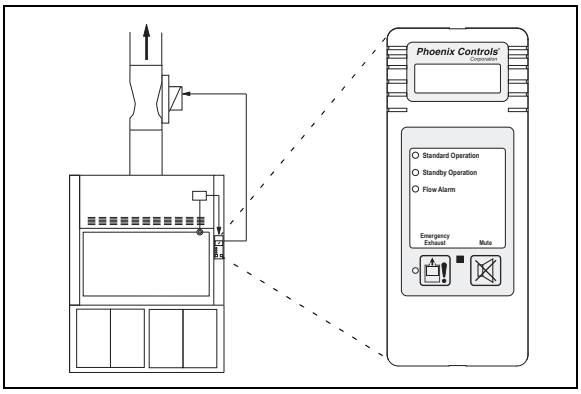
Phoenix Controls X30 Series Fume Hood Monitors (FHMs) are used on fume hoods with Phoenix Controls valves for airflow control. Airflow control on these fume hoods is achieved with the use of constant volume valves (CxV), two-position valves (PEV or BEV) or variable air volume valves (VAV). Each FHM provides two primary functions: indication of hood exhaust operating condition and alarming. In VAV systems, each FHM also provides face velocity control and optional energy-saving features.



X30 Fume Hood Monitor (631 model shown).

SPECIFICATIONS

Enclosure
- Dimensions:
  2.5" W x 6" H x 1.5" D
  (64 mm x 152 mm x 38 mm)
- Color: White
- IP44 compliant

Operating Range
32-122 °F (0-50 °C) ambient
10-90% RH, non-condensing
8202' (2500 m) altitude

Power Requirements for Each Unit
24 Vac, ±10%, 50-60 Hz, 10 VA
±15 Vdc, ±5%, 220 mA

Inputs and Outputs
See table in "Features" section on page 2 for model-specific inputs and outputs.

Input to Optional Use LED
- Yellow LED indicates unique customer conditions
- Wired directly from customer's device or Phoenix Controls device
- Limited to ≤ 12 Vdc with maximum current draw of 0.012 amps. Customer must install a 1 K Ω resistor in series with input signal.
- Visual indication only, no audible

Monitoring Points
- Airflow exhaust device command
- Actual exhaust airflow
- 0-10 Vdc alarm:
  - 0 Vdc indicates normal operation
  - 5 Vdc indicates incorrect airflow
  - 10 Vdc indicates low differential static pressure
- Sash position: 0-10 Vdc
- User status
- 10 K Ω minimum input impedence for monitoring system

Backward Compatibility
X30 Series Fume Hood Monitors are backward compatible with earlier standard models of Phoenix fume hood monitors.

Readout (FHM631 only)
The display shows one of the following measurements:
- Cubic feet per minute (CFM)
- Meters cubed per hour (m^3/h)
- Liters per second (l/s)
- Feet per minute (fpm)
- Meters per second (m/s)

Power Loss Alarm Option (±15 Vdc powered monitor only)
Indicates loss of power to the fume hood system.
- During power failure, a red LED flashes once every 4 sec
- Accompanied by short audible alarm "chirp"
- Alarm continues for at least 64 hours or until power is restored

Dimensions
4.75" W x 4" H x 4.75" D
(121 mm x 102 mm x 121 mm)

Color
- Black enclosure
- Yellow switch

Operating Range
32-122 °F (0-50 °C) ambient

Power Requirements
±15 Vdc @ 0.015 amp
More details on this option are in the "Features" section on page 2.

FCC Compliance
This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:
1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

See wiring diagrams

ORDERING GUIDE

FHM 430 - SWE - PLA

PRODUCT FAMILY
FHM = Fume Hood Monitor

SERIES
Units come standard with white enclosure.
430 = Base Monitor, EXV applications
530 = Constant volume or two-state applications (CxV, PxV, BxV)
631 = Face Velocity Monitor, EXV applications

LANGUAGE
ENG = English
FRN = French
JPN = Japanese
SWE = Swedish
FRC = French Canadian
GER = German
NOR = Norwegian

OPTIONS
DFT = Drive failure text (*FHM430 only*) - cannot be ordered with DIV or NZP; *only available in English (ENG)*.
DIV = Diversity LED - driven by external contact closure from Celeris system or BMS.
NZP = No standby LED and icon - a Zone Presence Sensor can *never* be used with this unit.
PLA = Power loss alarm - only for units powered by +/- 15 Vdc.
PRI = Primary monitor (*FHM430 only*) - must be ordered with at least one secondary monitor.
RET = Retrofit Kit - recess mount kit replacing x10 series monitors.
RMT = Recess Mount Kit.
SEC = Secondary monitor (*FHM430 only*) - up to 3 secondaries can be associated with one Primary monitor.

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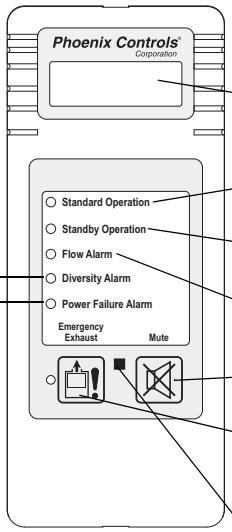
75 Discovery Way • Acton, MA 01720 • Tel (978) 795-1285 • Fax (978) 795-1111 • www.phoenixcontrols.com

FEATURES



Face Velocity or Flow Display—Indicates the face velocity or flow of the hood. (Available only on the FHM631.)

Standard Operation LED—When this LED is on, it indicates the hood is operating at the standard face velocity or flow.

Standby Operation LED—When this LED is on, it indicates the hood is operating at a lower face velocity or flow (active only with a ZPS).

Flow Alarm/Drive Failure LED—When this LED is on, it indicates unsafe airflow condition.

Mute button—Push the button to silence an alarm. The Flow Alarm LED will remain on. Mute mode is reset when the alarm conditions clear.

