STREIVOR™ AIR SYSTEMS

Ultraviolet Light Hoods

Installation and Operations Manual

Standard Features:

- Hood Exhaust Plenum and Duct Cleaning Technology
- Hood Extractor, UV Lamp Status, and Fan Status Safety Monitoring
- Laboratory Tested and Proven Technology
- Easy UV Lamp Replacement without Removing Fixture
- Optimal UV Lamp Spacing for Maximum Ozone Production
- Programmable Logic Controller with Visual/Audible Alarms

Optional:

Add UV Light Technology to Self-Cleaning Water Wash Hoods

Striving for Excellence

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Acronyms

BMS	Building Management System
CKV	Commercial Kitchen Ventilation
DCKV	Demand Control Kitchen Ventilation
DCP	DemandAire Control Panel
FSS	Fire Suppression System
HMI	Human Machine Interface
IHF	Internal Hood Fan
MUA	Make Up Air
PLC	Programmable Logic Controller
PTC	Programmable Time Clock
RTD	Resistance Temperature Detector
SJ	Safety Switch Junction Box
VFD	Variable Frequency Drive
UJ	Ultraviolet Light Power Junction Box
UV	Ultraviolet

General Information

System Overview

Streivor's Ultraviolet Light Hoods provide a self-cleaning solution for Type I Commercial Kitchen Hoods and Grease Exhaust Ducts. Ultraviolet light has long been known for its air, water, and surface sterilization qualities in healthcare, agriculture, printing, and HVAC applications amongst others. When safely introduced into Commercial Kitchen Ventilation (CKV) systems, type UVC ultraviolet light has specific characteristics which ultimately result in a reduction of cooking odors and the chemical breakdown of grease compounds into substances which are easier to clean.

Streivor's Ultraviolet Light Hoods include Stainless Steel UVC Lamp Fixtures installed against the back and/or top interior of the Hood Exhaust Plenum. The UVC Lamps are designed to turn on automatically whenever the hood is exhausting. The UVC light reacts with the exhaust air through a chemical process called, Photodissociation, in which oxygen molecules are broken down into oxygen atoms by photons. The oxygen atoms and remaining oxygen molecules combine to form Ozone molecules which chemically react with organic compounds in the grease laden vapor of the exhaust air to form easy-to-clean byproducts, namely water vapor and carbon dioxide. This chemical reaction, known as Ozonolysis, significantly reduces buildup of grease deposits in both the Hood Exhaust Plenum and Grease Exhaust Duct. This process results in reduced cleaning and maintenance costs, as well as improved safety for the kitchen staff by decreasing the likelihood of grease fires in the exhaust duct.

Direct exposure to UVC light is hazardous to both skin and eyes without the proper protective equipment, thus Streivor has taken additional measures to ensure personal safety when operating cooking appliances below the Ultraviolet Light Hoods. The hoods are designed with Stainless Steel Grease Extractors which prevent UVC light from escaping the Hood Exhaust Plenum. Extractor Positioning Switches are installed above each Grease Extractor to ensure all Grease Extractors are in the correct position before allowing the UV Lamps to turn on.

The Ozone produced by the UV Lamps is harmful to breathe and long term exposure can cause respiratory irritation, shortness of breath, and even permanent lung damage. Streivor's Ultraviolet Light Hoods include a UL Listed adjustable pressure switch which confirms that the grease exhaust fan is on prior to allowing the UV Lamps to turn on. This also prevents Ozone from accumulating and leaking out of the Hood Exhaust Plenum in the event that the grease exhaust fan turns off when the UV lamps are still on. The pressure switch can be accessed from below the hood and is adjusted by a Streivor technician during the commissioning process.

Streivor's UV Lamps, Pressure Switch, and Extractor Positioning Switches are designed to integrate with Streivor's Demand Control Kitchen Ventilation (DCKV) DemandAire system. The DemandAire system includes a Human Machine Interface (HMI) touch screen and is pre-programmed to control the kitchen ventilation system and UV Lamps. The DemandAire system will also provide visual/audible alarms including Extractor Position Alarm, Low Airflow Alarm, and Maintenance Alarms.

General Information

Extractor Positioning Switches

Streivor's Ultraviolet Light Hoods include Extractor Positioning Switches for each Grease Extractor. The Extractor Positioning Switches ensure that all of the Grease Extractors are in the correct position in the Hood Exhaust Plenum before allowing the UVC Lamps to turn on. This prevents UVC light from escaping the Hood Exhaust Plenum. If a Grease Extractor is not in the correct position while the hood is exhausting, an Extractor Position Alarm will occur and the UVC Lamps will remain off until the alarm is resolved (refer to the *Alarms* section for more information).

The Extractor Positioning Switches are located behind the Switch Housing Cover.

Figure 1: Extractor Positioning Switch Housing Cover

If necessary, an Extractor Positioning Switch can be accessed for replacement. Power must be turned off to the DemandAire Control Panel (DCP) when accessing the Extractor Positioning Switch(es).

WARNING: Do not turn off power to the DemandAire Control Panel if cooking appliances are in use or generating heat below the hood(s), as the kitchen hood exhaust fan will turn off and excessive heat in the hood(s) may cause the hood's fire suppression system to activate.

WARNING: Do not defeat the purpose of the Safety Extractor Positioning Switch Interlock.

General Information

Extractor Positioning Switches (cont.)

After power has been turned off to the DCP, remove the screws on the front of the Switch Housing Cover and remove the Switch Housing Cover. Each Extractor Positioning Switch is mounted to a Switch Bracket which can be accessed through the openings shown below.

Figure 2: Extractor Positioning Switch Access Opening with Switch Housing Cover Removed

The Switch Bracket can be removed to allow access to the Extractor Positioning Switch.

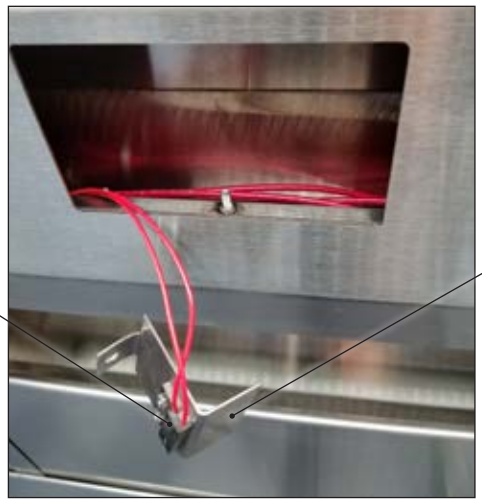


Figure 3: Extractor Positioning Switch

For every Extractor Positioning Switch mounted in the hood as shown above, an Extractor Positioning Switch Actuator is located in the top of each Grease Extractor. The Extractor Positioning Switch Actuator is a magnetic device which can be accessed by removing the Actuator Cover from the rear upper section of the Grease Extractor as shown below.

