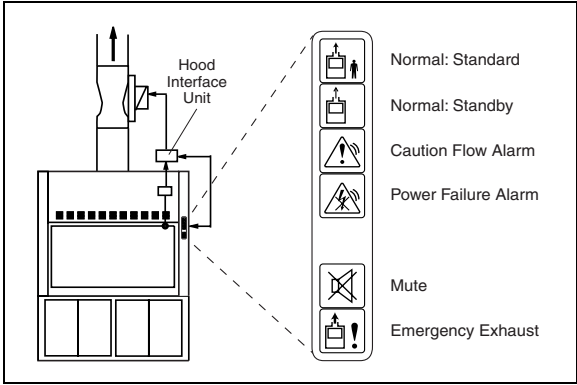


Phoenix Controls FHM420 Fume Hood Monitor is sized to fit any fume hood and includes icons for simple and universal operation. The FHM420 slim line monitor works in conjunction with a separate hood interface unit (mounted on top of the fume hood) to provide flow control logic and alarming functions.

Control: Provides an airflow control signal to a Phoenix Controls valve. For VAV applications, constant face velocity is maintained by adjusting the exhaust airflow as the measured sash position changes. The face velocity may be reset to a lower setting when an operator is not present at the fume hood.

Alarm: Continuous display of normal and alarm hood conditions by use of green and red LEDs. Alarms are also audible.



FHM420 as part of a fume hood exhaust system with Zone Presence Sensor and optional power loss alarm.

FEATURES

	FEATURES/OPTIONS	FHM420	Hood Interface Unit
FACEPLATE*	Operating mode LEDs	✓	
	Emergency exhaust LED	✓	
	Caution flow alarm LED	✓	
	Emergency exhaust override button	✓	
	Mute button	✓	
	Power Loss Alarm LED (optional)	✓	
	Optional use LED	✓	
CONTROL	Face velocity logic		✓
	Sash position input		✓
	Standby mode input		✓
	Standby mode logic		✓
	Emergency exhaust (local)	✓	
	Emergency exhaust (remote)		✓
	Hood exhaust command output		✓
	Power Loss Alarm Logic (optional)*		✓
MONITORING	Hood exhaust command/emergency exhaust		✓
	Hood exhaust feedback		✓
	Alarm signal		✓
	Sash position		✓
	User status		✓

* Via optional Power Failure Alarm board

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FHM420 SPECIFICATIONS

- Display Unit**
Dimensions
 0.94" W x 4.40" H x 0.55" D
 (24 mm W x 112 mm H x 14 mm D)
Enclosure
 • Made of ABS plastic
 • IP44 compliant (display unit only)
Color
 Light gray (standard) or white (optional)
Cable
 24 AWG nine-wire, PVC-jacketed signal cable factory wired (10 ft, 3 meters)
Input to Optional Use LED
 • Indicates unique customer conditions
 • Wired directly from customer's device to two dedicated conductors within the nine-wire signal cable
 • Limited to ≤5 Vdc with maximum current draw of 0.010 amps
 • Visual indication only, no audible
Hood Interface Unit
Dimensions
 2.75" W x 8.625" H x 1.75" D
 (70 mm W X 219 mm H x 44 mm D)
Color
 Black
Inputs
 • Sash position indication from Phoenix Controls Variable Sash Sensor
 • Operator occupancy signal from Zone Presence Sensor
 • Remote contact closure or DDC signal for emergency exhaust override
Output
 • 0-10 Vdc output signal commands Phoenix Controls valve or drive
Monitoring Points
 • 0-10 Vdc output commands exhaust device
 • 0-10 Vdc output represents actual exhaust airflow
 • 0-10 Vdc alarm:
 • 0 Vdc indicates normal operation
 • 5 Vdc indicates incorrect airflow
 • 10 Vdc indicates low differential static pressure
 • 0-10 Vdc output represents sash position
 • 0 (standard) or ~12 Vdc (standby) indicates user status
Combined Display and Hood Interface Unit
Operating Range
 32-122 °F (0-50 °C) ambient
Power Requirements
 ±15 Vdc, ±5% @ 0.100 amp
Power Loss Alarm (optional)
Dimensions
 4.75" W x 4" H x 4.75" D
Color
 • Black enclosure
 • Yellow switch
Operating Range
 32-122 °F (0-50 °C) ambient
Power Requirements
 ±15 Vdc @ 0.006 amp
 • During power failure, visual indication via flash of red LED once every 4 sec
 • Accompanied by short audible alarm "chirp"
 • Alarm indications persist for at least 64 hours or until power is restored



