BROAD Combats POLLUTION

BROAD CLEAN AIR

BROAD FRESH AIR

A Knowledge Catalogue

Function:
Fresh Air Exchange
Air Filtration
Fresh Air Heat Recovery

Application:
Residence, School
Office building
Hotel, Shopping mall,
Clean Workshop
Hospital, Operation Room,Ward

2020 03 English

Contents:

What Kind of Air do We Really Need?

4 "No"s + 1 "Saving"

No dust: indoor air is 100 times cleaner than outdoor air

Currently in the modern society, purified water is considered a daily necessity. However, in the future, clean air would become even more vital.
BROAD Clean Fresh Air Machine, filters PM2.5 by 99.9%, makes your room spotless and safeguards your lifelong health

No hypoxia: eradicate the "sick building syndrome"

Insufficient ventilation will reduce oxygen level in blood, weaken immune and detoxification functions.
BROAD Clean Fresh Air Machine, brings in 100% fresh air, and completely removes CO_2 and formaldehyde out of the room

No bacteria: static electronic bacterial killing

Outdoor air will carry in bacterias during flu and pollen season, causing families to catch illnesses without any clear indications.
BROAD Clean Air Machine is equipped with electrostatic cleaner to kill bacterias and blocks germs and pollen.

No noise: absolute silence

Ordinary fresh air systems are noisy which would spoil the mood and lower the standard of living.
BROAD Clean Fresh Air Machine operates under high air pressure. With the capability to provide clean air through a long path, it can be installed away from the living room or bedrooms that people stay frequently.

A/C energy saving: 80% heat is recovered

Expensive energy will be wasted if windows are open or fans are turned on for ventilation during A/C running season.
BROAD Clean Fresh Air Machine recovers 80% heat from the exhaust air, and helps you save more than you spend.

One of BROAD's Top 10 inventions: Clean Fresh Air Machine

Nobody in the world has dreamed that indoor air can be 100 times cleaner than outdoor air, except BROAD, who not only conceived but also made it a reality.

Most importantly, BROAD made it at an affordable cost, which is dozens of times lower than that of purification equipment in operation rooms. This is how you define real innovation.

What's more, BROAD Clean Fresh Air Machine recovers 80 % heat, drastically saving air conditioning energy consumption while improving air quality.

I understnad that it is human nature to follow. Most people will do nothing if they see others living well without fresh air machine, and they will even treat the whole fresh air machine installation process as a huge nuisance. Only a few thoughtful people will always try to improve their lives and will eventually become our customers. This is how you define a kindred spirit.

I suppose that if BROAD Clean Fresh Air Machine is popularized around the world, average human life could be prolonged by 20 years. Consequently, new medical techonologies that are constantly being created will be seemly completely unimportant.

I believe this brochure should be studied carefully regardless whether you buy any fresh air machines, because in the future there will be a focus on more conscientious living and a shift of emphasis from disease treatment to disease prevention.

Zhang Yue
Chairman BROAD Group
July 1, 2019

BROAD Fresh Air, Change Your Life Quality Dramatically

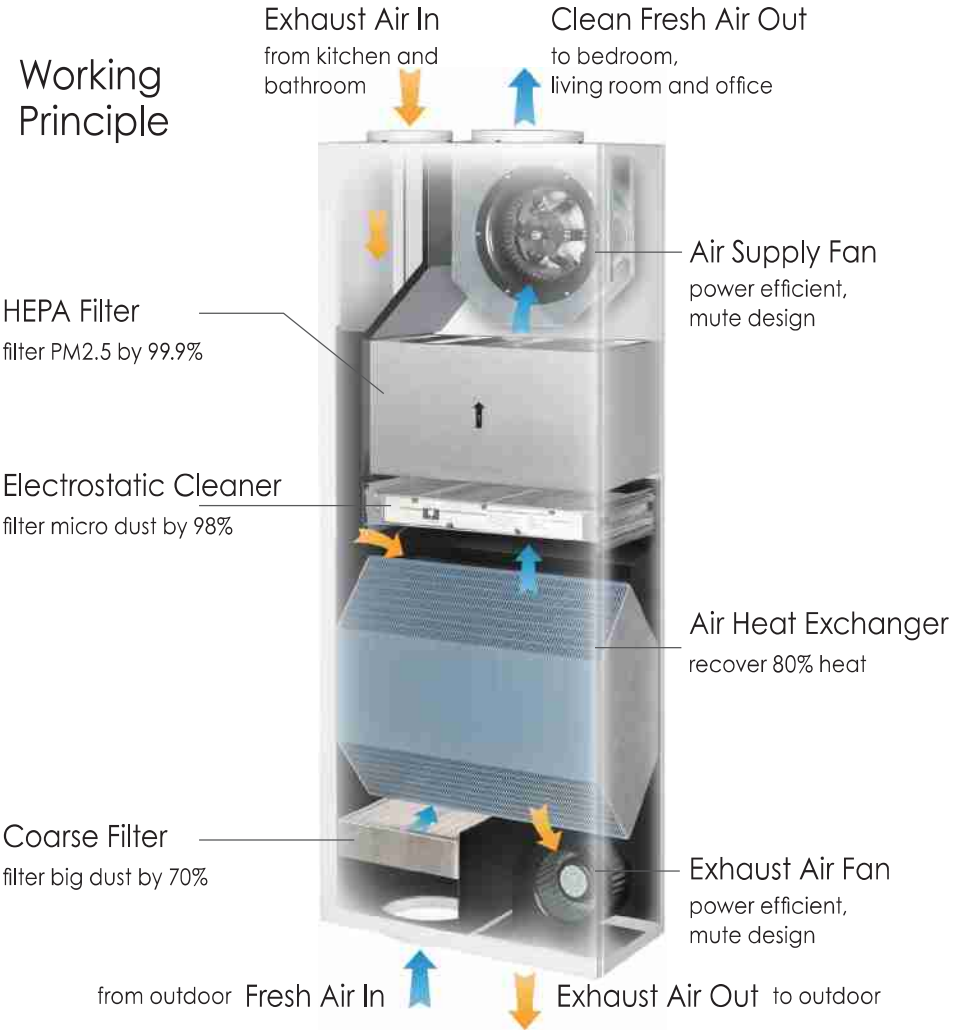
Immediate Benefits

- No dry throat with bitter taste when you wake up in the morning.
- Better feeling in many aspects in just a few days, like reduced phlegm and fatigue, and improved appetite.
- Less chance to catch cold. Quickly alleviate symptom for respiratory patients, especially asthma patients.
- No bad smell when you enter the room.
- No smell of formaldehyde for newly decorated rooms or no smell of cigarettes after smoking.
- No dust on desks or bed sheets even they are not cleaned for a long time.

Long-term Benefits

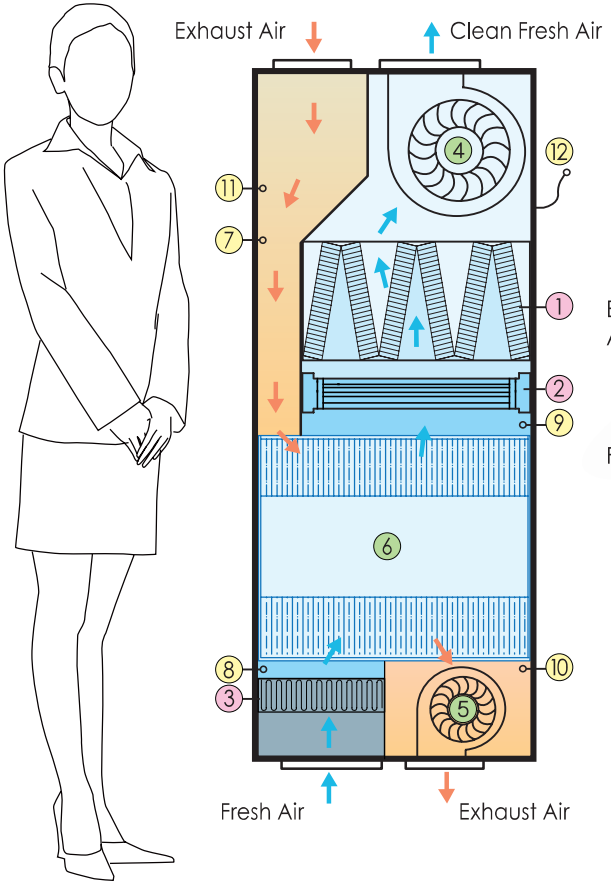
- The chance for cancer is greatly reduced since your lung, liver and kidney are protected from heavy metals in the air.
- The chance for organ related diseases such as diabetes, prostatitis and coronary heart is drastically reduced since your will have sufficient blood oxygen and normal endocrine and detoxification function due to the fresh air.
- Since there is no pollutants blocking the lung, blood oxygen supply is sufficient, cardiac load is reduced, blood circulation is smooth, and your immunity is enhanced.

