Energy-Logic Ventilation System Controller

Installation, Operation and Maintenance

Your Password
Protection Code is:
0144

Carroll Manufacturing
Commercial Kitchen Ventilation Products

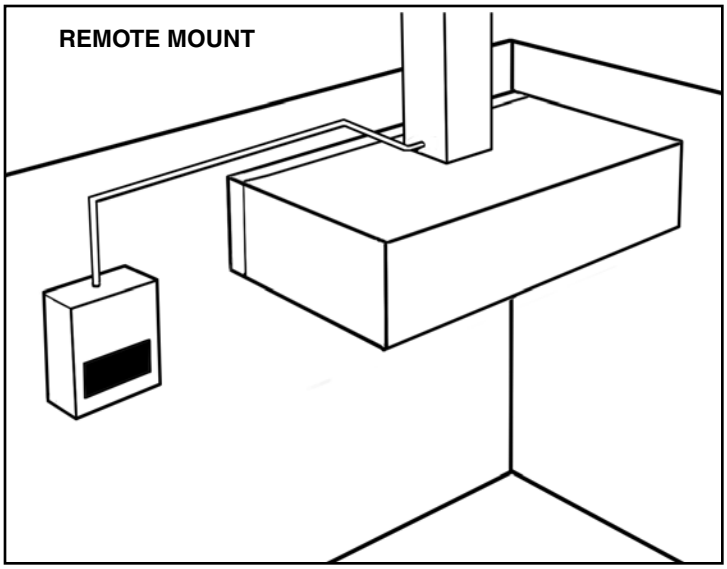
CONTENTS

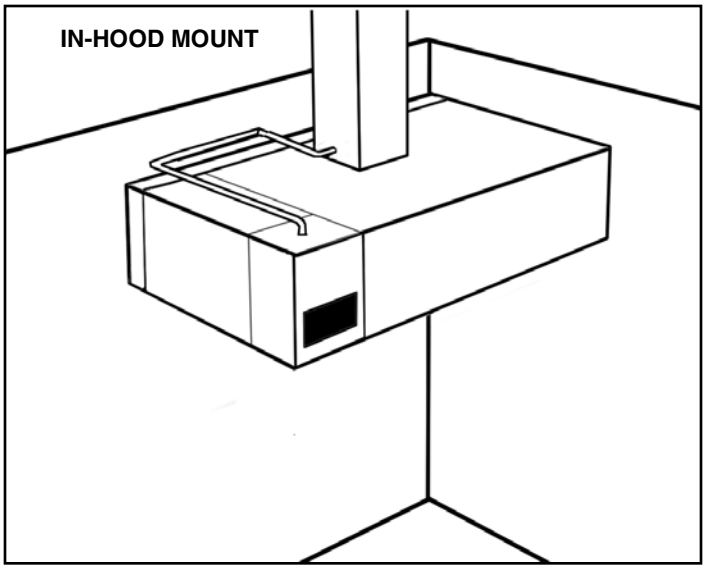
OVERVIEW

ENERGY SAVINGS

The Energy Logic Controller (ELC) automatically matches energy use to the cooking load requirements that vary throughout the day. Unlike conventional systems that waste energy by maintaining peak output regardless of demand, the ELC modulates fans during idle cooking periods, running as low as 50% during off hours to lower the cost of energy use.

SYSTEM CONFIGURATIONS





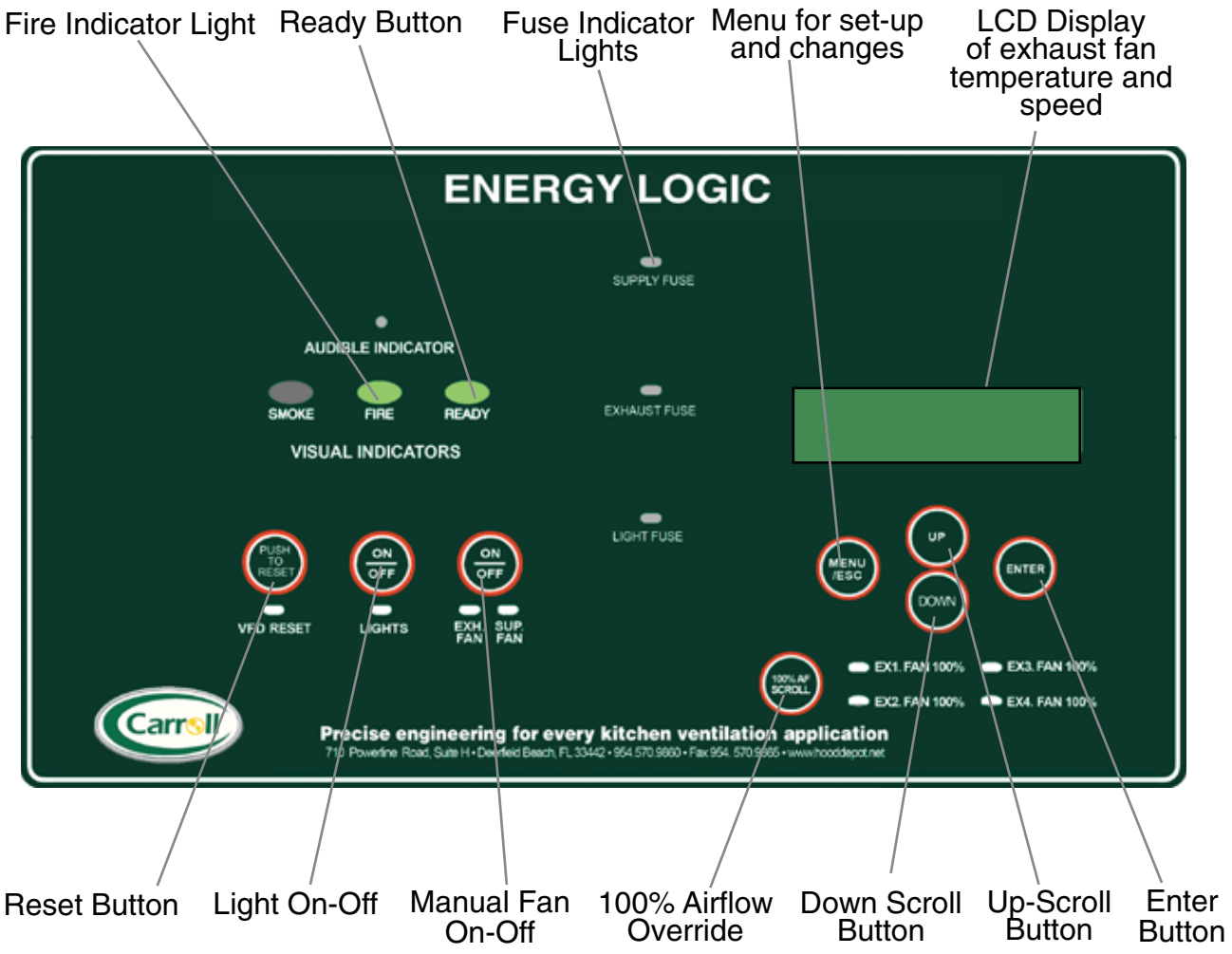
Basic components of the system include the controller/operator interface with internal circuit boards, in-duct temperature sensors, variable frequency drives and system wiring.

Parts list:

1. Carroll Controller/Operator Interface
2. Variable Frequency Drive (one per fan)
3. Temperature Sensor
4. U.L. Listed Quick Seal
5. Low Voltage High Temp Shielded Wire

Carroll's ELC is engineered, manufactured and installed to meet or exceed the listing standard

CONTROL PANEL TOUCHPAD



FEATURES DEFINITIONS

• **Ready Mode** - System is in normal operation and fire system is armed. Green ready LED will be lit. Fans and lights can be operated normally with fan and light touch-buttons.

• **Fire Mode** - Alarm condition, fire system has been activated and red LED is lit. Exhaust fans will run with or without the fan button on; lights will be off with or without light button off. Shunt trip power, horn/strobe power and audible indicator to be activated. Appliance contactor to be deactivated. Supply fans will shut down with or without fan button on.

• **Light(s) Output -** The lights in the hood need to be wired to the LTS1 terminal. If more than 800 watts are used, then an additional 800 watts can be wired to the LTS2 terminal. If additional lighting loads are needed, the internal appliance contactor can be used for an additional 20 amps.

• **Horn/Strobe** - The touchpad control has audible and visual indicators to meet NFPA 96. In the event that an additional horn or strobe device is required, it can be powered up through the horn/strobe terminal. The device will need to accept 120v 1-phase.

• **AC Drive Output -** The drives will need to be powered on and off and must accept 24v dc. Read your AC drive manual to determine your connection points. Terminal EF24v should be used to power exhaust fan drives and terminal SF24v should be used to power up supply fan drives.

• **Fire System Microswitch** - The fire system microswitch must be wired into the +5v terminal and the fire terminal. The *com* wire of the microswitch needs to be wired into the +5v terminal and the *nc* wire of the microswitch must be wired to the fire terminal. The microswitch's *no* wire is not used.

• **Gas Sensor Input** - An optional gas sensor can be provided to turn on the hood fans if the gas sensor reads a preset level of gas PPM. This assures safety to personnel in case cooking occurs without turning the hoods on. The sensor will have a set of dry contacts and the *com* wire will need to be wired to the 5v terminal while the *no* wire will must be wired to the MISC IN terminal.

• **Temperature Sensor** - To meet IFC and FMC 507.2.1.1, a temperature sensor can be installed in the duct to turn on fans automatically if the temperature rises above a preset level. Once the temperature falls below the setpoint by two degrees, the fans will turn off again.

• **Control Circuit** - Connect your control circuit to the INPUT POWER terminals.

FIRE EMERGENCY APPLIANCE SHUTDOWN

To meet NFPA 96, 17 and 17A, any receptacle or hard-wired appliance under the hood (or any receptacle outside the hood that feeds an under-hood appliance) must have its power shut down upon activation of the fire system. There are two methods for meeting this code requirement:

Shunt Trip Output - Use the shunt terminal to power the shunt trip mechanism of the shunt trip breakers in the circuit panel. An electrician-installed shunt trip breaker is needed for any powered equipment under the hood.

INSTALLATION

UNPACK & INVENTORY

Upon delivery of the system to your site, immediately inventory all needed parts (see page 3) and check contents for damage; report any damage to the freight carrier. To assist filing of a claim call our customer service at 1 800 322-8730.

PANEL MOUNTING LOCATION

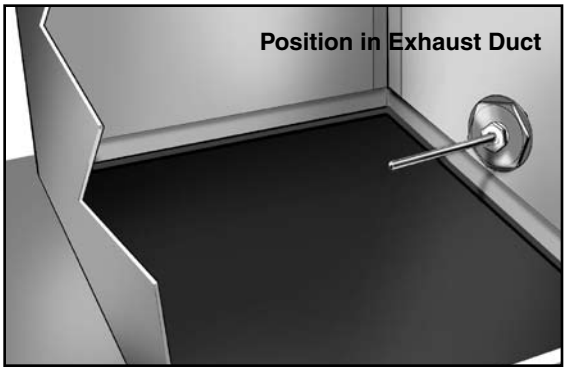
OPTION 1: If ordered with a new hood and the kitchen layout allows room for a right or left end cabinet, the ELC (Energy Logic Controller) will be mounted as shown:

OPTION 2: If the hood is a retrofit or does not allow the attachment of a cabinet, a Remote ELC wall cabinet will be provided for mounting in a suitable location with sufficient hardware to support the system's weight (mount securely to underlying wall studs).

SENSOR(S) MOUNTING LOCATION

Sensors are located within the exhaust duct collar, one for each main duct. There can be up to five sensors depending on ventilation system complexity. The sensor is to be located at midpoint through the duct's vertical or horizontal wall, perpendicular to the exhaust flow:

Temperature Sensor



ELECTRICAL: CONTROL PANEL SYSTEM WIRING

INSERT PAGE 7 FOLDOUT 11” x 17”

REQUIRED WIRING:

1. Control Circuit
2. Shunt Trip Breakers
3. Horn Strobes / Fire Alarm
4. Exhaust Duct Temperature Sensors
5. Hood Lights
6. Fan Circuits
7. Power to Exhaust Fans
8. Power to Supply Fans
9. Micro Switch (Remote Only)

