MANUAL

FUME HOOD CONTROL

CRC™

Measure What Matters.

FUME HOOD CONTROL

MANUAL

TABLE OF CONTENTS

IMPORTANT NOTES

The “Important Notes” header is used throughout this manual to call out important considerations that the reader should be aware of. Please take time to thoroughly read these sections.

PRODUCT OVERVIEW

The Fume Hood Control Solution, equipped with the advanced Fume hood Valve (FHV) and Fume Hood Controller (FHC) delivers comprehensive airflow monitoring and alarm functionality, supporting multiple sensing methodologies, including sash position sensing, sidewall velocity sensing, and constant volume control. It incorporates advanced control algorithms designed to enhance energy efficiency and maintain safety through precise and responsive airflow regulation. Featuring Immediate Valve Control™ (IVC) and Predictive Sash Valve Control™ (PSVC) technologies, the system achieves industry-leading response times, providing exceptional performance and reliability for critical containment environments.

KEY FEATURES

- **Complete Fume Hood Control Solution:** Includes the Fume Hood Monitor/Controller and high-speed CRC air valve featuring patented CLV technology.
- **Advanced Precision Control:** Industry-leading accuracy with CRC's Immediate Valve Control™ (IVC) and Predictive Sash Valve Control™ (PSVC) for rapid and reliable airflow regulation.
- **Flexible User Modes:** Multiple operating modes provide clear and safe indication of fume hood status, aligning airflow control with room demand requirements.
- **Energy-Saving Sequencing:** Optimized efficiency through occupancy sensing, airflow waste alarms, and intelligent control sequencing to maintain safe and energy-efficient operation.
- **Seamless System Integration:** Fully integrated BACnet® MS/TP communications for robust interoperability with building management systems.

FUME HOOD

Components of the Fume Hood Control Solution

- Fume hood Valve (FHV)
- Fume Hood Controller (FHC)
- Vertical (VS5) or Sidewall Sash Sensor (SVS)
- Optional Accessories & Sensors

APPLICATION OVERVIEW

(FHV) FUME HOOD VALVE

The Fume Hood Valve (FHV) incorporates CRC's patented CLV air valve technology, delivering high-speed, precision airflow control. It supports both Variable Volume Constant Face Velocity and Constant Volume fume hood control strategies, as managed by the CRC Fume Hood Controller (FHC).

VARIABLE VOLUME CONSTANT VELOCITY SASH SENSING

The CRC vertical sash sensor accurately measures the open sash area of the fume hood in real time. This measurement, combined with airflow volume data from the associated CRC fume hood air valve, allows the CRC FHC to precisely calculate and control face velocity, delivering a constant face velocity variable volume control solution. For fume hoods with horizontally sliding sashes or combination horizontal and vertical sash configurations, we recommend utilizing our sidewall sensing technology for optimal performance.

VARIABLE VOLUME CONSTANT VELOCITY SIDEWALL VELOCITY SENSING

The CRC sidewall velocity sensor provides real-time measurement of a fume hood's face velocity. This continuous velocity feedback enables the Fume Hood Controller (FHC) to precisely control face velocity by modulating the CRC fume hood air valve, ensuring a constant face velocity variable volume control solution. Utilizing a patented dual-path velocity sensing technology, the sidewall sensor is an ideal solution for single vertical sash hoods, horizontal sash hoods, and combination horizontal/vertical sash configurations.

CONSTANT VOLUME AIRFLOW CONTROL

The CRC Fume Hood Controller can be configured for constant volume applications where neither sash position sensing nor sidewall velocity sensing is required. This configuration supports traditional bypass fume hoods as well as non-standard exhaust equipment, including biosafety cabinets, glove boxes, snorkels, and canopy hoods. In this mode, the FHC regulates the associated air valve to maintain a fixed, constant airflow volume, ensuring consistent and reliable exhaust performance.

FUME HOOD MONITOR

MONITOR SPECIFICATIONS

Dimensions	3.90 x 5.32 x 0.85 in
Input Power	Supplied by I/O board via Cat6 cable
Cable Length	25 ft shielded Cat6 (included)
Operating Temperature	-4 to 158 °F (-20 to 70 °C)
Storage Temperature	-22 to 176 °F (-30 to 80 °C)
Operating Humidity	90 % RH max non-condensing
Storage Humidity	90 % RH max non-condensing
Resolution	480 x 272 px
Display Type	Resistive Touch

FUME HOOD CONTROLLER

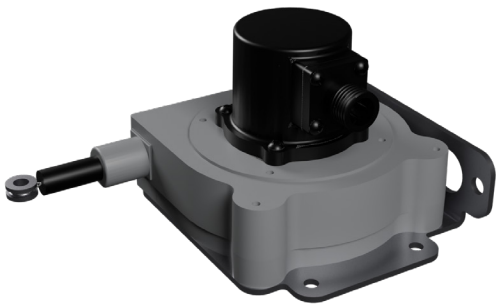
FHC SPECIFICATIONS

Dimensions	5.5 x 3.10 x 1.26 in
Input Power	24 VAC ±10%, 50/60 Hz, maximum 30 VA, Class 2
Onboard Power	3 @ 5 VDC (100mA total max.)
Operating Temperature	32 to 158 °F (0 to 70 °C)
Storage Temperature	-40 to 185 °F (-40 to 85 °C)
Operating Humidity	5 to 60 % RH non-condensing
Storage Humidity	20 to 70 % RH non-condensing
Communications Protocol	BACnet® MS/TP
Connectors	14-26 AWG

ENCLOSURE

Dimensions	9.54 x 9.81 x 3.67 in
Material of Construction	ABS Plastic
Flame Rating	UL94 HB
NEMA Rating	1

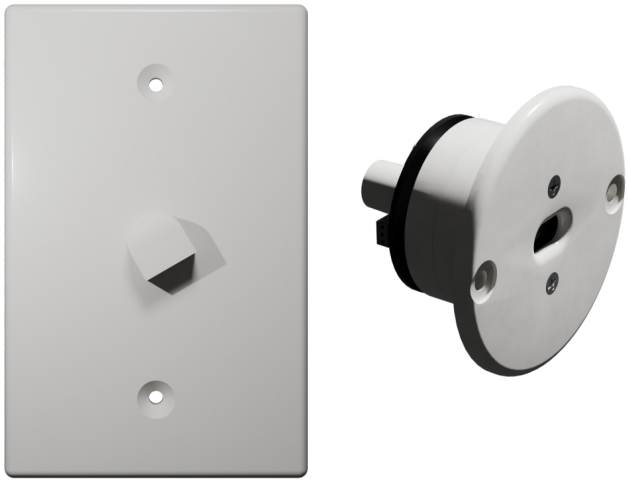
VERTICAL SASH SENSOR



SPECIFICATIONS

Operating Temperature	0 to 160 °F (-18 to 71 °C)
Operating Humidity	0 to 95% RH non-condensing
Cable Material	Nylon-Coated SS
Input Voltage	10 VDC from 10V on FHC
Output Voltage	0 to 10 VDC to AIN2 on FHC
Accuracy	±0.25 % of Full Scale
Repeatability	±0.02 % of Full Scale
Cable Range	50 in (1.27 m)

SIDEWALL VELOCITY SENSOR



SPECIFICATIONS

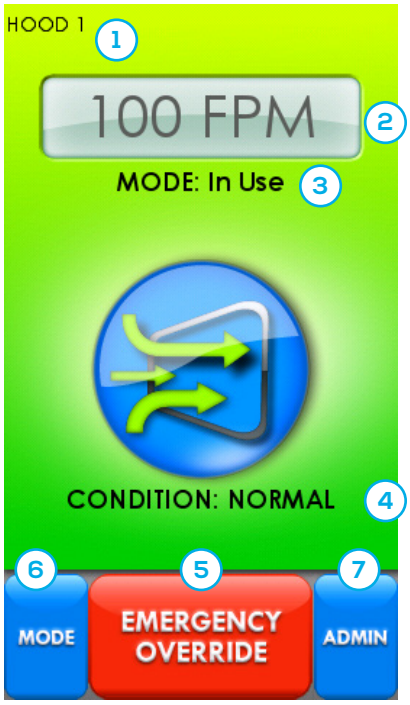
Operating Temperature	14 to 140 °F (-10 to 60 °C)
Operating Humidity	0 to 95 % RH non-condensing
Input Voltage	10 VDC from 10V on FHC
Output Voltage	0 to 10 VDC to AIN2 on FHC
Velocity Range	0 to 197 FPM (0 to 1 m/s)
Accuracy	±5 % of FS
Repeatability	±0.04 % of Full Scale

OCCUPANCY SENSOR

SPECIFICATIONS

Sensor Operating Temperature	-4 to 140 °F (-20 to 60 °C)
Relay Operating Temperature	-13 to 131 °F (-25 to 55 °C)
Operating Humidity	85 % ± 5 % RH non-condensing
Input Voltage	24 VDC
Relay Current Draw	75 mA
Relay Current Rating	5A / 220 VAC or 28 VDC
Delay Time	1 to 10 minutes
Field of View	60 degrees
Induction Range	16 ft (4.9 m)
Max Load Current	6 A

MAIN SCREENS



FUME HOOD HOME SCREEN:

1. **HOOD NAME:** Displays the assigned name of the fume hood.

2. **VALUE:** Indicates airflow measurement based on control type:
   - Displays face velocity in Feet Per Minute (FPM) for constant face velocity control using sash position or sidewall sensing.
   - Displays airflow volume in Cubic Feet per Minute (CFM) for constant volume applications.

3. **MODE:** Shows the current operating state of the hood, including:
   - In Use
   - Standby
   - Decommission

4. **CONDITION / BACKGROUND COLOR:** Visual status indication through color coding:
   - **Green:** Normal operation
   - **Red:** Alarm condition
   - **Blue:** Standby mode
   - **Grey:** Decommissioned status

5. **EMERGENCY OVERRIDE:** Activates emergency override mode, driving the hood to full exhaust capacity.

⚠ The FHC can be configured to hide this button in the Administrative Menu.

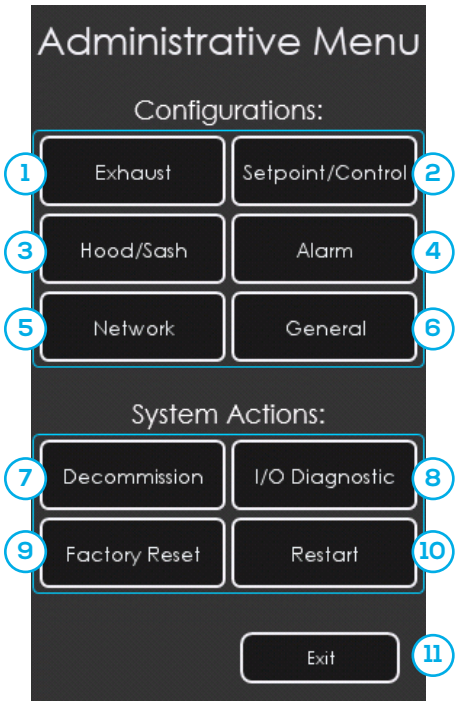
CONTROLS DISPLAYED UPON TOUCH INTERACTION WITH FHC SCREEN

6. **MODE BUTTON:** Allows the user to switch the fume hood's mode between In Use and Standby.

7. **ADMIN:** Provides access to the Administrative Menu, with optional password protection for restricted access.

For home screen configuration, refer to the General Setup Menu.

MAIN SCREENS

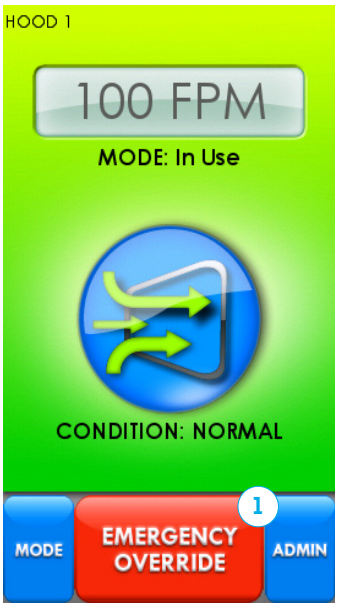


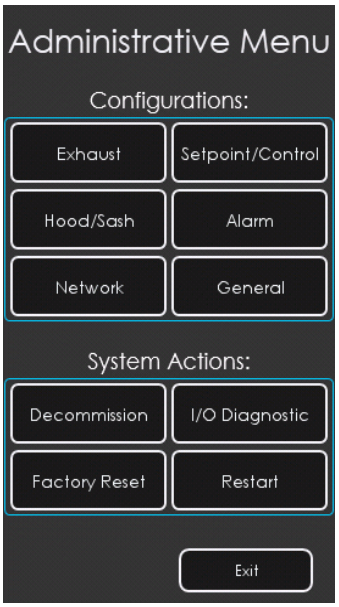
ADMINSTRATIVE MENU:

1. **EXHAUST:** Configures the Fume Hood Controller (FHC), including hood control strategy, valve configuration, and commissioning parameters.
2. **SETPOINT / CONTROL:** Defines hood control set points, response speed, and airflow control limits.
3. **HOOD/SASH:** Configures hood sash settings; not appli cable for sidewall sensing or constant volume control strategies.
4. **ALARM:** Sets up fume hood alarm parameters and thresholds.
5. **NETWORK:** Manages BACnet communication settings.
6. **GENERAL:** Provides access to basic configuration options, including password management, hood identification, and home screen preferences.
7. **DECOMMISSION:** Activates Decommission Mode for the fume hood.
8. **I/O DIAGNOSTIC:** Displays real-time visual status of active analog inputs and outputs.
9. **FACTORY RESET:** Restores the controller to its factory default settings.
10. **RESTART:** Reboots the controller and initiates touch screen calibration.
11. **EXIT:** Returns to the Home Screen interface.