Working Principle



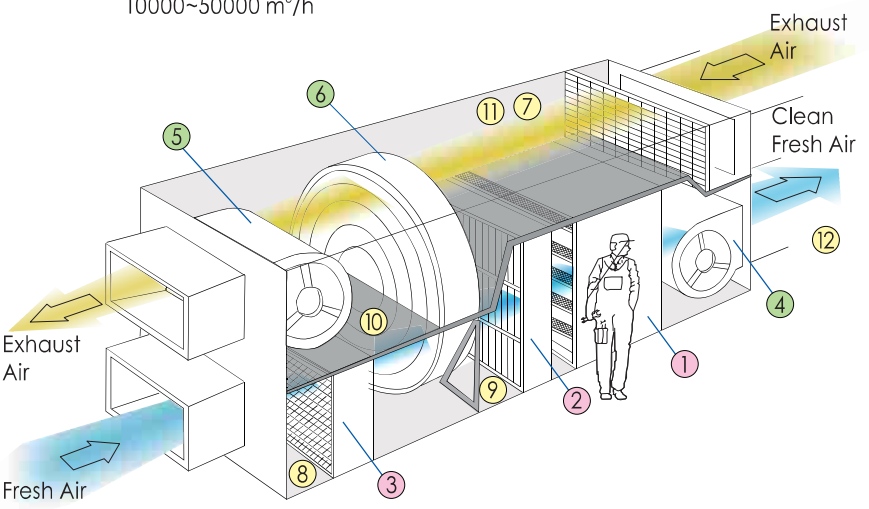
Small and Medium Models

260~3000 m^3/h



Large Model

10000~50000 m^3/h



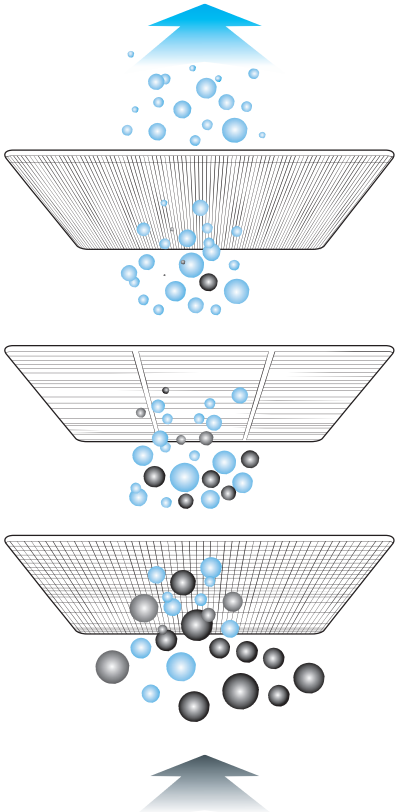
1. HEPA Filter (Teflon)
2. Electrostatic Cleaner (aluminum alloy plate and tungsten filament)
3. Coarse Filter (stainless steel net)
4. Fresh Air Fan
5. Exhaust Air Fan
6. Air Heat Exchanger (polymer material)
7. Indoor Temp. Sensor
8. Outdoor Temp. Sensor
9. Fresh Air Temp. Sensor
10. Exhaust Air Temp. Sensor
11. Indoor CO_2 Sensor
12. Human Infrared Sensor

Important note: BROAD clean fresh air technology is BROAD patented, any counterfeit will be sued

BROAD Clean Fresh Air Machine VS Traditional Fresh Air Machine

Items	BROAD Clean Fresh Air Machine	Traditional Fresh Air Machine
Filtration mode	coarse filter+ electrostatic cleaner + HEPA filter	Coarse filter+medium-efficient filter
PM2.5 filtration efficiency	99.9%	≤30%
Bacteria killing function	static electricity at 6000V to kill germs	No
Air heat exchange	heat recovery efficiency 80%	No
CO_2 concentration test	Yes	No
Fresh air system	100% fresh air	30% fresh air+70% circulating air
Cross contamination	No	serious
Filter maintenance cycle	Coarse filter and electrostatic cleaner to be washed every 1-3 months HEPA filter to be replaced every 2~5 years	To be replaced every 1-3 months
Maintenance convenience	Exposed installation. Filters can be taken out for maintenance simply by opening the door in 3 secs.	According to investigations, most users never touch the filters since the machine is hidden in suspended ceiling

3-Stage Filtration



The 3rd stage
HEPA Filter
Filter PM2.5 by
99.9%

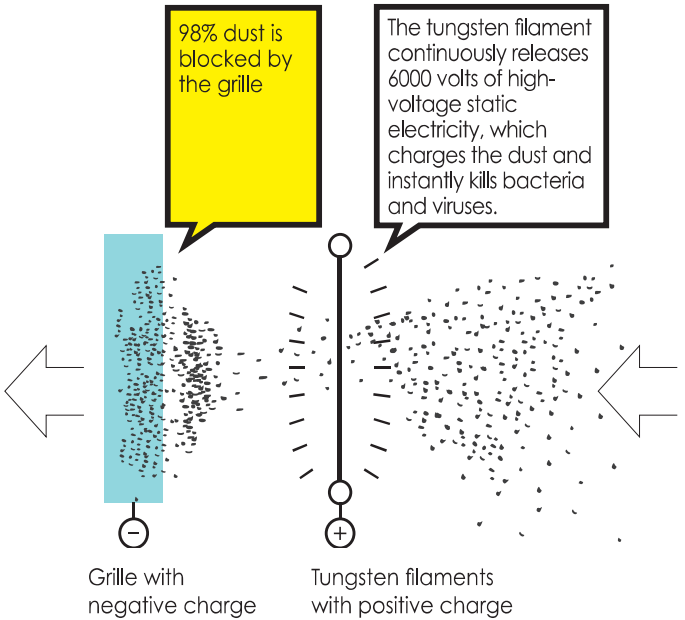
The 2nd stage
Electrostatic
Cleaner
Filter micro dust by
98%

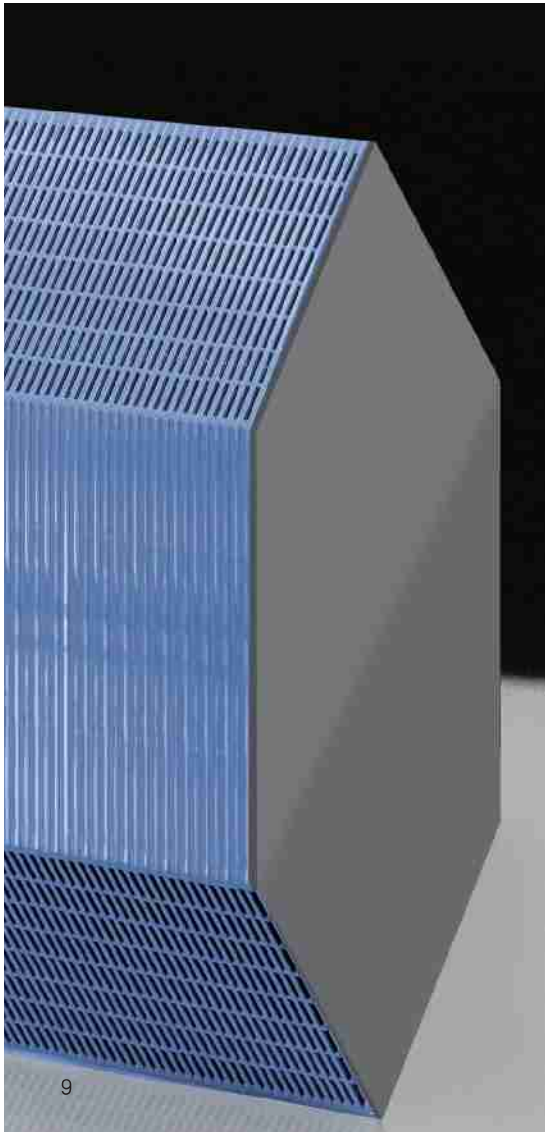
The 1st stage
Coarse Filter
Filter big dust by
70%

Electrostatic Cleaner: Zero Resistance Filtration & Germs Killing

BROAD's original electrostatic cleaning technology realizes the cleaning of 98% infinite micro dust and instant killing of bacteria and viruses, which lowers the load of HEPA filter to only 2% and thus prolongs its service life.

The electronic cleaner boasts a zero ventilation resistance and can be water washed for a long service life, reducing operation cost for users.

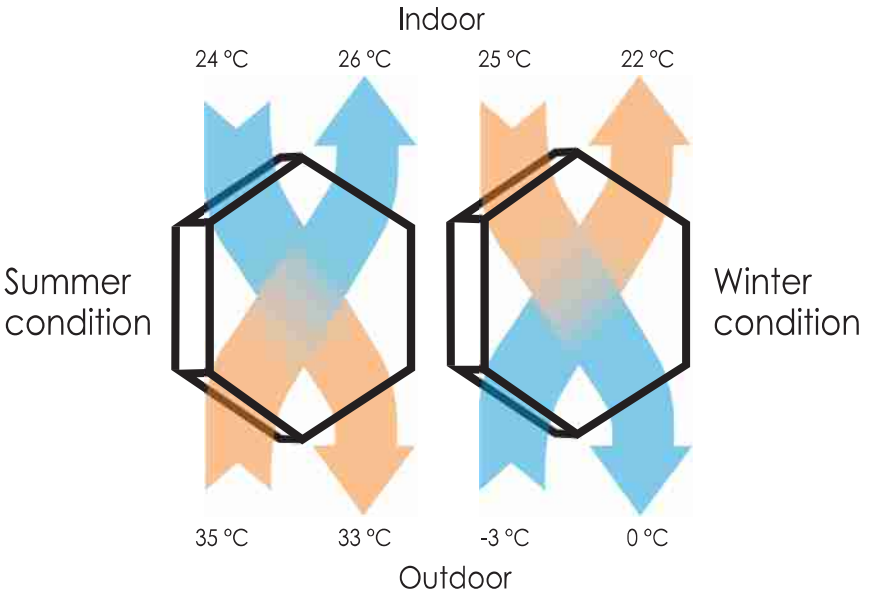




Air Heat Exchanger: 80% Heat Recovery Efficiency

BROAD Clean Fresh Air Machine adopts nano-polymer air heat exchanger to realize high efficient energy conversion of fresh air and exhaust air, which not only provides sufficient fresh air, but also preserves indoor heating in winter and indoor cooling in summer. At the same time, the ventilation resistance is extremely low.

Working Principle:80% of the heat from the exhaust air can be recovered through the heat exchange process of exhausted indoor air and introduced outdoor air, through the air heat exchanger.



