

# **KES Enviro-unit Maintenance Manuel**

(For control information refer to control  
panel CC50 manual)



## KES ENVIRO OPERATION AND MAINTENANCE MANUAL

### INTRODUCTION

Thank you for purchasing a Cadexair commercial kitchen ventilation product. Please read the complete “KES Enviro Operation and Maintenance Manual” prior to installation, commissioning or operating a KES unit.

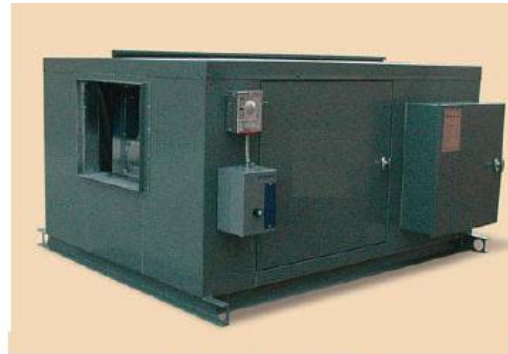
The SPRING AIR SYSTEMS INC. kitchen Enviro system (KES), Exhaust Cleaning Assembly for Kitchen Exhaust Duct, “Enviro Unit” is ULC and UL listed for use in a commercial kitchen exhaust system. KES units are available in sizes ranging from 1,000 CFM to 40,000 CFM for indoor or outdoor applications.

The primary function of a KES Enviro unit is to filter the grease, lint and dust particles and remove the odor from the exhaust air.

The Underwriters Laboratories Inc. (UL) and Underwriters’ Laboratories of Canada Limited (ULC) listings allow the kitchen exhaust air to be discharge to atmosphere at low levels. Prior to any installation the installer must seek approval from the authorities having jurisdiction.