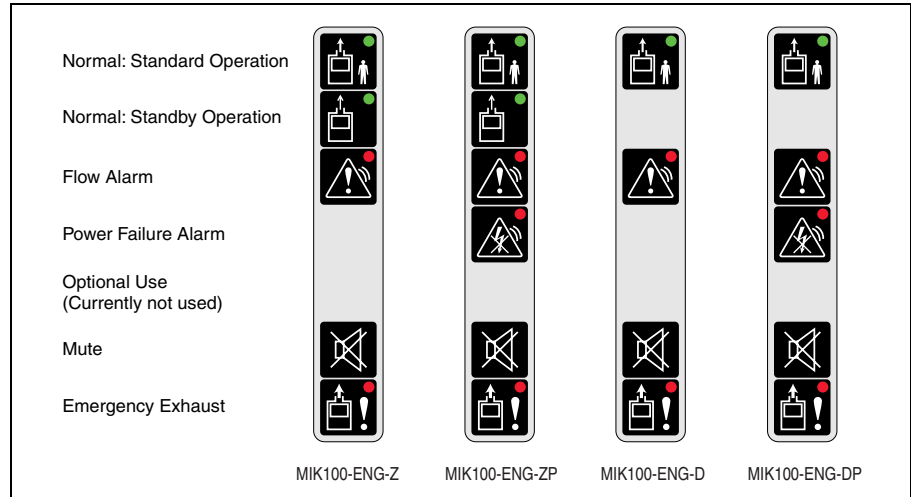
APPLICATIONS

VAV Fume Hoods

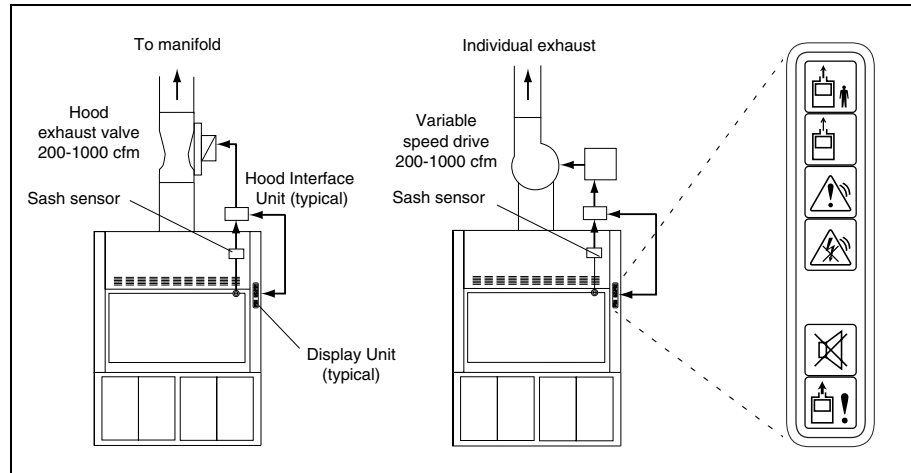
Fume hood containment is accomplished by maintaining proper face velocity through the variable sash opening. Phoenix Controls FHM420 fume hood monitors can be used on manifolded exhaust systems (with Phoenix Controls valves) and on individual exhaust systems (with a Phoenix Controls drive).