100% Fresh Air with No Mixed Return Air, Eliminating Cross-contamination

For decades, the American standard has been globally adopted for the design of central fresh air system, which requires 30% fresh air and 70% circulating air. Although an effective energy-saving measurement, the lack of heat recovery function will lead to more serious consequences:

· Cross contamination: the whole building will be affected if one person gets sick, and the whole building will be polluted if one person smokes
· Indoor toxic gases like formaldehyde cannot be ruled out
· Insufficient fresh air
· Bacterias and viruses breed in air ducts

BROAD Clean Fresh Air Machine is capable of recovering heat effectively. Despite introducing 100% fresh air from outdoor, it consumes the minimum energy and eradicates building cross contamination completely.

The WHO describes building cross contamination as the "sick building syndrome", which is a global threat to public health. BROAD Clean Fresh Air Machine eliminates this threat fundamentally.

Smart Air

The interface of the fresh air machine is easy to operate, which displays real-time fresh air volume, CO_2 concentration, indoor & outdoor temp., post heat exchange temp. and fan frequency. It makes air quality and energy efficiency rate visible, and allows users to select the proper operation mode according to the indoor & outdoor environment and his/her living habits, achieving the goal of energy conservation while realizing smart clean control.

· Self-controlled Freshness
Fresh air volume is automatically adjusted as per indoor CO_2 concentration level, preventing O_2 deficiency.

· Energy-saving Mode
Equipped with sensors, the machine automatically turns on / off based on human detection.

· Timer
Auto on/off as per user's will

· Energy Consumption Record
Real time and history of recovered heat, as well as power consumption of the fan available for view

· Fault Diagnosis
Auto fault diagnosis, O_2 deficiency alarm, cleaning reminder, etc.

· Mobile Control
With the APP *of BROAD Air*, users can use their mobile phones and computers to check indoor air quality and energy consumption data, turn on/off the machine, or adjust the fresh air volume.

Key Technical Indicators

1. PM2.5 filtration rate: 99.9 %
   Air at the fresh air outlet is 1000 times cleaner than that outdoors
2. Rated Power Consumption:
   0.17 W/m^3 for small models, 0.31 W/m^3 for medium and large models
3. Heat recovery efficiency: 80%
   (when there's a 25 °C temp. difference between indoor and outdoors)
4. Coarse filter and electrostatic cleaner to be cleaned every 1~3 months
5. HEPA filter to be replaced every 2~5 years
6. Designed lifespan: 40 years

Investment Tips

Try to select large model with less quantity to lower equipment investment
For example: one SE 2.0 is recommended for an 8000 m^2 building, per m^2 cost: approx 48 RMB
One SG500 is recommended for a 200 m^2 apartment, per m^2 cost: approx. 99 RMB

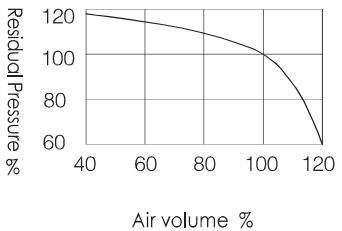
Rated Parameters and Prices

Type	Model	Fresh air volume m^3/h	Exhaust air volume m^3/h	Residual Pressure Pa	Noise dB(A)	Rated Power kW	Machine Weight kg	Dimension (L x W x H) m	Applicable building area (indicative) m^2
Small (domestic use)	SG260 SG500	260 500	170 340	40 45	40 41	73W 140W	58 110	0.54x0.26x1.35 0.54x0.49x1.35	80~120 120~200
Medium	SF1000 SD1500 SD3000	1000 1500 3000	800 1200 2400	70 55 55	45 48 49	500W 750W 1500W	190 580 760	0.8x0.52x1.95 1.16x0.87 x2.57 1.16x1.47x2.57	200~300 300~500 600~1000
Large	SE1.0 SE2.0 SE5.0	10000 20000 50000	8000 16000 40000	90 120 130	60 62 65	5.5kW 11kW 28kW	2150 2680 5750	4.3x2.1x2.2 5.3x2.2x2.5 10.4x3.2x2.6	2000~4000 4000~8000 10000~20000

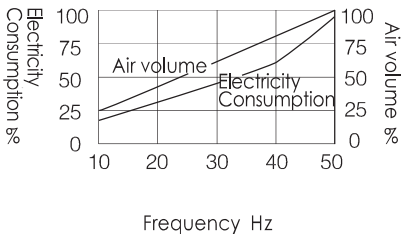
Note: Recommended suggested coverage area is just for reference. Actual model selection should be done by HVAC engineers from building design institutes as per actual conditions. Please refer to Fresh Air Volume Calculation.

Performance Curve

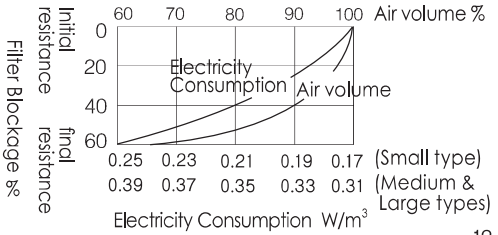
Residual Pressure VS Air Volume



Frequency VS Electricity Consumption & Air Volume



Air Volume & Filter Blockage VS Electricity Consumption



Sales Policy

Lead time

Lead Time: 2~4 months for small models, and 3~9 months for medium and large models.

Product Price Policy

Open Principle: It is stated in *BROAD Values* that BROAD "never cheats customers nor conducts vicious competition", standard price and corresponding discount policy is open to customers. Regular BROAD customers greatly support BROAD and thus deserve bigger discounts.

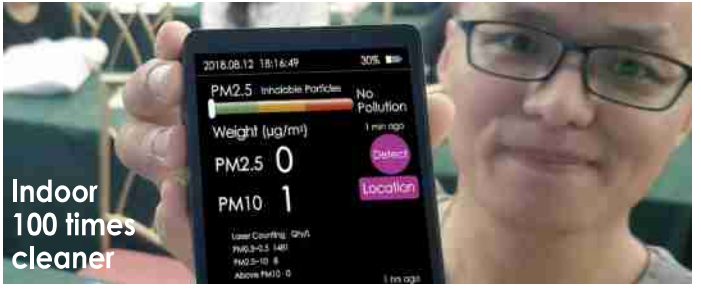
Discount Table for Cumulative Purchase

Purchase Amount (RMB)	Discount
≥ 1 million	95%
≥ 5 million	93%
≥ 20 million	90%
≥ 50 million	88%

Note: Cumulative purchase refers to the accumulated purchase amount of BROAD products over the years (including all products such as clean air products, air conditioning, factory-made buildings., etc.) by customers and enterprises that has ownership relations with them.

BROAD Commitment of "100 Times Cleaner Indoor Air"

All orders of BROAD Clean Fresh Air Machine will indicate: 1. Air at the fresh air outlet is 1000 times cleaner than that outdoors (product); 2. Indoor air is 100 times cleaner than that outdoors (service); 3. If failed, BROAD bears the full responsibility of re-commissioning, repair, replacement or return and refund
BROAD is the only company in the world to quantify and contract the effects of fresh air.



One of Ten BROAD's Inventions: Air Monitor

Air Monitor enables common people to detect PM2.5 anytime and anywhere possible with a miniaturized device which integrates detectors of dust, carbon dioxide, electromagnetic radiation and ultraviolet ray. Air Monitor is an affordable, portable and convenient tool. The invention of Air Monitor is not merely a technical innovation, but also a revolution of awareness-igniting the Chinese "PM 2.5 Fever". In the near future, checking environmental pollution will become everyone's daily habit. People will move from the "age of consumerism" to an era with "life-conscious awareness" step by step.

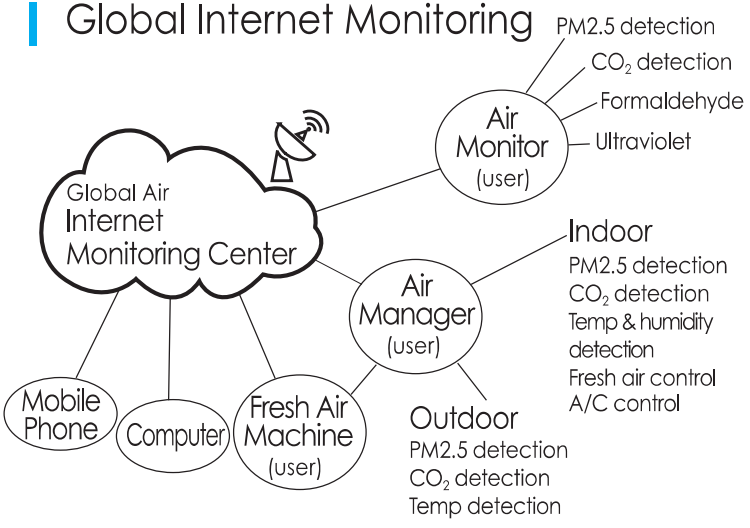
The Importance of Air Monitor to Fresh Air Machine

It is hard to identify air quality without a device. That is why we recommend customers who already have BROAD Clean Fresh Air Machine to purchase BROAD Air Monitor (or detectors of other brands). Five monitors are needed for family with central fresh air system. The user should detect indoor and outdoor air quality at least once a day. If the indoor air quality is not 100 times cleaner than that outdoors, the user should rectify it or seek help from BROAD. Otherwise, the machine will not fully play its purpose due to malfunction, or improperly closed window or doors.

