Energy Management System Control

Installation, Operation, and Maintenance Manual

RECEIVING AND INSPECTION

Upon receiving unit, check for any interior and exterior damage, and if found, report it immediately to the carrier. Also check that all accessory items are accounted for and are damage free.

WARNING!!

Installation of this control panel should only be performed by a qualified professional who has read and understands these instructions and is familiar with proper safety precautions. Improper installation poses serious risk of injury due to electric shock and other potential hazards. Read this manual thoroughly before installing or servicing this equipment. ALWAYS disconnect power prior to working on module.

Save these instructions. This document is the property of the owner of this equipment and is required for future maintenance. Leave this document with the owner when installation or service is complete.

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TABLE OF CONTENTS

WARRANTY 2
SAFETY INFORMATION 3
INSTALLATION 5
Mechanical 5
Room Sensor Installation 5
Duct Sensor Installation 6
Electrical 6
High Voltage Wiring 7
Low Voltage Wiring 8
Variable Frequency Drive (VFD) Installation Instructions 9
OPERATION 11
Start-Up Procedure 11
Sequence of Operation 12
Functionality 13
Fan Control 13
Preparation Time Mode 13
Hood Lights 14
Electric Gas Valve Reset 14
High Temperature Automatic Appliance Shutdown 14
Make-Up Air Interlock 14
Building Management System (Optional) 14
Self-Cleaning (Optional) 14
Fan Proving Interlock (Optional) (i.e. Loss of Load Interlock/Airflow Fault Interlock) 15
CORE Protection Fire System (Optional) 15
PCU Advanced Filter Monitoring (AFM) (Optional) 15
Configuration and Diagnostics 16
Security 16
Setup Options 16
a. Display System Information 16
b. Display Fault History 16
c. Display temperature readings 16
d. Display Fan Monitoring data: Fan Frequencies and Motor Amps 17
e. Fan Proving Interlock: Calibration 17
f. Configure Temperature Sensor Assignments 17
g. Configure Temperature Sensor Offset values 17
h. Enable Electric Gas Valve control 17
i. Set Electric Gas Valve type 18
j. Adjust the Temperature Hysteresis 18
k. Adjust the Hysteresis Timer 18
l. Adjust the Max Air Time 18
m. Set 0-10VDC output 18
n. Fan Proving Interlock: Proving Percentage 19
o. Adjust Wash Time (Min) 19
p. Adjust Wash Frequency (Hz) 19
q. Set Wash Min Fan Runtime 19
r. Set Wash Min Interval Time 20
s. Adjust the number of PCU Advanced Filter Monitoring (AFM) Units 20
t. Set External input to interlock Fans option 20
u. Configure Fan Options 21
v. Configure the Fire Options 22
w. Configure Factory Options 23
Component Description 24
Troubleshooting 27
MAINTENANCE 29

WARRANTY

This equipment is warranted to be free from defects in materials and workmanship, under normal use and service, for a period of 12 months from date of shipment. This warranty shall not apply if:

1. The equipment is not installed by a qualified installer per the MANUFACTURER'S installation instructions shipped with the product,
2. The equipment is not installed in accordance with federal, state and local codes and regulations,
3. The equipment is misused or neglected,
4. The equipment is not operated within its published capacity,
5. The invoice is not paid within the terms of the sales agreement.

The MANUFACTURER shall not be liable for incidental and consequential losses and damages potentially attributable to malfunctioning equipment. Should any part of the equipment prove to be defective in material or workmanship within the 12-month warranty period, upon examination by the MANUFACTURER, such part will be repaired or replaced by MANUFACTURER at no charge. The BUYER shall pay all labor costs incurred in connection with such repair or replacement. Equipment shall not be returned without MANUFACTURER'S prior authorization and all returned equipment shall be shipped by the BUYER, freight prepaid to a destination determined by the MANUFACTURER.

SAFETY INFORMATION

General

This control panel utilizes a mixture of traditional controls along with a “smart” digital circuit board controller, referred to as the ECPM03 control board. It is intended to be installed within a UL508A electrical control package. The board is powered by 24 Volts DC, which is provided by an approved 10-20 Watt class 2 power supply included inside the panel.

Some parts of the ECPM03 circuit board can be electrically live and some surfaces can be hot. Inappropriate use and incorrect installation or operation creates the risk of injury to personnel and/or damage to equipment. All operations concerning installation, commissioning and maintenance must be carried out by qualified, skilled person who is familiar with the installation, assembly, commissioning, and operation of the control panel and the application for which it is being used.

Installation

Ensure proper handling and avoid excessive mechanical stress. Do not bend any components during transport, handling, installation or maintenance. Do not touch any electronic components or contacts. This board contains electrostatically sensitive components, which can easily be damaged by inappropriate handling. Static control precautions must be adhered to during installation, testing, servicing and repairing of this board. Component damage may result if proper procedures are not followed.

To ensure proper operation, do not install the board where it is subjected to adverse environmental conditions such as combustible, oily, or hazardous vapors; corrosive chemicals; excessive dust, moisture or vibration; direct sunlight or extreme temperatures.

The ECPM03 may be mounted by means of DIN rail clips and board standoffs or by standoffs alone. It will be mounted in a NEMA 1 enclosure for indoor use only.

When working on live panel controllers, applicable national safety regulations must be observed. The electrical installation must be carried out according to the appropriate regulations (e.g. cable cross-sections, circuit breaker, protective earth [PE] connection). While this document does make recommendations in regards to these items, national and local codes must be adhered to.

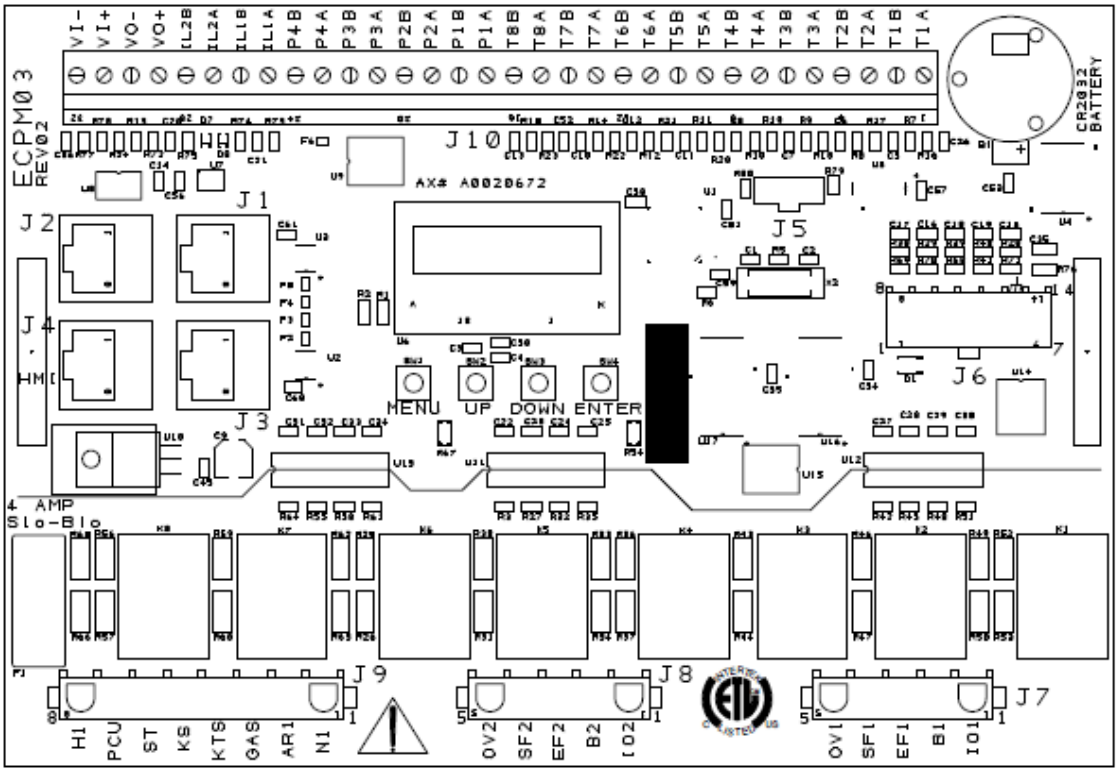
Control board (ECPM03) Technical Information

Ratings	24VDC, 10-20Watts
Other Ratings	On-board relay contacts are 120VAC with 4Amps Max
Flammability	FR4 board with 94V0 flammability rating
IP rating	IPX0
Fuse on board	Slo-Blo 4 Amp fuse, 5x20mm
Humidity	< 95% non-condensing
Temperature range	-10 to +55℃ or +15 to +130 ℉
Battery	Model 2032 - Lithium Coin Cell, 3VDC, 0.043mA
Dimensions	203mm L x 140mm W x 46mm H
Weight	0.6 lbs.

FIELD WIRING: The following is for reference only. All 120 Volt AC field wiring is landed on terminal blocks, not on the board itself. See Installation section for details. Low voltage class 2 field wiring may be landed at J3, J4, or J10 connectors only, as indicated by the panel labeling and installation schematic. Provision for spacing and routing of the field wiring is provided in the panel.

FACTORY WIRING:
The connectors below are intended to be used for factory wiring only by a UL508A panel shop: J7, J8, J9 are provided for the control of 120 Volt AC relays, contactors, solenoids and shunt trip breakers. Under no circumstances shall any lighting or motor loads be directly connected to these connectors.

J1, J2, J6, are reserved for low voltage class 2 factory wiring.



Control Board (ECPM03) diagram

INSTALLATION

It is imperative that this unit is installed and operated with the designed airflow and electrical supply in accordance with this manual and applicable codes. If there are any questions about any items, please call the service department at **1-866-784-6900** for warranty and technical support issues.