Display Unit/Hood Interface Unit Functions

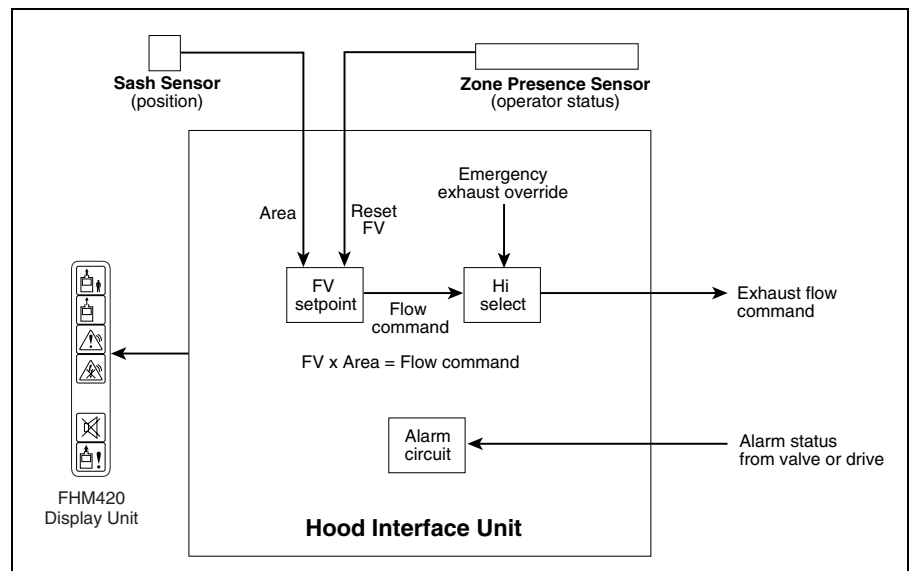
- Constant face velocity control**—The goal is to maintain a constant face velocity (FV) as the sash opening varies. Since the FV setpoint is known, a change in sash area causes a linear change in exhaust flow ($FV \times \text{Area} = \text{Flow command}$).
Example: $5 \text{ ft}^2 \times 100 \text{ ft}/\text{min} = 500 \text{ ft}^3/\text{min}$
 (or $0.5 \text{ m}^2 \times 0.5 \text{ m}/\text{s} \times 368 \text{ s}/\text{hr} = 900 \text{ m}^3/\text{hr}$)
- Setback of face velocity**—Under many conditions, the face velocity can be set back to provide safe containment when the hood area is vacated. Setback face velocity is adjustable to field conditions—typically between 60-100 fpm (or 0.3-0.5 m/s).
- Alarms**—The monitor provides indication of normal operation and alarm conditions. Alarms include:
 - insufficient differential static pressure as detected by the valve's pressure switch
 - incorrect airflow alarm (sash command \neq closed-loop feedback)
 - optional power loss alarm indicates loss of hood system power



Monitor icon keys.

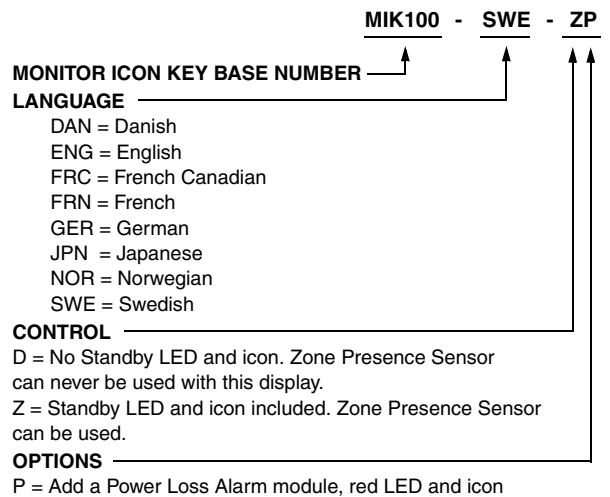
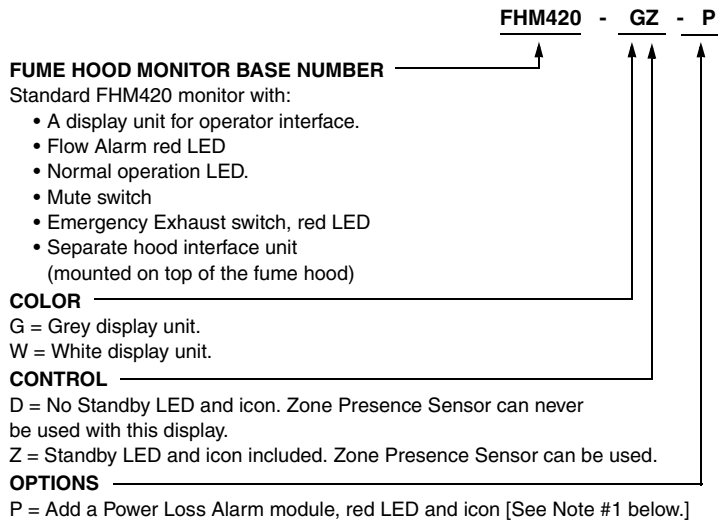



Fume hood containment—valve and drive systems.



Fume hood monitor/hood interface unit signal flow diagram.

ORDERING GUIDE



 **NOTE #1:** By ordering the add-on option "P" you will receive a separate Power Loss Alarm board and box that also mounts on top of the hood. This board interfaces to a FHM420 display unit with an additional red LED and icon.

INSTALLATION

DISPLAY UNIT

Phoenix Controls slim line fume hood monitors are installed surface mounted to the hood by the hood manufacturer, installation contractor or the field controls electrician.