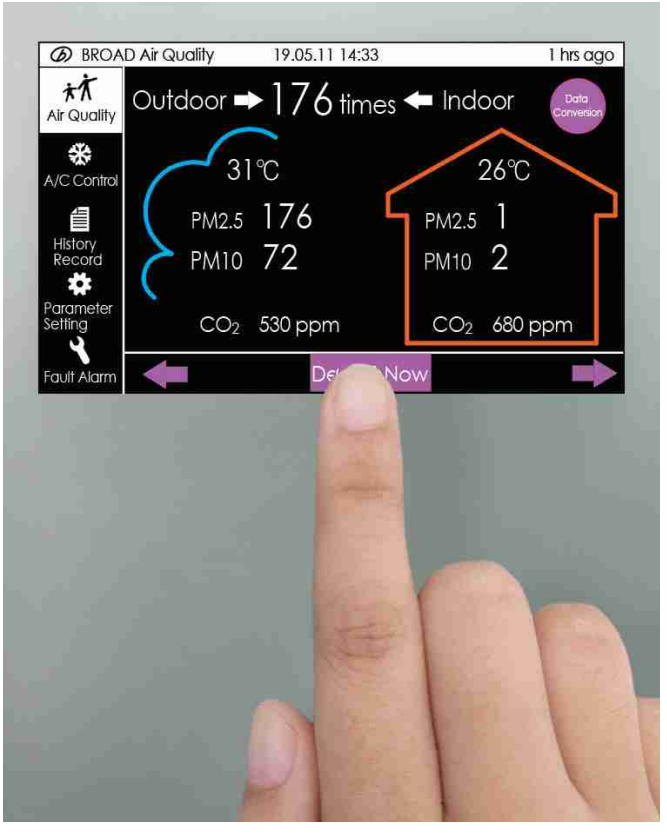
Health Record

It is recommended to check indoor and outdoor PM2.5 once a day and note down the location. Try to save only one or two typical data per week and never keep data without a location, it will weaken your interest to check and compare later on. If 100~200 data is kept every year, you'll have a direct concept of the air you live in after just several years. Compare the changes between the air quality and your health, you'll be surprised to find that BROAD Air Monitor is a health archive of you and your family.

Global Internet Monitoring



The Global Internet Air Monitoring Center located at BROAD headquarters



As an optional device for families, hospitals and hotel rooms, the BROAD Air Manager can monitor and control fresh air and air conditioning.

Air monitoring screen is set up prominently in the lobby of each building so that occupants can have clear comparisons of the air they breathe and the air around the world.

Model Selection Guide

Fresh air volume calculation and machine model selection

Fresh air volume is a key index to define indoor air quality. It refers to the amount of fresh air (m^3/h) per hour introduced in from the outside. Traditional way to estimate fresh air demand is based on air-exchange times, calculated by total space / total fresh air volume, which ignores the actual human demand of O_2. That's why we recommend the method of "fresh air demand per capita" or "fresh air demand per room", the former for large family and the later for small family.

1. Fresh air demand per per capita: the below is recommended based on the Design Standard of Energy Conservation of *Public Buildings* and our years of experiences:

Building type	Residence	Hotel room 3/4/5 star	Meeting room/ Restaurant	Office building	Hospital ward	Classroom (primary, junior or senior high school)
Fresh air volume m^3/hour·person	30	30/60	15	30	50	12/16/20

2. Recommended fresh air volume for residence (per room): bed room/study 40~80 m^3/h, living room 80~120 m^3/h

> Example: calculation for a flat with 2 bedrooms + 1living room: 60+60+100 m^3=220 m^3/h. In this case, fresh air machine SG260 is recommended (air outlet quantity is far more important than building area)

3. Estimation for building fresh air volume: when the layout or function is not decided yet, please calculate by 2.5~4 m^3/m^2

> Example: for 30,000 m^2 hotel estimated by 3.5 m^3/m^2, its total fresh air volume should be 105,000 m^3. In this case, please select 2 sets of SE5.0 or 5 sets of SE2.0

4. Buildings with big space such as airport or showroom can be calculated by 2~3 m^3/m^2, since it has a long fresh air path and high fresh air utilization efficiency.

The Four Principles of Central Fresh Air Design

1. Long-path Principle

All the key issues are focused on one point: to extend the fresh air path (or air age) as much as possible. The longer the path, the higher the utilization rate of fresh air. The path is based on 10 meters. For each 10 meters' length, the required air volume per unit area can be reduced by 50%. The best path is 30 meters, and the longest path is 80 meters. For different fresh air path designs of the same building, the load required by the fresh air may differ by 1 to 4 times, or the fresh air effect may differ by 1 to 4 times.

2. 100% Fresh Air Principle

Because BROAD Clean Fresh Air Machine has a heat recovery efficiency of 80%, even if it introduces 100% fresh air with no mixed return air, its heat loss will not be high, creating conditions to completely eliminate the cross-contamination of each room in the building.

3. Short Air Duct Principle

To reduce the cost and engineering interference to the building, try to reduce the length and quantity of the air ducts.

4. Less Air Outlet Principle

Use the minimum air outlet, e.g., only one air outlet for each room no matter how big it is, or only one air outlet in each men's and women's washroom no matter how big each floor of the building is.

Duct Design Guides for Central Fresh Air

1. Duct design includes the design of duct layout, shape, size, material, etc. Room structure should be considered to save the maximum material and to realize the simplest construction, the lowest cost, and the best fresh air effect.
2. Material: metal is recommended for the main air duct, PE can be used for small duct, and metallic hose can be used for short duct. If A/C fan coil is installed at the fresh air outlet of the machine, the air supply duct must be thermal insulated (normally 20mm)
3. Outlet: try to locate the fresh air outlet at the edge of the room and keep it away from the exhaust air outlet. Locate the exhaust air outlet in the bathroom or kitchen, but do not connect it with the range hood.
4. Duct diameter: The duct diameter design should aim at small air resistance and small space occupation, and ensure that the air volume of different air outlets is equal. Some designers simply correspond the duct diameter to the air speed, but ignore the air pressure balance of the branch ducts. BROAD's years of engineering experiences have proved that the air speed should be very low (or use the air box) for main air duct with branches, and higher air speed of the end branch duct is conducive to equal air pressure at each outlet. Please follow the form below:

Duct Diameter VS Air Speed

Type	Main duct with branches			Terminal branch duct	
duct diameter mm	≤Φ300	≤Φ500	≤Φ1000	≤Φ100	≤Φ200
air speed m/s	2~2.3	2.3~2.7	2.7~3.3	4~5	5~6

Note: 1. Air speed for main air duct with no branches:: ≤Φ500: 4~7m/s
>Φ500: 7~9m/sΦ>Φ1000: 9~12m/s
2. Calculation for square or rectangular duct is based on the cross-section of round duct

Site Selection for Central Fresh Air Machine Room

1. The machine room should be located in the middle of the load. For a 30-storey building, the machine room should be located between the 14th~16th floor, and the horizontal duct of each floor should be connected by vertical main air duct.
2. Maintenance space must be reserved in the machine room as per the machine's outline drawing, and extra space for back-up filter should also be reserved (similar size as the machine room). The machine room has little noise and won't interfere the next door's work or living.

Solution Differs for New Building and Old Building

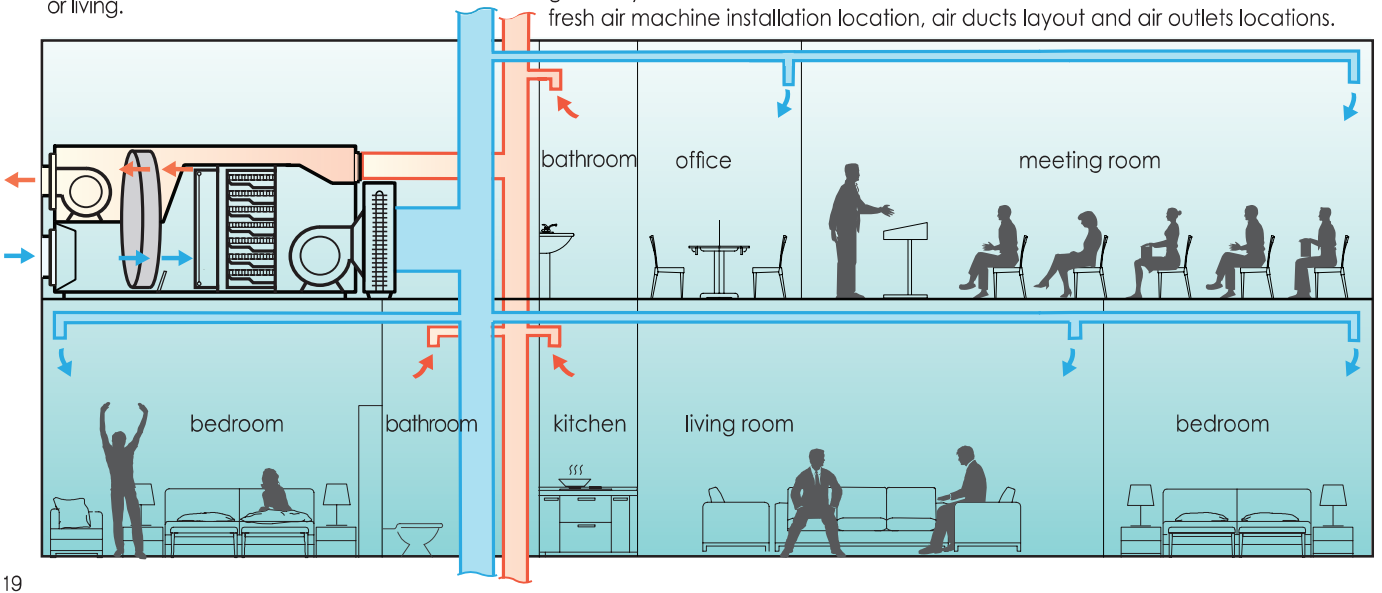
Design for New Building

· Please select and design the fresh air machine model in strict accordance with this guide, and submit the drawings to BROAD engineers for review (free of charge)

Renovation for Old Building

· Central Fresh Air System: try to use the original air ducts as much as possible (but air supply ducts must be cleaned thoroughly). The original machine room can also be utilized if necessary. In short, bring the minimum change to the existing building and save the maximum unnecessary expenses. However, if the old system clearly violated BROAD's fresh air design principles, it must be changed.

