



KES ENVIRO TOUCHSCREEN



Maintenance Manual

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INTRODUCTION

Thank you for purchasing a Spring Air Systems commercial kitchen ventilation product. Please read the complete “KES Enviro with Touchscreen 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.

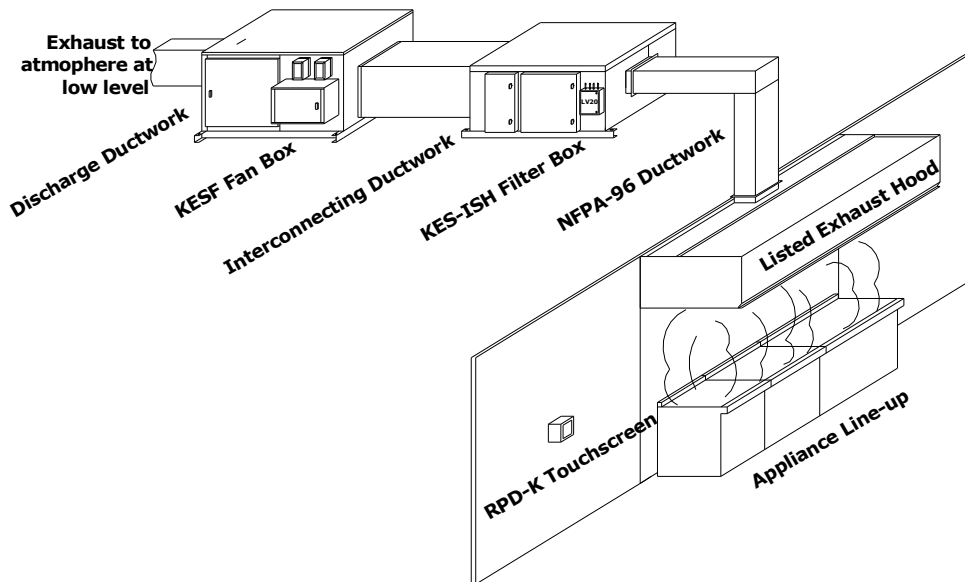
The primary function of a KES Enviro unit is to filter the grease, lint and dust particles and remove the odor from the exhaust air.

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.

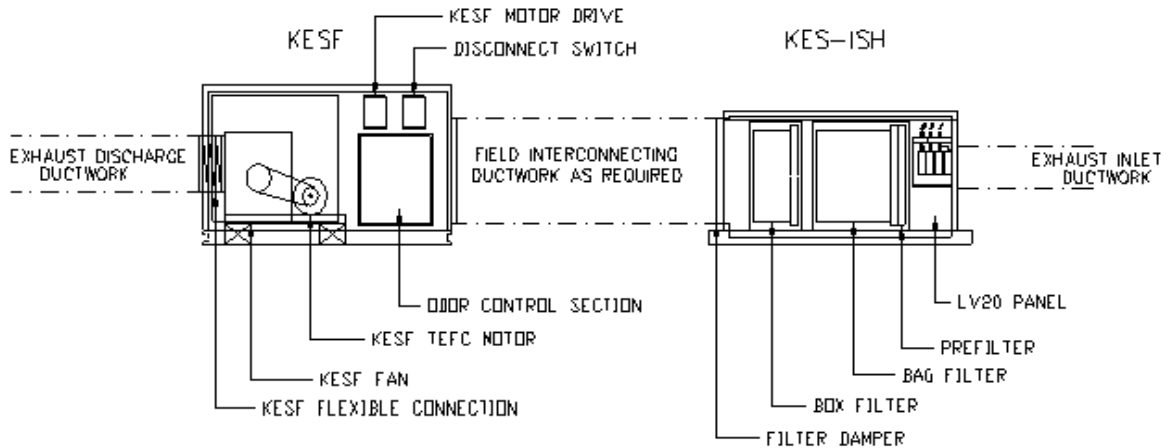
Prior to any installation, the installer must seek approval from the authorities having jurisdiction.

THE SYSTEM COMPONENTS

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.



Typical KES System Schematic



KES-ISH and KESF Enviro Components

KES ENVIRO FILTER UNIT (KES-ISH)

The *KES Enviro Filter* unit contains the three stages of filters and the control circuit (LV20 panel and pressure transmitters).



The unit is constructed of 16-gauge steel inner shell, continuously welded and liquid tight in accordance with the NFPA-96. The outside of the unit is wrapped in 1.5" insulation and 18-gauge steel protective covering primed and painted. Channels running along the length of each side support the unit. Lifting and support points are at the four corners of the KES-ISH unit at the ends of these channels. No external isolation of the unit is required. The two access doors are double wall construction with 1.5" insulation and cam lock door fasteners per the UL/ULC fire rated listing.

The KES filter section contains the three-stage filtration to remove grease, dust, and lint particulate from the air captured at the exhaust hood. The quantity and size of the filters is determined on the size of the KES unit.

PRE FILTERS – first stage



Rated at **MERV7 (30% ASHREA 52-76) ULC/UL Class II.**

BAG FILTERS – second stage



Rated at **MERV14 (90-95% ASHREA 52-76) ULC/UL Class II**

BOX FILTERS – final stage



Rated at **95% DOP / 99% ASHREA 52-76, ULC/UL Class II**

CONTROL CIRCUIT

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 transducers determine when the filters are totally used and must be replaced. The static pressure across each filter increases as the filter reaches the grease loading capacity. 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.) In addition, the screen of the PLC in the RPD-KD or RPD-KW has a text message also indicating which filter is clogged.



Copper pressure tubing from the pressure transmitters is ran inside along the top of the unit to pressure probes located in front and behind each filter section.

Box Filter probes as viewed from discharge



1. *Pressure tubing*
2. *Cat5 Insulated jack*
3. *P1 (prefilter) pressure transmitter*
4. *P2 (bag filter) pressure transmitter*
5. *P3 (box filter) pressure transmitter*
6. *Terminal strip*
7. *P4 (MxFlow) pressure transmitter*

Fire Damper



The fire damper (shown here in a KES still under construction) is located between the fan and filter sections and is accessible through the Prefilter/Bag filter access door.

The damper is held open by a fusible link that will melt once a rated (165° F) temperature is reached inside the KES unit.

Firestat High Limit



The firestat is located at the exhaust inlet end and mounted on the same side as the LV20 panel.

The relay contacts inside this stat are the NORMALLY CLOSED contacts.

Optional Fire Suppression



All KES units come factory pre-piped for fire suppression. The pre-piping includes the hole and seal through which fire suppression discharge pipe and detection lines are run.

Units that are specified with full fire suppression will also include all necessary components for a fully operational fire suppression system.

KESF ENVIRO FAN UNIT



The *KESF Enviro Fan* unit contains the exhaust fan, exhaust fan motor, drives, and belts, disconnect, variable speed drive for MxFlow operation, isolators and optional odor reduction sections, spray or pellets.

The unit casing is 16-gauge steel, primed and painted, suitably reinforced to ensure rigidity. An optional sound attenuation package is available for the interior of the fan unit. This package is highly recommended on all indoor units. Channels running along the length of each side support the KESF unit. Lifting and support points are at the four corners of the KESF unit at the ends of these channels. An access door is provided for the exhaust fan/ motor and drive section.

Every KESF unit is equipped with a backward-inclined; AMCA rated, Class II, exhaust fan with heavy-duty bearings, and two groove sheaves. The Class of the fan is dependent on the total static pressure and CFM of the system. The Class II blower will handle up to 7.5" W.C. total static pressure. The following options are also available:



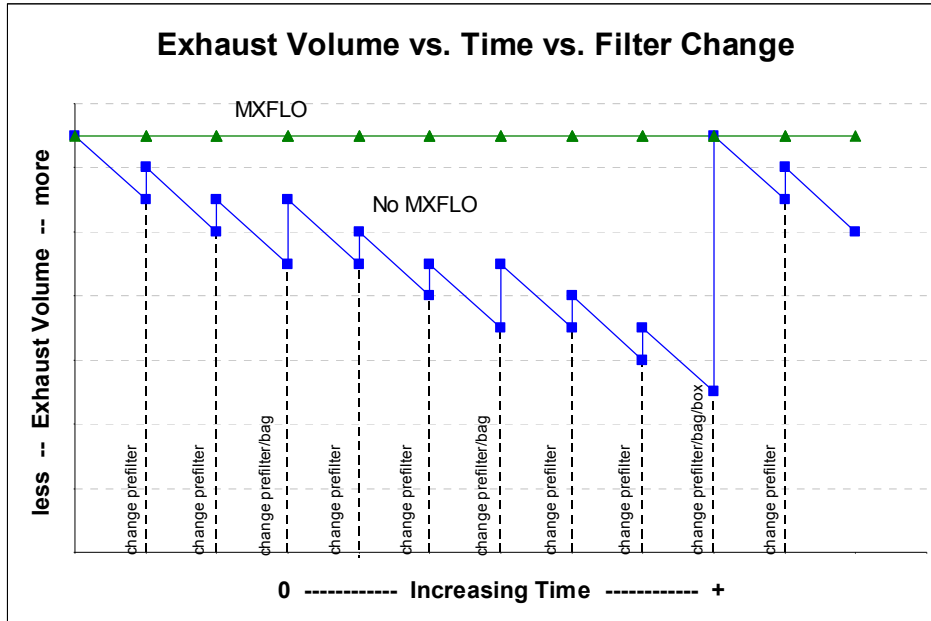
Single Width, Single Inlet (SWSI) or Double Width, Double Inlet (DWDI): The standard unit comes with a DWDI fan package. The DWDI is preferred when the exhaust discharge is straight through the KESF Fan unit. The DWDI can also discharge up or down from the KESF fan unit but not out the sides. DWDI exhaust fans up to 8,000 CFM are stocked at the Spring Air factory.

The SWSI fan is preferred if the exhaust discharge from the KESF Enviro fan unit is required to be at right angles (Out the Side) to the exhaust discharge.

The KESF fan unit is always **internally** isolated. The KESF fan unit has spring-mounted isolators inside the KESF fan unit and does not require any external flexible connection outside the unit.

MXFLOW

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 sections 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 as peaked) 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. However, in some cases this can be enough to affect the hoods ability to capture smoke adequately.

The “MXFlow” 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 the increased static pressure to maintain a constant exhaust volume.

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

A. MXFlow 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.

B. MXFlow Components

The MXFlow is factory installed and tested prior to shipment. The components consist of the MXFlow control panel model LV20 in conjunction with an exhaust fan motor variable speed controller.

The MXFlow components are located in the LV20 panel. The MXFlow components include the pressure transducer (PT), and NODE PID control loop inside the PLC. When the operator turns on the KESF exhaust fan the motor starts. In addition, a 24V power supply activates the PT. The (+ve) pressure port on the PT is vented to atmosphere and the (-ve) pressure port is piped into the inlet of the KES-ISH filter box. The probes measure the external static pressure on the inlet of the KES-ISH filter box. The NODE is factory set to the filter box inlet static pressure as indicated on the KES LV20 drawing. The PT is located in the LV20 panel with the pressure probes existing from the top. One probe enters the unit casing and the other is vented to atmosphere.

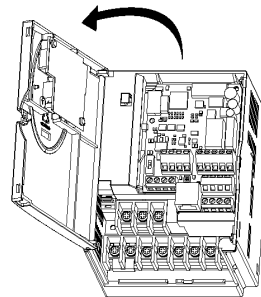
Variable Frequency Drives (VFD)

The variable frequency drive is mounted on the KES fan section next to, or below, the disconnect switch. The VFD is connected to the LV20 panel by a shielded CAT5 cable. This cable is factory supplied. The drive changes the AC frequency to the exhaust motor between 18Hz and 70Hz.

All 460V/3/60 and 575V/3//60 VFD's are provided with an Input Line Reactor that is located between the disconnect and the VFD. The Input Reactor levels out the power feed from the building load center.



VSD front



VSD open front

Input (Line) Reactor

An input or line reactor helps protect a variable frequency drive (VFD) from input power line disturbances that could cause nuisance tripping or damage to the drive. An input (line) reactor also reduces the harmonics that the VFD generates back onto the line. Line reactors are sized based on the HP and voltage ratings of the drive in use. Lenze-AC Tech uses 3% or 5% reactors. Input (line) reactors should be used in these circumstances:

1. The input line power is prone to have disturbances such as surges, spikes, transients, etc.
2. The supply line power is very stiff (greater than 10 times the kVA rating of the connected VFD).
3. Where harmonic distortion is a concern. (IEEE-519 Harmonic Control in Electrical Power Systems)

Line reactors are connected in series between the input source and the VFD Controller. Refer to Figure 1 for proper wiring installation. The reactor should be mounted as close to the drive as possible.

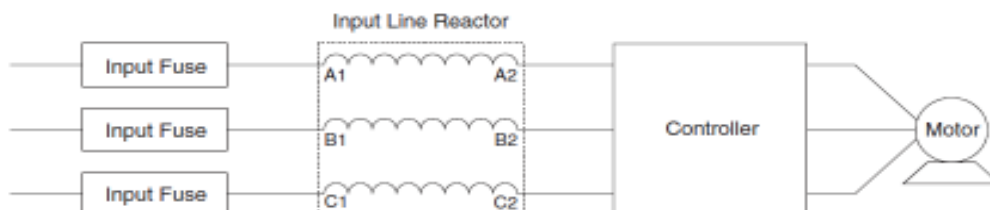


Figure 1: Input (Line) Reactor

OPTIONAL ODOUR MODULE

Once through the particulate filter sections the exhaust air enters the optional odour removal section. The odour section is only required when discharging cooking smells may be offensive. This section consists of two optional odour removal systems.

1. **Odour Tray/Cells** filled with activated alumina impregnated with potassium permanganate. The odour is controlled through a combination of sorption and the chemical modification of the gaseous contaminants. The odour media is non-toxic and non-flammable.



New odour pellets



Unfilled odour tray

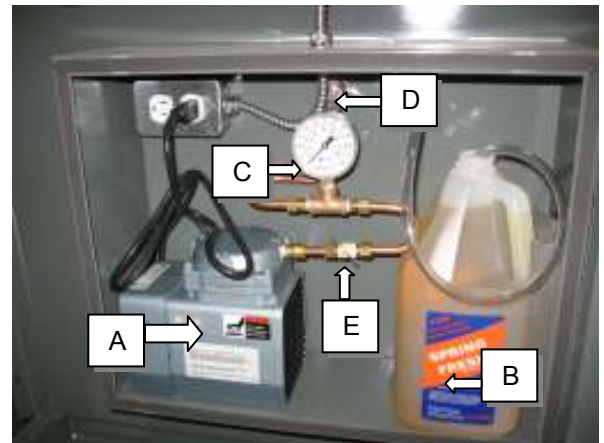


Filled odour tray

2. **Odour Spray Solution** - The odour is control by spraying an odour reducer into the exhaust air stream intermittently during the operation of the cooking systems. The odour spray unit is normally located mounted on the KESF fan section. The cabinet includes an air compressor, atomizing air nozzle and piping and odour spray container.

The duration and length of the spray can be adjusted by using the Touchscreen SETTINGS, SYSTEM OPTIONS

- A** Air Compressor
- B** Spring Fresh Liquid Deodorant
- C** Pressure Gauge
- D** Spray Nozzle
- E** Needle Valve



Odour Spray components

Touchscreen Operation



The exhaust system is operated through a Touchscreen control panel. The Touchscreen allows users to turn the system on, off, set up an automatic start/stop schedule, and monitor the status of the KES filters all through the Touchscreen. The Touchscreen also keeps a record of system alarms that are useful for service technicians to diagnose and correct problems.

The time of day, kitchen name, and automatic start/stop schedule times are adjusted using the Touchscreen by logging in.

There are four main windows on the KES Touchscreen:

1. Dashboard



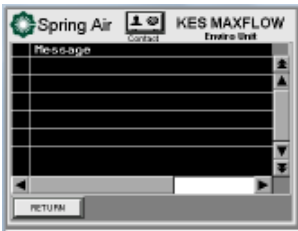
The **Dashboard** is the heart of the KES system. It displays the current system status, if the automatic scheduling is enabled, running Hertz of VFD and calculated CFM's. It also has the access icons for Filter Status, Fan Status, Messages and Settings. There is also a access icon for the contact information of the local authorized service company for your KES.

2. Fan Status Access



The **Fan Status** window provides access to the exhaust components controlled by the Touchscreen panel. This screen will allow the service technician to enter the design CFM, Motor nameplate FLA, and the Minimum and Maximum Hz settings for the VFD. It also displays the operating Frequency, Voltage and current draw.

3. Message Access



The **Message Access** window provides a list of current and previous messages that have been recorded by the Touchscreen. A few of the recorded alarms are filters requiring changing, power outages, and high temperature. Users will need to go to this screen to clear or acknowledge an alarm. The red alarm message indicates an active alarm, a green alarm message indicates a cleared alarm, and a yellow alarm message indicates the alarm is still active, but has been acknowledged.

4. Settings Access



The **Settings Access** window allows service technician to make changes to the time, System Options, Node Settings, Aux mA Values, FLA values and Max Air. Technician can also change the Kitchen 1 name from this screen.

The window shown left is the Settings Access after logging in.

Logging in and out of the Touchscreen

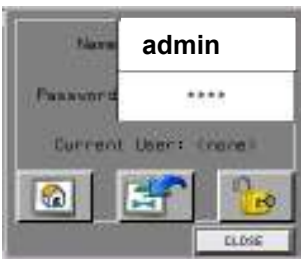
In order to make any changes to the system setup, the service technician must log in.



Touch the **SETTINGS** icon.