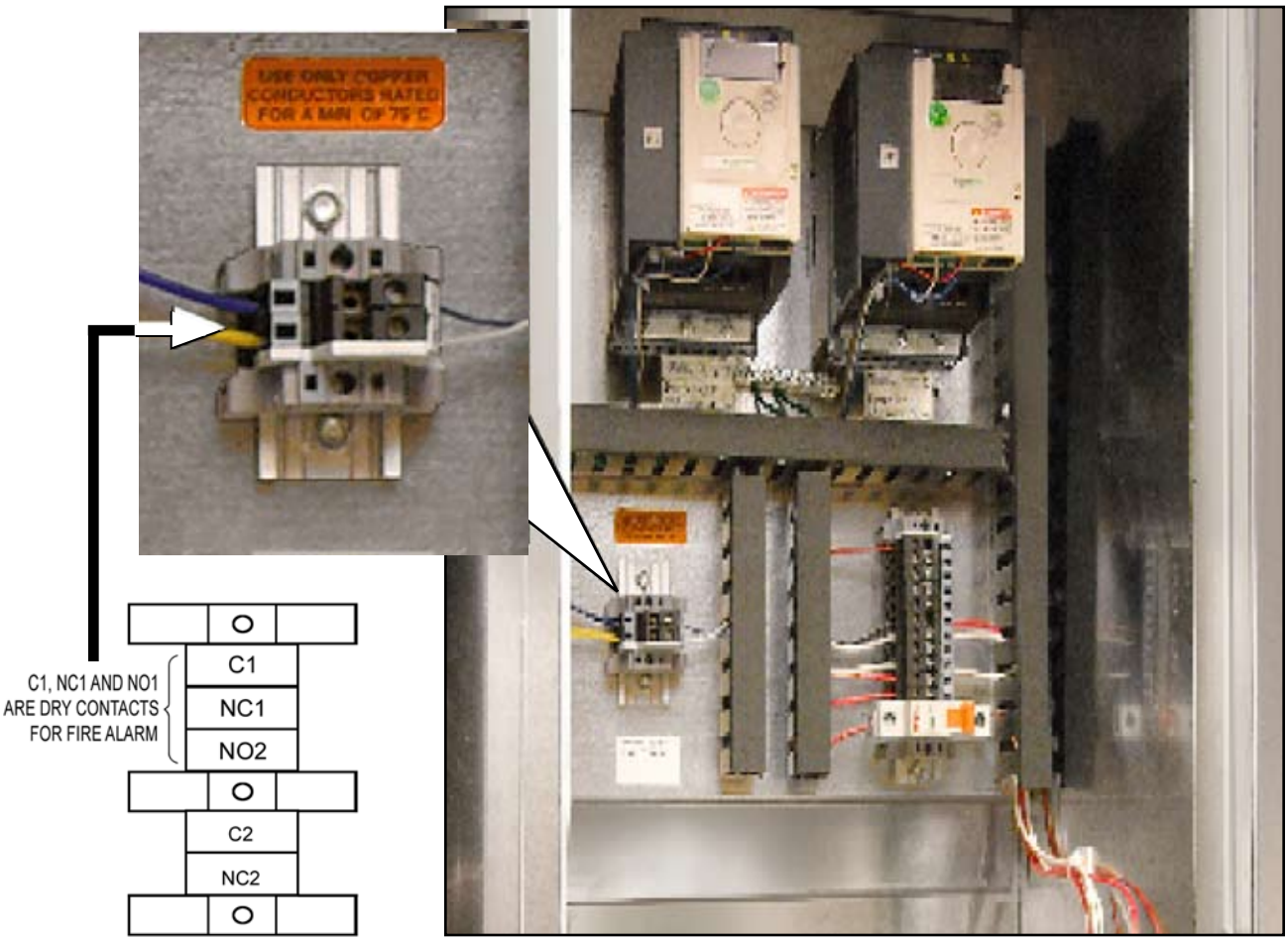
NOTES ON WIRING:

• MAKE SURE sensor wires are ran and strapped according to NEC, national, state and local codes to meet the requirements of your local AHJ

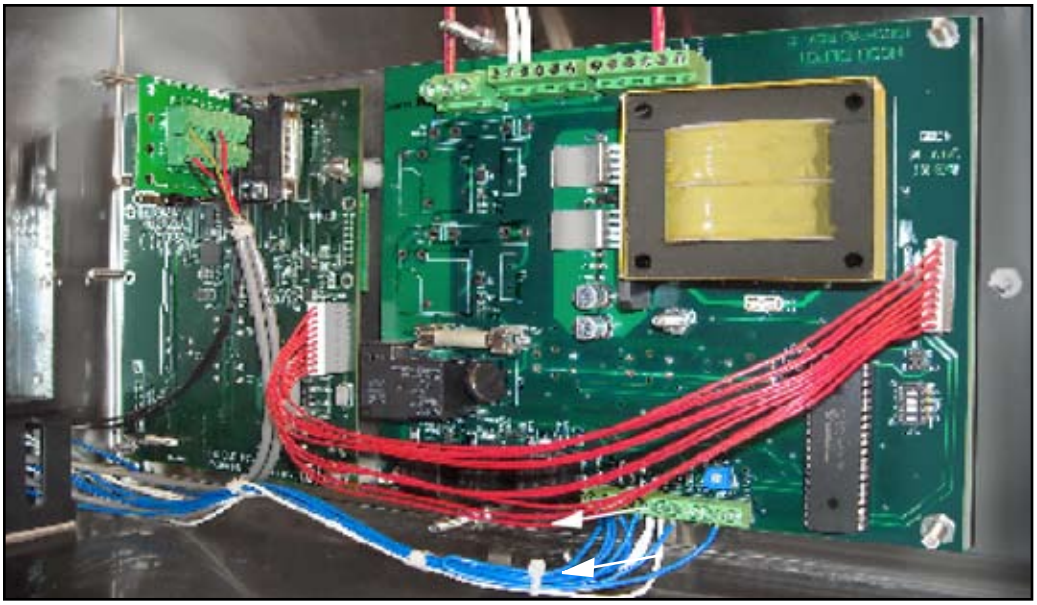
• DO NOT run wires from VFD's next to sensor wires as it can cause noise in the low voltage sensor circuit.

• DO NOT bundle high voltage with low voltage (example: 120VAC→5-24VDC)

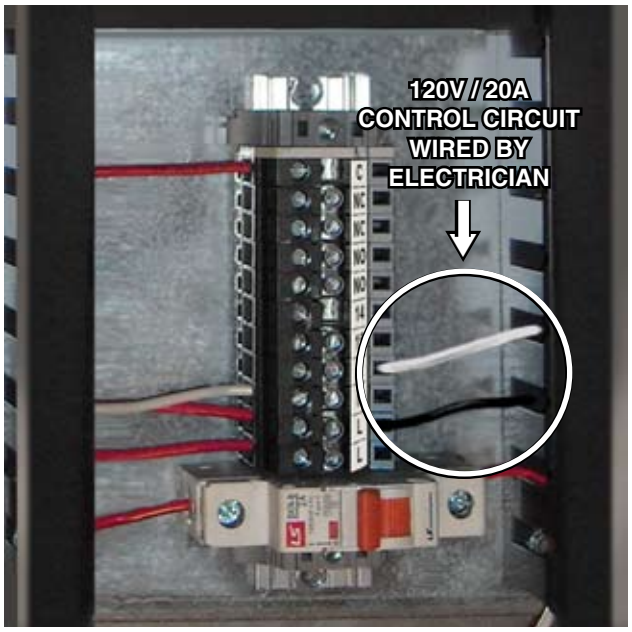
TYPICAL VFD WIRING (INSIDE ENCLOSURE)



TYPICAL TOUCHPAD WIRING (BACK OF CONTROLLER)



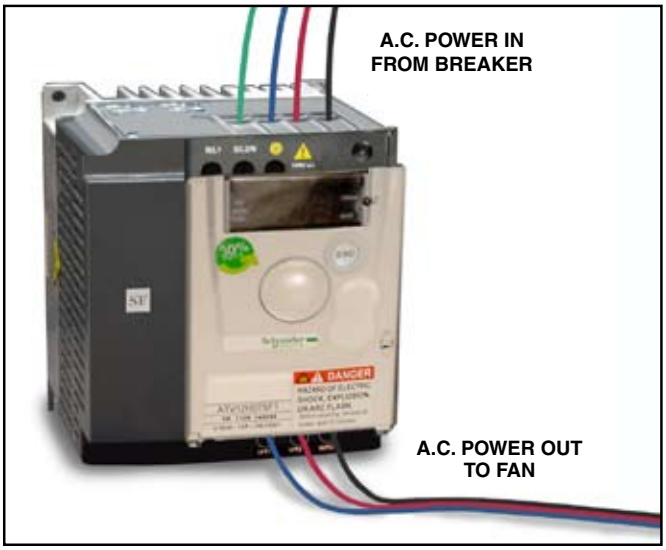
CONTROL CIRCUIT WIRING



NOTE: Refer to wiring diagram (pg. 7) and notes (pg. 8).

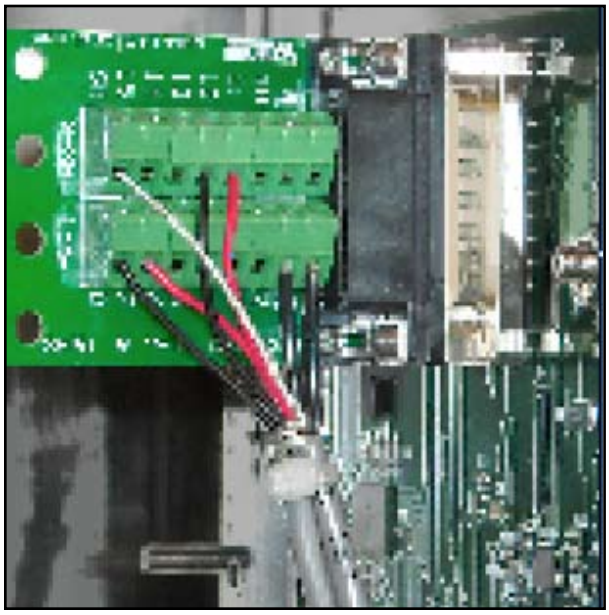
FAN WIRING (TO VFDs)

Exhaust and Supply fans are controlled by Variable Frequency Drives with power in at top of unit and supplied to fans at bottom.



WARNING! Do not put line power into T1, T2 or T3 terminals or unit will have fatal damage.

EFI DUCT SENSOR WIRING (SINGLE SENSOR)



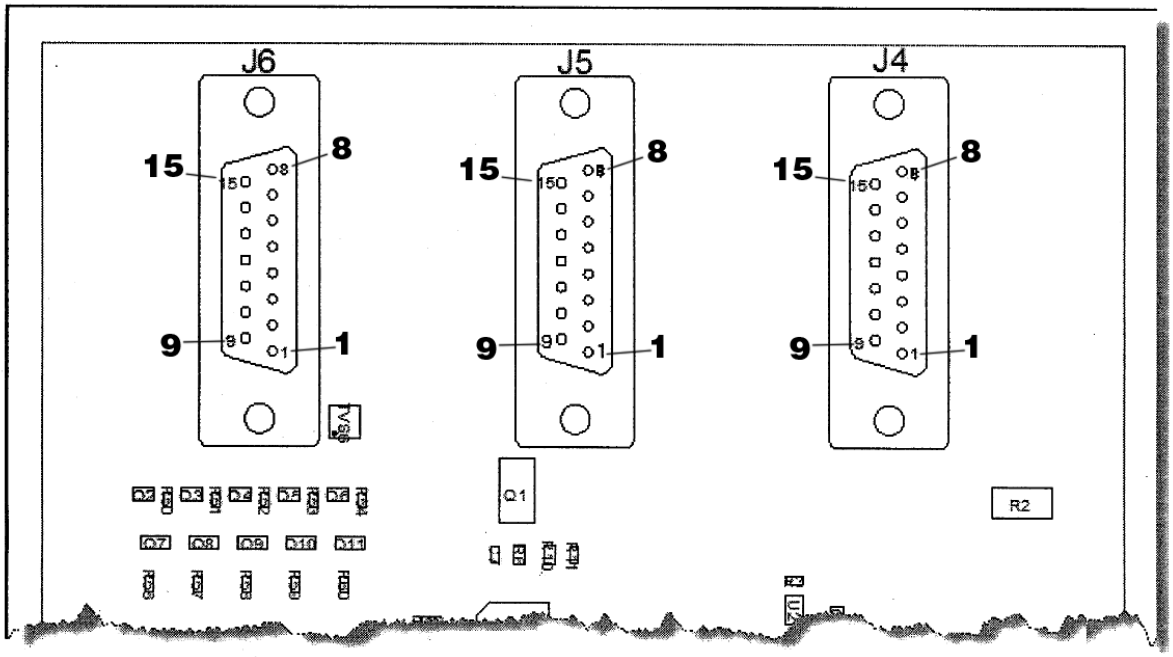
NOTE: See pg. 11 for terminal numbers and their use.

SENSOR WIRING (TO EXHAUST DUCT)

Sensor is installed in duct connected by j-box; wiring to control unit from j-box is through metal shielded (BX) cable or electrical conduit. Use wire nuts to connect sensor leads to low voltage shielded cabling.

EF DUCT SENSOR WIRING CONNECTIONS FOR MULTIPLE SENSOR SYSTEMS

ECO 10V Connector Pinouts



NOTE: PIN 17 on DB15 breakout connector is SHIELD.