Figure 4: Extractor Positioning Switch Actuator

General Information

Extractor Positioning

To properly install and position the Grease Extractors in the Hood Exhaust Plenum, it is important to first identify the three types of Ultraviolet Light Hood Grease Extractors: Right Extractor, Middle Extractor(s), and Left Extractor.

Figure 5: Right Grease Extractor

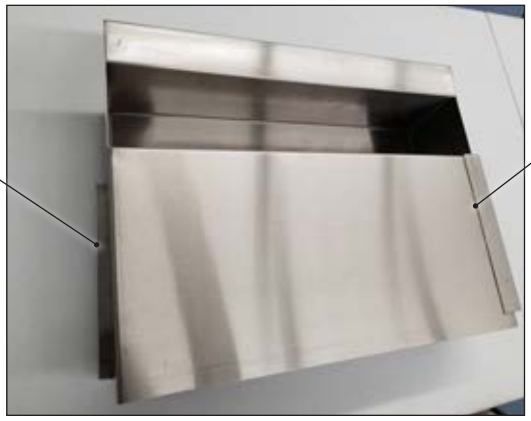


Figure 6: Middle Grease Extractor(s)

Figure 7: Left Grease Extractor

General Information

Extractor Positioning (cont.)

The Right Grease Extractor must be installed first and slid as far to the right as possible against the Right Extractor Blank. To install the Grease Extractors, push the top of the Grease Extractor into the upper filter track and then push the bottom of the Grease Extractor towards the rear of the hood. The Grease Extractor will rest on the lower filter track once installed.

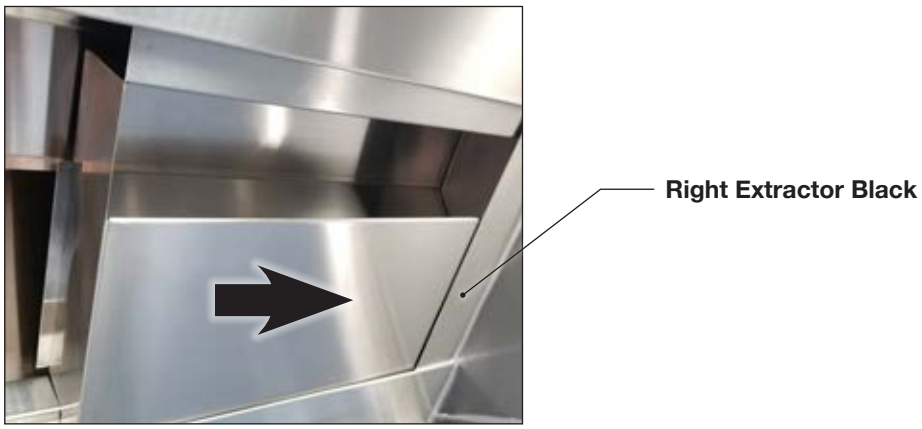


Figure 8: Install Right Grease Extractor

Figure 9: Install Middle Grease Extractor(s)

Each Middle Grease Extractor can then be installed as shown above.

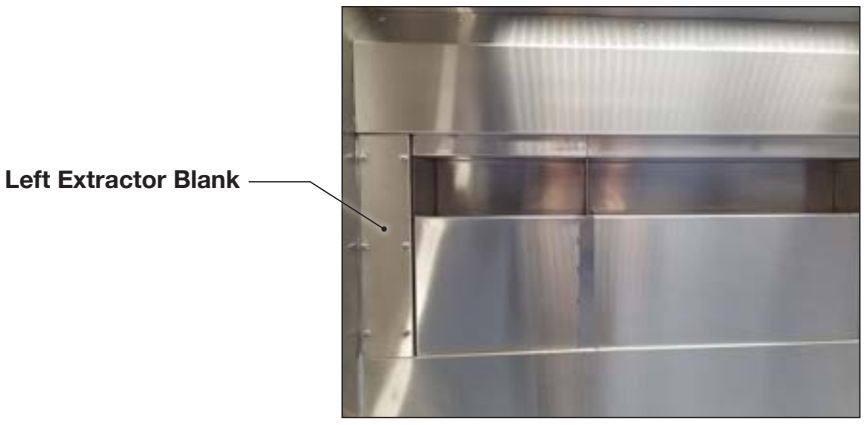


Figure 10: Install Left Grease Extractor

Install the Left Grease Extractor last.

General Information

Refer to the UV System Status Screen on the HMI Touch Screen for Extractor Positioning Status for each hood to verify that the Grease Extractors are properly positioned to allow the UVC Lamps to operate. Refer to the *Operations* section of this manual for more information regarding the UV System Status Screen.