Emergency Exhaust button with LED—Push this button to activate the emergency exhaust mode. The alarm will sound and the LED at the left of the Emergency Exhaust button will blink. In this mode, exhaust air is at its maximum flow. Push the button again to turn off the emergency exhaust/test mode.
Note: *On constant volume hoods, this button is used only to test the alarm circuit, not modulate the exhaust valve.*

Light sensor—Detects the light level in the room. Triggers the energy waste alert, if configured. (Available only on the FHM631.)

OPTIONAL FEATURES

Diversity Alarm LED—Alerts lab users to reduce the total flow by closing their sashes. This visual alarm is triggered when the flow demand exceeds the flow limit and a diversity alarm is generated by the Celeris system or the BMS.

Power Failure Alarm LED—Activates when there is a loss of power. Used in conjunction with the Power Failure Alarm. With this option, a separate PLA module is provided with the monitor.

The optional PLA circuit:

- Has a sealed lead acid battery that uses +15 Vdc to recharge the battery while the system is powered. The battery recharges enough in 8 hours to power the alarm circuit for 24 hours. The battery's expected service life is five years.
- Detects the loss of ±15 Vdc system power. Not available for 24 Vac powered monitors.
- Trips a solid-state relay that causes the battery to provide power to the monitor's alarm circuit.
- Drives the audible alarm and LED on the monitor to indicate loss of power.

The DIN standard requires PLAs on fume hood monitors, as well as periodic functional testing. Therefore, we provide a test button on all PLA option enclosures. Units can be tested by pushing and holding the test button for at least four seconds. This cuts the system's power, trips the relay and tests the battery and alarm circuitry. No other maintenance is required.

Note: *The PLA must be powered by the same ±15 Vdc that powers the monitor.*

If the X30 Series Fume Hood Monitor is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

FEATURES (CONTINUED)

	FEATURE/OPTION	DESCRIPTION	CV	Two-position	VAV	
			FHM530 (CxV)	FHM530 (PEV or BEV)	FHM430 (EXV)	FHM631 (EXV)
FACEPLATE*	Face velocity display	Displays the current face velocity setting in either English or metric units.				X
	Operating mode LED	Specifies use of hood.	X	X	X	X
	Emergency exhaust LED	Indicates that the emergency exhaust has been activated.	**	X	X	X
	Caution flow alarm	Alarm due to either pressure alarm, valve jam alarm failure.	X	X	X	X
	Spare or Diversity LED	Customer specified LED (spare) or diversity alarm condition has been initiated.	X†‡	X†‡	X†‡	X†‡
	Emergency exhaust button LED	Emergency exhaust button has been pushed.	X	X	X	X
	Setback LED	Setback mode has been activated.	X	X	X	X
	Power loss LED	Power loss mode has been activated.	X†	X†	X†	X†
	Emergency exhaust override button	Provides a means of activating the emergency exhaust.		X	X	X
	Mute button	Provides a means of muting the audible alarms.	X	X	X	X
	Light sensor	Activates energy waste alert.				X
CONTROL	N.O. microswitch input	Activates the two-state command to the valves.	X	X		
	Sash position input	Activates the two-state or variable air volume (VAV) command to the valves.	X	X	X	X
	Sash opening alarm setting	Sets the sash height alarm set point.	X	X	X	X
	Two-position switch point setting	Sets the trip point for the two-state command operation.		X		
	Standby mode input (e.g., ZPS)	Activates standby mode.		X	X	X
	Switch input	Activates hibernation mode.				X
	Emergency exhaust (locally or remotely)	Ability to activate emergency exhaust with digital input.		X	X	X***
	VAV hood exhaust command output	Command output to the exhaust source (valve).			X	X
	VAV drive command output	Command output to a fan drive.			X	
	24 Vdc relay output two-position mode	24 Vdc relay output to command 24 Vdc solenoids for two-position application.		X		
	Primary-secondary option (e.g., teaching hood)	Configures monitor for either primary or secondary control of a teaching hood.			X†	
	Standby velocity setting	Sets the standby mode velocity.		X	X	X
	Auto alarm mute	Audible alarms will mute automatically after 20 seconds when this function is enabled.	X	X	X	X
	Mute duration setting	Allows for resounding audible alarms after the Mute function has been activated. Adjustable from 1-10, 15, or 20 minutes.	X	X	X	X
	Sound volume setting	Adjust the sound volume. Two settings are available: high and low.	X	X	X	X
	Power loss alarm	Allows for power loss module that will display power loss alarm when the monitor has lost main power (±15 Vdc only).	X†	X†	X†	X†
	Spare LED control	User-defined LED that can be engaged externally by means of a digital input.	X†	X†	X†	X†
	Broken sash alarm	Alarm is generated when the sash sensor's signal cable has been broken or when a vertical sash sensor (VSS110) retracting cable has detatched.	X	X	X	X
	±15 Vdc or 24 Vac power	May be powered by either AC or DC voltage.	X	X	X	X
MONITORING	Hood exhaust command/emergency exhaust	0-10 Vdc signal represent command or > 10 Vdc represents activation of emergency override.			X	X
	Hood exhaust feedback	0-10 Vdc scaled feedback signal.			X	X
	Alarm signal	0, 5, or 10 Vdc alarm signal generated at the valve can be monitored at the fume hood monitor.			X	X
	Normally open (NO) alarm relay	NO contact output that de-energizes during alarm condition.	X	X		
	Sash position	0-10 Vdc signal proportionally represents sash position from fully closed to fully open.	X	X	X	X
	Hood in hibernation	Monitors hood hibernation command.				X
	User status	Monitors Zone Presence Sensor's (ZPS') activity.		X	X	X

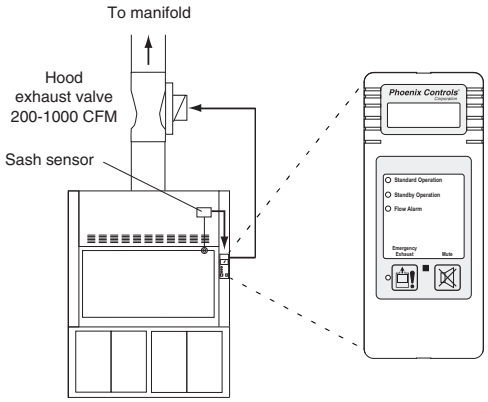
* Faceplates are available in English, Danish, French Canadian, French, German, Japanese, Norwegian and Swedish.
** Does not modulate exhaust CV valve, but allows the operator to test the alarm circuit.
*** Cannot use this external input with hibernation mode via the external switch or BMS command.
† Options
‡ Contact your representative to communicate details.