VERTICAL SASH SENSOR

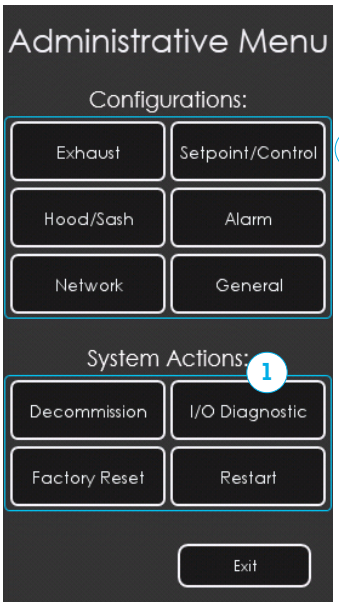
ACCESSING THE ADMINISTRATIVE MENU

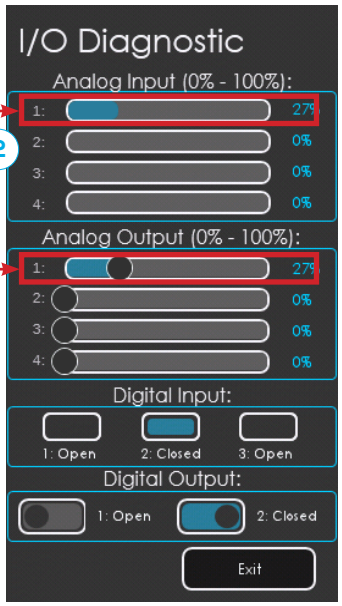




1. Touch anywhere on main screen. When ADMIN button appears, select it to access the Administrative Menu

WIRING VERIFICATION THROUGH I/O DIAGNOSTICS





1. Tap I/O Diagnostics to open the Controller Diagnostics screen. Verifying Fume Hood Air Valve Wiring
2. The fume hood air valve damper is controlled via Analog Output 1 (AO1), and the air valve airflow feedback is wired to Analog Input 1 (AI1).

To verify correct wiring of the FHV air valve:

- Use the Analog Output 1 slider to override the FHV air valve damper control signal. A value of 0 rep resents 100% open, and 10 represents fully closed.
- As the valve modulates between open and closed positions, observe Analog Input 1.
- AI1 should track the modulation of the air valve damper as overridden by AO1.
- If the air valve does not modulate between open and closed, check the wiring for:
- Analog Output 1 (Air Valve Damper Control Signal)
- Analog Input 1 (Air Valve Airflow Feedback Signal

Verifying Vertical Sash Sensor Wiring

The fume hood vertical sash sensor is wired to Analog Input 2 (AI2).

To confirm proper wiring:

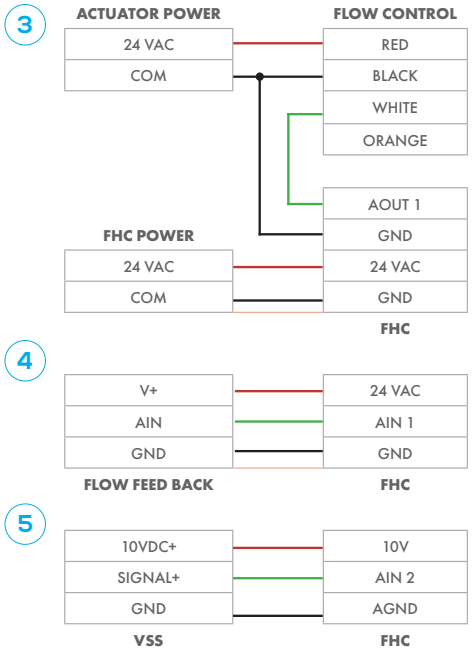
- Move the fume hood sash up and down. • Observe Analog Input 2; the visual display should increase and decrease corresponding to the sash's movement.

If AI2 does not change:

- Verify the wiring of the vertical sash sensor.
- Ensure the fume hood sash cable is properly connected to the hood and moves freely with the sash.

VERTICAL SASH SENSOR

VERIFY WIRING WITH I/O DIAGNOSTIC CONT.



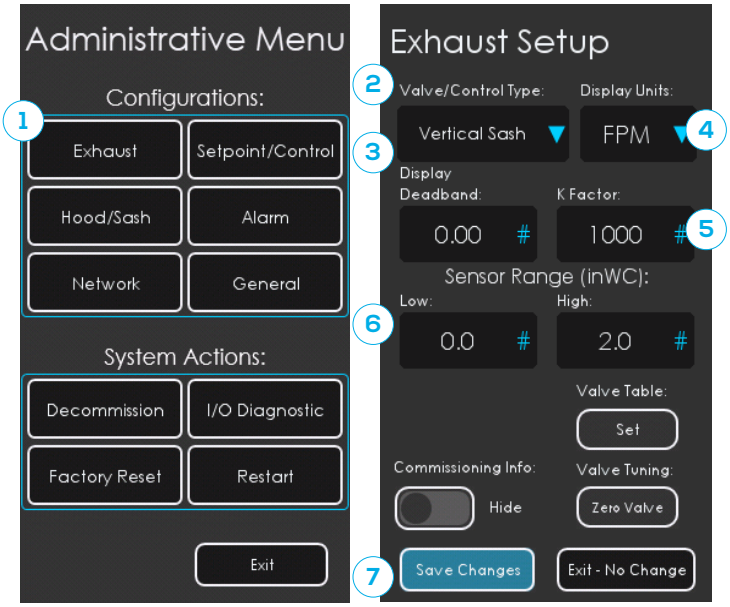
3 Power wiring for the FHV Damper Actuator and FHC.

⚠ The FHC controller and FHV actuator must not share the same 24VAC power supply. Each device requires a dedicated 24VAC power source.

4 **Wiring Connection:** Air Valve Airflow Sensor to FHC Controller

5 **Wiring Connection:** Vertical Sash Sensor (VSS)

EXHAUST SETUP



Unit Size	K Factor
106	450
108	775
110	1250
112	2600
114	2275
116	2967
212	3377
214	4597
216	6000

1 Select Exhaust Setup to access the Exhaust Input Setup screen

2 Set Valve / Control Type to Face Veloc. Sash

3 **Display Units:** value descriptor that appears after current value on main screen
Recommended: FPM (feet per minute)

4 Display Deadband: main screen value will not update until it exceeds current value ± Display Deadband
Recommended: 5.00 (FPM)

5 **K Factor:** identify CLV model and enter default K Factor from the table on the left

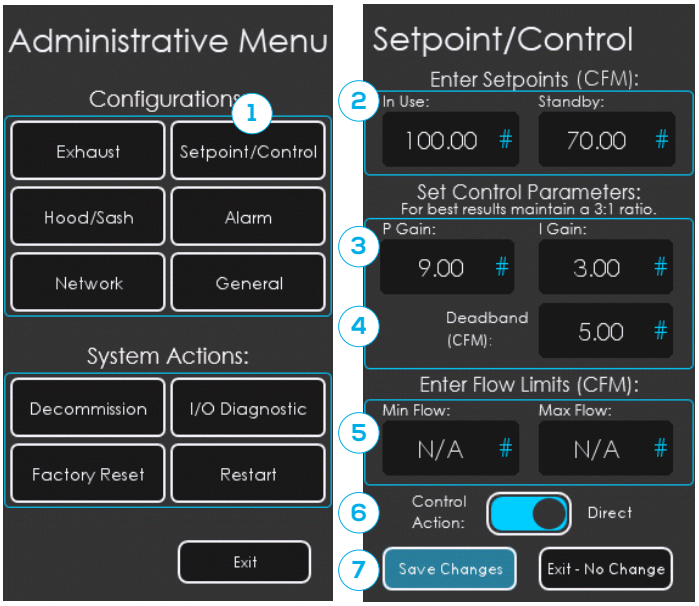
6 Set Sensor Range High to 2.00
Set Sensor Range Low to 0.00

Commissioning Info, and Valve Tuning will be discussed in the Commissioning section.

7 Save Changes

VERTICAL SASH SENSOR

SET POINT / CONTROL SETUP



1. Select Set Point / Control to access the Set Point / Control screen
2. Enter Set Point Values (in FPM) for face velocity
   In Use: occupied mode
   Recommended: 100.00 (FPM)

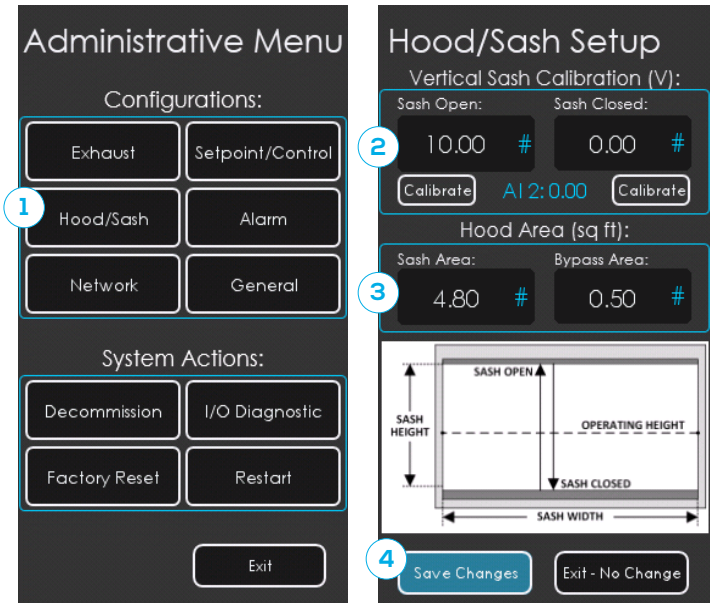
   Standby: unoccupied mode / setback / energy saver
   Recommended: 80.00 (FPM)

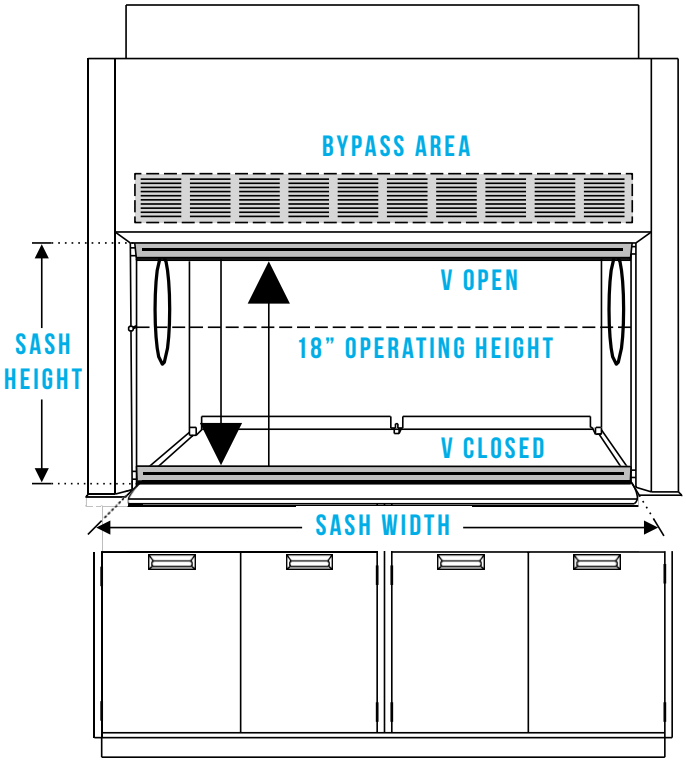
   ⚠ Final set points to be based on project risk assessment per ANSI Z9.5
3. Set P Gain to 9.00
   Set I Gain to 3.00

   ⚠ The P Gain must be set to three times the value of the I Gain. Any modifications to these parameters can adversely affect fume hood control stability and overall system performance.
4. **Fume Hood Control Deadband (in FPM):** The tolerance range around the face velocity setpoint within which the control loop remains inactive. The controller will only respond when the measured face velocity deviates beyond this ± value from the setpoint.
   Recommended deadband: 5.00 FPM
5. **Minimum Airflow (Min. Flow):** The minimum allowable airflow rate (measured in CFM) that the fume hood controller will maintain, even if the sash open area reduces below the required area to sustain the face velocity setpoint. This ensures minimum ventilation when the sash is fully closed.
   - Minimum airflow must be 100 CFM or greater.* Maximum Airflow (Max. Flow): The upper airflow limit (measured in CFM) that the fume hood valve will not exceed, regardless of face velocity demands.
   - Minimum and maximum airflow limits should be determined based on project-specific risk assessments in accordance with ANSI Z9.5 standards.
6. **Control Action Configuration:** Set the control action to “Reverse” for standard fume hood applications.
7. **Save Configuration:** Ensure all changes are saved after configuration.

VERTICAL SASH SENSOR

HOOD / SASH SETUP





1. Select Hood / Sash Setup to access the Sash Type Setup screen
2. Set sash type to Vertical Sash
3. Set Vertical Sash Sensor parameters; use the fume hood illustration below as reference.

   V Open: move sash to max open position (beyond safety stop); touch Calib. to calibrate

   V Closed: move sash to full closed position; touch Calib. to calibrate

⚠ V Open and V Closed must populate with different values. If values are equal, refer to VERIFY WIRING WITH I/O DIAGNOSTIC.