Connector J4		
Pin	**Designed for Connection**	**I/O Name**
1	EXF1 THERMISTOR	+5VDC
2	EXF1 THERMISTOR	AN0_TMP1
3	EXF2 THERMISTOR	+5VDC
4	EXF2 THERMISTOR	AN1_TMP2
5	EXF3 THERMISTOR	+5VDC
6	EXF3 THERMISTOR	AN2_TMP3
7	EXF1 VFD AI+	AOUT_EF1
8	EXF1 VFD AI GND	GND
9	EXF2 VFD AI+	AOUT_EF2
10	EXF2 & EXF3 VFD AI GND	GND
11	EXF3 VFD AI+	AOUT_EF3
12	SF1 VFD AI+	AOUT_SF1
13	SF1 & SF2 VFD AI GND	GND
14	SF2 VFD AI+	AOUT_SF2
15	SHIELD CONNECTION AOUT	SHIELD

Connector J5		
Pin	**Designed for Connection**	**I/O Name**
1	EXF4 THERMISTOR	AN3_TMP4
2	EXF4 THERM. & TEMP FACILITY THERM.	+5VDC
3	TEMP FACILITY THERMISTOR	AN4_TMP_FACILITY
4	EXF4 VFD AI+	AOUT_EF4
5	EXF4 VFD AI GND	GND
6	SF3 VFD AI+	AOUT_SF3
7	SF3 & SF4 VFD AI GND	GND
8	SF4 VFD AI+	AOUT_SF4
9	+24VDC OUT	VDC
10	AIR FLOW DMPR EXF1 4-20MA AIN	AN6_AF1
11	AIR FLOW DMPR EXF2 4-20MA AIN	AN7_AF1
12	AIR FLOW DMPR EXF3 4-20MA AIN	AN8_AF3
13	AIR FLOW DMPR EXF4 4-20MA AIN	AN9_AF4
14	AIR FLOW DMPR SF 4-20MA AIN	AN10_AF_SF
15	SHIELD CONNECTION AOUT	SHIELD

Connector J6		
Pin	**Designed for Connection**	**I/O Name**
1	DIGITAL INPUT 1 10-24VDC	RG0_IN1
2	DIGITAL INPUT 2 10-24VDC	RG1_IN2
3	DIGITAL INPUT 3 10-24VDC	RG2_IN3
4	DIGITAL INPUT 4 10-24VDC	RG3_IN4
5	DIGITAL INPUT 5 10-24VDC	RG4_IN5
6	+24VDC OUT	VDC
7	+24VDC OUT	VDC
8	+24VDC OUT	VDC
9	DIGITAL OUT 1 24VDC 20MA	RE2_OUT1
10	DIGITAL OUT 2 24VDC 20MA	RE3_OUT2
11	DIGITAL OUT 3 24VDC 20MA	RE4_OUT3
12	DIGITAL OUT 4 24VDC 20MA	RE5_OUT4
13	DIGITAL OUT 5 24VDC 20MA	RE6_OUT5
14	GND	GND
15	GND	GND

INITIAL START UP & PROGRAMMING FOR A 1 EXHAUST FAN / 1 SUPPLY FAN SYSTEM

START-UP PROCEDURE

STEP 1: After installation, confirm circuit breakers are turned on for all exhaust and supply fans as well as the DVS controller. System may then be started up (verify "Ready" light is on).

EXPLANATION

Preparation for programming touchpad menu

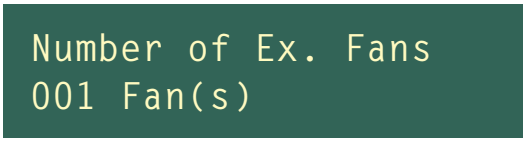
STEP 2 (FOR INTITIAL SETUP): The menu will automatically ask for set-up input; the first prompt is: **Set Low Fan Speed Percentage** to establish fan speed 20% (recommended) slower than design at start temperature. Use up & down arrow buttons, set low fan speed to desired percentage then press "Enter".

Example Settings:

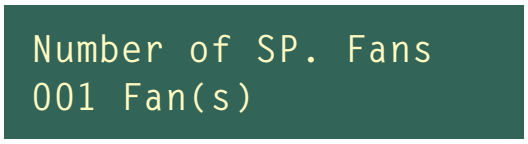
1) Start temperature set at 90º
2) Max temp set to 110º
3) Exh fan %LSP 020%

When system shows duct temperature reaching 90º fan will autostart and run at 80% of design CFM. As duct temperature increases, the CFM will increase proportionately until duct temperature reaches maximum temperature at which it will run at 100% of design CFM.

STEP 3: Use up and down arrow keys to input one (1) exhaust fan; press enter.

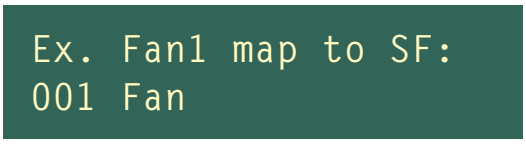


STEP 4: Use up and down arrow keys to input one (1) supply fans; press enter.



STEP 5: Use up and down arrow keys to input the supply fan correlation with the exhaust fan (this is a variable for multiple fan systems but in this single-fan, single-exhaust system, display only needs to read as below, then press "Enter".

In a system with single make-up air fan, the exhaust fan EF1 is correlated to SF: 001.



STEP 6: Set **Supply-to-Exhaust Fan Ratios** to determine the percentage of supply air required for the exhaust fan. In this single-fan, single-exhaust system, display only needs to read 100%, then press "Enter".

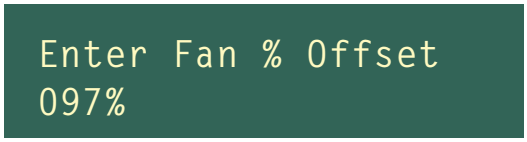
In a system with single make-up air fan, the exhaust fan is allocated 100% of supply air.

START-UP PROCEDURE (Continued)

STEP 7: Set **Temperature Maximum** for the exhaust fan according to medium or heavy duty appliance layout demand. Then press "Enter".

STEP 8: Use up & down arrow buttons to set desired **Start Temperature** for the exhaust fan (85º-90º is recommended). Press "Enter" after input.

STEP 9: Enter **Fan Percentage Offset** (97% is recommended and should only be set differently if recommended by factory). Then press "Enter".



STEP 10: Enter **Auto Off Delay** to set number of minutes delay before fans shut-off from the time the hood turns on automatically (this eliminates nuisance debouncing). Factory recommends 20 mins. Then press "Enter".

EXPLANATION

Examples: Charbroilers, multiple fryers, woks, upright broilers = Heavy Demand (set to 25˚-40˚ above start temp.); Flat-top griddles, ranges, pasta cookers, single fryer, etc. = Medium Demand (set to 10˚-20˚ above start temp.). Use up & down arrow buttons to input desired maximum temperature for each exhaust fan. Press "Enter" after input.

85º-90º is recommended beginning with EF1, then EF2 as shown at below left, pressing "Enter" after each input.

STEP 10 COMPLETES INITIAL SET-UP. THE FOLLOWING PROCEDURE IS TO ALLOW A TEST AND BALANCE OF THE SYSTEM BY A QUALIFIED TECHNICIAN

NOTE: IF FAN DISCONNECT ON ROOF IS SHUT DOWN, IT MAY BE NECESSARY TO PRESS VFD RESET ON FACE OF CONTROL PANEL TO RESET DRIVE.

STEP 11: System Balance: After properly performing your initial set-up, press "100% AF SCROLL" and use 'up' arrow key to set EF1 to 60 minutes, then press 'Enter' (to force exhaust and supply fans to 100% airflow for 60 minutes to give you enough time to balance the system at 100%).

Provides 100% (design) airflow to perform a test and balance after installation. This allows technician to force the system into 100% speed in order to adjust fans to the designed cfm. Once the system is balanced it will stay balanced when modulating.

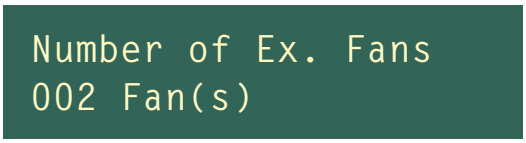
INITIAL START UP & PROGRAMMING FOR A 2 EXHAUST FAN / 1 SUPPLY FAN SYSTEM

START-UP PROCEDURE

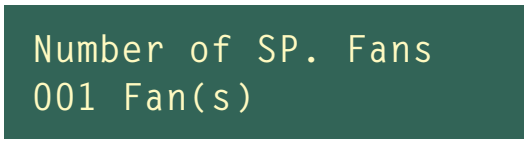
STEP 1: After installation, confirm circuit breakers are turned on for all exhaust and supply fans as well as the DVS controller. System may then be started up (verify "Ready" light is on). Note: Password code is not needed for initial setup.

STEP 2 (FOR INTITIAL SETUP): The menu will automatically ask for set-up input; the first prompt is: **Set Low Fan Speed Percentage** to establish fan speed 20% (recommended) slower than design at start temperature. Use up & down arrow buttons, set low fan speed to desired percentage then press "Enter".

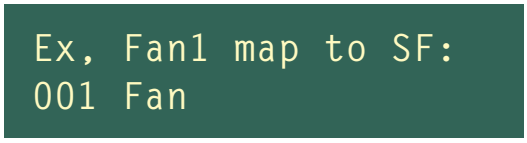
STEP 3: Use up and down arrow keys to input two (2) exhaust fans; press enter.

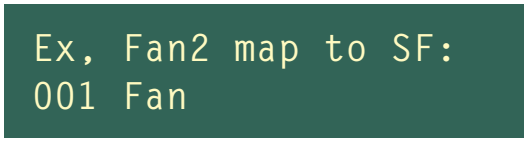


STEP 4: Use up and down arrow keys to input one (1) supply fan; press enter.



STEP 5: Use up and down arrow keys to input which supply fan number correlates with each of the exhaust fans. After each input below Press "Enter".





EXPLANATION

Preparation for programming touchpad menu

Example Settings:

1) Start temperature set at 90º
2) Max temp set to 110º
3) Exh fan %LSP 020%

When system shows duct temperature reaching 90º fan will autostart and run at 80% of design CFM. As duct temperature increases, the CFM will increase proportionately until duct temperature reaches maximum temperature at which it will run at 100% of design CFM.

In a system with single make-up air fan, the exhaust fan EF1 is correlated to SF: 001.

START-UP PROCEDURE

STEP 6: Set **Supply-to-Exhaust Fan Ratios** to determine the percentage of supply air required for each exhaust fan when multiple exhaust fans operate at unequal or differing CFM rates. Press "Enter" after each of the two ratio inputs.

EXPLANATION

Example: A system with two exhaust fans operating 2000 CFM and 1000 CFM respectively will require supply air allocation (ratio) of 67% and 33%, entered in the display one at a time, first as "EF1/SF Ratio 067%" and next as "EF2/SF Ratio 033%". Specific ratios are determined by the following calculation:

$$\frac{\text{EF1 CFM}}{\text{Total Exhaust CFM}}$$

Note: 50% for both is most common. If both exhaust fans are designed for the same airflow, set both to 50% as shown.

STEP 7: Set **Temperature Maximum** for each exhaust fan according to medium or heavy duty appliance layout demand.

Examples: Charbroilers, multiple fryers, woks, upright broilers = Heavy Demand (set to 25˚-40˚ above start temp.); Flat-top griddles, ranges, pasta cookers, single fryer, etc. = Medium Demand (set to 10˚-20˚ above start temp.). Use up & down arrow buttons to input desired maximum temperature for each exhaust fan. Press "Enter" after each input.

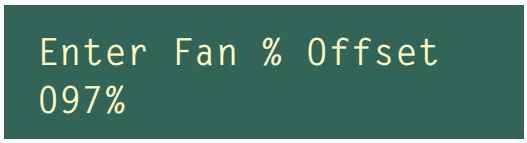
STEP 8: Use up & down arrow buttons to set desired **Start Temperature** for each exhaust fan

85º-90º is recommended beginning with EF1, then EF2 as shown at below left, pressing "Enter" after each input.

START-UP PROCEDURE

EXPLANATION

STEP 9: Enter **Fan Percentage Offset** (97% is recommended and should only be set differently if recommended by factory). Then press “Enter”.



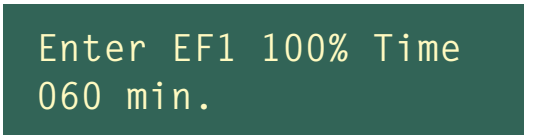
STEP 10: Enter **Auto Off Delay** to set number of minutes delay before system shut-off from the time the hood turns on automatically when start temperature is reached.

This setting is global to all exhaust fans. Factory recommends 20 minutes. This allows time to stabilize heat in the duct and eliminate nuisance debouncing.

STEP 10 COMPLETES INITIAL SET-UP. THE FOLLOWING PROCEDURE IS TO ALLOW A TEST AND BALANCE OF THE SYSTEM BY A QUALIFIED TECHNICIAN

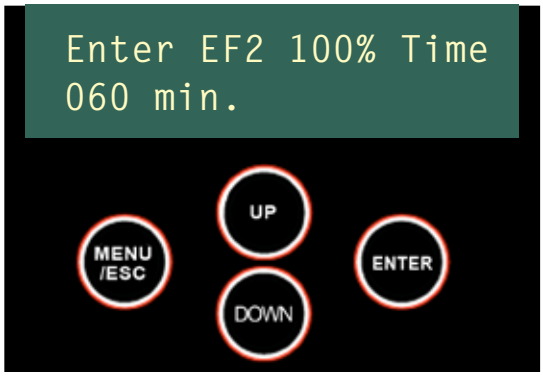
STEP 11: System Balance: After properly performing your initial set-up, press “100% AF SCROLL” and use ‘up’ arrow key to set EF1 to 60 minutes, then press ‘Enter’ (this forces exhaust and supply fans into 100% airflow for 60 minutes to give you enough time to balance the system at full airflow).

Provides 100% (design) airflow to perform a test and balance after installation. This allows technician to force the system into 100% speed in order to adjust fans to the designed cfm. Once the system is balanced it will stay balanced when modulating.



Next, press “100% AF SCROLL” two times to set EF2 as well, again upscrolling to 60 minutes; press “ENTER”.

Provides additional time for balancing multifan systems.



INITIAL START UP & PROGRAMMING FOR A 2 EXHAUST FANS / 2 SUPPLY FAN SYSTEM

START-UP PROCEDURE

STEP 1: After installation, confirm circuit breakers are turned on for all exhaust and supply fans as well as the DVS controller. System may then be started up (verify "Ready" light is on). Note: Password code is not needed for initial setup.

EXPLANATION

Preparation for programming touchpad menu

STEP 2 (FOR INTITIAL SETUP): The menu will automatically ask for set-up input; the first prompt is: **Set Low Fan Speed Percentage** to establish fan speed 20% (recommended) slower than design at start temperature. Use up & down arrow buttons, set low fan speed to desired percentage then press "Enter".

```
Enter Ex. Fan % LSP
020%
```

Example Settings:

1) Start temperature set at 90º
2) Max temp set to 110º
3) Exh fan %LSP 020%

When system shows duct temperature reaching 90º fan will autostart and run at 80% of design CFM. As duct temperature increases, the CFM will increase proportionately until duct temperature reaches maximum temperature at which it will run at 100% of design CFM.

