Low Voltage Powered UV Lights
Provide Installation Ease and Flexibility

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As the indoor air quality market has matured, more HVAC contractors and indoor air quality professionals are embracing the benefits and use of ultraviolet light technology as a tool for the control of indoor air contamination. With this increased interest the market need for more flexible and easier to install UV products has arisen.

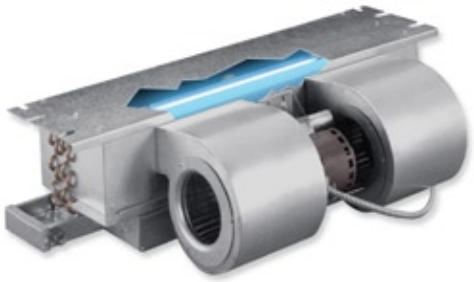
Traditional Line Voltage UV Light Systems

Early designs of UV light products for residential applications involved a line voltage powered power supply base with the UV lamps rigidly fixed to the base and mounted on the exterior of air handling systems. Holes are then cut to allow the lamps to protrude inside of the air conditioning system for the purpose of air handler surface sterilization or for airborne disinfection. The pitfalls of this style of installation is that at times locating a nearby power source may be difficult or unavailable, and cutting large holes in the covers or ductwork of air handler systems can be difficult or not preferred.

The Low Voltage Alternative

In typical air handler installation, a low voltage 24 VAC control circuit exists for the thermostat and component contactors that control the system. These circuits usually contain a standard 24 VAC transformer with 40 volt amps (VA) of power that in most cases has plenty of additional power available to supply other low voltage accessories such as overflow drain floats switches, humidifiers, zone dampers and electronic air cleaners.

In this case, this readily available accessory power source becomes an ideal means of powering a UV light system with many benefits. First and foremost, it provides a convenient safe source of power for an inexperienced first time installer who may be intimidated by connecting to the line voltage. It provides a source of power that can be used to locate the UV light system remotely from the air handler or when there is the absence of local power by simply running a low voltage wire to the desired installation location. Plus, it provides a means to safely tuck the UV light inside an air handler eliminating the need to drill holes to access the air space or to prevent tampering of the UV light. Additionally, it provides options for installing a UV light for tight fitting applications that previously could not accommodate UV lights, such as, PTAC's or fan coil units.



Investigate the Low Voltage Circuits Prior to Installation

First, investigate the air handlers control components to determine whether it is a simple circuit or a more complex circuit. This is important because overlooking the type of control circuit can cause failure to some 24 VAC designed UV light products. A simple circuit is one that contains single speed blowers and motor/compressor contactors. These are often referred as straight heat or cool systems. A more complex circuit is one that contains variable speed blower circuits and electronic control boards, which are becoming more common with the rise of the 13 SEER standards.

This is an important observation for two reasons. First, straight heat/cool systems tend to have low power draw and can typically easily accommodate additional accessories such as the UV light with little concern. Secondly, variable speed blower circuits can cause problems with UV light products or accessories not designed to work on these types of circuits. This is due to inherent voltage spikes, referred to as “signal noise”, created by the variable speed blowers’ control board. This is because the circuit typically converts the alternating sign wave of the 24 VAC circuit to pulse waves to drive the variable speed blower motor, and the spikes are due to voltage “bounce back” from the circuit. This can cause failure to earlier generations of 24 VAC powered UV light products because the power supplies circuits cannot handle the circuits “noise”. So, installing these versions on an isolated low voltage power sources via a second 24 VAC transformer is recommended. Newer generations of low voltage UV lights take this phenomenon into account and are designed with several fail safes in place, such as a wider operating voltage range referred to as extended operating range designed to operate at 18-32 VAC instead of just at 24 VAC and by incorporating input power filters and conditioners intended to filter out the “noise” of these circuits to prevent the failure problems.

Verifying the Low Voltage Circuits Power Load Availability

As with any installation that uses power, whether it is a line voltage circuit or low voltage circuit, it is equally as important to check the availability of additional power load before installing the UV light or other accessory. This is a simple procedure and should be tested with a full load on the air handler, such as with the heat or cool running. Simply take a full load voltage reading of the circuit by connecting the meters probes across the transformers output terminals. For variable speed air handlers it is recommended to use a true RMS meter to get an accurate reading. Then, take a full load current draw reading either using an amp clamp on one of the output leads of the transformer or buy using the probes inline on one of the output leads. Then use the following formula to determine the VA load:

Full Load Volts x Full Load Amp Draw = VA (Volt Amps)

Example:
Full load voltage = 25.61 VAC
Full Load current draw = 0.43 A

25.61 volts x 0.44 amps = 11.27 VA

In the above example, that leaves an additional 28.73 VA for additional accessories to be installed on a 40 VA full load transformer. Most of the low voltage UV products currently found on the market only require 16-18 VA and could easily be installed on the above example. If the total VA burden exceeds 40 VA full load (UV VA + FL VA), a separate transformer should be installed.

Conclusion
As the interest in the use of ultraviolet light products in the HVAC market continues to grow, so will the diversity of the installation opportunities and the experience levels of the installers. The use of low voltage UV light products can afford the opportunity for many new types of installations that were previously not possible until now. Plus, first time installers can safely get involved with applying these types of products.

About The Author
Chris Willette is president of Triatomic Environmental Inc., which specializes in providing advanced germicidal light solutions for the enhancement of indoor air quality. Chris has been designing and developing products for the indoor air quality industry since 1994, is a published author and has several patents pending, including several for extended range low voltage UV light systems. To learn more visit, www.freshaireuv.com.

Triatomic Environmental specializes in providing advanced germicidal light solutions for enhancement of indoor environmental quality. To learn more visit them on the web at: www.freshaireuv.com. Or contact sales@freshaireuv.com