Figure 11: All Grease Extractors Installed

General Information

Ultraviolet Light Hood System

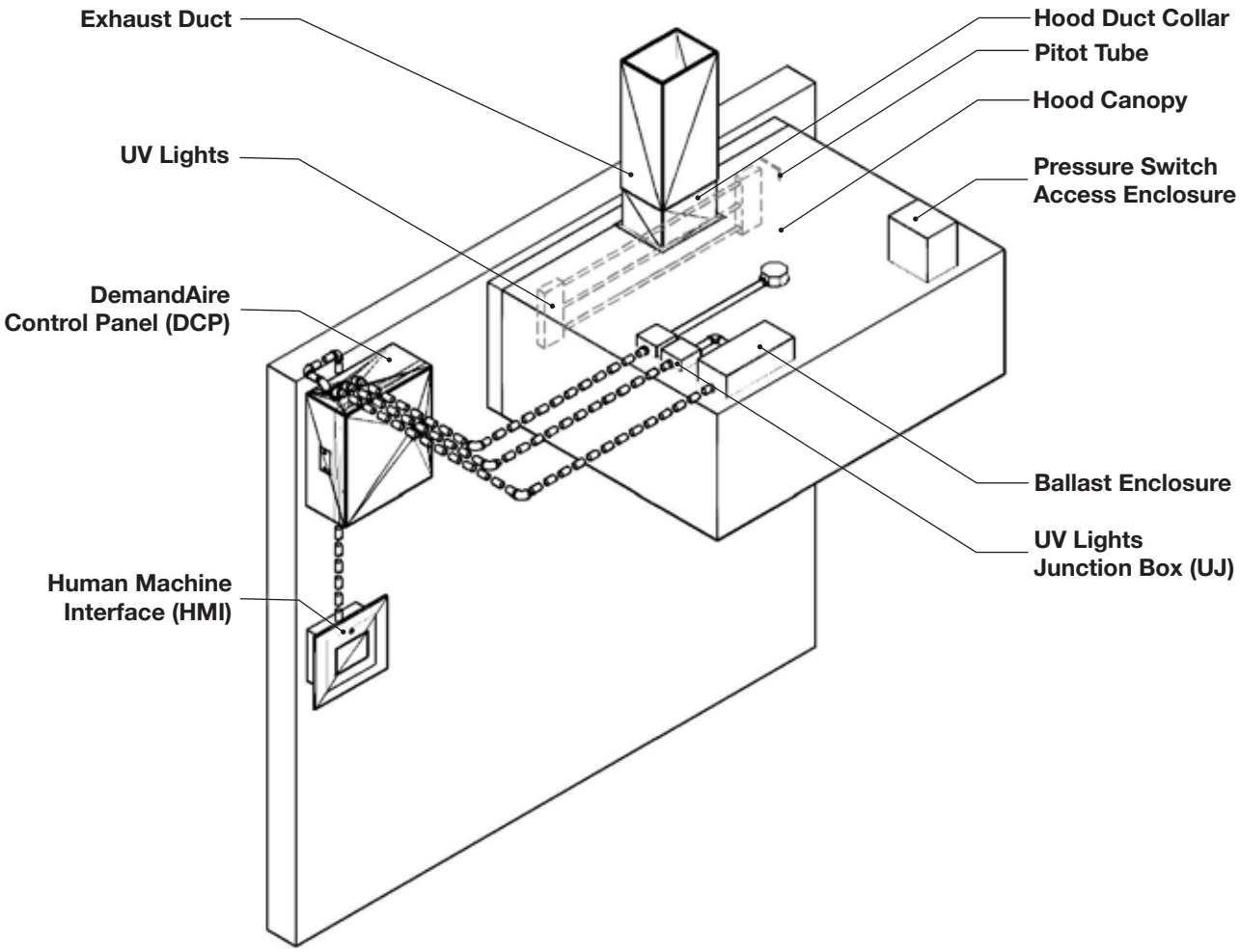


Figure 12: Ultraviolet Light Hood System

Installation Proceedures

Pressure Switch

Streivor's Ultraviolet Light Hoods include a Pressure Switch in a UL Listed access enclosure which can be accessed from below the hood. The Pressure Switch sends a signal to the DemandAire system when the pressure in the Hood Exhaust Plenum decreases beyond the pressure set point, proving that the kitchen exhaust fan is on. The UV Lamps cannot be turned on unless the kitchen exhaust fan is on and the Pressure Switch proves that sufficient exhaust airflow is present to exhaust Ozone from the Hood Exhaust Plenum. The Pressure Switch has an adjustable set point and is adjusted during commissioning by a Streivor technician, but may need to be readjusted after the hood exhaust airflow has been balanced by a third-party Test and Balance company.

The Pressure Switch set point can be adjusted in the 0.05" w.c. to 2.00" w.c range. To adjust the set point, first remove the Switch Housing Cover as shown below.

Figure 13: Pressure Switch Located Behind Switch Housing Cover

Rotate the adjustment knob shown below clockwise to increase the set point. Each full turn represents approximately -0.2" w.c. The Pressure Switch should be adjusted and set so that there is continuity between the common and normally open contacts on the electrical switch just prior to the kitchen exhaust fan reaching its minimum operating speed.

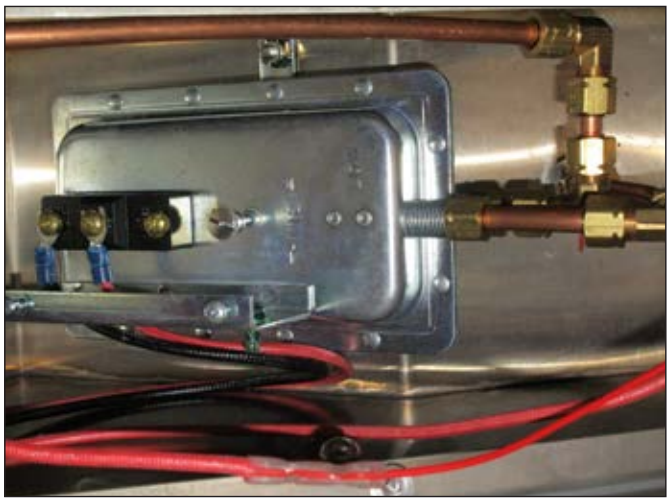


Figure 14: Pressure Switch Adjustment

Installation Procedures

Electrical

Refer to Streivor's DemandAire Drawings for electrical installation details, specific requirements, and locations of equipment requiring electrical connections. All work should be performed by qualified contractors in accordance with all applicable prevailing codes and standards.

Electrical Pre-Installation Precautions

WARNING

PRIOR TO MAKING ANY ELECTRICAL CONNECTIONS TO THE CONTROL PANEL, READ AND UNDERSTAND THIS ENTIRE INSTALLATION AND OPERATIONS MANUAL. ALL WORK ON THE CONTROL PANEL SHOULD BE PERFORMED BY QUALIFIED CONTRACTORS IN ACCORDANCE WITH ALL APPLICABLE PREVAILING CODES AND STANDARDS.

THE CONTROL PANEL HAS MULTIPLE ELECTRICAL CONNECTIONS. VERIFY THAT ALL POWER HAS BEEN DISCONNECTED TO THE CONTROL PANEL PRIOR TO WORKING ON OR NEAR THE CONTROL PANEL. LOCK OUT / TAG OUT ALL OF THE DISCONNECT SWITCHES OR CIRCUIT BREAKERS TO PREVENT ACCIDENTAL POWER UP.