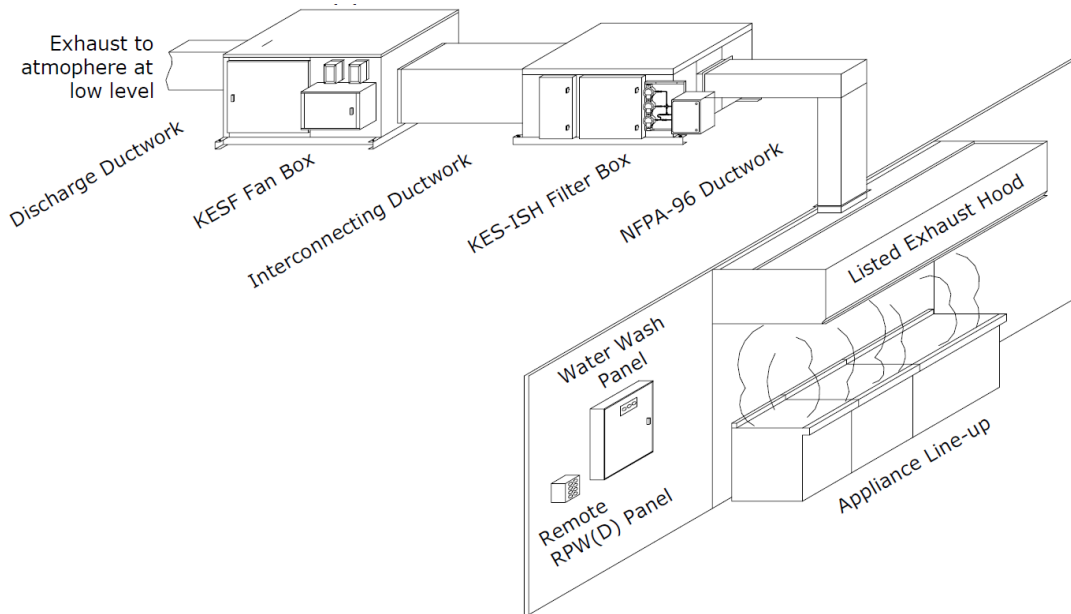
*KES-ISH Enviro Filter Box  
Figure 1*



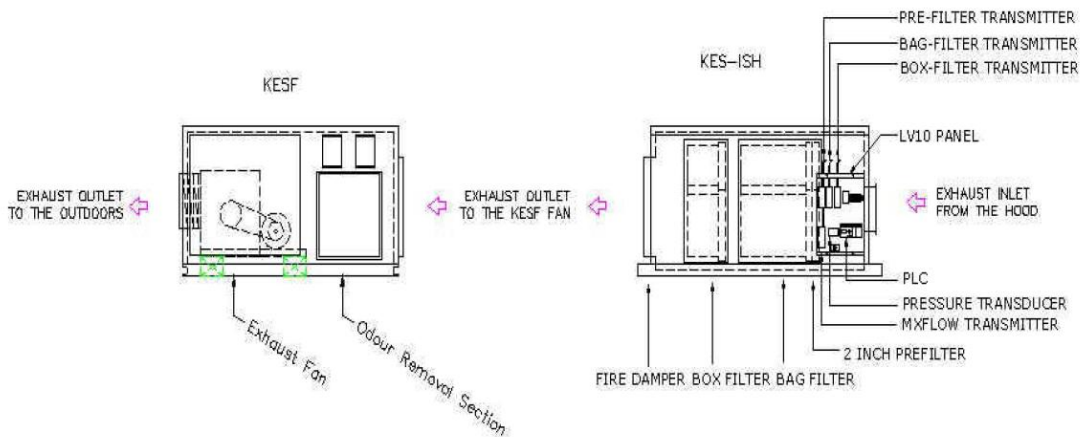
*KESF Enviro Fan Box  
Figure 2*

## THE SYSTEM

The grease-laden air rises from the cooking equipment into a UL or ULC exhaust hood. The exhaust hood removes some of the airborne grease particulate. Typically most micron and submicron particles escape into the exhaust ductwork. The exhaust ducting is connected from the hood to the inlet of the KES Enviro unit. This exhaust ductwork must be supplied and installed in accordance with the NFPA-96 code.



*KES System Schematic  
Figure 3*



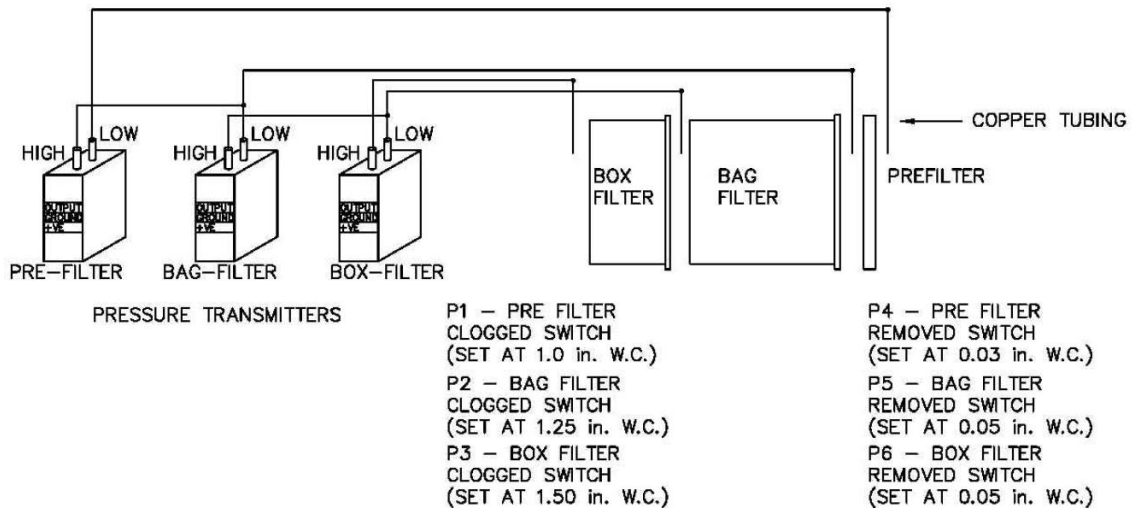
*KES-ISH and KESF Enviro components*

*Figure 4*

## CONTROL CIRCUIT

### Filter Clogged:

During normal operation of the KES unit three-filter stages collect grease, dust, and lint particulate. The type of cooking equipment and the hours of operation determines the useful life of the individual filters.



Pressure Transmitter Locations  
Figure 6



Box Filter probes as viewed  
from discharge  
Figure 7

Pressure transducers determine when the filters are totally used and must be replaced. As the filter reaches the grease loading capacity the static pressure across each filter increases. When the maximum static pressure is reached the transducer activated a PLC output.. The exhaust fan shuts off, the "NORMAL" pilot energizes, and the kitchen remote panel annunciates a filter-clogged condition. (The remote panel indicates which stage of filters has clogged; PREFILTER, BAG FILTER, or BOX FILTER.)