Total Area: measure sash height and sash width; use equations below to calculate total sash area (ft^2) and enter value

$$\textit{Using inches} \rightarrow \frac{\textit{Width x Height}}{144} = \textit{Total Area } (ft^2)$$

$$\textit{Using feet} \rightarrow \textit{Width x Height} = \textit{Total Area } (ft^2)$$

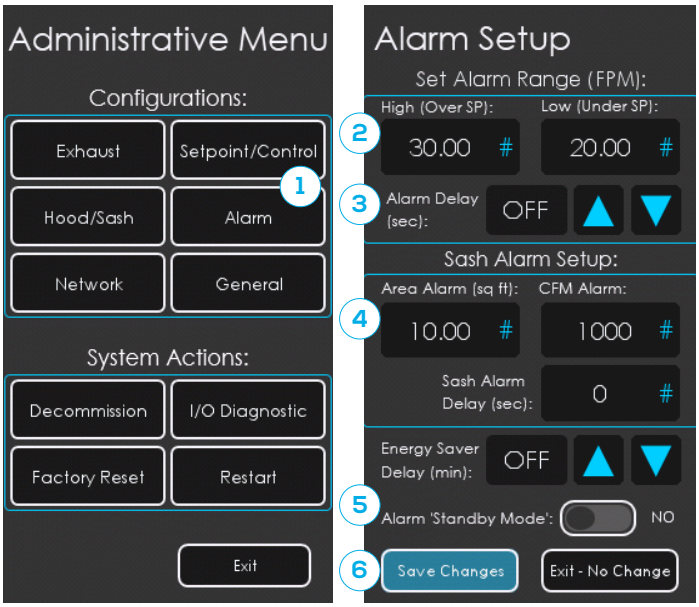
Bypass Area: The bypass area of the fume hood is the space located at the bottom of the fully closed sash, between the closed sash and the working surface of the fume hood. This area extends across the entire width of the fume hood opening and is measured and entered SQFT.

⚠ Bypass area is typically entered between 0.5 to 1.0 sqft.

4. **Save Configuration:** Ensure all changes are saved after configuration.

VERTICAL SASH SENSOR

ALARM SETUP



1. Select Alarm Setup to open the Flow Alarm Parameters screen.

2. **Configure Alarm Range (in FPM):** Define the velocity setpoint limits that will trigger an alarm when airflow goes above or below these values.
Recommended Settings:
High Alarm Setpoint: 20.00 FPM
Low Alarm Setpoint: 10.00 FPM

3. **Set Alarm Delay (Seconds):** Specify the time in seconds that the fume hood can remain in an alarm state before the audible alarm is activated.
Recommended Setting: 30 seconds

4. **Configure Sash Alarm Setup**
Area Alarm: Triggers an alarm if the fume hood sash open area (in square feet) exceeds a defined value for a duration longer than the Sash Alarm Delay setpoint.
Recommended Setting: Confirm with project requirements. If this alarm is not required, set this value higher than the calculated total sash open area of the fume hood.

   CFM Alarm: Triggers an alarm if the fume hood exhaust airflow surpasses a defined value for a duration longer than the Sash Alarm Delay setpoint.
Recommended Setting: Confirm with project requirements. If this alarm is not required, set this value higher than the maximum measurable airflow of the fume hood.

   Sash Alarm Delay (Seconds): Defines the time delay before an alarm is triggered for either an Area Alarm or a CFM Alarm.
Recommended Setting: If used 300 seconds

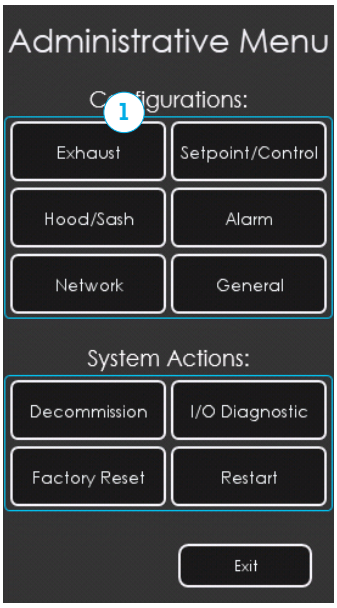
5. **Alarm Standby Mode:** Allows the user to activate alarm settings when the
Recommended Setting: Disabled = NO

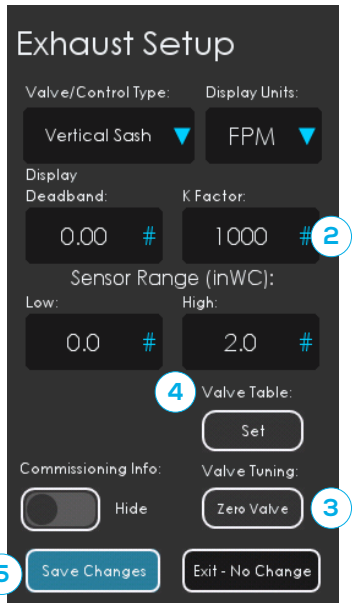
⚠ The Energy Saver Delay will be addressed in the Energy Saver Setup section.

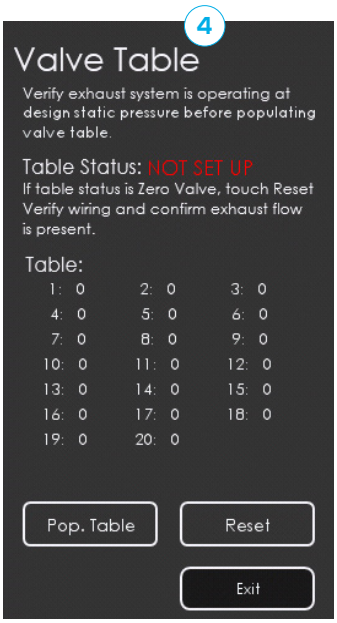
6. **Save Configuration:** Ensure all changes are saved after configuration.

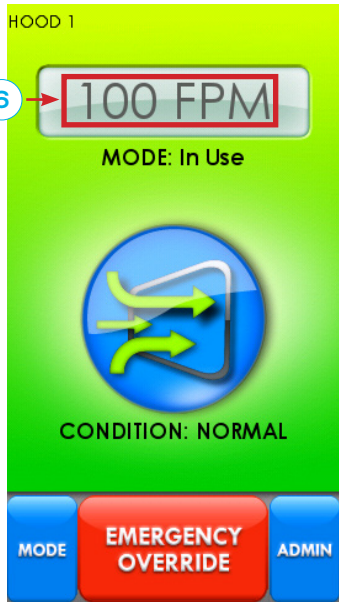
VERTICAL SASH SENSOR

COMMISSIONING









Unit Size	K Factor
106	450
108	775
110	1250
112	2600
114	2275
116	2967
212	3377
214	4597
216	6000

⚠ Before starting the balancing process, confirm that the exhaust system is operating at the design static pressure prior to commissioning.

1. **Accessing Exhaust Setup:** Select "Exhaust" to navigate to the Exhaust Setup screen.
2. **Verifying K Factor:** Ensure the K Factor matches the default value for the specific FHV model being configured.
3. **Valve Tuning:** Select "Zero Valve": The fume hood controller will drive the fume hood valve to the fully closed position and hold for 10 seconds.
4. **Populating the Valve Table:**
   - Select "Set": The fume hood controller will automatically populate the valve table.
   - Verify that the valve table values increase progressively.
   - Once the valve table is fully populated, the fume hood controller should indicate a status of "No Issue."

⚠ If the fume hood controller displays a status of "Zero Valve," touch "Reset" and verify the wiring and confirm the presence of exhaust system flow. Then repeat Steps 3 and 4.5.Saving

5. **Saving Configuration:** Ensure that all configuration changes are saved before exiting.
6. **Fume Hood Balancing:**
   - Open the fume hood sash to its maximum operatin position.
   - Measure the actual face velocity of the fume hood. • On the main Fume Hood Controller home screen, record the displayed face velocity and the current K Factor setpoint.
   - Use the following equation to calculate the new K Factor setpoint for the Fume Hood Controller.

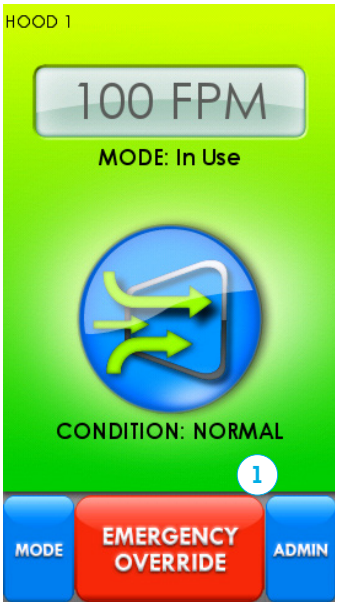
$$\frac{\textit{Measured Velocity (FPM)}}{\textit{Controller Velocity (FPM)}} \times \textit{Current K Factor} = \textit{New K Factor}$$

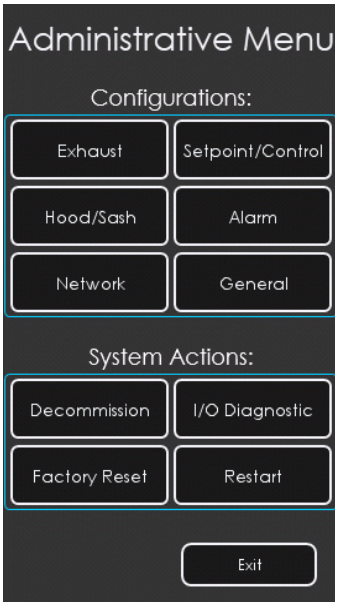
Input the newly calculated K Factor into the Exhaust Input administrative screen and save the changes.

⚠ The K Factor derived from the balancing process should fall within ±5% of the default K Factor, as determined by the applicable valve size. For reference, consult the table provided.

SIDEWALL VELOCITY SENSOR

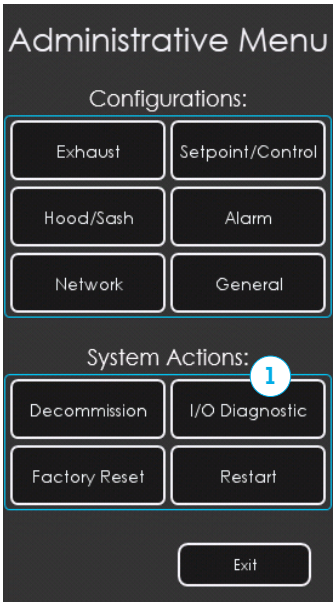
ACCESSING THE ADMINISTRATIVE MENU

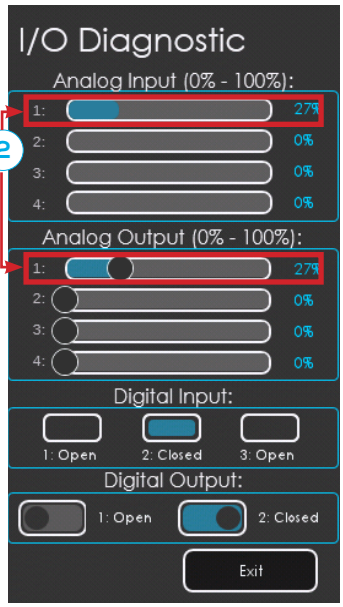




1. Touch anywhere on main screen. When ADMIN button appears, select it to access the Administrative Menu

WIRING VERIFICATION THROUGH I/O DIAGNOSTICS





1. Select I/O Diagnostics to open the Controller Diagnostics screen.Verifying Fume Hood Air Valve Wiring
2. The fume hood air valve damper is controlled via Analog Output 1 (AO1), and the air valve airflow feedback is wired to Analog Input 1 (AI1).

To verify correct wiring of the FHV air valve:

- Use the Analog Output 1 slider to override the FHV air valve damper control signal. A value of 0 represents 100% open, and 10 represents fully closed.
- As the valve modulates between open and closed positions, observe Analog Input 1.
- AI1 should track the modulation of the air valve damper as overridden by AO1.
- If the air valve does not modulate between open and closed, check the wiring for:
- Analog Output 1 (Air Valve Damper Control Signal)
- Analog Input 1 (Air Valve Airflow Feedback Signal.

Verifying the Sidewall Velocity Sensor Wiring

The fume hood Sidewall Velocity Sensor is wired to Analog Input 2 (AI2).To confirm proper wiring:

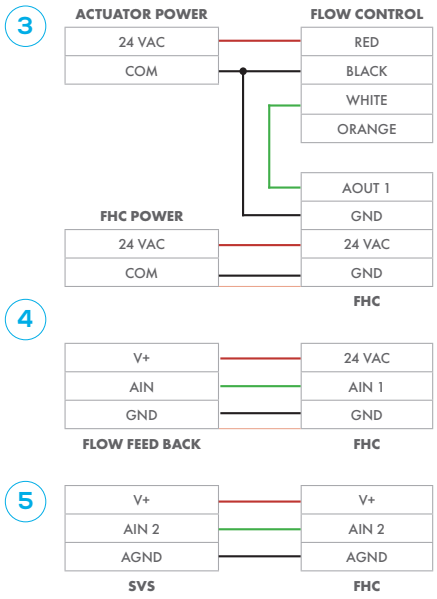
- Move the fume hood sash up and down.
- Observe Analog Input 2; the visual display should increase and decrease corresponding to the sash's movement.

If AI2 does not change:

- Verify the wiring of the Sidewall Velocity Sensor.
- Ensure the fume hood Sidewall Velocity Sensor is installed correctly with unobstructed reference to Fume Hood.

SIDEWALL VELOCITY SENSOR

VERIFY WIRING WITH I/O DIAGNOSTIC CONT.



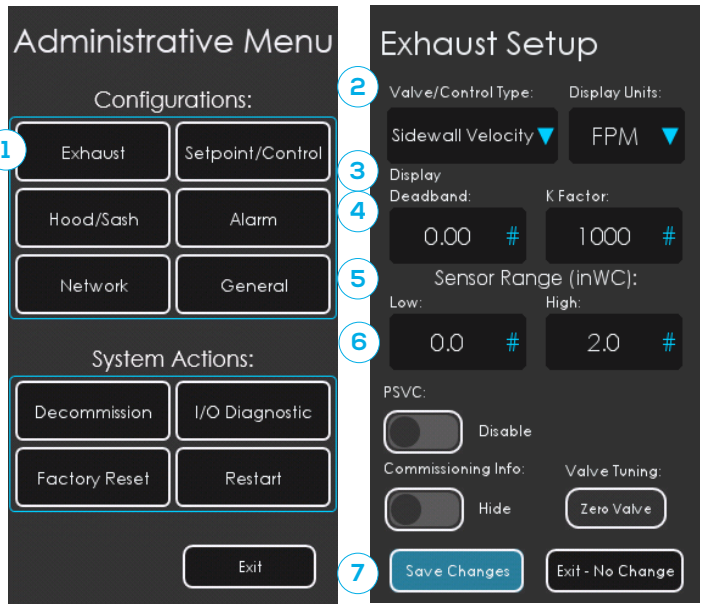
3 Power wiring for the FHV Damper Actuator and FHC.