ALL ELECTRICAL WIRING AND CONNECTIONS TO THE CONTROL PANEL SHALL BE IN ACCORDANCE WITH THE PREVAILING CODES, THE NATIONAL ELECTRICAL CODES, AND ANSI/NFPA70.

VERIFY THAT THE SERIAL NUMBER ON THE WIRING DIAGRAM PROVIDED WITH THE CONTROL PANEL MATCHES THE SERIAL NUMBER OF THE CONTROL PANEL BEFORE USING THE WIRING DIAGRAM FOR REFERENCE.

VERIFY THAT THE VOLTAGE AND WIRE AMPERAGE CAPACITY AND WIRE INSULATION IS IN ACCORDANCE WITH THE CONTROL PANEL NAMEPLATE.

Refer to the *DemandAire Installation and Operations Manual* for DemandAire Control Panel installation procedures.

Installation Procedures

UV Lamp Power Wiring to UJ Junction Box

a. Verify that all supply power to the DemandAire Control Panel (DCP) is locked out and tagged out.
b. Connect 120 VAC single phase power from terminal block *UV1+* (hot), terminal block *UV1-* (neutral), and *ground* in the DCP to the black, white, and green wires in the UJ Junction Box on the hood per Streivor's DemandAire Drawings.
c. The wires should be torqued to 0.6 - 0.8 N•m at the terminal blocks.

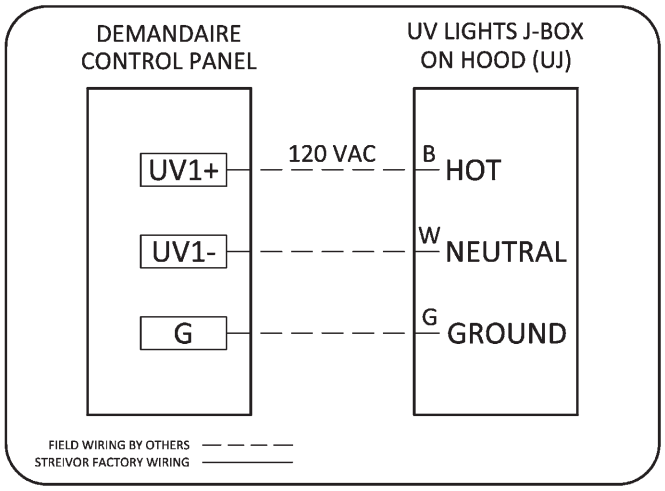


Figure 15: UV Lamp Power Wiring

Safety Switch Wiring to SJ Junction Box

a. Verify that all supply power to the DemandAire Control Panel (DCP) is locked out and tagged out.
b. Connect 24 VDC control power from terminal block *ES1+* and terminal block *ES1-* in the DCP to the corresponding Extractor Positioning Switch terminal blocks in the SJ Junction Box on the hood per Streivor's DemandAire Drawings.
c. Connect 24 VDC control power from terminal block *PS1+* and terminal block *PS1-* in the DCP to the corresponding Pressure Switch terminal blocks in the SJ Junction Box on the hood per Streivor's DemandAire Drawings.
d. The wires should be torqued to 0.6 - 0.8 N•m at the terminal blocks.

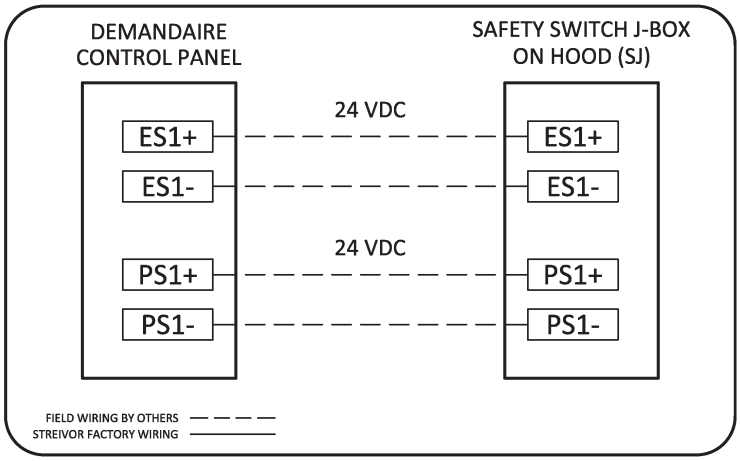


Figure 16: UV Lamp Power Wiring

Operation Procedures

DemandAire Control Panel (DCP)

Start Up

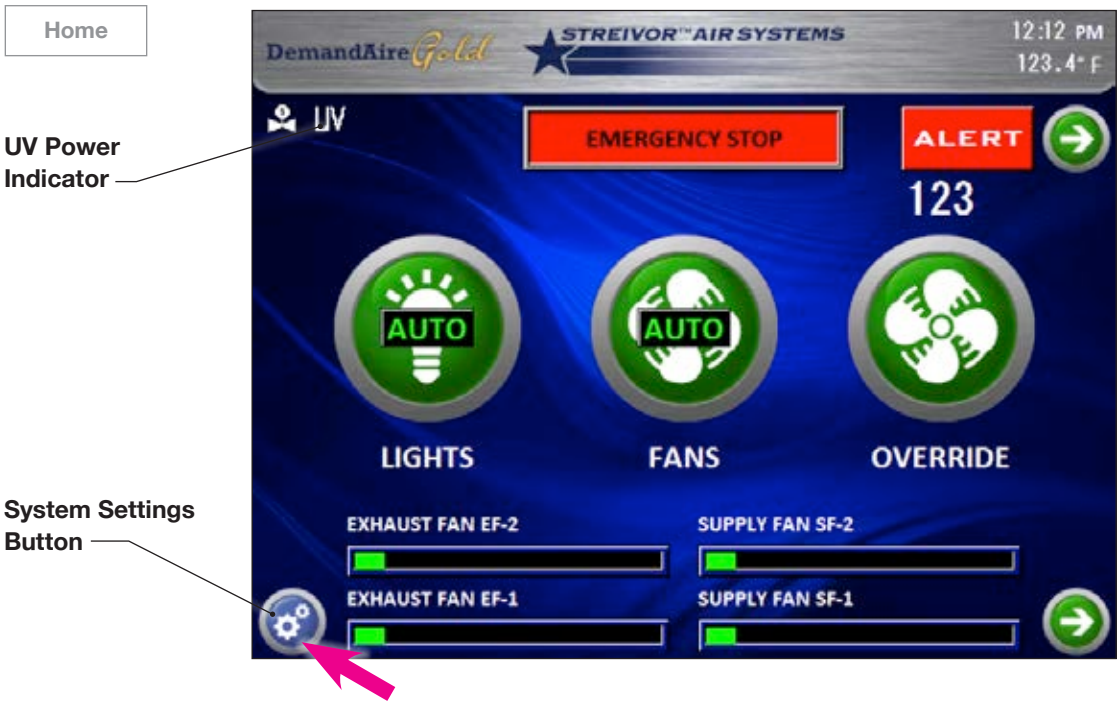
Refer to the *DemandAire Installation and Operations Manual* for installation and start up instructions for the DemandAire Control Panel (DCP).

