

### How can I tell what levels of VOCs are in my home?

Many heating and cooling contractors and IAQ professionals are able to provide home screening to measure total volatile organic compound (TVOC) levels, and some individual VOCs.

### How else can I improve IAQ in my home?

There are three basic approaches to improving indoor air quality. You can (1) control or eliminate the source of pollutants, (2) dilute the contaminants, usually through ventilation, and (3) remove contaminants from the air by filtration or germicidal air purification.

**High Efficiency Filtration** – Use high efficiency air cleaners that remove particles less than 1 micron in size and use those with activated charcoal filtration that remove chemicals from the air. The Dynamic polarized-media air cleaner is a high-efficiency whole-house electronic air cleaner that collects sub-micron particles in addition to odors and VOCs. Dynamic Air Cleaners provide an efficiency of 97% for particles down to .3 microns in size.

**Germicidal** – Ultraviolet light is an effective means of inactivating pathogens on surfaces. UV-C lamps such as

the Dynamic Sterile Sweep™ kill pathogens trapped inside filter media. Another common application is to illuminate indoor coils in order to prevent organisms from growing.

**Ventilation** – The type of ventilation equipment that's right for you depends on where you live. Some ventilators bring in straight outside air. Others, such as ERVs and HRVs recover and transfer the temperature of the indoor air being expelled to the outside air being brought in. Balanced systems bring in the same amount of air as they expel.

### Dynamic Air Quality Solutions

Since 1982, Dynamic Air Quality Solutions' mission to its customers has been to develop and bring to market innovative, technologically advanced and affordable solutions to help clients optimize air quality, energy consumption, and the environment. In addition to residential products, the company manufactures commercial air cleaners and germicidal systems that clean the air and save energy. Dynamic Air Cleaners can be found in casinos, airports, schools, hospitals and clean rooms.

There are three different phases of airborne contaminants;

- 1) particulates - which include airborne respirable particles,
- 2) microbial organisms - which include mold spores, bacteria, allergens and viruses, and
- 3) gas phase contaminants - which include odors, VOCs and chemicals in the air.

Dynamic polarized-media electronic air cleaners, used in conjunction with the Dynamic Advanced PCO System, address all three phases of airborne contaminants.

For more information, visit  
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IMPROVING THE AIR YOU BREATHE

# ADVANCED PCO SYSTEM

Dynamic Advanced PCO Air Purification System  
for gas-phase filtration of chemicals and VOCs



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# The Impact of Chemicals and VOCs on Health and Indoor Air Quality (IAQ)

Does it seem like your children are much more susceptible to allergies and asthma than you or your parents were as children? Well, it's true. And there are good reasons for it.

Most homes built prior to 1970 were poorly insulated and poorly sealed because energy costs were low. This provided a natural form of ventilation which brought clean fresh air in from the outdoors through cracks and crevices around doors and windows. Stale, contaminated air was removed from our homes by the same means. Since the 1970s, however, because of rising energy costs, it has become common practice to seal up our homes to prevent heated or cooled air from escaping. We insulate, we seal up cracks, and we add weather stripping. Today, according to the U.S. Environmental Protection Agency, the average person spends over 90% of their time indoors. If the air inside the spaces where we spend our time is not adequately purified, then we are breathing a multitude of particles, chemicals and even living organisms. Many of the chemicals we breathe were not around thirty years ago. It's no wonder that respiratory problems and allergies are so commonplace today.