APPLICATIONS: HOOD CONTROL

Variable Air Volume (VAV) Fume Hoods (FHM430 and 631)

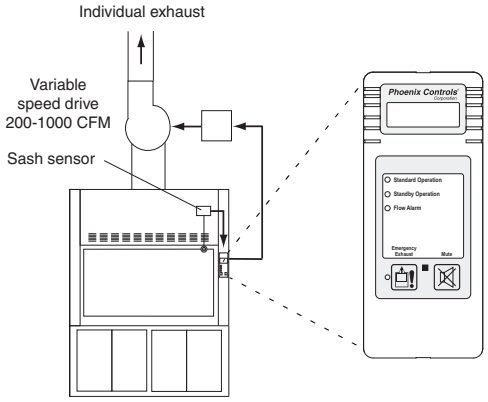
Fume hood containment is accomplished by maintaining proper face velocity through the variable sash opening. Phoenix Controls fume hood monitors can be used on manifolded exhaust systems (with Phoenix Controls valves) and on individual exhaust systems (with a variable speed drive by others).

Variable Air Volume (VAV)



Fume hood containment—valve system.

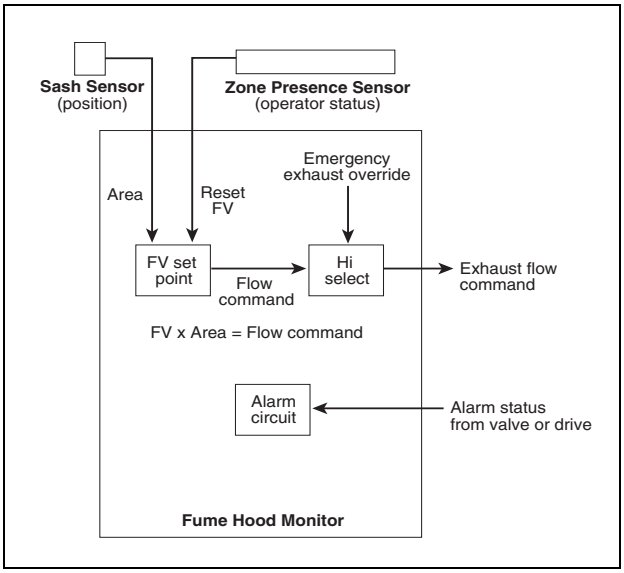
Variable Speed Drive



Fume hood containment—individual exhaust systems.

Functions

- **Constant face velocity control—**The goal is to maintain a constant face velocity (FV) as the sash opening varies. Since the FV set point is known, a change in sash area causes a linear change in exhaust flow (FV x Area = Flow command).
  Example: 5 ft^2 x 100 ft/min = 500 ft^3/min
  (or 0.5 m^2 x 0.5 m/s x 3600 s/hr = 900 m^3/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). *(See the Zone Presence Sensor Product Data Sheet for more details.)*
- **Alarms—**The FHM430 and 631 monitors provide indication of a fume hood's operation. Alarms include:
  - Insufficient differential static pressure as detected by the valve's pressure switch
  - Incorrect airflow alarm (sash command ≠ closed-loop feedback)



VAV fume hood monitor signal flow diagram.

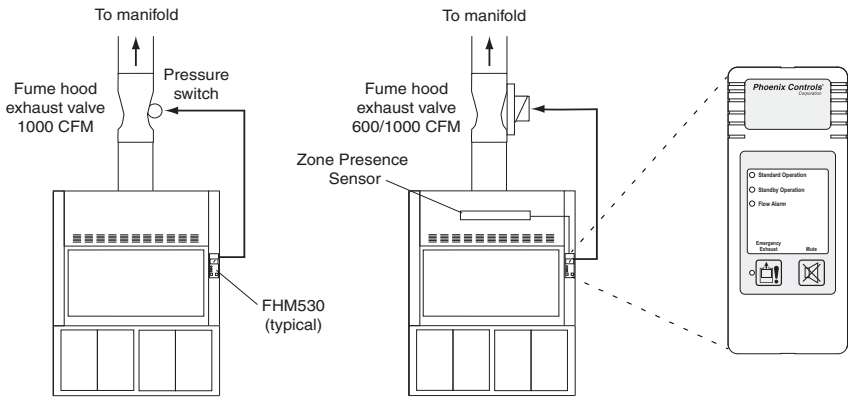
APPLICATIONS: HOOD CONTROL (CONTINUED)

Constant Volume (CV) and Two-state Fume Hoods (FHM530)

A Phoenix Controls (constant volume) CxV series airflow control valve provides the fume hood with a steady constant exhaust flow, independent of duct pressure changes. The two-state airflow control valve (PEV or BEV series) provides two-position exhaust control based on an operator's presence at the fume hood.

Functions

- **Alarm—**The FHM530, together with a differential pressure switch mounted on a Phoenix Controls airflow valve, indicates a fume hood's operation. An optional sash opening alarm may be used with a sash sensor or sash switch.
- **Two-position control—**The FHM530, together with a Zone Presence Sensor and a Phoenix Controls PEV or BEV series airflow control valve with an on-board solenoid, provides two-position exhaust control based on an operator's presence at the fume hood. Other switching mechanisms, such as a sash sensor or sash switch, may be applied.



Fume hood alarming and control—constant volume and two-state.