Human Machine Interface (HMI) Touch Screen Control

The HMI touch screen should be installed in a location where it is readily accessible, as it contains all of the switches required to operate both the DemandAire and Ultraviolet Light Hood Systems. The HMI also serves as an interface where programming changes are made to the System Settings. System information such as fan status, current temperatures in each hood, UVC Lamp Power status, and alarm status can be viewed on the HMI as well. Refer to the *DemandAire Installation and Operations Manual* for more information regarding controls and System Settings for the DemandAire System.

Home Screen

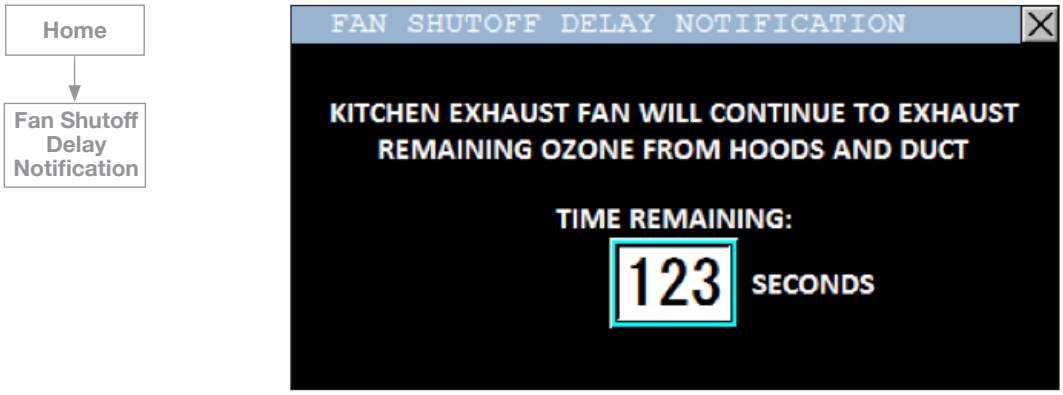
The Home Screen is the default screen for the HMI includes the provides switches required for normal operation of the DemandAire System. The UV Power Indicator will appear whenever the UV Lamps of at least one hood controlled by the DemandAire System are being provided with power. The *System Settings* button will allow access to all settings for both the DemandAire System and the Ultraviolet Light Hood System.



Operation Procedures

DemandAire Control Panel (DCP)

If there is no demand for ventilation, the UV Lamps will automatically turn off before the kitchen exhaust fan shuts down. This fan shutoff delay allows any remaining Ozone in the Hood Exhaust Plenum and duct to be safely exhausted to prevent Ozone from accumulating and leaking into areas occupied by kitchen staff. During the fan shutoff delay period, the popup screen shown below will appear indicating the remaining time before the kitchen exhaust fan shuts off. The fan shutoff delay time is preset by the factory and can be adjusted as needed (refer to the *UV Settings Screen* section).



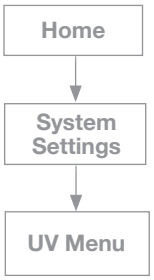
System Settings Screen

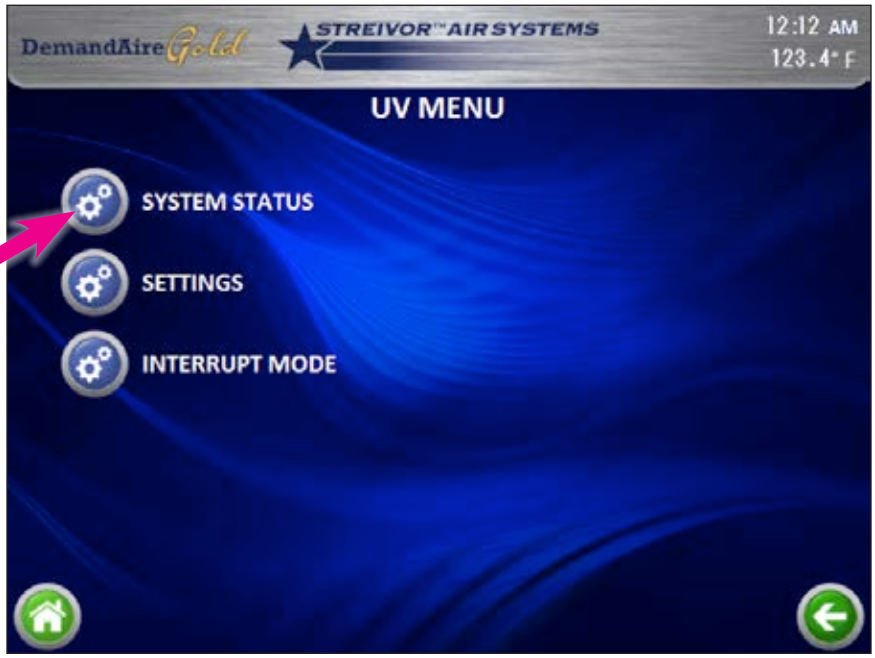
The System Settings Screen displays access to all system settings. Pressing the button next to the UV Menu will enter the UV Menu.

Operation Procedures

UV Menu Screen

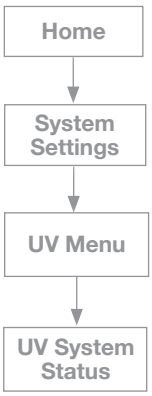
The UV Menu Screen displays access to system status, settings, and Interrupt Mode for the Ultraviolet Light Hood System.