STEP 3: Use up and down arrow keys to input two (2) exhaust fans; press enter.

```
Number of Ex. Fans
002 Fan(s)
```

STEP 4: Use up and down arrow keys to input two (2) supply fan; press enter.

```
Number of SP. Fans
002 Fan(s)
```

STEP 5: Use up and down arrow keys to input which supply fan number correlates with each of the exhaust fans. After each input below Press "Enter".

Most commonly, EF1 correlates with SF1, EF2 with SF2, etc.

```
Ex, Fan1 map to SF:
001 Fan
```

```
Ex, Fan2 map to SF:
002 Fan
```

START-UP PROCEDURE

STEP 6: Set **Supply-to-Exhaust Fan Ratios** to determine the percentage of supply air required for each exhaust fan when multiple exhaust fans operate at unequal or differing CFM rates. Press "Enter" after each of the two ratio inputs.

```
EF1 to SF1 Ratio
050%
```

```
EF2 to SF1 Ratio
050%
```

EXPLANATION

Example: A system with two exhaust fans operating 2000 CFM and 1000 CFM respectively will require supply air allocation (ratio) of 67% and 33%, entered in the display one at a time, first as "EF1/SF Ratio 067%" and next as "EF2/SF Ratio 033%". Specific ratios are determined by the following calculation:

$$\frac{\text{EF1 CFM}}{\text{Total Exhaust CFM}}$$

Note: 50% for both is most common. If both exhaust fans are designed for the same airflow, set both to 50% as shown.

STEP 7: Set **Temperature Maximum** for each exhaust fan according to medium or heavy duty appliance layout demand.

Examples: Charbroilers, multiple fryers, woks, upright broilers = Heavy Demand (set to 25˚-40˚ above start temp.); Flat-top griddles, ranges, pasta cookers, single fryer, etc. = Medium Demand (set to 10˚-20˚ above start temp.). Use up & down arrow buttons to input desired maximum temperature for each exhaust fan. Press "Enter" after each input.

```
Enter Temp Max. EF1
110˚
```

```
Enter Temp Max. EF2
110˚
```

STEP 8: Use up & down arrow buttons to set desired **Start Temperature** for each exhaust fan

85º-90º is recommended, beginning with EF1, then EF2 as shown below, pressing "Enter" after each input.

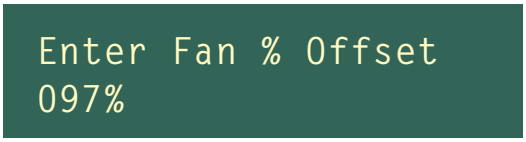
```
Enter Temp Start EF1
090˚
```

```
Enter Temp Start EF2
090˚
```

START-UP PROCEDURE

EXPLANATION

STEP 9: Enter **Fan Percentage Offset** (97% is recommended and should only be set differently if recommended by factory). Then press “Enter”.



STEP 10: Enter **Auto Off Delay** to set number of minutes delay before system shut-off from the time the hood turns on automatically when start temperature is reached.

This setting is global to all exhaust fans. Factory recommends 20 minutes. This allows time to stabilize heat in the duct and eliminate nuisance debouncing.

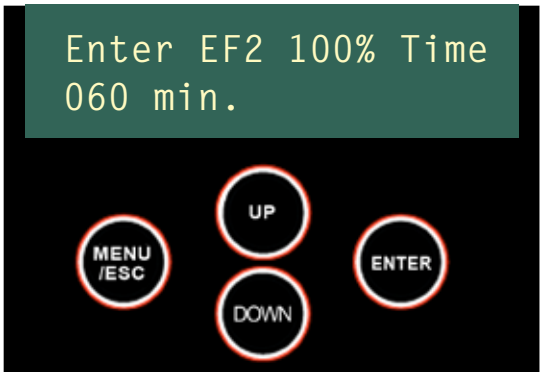
STEP 10 COMPLETES INITIAL SET-UP. THE FOLLOWING PROCEDURE IS TO ALLOW A TEST AND BALANCE OF THE SYSTEM BY A QUALIFIED TECHNICIAN

STEP 11: System Balance: After properly performing your initial set-up, press “100% AF SCROLL” and use ‘up’ arrow key to set EF1 to 60 minutes, then press ‘Enter’ (this forces exhaust and supply fans into 100% airflow for 60 minutes to give you enough time to balance the system at full airflow).

Provides 100% (design) airflow to perform a test and balance after installation. This allows technician to force the system into 100% speed in order to adjust fans to the designed cfm. Once the system is balanced it will stay balanced when modulating.

STEP 11: Next, press “100% AF SCROLL” two times to set EF2 as well, again upscrolling to 60 minutes; then press “ENTER”.

Provides additional time for balancing multifan systems.

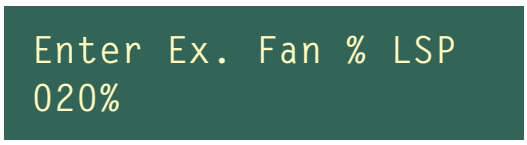


INITIAL START UP & PROGRAMMING FOR A 3 EXHAUST FANS / 1 SUPPLY FAN SYSTEM

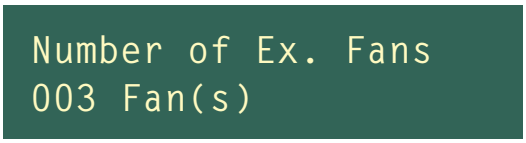
START-UP PROCEDURE

STEP 1: After installation, confirm circuit breakers are turned on for all exhaust and supply fans as well as the DVS controller. System may then be started up (verify "Ready" light is on). Note: Password code is not needed for initial setup.

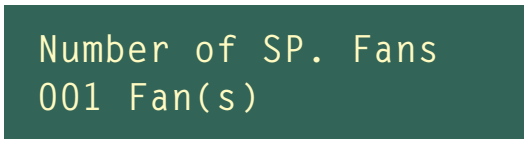
STEP 2 (FOR INTITIAL SETUP): The menu will automatically ask for set-up input; the first prompt is: **Set Low Fan Speed Percentage** to establish fan speed 20% (recommended) slower than design at start temperature. Use up & down arrow buttons, set low fan speed to desired percentage then press "Enter".



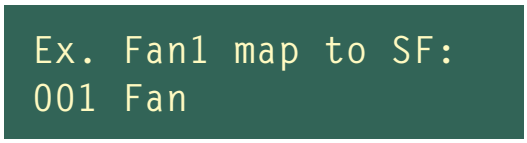
STEP 3: Use up and down arrow keys to input two (2) exhaust fans; press enter.

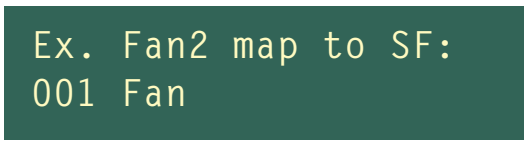


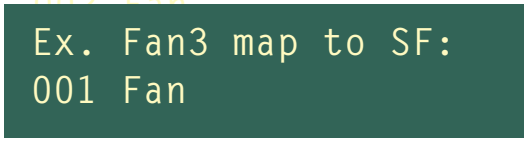
STEP 4: Use up and down arrow keys to input two (2) supply fan; press enter.



STEP 5: Use up and down arrow keys to input which supply fan number correlates with each of the exhaust fans. After each input below Press "Enter".







EXPLANATION

Preparation for programming touchpad menu

Example Settings:

1) Start temperature set at 90º
2) Max temp set to 110º
3) Exh fan %LSP 020%

When system shows duct temperature reaching 90º fan will autostart and run at 80% of design CFM. As duct temperature increases, the CFM will increase proportionately until duct temperature reaches maximum temperature at which it will run at 100% of design CFM.

In a system with single make-up air fan, the exhaust fan EF1 is correlated to SF: 001.

START-UP PROCEDURE

STEP 6: Set **Supply-to-Exhaust Fan Ratios** to determine the percentage of supply air required for each exhaust fan when multiple exhaust fans operate at unequal or differing CFM rates. Press "Enter" after each of the three ratio inputs.

```
EF1 to SF1 Ratio
33%
```

```
EF2 to SF1 Ratio
33%
```

```
EF3 to SF1 Ratio
34%
```

EXPLANATION

Example: A system with three exhaust fans operating at 2000 CFM, 1000 CFM and 1000 CFM respectively will require supply air allocation (ratio) of 50%, 25% and 25%, entered in the display one at a time, first as "EF1/SF Ratio 050%" and next as "EF2/SF Ratio 025%" and "EF3/SF Ratio 025%". Specific ratios are determined by the following calculation:

$$\frac{\text{EF1 CFM}}{\text{Total Exhaust CFM}}$$

Note: 33% for all three is most common if all exhaust fans are designed for the same airflow (set all to 33% as shown).

STEP 7: Set **Temperature Maximum** for each exhaust fan according to medium or heavy duty appliance layout demand.

```
Enter Temp. Max. EF1
110˚
```

```
Enter Temp Max. EF2
110˚
```

```
Enter Temp Max. EF3
110˚
```

Examples: Charbroilers, multiple fryers, woks, upright broilers = Heavy Demand (set to 25˚-40˚ above start temp.); Flat-top griddles, ranges, pasta cookers, single fryer, etc. = Medium Demand (set to 10˚-20˚ above start temp.). Use up & down arrow buttons to input desired maximum temperature for each exhaust fan. Press "Enter" after each input.

STEP 8: Use up & down arrow buttons to set desired **Start Temperature** for each exhaust fan (85º-90º is recommended) beginning with EF1, then EF2 and EF3 as shown below, pressing "Enter" after each input.

```
Enter Temp Start EF1
090˚
```

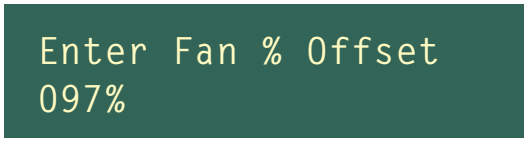
```
Enter Temp Start EF2
090˚
```

```
Enter Temp Start EF3
090˚
```

85º-90º is recommended beginning with EF1, then EF2 as shown at below left, pressing "Enter" after each input.

PROCEDURE

STEP 9: Enter **Fan Percentage Offset** (97% is recommended and should only be set differently if recommended by factory). Then press “Enter”.



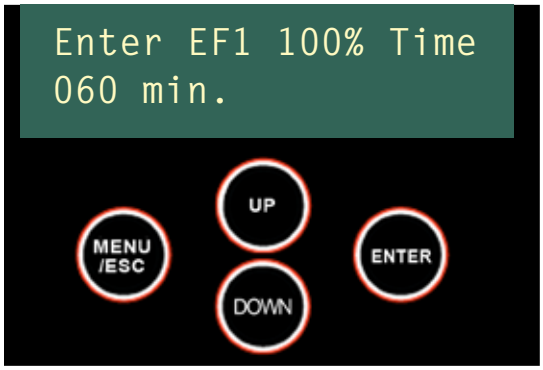
STEP 10: Enter **Auto Off Delay** to set number of minutes delay before system shut-off from the time the hood turns on automatically when start temperature is reached (this eliminates nuisance debouncing). Factory recommends 20 mins.

STEP 10 COMPLETES INITIAL SET-UP. THE FOLLOWING PROCEDURE IS TO ALLOW A TEST AND BALANCE OF THE SYSTEM BY A QUALIFIED TECHNICIAN

EXPLANATION

Provides 100% (design) airflow to perform a test and balance after installation. This allows technician to force the system into 100% speed in order to adjust fans to the designed cfm. Once the system is balanced it will stay balanced when modulating.

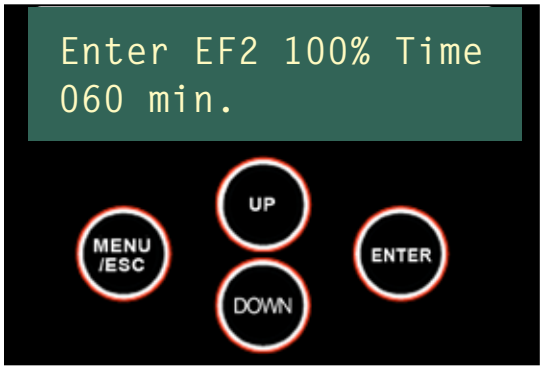
STEP 11: System Balance: After properly performing your initial set-up, press “100% AF SCROLL” and use ‘up’ arrow key to set EF1 to 60 minutes, then press ‘Enter’ (this forces exhaust and supply fans into 100% airflow for 60 minutes to give you enough time to balance the system at full airflow).



PROCEDURE

EXPLANATION

STEP 12: Next, press “100% AF SCROLL” two times to set EF2 to 60 mins. adjustment time at full CFM. Then press “ENTER”.



Provides additional time for balancing multifan systems.

STEP 13: Next, press “100% AF SCROLL” three times to set EF3 to 60 mins. adjustment time at full CFM. Then press “ENTER”.

Provides additional time for balancing multifan systems.

INITIAL START UP & PROGRAMMING FOR A 3 EXHAUST FANS / 2 SUPPLY FANS SYSTEM

START-UP PROCEDURE

STEP 1: After installation, confirm circuit breakers are turned on for all exhaust and supply fans as well as the DVS controller. System may then be started up (verify "Ready" light is on). Note: Password code is not needed for initial setup.

