, which is fast and reliable, and does not produce halogenated organic compounds with carcinogenic effects. With the development of disinfection technology, the scope of ozone disinfection application is expanding rapidly and drawing increased attention. Relevant articles, such as *Study on the Disinfection Effect of Ozone Disinfectors*, can be found in CNKI.NET, which is sponsored by Tsinghua University.

## Data on Experimental Results of Ozone Sterilization and Disinfection

Ozone Dosing Concentration(ppm)	Time (minutes)	Types of Viruses and Pathogens	Pathogen Killing Rate
4.67	20	Hepatitis B surface antigen (HbsAg)	99.99%
0.5	5	Influenza A viruses	99%
0.13	30	Poliovirus type I (PVI)	100%
0.04	20	Coliphage MS2	98%
0.25	1	rotavirusSA-H&Human rotavirus type 2	99.6%
4	3	HIV	100%
3.74	10	Pathogens such as Mycoplasma&Chlamydia	99.85%

## Comparisons of Ozone and Other Disinfectants

Compared with conventional disinfectants, ozone has a stronger ability to oxidize and kill bacteria. As a quantitative indicator to measure the effect of disinfection and sterilization, the concentration-time value (CT value) is defined as the product of the concentration of the disinfectant (C) and the time (T) necessary to kill a certain type of bacteria at a specified killing rate. It shows that the smaller the CT value, the stronger the effect of the disinfectant. Quantitative analysis data can be found in the table below. The efficiency of ozone disinfection is clear to see.

### Disinfection Efficiency Comparison (CT, mg/h·min)

Microorganism Species	Pathogen Killing Rate	Cl <sub>2</sub>	ClO <sub>2</sub>	O <sub>3</sub>
Spores	99.9%	1440	>120	>5
Trichomonad	99.9%	113	23	1.4
Escherichia Coli	99.99%	3~4	1.2	0.2
Influenza A viruses	99.9%	--	--	2.5

## Comprehensive Comparisons

	Ultraviolet	Chemical treatments	Ozone
Disinfection Method	Static	Static	Can be dynamic
Broad-Spectrum	Average	Average	Good
Disinfection Effect	Average	Average	Good
Residual Toxicity	No	Yes	No
Odor Eradication	No	No	Yes
Operation	Easy	Complex	Easy
Equipment Life Span	<1,000 hours	----	>1,000 hours

## Recommended Indoor Ozone

Concentration Levels: ppm

No.	Indoor spaces with many people	Public health emergency response level				
		I	II	III	IV	N/A
1	Single family residences, apartments, small offices, kindergartens and primary schools	0.08~0.12	0.04~0.08	0.02~0.05	No limit	
2	Dormitories, hotel guest rooms, office areas, schools	0.12~0.24	0.08~0.12	0.04~0.08	0.02~0.05	
3	Shopping malls, restaurants, meeting rooms, lobbies, wards, delivery rooms	0.24~0.4	0.12~0.24	0.08~0.12	0.04~0.08	
4	Public transport (vehicles, ships, aircraft), express transit warehouses	0.24~0.4	0.12~0.24	0.08~0.12		
5	Disinfection cabins at the entrances of stations, airports, hospitals (1 minute)	25~30	15~20	8~12		
6	Infectious disease wards, operation rooms, burn wards, laminar flow ward	0.3~0.5				



BROAD Electrostatic Air Purifier has obtained domestic and international quality and safety certifications



# Imitating the Sun to Use Ozone Smartly

For a long time, scientists from various countries have listed ozone as an air pollutant, the so-called "photochemical pollution".

Now, let's take a few minutes to pick this up. This is a bit of a challenge to the global scientific community, but fulfills the ancient Greek astronomer Claudius Ptolemy's famous saying: Science is simple.

There are two main sources of ozone in the atmosphere:

One is the exhaust gas from thermal power plants and vehicles, which photochemically reacts with ultraviolet rays from the sun. This part is indeed a pollutant and is called "photochemical pollution". But this part of ozone only accounts for about 5% of the ozone in the atmosphere (based on global average).

The second is the photochemical reaction of plant volatiles with the sun's ultraviolet rays, and the electrochemical reaction of lightning, which accounts for more than 95% of ozone in the atmosphere. This is something that has been happening for 4 billion years since the existence of the earth. Human beings have been multiplying in such an environment. Therefore, of course, human beings have adapted to it and surely need it. Otherwise, plants and animals on the earth would have already been devoured by microbes.

This also explains why countries all over the world always have flu outbreaks in the winter and rainy season when there is little sunshine (weak ozone), which has caused about 200,000 ~ 600,000 deaths each year worldwide during the past century.

It also explains why major plagues such as the Plague of 1910 and SARS in 2003 came to an inexplicably abrupt end in sunny May (strong ozone). People think that the weather turns hot and kills viruses, yet this is a misunderstanding.

It also explains why the novel coronavirus pneumonia spread in the southern part of China, which is cloudy with rain (weak ozone) in 2020, and rarely spread in the dry and sunny north (strong ozone).

Using ozone for disinfection and sterilization is actually imitating the great work of the sun.



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