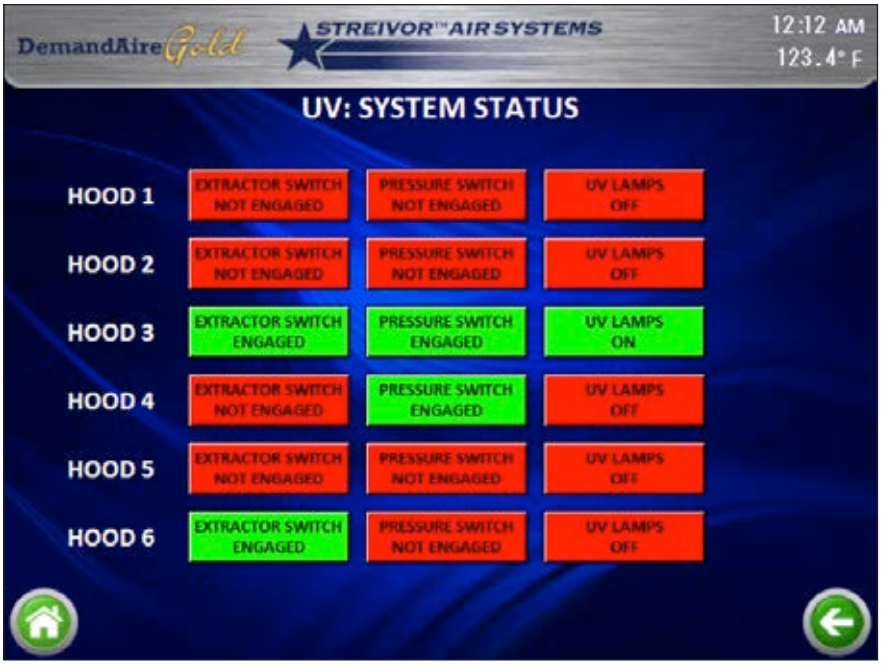




UV System Status Screen

The UV System Status Screen displays the extractor switch status, pressure switch status, and UV Lamp power status for each hood.





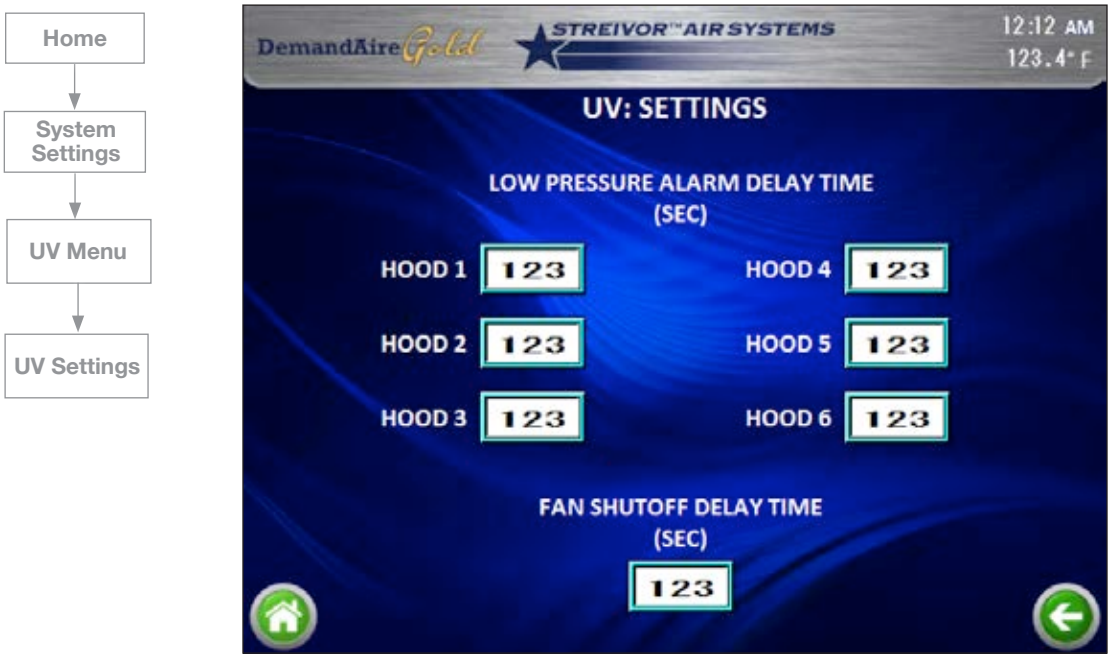
Operation Procedures

UV Settings Screen

The UV Settings Screen displays the Low Pressure Alarm Delay Time setting for each hood and the Fan Shutoff Delay Time setting for each kitchen exhaust fan.

The Low Pressure Alarm Delay Time is the duration for which there is insufficient negative pressure in the Hood Exhaust Plenum after the kitchen exhaust fan has been commanded to turn on. The Low Pressure Alarm Delay Time setting can be adjusted to allow more or less time for the fan to reach the minimum exhaust rate for engaging the Pressure Switch and allowing the UV Lamps to turn on. If the Pressure Switch does not engage by the time the Low Pressure Alarm Delay Time has expired, a Low Pressure Alarm will occur (refer to the *Alarms* section).

When there is no demand for ventilation, the Fan Shutoff Delay Time is the duration for which the kitchen exhaust fan will continue to exhaust Ozone remaining in the Hood Exhaust Plenum after the UV Lamps have been automatically powered off. The Fan Shutoff Delay Time setting can be adjusted to ensure all Ozone has been safely exhausted from the hood and duct system prior to turning off the kitchen exhaust fan.



Operation Procedures

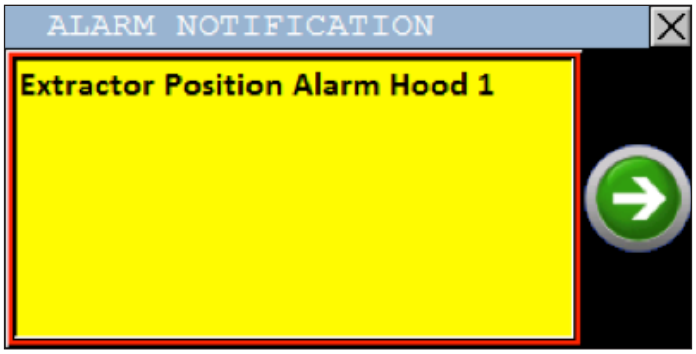
UV Interrupt Mode Screen

The UV Interrupt Mode Screen displays access to the *UV Interrupt* button which activates or deactivates UV Interrupt Mode. For safety, UV Interrupt Mode should be manually activated for the duration the UV Lamps, hood exhaust duct, or kitchen exhaust fan are being serviced for maintenance. During UV Interrupt Mode, UV Lamps will not be allowed to turn on which ensures that harmful UVC light and Ozone is not produced while UV Lamps are being replaced, hood exhaust ducts are being cleaned, and/or rooftop equipment is being serviced.

