

Quasar™ In-Duct Purification System

As our understanding of the nature and vectors of harmful organisms in indoor environments becomes clearer, new technologies are evolving in order to combat these pervasive threats. While it has long been understood that a variety of organisms can be transmitted via an airborne route, increasing amounts of evidence have demonstrated that this problem is more significant than previously recognized. Infection control for airborne organisms must be implemented not just in the immediate area, but throughout the potential air-movement paths throughout the vicinity. While in-room filtration is crucial for controlling airborne infection, the nature of modern HVAC systems is such that airborne organisms can very easily enter an air duct system, and be transported throughout a building, often carrying viable bacteria or viruses to areas of the building completely separate from the point of origin. Furthermore, many sources of bacterial and fungal infection are actually found within the HVAC system, leading to a necessity for a method of disinfection that can treat the entirety of a building's air. Recently, much attention has been drawn to the impact of "Sick Building Syndrome," (SBS) a generalized term referring to pathogenic infections that are magnified and spread throughout a building. SBS is quickly being recognized as not just damaging from a health perspective, but also from an economical perspective – loss of manpower due to a pathogenic infection spreading throughout a workforce causes millions of dollars in annual losses across the country.

UV-C light has long been demonstrated to be extremely effective at controlling airborne microorganisms. UV-C light, specifically of the 254nm wavelength, inactivates nearly all airborne microorganisms, including bacteria in both active and inactive/endospore states, viruses, and mold/fungi. UV-C light causes thymine dimerization in microorganismal DNA, preventing reproduction and in many cases primary function of the affected microorganism. However, UV-C light is also harmful to humans, causing inflammation and rapid sunburn-like symptoms. For this reason, most UV-C purification systems tend to be either small shielded units, which are limited in effectiveness by their air-intake capabilities, or systems designed to be effective in areas away from human exposure. It is from this second type of system that in-duct purification systems originate.

In-duct systems are an effective and important component in indoor air quality (IAQ) management. These systems are installed in the HVAC air ducts of a building, and therefore are able to exert their effect on all the air passing through this system, rather than being limited to a specific room. These systems effectively treat the air passing by them, although there are limitations in their effectiveness. The primary limitation is due to the very short residence time of the air passing across the system: air tends to flow very quickly through ductwork, and the effectiveness of UV light is limited to a relatively short radius around the UV lamps. Additionally, the placement and orientation of the lamps can affect the residence time and area of effectiveness.

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Although in-duct UV-C purification systems have existed for years, Universal UV Solutions set about to attempt to address the major obstacles associated with these systems, to create a highly effective, commercial and industrial-strength system. From the ground up, the Quasar™ In-Duct Purification System has been designed to be as effective as possible.

Most in-duct systems use only a single UV-C lamp, and the placement of these single-lamp systems is frequently designed in a manner that reduces overall effectiveness, such as installation of the lamp perpendicular to airflow, or installation very close to one side of the air duct. The Quasar™ features 4 high-quality Philips™ UV-C germicidal lamps, and is designed to allow for flexible in-duct placement, allowing for the system to be installed in the center of an air duct, allowing for maximum efficiency in every direction. The Quasar™ system is designed to be installed parallel to airflow, allowing for a maximum of air residence time over the lamps. The Quasar™ also features mathematically-designed parabolic reflector plates behind each lamp, allowing for light that would normally be lost in the center of the unit to be reflected back towards the air duct, further increasing its effectiveness. Using these innovations, the Quasar™ system is capable of effectively inactivating viruses and bacteria at up to 99.99% efficiency over a single pass across the system. Even in larger ducts, where air moves faster and has more room to travel, the effectiveness of the Quasar™ is maintained due to the recirculation of air through the system. Because most HVAC systems introduce a mix of both fresh and recirculated air into the building, the air in the system passes across the Quasar™ multiple times – even the hardest of fungi and spores are almost entirely inactivated after 6-8 passes. The Quasar™ is designed for constant operation, and therefore the air in a system is purified multiple times an hour, 24 hours a day.

In addition to being designed for maximum efficiency and efficacy, the Quasar™ includes features designed for convenience and easy maintenance. Featuring individual lamp detection as well as lamp/ballast failure indication, the Quasar™ eliminates any guesswork involved in maintaining the system and replacing lamps as necessary. Optional BMS (building management system) integration allows for the Quasar™ to be seamlessly integrated into a building's existing control systems. Finally, the Quasar™ features remote-installation capability, allowing the system's control/indication panel to be mounted up to 50 feet away from the lamp assembly, eliminating the need for duct access to monitor lamp status. The Philips™ lamps in the Quasar™ are rated for 18,000 hours (2 years) of continuous operation, reducing the overall cost of use across the life of the system.

Building on the proven efficacy of UV-C germicidal irradiation, the Quasar™ features the highest quality components and custom designs, while maintaining an aggressive price point. An easy installation followed by a lifetime of low-maintenance, high-efficiency in-duct purification ensures that the Quasar™ system is an important component of any building IAQ solution. Complemented with standard HVAC filtration systems, the Quasar™ system will ensure that the air in your building is as clean as possible.

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