EXPLANATION

Preparation for programming touchpad menu

STEP 2 (FOR INTITIAL SETUP): The menu will automatically ask for set-up input; the first prompt is: **Set Low Fan Speed Percentage** to establish fan speed 20% (recommended) slower than design at start temperature. Use up & down arrow buttons, set low fan speed to desired percentage then press "Enter".

```
Enter Ex. Fan % LSP
020%
```

Example Settings:

1) Start temperature set at 90º
2) Max temp set to 110º
3) Exh fan %LSP 020%

When system shows duct temperature reaching 90º fan will autostart and run at 80% of design CFM. As duct temperature increases, the CFM will increase proportionately until duct temperature reaches maximum temperature at which it will run at 100% of design CFM.

STEP 3: Use up and down arrow keys to input three (3) exhaust fans; press enter.

```
Number of Ex. Fans
003 Fan(s)
```

STEP 4: Use up and down arrow keys to input two (2) supply fan; press enter.

```
Number of SP. Fans
002 Fan(s)
```

STEP 5: Use up and down arrow keys to input which supply fan number correlates with each of the exhaust fans. After each input below Press "Enter".

Most commonly, EF1 correlates with SF1, EF2 with SF2, etc. In a system with two make-up air fans, two or more exhaust fans may be correlated to the second SF: 002.

```
Ex. Fan1 map to SF:
001 Fan
```

```
Ex. Fan2 map to SF:
002 Fan
```

```
Ex. Fan3 map to SF:
002 Fan
```

START-UP PROCEDURE

STEP 6: Set **Supply-to-Exhaust Fan Ratios** to determine the percentage of supply air required for each exhaust fan when multiple exhaust fans operate at unequal or differing CFM rates (always total 100%). Press "Enter" after each of the three ratio inputs.

```
EF1 to SF1 Ratio
033%
```

```
EF2 to SF2 Ratio
033%
```

```
EF3 to SF2 Ratio
034%
```

EXPLANATION

Example: A system with three exhaust fans operating at 2000 CFM, 1000 CFM and 1000 CFM respectively will require supply air allocation (ratio) of 50%, 25% and 25%, entered in the display one at a time, first as "EF1/SF Ratio 050%" and next as "EF2/SF Ratio 025%" and "EF3/SF Ratio 025%". Specific ratios are determined by the following calculation:

$$\frac{\text{EF1 CFM}}{\text{Total Exhaust CFM}}$$

Note: 33% for all three is most common if all exhaust fans are designed for the same airflow (set two to 33% and one to 34% as shown to total 100%)

STEP 7: Set **Temperature Maximum** for each exhaust fan according to medium or heavy duty appliance layout demand.

```
Enter Temp. Max. EF1
110˚
```

```
Enter Temp Max. EF2
110˚
```

```
Enter Temp Max. EF3
110˚
```

Examples: Charbroilers, multiple fryers, woks, upright broilers = Heavy Demand (set to 25˚-40˚ above start temp.); Flat-top griddles, ranges, pasta cookers, single fryer, etc. = Medium Demand (set to 10˚-20˚ above start temp.). Use up & down arrow buttons to input desired maximum temperature for each exhaust fan. Press "Enter" after each input.

STEP 8: Use up & down arrow buttons to set desired **Start Temperature** for each exhaust fan (85º-90º is recommended) beginning with EF1, then EF2 and EF3 as shown below, pressing "Enter" after each input.

```
Enter Temp Start EF1
090˚
```

```
Enter Temp Start EF2
090˚
```

```
Enter Temp Start EF3
090˚
```

85º-90º is recommended beginning with EF1, then EF2 as shown at below left, pressing "Enter" after each input.

START-UP PROCEDURE

STEP 9: Enter **Fan Percentage Offset** (97% is recommended and should only be set differently if recommended by factory). Then press “Enter”.

```
Enter Fan % Offset
097%
```

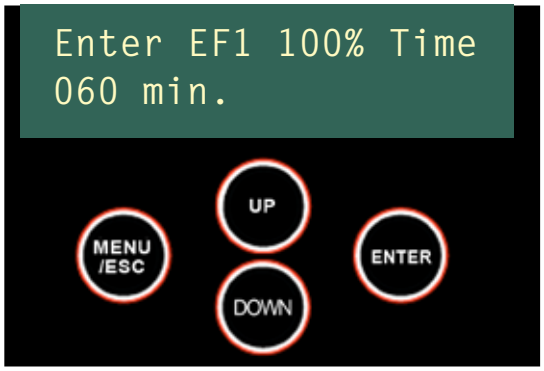
STEP 10: Enter **Auto Off Delay** to set number of minutes delay before system shut-off from the time the hood turns on automatically when start temperature is reached (this eliminates nuisance debouncing). Factory recommends 20 mins.

```
Enter Auto Off Delay
020 min.
```

EXPLANATION

STEP 10 COMPLETES INITIAL SET-UP. THE FOLLOWING PROCEDURE IS TO ALLOW A TEST AND BALANCE OF THE SYSTEM BY A QUALIFIED TECHNICIAN

STEP 11: System Balance: After properly performing your initial set-up, press “100% AF SCROLL” and use ‘up’ arrow key to set EF1 to 60 minutes, then press ‘Enter’ (this forces exhaust and supply fans into 100% airflow for 60 minutes to give you enough time to balance the system at full airflow).

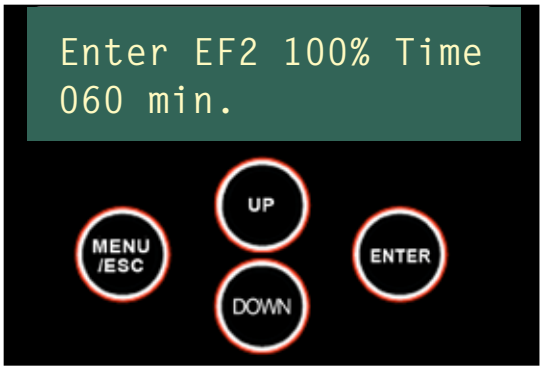


Provides 100% (design) airflow to perform a test and balance after installation. This allows technician to force the system into 100% speed in order to adjust fans to the designed cfm. Once the system is balanced it will stay balanced when modulating.

PROCEDURE

EXPLANATION

STEP 12: Next, press “100% AF SCROLL” two times to set EF2 to 60 mins. adjustment time at full CFM. Then press “ENTER”.



Provides additional time for balancing multifan systems.

STEP 13: Next, press “100% AF SCROLL” three times to set EF3 to 60 mins. adjustment time at full CFM. Then press “ENTER”.

Provides additional time for balancing multifan systems.

START-UP PROCEDURE

STEP 1: After installation, confirm circuit breakers are turned on for all exhaust and supply fans as well as the DVS controller. System may then be started up (verify "Ready" light is on). Note: Password code is not needed for initial setup.

EXPLANATION

Preparation for programming touchpad menu

STEP 2 (FOR INTITIAL SETUP): The menu will automatically ask for set-up input; the first prompt is: **Set Low Fan Speed Percentage** to establish fan speed 20% (recommended) slower than design at start temperature. Use up & down arrow buttons, set low fan speed to desired percentage then press "Enter".

```
Enter Ex. Fan % LSP
020%
```

Example Settings:

1) Start temperature set at 90º
2) Max temp set to 110º
3) Exh fan %LSP 020%

When system shows duct temperature reaching 90º fan will autostart and run at 80% of design CFM. As duct temperature increases, the CFM will increase proportionately until duct temperature reaches maximum temperature at which it will run at 100% of design CFM.

STEP 3: Use up and down arrow keys to input three (3) exhaust fans; press enter.

```
Number of Ex. Fans
003 Fan(s)
```

STEP 4: Use up and down arrow keys to input three (3) supply fan; press enter.

```
Number of SP. Fans
003 Fan(s)
```

STEP 5: Use up and down arrow keys to input which supply fan number correlates with each of the exhaust fans. After each input below Press "Enter".

Most commonly, EF1 correlates with SF1, EF2 with SF2, etc. In a system with two or more make-up air fans, two or more exhaust fans may be correlated to the second (SF: 002) or third (SF:003) supply fans.

```
Ex. Fan1 map to SF:
001 Fan
```

```
Ex. Fan2 map to SF:
002 Fan
```

```
Ex. Fan3 map to SF:
003 Fan
```

START-UP PROCEDURE

STEP 6: Set **Supply-to-Exhaust Fan Ratios** to determine the percentage of supply air required for each exhaust fan when multiple exhaust fans operate at unequal or differing CFM rates (always set to 100%). Press "Enter" after each of the three ratio inputs.

```
EF1 to SF1 Ratio
033%
```

```
EF2 to SF2 Ratio
033%
```

```
EF3 to SF3 Ratio
034%
```

EXPLANATION

Example: A system with three exhaust fans operating at 2000 CFM, 1000 CFM and 1000 CFM respectively will require supply air allocation (ratio) of 50%, 25% and 25%, entered in the display one at a time, first as "EF1/SF Ratio 050%" and next as "EF2/SF Ratio 025%" and "EF3/SF Ratio 025%". Specific ratios are determined by the following calculation:

$$\frac{\text{EF1 CFM}}{\text{Total Exhaust CFM}}$$

Note: A one-third ratio for all three is most common if all exhaust fans are designed for the same airflow (set two to 33% and one to 34% as shown to total 100%)

STEP 7: Set **Temperature Maximum** for each exhaust fan according to medium or heavy duty appliance layout demand.

```
Enter Temp. Max. EF1
110˚
```

```
Enter Temp Max. EF2
110˚
```

```
Enter Temp Max. EF3
110˚
```

Examples: Charbroilers, multiple fryers, woks, upright broilers = Heavy Demand (set to 25˚-40˚ above start temp.); Flat-top griddles, ranges, pasta cookers, single fryer, etc. = Medium Demand (set to 10˚-20˚ above start temp.). Use up & down arrow buttons to input desired maximum temperature for each exhaust fan. Press "Enter" after each input.

STEP 8: Use up & down arrow buttons to set desired **Start Temperature** for each exhaust fan (85º-90º is recommended) beginning with EF1, then EF2 and EF3 as shown below, pressing "Enter" after each input.

```
Enter Temp Start EF1
090˚
```

```
Enter Temp Start EF2
090˚
```

```
Enter Temp Start EF3
090˚
```

85º-90º is recommended beginning with EF1, then EF2 as shown at below left, pressing "Enter" after each input.

START-UP PROCEDURE

STEP 9: Enter **Fan Percentage Offset** (97% is recommended and should only be set differently if recommended by factory). Then press “Enter”.

```
Enter Fan % Offset
097%
```

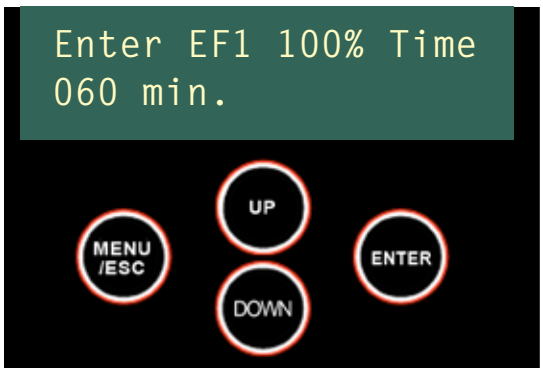
STEP 10: Enter **Auto Off Delay** to set number of minutes delay before system shut-off from the time the hood turns on automatically when start temperature is reached (this eliminates nuisance debouncing). Factory recommends 20 mins.

```
Enter Auto Off Delay
020 min.
```

EXPLANATION

STEP 10 COMPLETES INITIAL SET-UP. THE FOLLOWING PROCEDURE IS TO ALLOW A TEST AND BALANCE OF THE SYSTEM BY A QUALIFIED TECHNICIAN

STEP 11: System Balance: After properly performing your initial set-up, press “100% AF SCROLL” and use ‘up’ arrow key to set EF1 to 60 minutes, then press ‘Enter’ (this forces exhaust and supply fans into 100% airflow for 60 minutes to give you enough time to balance the system at full airflow).

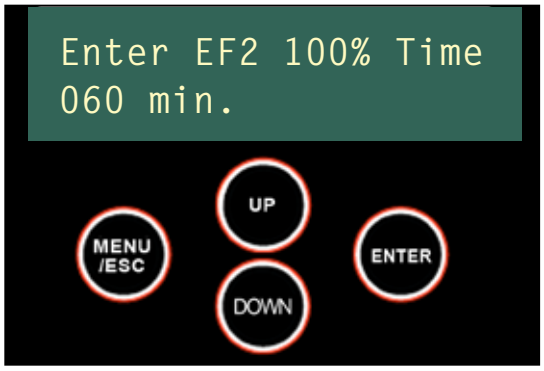


Provides 100% (design) airflow to perform a test and balance after installation. This allows technician to force the system into 100% speed in order to adjust fans to the designed cfm. Once the system is balanced it will stay balanced when modulating.

PROCEDURE

EXPLANATION

STEP 12: Next, press “100% AF SCROLL” two times to set EF2 to 60 mins. adjustment time at full CFM. Then press “ENTER”.



Provides additional time for balancing multifan systems.

STEP 13: Next, press “100% AF SCROLL” three times to set EF3 to 60 mins. adjustment time at full CFM. Then press “ENTER”.

Provides additional time for balancing multifan systems.

INITIAL START UP & PROGRAMMING FOR A 4 EXHAUST FANS / 1 SUPPLY FANS SYSTEM

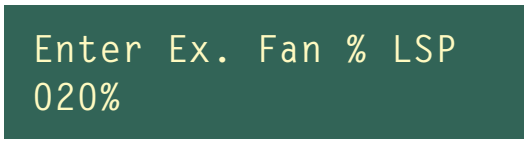
START-UP PROCEDURE

STEP 1: After installation, confirm circuit breakers are turned on for all exhaust and supply fans as well as the DVS controller. System may then be started up (verify "Ready" light is on). Note: Password code is not needed for initial setup.