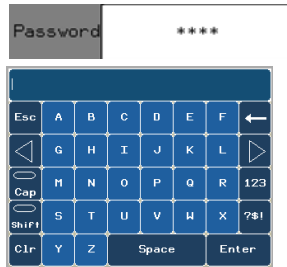
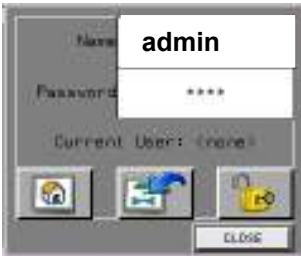
Touch the **Login** icon. (UN-LOCKED PADLOCK)



Touch the white field beside **Name**.

Type your username in the pop-up keyboard.
Touch **Enter** key.
Screen returns to the Login window.

The login name is case sensitive. The CAPS key is on automatically.



Touch the white field beside **Password**

Type your password in the pop-up keyboard.
Touch **Enter** key.
Screen returns to Login window

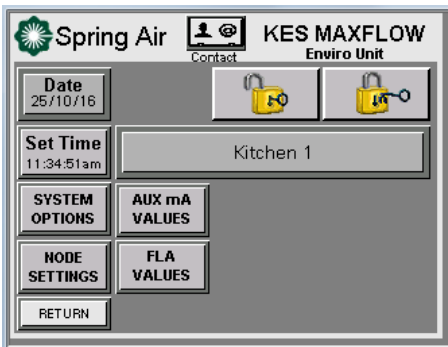
The password is also case sensitive.



Touch the **UNLOCK** icon.



Touch the word **Close** to close the login box.



You have completed the login.

This is the new screen displayed after logging in.

Logout

The Touchscreen will automatically log out users after a pre-set length of time. You can also manually log out with following instructions.



Touch the **Settings** window button.



Touch the **LOCK** button (LOCKED PADLOCK). Touch the **LOCK** button again to confirm.

You are now logged out.

DASHBOARD

The **Dashboard** is the heart of the KES system. It displays the current system operating status.

Example dashboards:



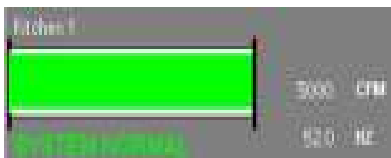
Normal ON Operation



Normal OFF



System ON in Scheduled Mode



Operating CFM Bar indicates the current operating CFM and the running Hz of the VFD. When the filters become so clogged that the motor can no longer compensate, this bar will recede to the left and change to yellow. Be sure to change filters *before* the system shuts down. It will also show system status or alarms



Kitchen **NAME**. This tag can be changed through the **Settings Options** screen.



This is the **POWER** button. Touching this button will start or stop the KES fan motor in manual mode.



This is the **SCHEDULE** button. Touching this button will access the AUTO start/stop scheduling screen. If this button is green and ON (as indicated at left) the unit will start at a specified time of day and shut off at a specified time of day.



This button accesses the **KES FILTER STATUS** screen. When you go to the status screen, you can see the actual filter static pressure for each type of filter.



This button accesses the **FAN STATUS** screen. The Fan Status screen displays VFD operational information and settings for systems CFM and Motor FLA as well as Minimum and Maximum VFD speed settings.



This button accesses the **MESSAGE** screen. All active, acknowledged and cleared messages are displayed on the Message screen. If control panel loses power or is cycled off and on, all messages will be erased from the screen.

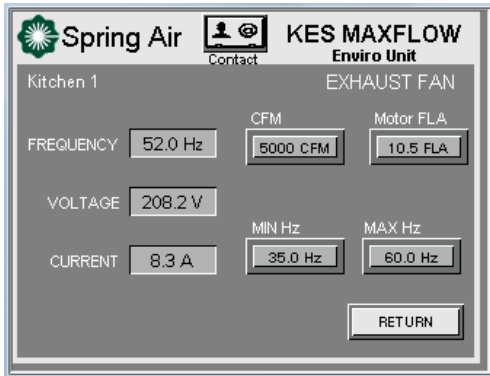


This button accesses the **LOG ON/OFF** screen which will allow access to the **OPTIONS** screen.


FAN STATUS



The **FAN STATUS** window provides access to the KES exhaust fan controlled by the Touchscreen panel.

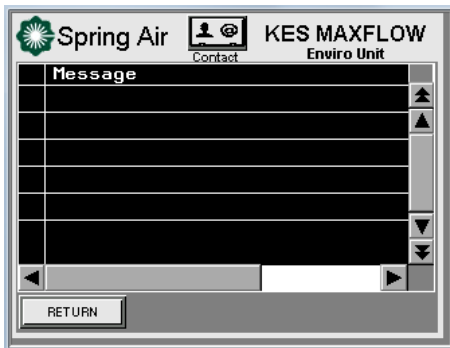


The screen for the FAN STATUS displays the running Frequency, Voltage and Current. The measured CFM is entered here to match the design CFM. Motor FLA is the actual FLA as marked on the fan motor nameplate. The Minimum and Maximum Hz are set once the operating NODE setting has been set. Maximum speed should be set for a current reading 0.2 amps below FLA.

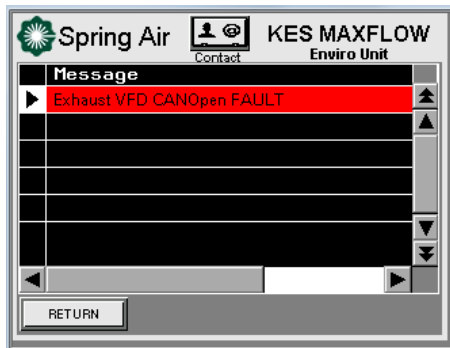
Return to Dashboard. Touching this  icon will return the Touchscreen view to the **Dashboard** window.

This section will describe the Messages function of this panel.

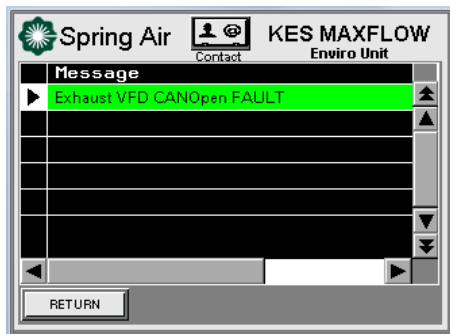
From the main screen, **PRESS MESSAGES** button



This is the main screen for the messages and alarms. This screen will always be blank as seen on the left after any power outage or power cycle to the panel. It will retain the messages and alarms as long as power is continuous. When there are alarms or messages, it is important to check this screen before cycling power to this panel.



When the control panel senses an input for any reportable alarm or message, the EXCLAMATION screen will pop up and a chirping alarm will sound. Touching this screen will take you to the message screen. All active alarms or messages are displayed in RED. The triangular boxes allow for cursor movement to read the date and time of the event and to move up or down each event or pages of events. A few of the recorded alarms are filters requiring changing, power outages, and high temperature. Users will need to go to this screen to clear an alarm.



Once the alarm or the condition that has caused the message to display has been corrected or attended to, the message will turn GREEN.

What to do in the event of an alarm:



When an alarm occurs, the window will change to red with a yellow exclamation mark.

Touch the screen anywhere to go to the **MESSAGE STATUS** window.

Alarms that are related to CLOGGED FILTERS or MISSING FILTERS can be addressed either by changing or by installing filters. There is a short-term OVERRIDE function for the filter alerts if the cooking schedule cannot be interrupted to change out or install filters immediately. Other messages related to VFD or cable missing/damaged must be dealt with before KES operation can continue.



To clear the variable speed drive, follow these steps:

1. Turn the disconnect on the KES unit to the OFF position.
2. Leave the disconnect off until all lights and the display on the VFD turn off.
3. Turn the disconnect back on.
4. Turn the KES unit back on using the Touchscreen.

If the alarm returns, refer to the Troubleshooting Sheet, or contact Spring Air for assistance.

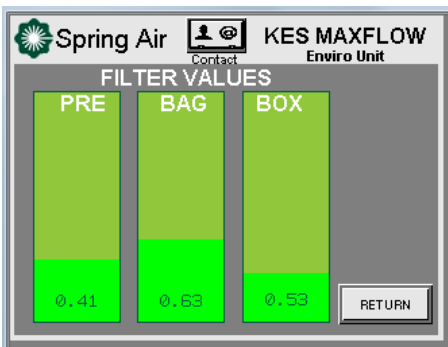
Common alarms reported by Touchscreen:

Message on screen:	Cause:	What to do:
Pre/Bag/Box filter clogged	The pre, bag, or box filters have been totally used. The filter status bar will show red.	The KES will shut down and can only be operated in Override. Replace clogged filter and reset system.
Bag/Box filter Out	The bag or box filter has been removed or the filter door is open or the VFD stopped on FAULT.	Check if the filters are removed or the KES filter door is open. Check VFD for FAULT code and reset drive.
High Temperature	The temperature inside the KES has reached a high limit.	Check filter statuses, make sure fire damper is open, check belts.
EXHT1 VFD CANOpen Fault	Communications fault between PLC and VFD.	Check CAT5 cables for proper connection and pinning.
MUA1 VFD CANOpen Fault	Communications fault between PLC and VFD.	Check CAT5 cables for proper connection and pinning.
Exhaust High Amp Alarm	Exhaust motor over maximum FLA rating.	Check motor for blockage or seized pulleys. May have burnt wirings
Exhaust Low Amp Fault	Exhaust motor under minimum amp set point.	Check circuit breaker for full voltage. Check wiring connections. Check for broken belts.
Fire Suppression Alarm	Wet Chemical fire suppression system activated.	Check Fire Suppression micro switch for annunciation to RPD panel. Should be on Normally Open contact. Reset at message screen.
Kitchen AutoStart	Exhaust fan auto starts if heat is detected under hood without turning on the system.	Touch the START icon on the dashboard to turn system ON.
EXHT Motor Overload Fault	Exhaust motor has exceeded maximum FLA setting.	Check for motor blockage, seized pulleys or burnt wiring.
MUA Motor Overload Fault	Supply motor has exceeded maximum FLA setting	Check for motor blockage, seized pulleys or burnt wiring.
EXHT Motor Phase Fault	Exhaust motor lost one or more phases.	Check all wiring connections between VFD and motor. Check winding continuity.
MUA Motor Phase Fault	Supply motor lost one or more phases.	Check all wiring connections between VFD and motor. Check winding continuity.

EXHT Main Overvoltage Fault	Exhaust line feed has exceeded maximum voltage allowances.	Call electrician for further investigation of overvoltage.
Message on screen:	Cause:	What to do:
MUA Main Overvoltage Fault	Supply line feed has exceeded maximum voltage allowances.	Call electrician for further investigation of overvoltage.
EXHT Main Phase Fault	Exhaust fan line feed has lost one or more phases.	Call electrician for further investigation of Phase loss.
MUA Main Phase Fault	Supply fan line feed has lost one or more phases.	Call electrician for further investigation of Phase loss.
EXHT Motor Short Circuit Fault	Exhaust motor has an open disconnect or contactor or loose wiring between VFD and motor	Check motor for burnt windings, open contactors or disconnects or loose connections inside motor
MUA Motor Short Circuit Fault	Supply motor has an open disconnect or contactor or loose wiring between VFD and motor	Check motor for burnt windings, open contactors or disconnects or loose connections inside motor
EXHT Main Under voltage Fault	Exhaust fan line feed has insufficient voltage to run motor.	Call electrician for further investigation of under voltage.
MUA Main Under voltage Fault	Supply fan line feed has insufficient voltage to run motor.	Call electrician for further investigation of under voltage.



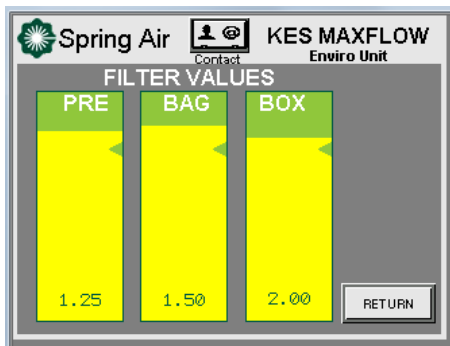
The **KES FILTERS** icon allows users to observe the actual filter static pressure differential when the fan is operating.



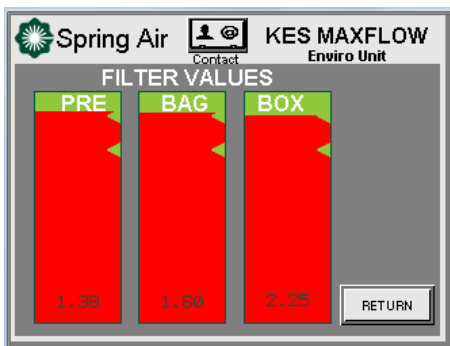
This is the Filter Screen when the KES unit is turned off. It shows values for PRE, BAG and BOX differential static pressures as a number at the bottom of each column. The filter condition is also reflected by the color of the column. GREEN for normal, YELLOW for warning of dirty condition of filter and RED for filter clogged.



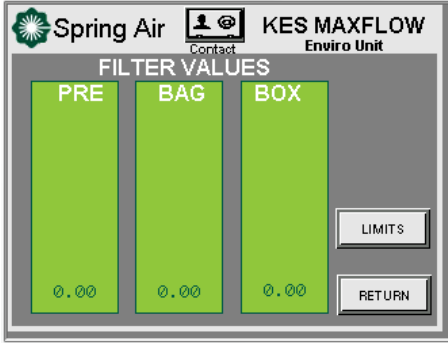
The first bar indicates the amount that the Pre Filter that has been used. The bright green area is the used portion of the Pre Filter and the green area above the bright green area is the portion left. The 0.41 value is the pressure drop in inches W.C. across the filter.



The second bar indicates the amount of the Bag Filter that has been used. The yellow area is the used portion of the Bag Filter. The yellow color indicates that the filter is about to run out of life and needs to be replaced shortly. The 1.50 value is the actual pressure drop in inches W.C. across the filter.



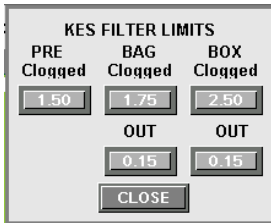
The third bar indicates the amount the Box Filter that has been used. The red color indicates that the filter has run out of life and at this point the fan will shut down. In this case the Box Filter has about 0% usage left. The 2.25 value is the actual pressure drop in inches W.C. across the filter.



The alarm set points for the filter **CLOGGED** and **OUT** can be adjusted if the site cooking requirements. The fan must be off and the touch screen has to be logged in. When the **KES Filters** button is touched, a new button will appear on the **FILTER VALUES** screen.



Touching this button will open a new popup for **KES FILTER LIMITS**.



Touching each box with number values will open a dialogue box that allows entry of new set values. The **FACTORY SET POINTS** for each type of filter is as follows:

PRE CLOGGED	1.50		
BAG CLOGGED	1.75	BAG OUT	0.15
BOX CLOGGED	2.50	BOX OUT	0.15

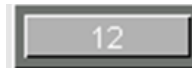
During the start up procedure for the KES the service technician will need to modify these settings for verification of the alarms.

Changing Time

The Touchscreen will update itself for Leap Years; however a user will need to adjust the time for daylight savings and the local time zone for the location that the unit is installed in..

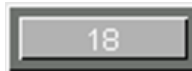


Touch the field with the HOUR. (uses 24 hour format for entry).



Enter the correct hour of day

Touch the field with the MINUTES.



Enter the correct minutes.

Touch the **CONFIRM**



button to lock in the new setting.

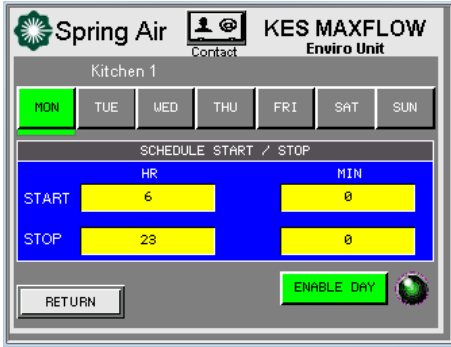
Setting the automatic Opening and Closing Times


An automatic time for the KES system to turn on and off can be set up for each day of the week. The system will need to be turned to Automatic via the **SCHEDULE** icon for the schedule to run.



Touch Automatic Schedule icon to set automatic opening and closing times.

The Automatic Schedule window will become available.

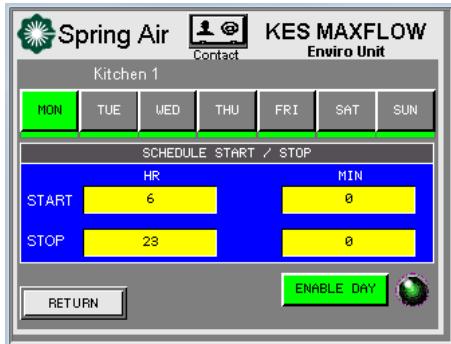


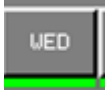
Touch the **DAY**  icon to set the time for the kitchen exhaust system to turn on and off for that day.

Touch the yellow field to open the pop-up keyboard and adjust the hour and minute for the kitchen exhaust system to turn on.



Press the ENABLE DAY button.



A green line will  be displayed under each day that has been enabled.

Continue to set start and stop time for each day of the week.

Touch **ENABLE DAY**  to return to the **Automatic Schedule** window.



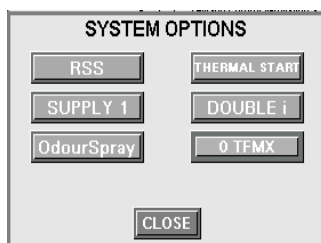
Auto schedule will be active if the  schedule icon is ON and GREEN.

SYSTEM OPTIONS SETUP



There are various **SYSTEM OPTIONS** available to the user.

