EZ Air Purification System

ABSTRACT

Self contained air purification system creating approximately 350 cfm of air flow at high speed, designed to remove allergy causing particulate, microorganisms, and odors, chemicals, and Volatile Organic Compounds (VOCs) from the air to create a healthy environment. The system utilizes a carbon Prefilter Pack for removal of larger particulate and odors/chemicals and gases, an individually certified Hospital Grade HEPA filter (99.99% efficient at .3 microns) for removal of smaller particulate, allergens, dust mite pieces, and bacteria, and carbon Postfilters for additional odor, chemical, and gas removal..

Air enters from the upper end of the cabinet from three sides, travels through the carbon Prefilter Pack and HEPA filter, past the motorized impeller, and finally through the carbon postfilter before it exhausts out of the lower end of the cabinet from three sides.

The unit is designed for use in homes, commercial offices, or any area having indoor air quality concerns.

CABINET:

Dimensions: 15” x 15” x 19”

Construction: 20 gauge powder-coated steel cabinet with 2” casters and a convenient back panel access to all components. 38 lbs.

Colors: Standard colors are Sandstone, White, and Black.

Air Intake: Air enters EZ AIR at the upper portion of the cabinet in the front, left, and right sides, effectively taking in air from all areas within the room. By having air enter through the top of the unit, dirty and contaminated air from the normal breathing zone in the room (3-6 feet high) is immediately and efficiently drawn into the cabinet and replaced with clean and disinfected air. Units that have air intake on the bottom can have difficulty drawing in dirty air from upper areas throughout the room because you have to hope that exhaust air will maneuver dirty air to the unit intakes, and this is especially difficult if the unit is placed in close proximity to furniture,. However, by having air intakes at the top of the cabinet, dirty air from the normal breathing zone is in direct contact and easily exposed to the air intakes, quickly and efficiently pulling airborne contaminants into EZ AIR. Furthermore, units that pull in air from the bottom can actually suck in and disrupt dust and dirt off of the floor and into the unit, thereby creating a dirty environment around the unit and prematurely causing filter loading.

Air Exhaust: Air is exhausted from EZ AIR through the lower front, left, and right of the cabinet. Outlets on three sides disperse and distribute clean air to all parts of the room, regardless of unit placement. Air is directed outwards and upwards through so as not to disrupt any dust or particulate on the floor. And unlike some top air discharge designs, the EZ AIR air exhaust works to corral dirty air back into the unit’s intakes and replace it with clean and disinfected air. Air exhaust is critical to the air flow pattern created, and therefore the overall effectiveness of any air

cleaner. Many units that exhaust air out of the top tend to scatter and force dirty air away from the cabinet (because the exhaust literally blows airborne contaminants away from the unit), and the air intakes are inefficient at bringing dirty air back to the cabinet. However, the exhaust air in EZ AIR evenly disperses clean air throughout the room but does not disrupt the efficient contaminant removal by the air intakes. And in doing so, the exhaust of EZ AIR keeps air 1-3 feet from the ground clean and safe, which is where children (and pets) get their air to breathe. In all, unlike most air cleaners on the market today, the air removal and air supply from the EZ AIR unit work together in concert to effectively clean the most important breathing spaces within the room.

FILTRATION TECHNOLOGIES:

Carbon Prefilter: A 14x14x1" carbon pack removes larger airborne dust and particulate to keep the HEPA filter clean and extend its lifespan, but it also contains over 3.5 lbs of activated carbon and zeolite to adsorb odors, chemicals and gases. In addition to removing regular household and office odors (styrene, food and pet odors, mercaptans, aerosols, smoke), a special blend of activated carbon oxidizes and zeolite is used that removes difficult gaseous pollutants like formaldehyde, ethylene, hydrogen sulfide, ammonia, and more that standard carbon in itself would be inefficient in adsorbing.