· Household Fresh Air System: Engineering designer should visit the site in person during project design, as the decoration drawing and the actual condition generally differs a lot. Serious discussions should be conducted with the user on fresh air machine installation location, air ducts layout and air outlets locations.

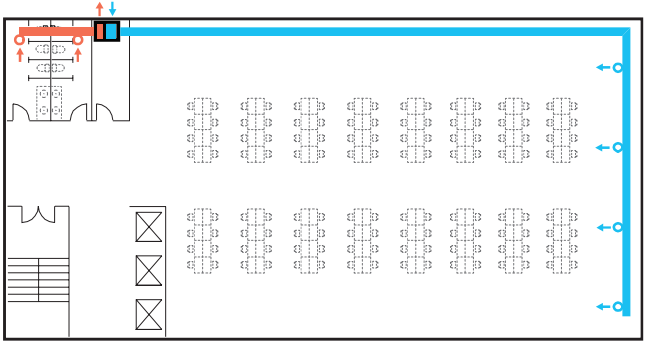


Fresh Air Ducting Modes

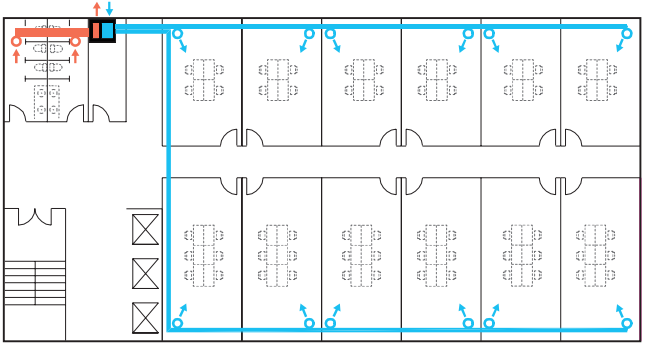
Mode	Fresh air efficiency	Feature	Advantage	Disadvantage	Key application
1. Long distance air supply	80~100% Path: 20~80 meters	Fresh air enters the room from one end of the hall and vents out from the other	Long fresh air path High energy efficiency Low ducting cost	Only applicable in hall with no obstacles	Big office area, meeting room, shopping mall, theater, airport, exhibition hall and hotel lobby (maximum path 80m)
2. Long distance air exhausting	80~100% Path: 20~80 meters	Opposite to long distance air supply	Long fresh air path High energy efficiency Low ducting cost	Dirty air will leak in for areas with poorly-sealed windows	
3. Multiple supply paths+one exhausting path	50~80% Path: 20~60 meters	Fresh air enters the room, flows into the fresh air machine through door gaps and vents out	Relatively high energy efficiency Low ducting cost	Door gap is a must for air exchange	Office and residential buildings with rooms not fully-sealed
4. One supply path + multiple exhausting paths	50~80% Path: 20~60 meters	Fresh air is absorbed into each room by exhaust air created suction	Good energy efficiency Low ducting cost	Door gap is a must for air exchange Dirty air will leak in for areas with poorly-sealed windows	Office and residential buildings with rooms not fully-sealed
5. Parallel supply & exhausting paths	20~40% Path: 3~10 meters	Fresh air enters the room and then vents out from the indoor bathroom or kitchen	Doors can be sealed and independent fresh air control is practicable for each room	Short fresh air path Low energy efficiency High ducting cost	Hotel rooms, mansions, wards, and offices with rooms fully-sealed
6. Mixed mode	Uncertain	Mixed modes	Advantages of different modes can be combined according to actual situation	Disadvantages of different modes shoud be avoided	Different modes are applicable to different functional areas

Diagram of Ducting

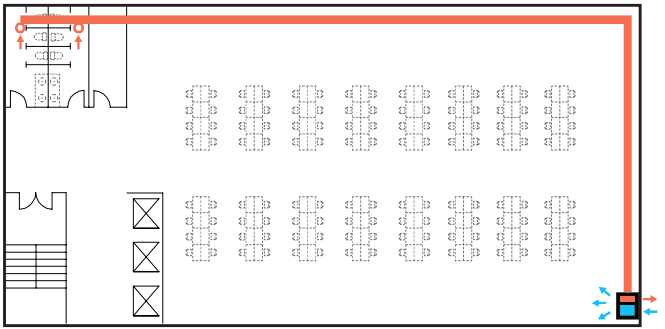
Long distance air supply
(suitable for big space)



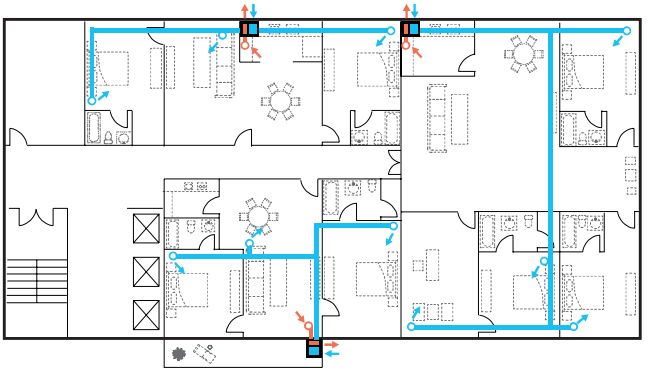
Multiple supply paths + one exhaust path
(Office)



Long distance air exhaust
(suitable for big space)

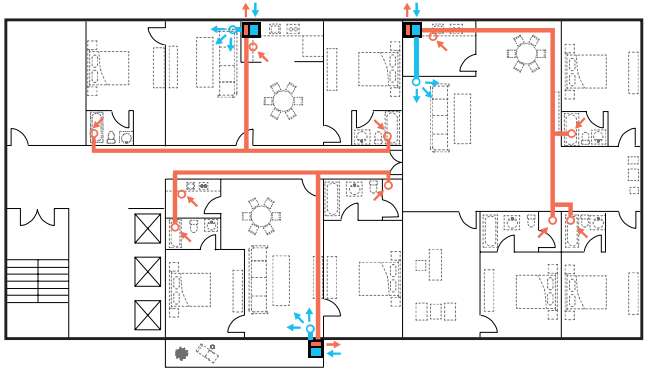


Multiple supply paths + one exhaust path
(suitable for residence renovation)

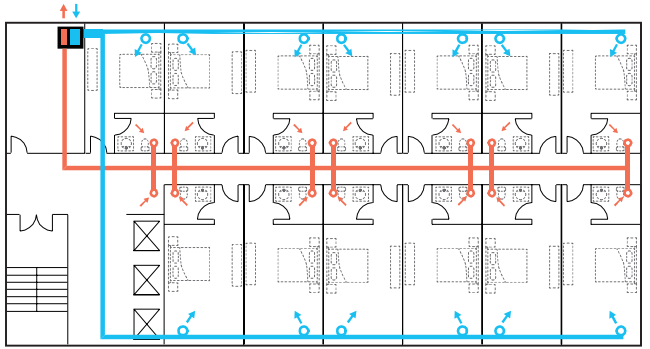


Note: Air Supply Duct | Ventilation Duct | Fresh Air Machine or Shaft

One supply path + multiple exhausting paths
(suitable for residence renovation)