Press



These options are RSS (Remote Start Stop), Thermal Start, Supply 1 VFD, Double i (double interlock), Odor Spray and 0 TFMX (TruFlow MXFlow)

RSS (Remote Start Stop)

This option allows for a remote switch to be used to start and stop the system away from the hoods. It could be in the executive chef or manager's office. The RSS is enabled by touching the RSS button and it will turn GREEN when enabled.

SUPPLY 1

This option allows for a Supply Fan VFD to be included in the PLC communication with exhaust VFD's. This VFD would be supplied by Spring Air Systems and be compatible with the communication protocol for the exhaust fan VFD's. This option is enabled by touching the SUPPLY 1 button; it will turn GREEN. You would then need to go to the Fan Status screen and touch the Supply VFD button. If the Supply VFD is selected without a VFD connected, it will result in a system error and stop system from running. If you do not select Supply VFD, then you will have the option on the DASHBOARD to select SUMMER/WINTER to enable a MUA heater.

Odour Spray System

How does it Work?

The odour spray setting is a qualitative measurement. The spray timers are field set to provide adequate odour reduction for the installation. This is completely subject to what a particular person feels is an acceptable discharge odour.

During the spray timer activation the combination air compressor and air-atomizing nozzle injects a volume of odour solution into the exhaust discharge. This solution is carried along the discharge duct and vented to atmosphere. The spray solution chemically activates with the kitchen exhaust air to reduce the kitchen exhaust odour. As the solution is carried down the duct some adheres to the duct walls. We will call this the spray residue. During the cycle time when the spray is not activated this spray residue continues the odour reducing process as the exhaust air passes. Therefore installation with longer discharge ducts can normally use a longer cycle time because there will be more spray residue. A shorter run of discharge duct usually results in shorter cycle time.

When adjusting the timers the object is to use as little spray solution as possible to provide adequate odour reduction:

1. First, adjust the spray cycle timer.
2. Reduce this setting by $\frac{1}{2}$ of the original cycle setting and check the operation. If $\frac{1}{2}$ proves adequate, increase the cycle back to $\frac{3}{4}$ of the original cycle setting. If this is adequate increase to $\frac{7}{8}$ of the original setting and so forth.
3. If reducing the setting by $\frac{1}{2}$ is not adequate decrease the cycle to $\frac{1}{4}$ of the original setting. If this is not adequate, adjust the spray timer.
 - a. Increase the spray time in increments of 5 seconds. After each 5 second increase evaluate the quality of the exhaust discharge air to determine if it is acceptable to the user.
 - b. When the spray timer setting equals the cycle timer settings the spray will be continuous. The maximum setting of B02 should not exceed the cycle timer.

The odour spray bottle must be changed regularly depending on the length of time set on the timers. The odour spray line from the spray bottle to the spray nozzle must be cleaned every 6 months in a water and detergent mixture. The compressor air gauge should read between 10 and 15 psi. Clean out the compressor airline when the air gauge is reading below 10 psi. If the pressure is still low, proceed to the next step compressor maintenance.

When there is odour in adjoining floors or office spaces

A kitchen located in the interior of an office building must be very negative to keep the kitchen odour within the kitchen. We recommend the kitchen be a minimum 20% negative. The fresh air supply is 80% of the total exhaust air from the kitchen space. When there is odour in adjoining spaces check the following.

1. The kitchen is not negative enough to keep the smell of the kitchen in the kitchen. If this is the case the odour is usually present all the time, even when there is no cooking. Reduce the amount of fresh air to the kitchen by adjusting the supply fan volume.

2. The kitchen may be connected to the same building A/C unit as the rest of the floor. If this is the case the return air grilles in the kitchen draws the kitchen odor to the main A/C unit and disperses the odour throughout the floor. The main A/C return must be blocked from the kitchen and put on a separate A/C unit.
3. The floor above the kitchen have odour. There are three possibilities.
 - a. The exhaust shaft is not sealed and the kitchen exhaust is leaking out onto the floors above the kitchen. Either adjust the amount of odour spray per section "A" above or install an exhaust fan on the roof to draw the kitchen exhaust to the roof and maintain a negative pressure in the discharge duct.
 - b. The odour may escape when the kitchen is not operating during the night. After the kitchen is shut off kitchen odour may migrate up the exhaust duct and leak out into the adjoining floors. This can be solved by operating the kitchen exhaust for several hours after the cooking has stopped for the day and starting the kitchen exhaust fan an hour before cooking starts in the morning.

Adjusting the Odour Spray

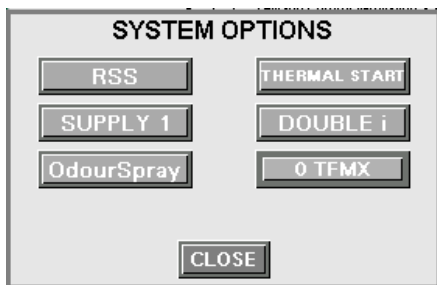
Touch the **SETTINGS** button



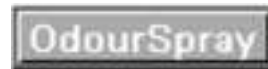
and login if not already.



Touch the **SYSTEMS OPTION** icon in the **Primary Toolbox** to open the **OPTIONS** window.



Touch the **ODOUR SPRAY**




icon.



Touch the grey display box beside the **OFF TIMER** **5 Min** label. Type the new length of time (in minutes) between sprays using the pop-up keypad.

Touch the grey display box beside the **ON TIMER** **3 Sec** label. Type the new duration (in seconds) for sprayer on using the pop-up keypad.




Touch the **ENABLE**  icon. When it turns **GREEN** the Odour Spray function is operational. Ensure that the Spring Fresh deodorant bottle has sufficient fluid in to allow spray operation for extended periods between scheduled service dates. You should always keep several bottles of deodorant on hand.


THERMAL START

Thermal Start option will start the exhaust fan to automatically when a specified hood or KES filter box temperature is reached.



The **DELAY OFF TIME** is set to allow the system to cool down normally to prevent having the exhaust fan cycle on and off due to residual heat under the hood after cooking has been completed.

To change the length of time for the delay, *TOUCH* the **DELAY OFF TIME** box  and enter the number of minutes to wait before the controller starts the Thermal Start sequence.

SET POINT is the actual set point for the THERMAL START to activate the exhaust fan(s). *TOUCH* the SET POINT box and enter the temperature (in Fahrenheit) for the activation .



Touch the **ENABLE**  icon to set the **THERMAL START** position.

This will allow the system to start on any cooking under the hood that reaches the set point. Viewing VFD Frequency Settings

DOUBLE INTERLOCK



This feature allows for a double interlock of the exhaust and supply fans. In this mode, the exhaust fan will not start until the supply fan proves that it is running. Once the supply and exhaust are running, the supply heater will only activate if the exhaust fan is running. This is usually only required with Direct-fired Supply heaters. To enable this feature *TOUCH* the **DOUBLE i** button and it will turn **GREEN** when active.

TRUFLOW/MXFLOW

Transition Set



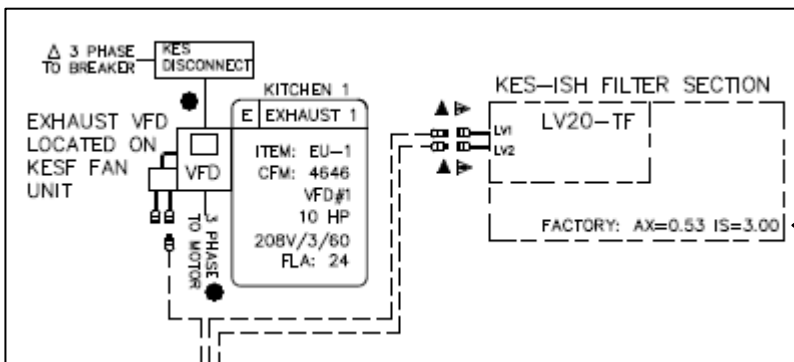
Point

This option allows for adjusting the actual mA set point that changes the system from TruFlow modulation to MXFlow filter conservation functions. This set point normally happens between 16 and 18 mA. By selecting this icon, you will be able to enter a number from 1600 to 1800.

SETTING the NODE VALUE



The MXFlow system operates on the principle of constant CFM extraction as a function of the fan speed and duct static pressure as measured between the hood and pre-filter. In order to maintain the CFM, the PLC has a process loop that performs a PID function on the duct static. The duct static is established during the startup stage related to the maximum CFM required by the hood with clean KES filters. As the filters load with grease and combustion residues, the static pressure between the hoods and the filter box decreases. The PID process loop interprets this drop and increases the VFD speed to compensate for the reduced airflow.



Typical LV20 Drawing Excerpt



From the Dashboard screen, press the SETTINGS



icon.



From the Toolbox screen, press the **NODE SETTINGS**



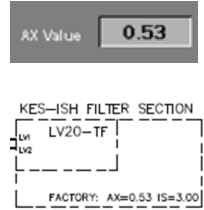
icon.

This will access the **NODE SETTING** screen as shown below.



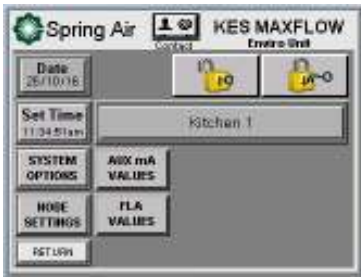
The only information **SET POINT** **1.25** that is required is the **SET POINT**.

This number will be input at the factory during the factory test. It can also found on the RPD control drawing. When the system is running, the **AX VALUE** will be shown on this screen. If the number is different than the **AX** as shown on the drawing and on the START-UP report, the **SET POINT** will need to be adjusted either up or down as needed to fine tune the fan speed.



Pressing the **RETURN** button will return to the **TOOLBOX** screen.

Setting the FLA Limits



From the **TOOLBOX** screen Press the **FLA VALUES**



icon.

This will access the FLA SETTINGS screen.



During the start-up of the exhaust KES fan, the minimum amps setting is to be determined by adjusting the maximum speed setting to 0.1 Hz higher than the MINIMUM Hz. Record the actual RUNNING AMPS and enter the value recorded plus 1 Hz into the MIN FLA.

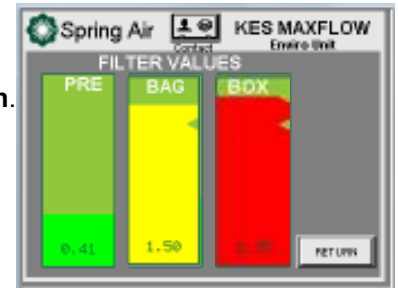
This setting aides in detecting the actual running of the VFD at lower than minimum set point or is belts break.

Filter Annunciation

This section will discuss how to check the status of the filters in the KES unit and what to do if alarms are triggered during cooking operations.



From the **Dashboard** , Touch the **KES Filters** icon. The **Filter Status** window will open.





The first bar indicates the amount that the Pre Filter that has been used. The bright green area is the used portion of the Pre Filter and the green area above the bright green area is the portion left. The 0.41 value is the pressure drop in inches W.C. across the filter.



The second bar indicates the amount of the Bag Filter that has been used. The yellow area is the used portion of the Bag Filter. The yellow color indicates that the filter is about to run out of life and needs to be replaced shortly. The 1.50 value is the actual pressure drop in inches W.C. across the filter.



The third bar indicates the amount the Box Filter that has been used. The red color indicates that the filter has run out of life and at this point the fan will shut down. In this case the Box Filter has about 0% usage left. The 2.25 value is the actual pressure drop in inches W.C. across the filter. This is also the Ax value for CFM determination with clean filters.

Filter Clogged Alarm



Once a filter has reached the end of its life (within the RED portion of the graph), a signal is sent to the Touchscreen, the Alarm screen is shown and the KES will turn off.

Touch anywhere on the screen to return to the **Dashboard** window.

Touch the KES Filter ICON. The override icon will be displayed.




If this condition occurs during a busy period when filters cannot be changed, Touch the **VERRIDE** button and the KES will turn back on.

Engaging the override option will begin an internal count-down and the KES will run for 4 hours before shutting down again.

All of the filters in the red status **must be changed** and the system reset.


Recording filter changes on the filter usage chart (Appendix xx) will help you prevent having to run in override. Using this chart a regular maintenance schedule can be set up to ensure constant uninterrupted operation of the commercial kitchen.

Filter Removed Alarm

Should any of the bag or box filters be removed during normal operation, or if a door is propped open, the KES unit is automatically shut down. The alarm icon  appears and when touched, the Message Screen will indicate "FILTER REMOVED/LOW EXHAUST. To resume normal operation the filter must be replaced, doors properly closed, and the system reset.

The system cannot be operated or turned to **VERRIDE** with a filter removed.

High Temperature Alarm

In the event of a high  temperature in the inlet to the KES-ISH filter unit a high temperature stat located at the inlet of the KES-ISH filter section is activated. When the exhaust air reaches 160 F the high temperature stat is energized. The exhaust fan shuts off, the alarm screen appears and the Diagnostic Screen will indicate “High temperature in the KES”. Should the KES exhaust temperature continue to rise the fusible link melts in the KES-ISH filter section discharge and closes the fire damper in the exhaust. 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. An authorized SPRING AIR SYSTEM INC. service technician should be called to inspect the unit.

Surface Fire Alarm

In the event that the exhaust hood surface fire suppression system activates, the KES touch screen display will display as shown to the left. Touching the Yellow exclamation icon will take you to the DASHBOARD.



It will show the system has shut down and a banner will read “SYSTEM ALARM”. If you touch the MESSAGES button, you will see the message “Fire Suppression Alarm”.



To resume normal operation, the fire suppression system and KES unit will need to be reset. The fire suppression contractor will need to reset the suppression release to open the micro switch that signals the tripped status. Once this has been reset ou will need to go to the MESSAGE screen and you will see the Surface Fire Suppression RESET button. Touching this button will reset and allow normal operation of the KES.

Determine the Filter Change Schedule

The Pre-filters, Bag filters and Box filters must be changed on a regular basis to maintain the high grease extraction efficiency required by the UL/ULC listing. Once a red filter clogged light comes on the filter has reached its grease holding capacity. Further use will restrict exhaust airflow 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 when the red Filter Clogged lights activates. This will provide simple uninterrupted operation for your commercial kitchen operation.

These steps can be used to determine an approximate date to change filters.

1. Operate the unit until the filter icon turns red.
2. Change the filter at the end of the shift or the next day before cooking.
3. Write that date under Filter Change No. 1 / Actual for the filter that was changed.
4. Count the number of days between the Startup Date and the first filter change date.
5. Count forward that number of days from the first filter change date.
6. Record that date under Filter Change No. 2 / Scheduled
7. If the filter icon turns red prior to the scheduled filter change date, change the filter at that time and re-count the days for the next scheduled change date.

EXAMPLE

KES unit was started up on June 1st and the pre-filter icon turned red on June 25th. This is 24 days. The Filter Change No. 2 / Scheduled should be written down as July 19th (June 25th plus 24 days).

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						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						

WHERE TO PURCHASE FILTERS:

Spring Air Systems Inc.

1388 Cornwall Rd., Oakville Ont., L6J 7W5
(905) 338-2999

Airguard Industries

125 Buttermill Rd., Concord, Ontario, L4K 3X5
905-669-9876

Airguard Corp.

4806 Strong Rd., Crystal Lake, IL, 60014
888-324-5665

Camfil Farr Filters

67 Steeplecase Rd. W., Markham Ont., L3R 2M4
(905) 415-3030

Camfil Farr

2201 Park Place, El Segundo, CA, 90245
310-727-6300

RECOMMENDATION

TO ENSURE TROUBLE FREE OPERATION FOR YOUR KITCHEN EXHAUST SYSTEM A PROPER PREVENTATIVE MAINTENANCE PROGRAM IS A NECESSITY.

SPRING AIR SYSTEMS RECOMMENDS THAT A YEARLY SERVICE CONTRACT BE SET UP WITH A REPUTABLE SERVICE ORGANIZATION. THIS WILL REDUCE UNEXPECTED DOWN TIME TO A MINIMUM.

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: MERV14 (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: MERV14 (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

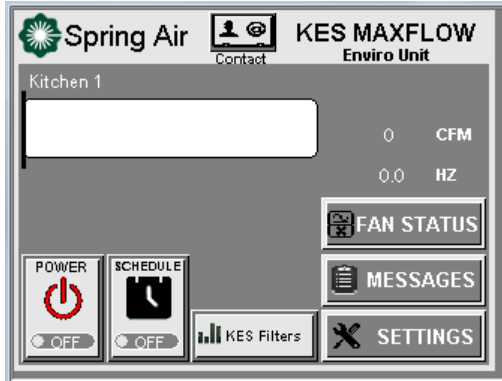
Farr Filter: 24" x 24" x 12" - 6 pocket - 95% DOP Class II
12" x 24" x 12" - 6 pocket - 95% DOP Class II

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

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

Odor Spray: Spring Fresh, Spring Air Systems

Local Service Company Contact Information



The touchscreen has the capability of storing and displaying the contact information of the authorized local service company in the area where the KES unit is located.

On the dashboard screen touch the



icon. This will pop

The local service company that was contracted to perform the initial start-up and any warranty work within the warranty period, should have input their company name, technician that performed the start-up, phone number and e-mail address for the service dispatcher.

The Project ID will be input at the factory and should be used whenever contacting Spring Air Systems for information or alerting about any operating issues.

Touching the CLOSE icon returns to the dashboard.

KES MAINTENANCE SCHEDULE

A. **Every two weeks:**

Check the pre-filter pressure reading. If the pre-filter bar graph is red replace the pre-filter. It is very important to maintain clean pre-filter(s). Replacing the inexpensive pre-filter(s) often extends the life of the bag and box filters and reduces unnecessary down time due to clogged filter shutdowns. The Touchscreen panel will indicate separately when the “pre-filter”, “bag” and “box” filters are clogged. When this occurs, the unit shuts down. Touch the override button to energize the system for another 4 hours. This provides time to change the filters after the day of cooking is complete. This is a final dirty filter alarm after the red dirty filter warning. Once the approximate filter life for your application is determined, we recommend that a regular filter change schedule be set up before the filter clog activates.