Mechanical

WARNING: DO NOT LIFT CONTROL BY WIRING COMPONENTS

Site Preparation

1. Provide clearance around installation site to safely install equipment into its final position. Supports must adequately support equipment. Refer to manufacturer's estimated weights.
2. Consider general service and installation space when locating unit.

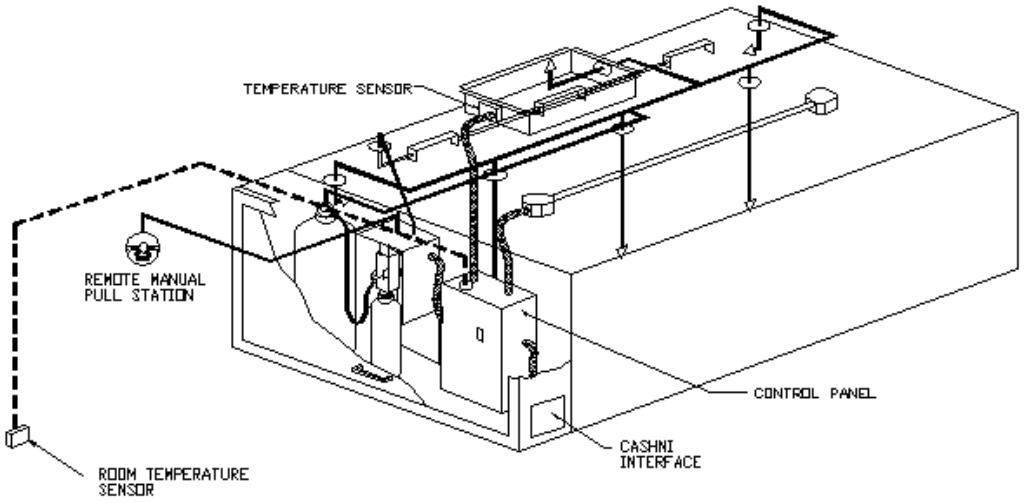
Assembly

When the control panel is ordered in a utility cabinet installed on the hood, there is no mechanical assembly required by the installer. If the control panel is ordered as a wall mounted panel, the enclosure must be secured to a fixed wall near the exhaust hoods. **Be certain to maintain adequate clearance from excessive heat sources such as appliances to prevent damage of the components**.

Room Sensor Installation

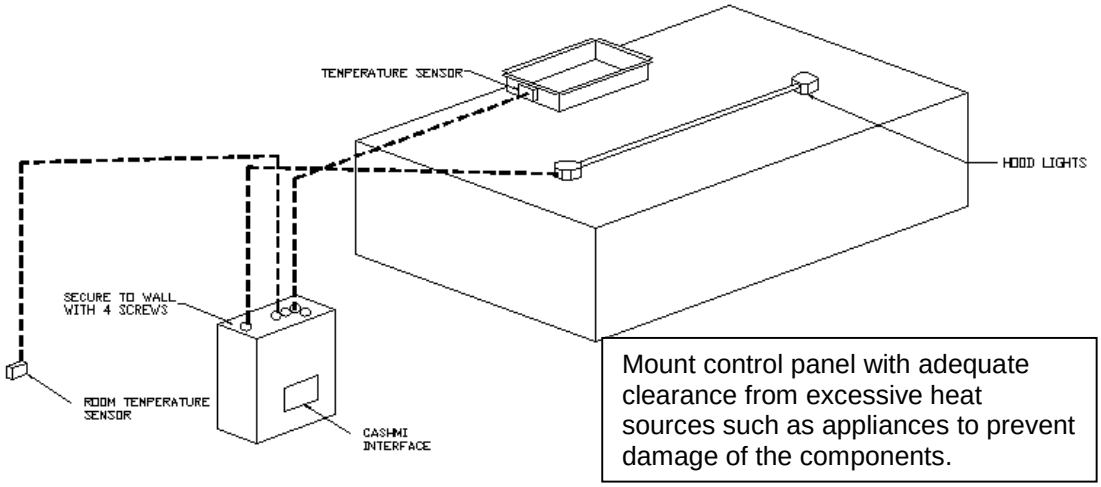
A room temperature sensor is provided with the panel. It should be installed in a safe location, free of influence from external heat sources. It should be indicative of the average kitchen temperature away from the appliances. For packages with 2 separate fan zones, a 2nd room sensor might require installation.

Utility Cabinet Installation (Typical)



TYPICAL CONTROL CENTER INSTALLATION

Wall Mount Installation (Optional)

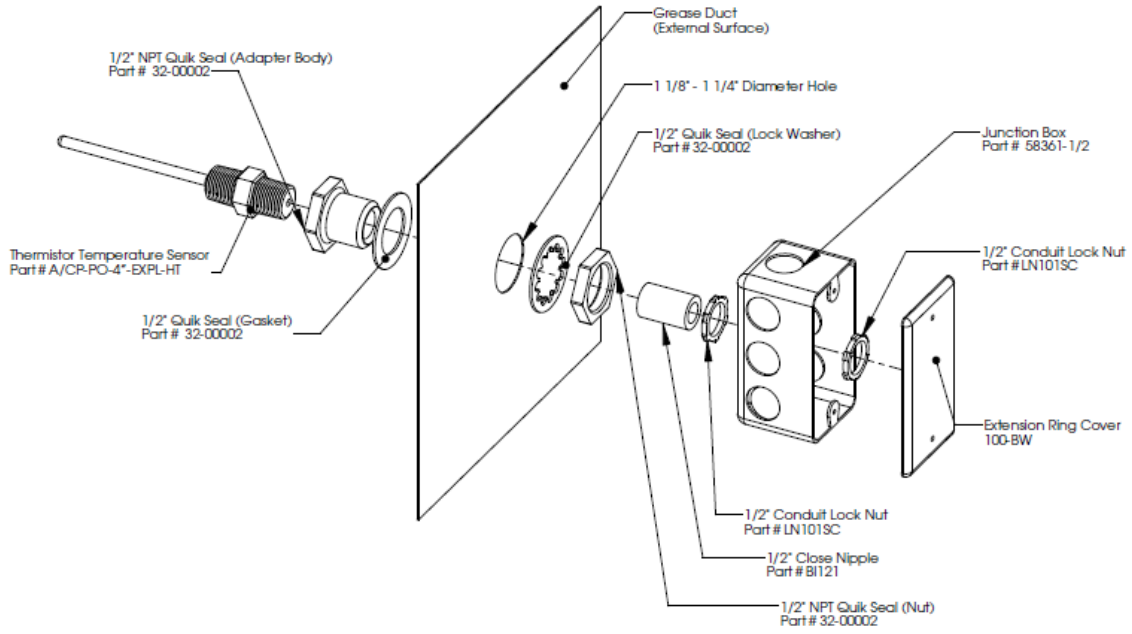


Mount control panel with adequate clearance from excessive heat sources such as appliances to prevent damage of the components.

WALL MOUNTED CONTROL CENTER

Duct Sensor Installation

When the control panel is ordered, the system typically consists of one duct sensor per hood exhaust riser. These sensors are typically shipped factory installed in factory assembled hood risers. If the risers are field cut, the sensor and other components are shipped loose for field installation as shown below. A hole must be cut in the grease duct, and the quick seal and sensor must be assembled as shown below. A 2-wire plenum rated thermistor cable (18 gauge typical), run in conduit, should be used to wire the sensors back to the controller and landed on connector J10 as indicated on the installation schematic.



IMPORTANT!!

When exhaust duct connections are located and cut in the field, duct temperature probes are shipped loose in the electrical package enclosure. These must be installed in the duct immediately above the hood for proper system operation.

Electrical

Before connecting power to the control, read and understand this entire document. As-built wiring diagrams are furnished with each control by the factory and are attached either to the door of the unit or provided within a paperwork pouch internal to the panel.

Electrical wiring and connections should be done in accordance with local ordinances and the National Electric Code, ANSI/NFPA70. Be sure the voltage and phase of the power supply and the wire amperage capacity is in accordance with the unit nameplate.

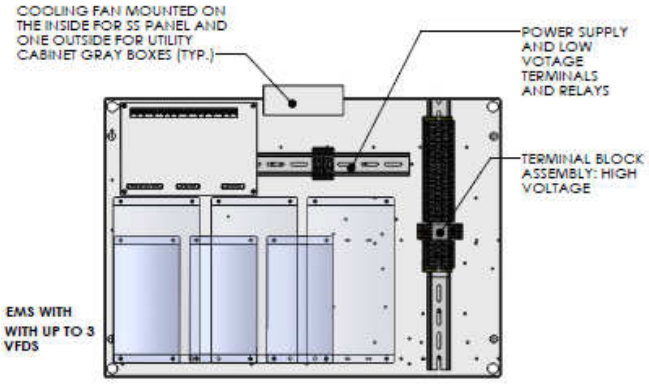
WARNING!!
Disconnect power before installing or servicing control. High voltage electrical input is needed for this equipment. This work should be performed by a qualified electrician.

1. Always **disconnect power** before working on or near this equipment. Lock and tag the disconnect switch or breaker to prevent accidental power up.
2. Make certain that the power source is compatible with the requirements of your equipment. The installation wiring schematic identifies the **proper phase and voltage** of the source breakers.
3. Before connecting control to power source, verify power line wiring is de-energized.
4. Secure all wiring to prevent contact with sharp objects.
5. Do not kink power cable and never allow the cable to come in contact with oil, grease, hot surfaces or chemicals.
6. Before powering up the system, make sure that the interior of the control is free of loose debris, metal shavings, or shipping materials. `
7. If any of the original wire supplied with the system must be replaced, it must be replaced with type THHN wire or equivalent.

