Auto Fan Control System™
Installation, Operation, and Maintenance Instructions

Description:

The Larkin Auto Fan Control System™ automatically starts the fans per IMC code 507.2.1.1 by means of a temperature sensor as cooking operations commence.

System Component:

The Larkin Industries AFCS (Auto Fan Control System™) wall mount control panel includes the following:

- Wall mounted 12” x 18” x 6” stainless steel enclosure with hinged door and tamper resistant latch. Enclosure may be recessed mounted (with optional trim ring) or hood mounted in utility cabinet.
- Door mounted light switch, pilot lighted fan switch, and temperature dial.
- Exhaust and supply fans are interlocked and fire suppression system activated, supply fan(s) shut down and exhaust fan(s) continuous operation in fire (lights off in fire optional).
- Temperature sensor(s) factory mounted in hood(s).
- Exhaust and supply fan starters (3 Phase) or contactors (1 Phase).
- Prewired with terminal strips and wiring diagrams.

Note: For hood mounted systems, the controls will be housed in a 12” x 18” x 6” galvanized steel enclosure and switches will be located on the face of the hood.

Wall mounted box size 12” x 18” x 6” for up to 4 starters or contactors and 18” x 18” x 6” for 5-6 starters or contactors.

Important Notice To Electrician

This system will not operate properly without a dedicated Control circuit and two fire suppression micro switches.

See wiring diagram and installation instructions (page3) for wiring requirements.
Mounting Options

Hood Mounted:

- For hood mounted AFCS, the control panel will be mounted in a utility cabinet or on top of the hood, switches will be located on the face of the hood or utility cabinet. (see Figure 1)

Wall Mounted:

- For wall mounted AFCS, the control panel will be housed in a 12” x 18” x 6” stainless steel enclosure and should be secured to a fixed wall near the exhaust hood it controls. Enclosure may be recess mounted with optional trim ring. (see Figure 2)
Figure 3

Electrical Connection Required for System
S/S 12” x 18” x 6” AFCS control panel with hinged door and switches:

- Low Voltage to hood sensor.
- Lights in hood (120V 1 Phase 20 AMP).
- *Low voltage control wiring (if tempered make up air is provided) from unit to control panel.
- Fire suppression micro switches.
- 2 separate circuits from breaker panel:
  - (1)120VAC 15AMP for control voltage
  - (1)120VAC 20AMP for hood lights
- 1 or 3 phase power as required from breaker panel to control panel for fans (see wiring diagram.)
- 1 or 3 phase from control panel to fans (see wiring diagram.)
- *1 or 3 phase power (if tempered make up air is provided.) from breaker panel to unit. *

*Note: If tempered make-up air is provided, the power wiring for the tempered unit must be connected directly from breaker panel. (H) and a separate control circuit connected from the unit to the control panel (C).
Hood Mounted Temperature Sensor

When the Larkin AFCS is ordered with a Larkin Industries hood model the temperature sensor is factory mounted in each hood, no field installation required. AFCS ordered for non-Larkin hoods or Retro-fit application the temperature sensor will have to be field installed in each hood controlled by the system. A 1-1/8" diameter hole must be cut in the top of the hood and the compression seal and sensor installed as shown in (Figure 4).

Note: Mount sensor in top of hood approximately 2" from seam close to filters and as close to center of hood left to right. CAUTION: If sensor is located too close to a light fixture, the heat generated can activate the system. Sensor must be centered between lights. On large hoods 12' to 16' avoid any dead areas (work tables, refrigerators, ovens etc.)

Wiring Instructions

The Larkin AFCS components are all prewired. The field wiring required to connect the control panel to the hood and breaker panel should be made in accordance with the wiring diagram provided with these instructions, and the NEC (National Electrical Code) requirements.

WARNING! Disconnect power before installing or servicing the system. High voltage electrical input is needed for this system. A qualified licensed electrician should only perform this installation.
1. Check the power source to see if it is compatible with the requirements of the provided system. The AFCS wiring diagram list the proper phase, voltage, and amp load.

2. Verify input power voltage before connecting to starters or contactors.

3. Check rotation of fans, exhaust fans will move some air in reverse (See rotation arrow on fan). To correct rotation of fans reverse any two leads from the 3 Phase starter to the fan.