The carbon filters in EZ AIR were designed for regular replacement, as carbon in any system can quickly become saturated and therefore be ineffective at removing odors, chemicals and gasses. Carbon acts like a sponge, and once it is saturated it will actually expel trapped fumes and chemicals. Even systems containing more than 10 lbs. of carbon likely need to be changed every four to six months or they can begin out-gassing trapped odors, chemicals, and gases. This can be quite expensive in many air cleaners as the carbon filters can cost in the hundreds of dollars.

Given prefilters in any air cleaner should be changed at least quarterly, PAS combined the prefilter function with the need for fresh activated carbon in the EZ AIR design; instead of changing just a prefilter pad on a regular basis, a carbon pack that combines particulate and odor removal is changed. The key factor in this design is that the retail price of the EZ AIR carbon prefilter pack (and postfilter pack) is actually LESS than the cost of standard prefilters/postfilters in many air cleaners on the market today. Therefore, if changed regularly, (every three months), the odor, chemical, and gas adsorption in EZ AIR will remain at peak efficiency and effectiveness while still costing much less than larger, more bulky carbon filters. And the cumulative amount of fresh carbon used over the course of a year in EZ AIR is actually the same or greater than the amount of carbon used in other units.

EVERY EZ AIR UNIT COMES WITH A TYPICAL YEAR'S SUPPLY (TWO) OF CARBON PREFILTER PACKS

HEPA filter: EZ AIR utilizes a 14" x 14" x 3 5/8" individually certified HEPA filter with 80 square feet of media for dust, dander, mold, allergen, and particulate removal at hospital grade efficiency. Given this amount of HEPA media, in normal environments the HEPA filter in EZ Air should last at least 3-4 years. Unlike many commercial/residential HEPA filters that utilize HEPA media but whose finished filters are not tested, the HEPA filter used in EZ AIR is individually tested and guaranteed to ensure the filter's

efficiency of 99.99% efficient at .3 microns. THIS IS THE SAME TESTING PROCEDURE AS THAT FOR HIGH EFFICIENCY FILTERS USED IN HOSPITALS FOR HIGH RISK INFECTION CONTROL AND CLEAN ROOMS. In some commercial/residential units the media may be 99.97% efficient at .3 microns but the media is not sealed within the filter frame to prevent air bypass around the media. As such, the filter itself may not be 99.97% efficient at .3 microns even though the media is.

Carbon Postfilters: Three 14 x 4 x ¾ " carbon pads cover each exhaust area on the EZ AIR unit to remove potential latent odors from the air and/or unit interior, and to buffer noise from the fan motor. These are permanently installed in the system, so they never need to be replaced.

UNIQUE ATTRIBUTES:

Airflow Pattern: The key to any air cleaner is the airflow pattern that it creates. A device can utilize the best air cleaning technology in the world, but if the dirty air is not drawn into the unit from throughout the room and replaced with clean disinfected air, then the device's overall effectiveness and efficiency is limited. The airflow pattern created by EZ AIR is designed to produce an excellent mixing factor and clean all parts of the room. Furniture and other room masses that can be disastrous to other unit's ability to collect dirty air have limited effects on the airflow created by EZ AIR. This is due to the location and design of the unit's intake area, the velocity of the air traveling out of the unit, and the location and design of the air exhaust vents.

With EZ AIR, dirty air is drawn in through the top of the unit through intake vents. This allows for the most efficient removal of contaminated air from the normal breathing zone (3-6 feet high), as the dirty air has easy and direct access to the unit's air intake. Air then passes through the five stages of filtration before being exhausted out of the lower portion of the unit. The exhaust air is directed outwards and upwards by the exhaust vents molded into the cabinet, effectively distributing air throughout all corners and within all levels in the room (please see picture below). The velocity of the air being exhausted is high enough to effectively move large volumes of air long distances, ensuring total room air cleaning.