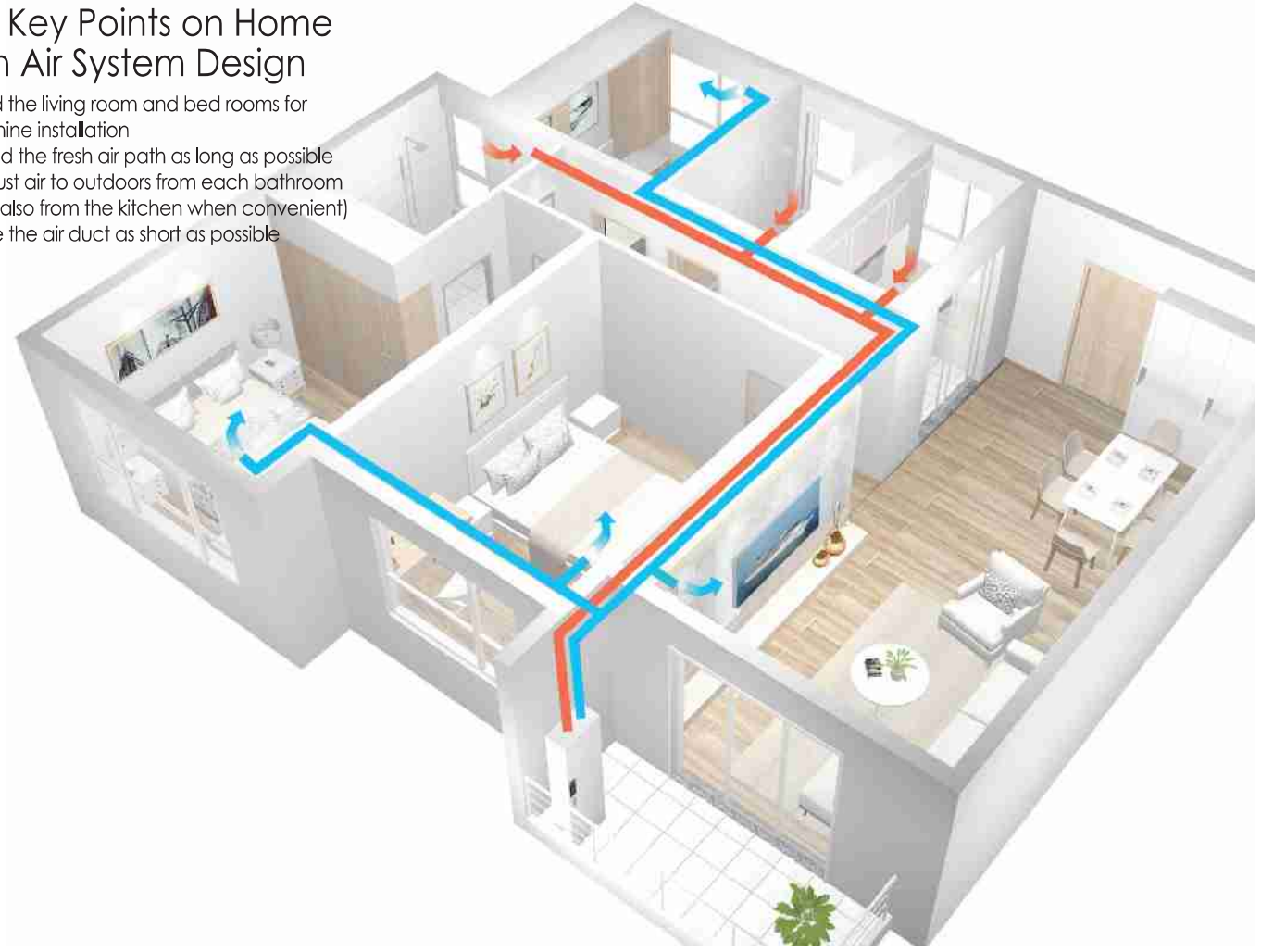


Parallel supply & exhaust paths (suitable for hotel)



Four Key Points on Home Fresh Air System Design

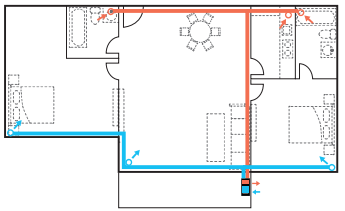
1. Avoid the living room and bed rooms for machine installation
2. Extend the fresh air path as long as possible
3. Exhaust air to outdoors from each bathroom (can also from the kitchen when convenient)
4. Make the air duct as short as possible



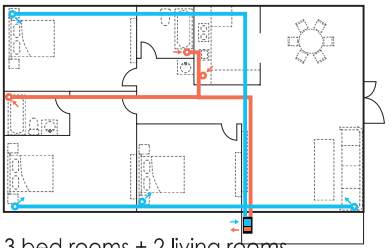
Model Selection, Installation Position and Ducting Layout Example for Home Fresh Air Machine

Note: Engineering designers and the master of the house should read and comprehend thoroughly this page (below are carpet areas)

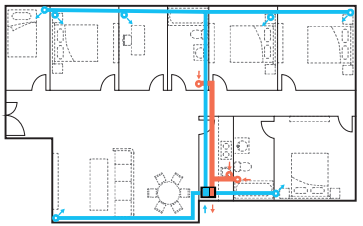
2 bed rooms + 2 living rooms
95 m^2 SG260



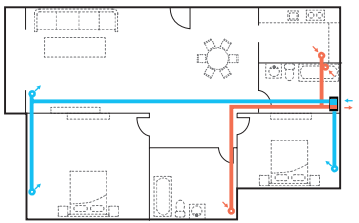
3 bed rooms + 2 living rooms
138 m^2 SG260



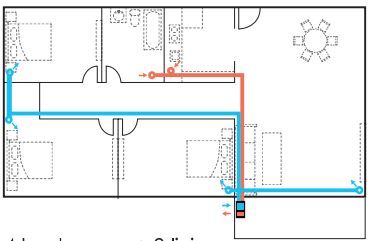
6 bed rooms + 2 living rooms
135 m^2 SG500



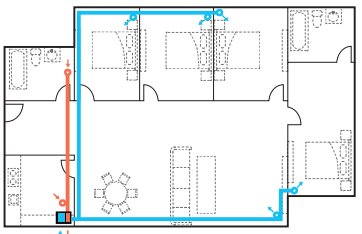
2 bed rooms + 2 living rooms
104 m^2 SG260



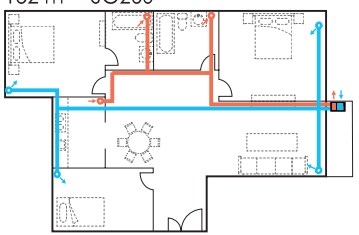
3 bed rooms + 2 living rooms
140 m^2 SG260



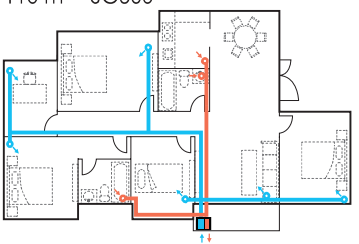
4 bed rooms + 2 living rooms
148 m^2 SG500



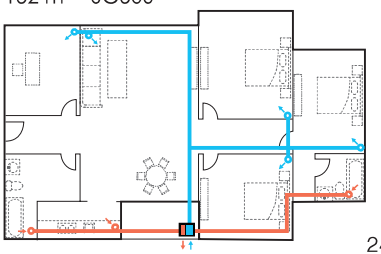
3 bed rooms + 2 living rooms
132 m^2 SG260



4 bed rooms + 2 living rooms
110 m^2 SG500



4 bed rooms + 2 living rooms
152 m^2 SG500



Installation Position for Home Fresh Air Machine

1. The fresh air machine is a product that can radically improve family heath, which deserves in-depth study on installation and operation, and profound house renovation.
2. The fresh air machine is recommended to be installed in places people don't stay often, such as the balcony, kitchen, bathroom, hallway, etc., living room or bedrooms should be avoided to ensure no disturbance of noise.
3. When installed in the balcony, air ducts can be exempt from the fresh air inlet and exhaust air outlet as long as the machine is safe from rain. Just leave a 200mm gap for ventilation.
4. When installed indoor, the back of the machine must be directed at the facade to facilitate air in and out.
5. For new buildings, a platform with barrier exclusively built for the machine is recommended outside the bathroom or kitchen window, so as to facilitate maintenance and filter exchange. Such a platform will not be calculated to the building area and won't occupy carpet space.

Installation Process of Home Fresh Air Machine

Preparation:
determine the installation location and duct layout according to the design, draw lines, prepare tools and accessories, and prefabricate the ducts as required.

↓

Drill holes for air inlet and outlet:
Drill the air inlet & outlet holes and mounting holes

↓

Air ducts installation:
Drill holes for bracket, hanger, and air ducts, connect the ducts with the main unit, install air nozzles.

↓

Machine installation:
Can be installed on the wall or at the ceiling

↓

Power and signal wire connection:
Insert the plug in the socket, connect the human infrared sensor with signal wiring and install it to the active area

Notes:

1. Preparation
   - Complete materials without damage, reliable tools.
   - Prepare thin films to cover the room from dust.
2. Drill holes for air inlet and outlet
   - Avoid the beams and bearing walls. Exterior holes should be 5~10mm lower than the interior ones to prevent rainwater entering the room.
   - Air ducts must be strong and tight, finish the installation in one day.
3. Air ducts installation:
   - Try to lay the ducts along the wall to bring the least change to the original decoration
   - Use the least elbows to avoid air pressure losses by sudden turning and duct diameter changing.
   - Bracket and hanger should be 200mm above the duct connections, seal the connections with adhesive tape
4. Machine and accessories installation
   - Ensure that the installation strength of bolts can bear 3 times the weight of the unit, e.g., do not install on hollow panel wall. A base should be provided to transfer the weight to the ground. The machine shall be horizontal with a deviation less than 2mm.
   - The air inlets & outlets should not be obstructed.
   - The condensate pipe should be sloped to ensure smooth flow of condensed water.
   - There should be enough maintenance space by the door side.

Function Design

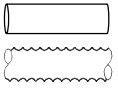
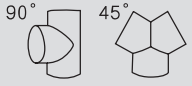
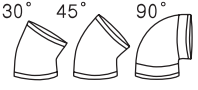
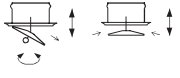
The 3 optional functions for BROAD Fresh Air Machine:
1. Solely as a fresh air machine
2. Equipped with extra humidifier to adjust humidity
3. Equipped with extra coils to adjust air temperature

The combination of fresh air supply and air conditioning is only suitable for big space or a flat as a whole, individual temperature adjustment is not workable for each room. To realize that, additional fan coils or radiators shall be added.

Optional Parts for BROAD Central Fresh Air System

Name	Specification	Function & Description
Central air conditioner	233~11630kW	Provide cold and heat sources to fan coils, and use natural gas, power plant exhaust heat, industrial residual heat as energy sources (electricity can also be used if there is no exhaust heat or natural gas)
Fan coil	13~400kW	Work with the fresh air machine to cool the fresh air in summer and heat it in winter
Humidifier	20~250kg/h	Work with big or medium fresh air machine to adjust fresh air humidity

Common Ducts for Fresh Air System

Name	Size	Shape	Function	Note
Air duct/ pipe	Φ75 Φ110 Φ160		To supply & exhaust air	The connections must be sealed. 20mm
3-Way	Φ75 Φ110 Φ160		air path branch	Pay attention to branch diameter
Elbow	Φ75 Φ110 Φ160		Air path turning	45° elbow is preferred
Coupling	Φ75 Φ110 Φ160		To fix air ducts	Expansion bolts needed for air duct installation
Air inlet & outlet	Φ75 Φ110		Room air inlet Room air outlet	Angle: 0~360° Air volume: 0~100%

Note: The above listed are common accessories for fresh air system projects. Users can place orders by themselves, or ask BROAD engineers to buy on their behalf.

Design & Installation Commissioning

Installation for Residential Users

Residential users can entrust BROAD or BROAD authorized professionals to survey, design and install. Hands-on users can also design and install by themselves, as long as they fully comprehend this brochure.