Materials/procedure for physical installation of FHM420 display unit

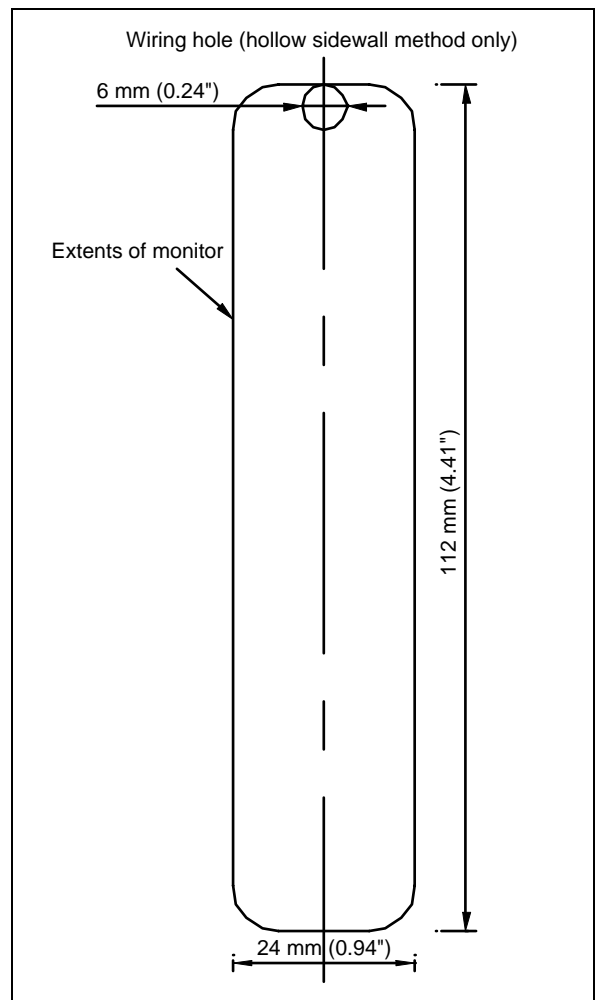
- Phoenix Controls FHM420 display unit.
- Cable conduit (not provided by Phoenix) [Preferred method - solid sidewalls only].

Preferred method for fume hoods with hollow sidewalls


1. *Installing contractor:* Identify the desired mounting location.
2. *Clean the mounting location properly for maximum adhesion.*
3. Drill a wiring hole into the fume hood according to the template shown at right.
4. Snake the monitor cable through the hole.
5. Run the monitor cable to the top of the hood.
6. Peel off the blue film from the tape on the back of the monitor.
7. Mount the monitor on the hood.

Preferred method for fume hoods with solid sidewalls

1. *Installing contractor:* Identify the desired mounting location.
2. *Clean the mounting location properly for maximum adhesion.*
3. Temporarily position the monitor on the hood.
4. Run the monitor cable to the top of the hood.
5. Install cable conduit (not provided by Phoenix) over the monitor cable.
6. Peel off the blue film from the tape on the back of the monitor.
7. Mount the monitor on the hood.



Surface-mounting wiring and pilot hole template.

 **NOTE:** This template is actual size.

INSTALLATION (continued)

HOOD INTERFACE UNIT

Phoenix Controls hood interface units are installed on top of the fume hood by the hood manufacturer, installation contractor or the field controls electrician.

Materials/procedure for physical installation of Hood Interface Unit

- Phoenix Controls FHM420 hood interface unit
 - Cleaning fluid
- Installing contractor:* Identify a mounting location on top of the hood.
 - Clean the mounting location properly for maximum adhesion.*
 - Peel off the blue film from the tape on the bottom of the interface box and mount it to the hood.

Materials/procedure for electrical installation of Hood Interface Unit

- Phoenix Controls room wiring diagrams
 - Cable per wiring diagram (not provided by Phoenix)
- Controls electrician:* Remove the cover from the interface enclosure by loosening the thumb screws at each corner.
 - Complete all wiring terminations between the hood interface unit and all other Phoenix Controls products as specified in the room wiring diagrams.
 - Replace the enclosure cover.