The airflow pattern created by EZ AIR is better than other air cleaners that may have the air intake on the lower portion of the cabinet and the exhaust on the top. If a small air cleaner is located on the floor (underneath the normal breathing zone), top exhaust can suspend dirty air 4-6 feet in the air without cleaning it. This occurs as the exhaust continually pushes dirty air upwards and away from the unit, scattering but keeping dirty air 4-8 feet from the floor and away from the air cleaner. Furthermore, dirty air that is suspended in the breathing zone cannot easily be cleaned if the air intakes are next to the floor, especially if the unit is placed next to furniture so that a portion of the intake panel is blocked from direct access to the air. EZ AIR, on the other hand, works to actively collect, consolidate and remove air directly from the breathing zone. EZ AIR does not wait and hope that exhaust air will maneuver dirty air back to the unit. Instead, the air intake system of EZ AIR aggressively takes dirty air out of the normal breathing zone (virtually "vacuuming" contamination out of the air) and cleans and disinfects it for

redistribution into the room. In doing so, the exhaust of EZ AIR also maintains clean air in the lower levels of the room (1'-4' from the floor), keeping that air level safe and clean for children and pets.

Furthermore, EZ AIR draws in and exhausts air out of three sides of the unit (front, and both sides). Therefore, the airflow pattern described above not only occurs in the area directly in front of the unit, but also on each side. Please see the drawing below showing the ceiling view. In all, with this design EZ AIR can effectively clean all corners of a room, and all levels of air within the room.

Finally, please review the table in Appendix B showing the air changes per hour that EZ AIR can achieve in various room sizes. The unit is designed to create approximately 350 cfm of airflow on high speed.

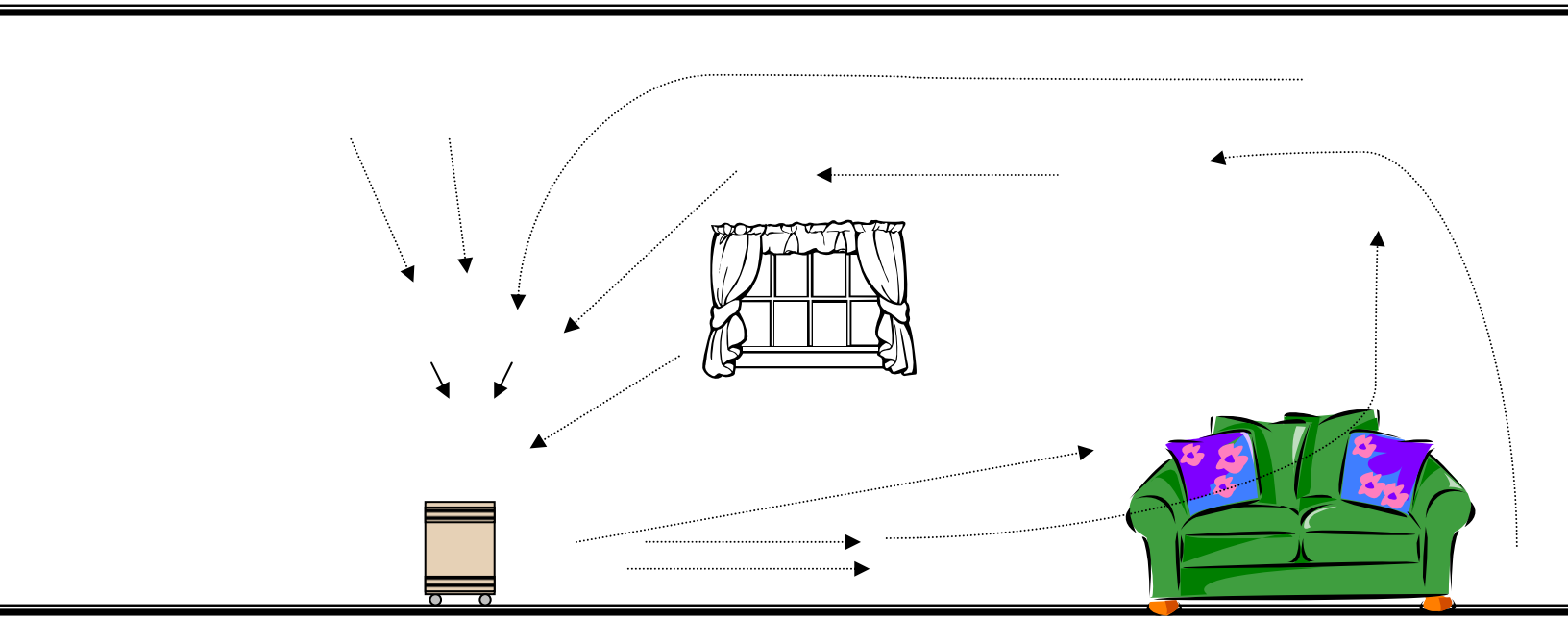
HEPA Sealed in Cabinet: The HEPA filter in EZ AIR is gasketed and sealed within the cabinet that forcefully prevents air from bypassing the high efficiency filtration. Given high velocity air will choose the path of least resistance, if the HEPA filter is not adequately sealed and gasketed within the cabinet, dirty air will completely bypass this primary means of filtration and be exhausted back into the environment. However, the HEPA filter rail mechanism within EZ Air creates an effective seal within the EZ AIR cabinet to ensure maximum unit efficiency and prevent dirty air bypass. Therefore, each unit is individually tested prior to shipping and sent with a Performance Certificate to ensure and document unit efficiency.