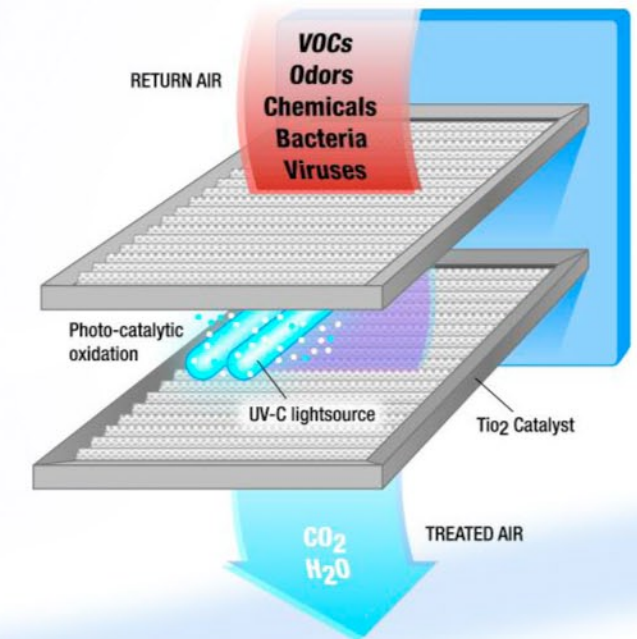


Good IAQ is critical to our quality of life. The American Medical Association now states, "Respiratory ailments, often related to poor indoor air quality, represent the third largest cause of death in the U.S. ranking only behind heart disease and cancer." In 'tight' homes, contaminants are continuously re-circulated. They can include odors from cooking and smoking, chemicals from cleaners and aerosol personal care products, common allergens including dust mites and dust mite feces, and volatile organic compounds (VOCs) emitted from household products including paints, varnishes, moth balls, solvents, bleach, newspaper, vinyl floors, carpets, upholstery fabrics, adhesives, caulks, cosmetics, air fresheners and furniture.

## How PCO works

Photo-catalytic oxidation (PCO) is an efficient means of eliminating airborne gas-phase contaminants. PCO technology utilizes ultraviolet light to promote electrons from the valence band into the conduction band of a titanium dioxide semiconductor. Destruction of organic compounds takes place through reactions with molecular oxygen or through reactions with hydroxyl radicals and super-oxide ions. Photo-catalysis does not require extreme temperatures to be effective, and the titanium dioxide material used in many PCO reactors can be incorporated into existing HVAC systems without adversely impacting the system static pressure.

The Dynamic Advanced PCO System consists of a high intensity UV-C ultraviolet lamp (254nm) and a Titanium Dioxide catalyst module. When exposed to ultraviolet light, the photo-catalyst becomes highly reactive and attacks the chemical bonds of VOCs and bio-aerosol pollutants, thereby reducing gaseous products and biological contaminants to carbon dioxide (CO<sub>2</sub>), water vapor (H<sub>2</sub>O), and benign mineral acids.



## Advantages of PCO include:

- No Ozone
- High destruction efficiencies at room temperatures
- High oxidation yields for gas phase reactant and odors
- UVC destroys bacteria and viruses
- Complete oxidation of organics to CO<sub>2</sub> and H<sub>2</sub>O
- Long service life with low maintenance requirements
- Negligible pressure drop in duct system
- Easy to install

## The Dynamic Advanced PCO System

The Dynamic Advanced PCO System destroys pollutants using ultraviolet light in a three-step process. First, the pollutant adsorbs to the surface of the catalyst. The pollutant and catalyst are then exposed to the photons of UV light. The light energy activates the catalyst, which breaks down the pollutant into nontoxic products.

The TiO<sub>2</sub> PCO catalyst module is constructed using dual titanium dioxide metal catalyst screens that are pleated to provide additional surface area. More surface area means higher efficiency. The screens are permanently mounted to a module that mounts directly to the HVAC system plenum or ductwork. Only a square 3.5" opening is required and a depth of at least 14" into the plenum.

The high output UV/PCO lamp (also available separately as a stand-alone dual-radiant™ UVC germicidal lamp) slides into the PCO catalyst module between the dual catalyst screens and easily mounts to the catalyst module. The 24V ballast is external to the unit to provide flexibility and ease of wiring.



## What are the health effects of VOC exposure?

Levels of VOC exposure in an indoor space can vary depending on the volume of air in the room or building, the rate at which the VOC is off-gassed, the building ventilation rate, outdoor concentrations, and the amount of time spent in the effected environment. Symptoms of acute problems include fatigue,

eye, nose and/or throat irritation, headaches, and nausea. Chronic effects can include liver or kidney damage, central nervous system disorders, and even cancer. Most studies to date have been conducted on single chemicals. Less is known about the health effects of combined chemical exposure.