EXPLANATION

Preparation for programming touchpad menu

STEP 2 (FOR INTITIAL SETUP): The menu will automatically ask for set-up input; the first prompt is: **Set Low Fan Speed Percentage** to establish fan speed 20% (recommended) slower than design at start temperature. Use up & down arrow buttons, set low fan speed to desired percentage then press "Enter".

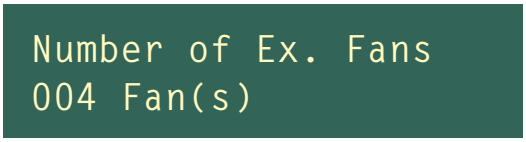


Example Settings:

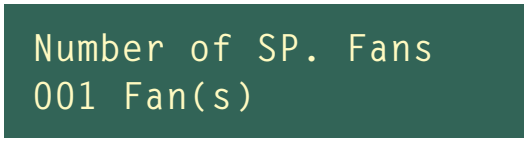
1) Start temperature set at 90º
2) Max temp set to 110º
3) Exh fan %LSP 020%

When system shows duct temperature reaching 90º fan will autostart and run at 80% of design CFM. As duct temperature increases, the CFM will increase proportionately until duct temperature reaches maximum temperature at which it will run at 100% of design CFM.

STEP 3: Use up and down arrow keys to input four (4) exhaust fans; press enter.



STEP 4: Use up and down arrow keys to input one (1) supply fans; press enter.



START-UP PROCEDURE

STEP 5: Use up and down arrow keys to input which supply fan number correlates with each of the exhaust fans. After each input below Press “Enter”.

```
Ex, Fan1 map to SF:
001 Fan
```

```
Ex, Fan2 map to SF:
001 Fan
```

```
Ex, Fan3 map to SF:
001 Fan
```

```
Ex, Fan4 map to SF:
001 Fan
```

EXPLANATION

Most commonly, EF1 correlates with SF1, EF2 with SF2, etc. In a system with single make-up air fan, all four exhaust fans are correlated to SF: 001.

STEP 6: Set **Supply-to-Exhaust Fan Ratios** to determine the percentage of supply air required for each exhaust fan when multiple exhaust fans operate at unequal or differing CFM rates (always set to 100%). Press “Enter” after each of the four ratio inputs.

```
EF1 to SF1 Ratio
025%
```

```
EF2 to SF1 Ratio
025%
```

```
EF3 to SF1 Ratio
025%
```

```
EF4 to SF1 Ratio
025%
```

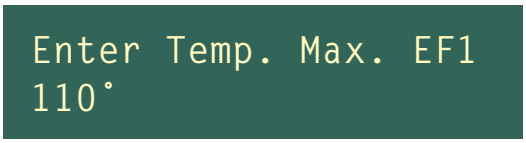
Example: A system with four exhaust fans operating at 2000 CFM, 1000 CFM, 1000 CFM and 1000 CFM respectively will require supply air allocation (ratio) of 40%, 20%, 20% and 20%, entered in the display one at a time, first as “EF1/SF Ratio 040%” and next as “EF2/SF Ratio 020%”, then “EF3/SF Ratio 020%” and “EF4/SF Ratio 020%”. Specific ratios are determined by the following calculation:

$$\frac{\text{EF1 CFM}}{\text{Total Exhaust CFM}}$$

Note: 25% for all four is most common if all exhaust fans are designed for the same airflow (set all to 25% as shown).

START-UP PROCEDURE

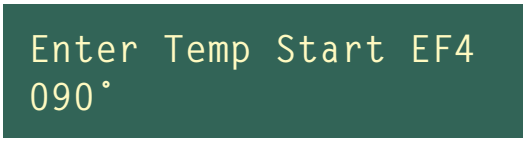
STEP 7: Set **Temperature Maximum** for each exhaust fan according to medium or heavy duty appliance layout demand. *Examples:* Charbroilers, multiple fryers, woks, upright broilers = Heavy Demand (set to 25˚-40˚ above start temp.); Flat-top griddles, ranges, pasta cookers, single fryer, etc. = Medium Demand (set to 10˚-20˚ above start temp.). Use up & down arrow buttons to input desired maximum temperature for each exhaust fan. Press “Enter” after each input.



EXPLANATION

Examples: Charbroilers, multiple fryers, woks, upright broilers = Heavy Demand (set to 25˚-40˚ above start temp.); Flat-top griddles, ranges, pasta cookers, single fryer, etc. = Medium Demand (set to 10˚-20˚ above start temp.). Use up & down arrow buttons to input desired maximum temperature for each exhaust fan. Press “Enter” after each input.

STEP 8: Use up & down arrow buttons to set desired **Start Temperature** for each exhaust fan (85º-90º is recommended) beginning with EF1, then EF2, EF3 and EF4 as shown below, pressing “Enter” after each input.



85º-90º is recommended beginning with EF1, then EF2 as shown at below left, pressing “Enter” after each input.

START-UP PROCEDURE

STEP 9: Enter **Fan Percentage Offset** (97% is recommended and should only be set differently if recommended by factory). Then press “Enter”.

```
Enter Fan % Offset
097%
```

STEP 10: Enter **Auto Off Delay** to set number of minutes delay before system shut-off from the time the hood turns on automatically when start temperature is reached (this eliminates nuisance debouncing). Factory recommends 20 mins.

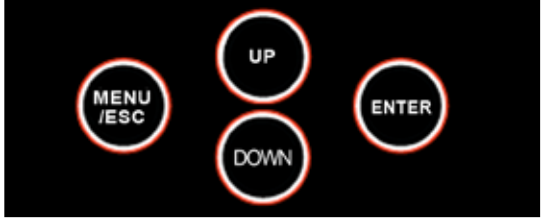
```
Enter Auto Off Delay
020 min.
```

EXPLANATION

STEP 10 COMPLETES INITIAL SET-UP. THE FOLLOWING PROCEDURE IS TO ALLOW A TEST AND BALANCE OF THE SYSTEM BY A QUALIFIED TECHNICIAN

STEP 11: System Balance: After properly performing your initial set-up, press “100% AF SCROLL” and use ‘up’ arrow key to set EF1 to 60 minutes, then press ‘Enter’ (this forces exhaust and supply fans into 100% airflow for 60 minutes to give you enough time to balance the system at full airflow).


```
Enter EF1 100% Time
060 min.
```

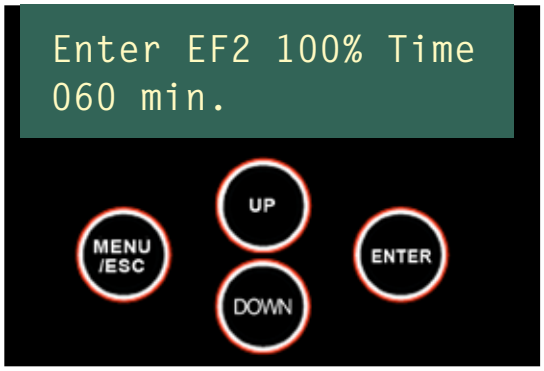


Provides 100% (design) airflow to perform a test and balance after installation. This allows technician to force the system into 100% speed in order to adjust fans to the designed cfm. Once the system is balanced it will stay balanced when modulating.

START-UP PROCEDURE

EXPLANATION

STEP 12: Next, press “100% AF SCROLL” two times to set EF2 to 60 mins. adjustment time at full CFM. Then press “ENTER”.

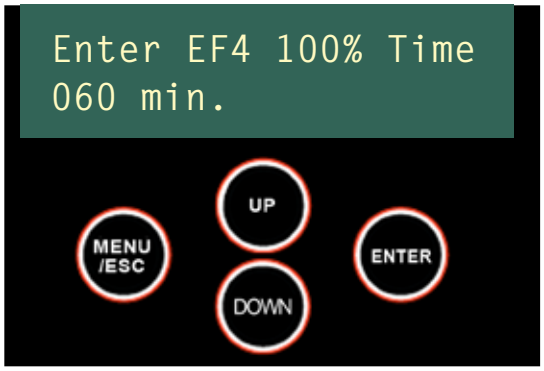


Provides additional time for balancing multifan systems.

STEP 13: Next, press “100% AF SCROLL” three times to set EF3 to 60 mins. adjustment time at full CFM. Then press “ENTER”.

Provides additional time for balancing multifan systems.

STEP 14: Next, press “100% AF SCROLL” four times to set EF4 to 60 mins. adjustment time at full CFM. Then press “ENTER”.



Provides additional time for balancing multifan systems.

INITIAL START UP & PROGRAMMING FOR A 4 EXHAUST FANS / 2 SUPPLY FANS SYSTEM

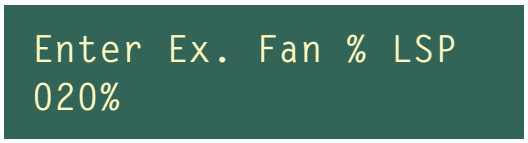
START-UP PROCEDURE

STEP 1: After installation, confirm circuit breakers are turned on for all exhaust and supply fans as well as the DVS controller. System may then be started up (verify "Ready" light is on). Note: Password code is not needed for initial setup.

EXPLANATION

Preparation for programming touchpad menu

STEP 2 (FOR INTITIAL SETUP): The menu will automatically ask for set-up input; the first prompt is: **Set Low Fan Speed Percentage** to establish fan speed 20% (recommended) slower than design at start temperature. Use up & down arrow buttons, set low fan speed to desired percentage then press "Enter".

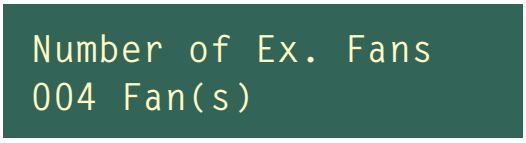


Example Settings:

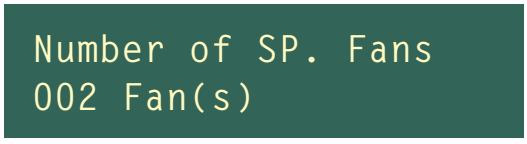
1) Start temperature set at 90º
2) Max temp set to 110º
3) Exh fan %LSP 020%

When system shows duct temperature reaching 90º fan will autostart and run at 80% of design CFM. As duct temperature increases, the CFM will increase proportionately until duct temperature reaches maximum temperature at which it will run at 100% of design CFM.

STEP 3: Use up and down arrow keys to input four (4) exhaust fans; press enter.



STEP 4: Use up and down arrow keys to input two (2) supply fans; press enter.



START-UP PROCEDURE

STEP 5: Use up and down arrow keys to input which supply fan number correlates with each of the exhaust fans. After each input below Press “Enter”.

```
Ex, Fan1 map to SF:
001 Fan
```

```
Ex, Fan2 map to SF:
001 Fan
```

```
Ex, Fan3 map to SF:
002 Fan
```

```
Ex, Fan4 map to SF:
002 Fan
```

EXPLANATION

Most commonly, EF1 correlates with SF1, EF2 with SF2, etc. In a system with two make-up air fans, two or more exhaust fans may be correlated to the second SF: 002.

STEP 6: Set **Supply-to-Exhaust Fan Ratios** to determine the percentage of supply air required for each exhaust fan when multiple exhaust fans operate at unequal or differing CFM rates (always set to 100%). Press “Enter” after each of the four ratio inputs.

```
EF1 to SF1 Ratio
025%
```

```
EF2 to SF1 Ratio
025%
```

```
EF3 to SF2 Ratio
025%
```

```
EF4 to SF2 Ratio
025%
```

Example: A system with four exhaust fans operating at 2000 CFM, 1000 CFM, 1000 CFM and 1000 CFM respectively will require supply air allocation (ratio) of 40%, 20%, 20% and 20%, entered in the display one at a time, first as “EF1/SF Ratio 040%” and next as “EF2/SF Ratio 020%”, then “EF3/SF Ratio 020%” and “EF4/SF Ratio 020%”. Specific ratios are determined by the following calculation:

$$\frac{\text{EF1 CFM}}{\text{Total Exhaust CFM}}$$

Note: 25% for all four is most common if all exhaust fans are designed for the same airflow (set all to 25% as shown).

START-UP PROCEDURE

STEP 7: Set **Temperature Maximum** for each exhaust fan according to medium or heavy duty appliance layout demand. *Examples:* Charbroilers, multiple fryers, woks, upright broilers = Heavy Demand (set to 25˚-40˚ above start temp.); Flat-top griddles, ranges, pasta cookers, single fryer, etc. = Medium Demand (set to 10˚-20˚ above start temp.). Use up & down arrow buttons to input desired maximum temperature for each exhaust fan. Press “Enter” after each input.

```
Enter Temp. Max. EF1
110˚
```

```
Enter Temp Max. EF2
110˚
```

```
Enter Temp Max. EF3
110˚
```

```
Enter Temp Max. EF4
110˚
```

EXPLANATION

Examples: Charbroilers, multiple fryers, woks, upright broilers = Heavy Demand (set to 25˚-40˚ above start temp.); Flat-top griddles, ranges, pasta cookers, single fryer, etc. = Medium Demand (set to 10˚-20˚ above start temp.). Use up & down arrow buttons to input desired maximum temperature for each exhaust fan. Press “Enter” after each input.