Copper Wire Ampacity

Wire Size AWG	Maximum Amps
14	15
12	20
10	30
8	50
6	65
4	85

High Voltage Wiring



1. All high voltage wiring shall be terminated on the right side of the vertical terminal blocks located on the right hand side.
2. **There are multiple electrical power sources** required for this panel. Refer to Installation diagrams for details.
3. The hood light wiring will also need to be wired to terminals as indicated on the installation diagram.
4. If a fire system is present, the fire system micro-switch will need to be wired to terminals as indicated on the installation diagram, typically "**C1**" and "**AR1**". C1 is the common and connects to terminal 1 on the micro-switch. AR1 is the armed state and connects to terminal 2 on the micro-switch.

Low Voltage Wiring

Low voltage field wiring consists of Duct and Room Temperature sensors, ECM motors, 0-10VDC output, 24VDC input, or Modbus communication over CAT-5 cables for switches and remote equipment.
Low voltage wiring must be run on the left hand side and directly terminated on the terminals located on the ECPM03 board.
WARNING: Low voltage wires should never be run together with high voltage wires.

1- **Room temperature sensor(s)**: For all installations, at least 1 room temperature sensor must be installed in a safe location, free of influence from external heat sources. It should be indicative of the average kitchen temperature away from the appliances. 2-wire 18 AWG thermistor cable must be used. The room temperature sensor shall be wired according to the installation wiring schematic, terminals "**T1A**" and "**T1B**".
2- **Duct temperature sensors**: For all installations excluding a single hood with factory risers and a hood mounted panel, duct mounted temperature sensors will need to be wired in the field. 2-wire 18 AWG plenum rated thermistor cable must be used. The temperature sensor should be wired to terminal blocks as indicated on the installation wiring schematic.
3- **LCD faceplate (CASHMI)** is connected to the ECPM03 board through a **CAT-5** cable. A Faceplate has two RJ-45 connectors connected together for Modbus. The switch plate connects to port J4 (RJ-45) of the ECPM03 board. The other RJ-45 port of the CASHMI faceplate will typically be occupied by a RJ-45 end-of-line terminator (Part # EOL120A).
4- **Two end-of-line terminators** (Part # EOL120A) are included in each panel. They are typically plugged in at the factory on J3 and either on port J4 or in the back of the first CASHMI faceplate. If another faceplate or other equipment need to connect to a port occupied by an end-of-line terminator, it shall be removed and place on the faceplate or equipment that became connected at the end of the Modbus network.
5- If other pieces of equipment such as PCU Advanced Filter Monitoring (AFM) are connected to this panel, a cat-5 cable will also be used to run the Modbus communication between these devices. The cable would be plugged in port J3 of the ECPM03 board. The end-of-line terminators should then be relocated from J3 to the PCU AFM module.

Variable Frequency Drive (VFD) Installation Instructions

Input AC Power

1. Circuit breakers feeding the VFDs are recommended to be thermal-magnetic and fast acting. They should be sized 1.25 to 1.5 times the input amperage of the drive. Refer to the installation schematic for breaker sizing.
2. Each VFD should be fed by its own breaker. If multiple VFDs are to be combined on the same breaker, each drive should have its own protection measure (fuses or miniature circuit breaker) downstream from the breaker.
3. Input AC line wires should be run in conduit from the breaker panel to the drives. AC input power to multiple VFDs can be run in a single conduit if needed.
4. The VFD should be grounded on the terminal marked PE.

STOP!
DO NOT connect incoming AC power to output terminals U, V, W. Severe damage to the drive will result. Input power must always be wired to the L terminal connections (L1, L2, L3)

Output Power

1. **Motor wires from each VFD to its respective motor MUST be run in a separate steel conduit away from control wiring and incoming AC power wiring to avoid noise and crosstalk between drives**.
2. Load reactors: If the distance between the VFD and the motor is great, a load reactor should be used between the VFD and the motor. The output reactor should be sized accordingly.
   208/230V – Load reactor should be used when distance exceeds 250 feet.
   460/480V – Load reactor should be ordered when distance exceeds 50 feet.
   575V– Load reactor should be ordered when distance exceeds 25 feet.
3. If the distance between the VFD and the motor is between 500 and 1000 FT, a dV/dT filter should be used.
4. No contactor should be installed between the drive and the motor. Operating such a device while the drive is running can potentially cause damage to the power components of the drive.
5. When a disconnect switch is installed between the drive and motor, it should only be operated when the drive is in a STOP state.

Programming

Most VFD parameters are preprogrammed at the factory when proper information about the fan motors is provided. However the 2 parameters below should be verified in the field during startup.

1. The Drive should be programmed for the proper motor voltage. Refer to parameter P107 in the “Component Description - Variable Frequency Drive” chapter below.
   P107 is set to 0 (Low) if motor voltage is 120 VAC, 208 VAC or 400 VAC. P107 is set to 1 (High) if motor voltage is 230 VAC, 480 VAC or 575 VAC.
2. The Drive should be programmed for the proper motor overload value. Refer to parameter P108 in the “Component Description - Variable Frequency Drive” chapter below.
   P108 is calculated as Motor FLA x 100 / Drive Output Rating (available in table below). P108 is also indicated on the factory wiring schematic under the “Motor Power Circuit” column.

ACTECH SMV VFD CROSS-REFERENCE TABLE

Model Number	Volts	1Ø input	3Ø input	HP	Input Amps 1Ø 120VAC	Input Amps 1Ø 240VAC	Output Amps	Breaker 1Ø 120VAC	Breaker 1Ø 240VAC
ESV751N01SXB571	120/ 240V	X		1	16.6	8.3	4.2	25	15
ESV112N01SXB571	120/ 240V	X		1.5	20	10	6	30	20
					Input Amps 1Ø	Input Amps 3Ø		Breaker 1Ø	Breaker 3Ø
ESV371N02YXB571	240V	X	X	0.5	5.1	2.9	2.4	15	15
ESV751N02YXB571	240V	X	X	1	8.8	5	4.2	15	15
ESV112N02YXB571	240V	X	X	1.5	12	6.9	6	20	15
ESV152N02YXB571	240V	X	X	2	13.3	8.1	7	25	15
ESV222N02YXB571	240V	X	X	3	17.1	10.8	9.6	30	20
ESV402N02TXB571	240V		X	5		18.6	16.5		30
ESV552N02TXB571	240V		X	7.5		26	23		40
ESV752N02TXB571	240V		X	10		33	29		50
ESV113N02TXB531	240V		X	15		48	42		80
ESV153N02TXB531	240V		X	20		59	54		90
ESV751N04TXB571	480V		X	1		2.5	2.1		15
ESV112N04TXB571	480V		X	1.5		3.6	3		15
ESV152N04TXB571	480V		X	2		4.1	3.5		15
ESV222N04TXB571	480V		X	3		5.4	4.8		15
ESV402N04TXB571	480V		X	5		9.3	8.2		15
ESV552N04TXB571	480V		X	7.5		12.4	11		20
ESV752N04TXB571	480V		X	10		15.8	14		25
ESV113N04TXB531	480V		X	15		24	21		40
ESV153N04TXB531	480V		X	20		31	27		50
ESV183N04TXB531	480V		X	25		38	34		60
ESV223N04TXB531	480V		X	30		45	40		70
ESV751N06TXB571	600V		X	1		2	1.7		15
ESV152N06TXB571	600V		X	2		3.2	2.7		15
ESV222N06TXB571	600V		X	3		4.4	3.9		15
ESV402N06TXB571	600V		X	5		6.8	6.1		15
ESV552N06TXB571	600V		X	7.5		10.2	9		20
ESV752N06TXB571	600V		X	10		12.4	11		20
ESV113N06TXB531	600V		X	15		19.7	17		30
ESV153N06TXB531	600V		X	20		25	22		40
ESV183N06TXB531	600V		X	25		31	27		50
ESV223N06TXB531	600V		X	30		36	32		60

OPERATION

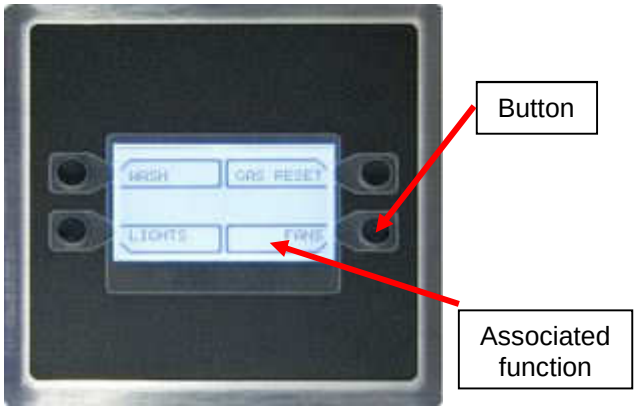
Start-Up Procedure

NOTE: FIRE system must be in ARMED state before proceeding.

1. Once all required connections have been completed as indicated on the installation schematic, startup can begin. Apply power to the panel. The ECPM03 board and the CASHMI LCD interface(s) will power up and beep. If that is not the case, check all power connections. Verify that there is no alarm message displayed on any CASHMI screen. If there are alarms present, you can press the MUTE button to silence the alarm and then work to resolve them.

   A CASHMI faceplate has 4 buttons; function is displayed adjacent to them on the LCD screen. These functions will change depending on the status of the panel. If no text is adjacent to the button, it does not have a function.

   Typically LIGHTS and FANS functions are shown on the bottom 2 buttons. The status of those elements is shown by the shading used inside the box associated with the function. An empty box around the FAN function means that the FANS are turned OFF. A dark box around the FAN function means that the FANS are turned ON. The same applies to LIGHTS.
   Note: For the rest of the document, the term button will be used to refer to either the actual button or the function associated with it.