APPLICATIONS: ENERGY-SAVING

Face Velocity Setback (FHM430, 530, and 631)

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). *(See the Zone Presence Sensor Product Data Sheet for more details.)*

Energy Waste Alert (FHM631)

The FHM631 is equipped with an energy waste alert, indicating the sash is open and the room is dark (adjustable light intensity level). The display shows ENRG, and an audible alarm sounds until the sash is closed or the lights are illuminated.

Fume Hood Hibernation Mode (FHM631)*

The fume hood hibernation mode on the FHM631 allows a fume hood to be powered down when it is not in use and the sash is fully closed. The exhaust flow is reduced below the fume hood's minimum to the valve's minimum flow (e.g., 90 CFM for a 12-inch valve), and the display shows OFF. This mode can be initiated in one of three ways:

1. Through pushbuttons on the monitor's faceplate. Press and hold the Emergency Exhaust and Mute buttons for three seconds. The display will flash OFF?, confirm by pressing the Mute button.
2. Through the external momentary switch (by others)
3. Through the BMS network command

The mode is exited automatically when the sash is opened.

** NOTES:*

- *Hibernation mode cannot be used in drive applications.*
- *Proper standard operating procedures (SOPs) must be in place to remove all chemicals from the fume hood before it is put in hibernation.*

INSTALLATION

The X30 Fume Hood Monitor Series is available with two mounting options: surface and flush.

Surface Mount Option

Required materials:

- Fume hood monitor, X30 series
- Phoenix Controls room wiring diagrams
- Two zinc-plated hex washer head slotted sheet metal screws, Type A

Installation steps:

4. Use the mounting template to mark the points for attaching the fume hood monitor to the fume hood (see Figure 1).
5. Unsnap the front cover from the monitor:
   - Loosen the bottom of the monitor housing and rotate it slightly upward.
   - Gently slide the enclosure up to release the two tabs inside the top of the monitor housing from the two grooves on the monitor base.
6. Set the monitor housing aside.
7. Using the enclosure base as a template, mark the mounting holes at both ends. Be certain the fume hood monitor assembly is oriented as indicated in the figure on the right. Set the enclosure base aside.
8. Drill pilot holes at the marked mounting holes.
9. Mount the monitor base to the fume hood using two sheet metal screws (see Figure 2).
10. Run the cable through the mounting plate and strip back the conductors.
11. Remove the connectors from the monitor housing.
12. Complete the terminations to the connectors (refer to the wiring diagrams provided).
13. Reinstall the connectors in the monitor housing.
14. Reattach the monitor housing to the monitor base (see Figure 3):
    - Insert the two tabs at the top of the monitor housing in the grooves at the top of the monitor base.
    - Rotate the monitor housing downward and snap the bottom of the cover onto the tabs in the monitor base to secure it.

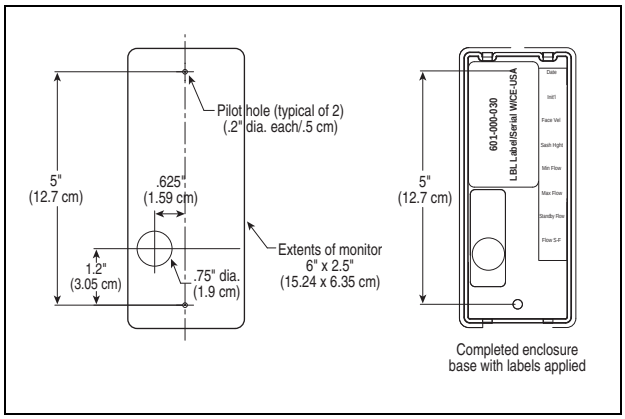


Figure 1. Fume Hood Monitor mounting template (surface mount).

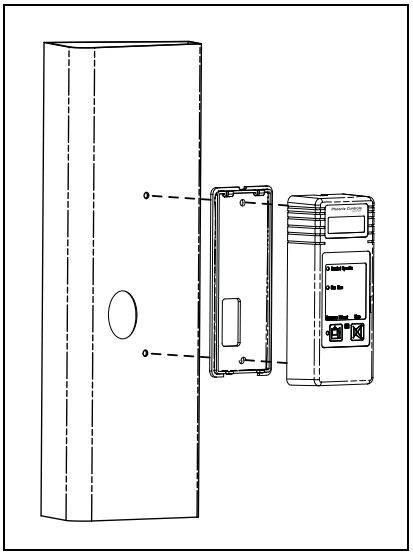


Figure 2. Attaching the Fume Hood Monitor to the fume hood (surface mount).

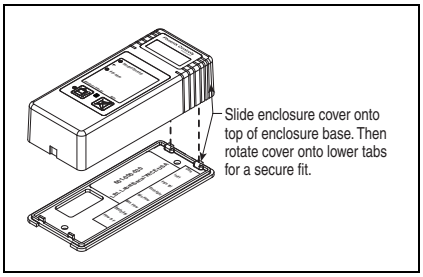


Figure 3. Reattaching the Fume Hood Monitor monitor housing to the base.

Recess Mount Option

Required materials:

- Fume hood monitor, X30-RMT series (includes recess mounting bracket and screws)
- Phoenix Controls room wiring diagrams
- Cable, based on wiring diagram (not provided by Phoenix Controls)