The clogged filter must be replaced and the system reset to resume normal operation. If this condition occurs during normally operating hours rotate the OVERRIDE selector switch and the fan will come back on. The systems can run

in the OVERRIDE position for about 4 hours. (See the section the OVERRIDE switch) If the system runs longer than 4 hours the fan will shut down. The filters must be changed and the system reset. It is recommended that the filters be changed prior to the filter clogged light energizing. A filter usage chart is attached to record when the filters are being changed. Using this chart a regular maintenance schedule can be set up to ensure constant uninterrupted operation of the commercial kitchen.

#### **Filter Removed:**

Should the bag or box filters be removed during normal operation the KES unit is automatically shutdown. A pressure transducer measuring static pressure across the bag filters and box filters monitors a minimum pressure drop of 0.05" W.C. When the filter is removed the pressure differential falls and the pressure switch is activated. The exhaust fan shuts off, the "FILTER REMOVED" pilot light on the control panel energizes and the screen of the PLC in the control panel has a text message indicating "FILTER REMOVED/LOW EXHAUST. To resume normal operation the filter must be replaced and the system reset. (See the section the OVERRIDE switch)

#### **High Temperature:**

In the event of a high temperature in the ductwork leading to the KES unit or within the KES unit a firestat located at the inlet of the KES filter section is activated. When the exhaust air reaches 160 F the firestat is energized. The exhaust fan shuts off, the "NORMAL" pilot goes off, and a "FIRE" pilot energizes on the remote RPD-KD or RPD-KW panel. Should the exhaust temperature continue to rise the fusible link melts and closes the fire damper in the exhaust discharge of the KES filter section. This fire damper is always located between the fan and filter section. The fire damper fusible link is rated at 165 F. Shut off all cooking equipment and notify the fire department. To resume normal operation, replace the fusible link and reset the system.