Installation for Group Users

Engineering design must be conducted by architectural design institute with qualification on fresh air project design, meanwhile installation must be conducted by professional company with qualification on mechanical & electrical equipment installation. BROAD subsidiary company BROAD Energy Efficiency Co., ltd can be an option for both. For customer with an existing central A/C system, the original fresh air machine can be replaced by BROAD Clean Fresh Air Machine, few changes will be needed for the original ducts in most conditions.

Supply List

Name	Function & Description
Machine	As per technical indexes & drawings listed in this brochure
Human Infrared Sensor (optional)	1 set for small and medium models, 5 for large models. Installed in rooms with frequent human activities to control fresh air supply automatically
Base	Standard part only for small models for ground installation
Plenum Box	Standard part for SG500 to converge air ports
Filter resistance sensor	Standard part only for large and medium models, to remind cleaning and replacement of filter
Networking module	For remote control
Rain-blocking air inlet & outlet	Only for small and medium models to introduce in fresh air and exhaust out dirty air, and prevent rain water from pouring in
Fresh air outlet	Optional part only for small models, for duct-free installation
Wall-mount bolt	Only for small models, for wall-mount installation
Package	Carbon box for small models, anti-collision protection for large and medium models, thin film covered for the entire machine

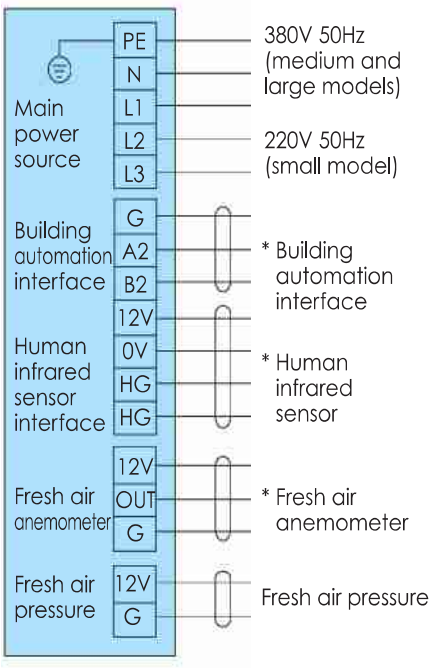
Construction Scope for Delivery (large and medium models)

Work	Content	BROAD	Customer	Description
Transportation	Transport from factory to site		√	Can be arranged by BROAD
	Machine positioning		√	Instructed by BROAD
Equipment & ducts installation	On site split units assembling	√		8% of the machine standard price to be charged
	Install A/C water pipes to the machine side		√	Piping for water supply, return water and condensate water
	Fresh air inlet / exhaust air outlet		√	Rain shields installed at air ports
	Air supply/exhaust ducting		√	
Electrical installation	Power supply next to the machine		√	380V
	Building automation connection	√		Customized modbus connection
	Ground wire next to the machine		√	Ground resistance ≤ 4Ω
	Anemometer installation	√		Supply duct (6 times of the diameter away from the outlet)
	Human sensor installation	√		Installed at places with frequent human activities
Commissioning	Cleanness detection, etc.	√		As per BROAD standard
Operation & maintenance	Training for user's operators	√		Onsite training, 4~10 operators from each user
	Clean or replace filters		√	Annual service contract can be signed with BROAD after 2- year warranty

Acceptance Standard

NO.	Item	Acceptance Standard	Inspection & Corrective Measures for any Failure
1	Particles in the fresh air outlet	1,000 times cleaner than outdoors	1. The entire Air Monitor shall be put into the fresh air outlet during detection 2. Check if there is dust in the air duct 3. Check if the electrostatic cleaner works properly 4. Check if the HEPA filter is installed tightly
2	Indoor particles (4 hours after fresh air machine is turned on)	100 times cleaner than outdoors	1. Make sure doors & windows fully closed 2. If someone just smoked, detect after 2 hours 3. If kitchen door is not closed during cooking, detect after 2 hours 4. Turn off the exhaust fan in the bathroom and kitchen to avoid negative pressure 5. Increase the positive pressure of fresh air, which is "fresh air/ exhaust air volume proportion", to ensure indoor micro-positive pressure
3	Fresh air volume	Reach the rated volume	1. Ensure no leakage at air ducts 2. Check if the air duct is too small, or the elbow is too sharp 3. Check if the filter is blocked by decoration dust (turn the machine off during decoration)
4	Fresh air machine noise	As per the rated parameter table	1. May be caused by resonance. Turn up or down the machine frequency by 2Hz 2. Check the fan

External Electrical Wiring Diagram



SE1.0, SE2.0 Power wire≥10mm^2

SE5.0 Power wire≥25mm^2

Multi-core shielded cable 0.5mm^2

* Refers to optional parts

After-sales Service

Service System

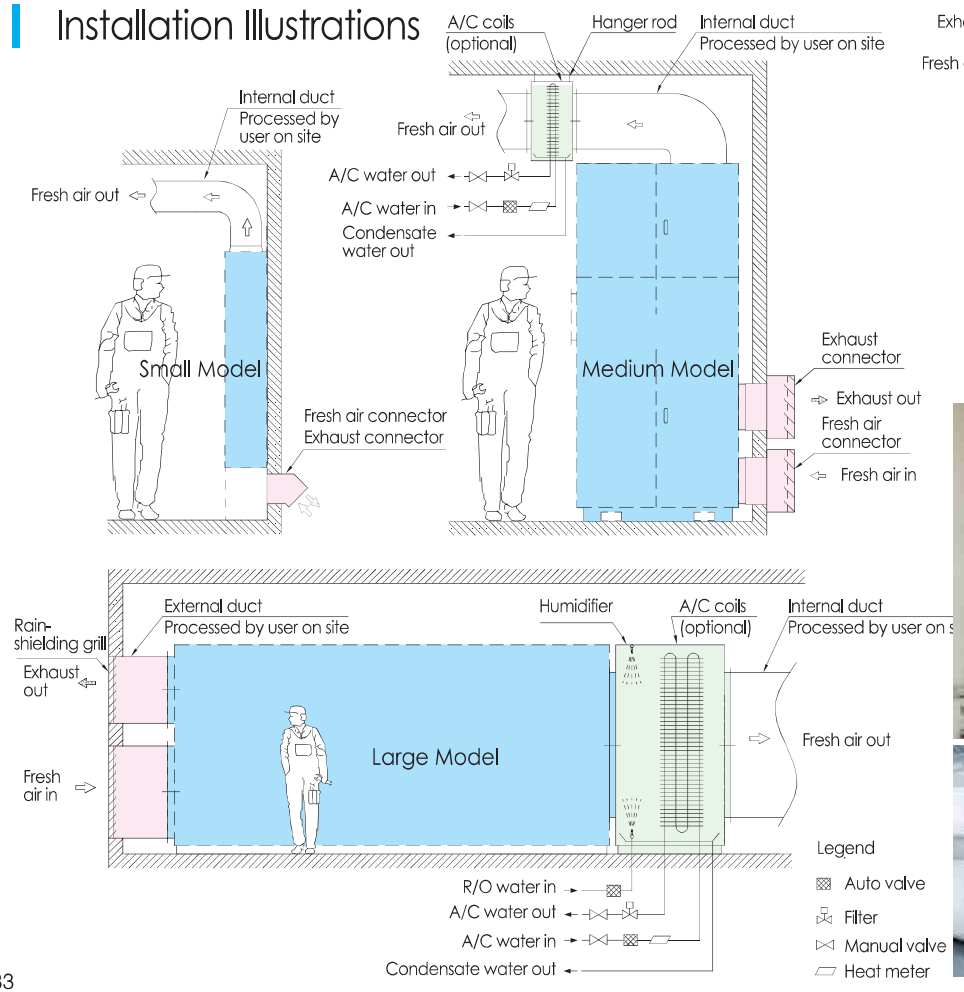
BROAD clean air products aim to provide "the best purification effect", "the lowest energy consumption", "zero malfunction" and "40 years' service life"

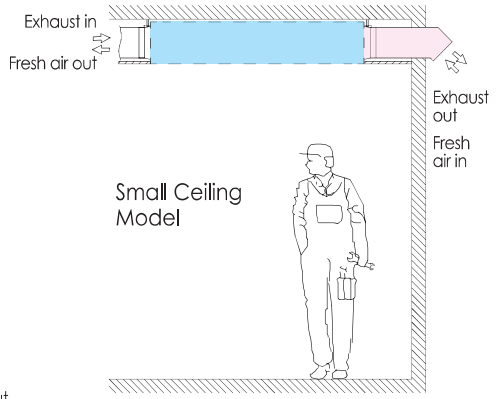
For cleaning and maintenance, please refer to *Operation & Cleaning* posted on the machine as well as the *Users' Manual*, maintenance procedure must be followed strictly and each maintenance work should be recorded in detail. For group users, maintenance work is suggested to be done or guided by BROAD service engineer (or authorized third party). Residence users can do maintenance work by themselves, or entrust BROAD.

Notes:

1. The fresh air machine is suggested to run at 30~40 HZ, which can be increased with more people in room. Do not run it under full load when not necessary.
2. Ensure doors & windows are closed and rooms are under micro-positive pressure
3. Turn off the range hood and exhaust fan in time
4. Smoking or incense burning will effect air quality
5. When there are no people in the room for a long time, it is suggested to set a regular time to start the machine every morning and evening for 15 minutes to ensure basic indoor cleanliness.