B. **Every Month:**

1. Complete the two-week list.
2. Inspect the exhaust fan belt for correct tension and wear. All belts usually require adjustment at this time. Failure to tighten may result in the belt falling off and no airflow.
3. Check the bag filter (2nd stage filtration) pressure reading. If the bag filter bar graph is red, replace the bag filter. The life of the bag filter depends on the type of cooking equipment and exhaust hood system. For heavy cooking applications, the bag filters may require replacement every month.
4. **(Odour Spray Option)** Inspect the odour spray bottle. Refill if necessary. *At start-up, the odour spray is adjusted to the desired level. The amount of odour spray used varies with this initial setting. It is important to inspect the level in the bottle every two weeks until the normal rate of use is determined.*

C. Every Three Months:

1. Complete the two-week and monthly checklist.
2. Inspect the exhaust fan belt for correct tension and wear. Adjust if necessary.
3. Check the box filter (3rd stage filtration) pressure reading. If the box filter bar graph is red replace the box filter. Once again, the life of the box filter depends on the type of cooking equipment and exhaust hood system. The box filter may provide one year of service on most applications with high efficiency, water wash ventilators.
4. Inspect all electrical connections. Tighten if necessary.
5. Test the filter-removed circuit. Open the pre-filter access door while the KES unit is in operation. The unit should shut down and indicate a filter-removed condition.

D. Every Six Months:

1. Complete the two-week, monthly and three-month check list.
2. Open the fan wheel access door or hatch on the KES fan section. Inspect the fan wheel for grease build up. Clean as required.
3. Inspect the exhaust inlet fire damper and fusible link. Replace link annually.
4. Check the motor and fan bearings for noise or overheating. STY and FYC bearings are factory pre-lubricated lifetime sealed and require no further lubrication. SY and FY bearings are pre-lubricated and equipped with pressure grease fittings for re-greasing. Under normal service conditions, grease after six months of operation.
5. (Odour Pellet Option) Inspect the condition of odour media.
6. *The odour media pellets can be checked for remaining life by sending a sample to an accredited test laboratory. Most major filter suppliers have access to such service. Replace media if required. To replace the media remove the cells from the KES unit. Open the side panel on each odor cell and pour out the used media. Refill the cells with new media. Shake cells while filling to allow pellets to settle evenly in the cell. **Note:** Do not allow odour media to come in contact with water, as this will immediately render the pellets useless.*

Every Year:

1. Complete the two-week, monthly, three month and six month check list.
2. Check if KESF fan motor is running hotter than normal. If the motor is running hot, check the operating AMPS of the motor.
3. Make sure the KESF fan wheel rotates freely before startup. Inspect and clean the wheel periodically. If dirt is allowed to build-up, the wheel could become out of balance and cause premature bearing wear.

E. Fan Bearings

1. STY and FYC bearings are factory pre-lubricated lifetime sealed and require no further lubrication.
2. SY and FY bearings are pre-lubricated and equipped with pressure grease fittings for re-greasing.
3. Under normal service conditions, grease after six months of operation.

F. Motor Bearings:

1. All motors leave the factory with bearings custom greased for many years of service under most conditions.
2. Re-greasing of motors depends on the application and is best left to trained service technicians.
3. Periodically check if motor is running hotter than normal.

G. Centrifugal Exhaust Fan:

1. Make sure the wheel rotates freely before startup.
2. Inspect and clean the wheel periodically.
3. If dirt is allowed to build up the wheel could become out of balance and cause premature bearing wear.
4. A noisy fan is a typical sign of a fan out of balance.

- 5.Excessive moisture in the cooking environment could lead to deterioration of the fan housing. Housing should be checked every year for any corrosion.

H. V-Belt Drives:

- 1.ALWAYS KEEP SPARE SET OF BELTS. Periodically check the belt tension and adjust if necessary.
- 2.Some slack should be left in the belt, typically 1/4” per foot of belt from the fan to the motor sheave.
- 3.Always replace the complete set of belts to ensure even tension and wear. When replacing belts loosen the motor mounts.
- 4.Do not force belts over sheaves.

I. VFD Drives:

1. Clean VFD cooling fan screens and fan blades every 6 months or if excessive dirt is noticed accumulating on the inlet screens.
2. Check all electrical terminations to ensure they remain tight. Ensure power is off at local disconnect and at breaker before working on VFD electrical connections.

J. RECOMMENDATION

TO ENSURE TROUBLE FREE OPERATION FOR YOUR KITCHEN EXHAUST SYSTEM A PROPER PREVENTATIVE MAINTENANCE PROGRAM IS NECESSARY. SPRING AIR RECOMMENDS THAT A YEARLY SERVICE CONTRACT BE SET UP WITH A REPUTABLE SERVICE ORGANIZATION. THIS WILL REDUCE UNEXPECTED DOWN TIME TO A MINIMUM.

K. TROUBLE SHOOTING

Low Exhaust Air

I. Exhaust fan is running but exhaust air is low.

1. Check if fan belts are slipping. Tighten if necessary.
2. Check if fusible link fire damper has closed in the KES filter section. Replace fusible link.
3. Check if filters are dirty but have not alarmed any filter clogged. Replace dirty filters.
4. Check for correct fan rotation. To correct fan rotation on MXFLOW units 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.

II. Red Filter Clogged Alarm.

1. Filter clogged pilot indicates which filter section has plugged. Replace filter and reset system.
2. If the filter clogged activates earlier than the normally established replacement span, check the actual operating pressure vs. the **FILTER CLOGGED** pressure setting for each of the filters from the TruFlow **screen**. Adjust the pressure setting alarm set point.
3. If adjusting the pressure switches is not effective and the amount/usage of the kitchen has not increased check the recommended filter clogged limits from the filter manufacturer.

III. Red Filter Out Alarm.

1. A filter has been removed or access door left open or the VFD has stopped running. Replace filter if necessary.
2. Check if fusible link fire damper has closed in the KES filter section. Replace fusible link.
3. Check if filters are dirty but have not alarmed any filter clogged... Replace dirty filters.
4. Check VFD for FAULT codes. If VFD shut down on a non-restartable fault, the VFD will need to be reset. Correct fault before resetting VFD.

IV. High Temperature Alarm.

- S. The high temperature stat in the KES filter section exhaust outlet has activated and shut the KES system down. If a high temperature is not present check calibration of high temperature stat TH1. High temperature stat is set at 160F.
- T. Check if fusible link fire damper has closed in the KES filter section. Replace fusible link.

L. CHECKING FAN ROTATION

Fan rotation **MUST be checked prior to commissioning the system**. 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





KESF DWDI fan. Correct rotation for this fan arrangement looking into the end shown above is clockwise.


**CHECK ROTATION ARROW
STICKER ON FAN HOUSING!**


APPENDIX

A. General Warning and Danger Alerts with VFD's

 DANGER
HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH
<ul style="list-style-type: none">• Read and understand this manual before installing or operating the Altivar 312 drive. Installation, adjustment, repair, and maintenance must be performed by qualified personnel.• The user is responsible for compliance with all international and national electrical code requirements with respect to grounding of all equipment.• Many parts of this drive, including the printed circuit boards, operate at the line voltage. DO NOT TOUCH. Use only electrically insulated tools.• DO NOT touch unshielded components or terminal strip screw connections with voltage present.• DO NOT short across terminals PA/+ and PC/- or across the DC bus capacitors.• Before servicing the drive:<ul style="list-style-type: none">- Disconnect all power, including external control power that may be present.- Place a "DO NOT TURN ON" label on all power disconnects.- Lock all power disconnects in the open position.- WAIT 15 MINUTES to allow the DC bus capacitors to discharge. Then follow the "Bus Voltage Measurement Procedure" page 18 to verify that the DC voltage is less than 42 V. The drive LEDs are not indicators of the absence of DC bus voltage.• Install and close all covers before applying power or starting and stopping the drive.
Failure to follow these instructions will result in death or serious injury.

 DANGER
UNINTENDED EQUIPMENT OPERATION
<ul style="list-style-type: none">• Read and understand this manual before installing or operating the Altivar 312 drive.• Any changes made to the parameter settings must be performed by qualified personnel.
Failure to follow these instructions will result in death or serious injury.

 WARNING
DAMAGED DRIVE EQUIPMENT
Do not operate or install any drive or drive accessory that appears damaged.
Failure to follow these instructions can result in death, serious injury, or equipment damage.

 WARNING
LOSS OF CONTROL
<ul style="list-style-type: none">• The designer of any control scheme must consider the potential failure modes of control paths and, for certain critical control functions, provide a means to achieve a safe state during and after a path failure. Examples of critical control functions are emergency stop and overtravel stop.• Separate or redundant control paths must be provided for critical control functions.• System control paths may include communication links. Consideration must be given to the implications of unanticipated transmission delays or failures of the link.³
Failure to follow these instructions can result in death, serious injury, or equipment damage.

⚠ CAUTION

INCOMPATIBLE LINE VOLTAGE

Before turning on and configuring the drive, ensure that the line voltage is compatible with the supply voltage range shown on the drive nameplate. The drive may be damaged if the line voltage is not compatible.

Failure to follow these instructions can result in injury or equipment damage.

CAUTION

RISK OF DAMAGE TO THE MOTOR

The use of external overload protection is required under the following conditions:

- Repowering up the product since there is no motor thermal state memory.
- Running multiple motors.
- Running motors rated at less than 0.2 times the nominal drive current.
- Using motor switching.

Failure to follow these instructions can result in equipment damage

Power and circuit protection

The drive must be grounded to conform with the regulations concerning high leakage currents (over 3.5 mA).

Where local and national codes require upstream protection by means of a residual current device, use a type A device for single-phase drives and a type B device for three-phase drives as defined in the IEC Standard 60755.

Choose a suitable model integrating:

- High frequency current filtering,
- A time delay that helps to prevent tripping caused by the load from stray capacitance on power-up.
The time delay is not possible for 30 mA devices; in this case, choose devices with immunity against nuisance tripping.

If the installation includes several drives, provide one "residual current device" per drive.

Keep the power cables separate from circuits in the installation with low-level signals (detectors, PLCs, measuring apparatus, video, telephone).

If you are using cables longer than 50 m (164 ft) between the drive and the motor, add output filters (please refer to the catalogue).

Control

Keep the control circuits away from the power cables. For control and speed reference circuits, we recommend using shielded twisted cables with a pitch of between 25 and 50 mm (1 and 2 in.), connecting the shielding to ground at each end.

Equipment Grounding

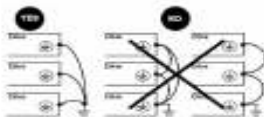
Ground the drive according to local and national code requirements. A minimum wire size of 10 mm² (6 AWG) may be required to meet standards limiting leakage current.

⚠ ⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- The drive panel must be properly grounded before power is applied.
- Use the provided ground connecting point as shown in the figure below.

Failure to follow these instructions will result in death or serious injury.



- Ensure that the resistance of the ground is one ohm or less.
- When grounding several drives, you must connect each one directly, as shown in the figure to the left.
- Do not loop the ground cables or connect them in series.

⚠ WARNING

IMPROPER WIRING PRACTICES

- The ATV312 drive will be damaged if input line voltage is applied to the output terminals (U/T1, V/T2, W/T3).
- Check the power connections before energizing the ATV312 drive.
- If replacing another drive, verify that all wiring connections to the ATV312 drive comply with wiring instructions in this manual page 29.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

⚠ WARNING

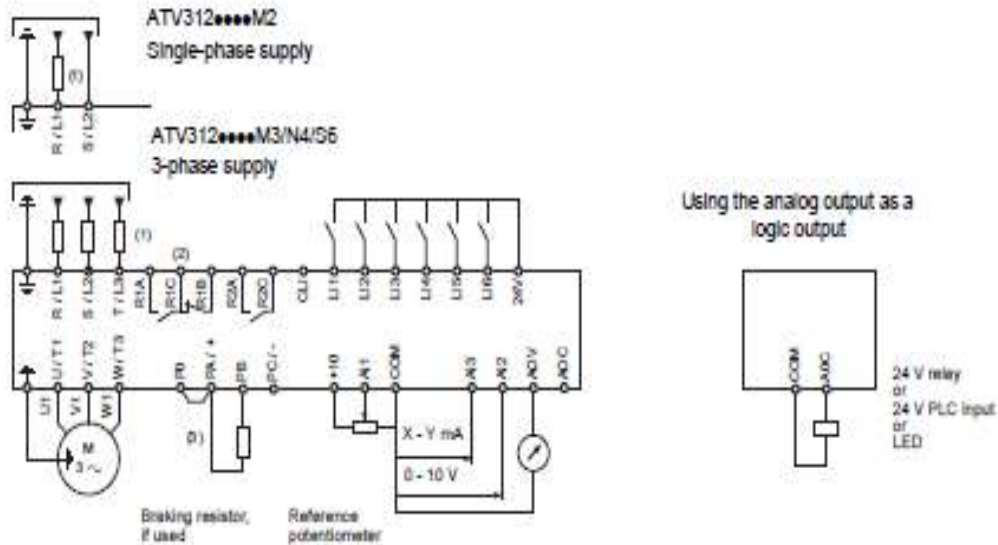
INADEQUATE OVERCURRENT PROTECTION

- Overcurrent protective devices must be properly coordinated.
- The Canadian Electrical Code and the National Electrical Code require branch circuit protection. Use the fuses recommended in the installation manual.
- Do not connect the drive to a power feeder whose short-circuit capacity exceeds the drive short-circuit current rating listed in this manual page 29.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

B. FACTORY DRIVE TERMINAL SCHEMATIC

General wiring diagram



- (1) Line choke, if used (single phase or 3-phase)
- (2) Fault relay contacts, for remote indication of the drive status
- (3) If a braking resistor is connected, set [Dec ramp adapt.] (brA) parameter to yes (refer to the programming manual).

Note 1: Use interference suppressors on all inductive circuits near the drive or coupled to the same circuit (relays, contactors, solenoid valves, etc).

Note 2: This diagram is for the standard ATV312 products. Optional communication cards may change the control wiring of the product. Please see the associated documentation for the option cards for details.

Choice of associated components:
Please refer to the catalogue.

Characteristics and functions of the control terminals

Terminal	Function	Electrical characteristics
R1A R1B R1C	Common point C/O contact (R1C) of programmable relay R1	<ul style="list-style-type: none"> • Min. switching capacity: 10 mA for 5 V ... • Max. switching capacity on resistive load ($\cos \varphi = 1$ and $L/R = 0$ ms): 5 A for 250 V ~ and 30 V ... • Max. switching capacity on inductive load ($\cos \varphi = 0.4$ and $L/R = 7$ ms): 1.5 A for 250 V ~ and 30 V ... • Sampling time 8 ms • Service life: 100,000 operations at max. switching power 1,000,000 operations at min. switching power
R2A R2C	N/O contact of programmable relay R2	
COM	Analog I/O common	0 V
AI1	Analog input voltage	Analog input 0 + 10 V (max. safe voltage 30 V) <ul style="list-style-type: none"> • Impedance 30 kΩ • Resolution 0.01 V, 10-bit converter • Precision $\pm 4.3\%$, linearity $\pm 0.2\%$, of max. value • Sampling time 8 ms • Operation with shielded cable 100 m max.
+10 V	Power supply for reference potentiometer	+10 V (+8% - 0%), 10 mA max, protected against short-circuits and overloads
AI2	Analog input voltage	Bipolar analog input 0 \pm 10 V (max. safe voltage ± 30 V) The + or - polarity of the voltage on AI2 affects the direction of the setpoint and therefore the direction of operation. <ul style="list-style-type: none"> • Impedance 30 kΩ • Resolution 0.01 V, 10-bit + sign converter • Precision $\pm 4.3\%$, linearity $\pm 0.2\%$, of max. value • Sampling time 8 ms • Operation with shielded cable 100 m max.

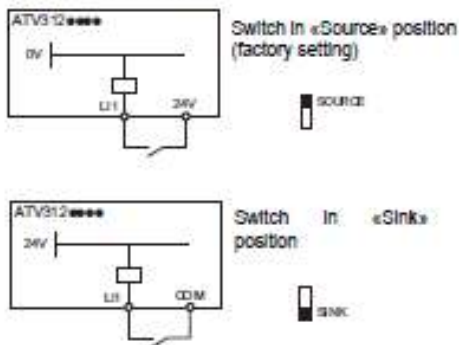
AI3	Analog input current	Analog input X - Y mA. X and Y can be programmed from 0 to 20 mA. • Impedance 250 Ω • Resolution 0.02 mA, 10-bit converter • Precision $\pm 4.3\%$, linearity $\pm 0.2\%$, of max. value • Sampling time 8 ms
COM	Analog I/O common	0 V
AOV AOC	Analog output voltage AOV or Analog output current AOC or Logic output voltage AOC AOV or AOC can be assigned (either, but not both)	Analog output 0 to 10 V, min. load impedance 470 Ω or Analog output X - Y mA. X and Y can be programmed from 0 to 20 mA, max. load impedance 800 Ω • Resolution 8 bits (1) • Precision $\pm 1\%$ (1) • Linearity $\pm 0.2\%$ (1) • Sampling time 8 ms This analog output can be configured as a 24 V logic output on AOC, min. load impedance 1.2 k Ω . (1) Characteristics of digital/analog converter.
24 V	Logic input power supply	+ 24 V protected against short-circuits and overloads, min. 19 V, max. 30 V Max. customer current available 100 mA
LI1 LI2 LI3 LI4 LI5 LI6	Logic inputs	Programmable logic inputs • + 24 V power supply (max. 30 V) • Impedance 3.5 k Ω • State 0 if < 5 V, state 1 if > 11 V (voltage difference between LI- and CLI) • Sampling time 4 ms
CLI	Logic Input common	See page 12.
RJ45	Communication port	Connection for SoMove software, Modbus and CANopen network, remote display, configuration loader tools.