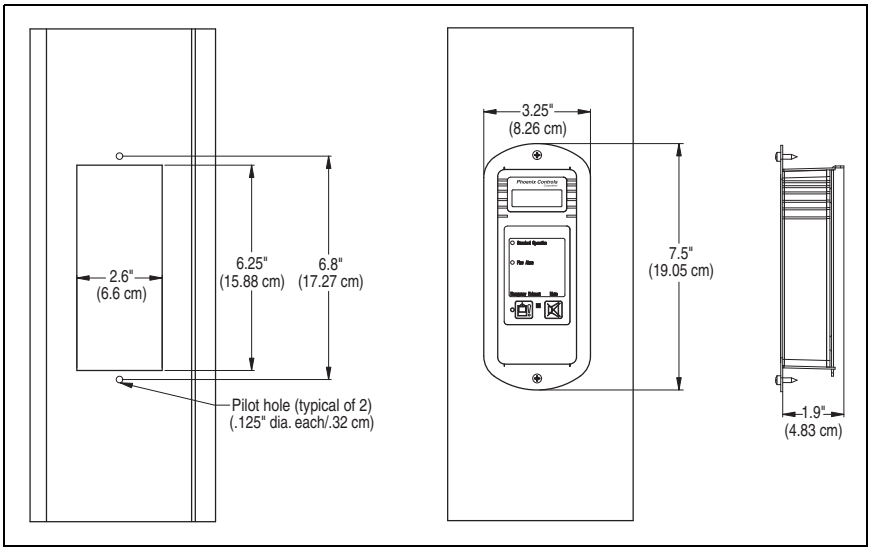


Figure 4. Fume Hood Monitor mounting template (recess mount).

Installation steps:

1. Use the recess mounting template to mark the area for cutout and mounting holes for attaching the fume hood monitor to the fume hood (see Figure 4).
2. Cut a square hole, as necessary, for the recess mounting kit.
3. Mark the holes for mounting the bracket:
   - Using the recess mounting bracket as a template, place the bracket in the cutout section of the fume hood and mark locations of holes required for attaching the bracket to the fume hood.
   - Set the bracket aside.
4. Drill .125" (.32 cm) pilot holes for mounting screws.
5. Unsnap the front cover from the monitor base:
   - Loosen the bottom of the monitor housing and rotate it slightly upward.
   - Gently slide the enclosure cover up to release the two tabs inside the top of the monitor housing from the two grooves on the monitor base.
6. Set the enclosure cover aside.
7. Run the cable through the back of the monitor base.
8. Remove the connectors from the monitor housing.
9. Complete the terminations to the connectors (refer to provided wiring diagrams).
10. Reinstall the connectors in the monitor housing.
11. Attach the enclosure cover to the monitor base:
    - Insert the two tabs at the top of the enclosure cover in the grooves at the top of the monitor base.
    - Rotate the enclosure cover downward and snap the bottom of the cover onto the tabs in the monitor base to secure it.
12. Attach the monitor to the recess mounting bracket (see Figure 6 on the next page):
    - Slide the monitor assembly into the mounting bracket from the back.
    - Insert the L-strap into the top slot on the recess mounting bracket as shown.
    - Rotate the L-strap and slide it downward through the bottom slot in the recess mounting bracket.

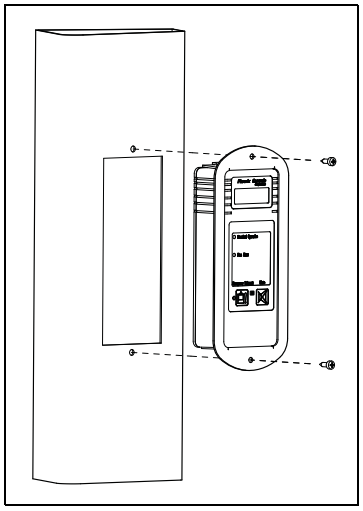


Figure 5. Attaching the Fume Hood Monitor to the fume hood (recess mount).

Recess Mount Option (continued)

13. Mount the monitor and bracket assembly to the fume hood (see Figure 5 on the previous page):
    - Slide the assembly into the cutout area.
    - Using the mounting screws provided, attach the bracket to the fume hood.

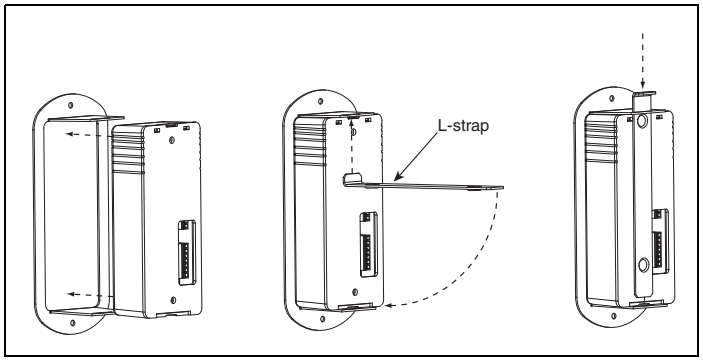


Figure 6. Attaching the Fume Hood Monitor to the recess mounting bracke

Retrofit Jobs

Required materials:

- Fume hood monitor, X30 series (includes recess mounting bracket assembly and screws)
- Phoenix Controls room wiring diagrams
- Cable, based on wiring diagram (not provided by Phoenix Controls)

Installation steps:

1. Use the existing monitor to cut out hole and screw pilot holes from the previous FHM X10 Series monitor installation. Ensure that the dimensions of the cutout and mounting holes match those given here (see Figure 7).
2. Follow steps 5-12 from the standard Recess Mount installation procedure above.
3. Mount the monitor and bracket assembly to the fume hood (see Figure 8):
    - Slide the U-nut (included) over the existing mounting holes with the spring side inward.
    - Slide the assembly into the cutout area.
    - Using the mounting screws provided, attach the bracket to the fume hood.

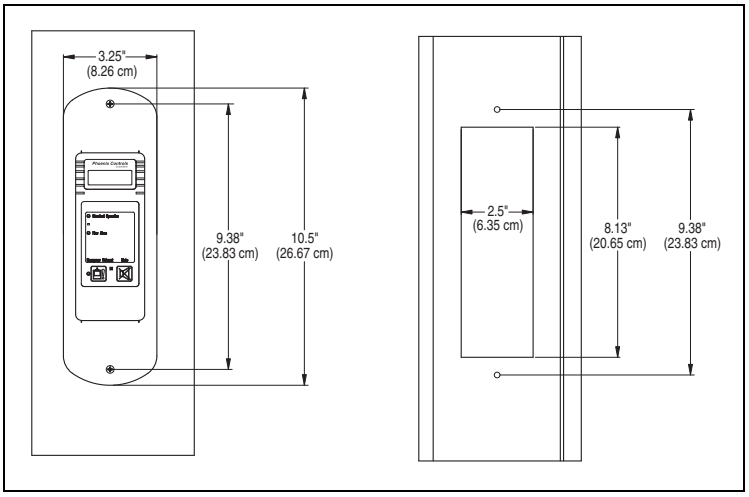


Figure 7. Fume Hood Monitor mounting template (retrofit jobs).