STEP 8: Use up & down arrow buttons to set desired **Start Temperature** for each exhaust fan (85º-90º is recommended) beginning with EF1, then EF2, EF3 and EF4 as shown below, pressing “Enter” after each input.

```
Enter Temp Start EF1
090˚
```

```
Enter Temp Start EF2
090˚
```

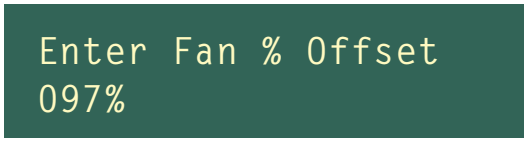
```
Enter Temp Start EF3
090˚
```

```
Enter Temp Start EF4
090˚
```

85º-90º is recommended beginning with EF1, then EF2 as shown at below left, pressing “Enter” after each input.

START-UP PROCEDURE

STEP 9: Enter **Fan Percentage Offset** (97% is recommended and should only be set differently if recommended by factory). Then press “Enter”.

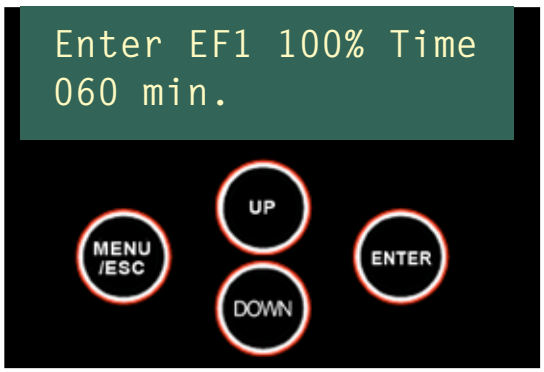


STEP 10: Enter **Auto Off Delay** to set number of minutes delay before system shut-off from the time the hood turns on automatically when start temperature is reached (this eliminates nuisance debouncing). Factory recommends 20 mins.

EXPLANATION

STEP 10 COMPLETES INITIAL SET-UP. THE FOLLOWING PROCEDURE IS TO ALLOW A TEST AND BALANCE OF THE SYSTEM BY A QUALIFIED TECHNICIAN

STEP 11: System Balance: After properly performing your initial set-up, press “100% AF SCROLL” and use ‘up’ arrow key to set EF1 to 60 minutes, then press ‘Enter’ (this forces exhaust and supply fans into 100% airflow for 60 minutes to give you enough time to balance the system at full airflow).



Provides 100% (design) airflow to perform a test and balance after installation. This allows technician to force the system into 100% speed in order to adjust fans to the designed cfm. Once the system is balanced it will stay balanced when modulating.

START-UP PROCEDURE

EXPLANATION

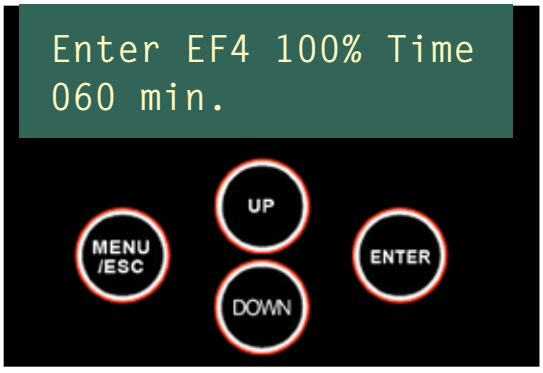
STEP 12: Next, press “100% AF SCROLL” two times to set EF2 to 60 mins. adjustment time at full CFM. Then press “ENTER”.

Provides additional time for balancing multifan systems.

STEP 13: Next, press “100% AF SCROLL” three times to set EF3 to 60 mins. adjustment time at full CFM. Then press “ENTER”.

Provides additional time for balancing multifan systems.

STEP 14: Next, press “100% AF SCROLL” four times to set EF4 to 60 mins. adjustment time at full CFM. Then press “ENTER”.



Provides additional time for balancing multifan systems.

INITIAL START UP & PROGRAMMING FOR A 4 EXHAUST FANS / 3 SUPPLY FANS SYSTEM

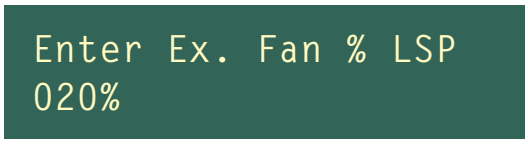
START-UP PROCEDURE

STEP 1: After installation, confirm circuit breakers are turned on for all exhaust and supply fans as well as the DVS controller. System may then be started up (verify "Ready" light is on). Note: Password code is not needed for initial setup.

EXPLANATION

Preparation for programming touchpad menu

STEP 2 (FOR INTITIAL SETUP): The menu will automatically ask for set-up input; the first prompt is: **Set Low Fan Speed Percentage** to establish fan speed 20% (recommended) slower than design at start temperature. Use up & down arrow buttons, set low fan speed to desired percentage then press "Enter".

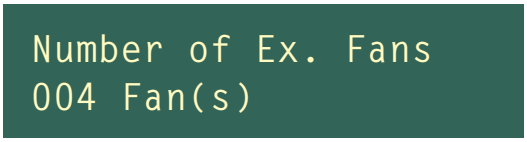


Example Settings:

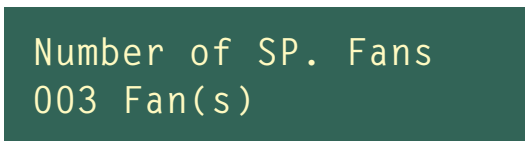
1) Start temperature set at 90º
2) Max temp set to 110º
3) Exh fan %LSP 020%

When system shows duct temperature reaching 90º fan will autostart and run at 80% of design CFM. As duct temperature increases, the CFM will increase proportionately until duct temperature reaches maximum temperature at which it will run at 100% of design CFM.

STEP 3: Use up and down arrow keys to input four (4) exhaust fans; press enter.



STEP 4: Use up and down arrow keys to input three (3) supply fans; press enter.



START-UP PROCEDURE

STEP 5: Use up and down arrow keys to input which supply fan number correlates with each of the exhaust fans. After each input below Press “Enter”.

```
Ex, Fan1 map to SF:
001 Fan
```

```
Ex, Fan2 map to SF:
002 Fan
```

```
Ex, Fan3 map to SF:
003 Fan
```

```
Ex, Fan4 map to SF:
003 Fan
```

EXPLANATION

Most commonly, EF1 correlates with SF1, EF2 with SF2, etc. In a system with two or more make-up air fans, two or more exhaust fans may be correlated to the second (SF: 002) or third (SF:003) supply fans.

STEP 6: Set **Supply-to-Exhaust Fan Ratios** to determine the percentage of supply air required for each exhaust fan when multiple exhaust fans operate at unequal or differing CFM rates (always set to 100%). Press “Enter” after each of the four ratio inputs.

```
EF1 to SF1 Ratio
025%
```

```
EF2 to SF1 Ratio
025%
```

```
EF3 to SF2 Ratio
025%
```

```
EF4 to SF3 Ratio
025%
```

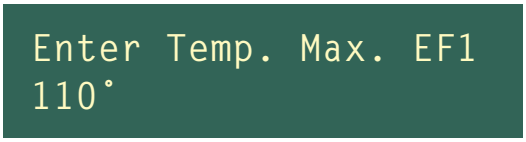
Example: A system with four exhaust fans operating at 2000 CFM, 1000 CFM, 1000 CFM and 1000 CFM respectively will require supply air allocation (ratio) of 40%, 20%, 20% and 20%, entered in the display one at a time, first as “EF1/SF Ratio 040%” and next as “EF2/SF Ratio 020%”, then “EF3/SF Ratio 020%” and “EF4/SF Ratio 020%”. Specific ratios are determined by the following calculation:

$$\frac{\text{EF1 CFM}}{\text{Total Exhaust CFM}}$$

Note: 25% for all four is most common if all exhaust fans are designed for the same airflow (set all to 25% as shown).

START-UP PROCEDURE

STEP 7: Set **Temperature Maximum** for each exhaust fan according to medium or heavy duty appliance layout demand. *Examples:* Charbroilers, multiple fryers, woks, upright broilers = Heavy Demand (set to 25˚-40˚ above start temp.); Flat-top griddles, ranges, pasta cookers, single fryer, etc. = Medium Demand (set to 10˚-20˚ above start temp.). Use up & down arrow buttons to input desired maximum temperature for each exhaust fan. Press “Enter” after each input.



EXPLANATION

Examples: Charbroilers, multiple fryers, woks, upright broilers = Heavy Demand (set to 25˚-40˚ above start temp.); Flat-top griddles, ranges, pasta cookers, single fryer, etc. = Medium Demand (set to 10˚-20˚ above start temp.). Use up & down arrow buttons to input desired maximum temperature for each exhaust fan. Press “Enter” after each input.

STEP 8: Use up & down arrow buttons to set desired **Start Temperature** for each exhaust fan (85º-90º is recommended) beginning with EF1, then EF2, EF3 and EF4 as shown below, pressing “Enter” after each input.

85º-90º is recommended beginning with EF1, then EF2 as shown at below left, pressing “Enter” after each input.

START-UP PROCEDURE

STEP 9: Enter **Fan Percentage Offset** (97% is recommended and should only be set differently if recommended by factory). Then press “Enter”.

```
Enter Fan % Offset
097%
```

STEP 10: Enter **Auto Off Delay** to set number of minutes delay before system shut-off from the time the hood turns on automatically when start temperature is reached (this eliminates nuisance debouncing). Factory recommends 20 mins.

```
Enter Auto Off Delay
020 min.
```

EXPLANATION

STEP 10 COMPLETES INITIAL SET-UP. THE FOLLOWING PROCEDURE IS TO ALLOW A TEST AND BALANCE OF THE SYSTEM BY A QUALIFIED TECHNICIAN

STEP 11: System Balance: After properly performing your initial set-up, press “100% AF SCROLL” and use ‘up’ arrow key to set EF1 to 60 minutes, then press ‘Enter’ (this forces exhaust and supply fans into 100% airflow for 60 minutes to give you enough time to balance the system at full airflow).


```
Enter EF1 100% Time
060 min.
```

UP

MENU /ESC

ENTER

DOWN

Provides 100% (design) airflow to perform a test and balance after installation. This allows technician to force the system into 100% speed in order to adjust fans to the designed cfm. Once the system is balanced it will stay balanced when modulating.

START-UP PROCEDURE

EXPLANATION

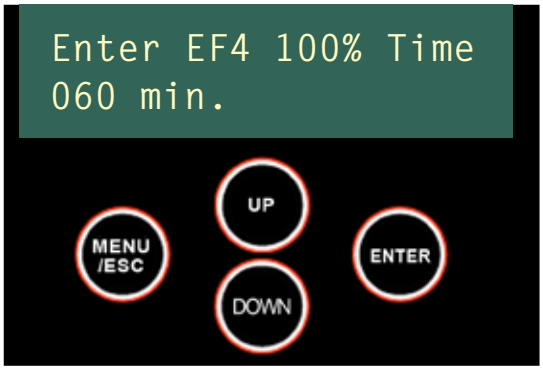
STEP 12: Next, press “100% AF SCROLL” two times to set EF2 to 60 mins. adjustment time at full CFM. Then press “ENTER”.

Provides additional time for balancing multifan systems.

STEP 13: Next, press “100% AF SCROLL” three times to set EF3 to 60 mins. adjustment time at full CFM. Then press “ENTER”.

Provides additional time for balancing multifan systems.

STEP 14: Next, press “100% AF SCROLL” four times to set EF4 to 60 mins. adjustment time at full CFM. Then press “ENTER”.



Provides additional time for balancing multifan systems.

INITIAL START UP & PROGRAMMING FOR A 4 EXHAUST FANS / 4 SUPPLY FANS SYSTEM

START-UP PROCEDURE

STEP 1: After installation, confirm circuit breakers are turned on for all exhaust and supply fans as well as the DVS controller. System may then be started up (verify "Ready" light is on). Note: Password code is not needed for initial setup.

EXPLANATION

Preparation for programming touchpad menu

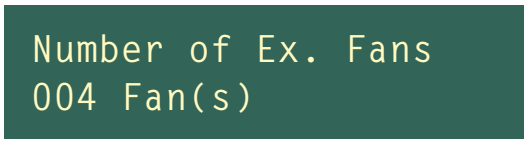
STEP 2 (FOR INTITIAL SETUP): The menu will automatically ask for set-up input; the first prompt is: **Set Low Fan Speed Percentage** to establish fan speed 20% (recommended) slower than design at start temperature. Use up & down arrow buttons, set low fan speed to desired percentage then press "Enter".

Example Settings:

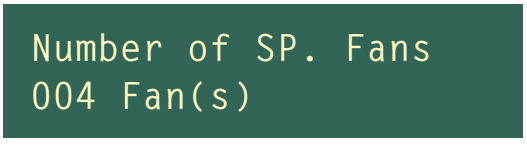
1) Start temperature set at 90º
2) Max temp set to 110º
3) Exh fan %LSP 020%

When system shows duct temperature reaching 90º fan will autostart and run at 80% of design CFM. As duct temperature increases, the CFM will increase proportionately until duct temperature reaches maximum temperature at which it will run at 100% of design CFM.

STEP 3: Use up and down arrow keys to input four (4) exhaust fans; press enter.



STEP 4: Use up and down arrow keys to input four (4) supply fans; press enter.



START-UP PROCEDURE (Continued)

STEP 5: Use up and down arrow keys to input which supply fan number correlates with each of the exhaust fans. After each input below Press “Enter”.

```
Ex, Fan1 map to SF:
001 Fan
```

```
Ex, Fan2 map to SF:
002 Fan
```

```
Ex, Fan3 map to SF:
003 Fan
```

```
Ex, Fan4 map to SF:
004 Fan
```

EXPLANATION

Most commonly, EF1 correlates with SF1, EF2 with SF2, etc. In a system with two or more make-up air fans, two or more exhaust fans may be correlated to the second (SF: 002) or third (SF:003) supply fans.