U. LOGIC INPUT SWITCH

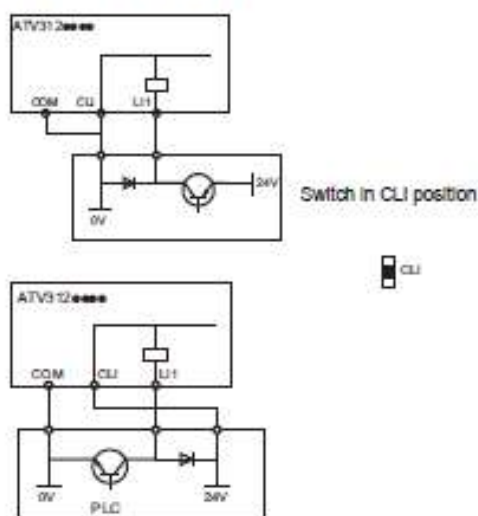
Logic input switch

This switch (1) assigns the link to 0V, 24 V or "floating":

Using volt-free contacts



Using PLC transistor output



(1) See page 24 to locate the switch on the terminal board.

▲ DANGER

UNINTENDED EQUIPMENT OPERATION

- Prevent accidental grounding of logic inputs configured for sink logic. Accidental grounding can result in unintended activation of drive functions.
- Protect the signal conductors against damage that could result in unintentional conductor grounding.
- Follow NFPA 79 and EN 60204 guidelines for proper control circuit grounding practices.

Failure to follow these instructions will result in death or serious injury.


V. DRIVE TECHNICAL SPECIFICATIONS FOR LOCATING DRIVE PANELS

Table 2: Environment

Degree of Protection	<ul style="list-style-type: none"> • IP20 without protective vent cover, NEMA 1, UL open type. • IP21 on wiring terminals • IP31 and IP41 all other areas • UL Type 1 without removal of the protective vent cover from the top of the controller and with the addition of the Conduit Entry Kit (see page 14).
Resistance to vibrations	Conforming to IEC/EN 60068-2-6: 1.5 mm peak to peak from 3 to 13 Hz, 1 gn from 13 to 150 Hz
Resistance to shocks	15 gn for 11 ms conforming to IEC/EN 60068-2-27
Pollution degree	Pollution degree 2 according to UL 840. Protect the drive controller against dust, corrosive gas, and falling liquid.
Maximum relative humidity	96% maximum, non-condensing and without dripping (provide heating system if there is condensation) Conforms to IEC 60068-2-3
Maximum ambient temperature	Storage: -13 to +158 °F (-25 to +70 °C) Operation: +14 to +122 °F (-10 to +50 °C) without vent cover removed and without derating +14 to +140 °F (-10 to +60 °C) with vent cover removed and with derating. Refer to derating curves on page 15.
Altitude	Up to 3,300 ft (1,000 m) without derating; derate by 1% for each additional 330 ft (100 m)

W. GOOD WIRING PRACTICE

Good wiring practice requires the separation of control circuit wiring from all power (line) wiring. In addition, power wiring to the motor must have the maximum possible separation from all other power wiring, whether from the same drive controller or other drive controllers; **do not run in the same conduit**. This separation reduces the possibility of coupling electrical transients from power circuits into control circuits or from motor power wiring into other power circuits.

 CAUTION
<p>IMPROPER WIRING PRACTICES</p> <ul style="list-style-type: none"> • Follow the wiring practices described in this document in addition to those already required by the National Electrical Code and local electrical codes. • The drive controller will be damaged if input line voltage is applied to the output terminals (U, V, W). • Check the power connections before energizing the drive controller. • If replacing another drive controller, verify that all wiring connections to the ATV31 drive controller comply with all wiring instructions in this manual. <p>Failure to follow this instruction can result in injury or equipment damage.</p>

Follow the practices below when wiring ATV31 drive controllers:

- Verify that the voltage and frequency of the input supply line and the voltage, frequency, and current of the motor match the rating on the drive controller nameplate.
- Use metallic conduit for all drive controller wiring. Do not run control and power wiring in the same conduit.
- Separate the metallic conduits carrying power wiring from those carrying control wiring by at least 76 mm (3 in.).

- Separate the non-metallic conduits or cable trays used to carry power wiring from the metallic conduit carrying control wiring by at least 305 mm (12 in.).
- Whenever power and control wiring cross, the metallic conduits and non-metallic conduits or trays must cross at right angles.
- Equip all inductive circuits near the drive controller (such as relays, contactors, and solenoid valves) with noise suppressors, or connect them to a separate circuit.

F. GROUNDING

Ground the drive controller according to the National Electrical Code and all local codes to ensure safe, dependable operation. To ground the drive controller:

- Connect a copper wire from the equipment ground lug or terminal to the power system ground conductor. Size the wire according to the drive controller rating and national and local codes.
- Verify that resistance to ground is one ohm or less. Improper grounding causes intermittent and unreliable operation.

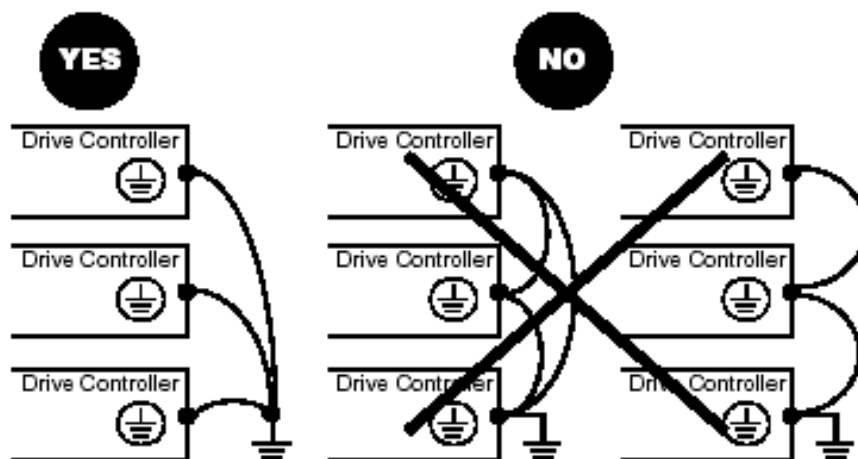
⚠ DANGER

HAZARDOUS VOLTAGE

Ground equipment using the provided ground connecting point as shown in the figure below. The drive controller panel must be properly grounded before power is applied.

Electric shock will result in death or serious injury.

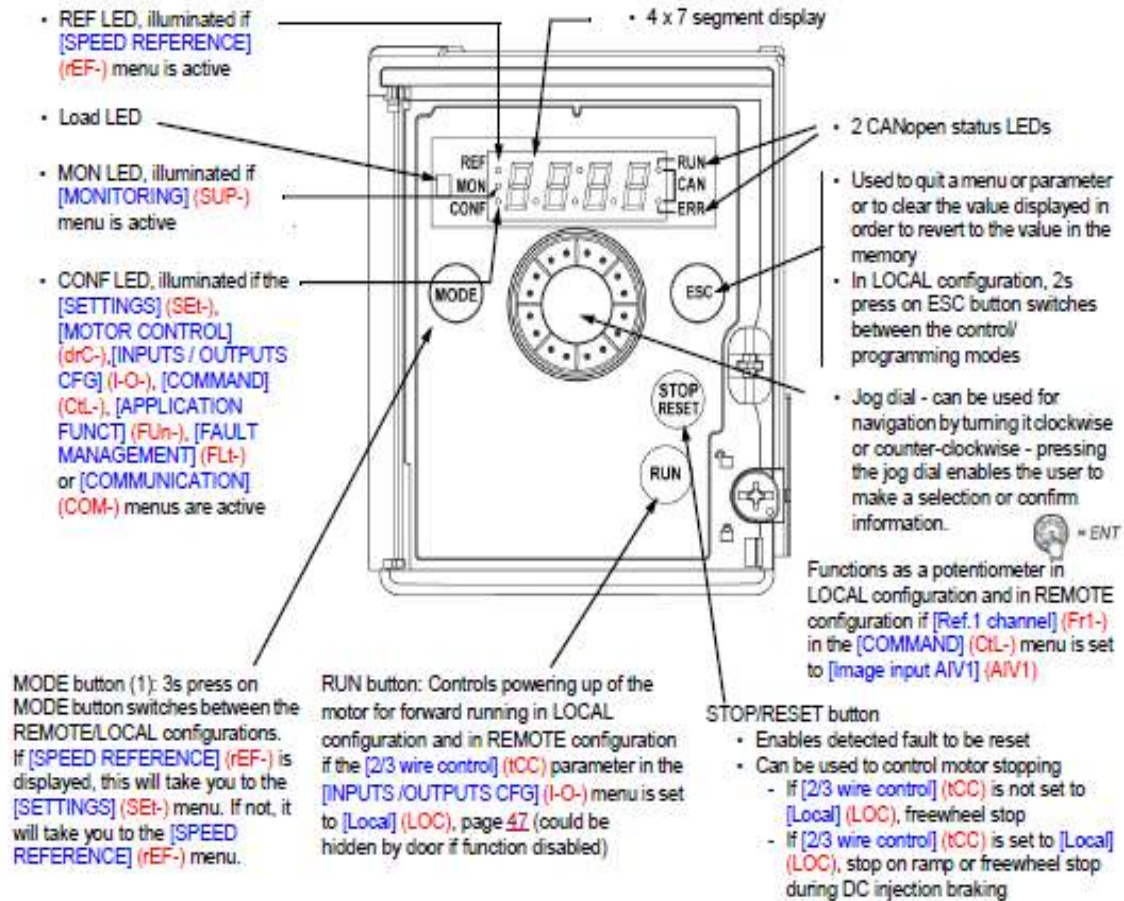
Ground multiple drive controllers as shown in the figure below. Do not loop the ground cables or connect them in series.



G. Description of the Human Machine Interface HMI

Description of the HMI

Functions of the display and the keys



Note1: In LOCAL configuration, the three Leds REF, MON, and CONF are blinking simultaneously in programming mode and are working as a Led chaser in control mode.

Normal display, with no fault code displayed and no startup:

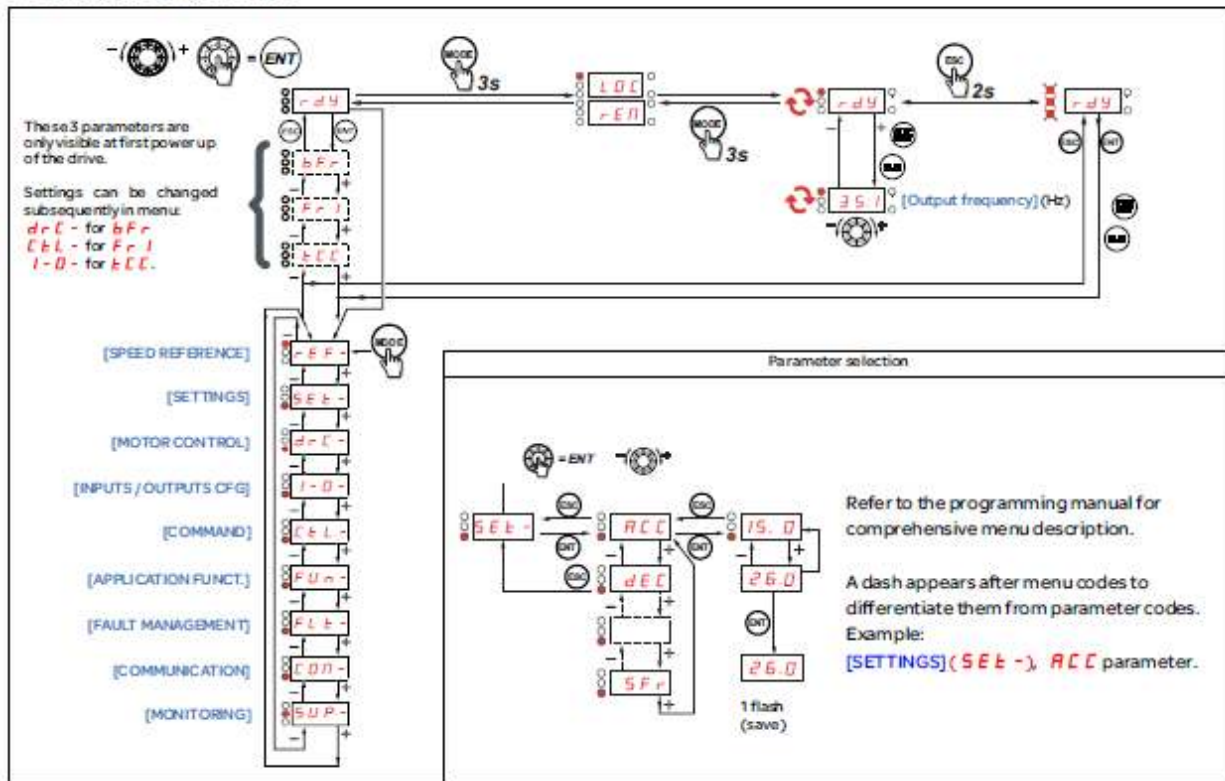
- **4 3.0:** Displays the parameter selected in the [MONITORING] (SUP-) menu (default: motor frequency). If the current is limited, the display flashes. In such cases, CLI will appear at the top left if an ATV61/ATV71 graphic display terminal is connected to the drive.
- **1 n 1 t:** Initialization sequence
- **r d y:** Drive ready
- **d C b:** DC injection braking in progress
- **n 5 t:** Freewheel stop
- **F 5 t:** Fast stop
- **t U n:** Auto-tuning in progress

In the event of a detected fault, the display will flash to notify the user accordingly. If an ATV61/ATV71 graphic display terminal is connected, the name of the detected fault will be displayed.

(1) If the drive is locked by a code ([PIN code 1] (COd), page 103), pressing the Mode key enables you to switch from the [MONITORING] (SUP-) menu to the [SPEED REFERENCE] (rEF-) menu and vice versa. It is no longer possible to switch between LOCAL and REMOTE configurations.

H. ACCESSING THE DRIVE PROGRAM MENU

Menus structure



The VFD parameters have been factory set for the particular job. However, on occasion, these parameters should be field verified at start up to ensure no issues with VFD communications with the PLC or HMI.

I. The following is a list of parameters for the Altivar 312 VFD used in a MXFlow configuration.

ALTIVAR VFD MaxFlow PROGRAM PARAMETERS

Power the Altivar VFD and proceed to input the following settings.

[bFr]	On power up select ENT -bFr will display, select ENT and set value to 60 Hz.
[SEt]	Press ENT ↓ or scroll down to SEt press ENT to enter <u>Settings Menu</u> .
ACC = 10	Press ENT again and scroll down to ACC. Press ENT and set value to 10 sec. Press ENT
dEC = 10	Press ESC ↓ or scroll down to dEC press ENT, set value to 10 sec. Press ENT
LSP = 35	Press ESC ↓ or scroll down to LSP press ENT, set value to 35 Hz. Press ENT
HSP = 65	Press ESC ↓ or scroll down to HSP press ENT, set value to 65 Hz. Press ENT
ttd = 118	Press ESC ↓ or scroll down to ttd press ENT, set value to 118. Press ENT
[drC]	Press ESC twice ↑ or scroll up to drC press ENT to enter <u>Drive Control Menu</u> .
nCr = FLA	Press ↓ or scroll down to nCr press ENT, set value to 20% above the FLA rating of installed motor.
tUn = POn	Press ESC ↓ or scroll down to tUn press ENT, set value to POn. Press ENT
tFr = 72	Press ESC ↓ or scroll down to tFr press ENT, set value to 72 Hz. Press ENT
[CTL]	Press ESC twice ↑ or scroll up to CTL press ENT to enter <u>Control Menu</u> .
LAC = L3	Press ENT ↓ or scroll down to LAC press ENT, set value to L3. Hold ENT for 3 sec.
Fr1 = AI3	Press ESC ↓ or scroll down to Fr1 press ENT, set value to AI3. Press ENT
[I-O]	Press ESC twice ↑ or scroll up to IO press ENT to enter <u>I/O Menu</u>
rrS = nO	Press ↓ or scroll down rrS press ENT, set value to nO. Press ENT
CrL3 = 4	Press ESC ↓ or scroll down to CrL3 press ENT, confirm value is set to 4. Press ESC
CrH3 = 20	Press ↓ or scroll down to CrH3 press ENT, confirm value is set to 20. Press ESC
AOIt = 4A	Press ↓ or scroll down to AOIt press ENT, set value to 4A. Press ENT
dO = OFr	Press ESC ↓ or scroll down to dO press ENT, set value to OFr. Press ENT
r1 = rUn	Press ESC ↓ or scroll down to r1 press ENT, set value to rUn. Press ENT
[FUn]	Press ESC twice ↑ or scroll up to FUn press ENT to enter <u>Application Function Menu</u>
SA1 = nO	Press ↓ or scroll down SA1 press ENT twice, set value to nO. Press ENT
[FLt]	Press ESC 3 times ↑ or scroll up to FLt press ENT to enter <u>Fault Menu</u>
Atr = yes	Press ↓ or scroll down Atr press ENT, set value to yes. Press ENT
LFL = LFF	Press ESC ↓ or scroll down to LFL press ENT, set value to LFF. Press ENT
LFF = 55	Press ESC ↓ or scroll down to LFF press ENT, set value to 55 Hz. Press ENT
drn = yes	Press ESC ↓ or scroll down to drn press ENT, set value to yes. Hold ENT for 3 sec.
FCS	Under drC parameter block set to InI to return VFD to factory settings.