   The center two lines of the LCD are reserved for displaying informational or fault messages

   When a fault occurs, an audible alarm is triggered and a message is displayed on the CASHMI screen(s). The Audible Alarm can be silenced by pushing the **Mute** button that appears on the top right corner.

2. Press the **LIGHTS** button on the CASHMI to energize the hood lights. If the lights do not come on, make sure the light bulbs are installed and/or check the lighting circuit.

3. Press the **FANS** button on the CASHMI to energize the fans. Also press the **PREP OFF** button to run all exhaust and supply fans.

4. If cooking appliances are connected to an Electric gas valve controlled by the control panel, the gas valve can be turned ON by pressing the **GAS RESET** button on the top right corner of the CASHMI. The icon will only show if the *Gas Valve* Option is turned ON under the ECPM03 menu: *Configuration* / *Misc. Options* / *Set Gas Valve*.

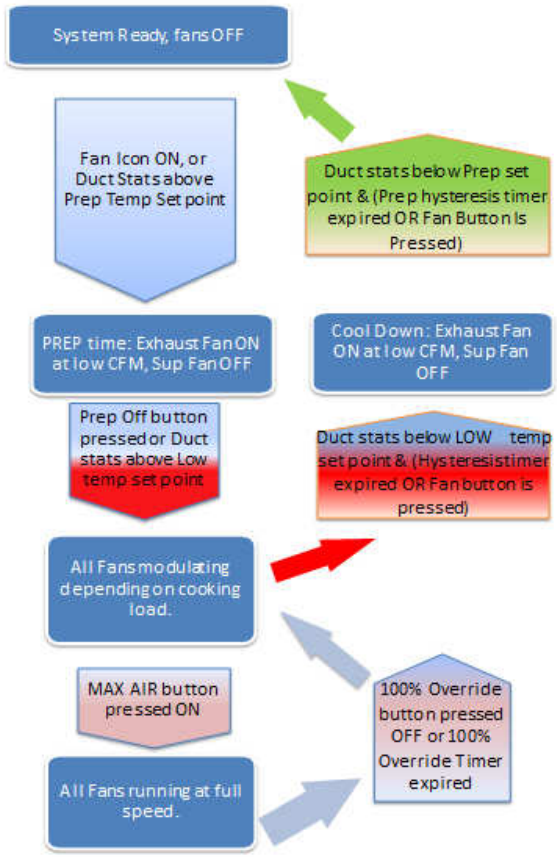
5. Turn the Fans off. Turn on the cooking appliance(s) and allow them to reach idle temperature. The fans should automatically activate as the cooking appliance(s) heats up. The factory set activation point for duct temperature override of the fan switch is 10 degrees above kitchen room temperature. Each duct temperature sensor has its own temperature offset setting. These values should be adjusted based on the cooking appliances and cooking load. Refer to paragraph (e) under the Configuration section for further details.

6. If the controls include the Self Cleaning or CORE Protection Fire System option, a **WASH** button will be displayed on the CASHMI screen. Push the button to start the wash cycle. Water will be sprayed in the plenum and duct of the hood and surfactant will be injected at a predetermined frequency. The wash cycle will stop when the wash timer expires or when the Stop Wash button is pressed. **Make sure Hood filters remain in place during the wash cycle.**

7. If the Proving Interlock Option is enabled, a calibration step is required at startup. Please refer to the Fan Proving Interlock section below under Functionality for further details about this function. To perform the calibration, refer to paragraph (e) under the Configuration section.

Sequence of Operation

- **Preparation Time mode:**
  Turn on the cooking appliances and allow Temperature to rise. The exhaust fans will automatically be energized in Preparation Time mode at first (Supply off). The factory set Prep activation point is 5 degrees above kitchen room temperature. LIGHTS will automatically be turned on as well. LIGHTS can be turned ON and OFF manually by pressing the LIGHTS button.
  Manual method: The FANS button can be pressed to energize the exhaust fans in Preparation Time mode (supply off).



- **Full Modulation:**
  As the cooking appliances heat up, the system will go into modulation mode with supply fan ON. The factory set activation point for modulation is 10 degrees above kitchen room temperature. This function allows the system to meet the requirements of IMC 507.2.1.1, which require exhaust fans to activate when cooking is occurring. The fans take a few seconds to come up to speed; this setting is programmed into the panel for a soft motor startup to prolong the fan motors. The VFDs should all indicate 48Hz. Once the cooking process begins, the VFDs will begin to modulate typically between 48 Hz and 60 Hz based on the Duct temperature. This results in a 20% reduction in airflow when operation is in low speed, which is equivalent to a 48% reduction in electrical consumption by the fan motors.
  For every exhaust fan, there are two possible factory settings for the temperature control: 450° degree rated hoods are programmed for a modulation range of 5°F, while the 600-700 degree rated hoods are programmed for a modulation range of 45°F. All temperature ranges are adjustable as needed for the application.
  Manual Method: The PREP OFF button can be pressed to go into modulation mode and energize the supply fan. VFDs for all fans will typically run at 48 Hz to start with and modulate based on temperature from that point on.

- **Max Air Flow:**
  By manually pressing the MAX AIR button, the fans will run at High Frequency, typically 60 Hz for a factory set time of 30 minutes. This time is adjustable under the Misc Options section of the configuration menu. Once the time period has expired or if the MAX AIR button is pressed again, the VFDs will go back to operating based on the duct temperature.

- **Cool Down mode:**
  The fans will go into Cool Down mode when the duct temperature goes below the activation point minus the temperature hysteresis of 2 degrees. For example, if the activation temperature is at 85 °F and the hysteresis is set to 2°F, Cool Down mode will start at 83°F.
  In Cool Down mode, the exhaust fans will run at the same speed than in Preparation Time mode and the supply fans will turn off.
  NOTE: The hysteresis timer, factory set at 30 minutes, is used to prevent the fans from cycling on and off too often due to small appliances generating just enough heat to turn on the fans but not enough to keep them ON for a long time. The Hysteresis Timer will maintain the fans on after they have been activated by temperature for a minimum time set by this timer, even if the temperature in the duct cools back down.
  Manual Method: If the duct temperature is in the Cool Down mode range, the Hysteresis timer can be bypassed by pressing the FANS button.

- **Fans Off:**
  If the system was in automatic operation, the fans will turn off when the duct temperature goes below the Prep activation point minus the temperature hysteresis of 2 degrees. For example, if the Prep activation temperature is at 80°F and the temperature hysteresis is set to 2°F, then the fans will turn off at 78°F.
  NOTE: The Prep hysteresis timer, factory set at 30 minutes, is used to prevent the fans from cycling on and off too often due to small appliances generating just enough heat to turn on the fans but not enough to keep them ON for a long time. The Hysteresis Timer will maintain the fans on Cool Down mode after they have been activated by temperature for a minimum time set by this timer, even if the temperature in the duct cools back down.
  Manual Method: If the duct temperature is below the Cool Down mode range, the Hysteresis timer can be bypassed by pressing the FANS button. This will also turn the lights off. If the temperature never went above the Prep activation point and the fans were turned on only by pressing the FANS button, the pressing the FANS button will directly turn off the fans.

Functionality

Fan Control

The control panel controls fans through VFDs. They are used to adjust the speed of 3 phase motors and frequency is proportional to airflow. There is one VFD for each fan in the system.

Preparation Time Mode

1. This option is enabled by default from the factory.
   It can be disabled under Configuration → Factory options.
2. Preparation Time Mode is available for morning operation when appliances are off or when very light food preparation is performed. Dedicated make-up air will be locked out only allowing the use of transfer air during this mode. Exhaust fan(s) will run at low CFM while maintaining a balanced kitchen pressure.
3. Preparation Time mode can be initiated by different means:
   - By pressing the FANS button on the CASHMI
   - Remotely through the building management system in BMS mode by sending a signal on input IO1.
   - When the duct temperature exceeds Prep activation point =Room Temperature + Temp Offset/2 (Factory Default: 5 ℉).

4. The fans will go back to running in modulation mode if the PREP OFF button is pressed or if the temperature sensors in the duct measure a temperature above the activation Temperature value.
5. Note: The speed of the exhaust fan(s) in Preparation Time is calculated automatically and is equal to the speed that will produce the same amount of CFM than the Transfer CFM when the fans are running in full speed in normal operation. If there is no dedicated supply fan in the system, the exhaust fans will run at the set High Frequency divided by 4 (typically 15 Hz).

Hood Lights

1. A control panel can have 1 CASHMI LCD light switch but potentially controls multiple light circuits. Each light circuit can feed with a maximum of 1400W. If more than 1400 watts of lights are needed, additional 15 amp circuits can be brought to the panel. Panel specific lighting limitations are indicated on the installation schematic.
2. Hood lights can be controlled manually through the LIGHTS button on the CASHMI screen. They will also be automatically turned ON or OFF when the fans assigned to that same fan zone turn ON or OFF. Manual light switch command on the CASHMI screen always takes priority.

Electric Gas Valve Reset

If the Gas Valve option is turned ON or the system is equipped with CORE Fire Protection, an additional button (GAS RESET/GAS ON) is displayed on the CASHMI screen to allow the user to reset or re-energize an electric gas valve connected to the panel. The gas valve is de-energized at initial startup, when the Fire System is triggered or in other conditions as well.
Refer to paragraph (h) under Configuration section to turn this option ON or OFF.