MONITOR ICON KEY

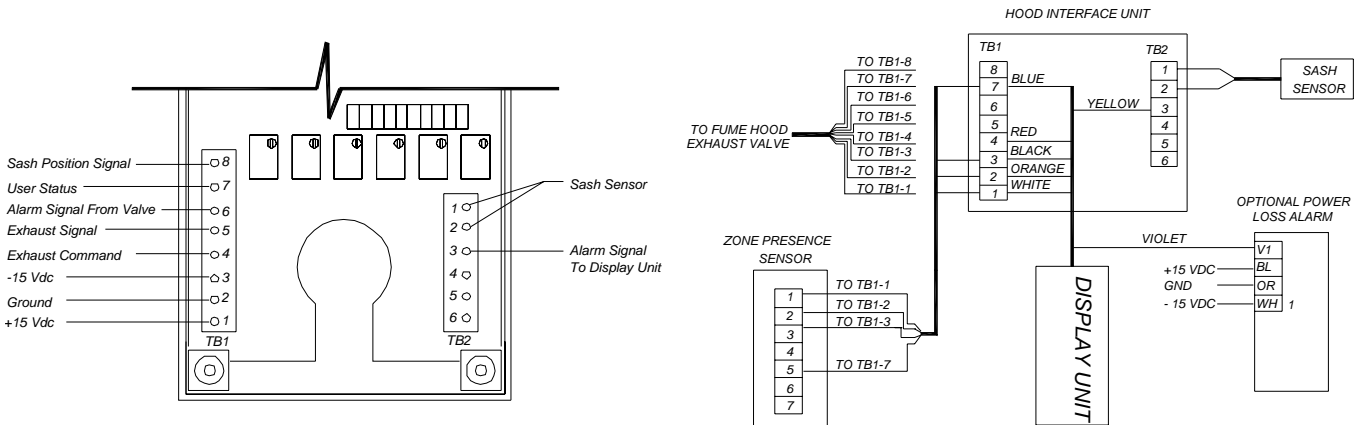
Phoenix Controls monitor icon keys are installed on the fume hood by the Phoenix certified Field Service Engineer.

Materials/procedure for physical installation of Monitor Icon Key

- Phoenix Controls MIK100
 - Cleaning fluid
- Identify a location close to the FHM420 display where the monitor icon key can be placed (either on the fume hood or an adjacent sash pane)
 - Clean the mounting location properly for maximum adhesion
 - Remove the adhesive backing from the MIK100 and mount.

POINTS & WIRING (see submittal wiring diagrams for project-specific details)

Hood Interface Unit Termination Points



- Eight-conductor wire is Belden 9421 or equivalent.
- Sash sensor is provided with two-conductor cable. See combination sash sensors for exception.

MAINTENANCE

Phoenix Controls VAV fume hood monitors require no ongoing preventative maintenance. Once the field engineer has completed the field setup, the monitors will provide years of continuous operation. Replacement components are available.

TROUBLESHOOTING

Phoenix Controls VAV fume hood monitors alert the operator of alarm conditions. Generally, this alarm is caused by a problem condition in the exhaust duct (e.g., fan failure). A trained facilities person may troubleshoot the system from the hood interface unit with a digital voltmeter, screwdriver, and perhaps a magnehelic gauge.

Problem at Fume Hood Monitor	Voltage at TB1-6 in Hood Interface Unit	Possible Cause/Solution
1. Monitor in flow alarm	>10 V 5 V Voltages may vary	<p>A. Low static pressure across valve</p> <ul style="list-style-type: none"> Loss of airflow. Check fan operation and duct blockage. Too many sashes open at one time. Close sashes. Valve failed open. Check pneumatic and mechanical connections. <p>B. Incorrect valve position.</p> <ul style="list-style-type: none"> Valve failed open. Sash open beyond the maximum allowable position. Lower sash. A broken sash cable. Check all sash sensor connections. <p>C. Equipment/connection problems.</p> <ul style="list-style-type: none"> Blocked or kinked pressure switch tubing. Correct tubing. Wiring terminations between monitor and control device. Correct terminations. Malfunctioning alarm circuits. Verify proper static.* Monitor miscalibration. Recalibrate.*
2. Monitor indicates normal operation, but actual face velocity has been measured high or low.	0 V	<p>A. Low static pressure.</p> <ul style="list-style-type: none"> Differential pressure between the pressure switch setpoint and the low end of the static pressure operating range (i.e., 0.3" and 0.6" wc (75-150 Pa) for medium pressure valves) will not trip the alarm circuit. Measure differential pressure. If low, see Possible Cause/Solution 1A above. <p>B. Monitor miscalibration. Recalibrate.*</p>
3. Monitor malfunction <ul style="list-style-type: none"> no display cannot mute alarm 	Voltages may vary	<p>A. Loss of power.</p> <ul style="list-style-type: none"> Check power at HIU TB1-1 (+15 Vdc) and TB1-3 (-15 Vdc). Check wiring connections at monitor, valve, and power supply. Verify power supply has input voltage (120 Vac or 240 Vac). <p>B. Defective monitor. Replace board on monitor.*</p>
4. Flow remains constant through sash travel.		<p>A. Broken sash sensor cable. Replace sensor.</p> <p>B. Monitor miscalibration. Recalibrate.*</p>

*Contact Phoenix Controls Product Support for assistance.