Installation Illustrations





Dimensions

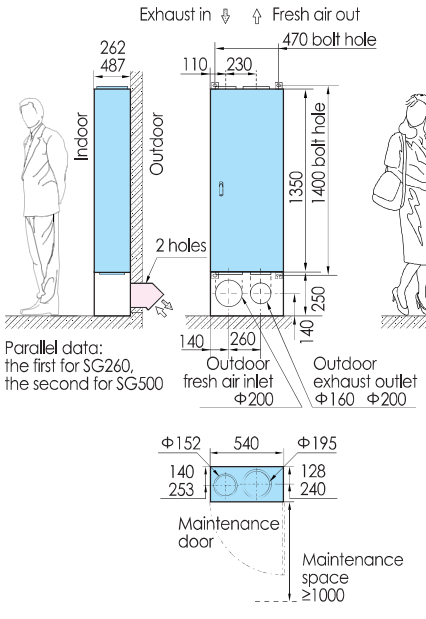
Small Models

Applicable to residences.
Installed in the balcony, kitchen, bathroom, or hallway.

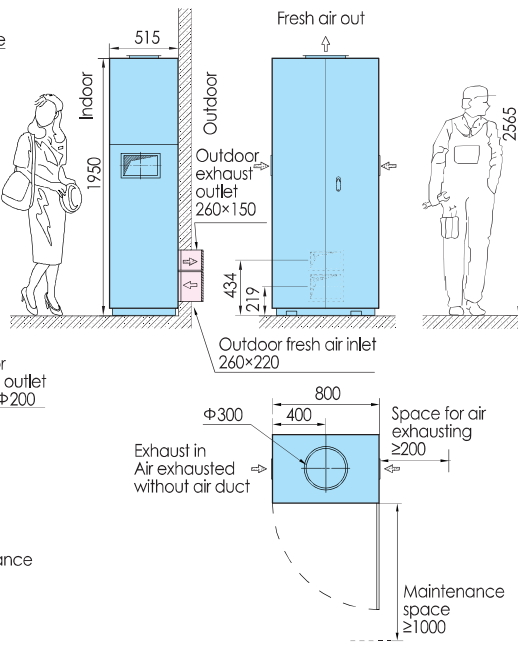
Medium Models

Applicable to villas and small public buildings. Installed in the tearoom, laundry room, balcony, or storage room.

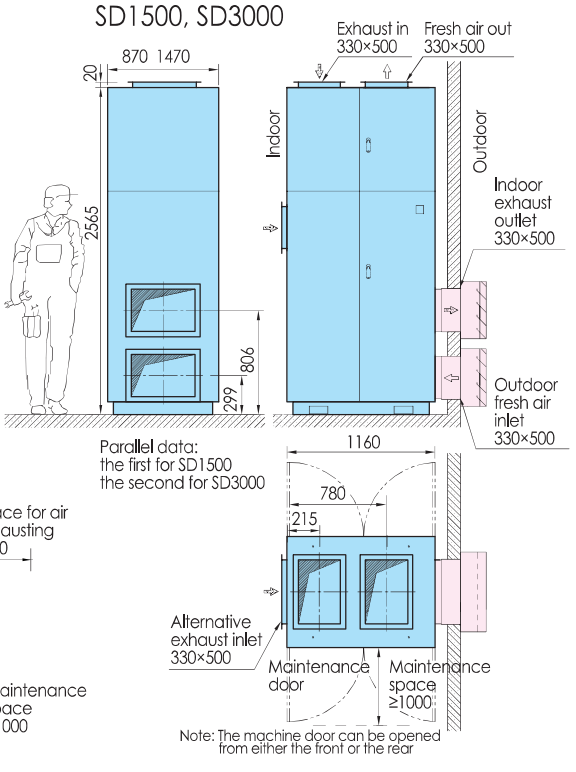
SG260, SG500



SF1000



SD1500, SD3000

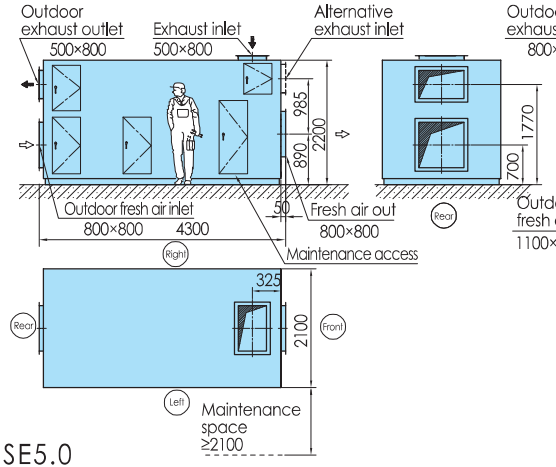


Large Model SE1.0-SE5.0

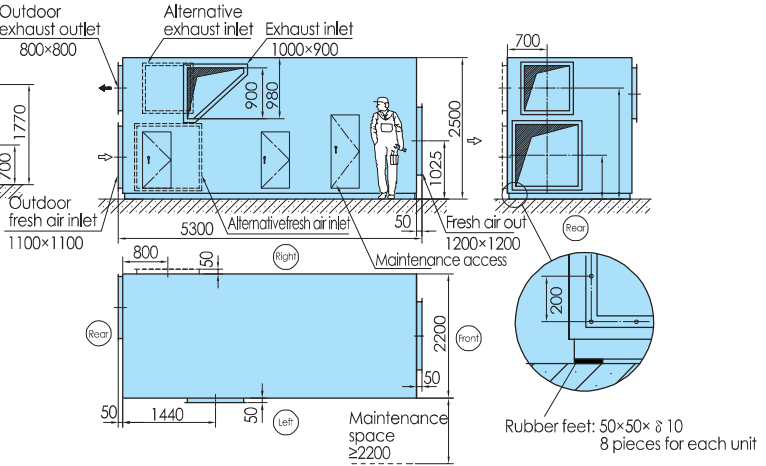
Applicable to large structures including office building, apartment, hotel, hospital, exhibition hall and airport, etc

Note: a. Maintenance space for large model can be by the left or right side of the unit.
b. EXW integrated shipment.
c. Split shipment is available for buildings with limited passway. Relevant charges will occur.

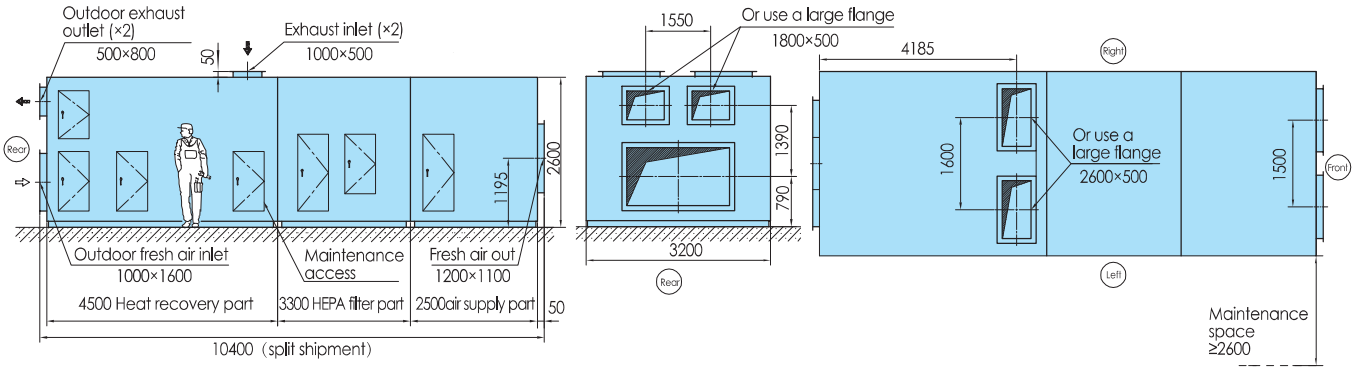
SE1.0



SE2.0



SE5.0



Disruptive Innovation Developing Milestones of BROAD Clean Air

2005
The world's first indoor A/C terminal with electrostatic cleaner

2006
The world's first electrostatic air purifier with CO_2 monitoring function

2008
The world's first heat recovery clean fresh air machine

2009
The world's first miniature air detector: BROAD Air Monitor

2013
The world's first mask-type air purifier: BROAD Airpro Mask

2015
The world's first air purifier for car with CO_2 monitoring function: BROAD Airpro CO_2 Sensor

BROAD Combats POLLUTION

It is a simple scientific principle that energy is the root cause of pollution

- China burns 50% of the global coal while covering less than 2% of the earth land, proving that frequent pollution in China is never a coincidence.
- Half of the coal is consumed by power generation, verifying that power causes serious pollution.
- Winter encounters more pollution, verifying that heating operation causes serious pollution.
- Urban areas suffer more from pollution, verifying that vehicles emit serious pollution.

BROAD experiences are very efficient, which save energy, cut emissions and combat pollution

- In 1992, BROAD developed the non-electric central air conditioning powered by natural gas, providing clean cooling, heating and hot water.
- In 1999, BROAD developed non-electric central air conditioning powered by exhaust heat, providing zero-emission for cooling, heating and hot water.
- In 2009, BROAD invented the factory-made sustainable building (BSB), accomplishing 5 times more energy efficiency.

BROAD combats pollution thoroughly by promoting domestic, commercial and mobile air products

Since 2005, BROAD has invented the clean fresh air machine that filters PM2.5 by 99.9%, and a series of clean air products from commercial, domestic to mobile usage, as well as the portable Air monitor.

BROAD Town – the R&D and manufacturing base of BROAD Clean Fresh Air Machines (located in Changsha, Hunan, China)

TÜV Rheinland ISO9001

SYSTEM CERTIFICATION ISO 14001:2004 SGS

CE CB CCC

- BROAD Clean Fresh Air Machine has obtained the CE Certificate, CB Certificate and 3C Certificate.
- The structure, system and parts of BROAD Clean Fresh Air Machine have been patented in China and around the globe. Counterfeits will be sued

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