High Temperature Automatic Appliance Shutdown

When any of the duct temperature sensors reads a temperature above the Appliance Shutdown Temperature threshold settings (Factory Default: 250 Degrees ℉), any electric gas valve wired to the panel will shut down and the shunt trip output of the panel will activate. This is intended to prevent potential fires. The activation threshold set point can be adjusted under *Configuration/Fire Options.*

Make-Up Air Interlock

When the dedicated supply fan is a Tempered Make-up Air unit, the blower inside the supply unit can be interlock so that it will not run unless the safety controls (Freezestat, CO sensor, Smoke Detector etc.) inside the supply fan are armed and until the internal motorized damper has reached its end limit switch. If the signal from the make-up air is not received by the EMS 90 Sec (factory default) after the start signal is sent to the supply fan, an alarm will appear on the CASHMI. The EMS panel ships with a jumper between terminals IL1A and IL1B for supply #1 and IL2A and IL2B for supply #2 if present. The jumper has to be removed first before wiring the interlock from a make-up air unit.

Building Management System (Optional)

1. If the panel is ordered with this option, an additional terminal IO1 will be available on the din rail, wired to terminal IO1 on the ECPM03 board. To control the fans through BMS, terminal IO1 should be energized. This can be done by closing a dry contact placed between terminals H1 and IO1.
2. Removing the signal from IO1 will typically cause the fans to turn off. However if the duct thermostat sensors are hot or if the fans are energized through the fan button on the CASHMI, then the fans will continue to run.

Self-Cleaning (Optional)

1. During the wash cycle, water will be sprayed in the plenum and duct and surfactant will be injected at a set frequency. The wash cycle will stop when the wash timer expires or when the Wash button is pressed again.

2. The wash timer is factory set to 3 minutes and is adjustable through the Configuration Menu. The surfactant is injected for 1 second at the start of each minute of Wash. This setting is not adjustable. If equipped with CORE Fire Protection, the wash timer is not configurable through the ECPM03 control board. Refer to the CORE Owner's Manual for further information.
3. **Hood filters MUST remain in place during the wash cycle**.
4. The wash cycle can be initiated in several ways:
    a. Manually, when the WASH button is pressed on the CASHMI interface.
    b. Automatically, if the following conditions are met
        - Fans will need to go out of modulation mode either with the FANS button being pressed or by the duct temperature cooling down and hysteresis value and timer are met.
        - The fans will need to have effectively run cumulatively for a period of time longer than the "Wash Min Fan Runtime" value configured under "Misc Options". Preparation Time mode and Cool Down mode fan time do not count towards runtime. The runtime is reset to zero when the wash cycle is run.
        - The amount of time elapsed since the previous wash cycle is greater than the "Wash Min Interval time" value configured under "Misc Options". That elapsed time is reset to zero when the wash cycle is run.
    c. If a Building Management System (BMS) is remotely controlling the fans through the external input terminal IO1, when the Fans are turned ON and then OFF through the IO1 terminal, granted that the fans are not maintained on by the duct temperature sensors or the fan button.
5. If the surfactant level is too low, an alarm will be triggered on the CASHMI interface. If the wash cycle is initiated while this alarm is active, water will be sprayed but no surfactant will be injected. Refill Surfactant as soon as possible for best results. (Refer to Self-Cleaning or CORE Manual for additional information)

Fan Proving Interlock (Optional) (i.e. Loss of Load Interlock/Airflow Fault Interlock)

1. This function is designed to prevent exhaust fans from running if the supply fans are not running, which in turn would shut off the cooking equipment. In practical terms, this means that all fans will shut off along with cooking equipment if any of the exhaust or supply fans are not properly running. Examples of reasons why a fan would not be properly running are: overload tripped, broken fan belt, defective motor, disconnect switch off, etc.
2. This function requires calibration, which can be performed through the *Calibration* setting on the ECPM03 LCD.
3. If this option is enabled, the load on all the exhaust and supply fans is constantly monitored. If the load for an exhaust fan or the load for a supply fan drops below the threshold calculated after calibration for more than the 35 sec, all exhaust and supply fans will shut down.
4. If an electric gas valve and shunt trip are attached to the system, they will shut down as well.
5. To reset the system after a Proving fault, press the Fault Reset button on the CASHMI interface.

CORE Protection Fire System (Optional)

1. If a CORE Protection Fire system is connected to the control panel, alarms from the CORE system will automatically be displayed on the CASHMI interface.
2. Multiple CORE systems can be connected to the same control panel. Refer to the CORE Manual for setup of CORE Interlock Network addressing to prevent communication conflicts.

PCU Advanced Filter Monitoring (AFM) (Optional)

1. If a PCU AFM is connected to the control panel through Modbus, alarms from the PCU will automatically be displayed on the CASHMI interface.
2. To connect the AFM system to the CASHMI, run a CAT-5 connection from terminal J3 to the RJ45 port on the PCU AFM internal to the PCU. This is outlined in the installation schematics.
3. Up to 8 PCU AFM can be connected to the same Control panel.

Configuration and Diagnostics

Security

1. To access the *Configuration / Factory*, the password 1111 must be used.
2. To access the *Configuration / Fire Options*, the password 1234 must be used.

Setup Options

The ECPM03 board allows the user to monitor the system and configure a broad range of options associated with the functionality of the system. Monitoring is done through the setup menus on the ECPM03 LCD screen as shown above. Configuration is done through the LCD of the CASHMI screen after calling for Configuration through the ECPM03 menu.

Below the ECPM03 LCD are 4 buttons for navigation: MENU, UP, DOWN, ENTER. When in configuration mode, the four buttons on the CASHMI will be labeled the same. See picture above.
The MENU button typically takes you up one level in the menu tree while the ENTER button takes you down one level. UP and DOWN navigate through the same level of the menu tree and also allow the user to change the value of a parameter.

After changing some parameters in the configuration menus, the user needs to press MENU multiple times on the CASHMI until the screen displays the message “Saving. Wait for reboot” As indicated, the processor will reboot. This allows the board to correctly process the parameters changed.
NOTE: a reboot of the board will cause the electric gas valve (if equipped) to shut off. Confirm that gas/pilot lights are re-lit if necessary. It will also cause the VFDs to stop if not in Auto mode.

The 4 items below can be accessed through the **ECPM03 LCD screen**:

a. Display System Information
   Starting from the Main menu, press the DOWN button, press DOWN again. Screen displays “Info”. Press the ENTER button. Screen displays “Fault History”. Press DOWN to View the Version number. Press DOWN to view the package Type, which should be “EMS”.

b. Display Fault History
   Starting from the Main menu, press the DOWN button, press DOWN again. Screen displays “Info”. Press the ENTER button. Screen displays “Fault History”. Press ENTER. Press UP and DOWN to scroll through the fault history, with 1 being the most recent fault. To clear the fault history, please ENTER and press ENTER again when prompted “Clear Fault History”. Or press MENU to go back without clearing.

c. Display temperature readings
   Starting from the Main menu, press the DOWN button. Screen displays “Temperatures”. Press the ENTER button. Press the UP and DOWN buttons to view all temperatures measured by the room and duct temperature sensors.

d. Display Fan Monitoring data: Fan Frequencies and Motor Amps
Starting from the Main menu, press the DOWN button until the screen displays “Monitoring”. Press the ENTER button. Press the UP and DOWN buttons to alternate between “Fan Frequencies” and “Motor Amps”. Press enter for either one to view Frequency of each VFD or amps drawn by the motor on each fan.

e. Fan Proving Interlock: Calibration
If the Fan Proving Interlock option is enabled, Calibration is required at startup. To perform calibration, make sure Test and Balance has been performed on the entire system first. Filters should be in place.
Starting from the Main menu, press DOWN until the screen displays “Calibration”. Press ENTER. The screen should display “Proving Calib. Calibrate?”. Press ENTER again to start the Calibration process which takes about 40 sec. Press MENU once when calibration is complete.
If Calibration is unsuccessful, the message “Calibration Fail” will appear. Make sure the VFDs are running and the MUA interlock signal is wired correctly to ILxA ILxB.

All the items below are for Configuration and are accessed by putting the **CASHMI screen into Configuration mode**. To do this, starting from the Main menu on the ECPM03 LCD, press the MENU button. Screen displays “Configuration” Press the ENTER button. Screen will display “Config Menu on CAS HMI”. From there, the rest can be done on the CASHMI screen.

f. Configure Temperature Sensor Assignments
Starting from the Main menu of CASHMI, screen displays “Temp Sensor Assignment”. Press ENTER. Screen displays “Select Temp Sens to assign: 1”.
To navigate to another Temperature sensor, press the UP button. To configure the assignment for a Temperature Sensor, press ENTER.
1. For Temperature sensor 1, the options are either to follow the room sensor wired to terminal T1A, T1B (“Room Temp 1”) or to assign a preset room temperature (75℉ by default). Press UP or DOWN to choose the proper option. Press MENU to confirm the selection. To change the default preset value, press the ENTER button when displaying the Preset Temperature. Press UP or DOWN to change the preset value. Press MENU multiple times to get out to main menu.
2. For Temperature sensor 2 and above, the options are Exhaust 1, Exhaust 2 (if 2 exhaust fans are present), Exhaust 3 (if 3 exhaust fans are present) etc.

Press MENU multiple times to get back to the main menu or one more time to reboot the processor.

g. Configure Temperature Sensor Offset values (Factory Default: 10 Degrees ℉)
Starting from the Main menu of CASHMI, press DOWN once so screen displays “Temp Sensor Offset”. Press ENTER. Screen displays “Select Temp Sens to Offset: 2”
Press UP or DOWN to navigate between the different Duct Temperature sensors. Press ENTER to select one. Then press UP or DOWN to adjust the offset Temperature.
Press MENU multiple times to get back to the main menu or one more time to reboot the processor.

h. Enable Electric Gas Valve control
This option is not displayed if the system is equipped with CORE Protection Fire system since it will be enabled by default.
Starting from the Main menu of CASHMI, press DOWN or UP until the screen displays “Misc Options”. Press ENTER. Press UP or DOWN until the screen displays “Set Gas Valve”. Press ENTER. Press UP or DOWN to turn this option ON or OFF. Press ENTER.
Press MENU multiple times to get back to the main menu or one more time to reboot the processor.

i. Set Electric Gas Valve type

This option is only available if the system is setup for CORE. It allows the panel to determine which type of Gas Valve is being used: 24VDC gas valve wired to terminals 35 and N1D or 120VAC gas valve one wired to terminals GAS and N1. This allows the GAS Button to reflect the status of the proper gas valve output in the rare cases where the 2 outputs are not synchronized.