⚠ The FHC controller and FHV actuator must not share the same 24VAC power supply. Each device requires a dedicated 24VAC power source.

4 **Wiring Connection:** Air Valve Airflow Sensor to FHC Controller

5 **Wiring Connection:** Vertical Sash Sensor (VSS)

EXHAUST SETUP



Unit Size	K Factor
106	450
108	775
110	1250
112	2600
114	2275
116	2967
212	3377
214	4597
216	6000

1 Select Exhaust Setup to access the Exhaust Input Setup screen

2 Set Valve / Control Type to Face Veloc. Sidewall

3 Display Units: value descriptor that appears after current value on main screen
Recommended: FPM (feet per minute)

4 Display Deadband: main screen value will not update until it exceeds current value ± Display Deadband
Recommended: 5.00 (FPM)

5 **Set K Factor:**
- Identify the Fume Hood Valve model and size.
- Enter the corresponding K Factor from the reference table.

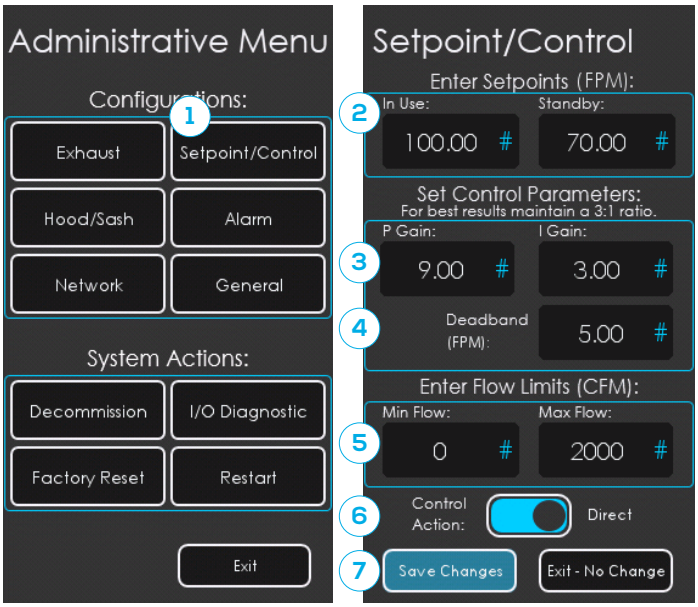
6 Sensor Range High: 2.00
Sensor Range Low: 0.00

Commissioning Info, and Valve Tuning will be discussed in the Commissioning section.

7 Save Changes

SIDEWALL VELOCITY SENSOR

SET POINT / CONTROL SETUP



1. Select Set Point / Control to access the Set Point / Control screen
2. Enter Set Point Values (in FPM) for face velocity
   In Use: occupied mode
   Recommended: 100.00 (FPM)

   Standby: unoccupied mode / setback / energy saver
   Recommended: 80.00 (FPM)

⚠ Final set points to be based on project risk assessment per ANSI Z9.5

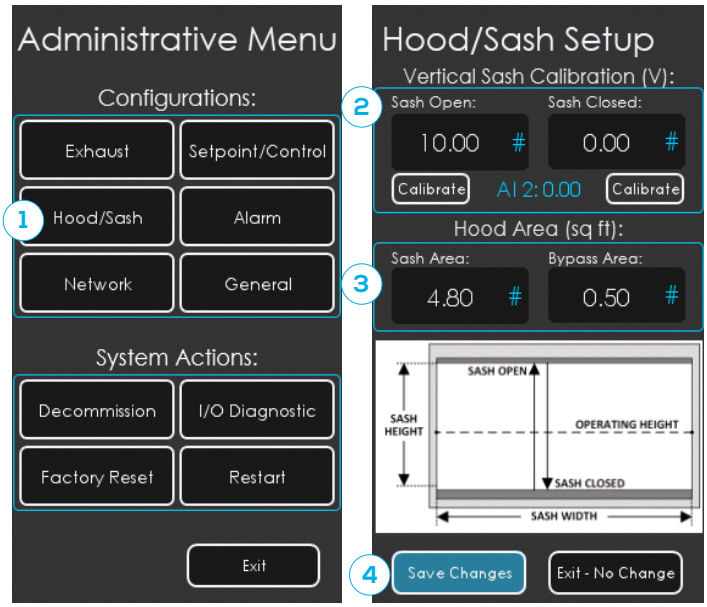
3. Set P Gain to 9.00
   Set I Gain to 3.00

⚠ The P Gain must be set to three times the value of the I Gain. Any modifications to these parameters can adversely affect fume hood control stability and overall system performance.

4. **Fume Hood Control Deadband (in FPM):** The tolerance range around the face velocity setpoint within which the control loop remains inactive. The controller will only respond when the measured face velocity deviates beyond this ± value from the setpoint.
   Recommended deadband: 5.00 FPM.
5. Minimum Airflow (Min. Flow): The minimum allowable airflow rate (measured in CFM) that the fume hood controller will maintain, even if the sash open area reduces below the required area to sustain the face velocity setpoint. This ensures minimum ventilation when the sash is fully closed.
   - Minimum airflow must be 100 CFM or greater.
     * Maximum Airflow (Max. Flow): The upper airflow limit (measured in CFM) that the fume hood valve will not exceed, regardless of face velocity demands.
   - Minimum and maximum airflow limits should be determined based on project-specific risk assessments in accordance with ANSI Z9.5 standards.
6. Control Action Configuration: Set the control action to "Revese" for standard fume hood applications.
7. **Save Configuration:** Ensure all changes are saved after configuration.

SIDEWALL VELOCITY SENSOR

SASH OPEN AREA



When using the SVS, Total Area must be calculated and entered to determine Sash Open % (AV 27). This is also useful for commissioning and balancing.

1. Touch Hood / Sash Setup to access the Sash Type Setup screen
2. Set sash type to Vertical Sash
3. Total Area: measure sash height and sash width; use equations below to calculate total sash area (ft^2) and enter value

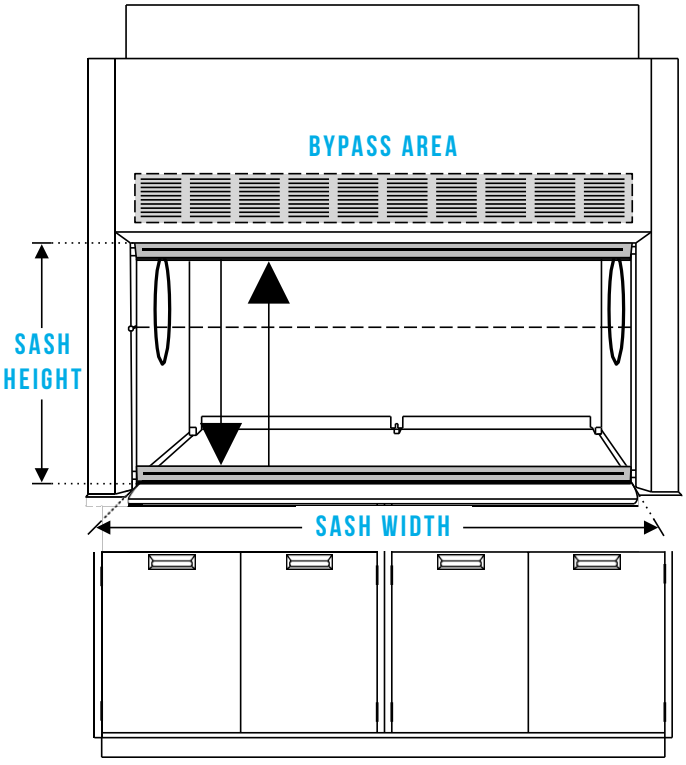
$$\textit{Using inches} \rightarrow \frac{\textit{Width x Height}}{144} = \textit{Total Area } (ft^2)$$

$$\textit{Using feet} \rightarrow \textit{Width x Height} = \textit{Total Area } (ft^2)$$

Bypass Area: intake grille, typically found above the sash, helps maintain constant velocity while sash is closed; calculate bypass area (ft2) and enter value

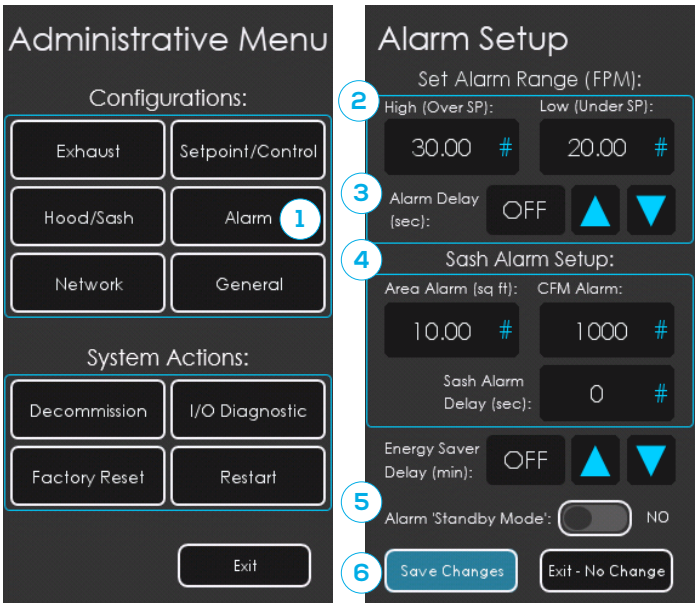
⚠ Commonly between 0.5 and 1.0 square feet

4. Save Changes



SIDEWALL VELOCITY SENSOR

ALARM SETUP



1. Select Alarm Setup to open the Flow Alarm Parameters screen.

2. Configure Alarm Range (in FPM): Define the velocity setpoint limits that will trigger an alarm when airflow goes above or below these values.
Recommended Settings:
High Alarm Setpoint: 20.00 FPM
Low Alarm Setpoint: 10.00 FPM

3. Set Alarm Delay (Seconds): Specify the time in seconds that the fume hood can remain in an alarm state before the audible alarm is activated.
Recommended Setting: 30 seconds

4. **Configure Sash Alarm Setup:**
Area Alarm: Triggers an alarm if the fume hood sash open area (in square feet) exceeds a defined value for a duration longer than the Sash Alarm Delay setpoint.
Recommended Setting: Confirm with project requirements. If this alarm is not required, set this value higher than the calculated total sash open area of the fume hood.

CFM Alarm: Triggers an alarm if the fume hood exhaust airflow surpasses a defined value for a duration longer than the Sash Alarm Delay setpoint.
Recommended Setting: Confirm with project requirements. If this alarm is not required, set this value higher than the maximum measurable airflow of the fume hood.

Sash Alarm Delay (Seconds): Defines the time delay before an alarm is triggered for either an Area Alarm or a CFM Alarm.
Recommended Setting: If used 300 seconds

Energy Saver Delay will be discussed in the Energy Saver Setup section.

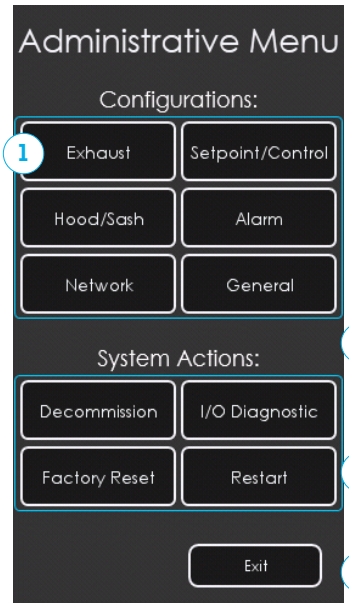
5. Allows the user to activate alarm settings when the Fume Hood mode is in standby mode.
Recommended Setting: Disabled = NO

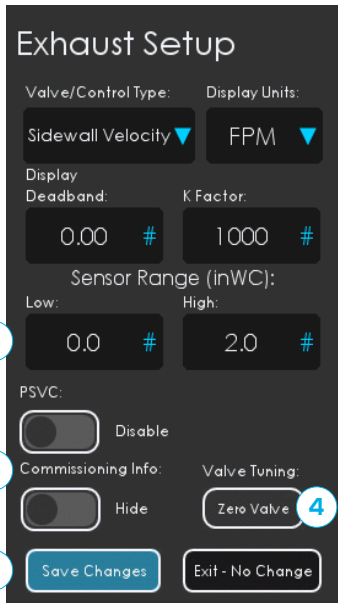
⚠ The Energy Saver Delay will be addressed in the Energy Saver Setup section.

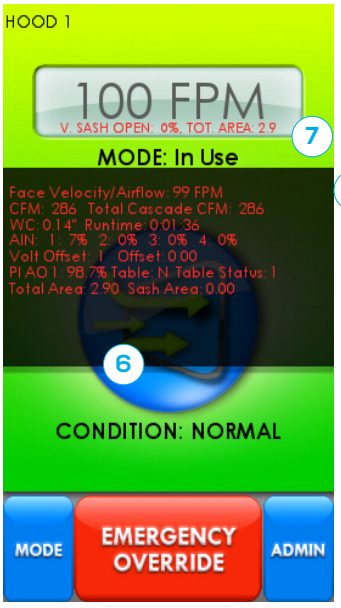
6. **Save Configuration:** Ensure all changes are saved after configuration.

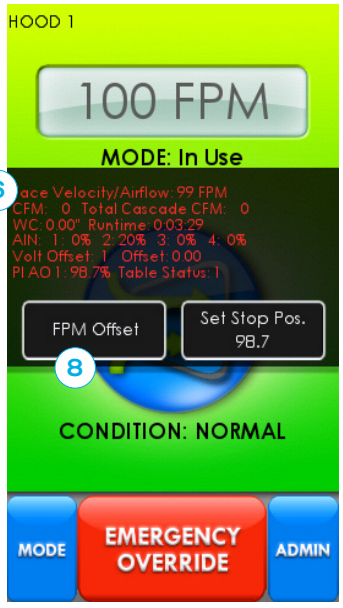
SIDEWALL VELOCITY SENSOR

COMMISSIONING









Unit Size	K Factor
106	450
108	775
110	1250
112	2600
114	2275
116	2967
212	3377
214	4597
216	6000

⚠ Before starting the balancing process, confirm that the exhaust system is operating at the design static pressure prior to commissioning.