J. TROUBLE SHOOTING AND DRIVE FAULT DISPLAY

PRECAUTIONS

Read the following safety statements before proceeding with any maintenance or troubleshooting procedures.

⚠ DANGER
HAZARDOUS VOLTAGE
<ul style="list-style-type: none">• Disconnect all power before servicing the drive controller.• Read and understand these procedure and the precaution on page 13 of this manual before servicing the ATV31 drive controllers.• Installation, adjustment, and maintenance of these drive controllers must be performed by qualified personnel.
Failure to follow this instruction will result in death or serious injury.

ROUTINE MAINTENANCE

Perform the following steps at regular intervals:

- Check the condition and tightness of the connections.
- Make sure that the ventilation is effective and that the temperature around the drive controller remains at an acceptable level.
- Remove dust and debris from the drive controller, if necessary.

FAULT DISPLAY

If a problem arises during setup or operation, ensure that all ambient environment, mounting, and connection recommendations have been followed.

The first fault detected is stored and displayed, flashing, on the screen. The drive controller locks and the fault relay (RA-RC) contact opens, if it has been configured for this function.

Drive Controller Does Not Start, No Fault Displayed

If the drive controller will not start and there is no display indication, consider the following:

1. Check the power supply to the drive controller.
2. The assignment of the fast stop or freewheel stop functions prevents the drive controller from starting if the corresponding logic inputs are not powered up. In this case, the drive controller displays nSt in freewheel stop mode and FSt in fast mode. This is normal, since these functions are active at zero speed so that the drive controller will stop safely if there is a wire break.
3. Ensure that the run command inputs have been actuated in accordance with the chosen control mode (tCC parameter in the I-O menu. See page 29).
4. If an input is assigned to the limit switch function and this input is at state 0, the drive controller can only be started by sending a command for the opposite direction (see page 72).
5. If the reference channel (page 37) or the control channel (page 38) is assigned to Modbus or CANopen, the drive controller displays nSt on power up and remains stopped until the communication bus sends a command.

Drive does not start, no code displayed

- If the display does not light up, check the power supply to the drive and check the wiring of inputs AI1 and AI2 and the connection to the RJ45 connector.
- The assignment of the "Fast stop" or "Freewheel stop" functions will prevent the drive from starting if the corresponding logic inputs are not powered up. The ATV312 then displays [Freewheel stop] (nSt) or [Fast stop] (FSt). This is normal since these functions are active at zero so that the drive will be stopped if there is a wire break.
- Check that the run command input(s) have been actuated in accordance with the chosen control mode (the [2/3 wire control] (tCC) parameter in the [INPUTS / OUTPUTS CFG] (I-O) menu, page 47).
- If an input is assigned to the limit switch function and this input is at zero, the drive can only be started up by sending a command for the opposite direction (see page 89).
- If the reference channel (page 53) or the control channel (page 54) is assigned to a communication network, when the power supply is connected, the drive will display [Freewheel stop] (nSt) and remain in stop mode until the communication bus sends a command.
- If the LED on the DC bus is lit and nothing appears on the display, check that there is no short-circuit on the 10 V power supply.
- If the drive displays [Ready] (rdy) and refuses to start, check that there is no short-circuit on the 10 V power supply and check the wiring of inputs AI1 and AI2 and the connection to the RJ45 connector.
- In the factory setting, the "RUN" button is inactive. Set the [Ref. 1 channel] (Fr1) parameter, page 29, and the [Cmd channel 1] (Cd1) parameter, page 59, to control the drive locally.

Fault detection codes which require a power reset after the fault is cleared

The cause of the fault must be removed before resetting by cycling power to the drive.

[PRECHARGE FAULT] (CrF), [OVERSPEED] (SOF), [AUTO-TUNING FAULT] (tnF), and [BRAKE CONTROL FAULT] (bLF) can also be reset remotely using a logic input (the [Fault reset] (rSF) parameter in the [FAULT MANAGEMENT] (FLt-) menu, page 92).

Code	Name	Probable cause	Remedy
bLF	[BRAKE CONTROL FAULT]	<ul style="list-style-type: none"> Brake release current not reached Brake engage frequency threshold [Brake engage freq] (bEn) = [No] (nO) (not set) whereas the brake control [Brake assignment] (bLC) is assigned 	<ul style="list-style-type: none"> Check the drive/motor connection. Check the motor windings. Check the [Brake release I FW] (lbr) setting in the [APPLICATION FUNCT.] (FUN-) menu, page 85. Apply the recommended settings for [Brake engage freq] (bEn), pages 84 and 85.
CrF	[PRECHARGE FAULT]	<ul style="list-style-type: none"> Precharge relay control or damaged precharge resistor 	<ul style="list-style-type: none"> Replace the drive.
EEF	[EEPROM FAULT]	<ul style="list-style-type: none"> Internal memory 	<ul style="list-style-type: none"> Check the environment (electromagnetic compatibility) Replace the drive.
IF1	[INTERNAL FAULT]	<ul style="list-style-type: none"> Unknown rating 	<ul style="list-style-type: none"> Replace the drive. Restart the drive. Contact a Schneider Electric representative.
IF2	[INTERNAL FAULT]	<ul style="list-style-type: none"> HMI card not recognized HMI card incompatible No display present 	
IF3	[INTERNAL FAULT]	<ul style="list-style-type: none"> EEPROM 	
IF4	[INTERNAL FAULT]	<ul style="list-style-type: none"> Industrial EEPROM 	
DrC	[OVERCURRENT]	<ul style="list-style-type: none"> Parameters in the [SETTINGS] (SEt-) and [MOTOR CONTROL] (drC-) menus are incorrect. Inertia or load too high Mechanical locking 	<ul style="list-style-type: none"> Check the parameters in [SETTINGS] (SEt-), page 32, and [MOTOR CONTROL] (drC-) page 41. Check the size of the motor/drive/load. Check the state of the mechanism.
ScF	[MOTOR SHORT CIRCUIT]	<ul style="list-style-type: none"> Short-circuit or grounding at the drive output Significant ground leakage current at the drive output if several motors are connected in parallel 	<ul style="list-style-type: none"> Check the cables connecting the drive to the motor, and the motor insulation. Reduce the switching frequency Connect chokes in series with the motor
SOF	[OVERSPEED]	<ul style="list-style-type: none"> Instability or Driving load too high 	<ul style="list-style-type: none"> Check the motor, gain and stability parameters Add a braking resistor Check the size of the motor/drive/load.
tnF	[AUTO TUNING FAULT]	<ul style="list-style-type: none"> Special motor or motor whose power is not suitable for the drive Motor not connected to the drive 	<ul style="list-style-type: none"> Use the L ratio or the [Var. torque] (P) ratio (see [U/F mot 1 selected] (Uft), page 44). Check that the motor is present during auto-tuning. If an output contactor is being used, close it during auto-tuning.

Fault detection codes that can be reset with the automatic restart function after the cause has disappeared

See the [Automatic restart] (Atr) function, page 91.

These detected faults can also be reset by turning the drive off then on again or by means of a logic input (the [Fault reset] (rSF) parameter, page 92, in the [FAULT MANAGEMENT] (FLt-) menu, page 91).

Code	Name	Probable cause	Remedy
CnF	[NETWORK FAULT]	<ul style="list-style-type: none"> Communication detected fault on the communication card 	<ul style="list-style-type: none"> Check the environment (electromagnetic compatibility) Check the wiring. Check the time out. Replace the option card. See the [CANopen fault mgt] (COL) parameter page 95 to define the stop mode with a (CnF).
CDF	[CANopen FAULT]	<ul style="list-style-type: none"> Interruption in communication on the CANopen bus 	<ul style="list-style-type: none"> Check the communication bus Refer to the relevant product documentation.
EPF	[EXTERNAL FAULT]	<ul style="list-style-type: none"> Depending on user 	<ul style="list-style-type: none"> Depending on user
LFf	[4-20mA LOSS]	<ul style="list-style-type: none"> Loss of the 4-20 mA reference on input AI3 	<ul style="list-style-type: none"> Check the connection on input AI3.
DbF	[OVERBRAKING]	<ul style="list-style-type: none"> Braking too sudden or driving load 	<ul style="list-style-type: none"> Increase the deceleration time Install a braking resistor if necessary. Activate the [Dec ramp adapt.] (bra) function, page 64, if it is compatible with the application.
DHF	[DRIVE OVERHEAT]	<ul style="list-style-type: none"> Drive temperature too high 	<ul style="list-style-type: none"> Check the motor load, the drive ventilation and the environment. Wait for the drive to cool before restarting.
DLF	[MOTOR OVERLOAD]	<ul style="list-style-type: none"> Triggered by excessive motor current [Cold stator resist.] (rSC) parameter value incorrect 	<ul style="list-style-type: none"> Check the [Mot. them. current] (Ith) setting, page 33, of the motor thermal protection, check the motor load. Wait for the drive to cool before restarting. Remeasure [Cold stator resist.] (rSC), page 42.
DPF	[MOTOR PHASE LOSS]	<ul style="list-style-type: none"> Loss of one phase at drive output Output contactor open Motor not connected or motor power too low Instantaneous instability in the motor current 	<ul style="list-style-type: none"> Check the connections from the drive to the motor. If an output contactor is being used, set [Output Phase Loss] (OPL) to [Output cut] (OAC) ([FAULT MANAGEMENT] (FLt-) menu, page 94). Test on a low-power motor or without a motor: In factory settings mode, motor output phase loss detection is active ([Output Phase Loss] (OPL) = [Yes] (YES)). To check the drive in a test or maintenance environment without having to switch to a motor with the same rating as the drive (particularly useful in the case of high-power drives), deactivate motor phase loss detection ([Output Phase Loss] (OPL) = [No] (nO)). Check and optimize the [IR compensation] (UFR), [Rated motor volt.] (UnS), and [Rated mot. current] (nCr) parameters, and perform an [Auto tuning] (tUn) operation, page 43.
DSF	[MAINS OVERVOLTAGE]	<ul style="list-style-type: none"> Line voltage is too high. Disturbed line supply 	<ul style="list-style-type: none"> Check the line voltage.
PHF	[INPUT PHASE LOSS]	<ul style="list-style-type: none"> Drive incorrectly supplied or a fuse blown Failure of one phase Three-phase ATV312 used on a single-phase line supply Unbalanced load <p>This protection only operates with the drive on load</p>	<ul style="list-style-type: none"> Check the power connection and the fuses. Reset Use a three-phase line supply. Disable the detection by setting [Input phase loss] (IPL) = [No] (nO) ([FAULT MANAGEMENT] (FLt-) menu, page 94).
SLF	[MODBUS FAULT]	<ul style="list-style-type: none"> Interruption in communication on the Modbus bus Remote display terminal enabled ([HMI command] (LCC) = [Yes] (YES), page 61) and terminal disconnected. 	<ul style="list-style-type: none"> Check the communication bus Refer to the relevant product documentation. Check the link with the remote display terminal.

Fault detection codes that are reset as soon as their cause disappears

Code	Name	Probable cause	Remedy
CFF	[INCORRECT CONFIG.]	<ul style="list-style-type: none"> The current configuration is inconsistent. Addition or removal of an option 	<ul style="list-style-type: none"> Return to factory settings or retrieve the backup configuration, if it is valid. See the [Restore config.] (FCS) parameter, page 46.
CFI	[INVALID CONFIG]	<ul style="list-style-type: none"> Invalid configuration The configuration loaded in the drive via the serial link is inconsistent 	<ul style="list-style-type: none"> Check the configuration loaded previously. Load a consistent configuration.
USF	[UNDERVOLTAGE]	<ul style="list-style-type: none"> Insufficient line supply Transient voltage dip Damaged precharge resistor 	<ul style="list-style-type: none"> Check the voltage and the voltage parameter. Tripping threshold in [UNDERVOLTAGE] (USF) ATV312●●●●M2: 160 V ATV312●●●●M3: 160 V ATV312●●●●N4: 300 V ATV312●●●●S6: 430 V Replace the drive.

What is an O.CF fault on an ATV31 or ATV312 drive?

Issue:

What is an O.CF fault on an ATV31 or ATV312?

Product Line:

Altivar, ATV31, ATV312

Environment:

All

Cause:

Motor will not run

Resolution:

O.CF is a phase-to-phase motor short circuit fault. Check motor windings and motor leads for a possible shorting path.

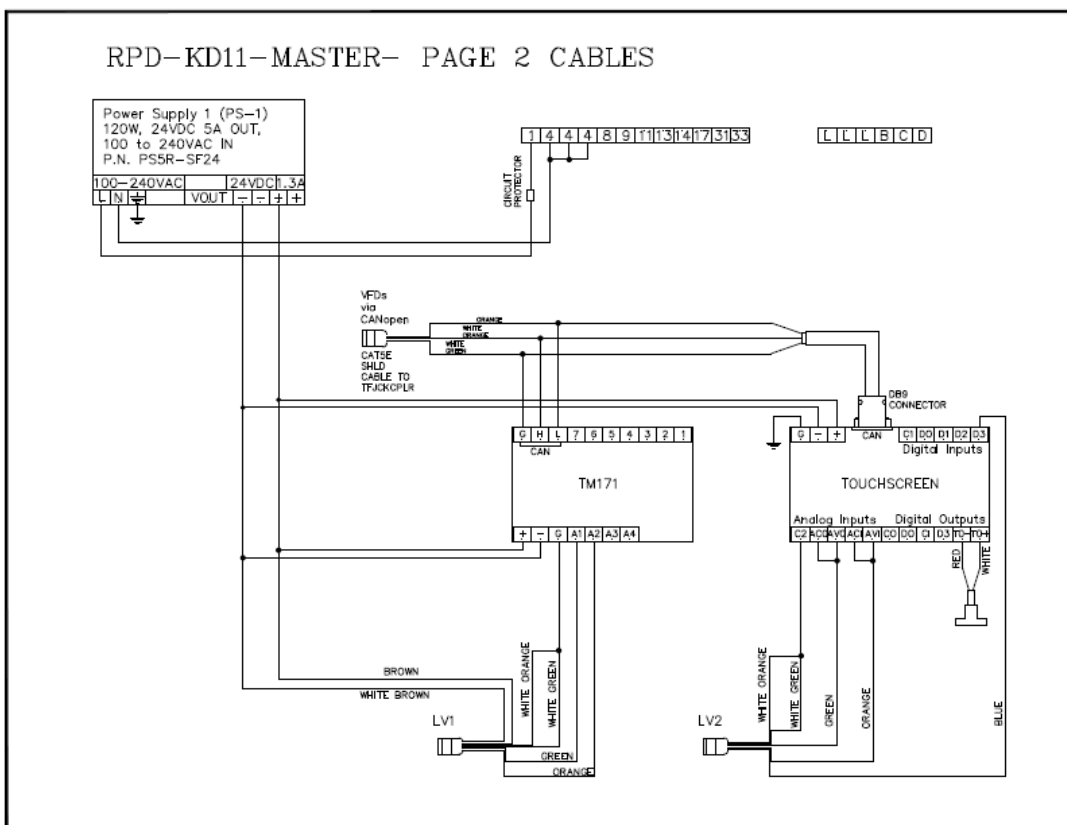
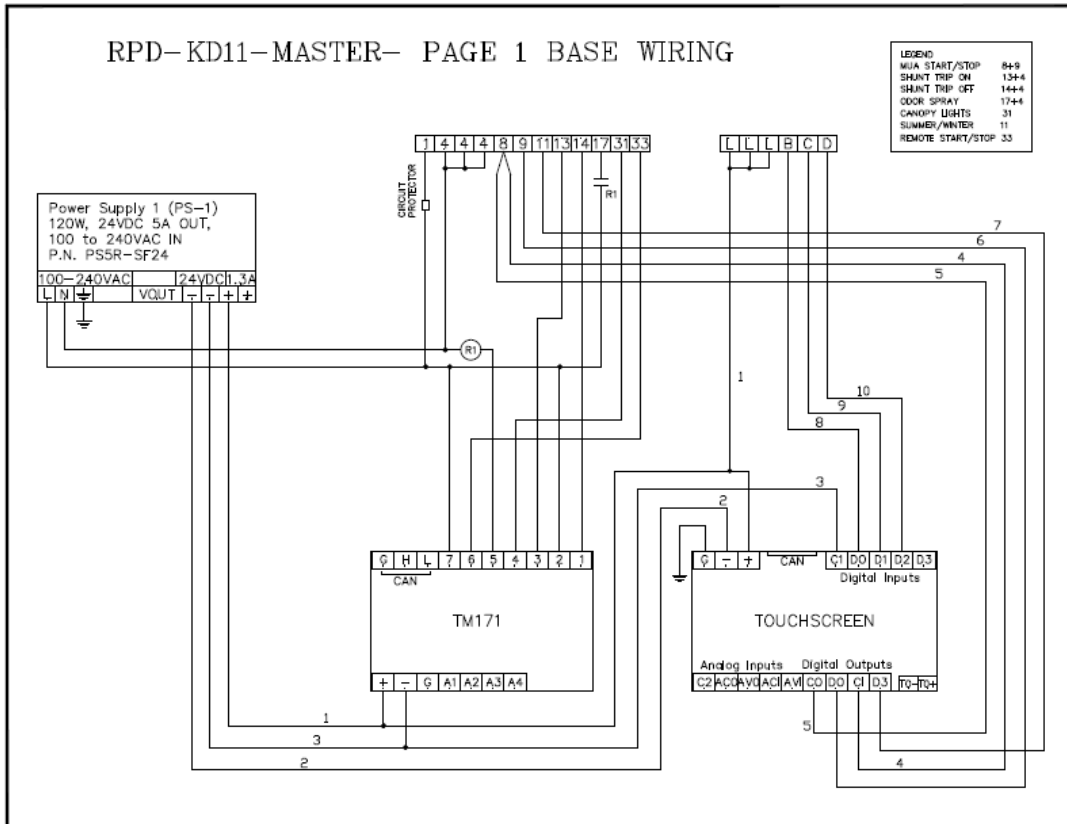
Other possible related fault codes are OCF and OC.F.