Starting from the Main menu of CASHMI, press DOWN or UP until the screen displays “Misc Options”. Press ENTER. Press UP or DOWN until the screen displays “Set Gas Type”. Press ENTER. Press UP or DOWN to turn this option ON or OFF. Press ENTER.

Press MENU multiple times to get back to the main menu or one more time to reboot the processor.

j. Adjust the Temperature Hysteresis (Factory Default: 2℉):

The hysteresis is used to prevent the fans from cycling ON and OFF when the temperature in the duct is near the activation value. The fans will turn ON when the duct temperature exceeds the activation value, but they will only turn off when the duct temperature goes below the activation temperature minus the temperature hysteresis. For example, if the activation Temperature is at 85 ℉ and Temperature Hysteresis is set to 2 ℉, th e fans will turn ON at 85 ℉ and will turn OFF at 83 ℉.

Starting from the Main menu of CASHMI, press DOWN or UP until the screen displays “Misc Options”. Press ENTER. Screen displays “Set Temp Hyst”. Press ENTER. Press UP or DOWN to adjust the Hysteresis value. Press ENTER

Press MENU multiple times to get back to the main menu or one more time to reboot the processor.

k. Adjust the Hysteresis Timer (Factory Default: 30 min):

The hysteresis is used to prevent the fans from cycling on and off too often due to small appliances generating just enough heat to turn on the fans but not enough to keep them ON for a long time. The Hysteresis Timer will maintain the fans on after they have been activated by temperature for a minimum time set by this timer, even if the temperature in the duct cools back down.

Starting from the Main menu of CASHMI, press DOWN or UP until the screen displays “Misc Options”. Press ENTER. Press UP or DOWN until the screen displays “Set Hyst Timer”. Press ENTER. Press UP or DOWN to adjust the Timer value. Press ENTER

Press MENU multiple times to get back to the main menu or one more time to reboot the processor.

l. Adjust the Max Air Time (Factory Default: 30 min):

Starting from the Main menu of CASHMI, press DOWN or UP until the screen displays “Misc Options”. Press ENTER. Press UP or DOWN until the screen displays “Set Max Air Time”. Press UP or DOWN to adjust the Timer value. Press ENTER.

Press MENU multiple times to get back to the main menu or one more time to reboot the processor.

m. Set 0-10VDC output (Factory Default: Exhaust CFM Ratio):

In addition to each variable frequency drive (VFD) in the EMS system providing a 0-10 VDC analog output from its terminals 30 and 2 directly proportional to its Fan Speed Ratio (Fan Frequency / Fan High Frequency), the ECPM03 also offers a 0-10VDC output from terminals VO- and VO+. This output can be configured depending on the type of signal needed by the building management system or the equipment receiving it.

Three (3) types of signal are available:

- Total Exhaust CFM Ratio = Total Operating Exh CFM / Total Design Exh CFM
- Total Supply CFM Ratio = Total Operating Sup CFM / Total Design Sup CFM
- Total Transfer CFM Ratio = Total Operating Transfer CFM / Total Design Transfer CFM

Total Exhaust CFM Ratio could be sent to a Roof Top Unit providing make-up air to the hood.
Total Transfer CFM Ratio could be sent to a HVAC unit indicating how much transfer air is needed for the kitchen. This selection takes in consideration the Preparation Time Mode where the same amount of transfer air is used as when the fans are all running at maximum speed.
Total Supply CFM Ratio is only available if a Supply fan is present in the EMS system. In Preparation Time, Total Supply CFM Ratio would be 0.
Starting from the Main menu of CASHMI, press DOWN or UP until the screen displays “Misc Options”. Press ENTER. Press UP or DOWN until the screen displays “0-10VDC output”. Press UP or DOWN to set the option needed. Press ENTER.
Press MENU multiple times to get back to the main menu or one more time to reboot the processor.

n. Fan Proving Interlock: Proving Percentage (factory default 80%)
If the Fan Proving Interlock option is enabled, the Proving Percentage setting is available.
Its value can range between 50% and 100%. The greater the ratio, the tighter the limits will be for fault detection, which also means the greater likelihood of false positive.
Starting from the Main menu of CASHMI, press DOWN or UP until the screen displays “Misc Options”. Press ENTER. Press UP or DOWN until the screen displays “Set Proving Percent”. Press ENTER. Press UP or DOWN to adjust the ratio value. Press ENTER. Press MENU multiple times to get back to the main menu or one more time to reboot the processor.

o. Adjust Wash Time (Min) (Factory Default: 3 min):
This option is available if the control system includes self-cleaning option from the factory. The wash time value is setup in minutes with a maximum value of 30 minutes.
Starting from the Main menu of CASHMI, press DOWN or UP until the screen displays “Misc Options”. Press ENTER. Press UP or DOWN until the screen displays “Set Wash Time”. Press ENTER. Press UP or DOWN to adjust the time value. Press ENTER
Press MENU multiple times to get back to the main menu or one more time to reboot the processor.

p. Adjust Wash Frequency (Hz) (Factory Default: 15 Hz):
This option is available if the control system includes self-cleaning option from the factory. This value is the frequency at which all exhaust fans will run in wash mode. The Supply fan will be stopped during Wash.
Starting from the Main menu of CASHMI, press DOWN or UP until the screen displays “Misc Options”. Press ENTER. Press UP or DOWN until the screen displays “Set Wash Frequency”. Press ENTER. Press UP or DOWN to adjust the frequency value. Press ENTER
Press MENU multiple times to get back to the main menu or one more time to reboot the processor.

q. Set Wash Min Fan Runtime (Factory Default: 480 min):
This option is available if the control system includes self-cleaning option from the factory. Its maximum value is 1440 minutes or 24 hours. Refer to the Self-Cleaning Section under Functionality for more details about this option.
Starting from the Main menu of CASHMI, press DOWN or UP until the screen displays “Misc Options”. Press ENTER. Press UP or DOWN until the screen displays “Set Wash Min Fan Runtime”. Press ENTER. Press UP or DOWN to adjust the time value. Press ENTER.
Press MENU multiple times to get back to the main menu or one more time to reboot the processor.

r. Set Wash Min Interval Time (Factory Default: 720 min):
This option is available if the control system includes self-cleaning option from the factory. Its maximum value is 1440 minutes or 24 hours. Refer to the Self-Cleaning Section under Functionality for more details about this option.
Starting from the Main menu of CASHMI, press DOWN or UP until the screen displays “Misc Options”. Press ENTER. Press UP or DOWN until the screen displays “Set Wash Min Interval time”. Press ENTER. Press UP or DOWN to adjust the time value. Press ENTER. Press MENU multiple times to get back to the main menu or one more time to reboot the processor.

s. Adjust the number of PCU Advanced Filter Monitoring (AFM) Units
If PCU AFM units are connected to the control panel (through Modbus), the number of units has to be adjusted through this parameter. Refer to the PCU AFM manual for additional information on how to setup the PCU AFM unit number at the unit control panel.
Starting from the Main menu of CASHMI, press DOWN or UP until the screen displays “Misc Options”. Press ENTER. Press UP or DOWN until the screen displays “Set Number of PCU AFM”. Press ENTER. Press UP or DOWN to adjust the number of units. Press ENTER.
Press MENU multiple times to get back to the main menu or one more time to reboot the processor.

t. Set External input to interlock Fans option
This option is used when the EMS panel is used in conjunction with a third party panel handling a wash sequence. Based on the value selected for this option, the fans will behave differently when an input is received on the OV2 terminal.
- OFF: no action.
- WASH CYCLE: Exhaust fans will run at the wash frequency and supply fans will stop. This is used when a third party panel is washing the hood.
- DRY CYCLE: Exhaust fans will run at High frequency and supply fans will stop. This is used when a third party panel requires the exhaust fan to run at full speed for drying purposes.

u. Configure Fan Options

This sub-menu contains all options related to Fan configuration.
Starting from the Main menu of CASHMI, press DOWN or UP until the screen displays “Fan Options”. Press ENTER. Press UP or DOWN until one of the options below is displayed. Press ENTER to access that option. Press UP or DOWN to select the fan (EXH1, EXH2, SUP1 etc.). Press ENTER. Press UP or DOWN to change the value of that option for that fan. Press ENTER Press UP or DOWN to select another fan or press MENU and then UP or DOWN to move on to the next option.

1. Set Fan Direction (Factory Default: FWD):
   If the fan is running in the wrong direction at startup, the direction can be changed here without having to change the wiring of the 3-phase motor.
   Fan direction can be changed between Forward (FWD) or Reverse (REV).

2. Set Fan Design CFM
   This is the design CFM value specified for each fan. This value is internally matched to the High Frequency set for this fan and used to calculate the Supply fan frequency, as well as the Preparation Time Frequency. This value should be adjusted after Test and Balance has been performed on the hood.
   Note: Changing this value will NOT automatically change the actual CFM exhausted by the fan. This is achieved by changing the High Frequency. This value is to report to the Controller what the design CFM is so it is used for internal calculation.