Low Maintenance Costs Please review the section above outlining the design and function of the carbon prefilter pack. To review, when changed regularly the cumulative annual amount of "fresh" carbon will equal or exceed that of most other residential/commercial units. But because the carbon pack also acts as the prefilter, (and they are priced as standard prefilters despite their significant carbon content), annual maintenance costs are considerably cheaper than units having prefilters/postfilters and separate carbon filters. Furthermore, PAS acknowledges that in order to keep an air cleaner running at peak performance, regular replacement of filters must occur. Therefore, all replacement parts used in EZ AIR are priced well below market value (and much less than competitor's units) to encourage regular maintenance and optimize unit efficiency and effectiveness. In all, annual maintenance costs of EZ Air are at least one half of that of most of its similar competitors.

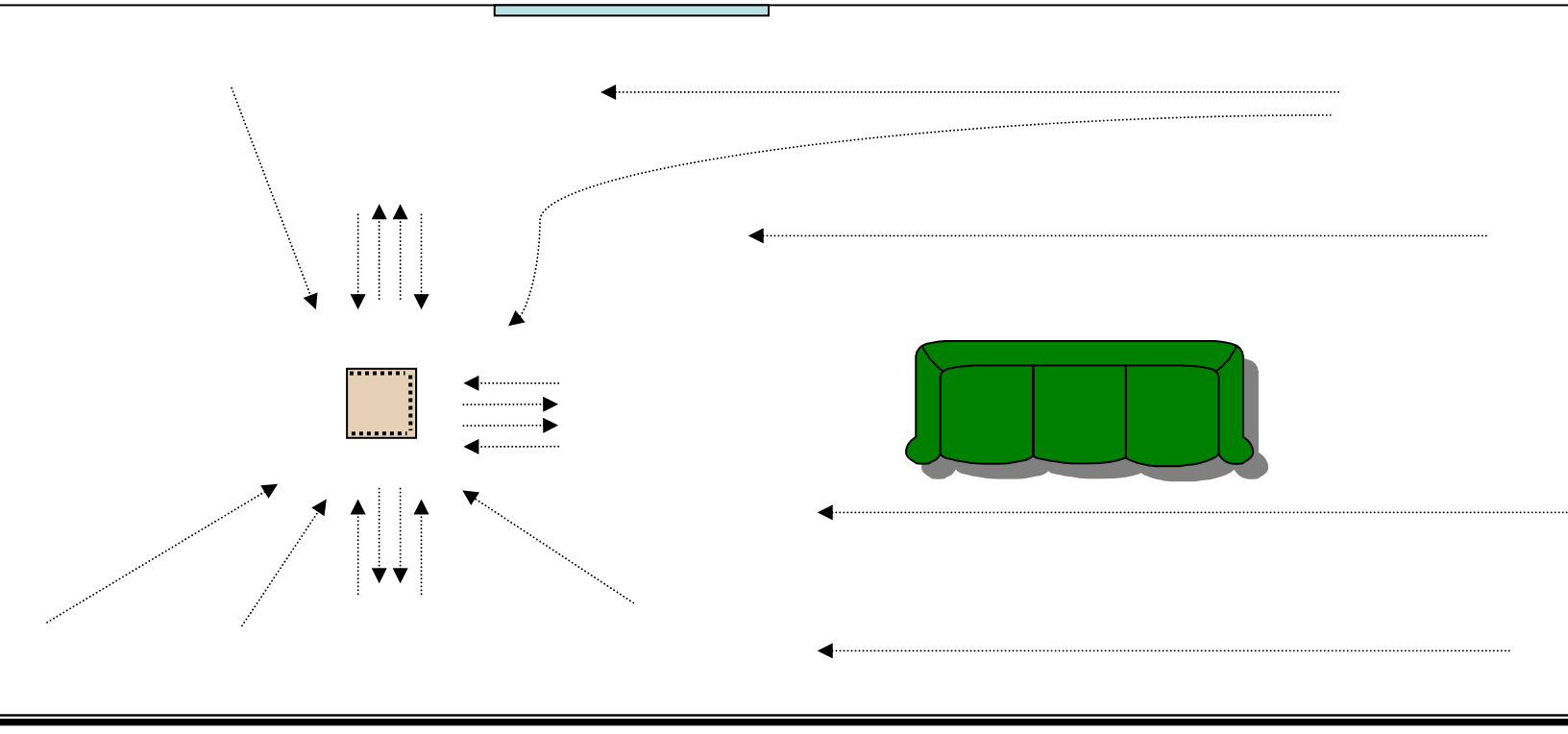
Ease of maintenance: **All** filters are easily accessed and replaced by simply removing the back panel and sliding/pulling the parts out. ***NO TOOLS ARE REQUIRED FOR REPLACEMENT OF FILTERS***. Four knurl screws need only be taken out to remove the back panel, and the unit can remain upright in normal operating position for all maintenance procedures.