1. Touch Exhaust Setup to access the Exhaust Input Setup screen
2. Current K Factor used in following steps. Verify K Factor matches default for FHV model.
3. Set Commissioning Info to Show
4. **Valve Tuning:**
   - Touch Zero Valve; wait 10 seconds for valve to close
   - Set PSVC (Predictive Sash Valve Control) In Use
5. Save Changes and return to main screen
6. **Calibrate Face Velocity:**
   - Open the sash to its typical operating position and measure actual face velocity.
   - View the controller's face velocity on the main screen. Use the following equation to calculate FPM Offset.

   Measured Velocity (FPM) - Controller Velocity (FPM)= FPM Offset

   - Touch FPM Offset and enter/save the calculated value.
7. With sash open at its typical operating position, touch Set Stop Pos
8. **Balance Hood Flow:**
   With sash open at its typical operating position, measure and calculate the sash open area (ft²).

⚠ This may include bypass area, which allows additional flow to pass through the hood.

- Use the sash open area and controller's face velocity to calculate measured airflow.

Open Area (ft²) x Controller Velocity (FPM) = Measured Flow (CFM)

Then, use Com. Info CFM, current K Factor from Exhaust Setup, and the following equation to calculate new K Factor.

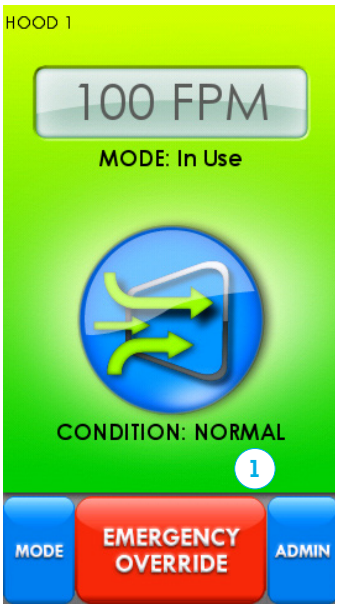
$$\frac{\text{Measured Flow (CFM)}}{\text{Com. Info CFM}} \times \text{Current K Factor} = \text{New K Factor}$$

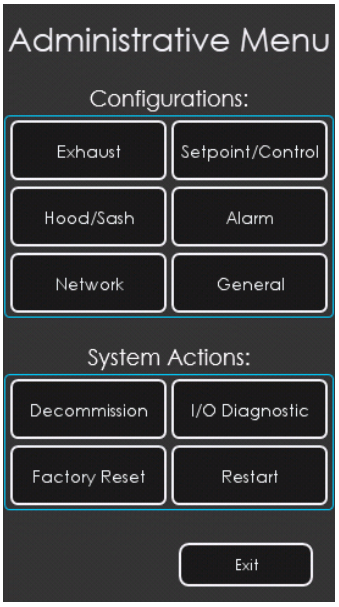
Enter new K Factor on Exhaust Input Setup screen, set Commissioning Info to Hide, and Save Changes (see above). Controller will now output calibrated hood flow (CFM) for system control.

⚠ The K Factor derived from the balancing process should fall within ±5% of the default K Factor, as determined by the applicable valve size. For reference, consult the table provided.

CONSTANT VOLUME HOOD

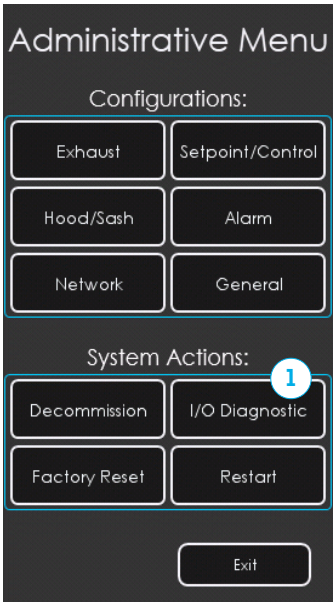
ACCESSING THE ADMINISTRATIVE MENU

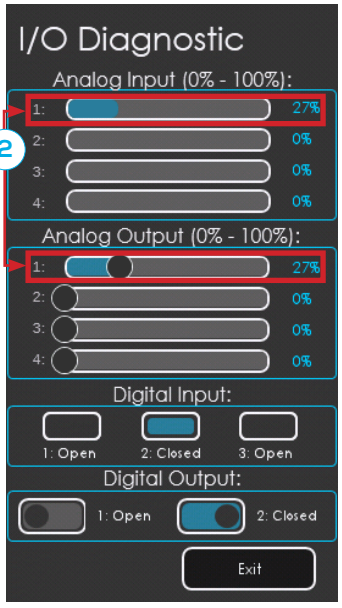




1. Touch anywhere on main screen. When ADMIN button appears, select it to access the Administrative Menu

WIRING VERIFICATION THROUGH I/O DIAGNOSTICS





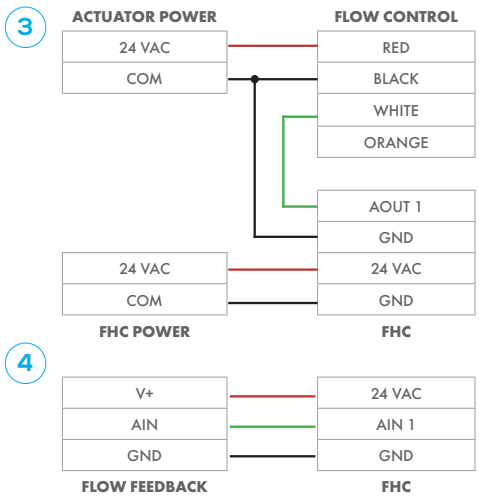
1. Select I/O Diagnostics to open the Controller Diagnostics screen. Verifying Fume Hood Air Valve Wiring
2. The fume hood air valve damper is controlled via Analog Output 1 (AO1), and the air valve airflow feedback is wired to Analog Input 1 (AI1).

To verify correct wiring of the FHV air valve:

- Use the Analog Output 1 slider to override the FHV air valve damper control signal. A value of 0 represents 100% open, and 10 represents fully closed.
- As the valve modulates between open and closed positions, observe Analog Input 1.
- AI1 should track the modulation of the air valve damper as overridden by AO1.
- If the air valve does not modulate between open and closed, check the wiring for:
- Analog Output 1 (Air Valve Damper Control Signal)
- Analog Input 1 (Air Valve Airflow Feedback Signal)

CONSTANT VOLUME HOOD

VERIFY WIRING WITH I/O DIAGNOSTIC CONT.

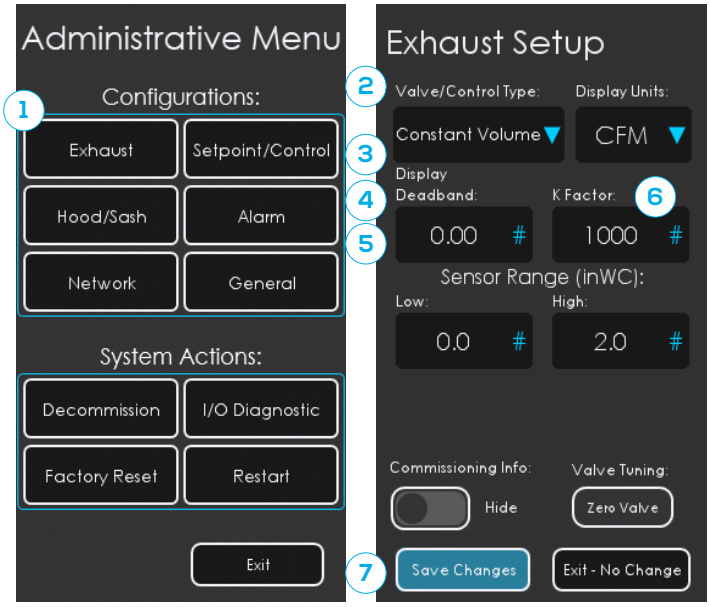


3 Wiring for Flow Control and Power

⚠ Actuator cannot be powered from FHC. Actuator and FHC must be powered from separate 24 VAC power sources.

4 Wiring for Flow Feedback

EXHAUST INPUT SETUP PROCEDURE



Unit Size	K Factor
106	450
108	775
110	1250
112	2600
114	2275
116	2967
212	3377
214	4597
216	6000

1 **Access Exhaust Input Setup:** Touch "Exhaust Setup" to open the Exhaust Input Setup screen.

2 **Set Valve/Control Type:** Select "Face Veloc. Sidewall" as the Valve/Control Type.

3 **Configure Display Settings:**
Display Units: Descriptor that appears after the current value on the main screen.
Recommended: FPM (Feet per Minute)

4 **Display Deadband:** The main screen value will only up date when it exceeds the current value by ± Display Deadband.
Recommended: 5.00 FPM

5 **Set Sensor Range:** Confirm the Fume Hood air valve sensor range.
Sensor Range High: 2.00
Sensor Range Low: 0.00

6 **Set K Factor:**
- Identify the Fume Hood Valve model and size.
- Enter the corresponding "K Factor" from the reference table.

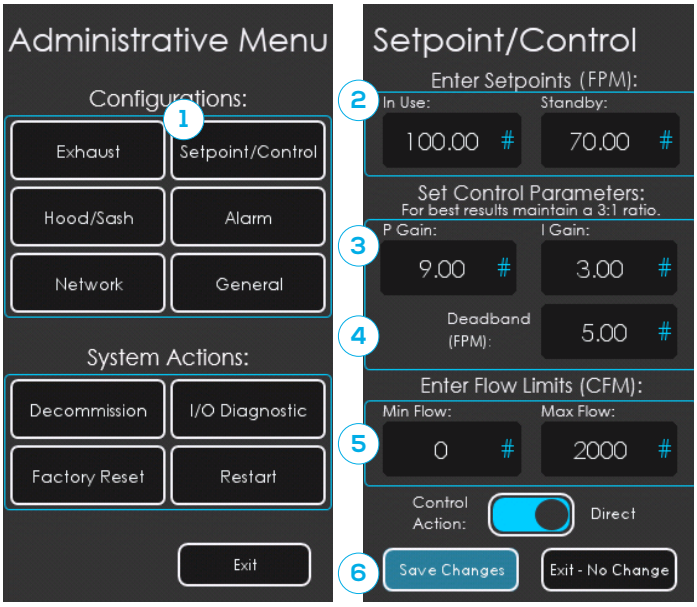
7 **Additional Information**

Commissioning Info and Valve Tuning will be covered in the commissioning section.

7 **Save Configuration:** Ensure all changes are saved after configuration.

CONSTANT VOLUME HOOD

SET POINT / CONTROL SETUP



1. Touch Set Point / Control to access the Set Point / Control screen
2. Enter Set Point Values (in CFM) for hood flow
   In Use: occupied mode
   Standby: unoccupied mode / setback / energy saver

⚠ Final set points to be based on project risk assessment per ANSI Z9.5

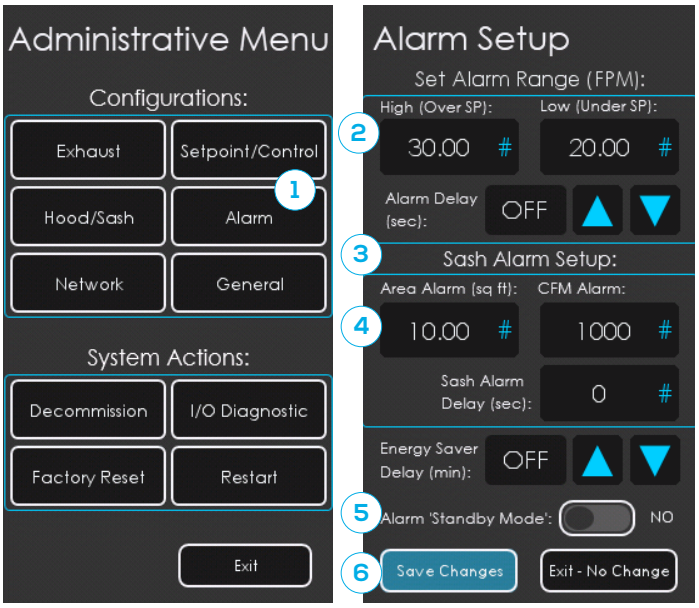
3. Set P Gain to 9.00
   Set I Gain to 3.00

⚠ The P Gain must be set to three times the value of the I Gain. Any modifications to these parameters can adversely affect fume hood control stability and overall system performance.

4. **Fume Hood Control Deadband (in CFM):** The tolerance range around the face velocity setpoint within which the control loop remains inactive. The controller will only respond when the measured face velocity deviates beyond this ± value from the setpoint.
   Recommended: 5.00 to 20.00 (CFM)
5. **Control Action Configuration:** Set the control action to "Reverse" for standard fume hood applications.
6. Save Configuration: Ensure all changes are saved after configuration.

CONSTANT VOLUME HOOD

ALARM SETUP



1. Select Alarm Setup to open the Flow Alarm Parameters screen.
2. Configure Alarm Range (in CFM): Define the CFM setpoint limits that will trigger an alarm when airflow goes above or below these values.
   Recommended Settings:
   High Alarm Setpoint: 50.00 CFM
   Low Alarm Setpoint: 30.00 CFM
3. Set Alarm Delay (Seconds): Specify the time in seconds that the fume hood can remain in an alarm state before the audible alarm is activated.
   Recommended Setting: 30 seconds
4. **Configure Sash Alarm Setup:** Not Used in Constant Volume Applications

   CFM Alarm: Triggers an alarm if the fume hood exhaust airflow surpasses a defined value for a duration longer than the Sash Alarm Delay setpoint.
   Recommended: Confirm with project requirements. If this alarm is not required, set this value higher than the maximum measurable airflow of the fume hood.