STEP 6: Set **Supply-to-Exhaust Fan Ratios** to determine the percentage of supply air required for each exhaust fan when multiple exhaust fans operate at unequal or differing CFM rates (always set to 100%). Press “Enter” after each of the four ratio inputs.

```
EF1 to SF1 Ratio
025%
```

```
EF2 to SF2 Ratio
025%
```

```
EF3 to SF3 Ratio
025%
```

```
EF4 to SF4 Ratio
025%
```

Example: A system with four exhaust fans operating at 2000 CFM, 1000 CFM, 1000 CFM and 1000 CFM respectively will require supply air allocation (ratio) of 40%, 20%, 20% and 20%, entered in the display one at a time, first as “EF1/SF Ratio 040%” and next as “EF2/SF Ratio 020%”, then “EF3/SF Ratio 020%” and “EF4/SF Ratio 020%”. Specific ratios are determined by the following calculation:

$$\frac{\text{EF1 CFM}}{\text{Total Exhaust CFM}}$$

Note: 25% for all four is most common if all exhaust fans are designed for the same airflow (set all to 25% as shown).

START-UP PROCEDURE (Continued)

STEP 7: Set **Temperature Maximum** for each exhaust fan according to medium or heavy duty appliance layout demand. *Examples:* Charbroilers, multiple fryers, woks, upright broilers = Heavy Demand (set to 25˚-40˚ above start temp.); Flat-top griddles, ranges, pasta cookers, single fryer, etc. = Medium Demand (set to 10˚-20˚ above start temp.). Use up & down arrow buttons to input desired maximum temperature for each exhaust fan. Press “Enter” after each input.

```
Enter Temp Max. EF1
110˚
```

```
Enter Temp Max. EF2
110˚
```

```
Enter Temp Max. EF3
110˚
```

```
Enter Temp Max. EF4
110˚
```

EXPLANATION

Examples: Charbroilers, multiple fryers, woks, upright broilers = Heavy Demand (set to 25˚-40˚ above start temp.); Flat-top griddles, ranges, pasta cookers, single fryer, etc. = Medium Demand (set to 10˚-20˚ above start temp.). Use up & down arrow buttons to input desired maximum temperature for each exhaust fan. Press “Enter” after each input.

STEP 8: Use up & down arrow buttons to set desired **Start Temperature** for each exhaust fan (85º-90º is recommended) beginning with EF1, then EF2, EF3 and EF4 as shown below, pressing “Enter” after each input.

```
Enter Temp Start EF1
090˚
```

```
Enter Temp Start EF2
090˚
```

```
Enter Temp Start EF3
090˚
```

```
Enter Temp Start EF4
090˚
```

85º-90º is recommended beginning with EF1, then EF2 as shown at below left, pressing “Enter” after each input.

START-UP PROCEDURE

STEP 9: Enter **Fan Percentage Offset** (97% is recommended and should only be set differently if recommended by factory). Then press “Enter”.

```
Enter Fan % Offset
097%
```

STEP 10: Enter **Auto Off Delay** to set number of minutes delay before system shut-off from the time the hood turns on automatically when start temperature is reached (this eliminates nuisance debouncing). Factory recommends 20 mins.

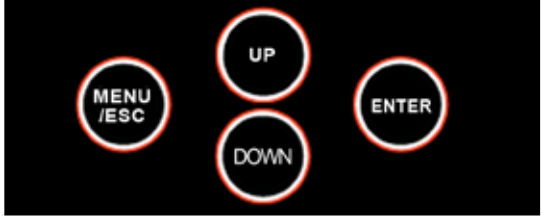
```
Enter Auto Off Delay
020 min.
```

EXPLANATION

STEP 10 COMPLETES INITIAL SET-UP. THE FOLLOWING PROCEDURE IS TO ALLOW A TEST AND BALANCE OF THE SYSTEM BY A QUALIFIED TECHNICIAN

STEP 11: System Balance: After properly performing your initial set-up, press “100% AF SCROLL” and use ‘up’ arrow key to set EF1 to 60 minutes, then press ‘Enter’ (this forces exhaust and supply fans into 100% airflow for 60 minutes to give you enough time to balance the system at full airflow).


```
Enter EF1 100% Time
060 min.
```



Provides 100% (design) airflow to perform a test and balance after installation. This allows technician to force the system into 100% speed in order to adjust fans to the designed cfm. Once the system is balanced it will stay balanced when modulating.

START-UP PROCEDURE

EXPLANATION

STEP 12: Next, press “100% AF SCROLL” two times to set EF2 to 60 mins. adjustment time at full CFM. Then press “ENTER”.

Provides additional time for balancing multifan systems.

STEP 13: Next, press “100% AF SCROLL” three times to set EF3 to 60 mins. adjustment time at full CFM. Then press “ENTER”.

Provides additional time for balancing multifan systems.

STEP 14: Next, press “100% AF SCROLL” four times to set EF4 to 60 mins. adjustment time at full CFM. Then press “ENTER”.

Provides additional time for balancing multifan systems.

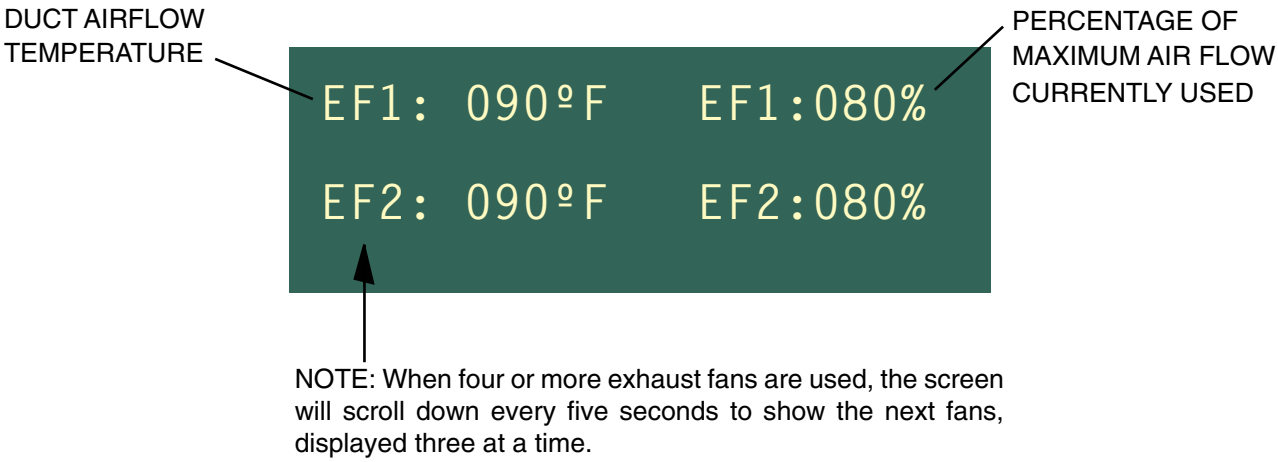
DAILY START-UP AND ROUTINE OPERATION

The on-demand system turns on automatically when cooking appliances heat up so there is no need for touchpad operation at morning start-up or at any other time. The "Lights On-Off" button needs to be operated manually.

NOTE: It is not necessary to use the fan on-off switch (except for special circumstances) because it overrides the automatic activation program and disables the on-demand system's automatic turn-off feature if the temperature sensor reads 3˚ lower than start temperature.

NORMAL OPERATING DISPLAY

During normal operation the LCD displays as follows:



SHUTDOWN PROCEDURE

The ON-Demand system requires no daily shut-down because the system has been programmed (see "Initial Start-Up") to shut off when heat-generating cooking equipment cools down 3˚ lower than start temperature (20 minutes "OFF" time delay). In an emergency, the entire system may be shut down at the breaker box.

NOTE: if fan ON/OFF button is used to turn hood on, it will not turn off until this button is pressed again and temperature is 3º less than start temperature.

VARIABLE FREQUENCY DRIVE (VFD) RESET

VFD Reset is used only to reboot all system VFDs after a 'Fatal Fault' occurrence which can include phase loss, high voltage surge or other unusual system interference caused by improper supply power. To address VFD problems, see VFD manufacturer's manual.

ALARMS

An **Audio Alarm** sounds to report activation of the fire suppression system (with or without visible fire) and is accompanied by a red indicator light labeled "FIRE" (see page 4).

PASSWORD PROTECTION / CHANGING SETTINGS

Your unique four-digit pass code is attached to the front of this manual (keep a secure record of this number). It is required only for changing the system settings (i.e., change %LSP, Max Temp, Start Temp, etc.) and is not needed for daily start-up. The system will accept initial set-up programming one time without use of the code.

OPERATOR INFORMATION

• Once the system has been set up and properly balanced, there is no need to change the display settings except as noted (see “Change Settings). Changes in cooking schedule, special events, holiday closures, etc., do not require any setting changes to the system. All adjustments are made automatically by the Energy Logic System.

• During routine cleaning, do not use caustic cleaners on the surface of the touchpad; wipe with damp cloth. DO NOT attempt to clean the interior of the control panel cabinet.

CAUTION: BE SURE TO TURN OFF POWER DURING HOOD CLEANING

• Do not use pressurized water cleaning devices directly into or behind unit control cabinet or at access door seams.

• Clean and/or replace hood filters according to recommended schedule to keep the system running at top efficiency.

• Do not attempt any electrical changes (e.g., appliance additions or use of alternate receptacles) without consulting the system manufacturer. All electrical work must be performed by a qualified electrician.

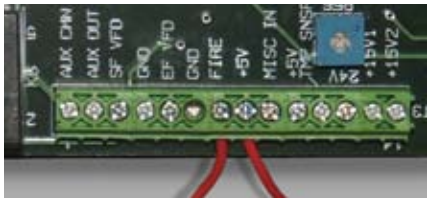
• Do not make changes to dampers, windows or any device that may alter kitchen airflow. This will require rebalancing the system.

• Never substitute fuses or any other replaceable part of system with anything other than approved OEM manufacturer’s parts.

• Report any malfunction or unusual noises directly to authorized system supervisor. Do not be alarmed by periods of low noise levels. This is a normal variation automatically made by the oELC system.

BASIC TROUBLE SHOOTING

Prior to calling a service company, some minor problems can be overcome by the operator. The following difficulties may not require advanced technical help:

PROBLEM	POSSIBLE CAUSE	REMEDY
Touchpad is operating but one or more fans are not running.	Fatal Fault on VFDs due to phase loss, voltage spike or loss, etc.	Press VFD Reset button on operator interface; allow one minute for system to reset.
	Fan Belt may need to be replaced.	Check fan belts and replace as necessary.
	Disconnect-Switch at fan may be off or may need replacement.	Go to fan(s) and verify that the switch is in “On” position and that power is going into the switch. If power is going into switch but not out (when switch is in “On” position) then replace bad switch.
	Motor may need to be replaced.	Verify that the non-performing motor is getting proper voltage. If so, replace motor.
Exhaust fan runs but lights and supply fans do not work.	Fire system has been activated.	Verify Ready Light is on at operator interface. If Fire Light (red) is on, call your fire system service company to service your fire system and find the cause of the activation.
	Microswitch for fire system has failed.	Have hood service tech verify that 5v coming from the circuit board to the microswitch is returning as 5v to terminal “Fire”. 
Fans are always running at 100% speed.	Sensor needs to be replaced.	Check voltage at terminal block(s) AIN CH to verify that circuit has between 0 and 5 volts.
	Maximum temperature setting is too low.	Press Menu button and enter password (located on the front of this manual) and press ‘Enter’ until you see “Enter Temp. Maximum”; increase maximum temperature accordingly.
Fans run all the time.	‘Start’ temperature setting is set too low.	Press Menu button and enter password (located on the front of this manual) and press ‘Enter’ until you see “Enter Start Temp.”; increase start temperature accordingly. If problem persists due to a fluctuation of space temperature, an optional room temperature sensor can be installed to work out the differential of temperatures between the room and the ducts.
Fans do not extract all smoke and vapors at low speed.	‘Low Speed’ setting needs to be increased.	Press Menu button and enter password (located on the front of this manual) and press ‘Enter’ until you see “Enter Ex. Fan% LSP”; Decrease this number so that the low speed is set closer to the design CFM.

MAINTENANCE

GENERAL MAINTENANCE

SAFETY: When working on the system, safe practices should be used to eliminate the chance of electric shock. Make sure to use lock-out/tag-out procedure to ensure that nobody turns power on while you are servicing the unit.

CHECK & ADJUST: Make sure all bolts, hardware and latches are kept clean and tight; make sure all wiring connections are tight and have not loosened over time.

WEEKLY QUICK-CLEAN

It is recommended that hood filters be removed and cleaned each week and each duct temperature sensor is wiped clean to assure prompt and accurate response to temperature changes. Do not use caustic cleaning agents.

CALIBRATION

Recalibration of the system should be done by a factory rep and only when miscalibration is evident to a qualified technician.

NOTE: Refer all maintenance questions to our service department at:

1 954 421-1238

Carroll™ Carroll Manufacturing

Commercial Kitchen Ventilation Products

DOCUMENTATION

RECORDS LOG

The following documentation is necessary to maintain warranty and inform service personnel of past service history.

***Note:* Service by unauthorized personnel may void warranty**

Date	Service Co.	Service Description	Technician Name	Service Co. Phone

Commercial Kitchen Ventilation Products

710 S. Powerline Road, Suite H, Deerfield Beach, FL 33442 • 954 421-1238 • www.carrollmanufacturing.com