Operation Procedures

System Alarms

The DemandAire System provides audible and/or visual indicators on the HMI in the event of an alarm condition. In addition to the alarms covered in the *DemandAire Installation and Operations Manual*, Ultraviolet Light Hood System alarms include Extractor Position Alarms and Low Pressure Alarms for each hood. In the event of an alarm condition, the Alarm Notification window shown below will pop up and list any current alarm(s). Press the Green button on the Alarm Notification window to view the Alarm Log Screen.



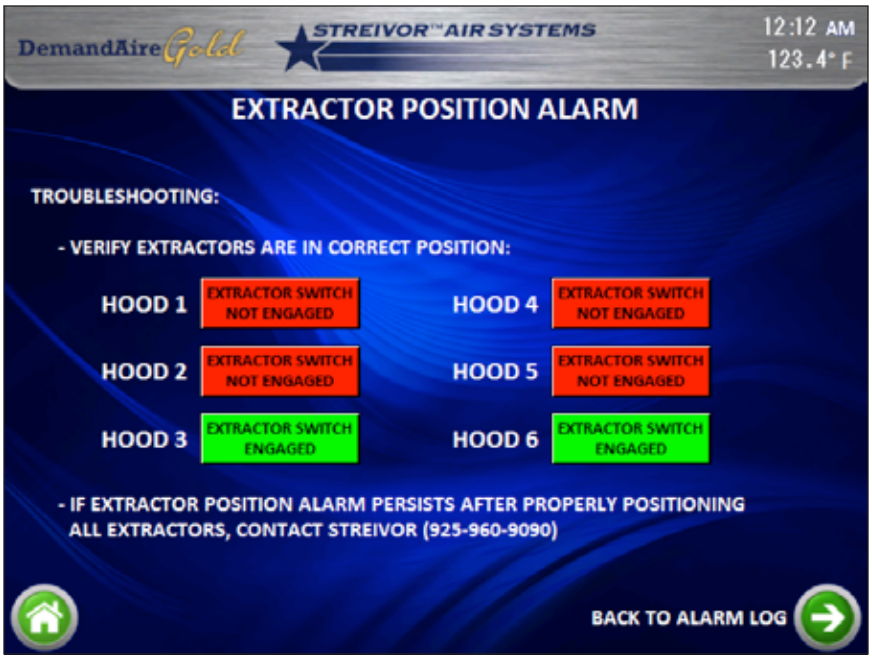
System Alarms Log Screen

In the event of an alarm condition, each alarm can be selected using the *Select* button on the Alarm Log screen. In the event of an alarm, select the unresolved alarm and press the *Acknowledge* button to confirm that the alarm has been acknowledged. Press the *More Info*. button to provide more detail on the specific alarm and further instructions regarding how to resolve the alarm.

Operation Procedures

Extractor Position Alarm Screen

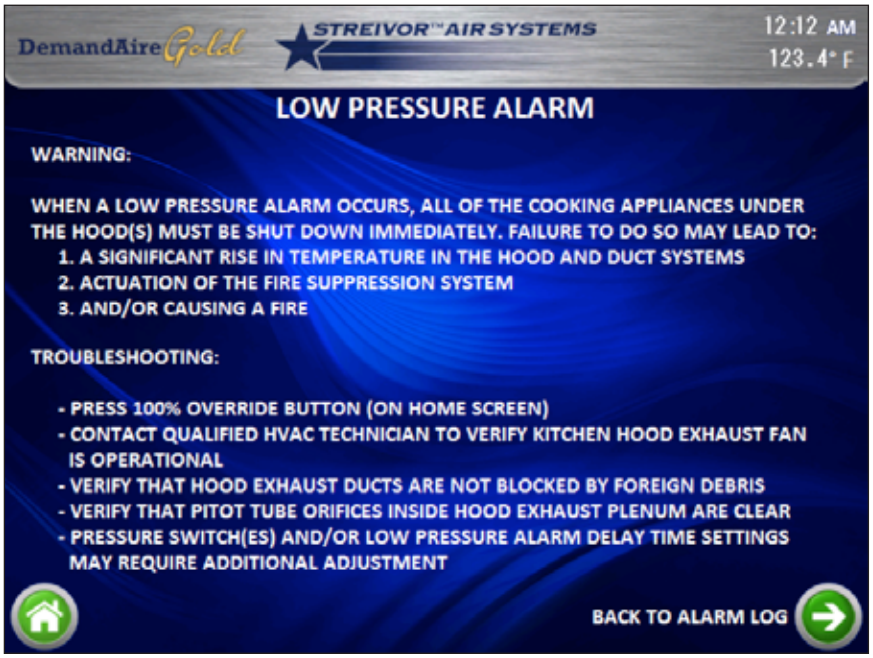
In the event of an Extractor Position Alarm, the Alarm Notification window will display which specific hood(s) have Grease Extractor(s) out of position. From the Alarm Log Screen, press the *More Info.* button to review additional information regarding the alarm. To resolve the alarm, properly position the extractors as described in the *Extractor Positioning* section of this manual.



Operation Procedures

Low Pressure Alarm Screen

In the event of a Low Pressure Alarm, the Alarm Notification window will display which specific hood(s) are experiencing a Low Pressure Alarm. From the Alarm Log Screen, press the *More Info.* button to review additional information regarding the alarm. Refer to the *Cleaning Pressure Switch Pitot Tube* and *Pressure Switch* sections of this manual for more information on troubleshooting the details show below.



Maintenance

WARNING!