3. Set High Frequency
   The High Frequency is the maximum frequency at which an exhaust fan will be running in modulation mode. This corresponds to the design CFM of the exhaust fan. This value can be adjusted during Test and Balance of the hood, if needed to adjust the amount of CFM exhausted at the hood when the adjustment is smaller than what can be achieved with a pulley change. The value can be increased up to 80 Hz and lowered down all the way to the Low Frequency setting.

4. Set Low Frequency (Exhaust fans only)
   The Low Frequency is the minimum frequency at which an exhaust fan will be running in modulation mode. The fan can still run slower in Wash mode or in Preparation Time. By default this value is set to 48 Hz which represents a minimum of 80% of full speed when High Frequency is left at 60 Hz. 20% is the recommended modulation value to ensure capture and containment at the hood during cooking. Lowering this value is possible but should be carefully evaluated.

5. Set Modulation (Exhaust fans only)
   This value is used to calculate the high temperature of the modulation range for each exhaust fan.
   The low temperature is the value at which the fan will come on automatically and at which it runs at the Low Frequency value. Low temperature = Room temperature measured + Temp Offset.
   The high temperature is the value at which the fans are running at full speed or High Frequency. High temperature = Room temperature measured + Temp Offset + Modulation Range.

Press MENU multiple times to get back to the main menu or one more time to reboot the processor.

v. Configure the Fire Options

This sub-menu is Password protected and **changes should not be made after passing an inspection**.

Starting from the Main menu of CASHMI, press DOWN or UP until the screen displays “Fire Options”. Press ENTER. When prompted, enter the password specified under the security section of this manual above. Press UP or DOWN until one of the options below is displayed. Press ENTER to access that option. Press UP or DOWN to change the value of that option. Press ENTER to move on to the next option.

1. Exhaust On in Fire (Factory Default: ON): When this option is turned ON, the exhaust fans will be turned ON in a fire condition. If the option is turned OFF, the exhaust fans will stay in whatever state they were before the fire condition.
2. Lights Out in Fire (Factory Default: ON): When this option is turned ON, the hood lights will be turned OFF in a Fire condition. If the option is turned OFF, the hood lights will stay in whatever state they were before the fire condition.
3. Supply Off in Fire (Factory Default: OFF): When this option is turned OFF, the Supply fans will be turned OFF in a Fire condition. If the option is turned ON, the Supply fans will turn ON in a fire condition.
4. Appliance Shutdown Temp Threshold (Factory Default: 250 Degrees ℉): When any of the duct temperature sensors reads a temperature above that threshold, the gas valve shuts down and shunt trip output is activated.

Press MENU multiple times to get back to the main menu or one more time to reboot the processor.

w. Configure Factory Options

This sub-menu is password protected and should only be accessed by the factory since all the settings under it are directly related to the hardware configuration of the system. Only access this page if instructed by the manufacturer.

Starting from the Main menu of CASHMI, press the DOWN button until the screen displays "Factory". Press ENTER. When prompted, enter the password specified under the security section of this manual above. Press UP or DOWN until one of the options below is displayed. Press ENTER to access that option. Press UP or DOWN to change the value of that option. Press ENTER to move on to the next option.

1. Set Number of Temp Sensors
   This includes all Room Temperature Sensors and Duct Temperature sensors conneted to the ECPM03 board. Valid values range from 2 to 32. 0 is also a valid value if the system in controlled only by CASHMI interfaces and no temperature sensor is used.
2. Set Number of Exhaust Fans:
   This defines the number of exhaust VFDs controlled the system. There can be up to 4 exhaust fans.
3. Set Number of Supply Fans
   This defines the number of exhaust VFDs controlled the system. There can be up to 2 supply fans.
4. Set Number of Light switches
   This defines the number of hood light switches controlled by the system. There can be 0, or 1 light switch. A light switch will be displayed on a CASHMI interface accordingly.
5. Set Proving Interlock
   This option enables or disables the Fan Proving Interlock. Refer to the Fan Proving Interlock paragraph under Functionality for further details. If this option is enabled, Proving calibration is required. Refer to paragraph e under Setup Options.
6. Set CORE
   This option determines if the system is connected to a CORE Fire Protection system.
7. Set Wash
   This option determines if the system includes a self-cleaning option. This option will not be available is CORE is enabled.
8. Set Prep Time Enable
   This option enables or disables the Preparation Time mode. Refer to the Preparation Time Mode paragraph under Functionality for further details.
9. Set KTS
   This option determines if a Kill switch or Tamper switch are connected to the system. If this option enabled, the input KTS shall be maintained energized for normal cooking operations. If KTS is deenergized, an electric gas valve connected to the system would drop and the shunt trip output will be energized.
10. Fan Controller type
    For each Fan, this option determines the type of Controller being used. Two (2) options are available: 571 and 531. If 571 is selected, the ECPM03 will communicate to a VFD with part number ending in 571. Typically these VFDs are 10 HP and below. If 531 is selected, the ECPM03 will communicate to a VFD with part number ending in 531. Typically these VFDs are 15 HP and above.

Press MENU multiple times to get back to the main menu or one more time to reboot the processor.

Component Description

Variable Frequency Drive

Variable frequency drives change the speed of 3 phase motors by changing the frequency signal sent to the motor. There is one variable frequency drive for each fan in this system. 2 RJ-45 plugs are used to connect the drives to each other and to the ECPM03 controller through CAT-5 cables.

Variable Frequency Drive Parameters

Variable frequency drive parameters can be changed with the buttons on the face of the drive. Only parameters P107 (Line voltage Selection) and P108 (Motor Overload) should be adjusted in the field if needed. All other settings can be adjusted through the CASHMI interface.

P107 is set to 0 (Low) if motor voltage is 120 VAC, 208 VAC or 400 VAC. P107 is set to 1 (High) if motor voltage is 230 VAC, 480 VAC or 575 VAC.

P108 is calculated as Motor FLA x 100 / Drive Output Rating (available in the VFD cross reference table under the Electrical Installation chapter above).

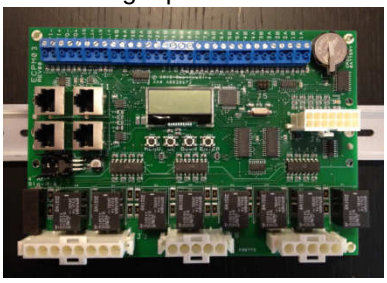
To enter the PROGRAM mode to access the parameters:

1. Press the Mode (M) button.
2. If no password is required, the display will read “P100”. If it prompts for a password (PASS), use the Up and Down buttons to scroll to the password value (the factory default password is “0225”) and press the Mode (M) button. Once the correct password is entered, the display will read “P100”, which indicates that the PROGRAM mode has been accessed at the beginning of the parameter menu.
3. Use the Up and Down buttons to scroll to the desired parameter number.
4. Once the desired parameter is found, press the Mode (M) button to display the present parameter setting. The parameter value will begin blinking, indicating that the present parameter setting is being displayed. The value of the parameter can be changed by using the Up and Down buttons.
5. Pressing the Mode (M) button will store the new setting and also exit the PROGRAM mode. To change another parameter, press the Mode (M) button again to re-enter the PROGRAM mode. If the Mode button is pressed within 1 minute of exiting the PROGRAM mode, the password is not required to access the parameters. After one minute, the password must be re-entered in order to access the parameters again.

P500 parameter provides a history of the last 8 faults on the drive. It can be accessed without getting into PROGRAM mode.

ECPM03 board

The ECPM03 is the main brain of the system. It receives all the digital and analog inputs and delivers the digital outputs and sends out messages to other devices.



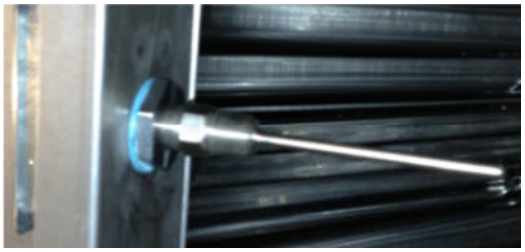
Connector Descriptions

- J1, J2: Modbus slave network connectors feed through RJ45s, which conform to the Modbus pin out for RS485 2 wire differential Modbus RTU standard. See http://www.modbus.org. Modbus communication is not configured for third party integration without additional components.
- J3, J4: Modbus master network connectors, feed through RJ45s, which conform to the Modbus pin out for RS485 2 wire differential Modbus RTU standard. J4 is the only RJ45 port on the ECPM03, which serves as a power source for CASHMIs (LCD Switch Plates).