4. When wiring to a Larkin Industries tempered make-up unit, a separate control circuit must be connected to the tempered make-up unit from the control panel or the unit will not operate. (See Heated Unit wiring diagram)

Note: The power wiring for tempered make up air is pulled directly from the breaker panel.

Field Wiring Requirements for Control Panel

**Light Circuit:** 120 VAC 1 Phase 20 AMP to terminals - #1 (Hot) and #2 (Neutral) from breaker.

```
       1  2
      G B W
CONTROL PANEL TERMINAL STRIP
120 V 1 PH. LIGHT POWER FROM BREAKER
```

**Control Circuit:** 120 VAC 1 Phase 15 AMP to terminals – 4 (Neutral) and 5 (Hot) from breaker. (Control circuit should not be wired to a shunt trip breaker.)

```
       4  5
      G W B
CONTROL PANEL TERMINAL STRIP
120 V 1 PH. CONTROL POWER FROM BREAKER
```

**Hood Lights:** Field wire hood light to terminals #2 (Neutral) and #3 (Hot) in the control panel.

*Note:* This connection is factory wired on hood mounted systems.

```
       2  3
      W B
CONTROL PANEL TERMINAL STRIP
```

JUNCTION BOX ON HOODS
HOOD SENSOR WIRING INSTALLATION INSTRUCTIONS FOR SINGLE HOOD APPLICATION

HOOD SENSOR IS PRE-WIRED TO JUNCTION BOX ON END OF HOOD.SENSOR MUST BE FIELD WIRED TO TERMINAL S1 AND S2 IN THE CONTROL PANEL FOR HOOD.

HOOD SENSOR JUNCTION BOX

CONTROL PANEL

JUNCTION BOX (TERMINAL STRIP FOR FIELD WIRING OF HOOD SENSOR)

FIELD CONNECT WITH LOW VOLTAGE THERMOSTAT WIRE

EXHAUST COLLAR

SUPPLY COLLAR

FACTORY WIRING
FIELD WIRING
CABLE GROUND
HOOD SENSOR WIRING INSTALLATION INSTRUCTIONS FOR END-TO-END CONFIGURATION

HOOD SENSOR IS PRE-WIRED TO JUNCTION BOX ON END OF HOOD. SENSORS MUST BE FIELD WIRED TO TERMINALS S1 AND S2 FOR SENSOR #1 AND S3 AND S4 FOR SENSOR #2 IN THE CONTROL PANEL.

NOTE: HOOD SENSOR ON HOOD SEC. #2 MUST BE CONNECTED TO THE TERMINAL STRIP ON HOOD SEC. #1.
**Hood Sensor(s):** To field-wire, connect low voltage wiring from the hood sensor terminals located in a junction box on end of hood, to sensor terminals S1 & S2 located in control panel. For a system controlling more than one hood, connect hood sensor #2 to S3 & S4, hood sensor #3 to S5 & S6, and hood sensor #4 to S7 & S8. A system can have up to four sensors. Sensors must be wired separately. Use conduit when making this connection.

*Note:* Sensor for hood #1 is factory connected on hood mounted systems, for multiple hoods or sections, field connections will be necessary (see wiring diagram).

**Micro Switches:** The Larkin AFCS requires two (2) micro switches. Micro Switch #1, for supply fan shutdown in fire, should be field wired to terminals NC1 (brown), C1 (red), and NO1 (black) in the control panel from the fire suppression system. Micro switch #2, for exhaust on in fire, should be field wired to terminals NC2 (brown), C2 (red), and NO2 (black) in the control panel from the fire suppression system.

**Fan Input Power:** Check the power source to see if it is compatible with the requirements of the provided system. The AFCS wiring diagram list the proper phase, voltage, and amp load. Verify input power voltage before connecting to starters or contactors.

**Fan Output Power:** Connect output power to proper fan from contactor(s) or starter(s) terminals T1 and T2 (1 Phase) or T1, T2, and T3 (3 Phase). Check rotation of fans, exhaust fans will move some air in reverse (See...
rotation arrow on fan). To correct rotation of fans reverse any two leads from the 3 Phase starter(s) to the fans. For 1 Phase fans, see instructions on motor plate to reverse rotation.