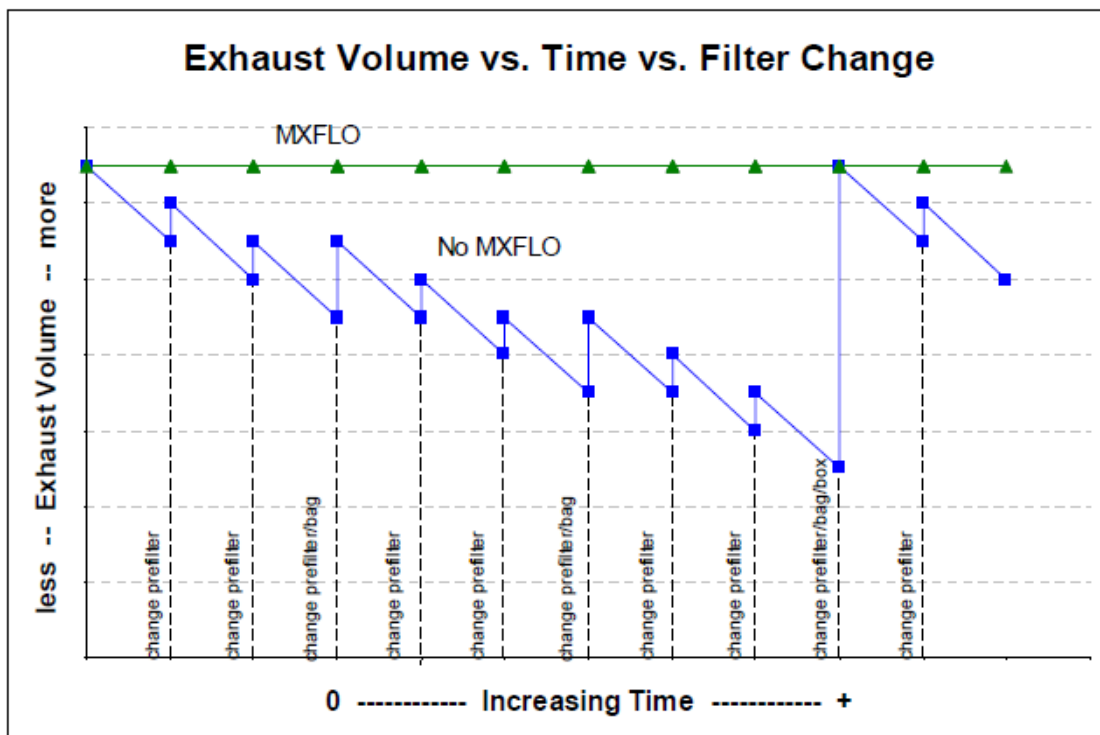
#### **Override Switch:**

In the event that the filter clogged annunciation shuts off the KES unit during a peak cooking time rotate the OVERRIDE SWITCH located on the control panel clockwise. The WARNING pilot light will energize and the FILTER CLOGGED and NORMAL lights will turn off. This is a temporary override to allow for the cooking equipment to be shut off prior to changing the filters. The systems can run in the OVERRIDE position for 4 hours. If the system runs longer than 4 hours the fan will shut down. The filters must be changed and the system reset. It is recommended that the filters be changed prior to the filter clogged light energizing. A filter usage chart is attached to record when the filters are being changed. Using this chart a regular maintenance schedule can be set up to ensure constant uninterrupted operation of the commercial kitchen. Once the dirty filter has been replaced rotate the OVERRIDE SWITCH to counter clock wise to resume normal operation.

## MXFLOW OPTION

### INCREASING FILTER LIFE

MXFLOW is designed to increase filter life while maintaining maximum exhaust volume during the commercial kitchen cooking operation. Immediately after commissioning the KES unit the exhaust air volume is at the highest level. As each of the three filter banks captures grease particulate of micron and submicron size they begin to fill and the air resistance through each filter increases. Even though the KESF unit has a heavy duty, Class II, backward inclined fan the increase in combined resistance (static pressure “W.C.”) through each filter will gradually reduce the exhaust volume. In cases where there is very heavy cooking with large quantities of micron and submicron grease particulate the reduced exhaust volume is most noticeable. In some cases the filters may have to be changed not because the filter is clogged but because the combined static pressure resistance through all the filters has reduced the exhaust volume enough to affect smoke capture. This is less of a problem with lighter cooking operations.



In the example above the “No MXFLOW” KES unit exhaust volume (shown in BLUE) gradually drops as the filters become increasingly clogged. Even when the prefilters and bag filters are replaced the exhaust volume does not return to maximum because the box filter continues to clog. This drop in exhaust volume generally only represents about 10% of the total exhaust volume. But in some

cases this can be enough to affect the hoods ability to capture smoke adequately. The "MAXFLOW" KES unit incorporates a combination pressure transducer/microprocessor and variable speed drive to maintain constant exhaust volume regardless of the increased static pressure through any of the particulate filters. As the pressure across any filter increases and the exhaust volume decreases the pressure transducer/microprocessor senses this change and automatically increases the exhaust fan speed to compensate for this increased static pressure to maintain a constant exhaust volume.

MAXFLOW also allows for one touch exhaust volume adjustment when commissioning the unit; thereby making commissioning a more straightforward process. Additionally, MAXFLOW eliminated the need to change sheaves. If the exhaust volume has to be field adjusted because of an appliance change or ductwork change the MAXFLO provides automatic exhaust volume adjustment, up or down, with the touch of a single button.

### **Operation**

As a filter clogs, the pressure drop through the filter increases, decreasing the exhaust air volume, and decreasing the static pressure measured at the PT. The PT sends a signal to the DMP to increase the static pressure back to the set point by increasing fan speed. The result is a constant exhaust volume until the filters are full and must be replaced.

### **CHECKING FAN ROTATION**

Fan rotation should be checked prior to commission the system. Turn the fan selector switch in to the off position. Turn on the circuit breaker powering the KESF unit. The backward inclined KESF fan must be running backwards such that the fan blades pushing the air from the back of the blade. If the fan is scooping the air change the fan rotation. To correct fan rotation switch two of the high voltage wires on terminals V/T1, U/T2 or W/T3 on the drive or switch two wires at the motor. SHUT OF ALL POWER TO THE KESF BEFORE CORRECTING ROTATION

## REPLACEMENT FILTER EQUIVALENTS

PREFILTERS: MERV7 (30% ASHRAE 52-76) - ULC Class II

Airguard: 24" x 24" x 2" - DP40 Class II  
12" x 24" x 2" - DP40 Class II

American Air Filter:  
24" x 24" x 2" - AM-AIR Class II  
12" x 24" x 2" - AM-AIR Class II

Farr Filters:  
24" x 24" x 2" - 30% ASHRAE 52-76 Class II  
12" x 24" x 2" - 30% ASHRAE 52-76 Class II

BAG FILTERS: MERV13 (90 - 95% ASHRAE 52 – 76) - ULC Class II

Airguard: 24" x 24" x 22" - V9-4M Class II  
12" x 24" x 22" - V9-4M Class II

American Air Filter:  
24" x 24" x 21" - DRI-PAK - Class II  
12" x 24" x 21" - DRI-PAK - Class II