Phoenix Controls Wiring Recommendations

- The fume hood monitor and exhaust valve should be powered from the same source.
- If control over the fume hoods is important during a power failure or if airflow conservation is required, fume hood monitors should be placed on backup power; otherwise, the fume hood valve defaults to its fail-safe state.
- Use cables recommended by Phoenix Controls.
- Stranded wire is strongly recommended for ease of installation.
- Follow good wiring practices:
    - Do not run the signal cable in the same conduit or wireway as the power cables.
    - If the signal cable must cross power cables, it is best to do so at a 90-degree angle.
    - Shield or drain wires, if required, should be wrapped with insulating tape to prevent contact with exposed conductors or contacts.
    - Maintain a consistent color code or polarity all the way through the wiring system.
    - All connections to the Celeris valve controller (LVC) must meet the requirements of an NEC Class 2 circuit.
    - Local and national electrical codes take precedence.

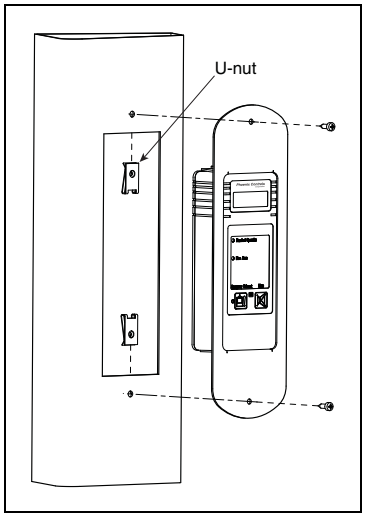
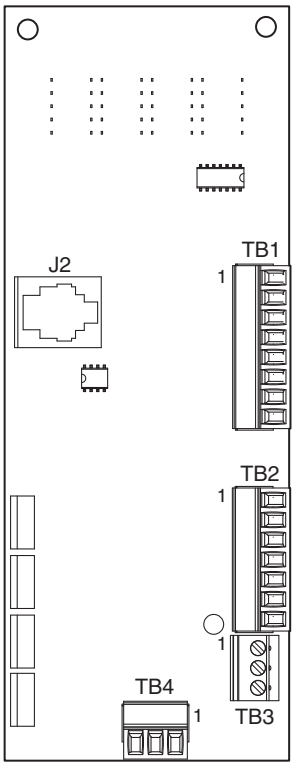


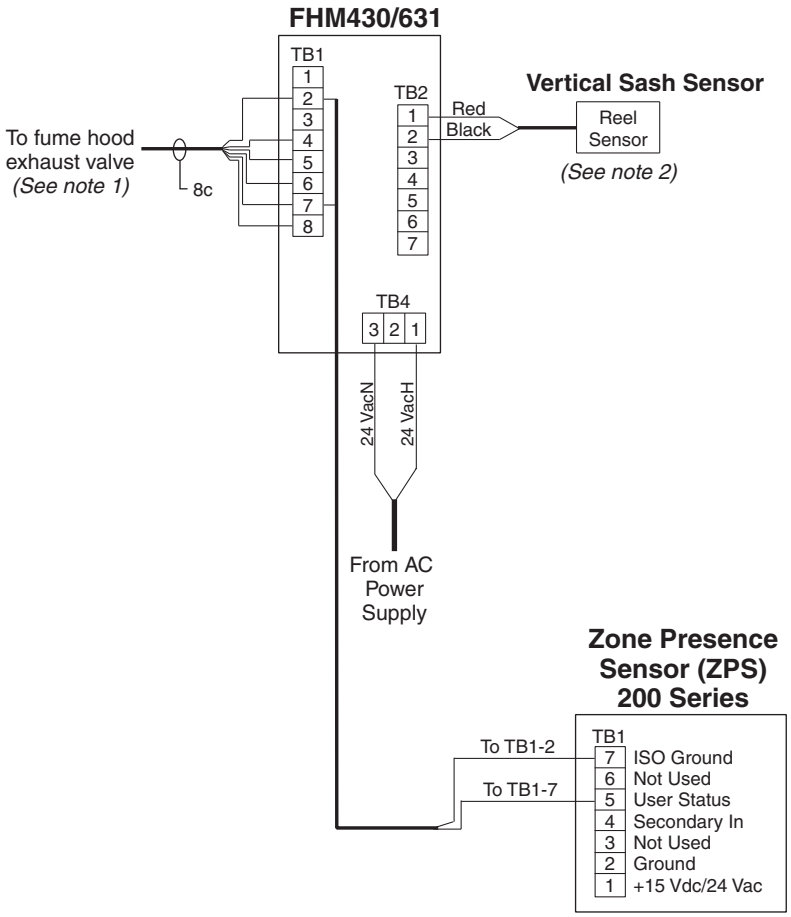
Figure 8. Attaching the Fume Hood Monitor to the fume hood (retrofit jobs).

FHM430 and 631

Monitor Termination Points



Typical Wiring Diagram
Variable Air Volume (VAV) Application



See pages 12-13 for DC wiring details, as well as the wiring of options and ancillary equipment.