When wiring from control contactor to a Larkin Industries tempered make-up air unit, use low voltage wiring to control panel located in unit. **NOTICE:** Remove jumper from terminals R1 and G in the tempered makeup-air unit.

**Note:** The power wiring for tempered make up air is pulled directly from the breaker panel.
Installation Check List

- Control panel is mounted next to the exhaust hood it controls.
- Hood sensor(s) are connected from hood(s) to control panel (one sensor per hood or hood section).
- Two separate circuits (115VAC 15AMP control & 115VAC 20AMP hood lights) have been connected from breaker panel to control panel. Ground wire is connected!!
- Hood lights have been connected from control panel to hood.
- Two Ansul micro switches are wired to control panel from fire system.
- Input power of proper Phase & Voltage from breaker panel is connected to each starter or contactor terminals L1, L2 (1 Phase) or L1, L2, L3, (3 Phase) and ground in control panel.
- Output power from starters or contactors and grounds are connected to the proper fans on the roof (Exhaust to Exhaust, Supply to Supply).

Optional Equipment:

- If tempered make up air is used, it must be Larkin ordered with starter/ contactor in unit and power wiring from breaker panel of proper voltage and phase connected to unit.
- Jumper from terminal R1 and G is removed in the tempered make-up air unit.
- Separate low voltage wiring is connected from tempered make up air unit to supply contactor in control Panel.

For technical support contact Larkin Industries, Inc. 1-800-322-4036

System Startup

1. Turn on all breakers that power the fan starter(s) or contactor(s), control panel power, hood lights, tempered make-up air unit power (If tempered unit is used). Check with a voltage meter for proper voltage at all terminals with fan switch off. Fan should not be operating unless the temperature sensor in the hood is warmer than the temperature adjustment dial on the control panel. The factory setting on the dial is for a room temperature of 80 Deg. F. Move dial to warmer if fans are operating.

2. Turn on fan switch. The fan switch should illuminate. This indicates the fans are operating.

3. Check the rotation of the fans. (Note: The exhaust fan will exhaust some air while rotating backward. You must check the direction arrow on the fan. To reverse rotation, (3 Phase only) change any 2 leads connected to the starter (T1, T2, T3). For 1 Phase, rotation must be changed at the motor (see instructions on motor plate).

   WARNING! Disconnect all power sources before servicing fans or equipment.

4. Adjust motor pulley for required CFM. Compare motor amperage with nameplate on motor. Unit should be rechecked after 3 days of operation for proper amperage of motor, belt tension, belt alignment, rotation and ensure all bolts and set screws are tight and blower is still properly aligned.

   Verify that motors and bearings have proper lubrication and that the belts have proper tension. Deflection in belt tension should not exceed \( \frac{1}{2} \)”.

   Check that the air intake filters are in place and clean and that the fire damper in the hood supply collar is open. If the airflow as measured is not in accordance with the project specifications, adjust the speed of the respective fans as required. (For further instructions refer to fan installation and maintenance instructions.)
5. Turn on the light switch to energize the hood lights.
   If lights are not working:
   A. Verify that the bulbs are installed.
   B. Verify that the fire suppression micro switches are connected and armed.
   C. Verify that all connections to hood(s) have been made.

6. The start up is now complete. To test the systems fire suppression interlock and auto fan control for IMC 507.2.1.1 compliance, follow the test procedures in the next section. For operation information and system adjustments, see system operation section.

Test Procedures

Test #1 - Testing of the system for IMC 507.2.1.1 compliance:

1. Place the fan switch in the off position.

2. Set the temperature adjustment dial to the factory-preset position or the closest to the actual room temperature. (See Figure 5, next page)

3. Conduct the test by turning on the cooking equipment or applying heat to the hood sensor located in the center of the hood, just in front of the grease filters. For multiple hood systems, when any of the sensors heat above the set point, the auto fan control system will energize the fans. **Note:** It does not require much heat, the palm of your hand or hot water should be sufficient. **DO NOT USE A PROPANE TORCH!**
   After the heat source is removed and the hood sensor cools below set point on the dial, the fans will de-energize (For multiple hood systems, all sensors must cool). It will take a few minutes for fans to de-energize.