Full Variable Speed: EZ AIR utilizes a full variable speed control, so it can be set on a virtually any speed up to 350 cfm. This allows the customer to balance air flow against any air noise that is suitable for their taste.

AIR FLOW PATTERN



AIR FLOW PATTERN – CEILING VIEW



APPENDIX A

Square feet of room*	Air changes per hour created**
100 ft^2	26 ACH
150 ft^2	18 ACH
200 ft^2	13 ACH
250 ft^2	11 ACH
300 ft^2	9 ACH
350 ft^2	8 ACH
400 ft^2	7 ACH
450 ft^2	6 ACH
500 ft^2	5 ACH
600 ft^2	4 ACH
700 ft^2	4 ACH
800 ft^2	3 ACH
900 ft^2	3 ACH
1,000 ft^2	3 ACH
1,250 ft^2	2 ACH
1,500 ft^2	2 ACH

* 8’ ceilings assumed

** Air Changes Per Hour: Term used to measure room airflow (ventilation) rates. ACH is a measure of the rate (time) it takes to clean/remove all of the air in the room, and replace it with clean/fresh air. For example, if 9 ACH are created in a room, then all of the air in the room will be cleaned 9 times per hour. Industry standards recommend a minimum of 3 ACH to achieve a satisfactory reduction in indoor air contamination.

*** 350 cfm used to make calculations.