- J5: factory programming only, Zilog ZDI microcontroller debug/programming interface
    - Pin 1 3.3VDC
    - Pin 2 /reset
    - Pin 3,5 Gnd
    - Pin 4 DBG input
    - Pin 6 NC
- J6: Factory low voltage connections
    - Pin 1 positive side of the 24 Volt DC input to the board
    - Pin 2 – 7 Open collector outputs, 100ma max each, suitable for driving 24VDC relays or indicator lamps.
    - Pin 8 – 12 4-20ma current inputs. 150 Ohm impedance to 24 VDC ground pin 14.
    - Pin 13 Chassis ground connection, this pin connects to the 24VDC ground through a paralleled 1000pf 2000V cap and a 100k Ohm 1/4W resistor.
    - Pin 14 negative side of the 24 volt DC power input (ground or common side of the low voltage circuitry)
- J7: 120 VAC control connector for factory wiring
    - Pin 1 IO1, BMS input, can detect the presence of 120VAC, this forces the fans on.
    - Pin 2 B1, input, this pin can detect the presence of 120VAC.
    - Pin 3 EF1, output and input, this pin can source 120VAC and detect the presence of 120VAC
    - Pin 4, SF1, output, this pin can source 120VAC
    - Pin 5, OV1, input, this pin can detect the presence of 120VAC
- J8: 120 VAC control connector for factory wiring
    - Pin 1 IO2, output and input, this pin can source 120VAC and detect the presence of 120VAC
    - Pin 2 B2, input, this pin can detect the presence of 120VAC
    - Pin 3 EF2, output and input, this pin can source 120VAC and detect the presence of 120VAC
    - Pin 4, SF2, output, this pin can source 120VAC
    - Pin 5, OV2, input, this pin can detect the presence of 120VAC
- J9: 120 VAC control connector for factory wiring
    - Pin 1 N1, Neutral, this is the neutral or return path for the detection of 120VAC by the input pins. It would be connected to the Neutral side of the 120 VAC supply
    - Pin 2 AR1, input, this pin can detect the presence of 120VAC
    - Pin 3 GAS, output, this pin can source 120VAC
    - Pin 4 KTS, input, this pin can detect the presence of 120VAC
    - Pin 5 KS, output, this pin can source 120VAC
    - Pin 6 ST, output, this pin can source 120VAC
    - Pin 7 PCU, input, this pin can detect the presence of 120VAC
    - Pin 8 H1, this is the 120 Volt AC 50/60Hz input to the board, it feeds through an on board 4 Amp Slo-Blo fuse and is used to source 120 VAC to all the pins described as 120 VAC outputs. The total current draw of all the 120VAC outputs must not exceed 4Amps.
- J10: Low voltage field connections
    - Pin 1, 2 – 15, 16 thermistor temperature probe inputs. 10k type B thermistors are connected to these inputs.
    - Pin 17, 19, 21, 23, 25, 27, sources 24VDC which is current limited through an on board 200ma PTC Poly-Fuse. This is the high side of the pulse with modulated outputs, and low voltage inputs listed below.
    - Pin 18, 20, 22, 24 Open collector PWM outputs, 100ma max each. Suitable for driving the opto-isolated PWM speed control inputs of ECM motors.
    - Pin 26, 28 low voltage inputs, suitable for detecting dry contact closures with pins 25, 27 above.
    - Pin29 0-10 Volt output, 5ma max, suitable for driving instrumentation inputs.
    - Pin 30, negative, common or ground side of the above 0-10 Volt output
    - Pin 31 0-10 Volt input, 10k Ohm impedance to ground or common.
    - Pin 32, negative, common or ground side of the above 0-10 Volt output

Temperature Sensor

The temperature sensor is a 10K Ohm Thermistor. The sensor gives constant feedback to the controller. One sensor is installed in every riser.



Room Temperature Sensor

The Room temperature sensor is a 10K Ohm Thermistor. The sensor provides constant room temperature to the controller. It should be installed on a wall somewhere in the space but not directly under the hood or close to an appliance so that the reading is not affected by heat.

Typically a system will have one room temperature sensor. However systems configured with 2 fan zones have the option to be ordered with 2 room temperature sensors, one for each zone. They should be mounted in the space accordingly.

CASHMI Interface

The CASHMI Interface is designed to withhold grease and water when installed on the face of the hood or utility cabinet.

The Interface is connected to the ECPM03 through a CAT-5 cable. If the interface is installed on the face of the hood, a high temperature CAT-5 Cable is used.

The CASHMI interface can be mounted to a standard 2-gang junction box.

Troubleshooting

The following table lists causes and corrective actions for possible problems with this control. Review this list prior to consulting manufacturer.

Troubleshooting Chart

Problem	Potential Cause	Corrective Action
Smoke Rollout of Hood – Fans don't start-up when appliances are ON	Dirty temperature sensor	Clean grease and dirt from sensor
	Poor Heat detection	Decrease duct Temperature offset values
	Improper hood installation	Check for proper hood overhang, cross drafts or improper hood design
Fans Spin Wrong Direction	3 phase Motor output wired backward	Swap 2 of the 3 phase wires on the output of the starter feeding the motor
Light icon On but No Lights Come On	Light bulbs are blown	Replace hood light bulbs
	Loose wiring connection	Check light terminal block wiring connections
Fan icon On but Fan doesn't comes On	Broken fan belt	Replace fan belt
	Loose wiring connection	Check wiring connections on starters

VFD Fault List

0	No Fault
1	IGBT Temperature Fault
2	Output Fault
3	Ground Fault
4	Temperature Fault
5	Flying Start Fault
6	High DC BUS
7	Low DC BUS
8	Overload Fault
9	OEM Fault
10	Illegal Setup Fault
11	Dynamic Brake Fault

12	Phase Lost
13	External Fault
14	Control Fault
15	Start Fault
16	Incompatible Parameter Set
17	EPM Hardware Fault
18-27	Internal Fault
28	Remote Keypad Lost
29	Assertion Level Fault
30 - 33	Internal Fault
34	Comm. Module Failure
35 - 44	Network Fault

Refer to VFD manufacturer manual for further details.

The following table lists Fault messages displayed on the CASHMI display and corrective actions. Review this list prior to consulting manufacturer.

Fault Message on CASHMI display	Potential Cause	Corrective Action
"Fire"	FIRE or fire circuit not wired properly.	If no fire, verify connection between terminal blocks C1 and AR1.
"Equipment Disable High Temp"	Duct temperature exceeded the High Temp Equipment shutdown Threshold and shut down the gas valve and energizes the shunt trip.	Verify why Temp in duct is high. Verify the Threshold value under Configuration is set sufficiently high (250 degrees default).
"Light Fault Zone 1 Bx De-energized"	Light output is energized but no power is detected on terminal B1.	Verify that the light relay is not damaged and that the light circuit breaker is not tripped.
"Light Fault Zone x B1 energized"	Light output is de-energized but power is detected on terminal B1.	Verify that the light relay contact is not welded in the close position.
"Overload Trip Zone 1")	One of the overload relays for fans associated with zone 1 is tripped.	Reset overload relay. Monitor fan to see why overload tripped.
"Surfactant Low"	Surfactant level is low.	Refill Surfactant into the tank. Refer to Self-Cleaning or CORE manual.
"PCU Fault"	PCU filters are clogged or missing.	Verify PCU filters and replace if needed.
"Proving Fault"	Fan Proving Interlock enabled. Exhaust fan not meeting its minimum calibrated load.	Verify fans are running properly. Verify Fan Proving calibration. Refer to Fan Proving Interlock section.
"Fuse F1 Blown"	Fuse F1 is blown or missing	Replace fuse and verify there is no short-circuit and load is below 4 amps.
"Temp Sensor x Not Connected"	Temperature sensor x is not wired to the ECPM03 board.	Verify proper wiring to terminals TxA and TxB on the board and wiring to the sensor.
"Modbus Communication Fault"	One or several components on the Modbus network are not responding.	Verify faceplates are all plugged in. Verify CORE or PCU AFM are plugged in if configured as such.
"CORE x Fault" Fault description	Specific fault is present on the CORE fire system	Refer to the CORE manual for specific fault description.
"PCU x Fault" Fault description	Specific fault is present on the PCU AFM x connected to the system.	Refer to the PCU AFM manual for specific fault description.
"Sup 1 Interlock" "Check MUA-1 Controls "	Interlock signal was not received back from the MUA.	Verify MUA is not faulted and damper is fully open. Verify Interlock is properly wired.
"Exh" or "Sup" "VFD Fault"	VFD fault on Exhaust or Supply	Refer to the VFD manual for details

MAINTENANCE

To guarantee trouble free operation of this control, the manufacturer suggests following these guidelines. Most problems associated with unit failures are directly related to poor service and maintenance.

Please record any maintenance or service performed on this equipment in the documentation section located at the end of this manual.

WARNING: DO NOT ATTEMPT MAINTENANCE ON THIS CONTROL UNTIL THE ELECTRICAL SUPPLY HAS BEEN COMPLETELY DISCONNECTED

General Maintenance

1. Control enclosure should be kept clean and free from any grease or dirt build-up.
2. All fasteners should be checked for tightness each time maintenance checks are preformed prior to restarting unit.
3. Control enclosure door panel should be securely closed after maintenance to prevent tampering or electrical shock.
4. Real Time Clock (RTC) battery should be replaced every 10 Years. Use CR2032 or equivalent.

Every Month

1. **Temperature sensor(s)** in exhaust hood riser(s) need to be cleaned by wiping any grease or dust build-up from probe with a clean cloth. A clean sensor ensures that the temperature switch will quickly respond to changes in exhaust air temperature.
2. Check all fasteners, sensors, and electrical connections for proper tightness and continuity.

Enclosure Fan Filter Inspection (Wall Mounted Enclosures Only).

1. Remove outer black plastic housing of the enclosure fan to gain access to the fan filter. The cover is held in place by frictional clips, simply pry on it to remove.
2. Inspect the fan filter for grease/debris. If the filter is dirty, clean or replace.

   Replacement fan filter part number: MC32658 (pack of 5)

   WARNING: If fan filter cleaning is not performed, grease/debris buildup may occur resulting in VFD failure due to overheating. VFD warranty may be denied if filter inspection is not performed on a monthly basis and logged on the maintenance record.

Self-Cleaning

Please refer to the Self-Cleaning or CORE Manual for Installation, Operation, and Maintenance of the Self-Cleaning system.

Start-Up and Maintenance Documentation

START-UP AND MEASUREMENTS SHOULD BE PERFORMED AFTER THE SYSTEM HAS BEEN AIR BALANCED (Warranty will be void without completion of this form)

Job Information

Job Name	
Address	
City	
State	
Zip	
Phone Number	
Fax Number	
Contact	
Purchase Date	

Service Company	
Address	
City	
State	
Zip	
Phone Number	
Fax Number	
Contact	
Start-Up Date	

Maintenance Record

Date	Service Performed

Factory Service Department
Phone: 1-866-784-6900
Fax: 1-919-554-9374