OCF is an overcurrent fault. Possible causes are incorrect settings in the SET and DRC menus, excessive loading on the motor or mechanical binding.

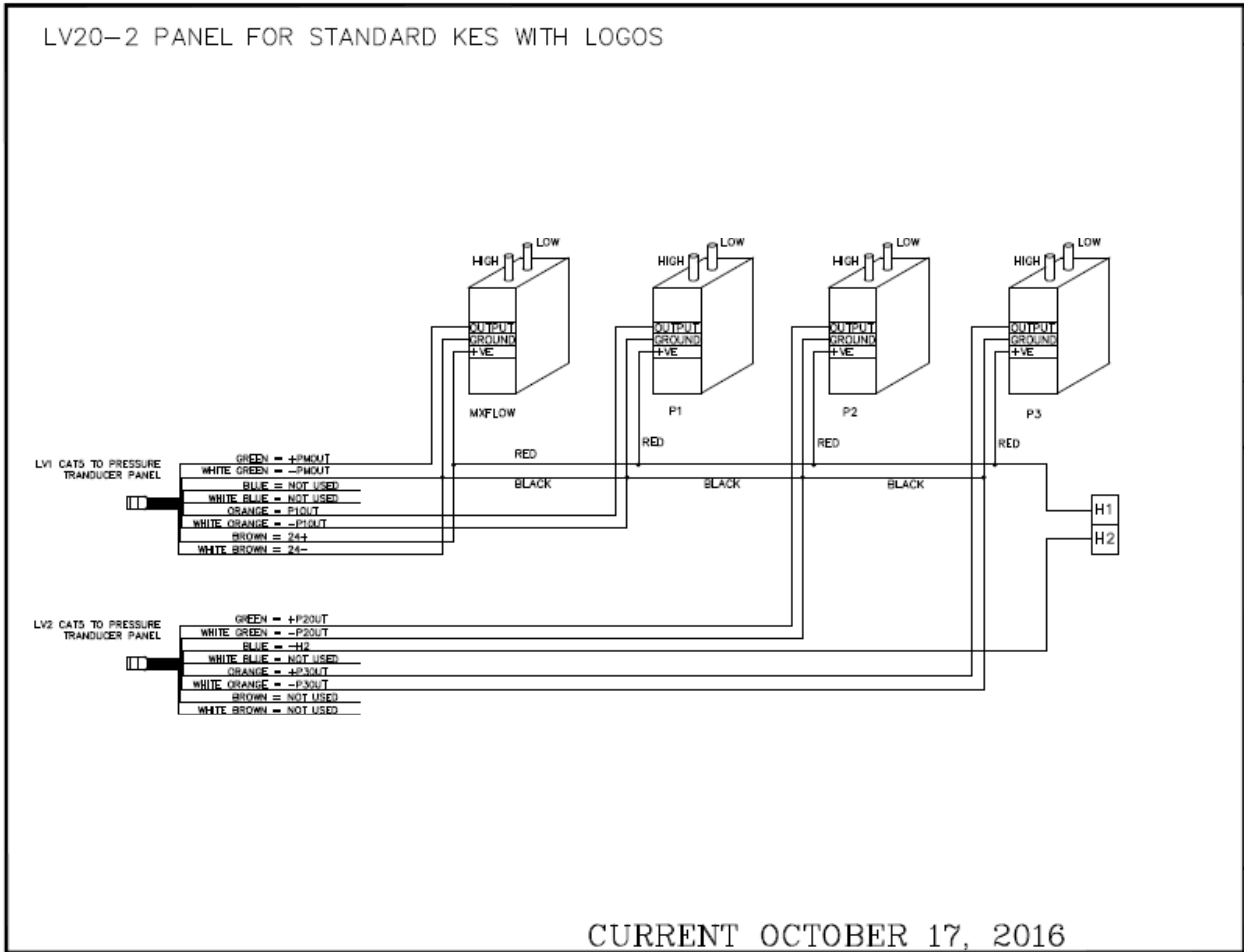
OC.F is an impedance short-circuit fault. This is a detected short-circuit or grounding at the drive output. Check the cables connecting the drive to the motor and the motor insulation. A Megger test at a 1,000 volts of the motor and motor leads should be performed.

S. Touchscreen FACTORY WIRING

RPD-KD Remote



Factory Wiring LV20



U. Odour Spray Compressor Maintenance

Do not, at any time lubricate any of the parts with oil, grease, or petroleum products nor clean with acids, caustics or chlorinated solvents. Be very careful to keep the diaphragm from contacting any petroleum product or hydrocarbons. It can affect the service life of the pump.

To clean or replace the filters and/or rubber gasket, remove the five screws in the top of the unit. The filters and gaskets are located beneath this top plate. Remove the filters and wash then in a solvent and/or blow off with air and replace. The gasket may be cleaned with water. Replace the filters in proper position and replace the gasket. Note that the gasket and top plate will fit in one position only.

To replace the diaphragm, remove the socket cap screws from the head of the pump. The diaphragm is held in place by two Philip head screws. Remove screws, retainer plate, and diaphragm. The diaphragm will fit in any position on the connecting rod. Replace the plate and the two Phillips head screws. Torque to 30 inch-pounds on DOA and DAA.

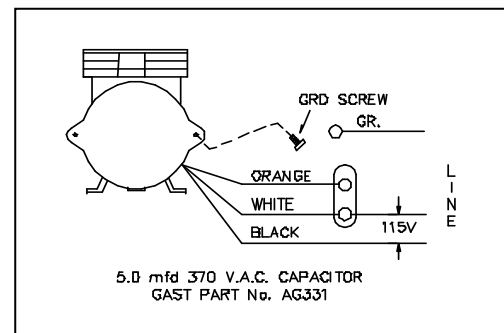
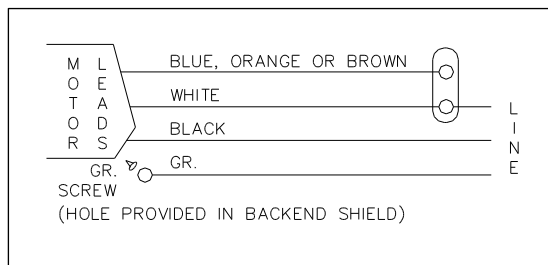
Caution: Do not raise any burrs or nicks on the heads of these screws. These burrs could cause damage to the inlet valve. For replacing the inlet and outlet valve, remove the slotted machine screw that holds each valve in place. The stainless steel inlet and outlet valves are interchangeable. Clean them with water. When replacing the outlet valve, place the new valve in location and note there is a retaining bar near the machine screw hole. This retaining bar holds the valve in position. When replacing the inlet valve, note that the valve holder is marked with an X in one corner. This X should be in the lower right hand corner toward the inlet of the air chamber. Replace the head and tighten the socket head screws to 90-100 inch-pounds or torque on DOA and DAA.

WARNING -
The motor is thermally protected and can automatically restart when the protector resets. ALWAYS disconnect KES fan power source before servicing.

Do not attempt to replace the connecting rod or motor bearings. If after cleaning the unit and/or installing a new service kit, the unit still does not operate properly, contact your representative, the factory, or return the pump to one of our authorized Service Centers.

IF YOUR PUMP IS EQUIPPED WITH PLASTIC PLUGS IN THE EXHAUST AND/OR INTAKE POTS, REMOVE BEFORE STARTING THE UNIT

C. Wiring Information



For any permanent split capacitor motor, which has four (4) leads is as follows:
Brown leads to capacitor. Black leads to Power Source.

For any permanent split capacitor for DOA & DAA motor, which has three (3) leads is as follows:

IMPORTANT NOTICE:

DO NOT AT ANY TIME ATTEMPT TO REMOVE THE CONNECTING ROD OR COMPLETELY DISASSEMBLE THE PUMP. IF IT DOES NOT GIVE YOU THE PROPER SERVICE EVEN AFTER INSTALLING A NEW SERVICE KIT, PLEASE RETURN IT TO ONE OF THE AUTHORIZED SERVICE CENTERS

V. MSDS Sheet Spring Fresh

MATERIAL SAFETY DATA SHEET

ENVIRONMENTAL ODOR CONTROL CORP.

191 ST. DAVID STREET, UNIT 7, LINDSAY, ONTARIO K9V 5K7

SECTION 1 - IDENTIFICATION

Issue Date: JANUARY 2012 Contact: 1-705-328-3305
Emergency: 1-201-825-7595

PRODUCT NAME: **DUMPSTER FRESH**

Chemical Identify: The specific chemical identities of the ingredients in this are considered by us to be trade secrets and are withheld in accordance with the provisions of 1910, 1200 of the code of federal regulations.

Product Use: Deodorizes garbage odors

WHMIS Classification: Class D-2B-CPR 63

TDG Classification: Not appl.

SECTION 2 - HAZARDOUS INGREDIENTS OF MATERIAL

Hazardous Rating: Health: 1 Fire: 1 Reactivity: 0

Health Hazards Including Signs

Symptoms of Overexposure: This mixture has not been tested as a whole. None of the ingredients are listed as carcinogens or potential carcinogens by OSHA

SECTION 3 - PHYSICAL DATA

Physical State:	Liquid	Solubility in Water:	Completely soluble
Color:	Yellow	Odor:	Floral mint, citrus
Flash Point:	Over 200 F	Boiling Point:	Aqueous solution
Specific Gravity:	1.025	Vapor Pressure:	Now known
Vapor Density (Air-1):	Not appl.	% Volatile:	>87%

SECTION 4 - FIRE AND SECTION EXPLOSION HAZARD DATA

Flash Point: Not known
Extinguishing Media: Carbon dioxide, foam, dry chemical
Special Fire Fighting

Procedures: Self contained breathing apparatus and protective clothing should be worn

Unusual Fire & Explosion

Hazards: Closed containers may build up pressure at elevated temperatures. Cool with spray.

Flammable Limits: Not known

SECTION 5 - REACTIVITY DATA

Chemical Stability: Stable
Incompatibility: Avoid contact with strong acids, alkalis or oxidizing agents
Hazardous Decomposition Products: Carbon monoxide and unidentified organic compounds may be formed during combustion
Hazardous Polymerization Products: Will not occur

SECTION 6 - HEALTH AND HAZARD DATA

Inhalation:	May cause irritation to nose and throat If breathing is irregular, call a physician
Eyes:	Flush immediately with water for at 15 minutes
Skin Contact:	Wash affected area with soap and water. Remove contaminated clothing. If irritation persists, call a physician
Indigestion:	Do "NOT" induce vomiting. Drink water or milk to dilute. Call a physician.

SECTION 7 - PRECAUTIONS FOR SAFE HANDLING

Leak and Spill Procedure:	Flush with water or remove in any water proof container. Ventilate area.
Waste Disposal Methods:	Dispose of in approved land fill site
Handling and Storage	
Precautions:	Keep containers tightly closed and upright when when not in use

SECTION 8 - FIRST AID MEASURES

Eyes:	Use goggles or face shield if eye contact may occur
Clothing:	Wear chemically resistant gloves if handling large volumes of chemical
Respiratory:	None generally required. In poorly ventilated area wear NIOSH approved respirator
Ventilation:	Provide adequate ventilation. Use exhaust fan if necessary
Work Practices:	Normal personal hygiene practices should be followed when handling chemical

SECTION 9 - DISCLAIMER

The information in this MSDS was obtained from current and reliable sources. However, the data is provided without any warranty, expressed or implied, regarding its correctness or accuracy. Since the conditions of handling, storage and disposal of this product are beyond our control, it is the responsibility of the use both to determine safe conditions for use of this product and assume full responsibility for loss, injury and expense arising our of the products improper use. No warranty, expressed or inferred, regarding the product described in this MMSDS shall be created or inferred by any statement of this MSDS. Various government agencies may have specific regulations regarding transportation, handling, storage, use of disposal of this product which may not be covered in this MSDS. The use is responsible for full compliance.

W.Touchscreen Initial Set-up

Login as Administrator. If you do not have the Administrators password call Spring Air Systems Inc. head office Service Manager. ONLY ADMINISTRATOR LOGIN WILL ALLOW YOU TO PERFORM THE STARTUP.

- 1) Do not power on the fan(s) prior to the set up.
- 2) Only administrator can sign in and proceed with the initial set up or make any changes to the system.
- 3) If the system is being set up for the first time errors will appear on the screen. Do not attempt to address these errors. Proceed with the initial set up instructions.

Follow the instructions step-by-step in order to complete the initial set up. This set up will allow you to set up the system when it is being installed for the first time.

Pre-Start Checklist

- ___ 1. The circuit breaker is on and providing 120V/1/60.
- ___ 2. The commercial kitchen surface fire suppression system must be installed as per NFPA code and tagged.
- ___ 3. The commercial kitchen exhaust hood(s), exhaust fan(s) and supply fan(s) have been installed in accordance with all applicable national and local codes.
- ___ 4. All equipment has been installed as per engineering drawings.
- ___ 5. The interconnection wiring has been installed as per engineering drawings.
- ___ 6. The interconnection wiring and cables have been installed in accordance with all applicable National and Local Codes.

General Information

Job Name		Date	
Location		File No.	
KES No.		Motor HP	
D. S/N		Voltage	

Item	Description	Y / N
1	Check all electrical connections in RPD and LV20 panels.. Tighten as necessary	
2	Check for power to the RPD-KD panel on terminals 1 & 4	
3	Check all remote wiring to ensure it has been connected and secured	
4	RPD to LV20 J-Box – Test and connect CAT5 cables LV1 and LV2 Note: If Cat5 cables are not connected or if they are not connected to correct connection, KES will not run. Screen will display YELLOW exclamation and beep continuously. Message will read “High Temp/Cable Fault”	
5	RPD to VFD – Test and connect CAT5 cable	
6	LV20 J-Box wiring to odor spray 4 & 17 (Optional for odor spray units)	

Check if all filters are in the unit. Enter quantity in chart below.

Type of Filter	Size	Qty
7 Prefilter	12” x 24” x 2”	
7a Large Prefilter	12” x 24” x 4”	
8 Prefilter	24” x 24” x 2”	
8a Large Prefilter	24” x 24” x 4”	
9 Bag Filter	12” x 24” x 22”	
10 Bag Filter	24” x 24” x 22”	
11 Box Filter	12” x 24” x 12”	
12 Box Filter	24” x 24” x 12”	

Item	Description	Y / N
13	Check of the inlet exhaust ductwork to the KES unit from the kitchen exhaust hood is all welded NFPA-96	
15	Check if clearance to top, sides, and ends of KES filter box is available: 18” to combustible or 6” to non-combustibles. Check for proper access to filters, odor trays (if provided) and motor/fan access. Report any interferences or potential problems in comments below.	
15a	Comments:	
16	KESF power wiring to disconnect switch	
17	Check power at disconnect switch	3/60/ V
18	Touch SETTINGS button	
19	Log into Settings/Options section. a) Touch UNLOCKED padlock. b) Touch USERNAME box. c) Confirm that keyboard is in LOWER CASE (CAPS button is not GREEN). d) Enter service username as provided by SAS Service Coordinator and press	

	<p>ENTER</p> <p>e) Touch PASSWORD box</p> <p>f) Enter password as provided by SAS Service Coordinator and press ENTER.</p> <p>g) Touch unlocked padlock in middle of screen and then touch CLOSE.</p> <p>h) New access buttons should appear.</p>	
20	Touch SET TIME button and enter current local time. Press CONFIRM to set and exit box.	
21	Return to MAIN screen and touch the FAN STATUS button	
22	Confirm CFM value is the same as the design CFM from the project drawing.	CFM
23	Set the Motor FLA to the value as displayed on the motor nameplate.	A
24	<p>Check fan rotation as follows:</p> <p>a) Turn on the main disconnect to the KESF fan VFD</p> <p>b) Open the fan access door and prop open.</p> <p>c) Touch the “System ON” button on the RPD-KD panel.</p> <p>d) Touch the Off button.</p> <p>e) Go to fan box and observe direction of rotation.</p> <p>f) If rotation is backwards, turn off disconnect at fan and change 2 of the output leads on the VFD. Repeat steps a) through e).</p> <p>g) If rotation is correct continue with start up.</p>	

Max Hertz Setting for VFD/Motor

Item	Description	Y / N
25	Check the <i>Motor nameplate MAX FLA</i> rating and record value here	A
26	Press SYSTEM ON button. Allow 1 minute for systems to stabilize.	
27	Press FAN STATUS button. Record actual running Hz.	Hz
28	Record actual running amps.	A
29	Set MAX HZ to 70.0. Press MIN HZ and change to running Hz (Step 20) + 10. Check Running Amps..	
30	If lower than MAX FLA from motor nameplate, increase MIN HZ by 1.0 Hz increments until running amps equals MAX FLA.	
31	If higher than MAX FLA from motor nameplate, decrease MIN HZ by 1.0 Hz increments until running Amps equals MAX FLA.	
32	When Running Amps equals MAX FLA record the MIN HZ	Hz
33	Set MIN HZ to 30.0 and MAX HZ to 2 Hz lower than the recorded Hz in Step 25.	
34	Record Final MAX HZ setting Return to Main Screen.	Hz

SETTING MINIMUM AMPS LOAD POINT – (CLEAN FILTERS)