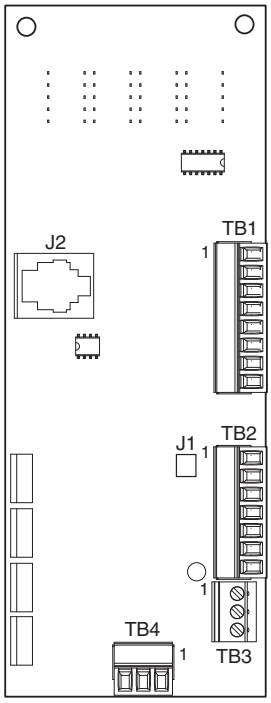
TERMINAL BLOCK POINTS

	1	2	3	4	5	6	7	8
TB1	+12 Vdc	Analog Ground	External Emergency/ Hibernation Input	Command	Feedback	Tri-level Alarm	User Status	Sash Signal
TB2	Sash Sensor	Analog Ground	—	Hibernation Output	Power Loss Input	Spare LED (+)	Spare LED (-)	—
TB4	24 Vac H/ +15 Vdc	Functional Ground	24 Vac N/ -15 Vdc	—	—	—	—	—

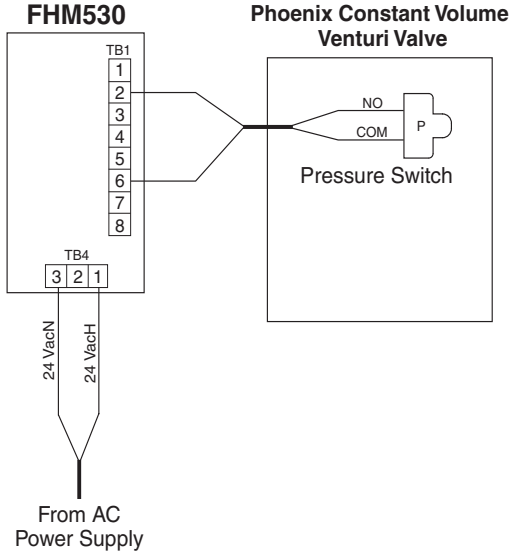
Notes:
1. Eight-conductor wire is Belden 9421 (22 AWG) or equivalent. (Tape back unused conductors.)
2. Sash sensor is provided with two-conductor cable. See combination sash sensors for exception.

FHM530

Monitor Termination Points



Constant Volume Application



See page 12 for DC wiring details, as well as the wiring of options and ancillary equipment.

COMPONENTS

Device	Function
J1	IN for DC solenoid OUT for AC solenoid

TERMINAL BLOCK POINTS

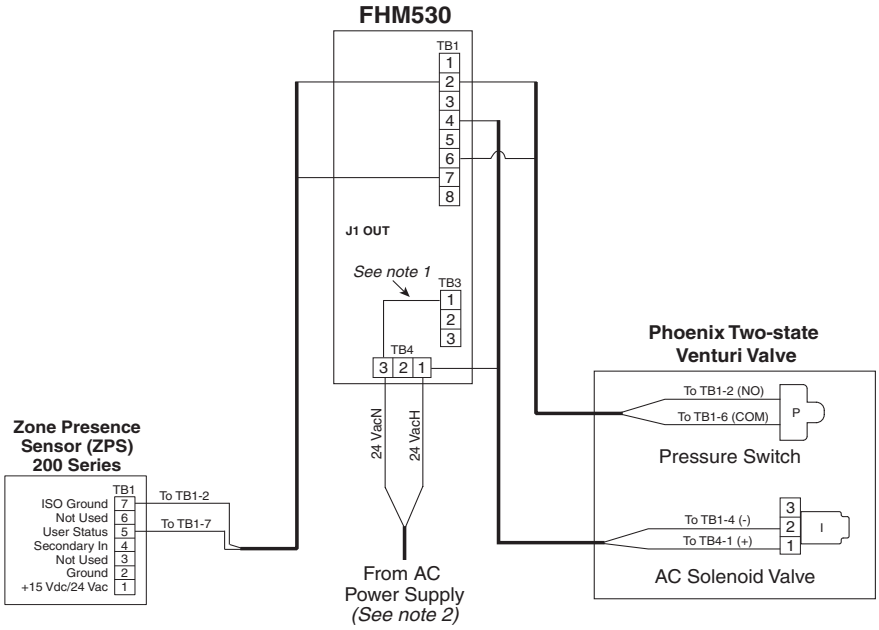
	1	2	3	4	5	6	7	8
TB1	+12 Vdc	Analog Ground	External Emergency	NOV Command	NCV Command	Pressure Switch	User Status	Sash Signal
TB2	Sash Sensor	Analog Ground	—	—	Power Loss Input	Spare LED (+)	Spare LED (-)	—
TB3	Solenoid Command Common	Alarm NO	Alarm Common	—	—	—	—	—
TB4	24 Vac H/ +15 Vdc NOV/NCV Common	Functional Ground	24 Vac N /-15 Vdc	—	—	—	—	—

Note:
Requirements for transformers:

- Secondary power shall be fused externally to current limit of 4 amps, in accordance with NEC CL2 power requirements. Thermal interrupts are not recommended.
- Do not earth ground secondary transformers.
- Maximum cable length for 96 VA load is 110'.
- Each pressurization zone shall have a dedicated single-phase primary circuit or a secondary circuit disconnect.

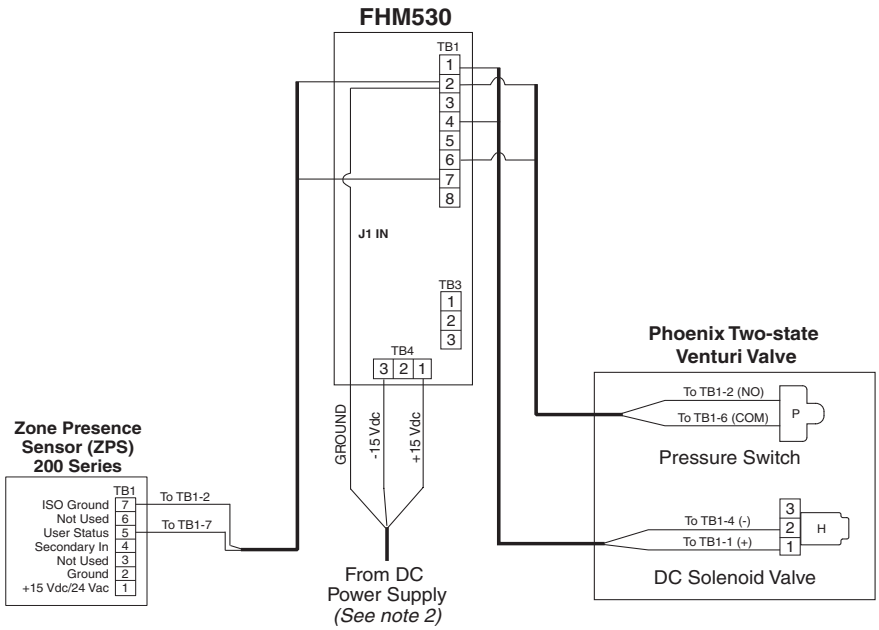
FHM530 (continued)