Direct exposure to UVC Light can cause damage to skin and eyes. To allow any remaining Ozone to be removed from the Hood Exhaust Plenum.The UVC Lamps must be powered off and the grease exhaust fan must be on for at least 5 minutes prior to cleaning or replacing the lamps

UVC Lamp Cleaning

The UVC Lamps should be cleaned daily, or as often as necessary, to maximize the amount of Ultraviolet light interacting with the exhaust air passing through the Hood Exhaust Plenum. This results in more Ozone generation and, therefore, a cleaner Hood Exhaust Plenum and duct system. The UVC Lamps are to be gently wiped down using a damp towel and standard glass cleaner to remove grease particulates from the exposed lamp surfaces. If necessary, individual lamps can also be removed for cleaning (refer to the *UVC Lamp Replacement* section). **WARNING! Use care when wiping down the lamps, as they can easily break if excessive force is applied.**

Figure 17: Cleaning UVC Lamps Located Inside Hood Exhaust Plenum

Cleaning Pressure Switch Pitot Tube

The Pressure Switch is connected to a pitot tube which extends through the Switch Housing into the upper section of the Hood Exhaust Plenum. The pitot tube allows the Pressure Switch to compare the differential pressure between the Hood Exhaust Plenum and the ambient air surrounding the hood. Over time, the small orifices on the pitot tube may become blocked by grease particulates which may affect the operation of the Pressure Switch. The pitot tube should be wiped off using a towel and the small orifices can be cleaned out with a piece of wire. The pitot tube should be inspected biweekly for grease buildup.

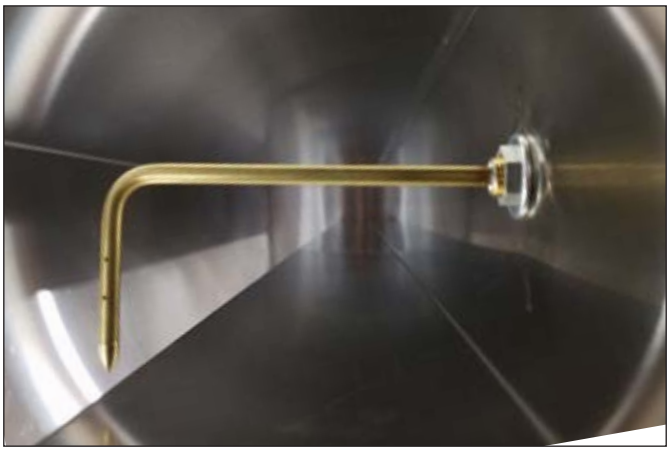


Figure 18: Pressure Switch Pitot Tube Located Inside Hood Exhaust Plenum

Maintenance

UVC Lamp Replacement

The UVC Lamps* are designed to operate efficiently for up to 8,000 hours under normal operating conditions. Individual UVC Lamps can be removed from below the hood for cleaning or replacement.

To remove a UVC Lamp, first manually turn off power to the UVC Lamps from the HMI touch screen by activating the *UV Interrupt* button (refer to the *Operations* section). Turn on the *Fan Switch* using the Home Screen from the HMI to allow the hoods to exhaust any remaining Ozone for at least 5 minutes with the UVC Lamps off. Once the cooking appliances have cooled down, turn off the Fan Switch and remove the Grease Extractors to access the UVC Lamps and UV Lamp Fixtures inside of the Hood Exhaust Plenum as shown below.

Figure 19: UVC Lamps and Fixtures Located Inside Hood Exhaust Plenum

Each UVC Lamp is secured by a UV Lamp Fixture from both ends of the lamp. Remove the UV Lamp Fixture Cover from each Lamp Fixture by removing the four screws which hold the cover plate in place.

Figure 20: UV Lamp Fixtures with Cover Removed

*UV Lamps must be Streivor Model UV 25, 35 or 45

Maintenance

Unplug the ceramic lamp sockets from both ends of the UVC lamp. While holding both ceramic ends of the lamp, carefully pull the lamp out from the Stainless Steel clamps which hold the lamp in position.

Figure 21: Removing UVC Lamp from UV Lamp Fixture

If the UVC Lamp is to be replaced with a new lamp, the silicone grommets can be reused on the new lamp. If the grommets show any sign of deterioration or damage, replace with new grommets. To secure the lamps place the new UVC lamp back into position and gently push the ceramic portion of the lamp bases into the Stainless Steel clamps within the UV Lamp Fixtures to secure the lamp. Plug the sockets back onto the lamp pins on both ends of the lamp and replace the UV Lamp Fixture Cover. The UVC Lamps can be reused again by deactivating the *UV Interrupt* button (refer to the *Operations* section). The UVC Lamps will resume normal operation, turning on whenever the hood is exhausting, as long as the kitchen exhaust fan is on and the Grease Extractors are in the correct position.

OZONE WARNING!

GREASE EXHAUST FROM KITCHEN EXHAUST FAN MAY CONTAIN OZONE, A HAZARDOUS GAS.

BEFORE SERVICING ROOFTOP EQUIPMENT, LOCATE DEMANDAIRE CONTROL PANEL HUMAN MACHINE INTERFACE (HMI) IN KITCHEN SPACE AND ACTIVATE "UV INTERRUPT MODE" TO PREVENT KITCHEN EXHAUST HOODS FROM PRODUCING OZONE.

AFTER SERVICING ROOFTOP EQUIPMENT, DEACTIVATE "UV INTERRUPT MODE" TO RESUME NORMAL OPERATION AND OZONE PRODUCTION.

Warranty

Streivor, Inc., (Seller), warrants this equipment to be free from defects in materials and workmanship, under normal use and service, for the period of 12 months from the date of shipment.

This warranty shall not apply if:

1. The equipment is not installed by a qualified installer per the Seller's installation instructions (copy of which is shipped with the product).
2. The equipment is not installed in accordance with federal, state and local codes and regulations by a qualified installer.
3. The equipment is misused or neglected.
4. The equipment is not operated within its published capacity.
5. The equipment is modified internally.

The Seller shall not be liable for incident and consequential losses and damages potentially attributed to malfunctioning equipment.

Should any part of the equipment prove to be defective in material or workmanship within the 12 months warranty period, upon examination by the Seller, such part will be repaired or replaced by Seller at no charge. The Buyer shall pay all labor costs incurred in connection with such repair or replacement.

Equipment shall not be returned without Seller's prior authorization and all returned equipment shall be shipped by the Buyer, F.O.B. Seller's factory, freight prepaid.

STREIVOR™ AIR SYSTEMS

The ULTIMATE In Kitchen Ventilation Systems

SmartAire Hoods
The Ultimate in Energy Efficient Hood Design
US Patent No. 8,857,424

Self-Cleaning Hood System
The Ultimate in Rotating Manifold Water Wash and Fogging Systems
Patent Pending

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