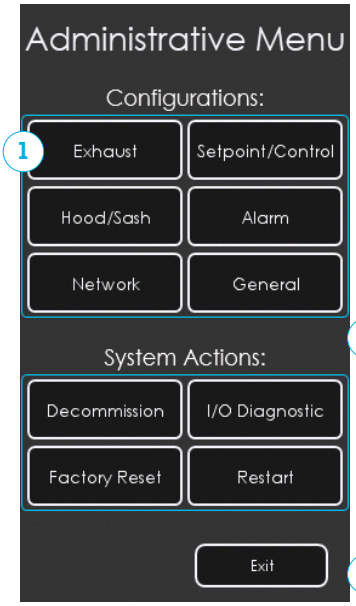
   Sash Alarm / CFM Alarm Delay (Seconds): Defines the time delay before an alarm is triggered for a CFM Alarm.
   Recommended Setting: If used 300 seconds
5. Alarm Standby Mode: Allows the user to activate alarm settings when the Fume Hood mode is in standby mode.
   Recommended Setting: Disabled = NO

⚠ The Energy Saver Delay will be addressed in the Energy Saver Setup section.

6. Save Changes

CONSTANT VOLUME HOOD

COMMISSIONING



Unit Size	K Factor
106	450
108	775
110	1250
112	2600
114	2275
16	2967
212	3377
214	4597
216	6000

⚠ Verify exhaust system is operating at design static pressure before commissioning. For small fan systems, consider locking other exhaust valves during this process.

1. Touch Exhaust Setup to access the Exhaust Input Setup screen
2. Current K Factor used in following steps .Verify K Factor matches default for FHV model.
3. Set Commissioning Info to Show
4. **Valve Tuning**
   Touch Zero Valve; wait 10 seconds for valve to close
5. Save Changes and return to main screen
6. **Balance Hood Flow**
   - Set the fume hood sash to its maximum operational position. Measure the actual air volume of the fume hood in CFM.
   - Access the Commissioning Information screen to record the current FHC CFM value and retrieve the K Factor from the Exhaust Setup screen.
   - Input these values into the following equation to calculate the updated commissioned K Factor:

$$\frac{\textit{Measured Flow (CFM)}}{\textit{Com. Info CFM}} \textit{ x Current K Factor = New K Factor}$$

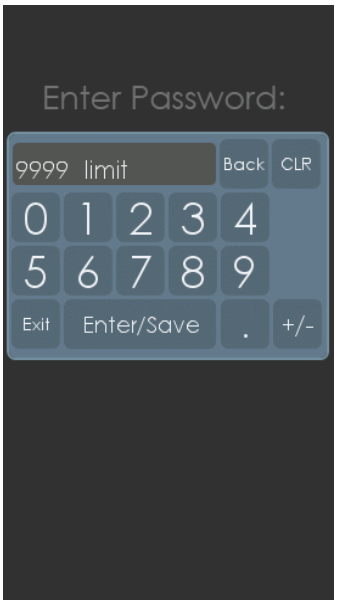
Enter new K Factor on Exhaust Input Setup screen,set Commissioning Info to Hide, and Save Changes (see above). Controller will now output calibrated hood flow (CFM) for system control.

⚠ The K Factor derived from the balancing process should fall within ±5% of the default K Factor, as determined by the applicable valve size. For reference, consult the table provided.

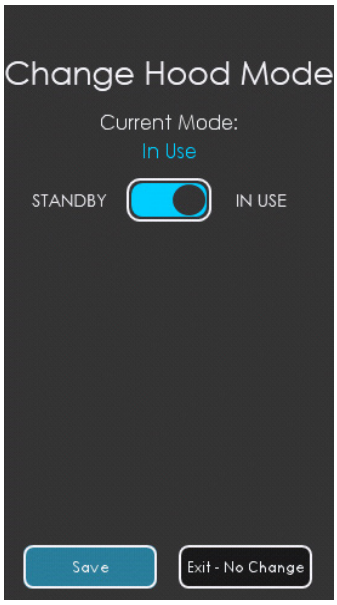
GENERAL SETUP

The General Menu allows users to configure basic settings for the fume hood, including password management, hood identification, display options, and system information. It provides access to controls for customizing the user interface and managing operational settings.

GENERAL SETUP



PASSWORD



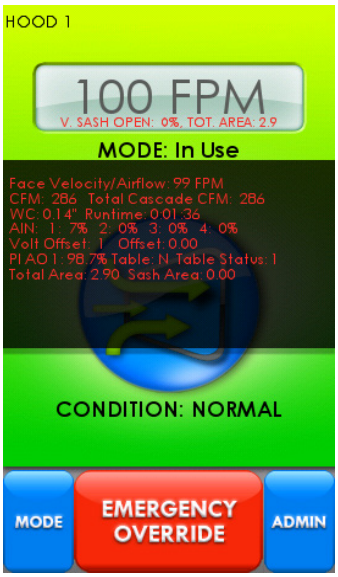
CHANGE HOOD MODE

GENERAL SETUP PARAMETERS

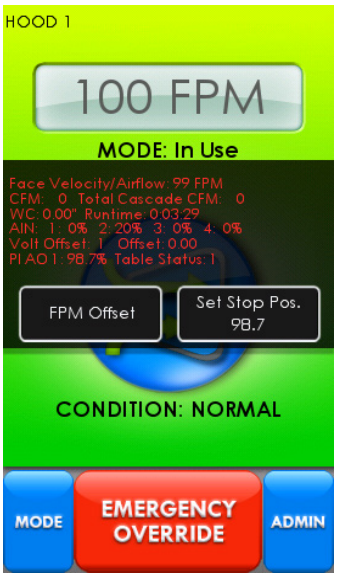
Parameter	Unit Selections	Description
Main Password	Numeric Value (up to 4 Digits)	Set a password for accessing the administrative menu.
Hood Summing (Prev. # of Hoods)	0-7	Adjusts the scaling for AIN 4 (0-10V) and AOUT 3 (0-10V) for fume hood flow summing, with each hood representing 2,000 CFM. Hood summing is used to add fume hood flow between devices for room level control.
Screen Time Out	4-60 seconds	Sets the duration for additional information and buttons to remain visible on the home screen after a touch. The info will disappear after the specified time.
Hood Name	Alphanumeric Free Text (11 Character Limit)	Change the name of the hood displayed in upper left corner of the Main Screen.
Mode	Show Hide	Selecting "Show" will display mode button on Main Screen and allow user to change mode.
Emergency Override	Show Hide	Selecting "Show" will display Emergency Override button on Main Screen and allow user to drive the CLV to maximum exhaust rate.
Fume Hood Software Version		Displays the current Fume Hood version
Save Changes		Apply and save changes.
Exit - No Change		Exit without saving changes.

COMMISSIONING INFO

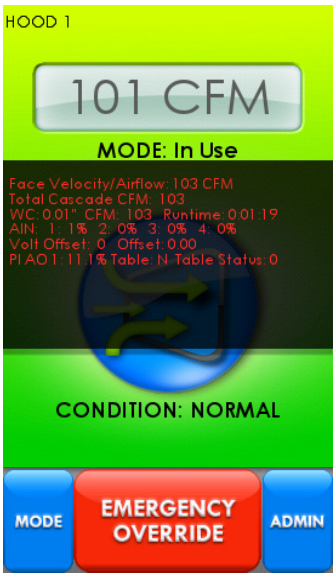
The Commissioning Info page provides the essential tools to configure and validate the fume hood controller during setup. This page allows users to set critical operating parameters and ensure that all sensors and components are functioning correctly. Proper commissioning ensures the fume hood operates safely, efficiently, and in compliance with performance requirements.



VERTICAL SASH



SIDEWALL VELOCITY



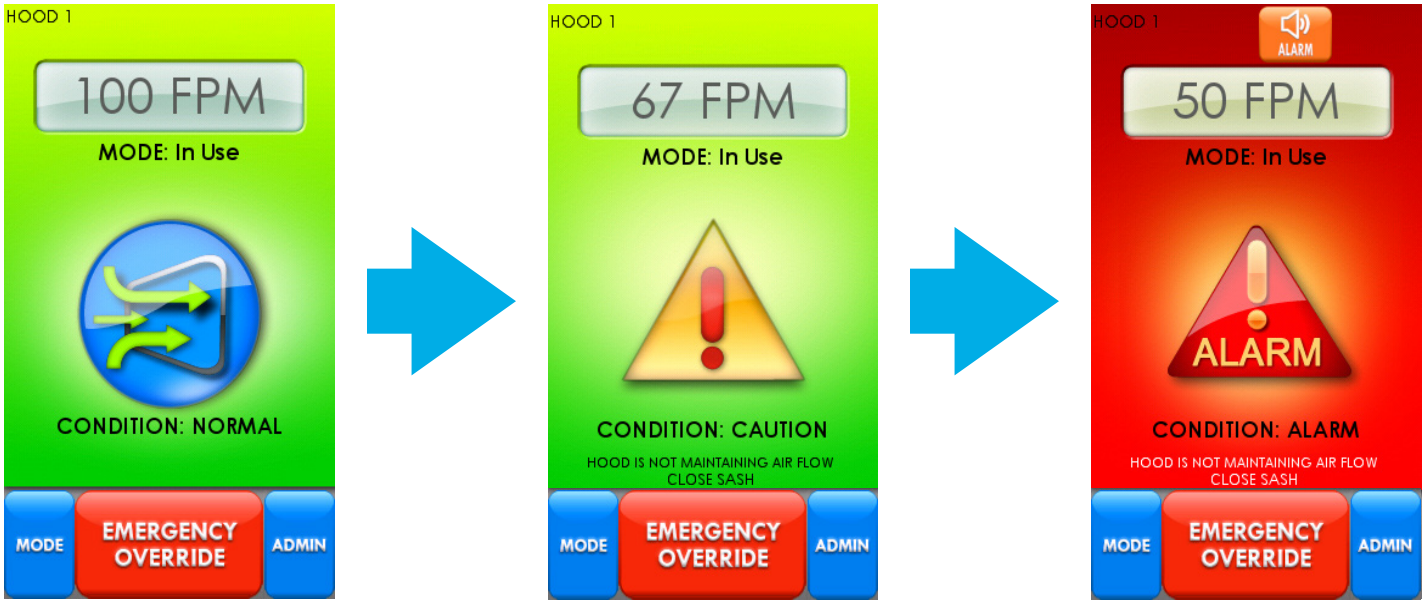
CONSTANT VOLUME

COMMISSIONING PARAMETERS

Parameter	Unit Selections	Description	Vertical Sash	Sidewall Velocity	Constant Volume
Face Velocity/ Airflow	Numerical Value	Measured face velocity or airflow	●	●	●
Total Cascade CFM	Numerical Value	Total summed fume hood flow from previous hoods in chain and this hood	●	●	●
WC	0-2	CLV flow sensor measurement	●	●	●
CFM	Numerical Value	Current airflow in CFM	●	●	●
Runtime	Hours: Min: Sec	Time since the I/O board booted	●	●	●
AIN 1-4	0-100%	Analog input signal scaled as percentage	●	●	●
Volt Offset	1-15	CLV flow sensor offset value set during commissioning	●	●	●
Offset	Numerical Value	Sidewall velocity sensor offset value set during commissioning	●	●	●
PI AO1	0-100%	The current output percentage for analog output 1 signal	●	●	●
Table	Y N	The minimum airflow (CFM) for the hood CLV; airflow will not control below this value. This cannot be set to 0 and is typically determined by the hood manufacturer or project requirements.	●		
Table Status	0,1,2,3	Indicates status of Valve Table 0: NO ISSUE 1: NOT SET UP 2: SENSOR ERR 3: ZERO VALVE	●		
Total Area		Calculated total area of the fume hood sash	●		
Sash Area		Calculated open area of the fume hood sash	●		
FPM Offset	Numerical Value	Click to enter calibration value for sidewall velocity sensor during commissioning.		●	
Set Stop Pos.	Numerical Value	If PSVC™ is enabled, click when the sash is open at its typical operating position.		●	

ALARM SEQUENCE

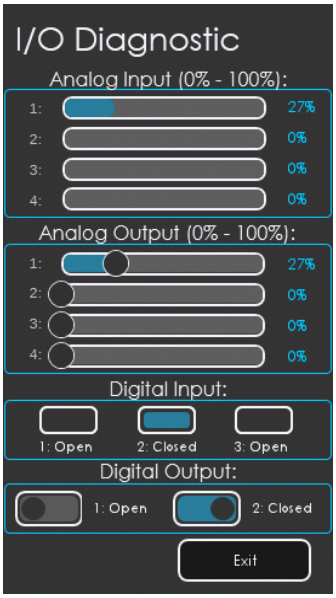
When face velocity or airflow readings exceed the configured alarm parameters, the fume hood enters alarm mode. If an alarm delay is set, a yellow “Caution” screen will appear during the delay period. Once the delay expires, the display switches to a red background, indicating a full alarm. If no alarm delay is set, the display will switch to red immediately.



NORMAL CAUTION ALARM

I/O DIAGNOSTIC

The I/O Diagnostic screen is used to verify the wiring and functionality of the fume hood controller, sensor, and FHV. In this menu, all control is overridden, allowing manual operation via analog output sliders and digital output switches. When you exit this menu, the hood will return to automatic control.