Item	Description	Y / N
35	Turn system ON. Allow to run for 1 minute for system to stabilize.	
36	Press FAN STATUS	
37	Touch Max Hz and set to 0.1 Hz higher than Minimum setting.	
38	Record actual running Amps	A
39	Re-set Max Hz to value from Step 34	
40	Press SETTINGS button	
41	Press FLA VALUES button	
42	Touch Min FLA and set to 1.0 Amps lower than value in Step 30. Return to main screen.	A

Check Volume With Filter Box Static – THIS CAN ONLY BE DONE WITH CLEAN FILTERS!		
Item	Description	Y / N
43	Press System ON button.	
44	Press KES FILTER Button	
45	Read Box Actual Static Ax	
46	The DESIGN Box Static is x.xx ”	
47	To adjust the NODE Settings follow these steps: a) Log in to Service Screen b) Press SETTINGS button c) Press NODE SETTINGS button d) Press SET POINT e) Increase or lower setting by 0.25” f) Allow fan to run for 1 to 2 minutes to tune into new setting. g) Check Ax to x.xx ”	
48	If the Actual static is below x.xx ” adjust the NODE value higher.	
49	If the Actual static is higher than x.xx ” adjust the NODE value lower.	
50	Record the final FACTORY NODE SETTING	In“
51	Record the final FIELD NODE SETTING	In”
52	Record the FACTORY VFD running Hz	Hz
53	Record the FIELD VFD running Hz	Hz
54	Record the FACTORY Fan Motor running amps	A
55	Record the FIELD Fan Motor running amps	A

RPD Annunciation Check

Item	Description	Y / N
56	Remove LV1 cable from top of RPD. YELLOW EXCLAMATION mark and alarm should activate. Touch YELLOW EXCLAMATION mark and touch MESSAGES button	
57	Screen should display message “HIGH TEMP ALARM/CABLE FAULT” in red.	
58	Plug LV1 cable back into connector on top of RPD. Message should turn green.	
59	Remove LV2 cable from top of RPD. YELLOW EXCLAMATION mark and alarm should activate. Touch YELLOW EXCLAMATION mark and touch MESSAGES button.	
60	Screen should display message “HIGH TEMP ALARM/CABLE FAULT” in red.	
61	Plug LV2 cable back into connector on top of RPD. Message should turn green	

Pre filter Clogged Test

Item	Description	Y / N
62	Turn system on wait for 1 minute for system to stabilize.	
63	Press FILTERS button on screen	
64	Press LIMITS button on new screen	
65	Observe the Ax value for the PRE-FILTER status. Record here	In”
66	Touch the CLOGGED Setting and enter value of half of the Ax	
67	Fan should shut down and message OVERRIDE message will pop-up	
68	Touch FILTER OVERRIDE button. Fan will start and message will read “OVERRIDE 4 HOURS”	
69	Press FILTERS button	
70	Press LIMITS button	
71	Re-set Pre Filter Clogged set point to 1.50	
72	Press CLOSE button. Turn System OFF to re-set OVERRIDE function.	

Bag Filter Clogged Test

Item	Description	Y / N
73	Turn system on and wait for 1 minute for system to stabilize.	
74	Press FILTERS button on screen	
75	Press LIMITS button on new screen	
76	Observe the Ax value for the BAG FILTER status. Record here	In ²
77	Touch the CLOGGED Setting and enter value of half of the Ax	
78	Fan should shut down and message OVERRIDE message will pop-up	
79	Touch FILTER OVERRIDE button. Fan will start and message will read "OVERRIDE 4 HOURS"	
80	Press FILTERS button	
81	Press LIMITS button	
82	Re-set Bag Filter Clogged set point to 2.00	
83	Press CLOSE button. Turn System OFF to re-set the OVERRIDE function.	

Box filter Clogged Test

Item	Description	Y / N
84	Turn system on wait for 1 minute for system to stabilize.	
85	Press FILTERS button on screen	
86	Press LIMITS button on new screen	
87	Observe the Ax value for the BOX FILTER status. Record here	
88	Touch the CLOGGED Setting and enter value of half of the Ax	
89	Fan should shut down and message OVERRIDE message will pop-up	
90	Touch FILTER OVERRIDE button. Fan will start and message will read "OVERRIDE 4 HOURS"	
91	Press FILTERS button	
92	Press LIMITS button	
93	Re-set BOX Filter Clogged set point to 2.50	
94	Press CLOSE button. Turn System OFF to re-set the OVERRIDE function.	

Filter Removed Alarm Setting

Item	Description	Y / N
95	Turn system on wait for 1 minute for system to stabilize	
96	Press FAN STATUS	
97	Record MAX HZ setting here	Hz
98	Set MAX Hz setting to same as MIN Setting plus 0.1Hz.	
99	Press FILTERS button	
100	Press LIMITS button	
101	Check Ax for BAG Filter. Set OUT Set point to half of the Ax Value.	
102	Record BAG FILTER OUT set value for Bag Filters	In ²
103	Check Ax for BOX Filter. Set OUT Set point to half of the Ax Value.	
104	Record BOX FILTER OUT set value for Box Filters	In ²

BAG Filter Out Test #1

Item	Description	Y / N
105	Remove all the bag filters. Shut the access door and turn the unit on. Wait for 40 sec.	
106	KES unit shuts off and message "FILTER ALARM OVERRRIDE 4 HOURS" appears	
107	Touch OVERRIDE button and fan starts with message "FILTER OVERRIDE"	
108	Press Message button. BAG FILTER REMOVED message in RED should be on screen	
109	Turn fan off and replace the bag filters. Turn fan on and check message screen to see if BAG Filter Removed message is now GREEN.	

BOX Filter Out Test #2

Item	Description	Y / N
110	Remove all the Box filters. Shut the access door and turn the unit on. Wait for 40 sec.	
111	KES unit shuts off and message "FILTER ALARM OVERRRIDE 4 HOURS" appears	
112	Touch OVERRIDE button and fan starts with message "FILTER OVERRIDE"	
113	Press Message button. BOX FILTER REMOVED message in RED should be on screen	
114	Turn fan off and replace the Box filters. Turn fan on and check message screen to see if BOX Filter Removed message is now GREEN.	

Final Actual CLEAN Filter Values

115	Read the PRE Ax	Record Value	In ^o
116	Read the BAG Ax	Record Value	In ^o
117	Read the BOX Ax	Record Value	In ^o

Final Actual Filter CLOGGED SET POINTS

118	Read the PRE CLOGGED Ax	Record Value	In ^o
119	Read the BAG CLOGGED Ax	Record Value	In ^o
120	Read the BOX CLOGGED Ax	Record Value	In ^o

Final Actual Filter OUT SET POINTS

121	Read the BAG OUT Ax	Record Value	In ^o
122	Read the BOX OUT Ax	Record Value	In ^o

Hi Temperature Switch Test

Item	Description	Y / N
123	Switch fan to ON and allow system to stabilize for 1 minute	
124	Open LV20 junction box on KES.	
125	Remove the heavy gauge wire from terminal H2	
126	Fan should shut down and large RED exclamation mark should show on screen.	
127	Touch exclamation mark. Screen message should read HIGH TEMPALARM/CABLE FAULT"	
128	Replace heavy gauge wire on terminal H2	
129	Message should clear.	
130	Turn system on and fan should start.	

SETTING SCHEDULED START/STOP FUNCTIONS (OPTIONAL)

Item	Description	Y / N
131	Press SCHEDULE button.	
132	Press SETTINGS button.	
133	Touch each day that you want to set a scheduled start and stop time for. Press ENABLE DAY button. A GREEN line will appear under all selected days.	
134	Touch the HOUR and MINUTE boxes to change the start and stop times to desired settings. (Clock function is 24 Hour format). When complete press RETURN.	
135	To activate the schedule, touch the CONFIRM button.	
136	The SCHEDULE button should change to GREEN and say ON if enabled. You cannot shut off system if the time of day is between the START and STOP times.	

ADDITIONAL SELECTABLE OPTIONS

Item	Description	Y / N
137	Touch SETTINGS button. The following OPTIONS will appear: a) RSS – Remote Start Stop Enable b) Thermal Start – Auto Start on Temperature Detection Enable c) Supply 1 – Enable Supply fan VFD option	

	d) Double i – Enable BC Direct Fired double interlock	
	e) Odor Spray – Enables odor spray option	
	f) TFMX – Option for TruFlow/MXFlow switchover setting.	
137a	Pressing RSS will turn Label GREEN. This allows a dry contact to switch the system on and off from a remote switch or from BMS.	
137b	Pressing this button will open the Thermal Start settings box. See instructions in STEP 144 to 153 below for setup instructions.	
137c	Pressing SUPPLY 1 button will turn label GREEN and allow for VFD operation of SUPPLY fan. If no SUPPLY vfd is installed, system will shut down on VFD MISSING fault.	
137d	Pressing DOUBLE i button will enable the double interlock for direct fired make up air units. Button will turn GREEN if enabled.	
137e	Pressing ODOR SPRAY button will access settings and enable for odor spray operation. See instructions in STEP 138 to 143 below.	
137f	Pressing TFMX button will access the TruFlow to MX Flow switchover function. This only applies to TC systems. A popup screen allows the setting of the switchover from 16 Ma (1600) to 18 Ma (1800).	

SETTING ODOUR SPRAY FUNCTIONS (OPTIONAL)

Item	Description	Y / N
138	Press SETTINGS button.	
139	Press SYSTEMS OPTIONS button.	
140	Press ODOUR SPRAY button. It will turn GREEN.	
141	Touch DELAY TIME button and enter time interval between sprays in minutes.	
142	Touch the DURATION TIME button to set the length of the actual spray time in minutes.	
143	Close screen.	

SETTING THERMAL (AUTO) SYSTEM START (OPTIONAL)

Item	Description	Y / N
144	Turn system off	
145	Press SETTINGS button	
146	Press SYSTEMS OPTION button	
147	Press THERMAL START button	
148	Press SET POINT button. Enter 55.0 and press ENABLE	
149	Check that ENABLE button is GREEN. If not Press ENABLE again.	
150	Press DELAY TIME OFF button. Set to 1.0 minute and close screen to return to start screen	
151	Wait 1 minute. Unit should start running and message will read “THERMAL START ACTIVE”	
152	To remove this message Press START button.	
153	Re-set SET POINT to 110.0 and DELAY TIME OFF to 30 minutes.	

ENTERING LOCAL SERVICE COMPANY CONTACT INFORMATION

Item	Description	Y / N
154	Touch Service @ button at top center of touchscreen	
155	Touch LOCAL COMPANY NAME box and Enter your company name	
156	Touch TECH NAME box and enter primary contact name	
157	Touch PHONE # box and enter local phone number for service company	
158	Touch E-MAIL box and enter e-mail address for primary contact for local company	
159	Confirm that the PROJECT ID # is the same number as the File No at top of this form.	
160	Close Service Contact Information screen.	

You have completed the start up of the KES unit.

161 Measure the exhaust air volume at each hood Use hood start up form for this. If the hood airflows are higher or lower than the design, refer to Steps 43 to 55 to raise or lower the fan speed. If the max FLA of the motor has been reached and airflows remain low, call **Spring Air Systems Service for further instructions. 1-866-874-4504**

Please record any site conditions and/or any concerns about installation or operation in space provided below.

Comments:

Service Technician : _____

Service Company : _____

Yes, I have received a set of Spring Air Systems Inc. maintenance manuals.

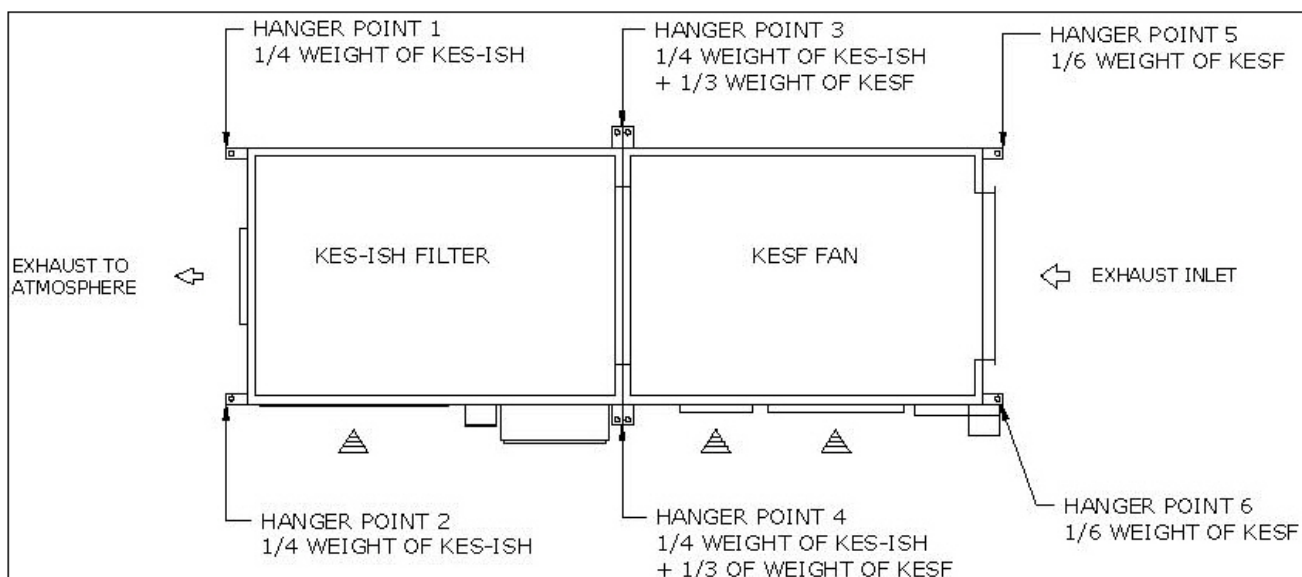
Signature _____ Print Name _____

Y. Field Connecting the KES-ISH Filter Box and KESF Fan Box

1. The complete unit is shipped in two pieces as outlined on the drawings.
2. Uncrate the filter and fan box and place on a level surface. Align the KES-ISH filter box discharge (this is the end with the fire damper in the duct collar) so that it is facing the KESF fan unit inlet.
3. There is a neoprene gasket attached to the KES-ISH filter box inside standing flange. Check to ensure that it is still in place on the flange inside the bolt holes pattern. If parts of the gasket have been removed reseal them with silicone.
4. Remove the nuts, bolts and lock washers from a box in the KESF fan section.
5. Slide the KESF inlet fan section into the KES-ISH filter box.
6. Align the bolt holes on the top and lower side exterior standing flange of the KES-ISH filter unit and KESF fan unit. Insert the four bolts. One in each of the top corners and one in each of the bottom sides of the KES-ISH filter and KESF fan section. Place lock washers and nuts on the end of the bolts and tighten each corner. Check periodically that the other bolt-holes remain aligned.
7. Enter the unit through the KES-ISH filter section box filter access door and insert the bolts and nuts into the standing flange at the bottom of the KES-ISH filter and KESF fan unit. Tighten these nuts and bolts uniformly.
8. Insert bolts into each side of the base flanges where the exterior bases of KES-ISH filter and KES fan unit meet. The base at the outside lifting point of the two pieces.
9. Continue to insert the bolts, lock washers, and nuts in the remaining bolt holes connecting the KES-ISH filter and KESF fan boxes. It is best to start in the middle of the top and ends and work back towards the corners.
10. Reconnect the electrical connection from KES-ISH LV10 panel to the KESF motor starter. The original connection was made in the factory and disconnected for shipment.

z. Hanging the KES-ISH Filter and KESF Filter Box

1. Complete the field connecting of the KES-ISH filter box and KESF fan section.
2. Once the pieces are together forming one unit the complete assembly can be suspended from the lifting points indicated on the dimensional drawings.
3. The total weight of the assembly is the weight of the KES-ISH unit plus the weight of the KESF fan unit. The weight distribution is outlined below as a percentage of the weight of each pieces.
4. The unit is suspended on six (6) hanging threaded rods through the holes in the web of the lifting flanges. Secure a bolt and lock washer to the end of each threaded rod under the unit flanges. Size the rods to hold the weight calculated for each rod below.



AA. KES UNIT WEIGHT CHART (lbs)

KES Model Number	KES-ISH Filter Box	KESF Fan Unit DWDI	KESF Fan unit SWSI	KESV Vertical unit	Odor Pellet Section	Odor Spray Section
10	250	630	550	950	200	100
20	300	630	600	1050	300	100
30	350	710	700	1100	450	110
40	450	710	800	1300	500	110
50	550	950	1000	1650	550	150
50F	550	n/a	n/a	n/a	550	150
60	600	950	1100	1750	600	150
60F	650	n/a	n/a	n/a	600	150
80	700	1300	1350	2100	900	170
100	850	1600	1500	2550	1050	190
120	950	1700	1950	n/a	1250	200
140	1050	1850	2050	n/a	1450	220
160	1150	2250	2300	n/a	1600	250
180	1200	2300	2550	n/a	1850	250
200	1250	2450	2550	n/a	1950	275
240	1400	2750	2650	n/a	2400	300
280	1500	3150	3450	n/a	2600	350
320	1650	3700	4050	n/a	3100	400
360	1800	4350	4350	n/a	3300	465
400	1950	5000	4850	n/a	3800	550

Notes:

- II.* KES Filter box discharge outlet duct dimensions are sized to suit the KES fan section inlet dimensions.
- III.* For outdoor units add 250 lbs. to the weight of the KESF and KES-ISH.
- IV.* The KESF fan units with DWDI fans and internal or external isolation are available with exhaust discharge positions: UB up blast, DB down blast and TB straight through discharge.

The KESF fan units with SWSI fans and internal or external isolation are available with exhaust discharge positions: RB right discharge, LB left discharge, UB up blast and DB down blast. Right and left discharge based on looking into fan inlet. Access doors can be RS right side or LS left side based on looking into inlet of unit.

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