Farr Filters:  
24" x 24" x 22" - 90% ASHRAE 52-76 Class II  
12" x 24" x 22" - 90% ASHRAE 52-76 Class II

BOX FILTERS: MERV16 (95% DOP/99% ASHRAE 52-76) ULC Class II

Airguard: 24" x 24" x 12" - VMB- 904 Class II  
12" x 24" x 12" - VMB-904 Class II

American Air Filter:  
24" x 24" x 12" - BIOCELL Class II  
12" x 24" x 12" - BIOCELL Class II Farr Filter:  
24" x 24" x 12" - 6 pocket - 95% DOP Class II  
12" x 24" x 12" - 6 pocket - 95% DOP Class II

ODOR MEDIA: 1/8" Activated alumina pellets impregnated with potassium permanganate.

Airguard: Barneby-Cheney CP-2  
American Air Filter: Permasorb  
Farr Filters: Unisorb.



## **WHEN TO CHANGE THE KES FILTERS**

The Pre-filter, Bag filter and Box filter must be changed on a regular basis to maintain the high grease extraction efficiency required by the UL/ULC listing. Once a filter clogged light comes on the filter has reached its grease holding capacity. Further use will restrict exhaust air flow causing hood smoke capture problems and/or cause the clogged filter to blow out into the next filter or the exhaust fan. Therefore the three particulate filters must be changed before the Filter Clogged lights activate and shut the unit down under normal kitchen operation. This will provide simple uninterrupted operation for your commercial kitchen operation.

### **Determine the Filter Change Schedule**

When the KES unit is turned over to you by the installing contractor immediately change the Pre-filters. The Pre-filters will probably be full of construction debris and this debris will effect the initial operation of the unit.

### **PREFILTERS**

1. Enter the start-up date on the attached FILTER FREQUENCY CHART. This is the date the Pre-filters were changed as well.
2. Run the unit until the Pre-filter Clogged lights turns on. When the light comes on the unit will shut down. Immediately turn the Override switch clockwise and put the unit into override. The unit will come back on. Change the pre-filters at the end of the shift or the next day before cooking. Write the date that the Pre-filters were changed on the FILTER REQUENCY CHART under Filter Change No. 1/Actual.
3. Determine the number of days between the Start-up date and the Pre-filter Change No. Actual date. Subtract two days from this number. Add the this number of days to the last actual pre-filter change and enter this new pre-filter schedule date in the schedule under Filter Change No. 2/Schedule. Change the Pre-filters on this new date. If the Filter light activates before this new date reduce the number of days to the next scheduled change by one day.

### **BAG FILTERS**

1. Run the unit until the Bag Filter Clogged lights turns on. When the light comes on the unit will shut down. Immediately turn the Override switch clockwise and put the unit into override. The unit will come back on. Change the Bag filters at the end of the shift or the next day before cooking. Write the date that the Bag filters were changed on the FILTER REQUENCY CHART under Filter Change No. 1/Actual.
2. Determine the number of days between the Start-up date and the Bag filter Change No. Actual date. Subtract two days from this number. Add the this number of days to the last actual bag filter change and enter this new bag filter schedule date in the schedule under Filter Change No. 2/Schedule. Change the bag filters on this new date. If the Filter light activates before this new date reduce the number of days to the next scheduled change by one day.

## **BOX FILTERS**

1. Run the unit until the Box Filter Clogged lights turns on. When the light comes on the unit will shut down. Immediately turn the Override switch clockwise and put the unit into override. The unit will come back on. Change the Box filters at the end of the shift or the next day before cooking. Write the date that the Box filters were changed on the FILTER REQUENCY CHART under Filter Change No. 1/Actual.
2. Determine the number of days between the Start-up date and the Box filter Change No. Actual date. Subtract two days from this number. Add the this number of days to the last actual box filter change and enter this new box filter schedule date in the schedule under Filter Change No. 2/Schedule. Change the box filters on this new date. If the Filter light activates before this new date reduce the number of days to the next scheduled change by one day

By following the above procedure you will maximize your filter life. Changing the prefilter prior to clogging improves the bag filter life and changing the bag filter prior to clogging improves the box filter life.

## FILTER FREQUENCY CHART

Startup date/First Prefilter change						
Change No.	Prefilter		Bag Filter		Box Filter	
	Schedule	Actual	Schedule	Actual	Schedule	Actual
1						
2						
3						
4						
5						
6						
7						
8						
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