I/O DIAGNOSTICS

I/O DIAGNOSTICS PARAMETERS

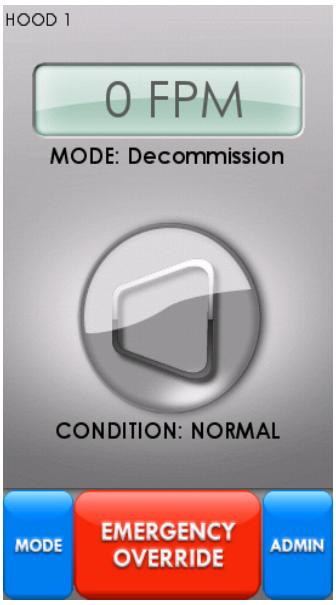
Parameter	Unit Selections	Description
Analog Input 1	0-100% (0-10V)	Flow feedback signal from CLV
Analog Input 2	0-100% (0-10V)	Vertical sash sensor signal / sidewall velocity sensor signal
Analog Input 3	0-100% (0-10V)	Unused
Analog Input 4	0-100% (0-10V)	Hood summing feedback signal
Analog Output 1	0-100% (0-10V)	Flow control signal to CLV
Analog Output 2	0-100% (0-10V)	Face velocity output signal
Analog Output 3	0-100% (0-10V)	Summed hood flow output signal
Analog Output 4	0-100% (0-10V)	Single hood flow output signal
Digital Input 1	Open Closed	Hood occupancy sensor trigger Closed: Occupied Open: Unoccupied
Digital Input 2	Open Closed	Emergency override trigger Closed: Emergency override mode active Open: Emergency override mode inactive
Digital Input 3	Open Closed	Decommission mode trigger Closed: Decommission mode active Open: Decommission mode inactive
Digital Output 1	Open Closed	Fume hood alarm status Closed: Alarm condition Open: Normal condition
Digital Output 2	Open Closed	Fume hood mode status Closed: Standby mode Open: In Use mode

FACTORY RESET, RESTART, AND DECOMMISSIONING INFO

Decommission: Closes the hood valve to stop airflow and disables alarms. This mode is used when a hood requires repairs or is not ready for configuration/commissioning. The hood is non-operational while in this mode.

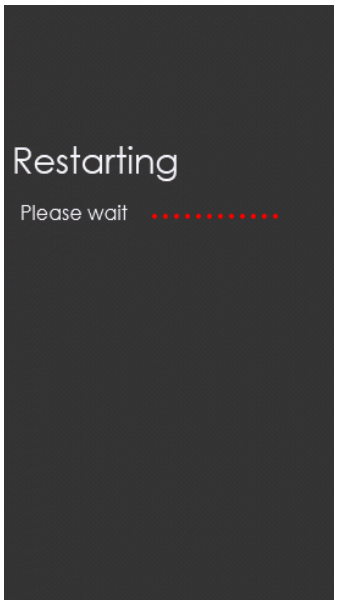
Factory Reset: Resets the Fume Hood Controller to factory settings and restarts the device. Option to cancel without resetting.

Restart: Restarts the Fume Hood Controller without affecting settings.



DECOMMISSION

RESET CONTROLLER

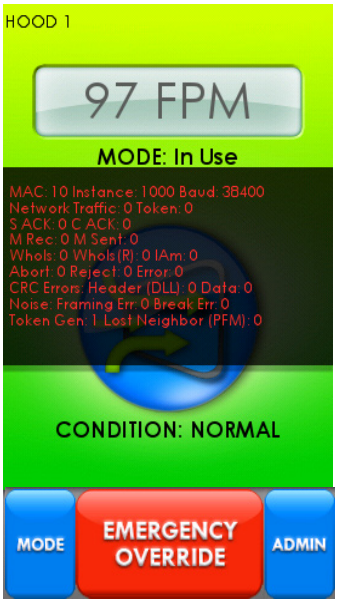


RESTARTING

NETWORK

The Network Setup menu allows you to configure the I/O board's communication settings, including MAC address, baud rate, and BACnet® Instance ID. It also provides an option to display network debugging information for troubleshooting.

NETWORK SETUP



DEBUG INFO

NETWORK PARAMETERS

Parameter	Unit Selections	Description
MAC	1-126	Enter a MAC address (1-126), unique to this I/O board.
Baud Rate	9600, 19200, 38400 57600, 76800, 115200	Select a baud rate for this I/O board.
Instance ID	(0-4,194,304)	Enter a BACnet® Instance ID (0- 4,194,304), unique to this I/O board.
Debug Info	Show Hide	Used to display the network communication information on the home screen for troubleshooting.
Save Changes		Apply and save changes.
Exit - No Change		Exit without saving changes.
Network Traffic		The number will increase if there is any network traffic regardless if this unit's BAUD rate is correct. If this number is NOT increasing, then there is no traffic on the network or the unit is not connected to the network.
M Rec (Messages In)		This number will increase when this unit receives a message addressed specifically to it
S ACK (Simple Acknowledgement)		This number increases as this unit responds to requests to WRITE points.
CACK (Complex Acknowledgement)		This number increases as this unit responds to requests to READ points.
M Sent (Messages Sent)		This number increases with when this unit sends out a message (including passing a token).
Who Is		This number will increase when this units receives a WHO IS request that is broadcasted to every device on its bus.
Who Is R (Ranged Who Is)		This number will increase when this units receives a WHO IS request for a specific range of instance ID's.
I Am		This number increases when this unit responds to a WHO IS request
Token		This number increases with when this unit receives and passes a token.
Errors (Framing or Break)		If this number is increasing, then it usually means that there is noise on the trunk.

BACnet® POINTS LIST

Object	Name	Units	Range	Write setting
AV0	CLV FEEDBACK (AIN 1)	%	0-1	R
AV1	HOOD SENSOR (AIN 2)	%	0-1	R
AV2	UNUSED (AIN 3)	N/A	N/A	N/A
AV3	SUMMED HOOD FLOW IN (AIN 4)	%	0-1	R
AV4	IN USE SETPOINT	FPM CFM	0-99999	R/W
AV5	FACE VELOCITY/AIRFLOW	FPM CFM	0-197 0-99999	R
AV6	STANDBY SETPOINT	FPM CFM	0-99999	R/W
AV7	CLV AIRFLOW CFM	CFM	0-9999	R
AV8	SASH OPEN AREA	Sq ft	0-999	R
AV9	HOOD MODE (0 = IN USE, 1 = STANDBY, 2 = EMERGENCY OVERRIDE, 3 = DECOMMISSION)	N/A	0,1,2,3	R/W
AV10	HOOD CONDITION (0 = HOOD NORMAL, 1 = CAUTION, 2 = ALARM)	N/A	0,1,2	R
AV11	ALARM HIGH	FPM CFM	0-99999	R/W
AV12	ALARM LOW	FPM CFM	0-99999	R/W
AV13	SUMMED HOOD FLOW IN CFM	CFM	0-99999	R
AV14	SUMMED HOOD FLOW IN CFM	%	0-1	R
AV15	K FACTOR	N/A	0-9999	R/W
AV16	RESERVE TROUBLESHOOTING	N/A	N/A	N/A
AV17	RESERVE TROUBLESHOOTING	N/A	N/A	N/A
AV18	P GAIN	N/A	0-99999	R/W
AV19	I GAIN	N/A	0-99999	R/W
AV20	MIN FLOW CFM	CFM	0-99999	R/W
AV21	MAX FLOW CFM	CFM	0-99999	R/W
AV22	SASH CONDITION (0 = NO ALARM, 1 = ALARM, 2 = ALARM MUTE)	N/A	0,1,2	R
AV23	CONTROL OUTPUT PERCENT	%	0-1	R
AV24	RESERVE TROUBLESHOOTING	N/A	N/A	N/A
AV25	SUMMED HOOD FLOW OUT CFM	CFM	0-99999	R
AV26	RESERVE TROUBLESHOOTING	N/A	N/A	N/A
AV27	RESERVE TROUBLESHOOTING	N/A	N/A	N/A
AV28	EMERGENCY OVERRIDE BUTTON HOME SCREEN (0 = SHOWN, 1 = HIDDEN)	N/A	0,1	R/W
BV0	IN USE SENSOR (DIN 1) 0 = CLOSED / IN USE MODE, 1 = OPEN / STANDBY MODE	N/A	0,1	R
BV1	EMERGENCY OVERRIDE (DIN 2) 0 = CLOSED / EMERGENCY OVERRIDE MODE, 1 = OPEN	N/A	0,1	R
BV2	DECOMMISSION (DIN 3) 0 = CLOSED / DECOMMISSION MODE, 1 = OPEN	N/A	0,1	R
BV3	UNUSED	N/A	N/A	N/A
BV4	RESERVE TROUBLESHOOTING	N/A	N/A	N/A
BV5	MUTE ALARM (0 = MUTED ALARM, 255 = AUDIBLE ALARM)	N/A	0,255 R	R/W

TECHNICAL PRODUCT DETAILS

CHARACTERISTICS AND PERFORMANCE

Valve Connection	Slip fit w/ band clamps, dual plates, or sheet metal screws
Mounting Orientation	Universal, any orientation or axis
Commissioned Accuracy	±5 % (Pressure independent)
Input Power	24 VAC ±5 %, 50/60 Hz 106 to 116: 30 VA, 212 to 216: 60 VA
Speed of Response	≤ 1 Second
Designed Max APD	0.25 inWC

ENVIRONMENTAL LIMITATIONS

Operating Temperature	-4 °F to 175 °F (-20 °C to 79 °C), 5 to 95 % RH non-condensing
Storage Temperature	-40 °F to 175 °F (-40 °C to 79 °C), 5 to 95 % RH non-condensing

VALVE CONSTRUCTION

			Construction			
			Non-Corrosive		Corrosive	
Size	**Type**	**Description**	**Valve Body**	**Damper & Shaft**	**Valve Body**	**Damper & Shaft**
106 - 112	Single Valve	Single Valve 6", 8", 10", 12"	E-Coated Galvanized Steel	Stainless Steel	Stainless Steel	Stainless Steel
114 - 116	Single Valve	Single Valve 14" & 16"	Aluminum	Stainless Steel	Stainless Steel	Stainless Steel
212 - 216	Dual valve	Dual Valve 2-12", 2-14", 2-16"	Aluminum	Stainless Steel	Stainless Steel	Stainless Steel

VALVE ACTUATION AND ACCESSORIES

			Fail Position		Optional Accessories	
Size	**Type**	**Description**	**Option 1**	**Option 2**	**Band Clamps**	**Insulation**
106 - 112	Single Valve	Single Valve 6", 8", 10", 12"	Fail In Place	Fail Safe	✔	✔
114 - 116	Single Valve	Single Valve 14" & 16"	Fail In Place	Fail Safe	✔	✔
212 - 216	Dual valve	Dual Valve 2-12", 2-14", 2-16"	Fail In Place	Fail Safe	✕	✔

VALVE MODEL INFORMATION

Unit Size	K Factor	Flow Range (CFM)	Flow Range (LPS)
106	450	0-600	0-283
108	775	0-1050	0-495
110	1250	0-1700	0-802
112	2600	0-2600	0-1228
114	2275	0-3200	0-1510
116	2967	0-4200	0-1982
212	3377	0-4700	0-2218
214	4597	0-6400	0-3020
216	6000	0-8400	0-3964

NOMENCLATURE

FHV ____ - ____ - ____ - ____ - ____

Name
SVS
VS5

Size
106 - 06″
108 - 08″
110 - 10″
112 - 12″
114 - 14″
116 - 16″
212 - Dual 12″
214 - Dual 14″
216 - Dual 16″

Environment
1-Non Corrosive
2-Corrosive

Actuation
1-High Speed Fail in Place
2-High Speed Fail Safe*

Option
0-None
1-band clamps
2-Insulated w/band clamp
3-Insulated

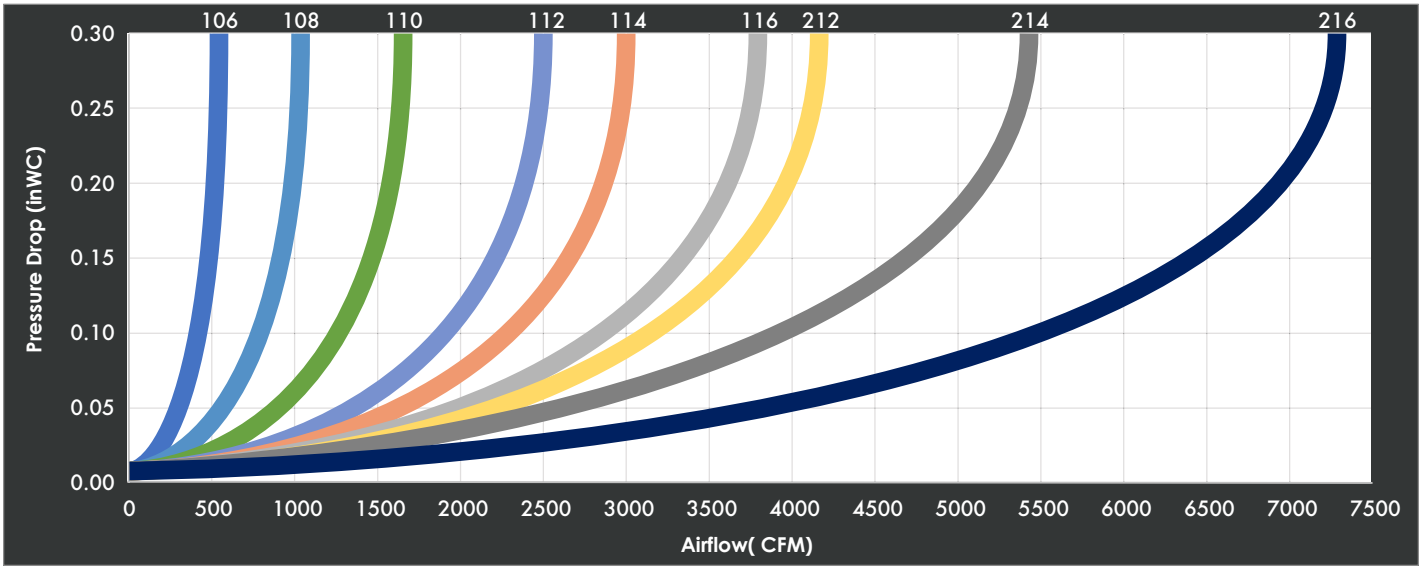
*Factory default is open, user changeable