Test #2 - Testing the fire system interlock. The system is designed to shut down the supply fan(s) and run the exhaust fans (lights off in fire optional). To conduct the test with the fan and light switches in the on position, simply trip the micro switches. The exhaust fan will continue to run and the supply fan will shut off (lights will turn off optional). After testing, place the micro switches back to the normal position, supply fan will re-start (lights will come back on optional).

**Notice:** After the test and inspection is complete, remove the timer jumper wire in the control panel (Terminals J2 and J3). This activates the 30-minute cool down timer for normal operation.

System Operation

To comply with the International Mechanical Code 507.2.1.1 the fans must energize automatically as cooking operation commences. This means that the Auto Fan Control System™ must over ride the fan switch anytime the hood sensor detects heat. Any temperature (including room temperature) over the preset mark of 80 deg on the dial located on the control panel will activate the fans.

To eliminate the problem of fans energizing automatically in warm or hot kitchen environments (over 80 deg) or not energizing quick enough in a cool environment the Auto Fan Control System™ is fully adjustable by means of the dial on the control panel. The dial has a factory **preset** mark at 80 deg, a cooler, normal, and warmer setting. In a conditioned space (72 deg – 77 deg) the preset to normal settings should work well. The illustration below (Figure 5) shows the actual temperature of the settings on the 7-position dial at which the hood sensor must reach to energize the fans.
**Important Notice:** The fans will de-energize when the hood sensor cools 1 ½ deg below the set temperature. The fan switch can energize the fans at any time, however, the fan switch can only de-energize the fans if the hood sensors have cooled and the 30 minute timer has expired. The system cannot de-energize the fans unless the fan switch is in the Off position.

After cooking equipment is turned off the fans will continue to operate until the hood sensor cools 1 ½ deg below set point. However, the residual heat from griddles, char-broiler grates or fryer grease will reheat the hood sensor causing the fans to cycle on and off. This shortens the life of the starters or contactors and fan motors. To eliminate this problem the Larkin Auto Fan Control System™ has a built in cool down timer of 30 minutes. This timer can be adjusted if needed. The timer is removed from the system with a jumper wire at the factory for testing and inspection purposes. It is necessary to remove the wire located in the control panel marked jumper after any test & inspections are complete to eliminate fan cycling.

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**NOTICE:** This hood is equipped with an Automatic Fan Control System™ and hood mounted sensors. The fans will automatically energize as the temperature of the cooking equipment rises and cooking operations commence, in compliance with International Mechanical Code 507.2.1.1

**AUTOMATIC FAN CONTROL INSTRUCTIONS:**

1. To energize the fans, use the fan switch or wait for the cooking equipment temperature to rise and activate the automatic fan control system.
2. To de-energize the fans, the switch must be in the OFF position. Fans will continue to operate until hood sensors cool below set point and the thirty-minute time delay expires.
3. For warmer kitchen environments, adjust the dial warmer to allow fans to de-energize after cooking equipment cools. In extremely hot kitchen environments the fans may energize automatically without the cooking equipment being activated, if this occurs, adjust the dial warmer.
4. For cooler kitchen environments, adjust the dial cooler to allow fans to energize quicker as the cooking equipment temperature rises.
It is not recommended to adjust this system except in extreme cases. The solid-state temperature controller contains 2 adjustments.

1. Cool down timer. (10 min. – 60 min.)
2. Fan start temperature. (Temperature above dial setting that will start fans. 1 deg. F – 8 deg. F)
Maintenance

**WARNING!** Do not attempt maintenance, repairs, or adjustments on this system until all electrical power has been completely disconnected.

- The Control panel door should be securely closed after opening to avoid tampering or electrical shock.

- The control panel is a type1 electrical enclosure and is not watertight. Do not spray, soak or submerge with water. Panel should only be cleaned with a mild cleaner and damp cloth.

- Hood temperature sensor(s) should be cleaned weekly to prevent grease build up and ensure a quick response to temperature changes. Sensor(s) should be cleaned with a mild cleaner to remove grease.