PERFORMANCE

FHV PERFORMANCE DATA

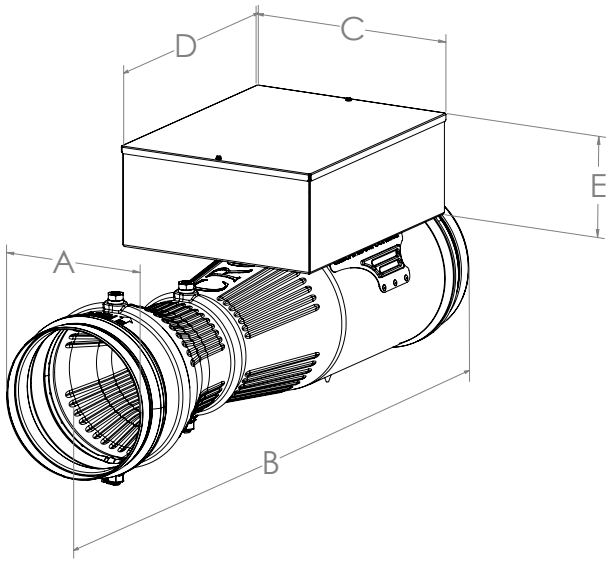
					Optimal Performance Design Range										
Valve Size	Eng. Units	±20%	≤15%	≤7%	≤5%	≤3%	≤2%	≤1%	≤1%	≤1%	≤1%	≤1%	≤1%	Max CFM	Valve Size
106	CFM	0-30	30	40	60	100	120	220	300	380	440	480	540	600	106
108	CFM	0-60	60	80	100	160	200	360	540	680	800	900	980	1050	108
110	CFM	0-80	80	140	170	300	400	640	900	1140	1320	1440	1600	1700	110
112	CFM	0-160	160	200	240	380	560	920	1420	1720	2000	2280	2500	2900	112
114	CFM	0-180	180	240	310	540	800	1200	1720	2100	2420	2700	2960	3100	114
116	CFM	0-210	210	315	420	700	1000	1580	2210	2730	3125	3520	3850	4200	114
212	CFM	0-230	230	350	460	660	1100	1760	2520	3040	3520	3800	4100	4600	212
214	CFM	0-360	360	480	600	1080	1600	2400	3240	4200	4840	5200	5400	6000	214
216	CFM	0-420	420	630	780	1400	2000	3160	4420	5460	6250	6800	7200	7800	216
ΔPS	inWC	≤0.005	≤0.005	≤0.005	≤0.005	0.01	0.02	0.05	0.10	0.15	0.20	0.25	0.30	in WC	ΔPS

FHV PERFORMANCE CHART



⚠ To achieve optimal energy-efficient performance, choose a valve size that maintains a maximum pressure drop of 0.25" at the design airflow rate.

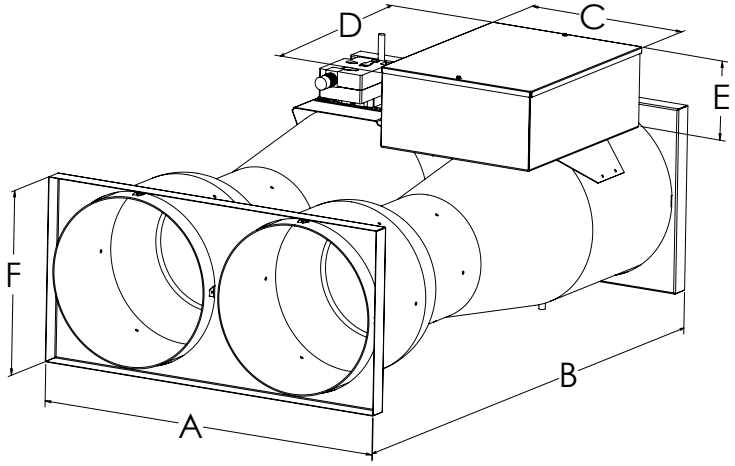
DIMENSIONAL DATA



SINGLE FHV

Valve Size	A	B	C	D	E
	in [mm]	in [mm]	in [mm]	in [mm]	in [mm]
106	5.9 [149]	28.5 [724]*	13.6 [345]	17.1 [435]	6.5 [165]
108	7.9 [200]	34.8 [884]*	13.6 [345]	17.1 [435]	6.5 [165]
110	9.9 [251]	39.3 [998]*	13.6 [345]	17.1 [435]	6.5 [165]
112	11.9 [302]	40.5 [1029]*	13.6 [345]	17.1 [435]	6.5 [165]
114	13.9 [352]	48.0 [1220]	13.6 [345]	17.1 [435]	6.5 [165]
116	15.9 [381]	48.0 [1220]	13.6 [345]	17.1 [435]	6.5 [165]

*Length measurement is taken from gasket to gasket to account for the slip-fit connection.



DUAL FHV

Valve Size	A	B	C	D	E	E
	in [mm]	in [mm]	in [mm]	in [mm]	in [mm]	in [mm]
212	26.0 [660]	48.0 [1220]	13.6 [345]	17.1 [435]	6.5 [165]	13.0 [165]
214	30.0 [762]	48.0 [1220]	13.6 [345]	17.1 [435]	6.5 [165]	15.0 [165]
216	34.0 [864]	48.0 [1220]	13.6 [345]	17.1 [435]	6.5 [165]	17.0 [165]

RECEIVING AND INSTALLATION

SAFETY PRECAUTIONS

- Carefully read all instructions before beginning installation.
- Ensure all installation work, including electrical wiring, complies with applicable codes and standards.
- Adhere to all fire ratings during installation.
- Wear appropriate protective gear, including eyewear, gloves, and clothing, suitable for the working environment.
- The manufacturer assumes no responsibility for personal injury or property damage resulting from improper installation, service, or product handling.
- Deviation from specifications or drawings may lead to product damage, additional site work, and delays in system delivery.

RECEIVING INSTRUCTIONS

- Inspect all equipment thoroughly upon receipt for shipping damage. Document any damage with a detailed description.
- Immediately report any damage or loss to the delivering carrier.
- Notify the carrier in person or by phone and follow up

PRIOR TO INSTALLATION

- Visually inspect the valve for any signs of damage.
- Confirm that the valve size, material, and coatings are appropriate for the installation location.
- Ensure all packing materials are removed from the valve.
- Check the valve label to verify its correct location and function (refer to Figure 1).

INSTALLATION PROCEDURE

- Support all ductwork within 18 inches (18") of the air valve.
- Verify that the airflow direction in the duct matches the airflow direction indicated on the valve (refer to Figure 2).
- Maintain a minimum clearance of 12 inches (12") of free space around the air valve for access.
- Install the air valve in any orientation that allows easy access to the enclosure (refer to Figure 3).

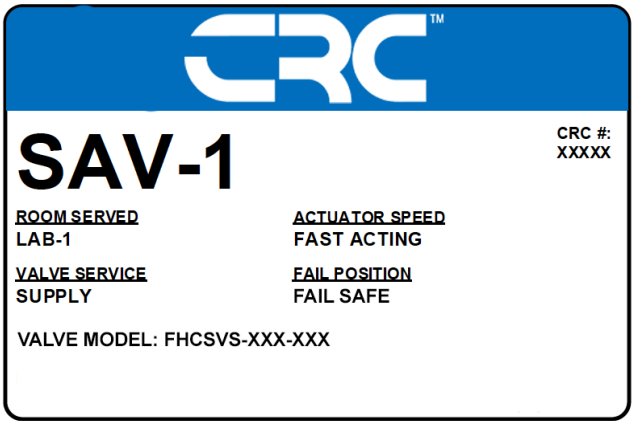


Figure 1

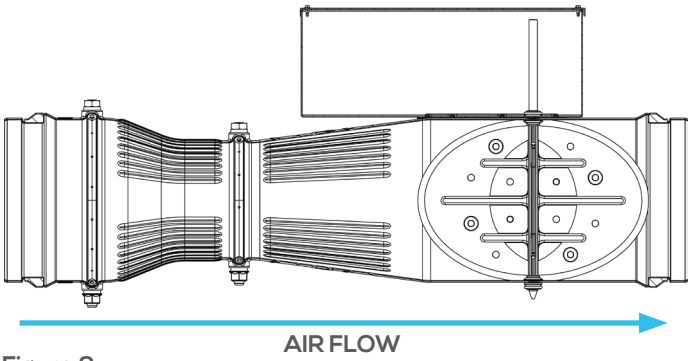


Figure 2

Figure 3

RECEIVING/INSTALLATION/MOUNTING

SLIP-FIT CONNECTION INSTRUCTIONS

1. **Valve Installation:**
   Insert the FHV inlet and outlet into the properly sized ductwork.
2. **Support:**
   Secure the ductwork with hangers within 18 inches (18") of both the inlet and outlet of the FHV.
3. **Fastening:**
   Attach the air valve to the ductwork using a minimum of six (6) sheet metal screws (see Figure 4). Ensure screws do not interfere with the FHV operation or airflow.
4. **Sealing:**
   Seal the ductwork connections with the specified duct sealer (see Figure 5).

SLIP-FIT WITH BAND CLAMPS INSTRUCTIONS

1. **Prepare Draw Band Clamps:**
   Slide draw band clamps onto the inlet and discharge ductwork (refer to Figure 6).
2. **Valve Installation:**
   Insert the FHV inlet and outlet into the appropriately sized ductwork.
3. **Seal the Connection:**
   Apply duct tape to seal the connection between the FHV and ductwork as specified.
4. **Support:**
   Secure the ductwork with hangers within 18 inches (18") of both the inlet and outlet of the FHV.
5. **Position Band Clamps:**
   Slide the draw band clamps over the connection points between the FHV and the ductwork (refer to Figure 7).
6. **Tighten Clamps:**
   Tighten the draw band clamps around both the FHV body and the ductwork to secure the connection.
7. **Avoid Screws:**
   Do not use screws to secure the band clamps.

Figure 4

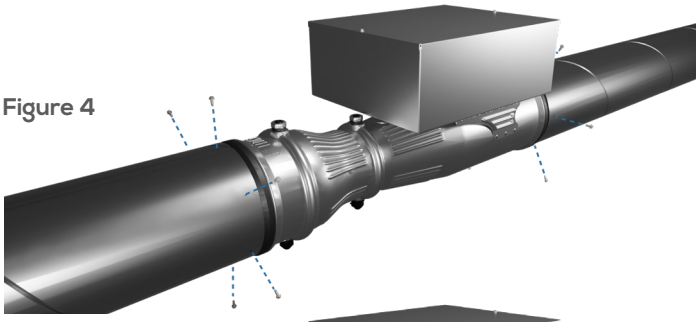


Figure 5

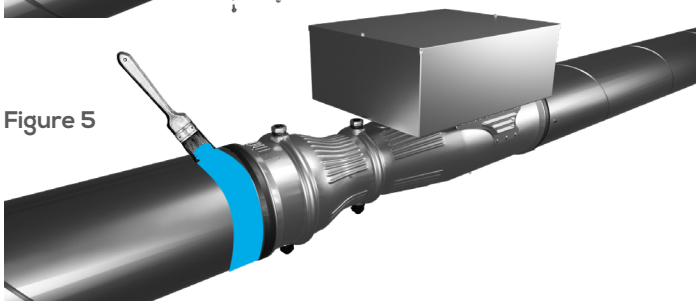
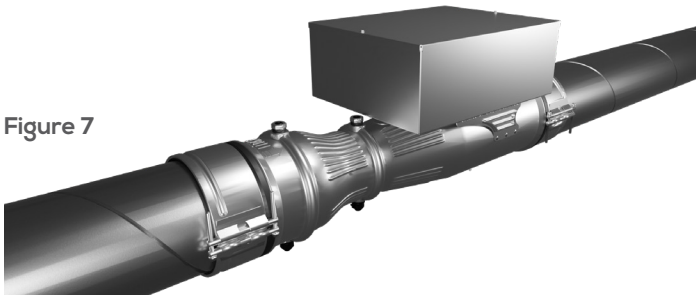


Figure 6

Figure 7

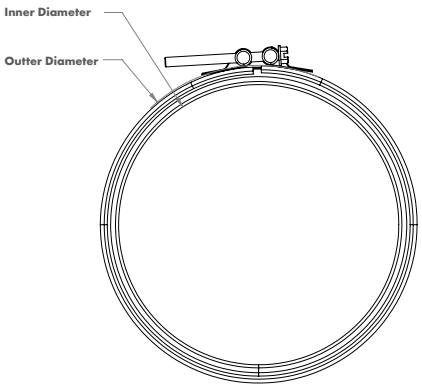


⚠ Band Clamp Bead Position: Ensure the band clamp bead is correctly positioned on the duct, not on the air valve body.

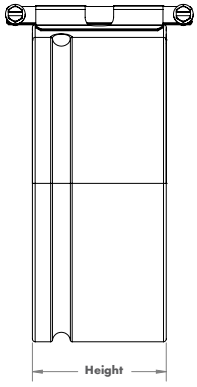
OPTIONAL ACCESSORIES

BAND CLAMPS

Top View



Side View



CHARACTERISTICS

Material of Construction	Galvanized Steel
Gasket	UL94 Neoprene
Design	Dual-Bolt
Torque	Not to exceed 40 in-lbs
Band Clamps provided in sets of (2)	

SIZE CHART

Part #	Inner Diameter	Outer Diameter	Height
BC-106	[136.65] 5.38	[159.93] 6.3	[89.33] 3.52
BC-108	[187.45] 7.38	[211.93] 8.34	[89.5] 3.52
BC-110	[238.25] 9.38	[262.73] 10.34	[89.5] 3.52
BC-112	[289.05] 11.38	[313.53] 12.34	[89.5] 3.52
BC-114	[339.85] 13.38	[364.33] 14.34	[89.5] 3.52
BC-116	[390.65] 15.38	[415.13] 16.34	[89.5] 3.52

Key
[BRACKETS] = MILLIMETERS (mm)
NO BRACKETS = INCHES (in)

criticalroom.com

Measure What Matters.

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