Two-state Application: AC Solenoid



See page 12 for the wiring of options and ancillary equipment.

Two-state Application: DC Solenoid



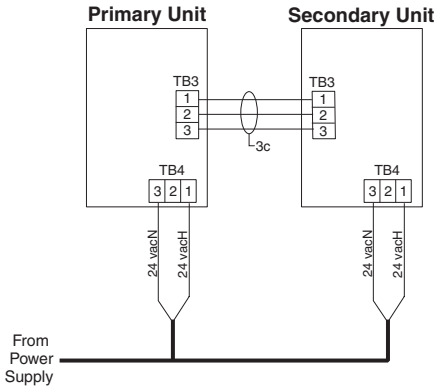
See page 12 for the wiring of options and ancillary equipment.

Notes:

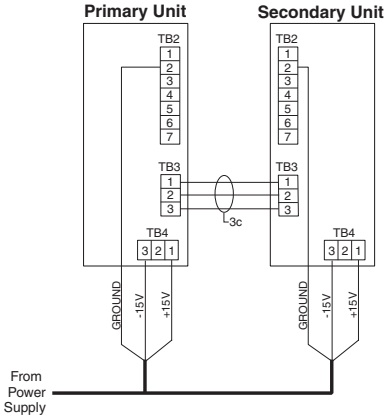
1. For AC-powered solenoid, two-position applications, you must install a field jumper between TB3-1 and TB4-3 (not required for DC-powered solenoids).
2. AC solenoids require the fume hood monitor to have AC power. DC solenoids require the fume hood monitor to have DC power.

Wiring of Options and Ancillary Equipment for X30 Fume Hood Monitor Series

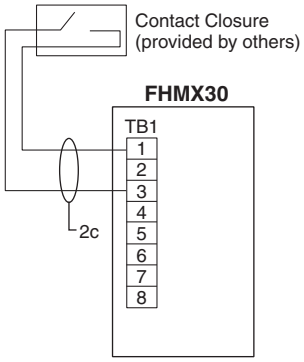
FHM430 Primary/Secondary Wiring (for AC-powered units)



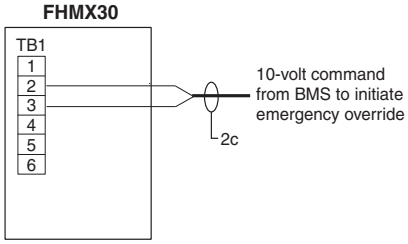
FHM430 Primary/Secondary Wiring (for DC-powered units)



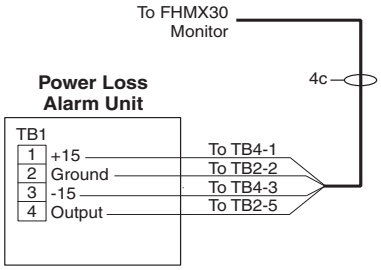
FHM430/631/530 External Emergency Override, Method 1



FHM430/631/530 External Emergency Override, Method 2

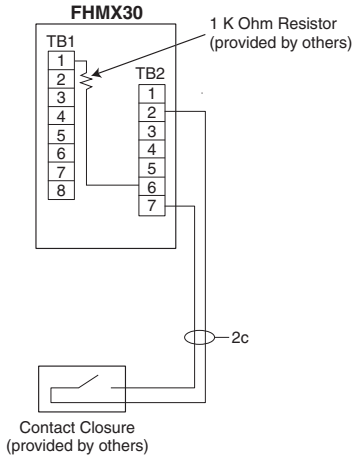


FHM430/631/530 Power Loss Alarm

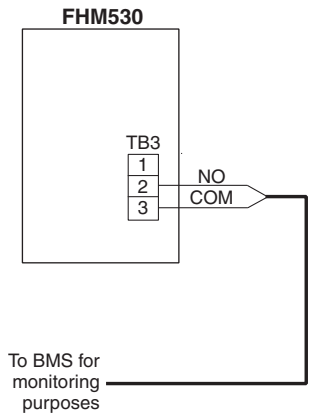


NOTE: The Power Loss Alarm unit will work only if powered by the same DC power source serving the monitor. AC-powered monitors cannot have a Power Loss Alarm.

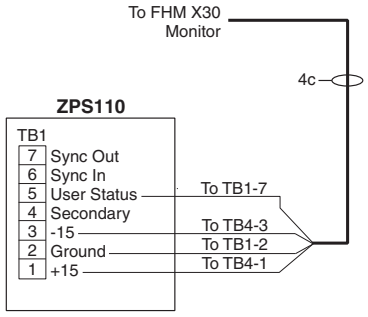
FHM430/631/530 Optional/Diversity LED



FHM530 Alarm Relay

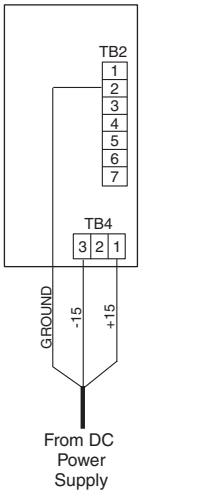


Zone Presence Sensor (ZPS100 Series)



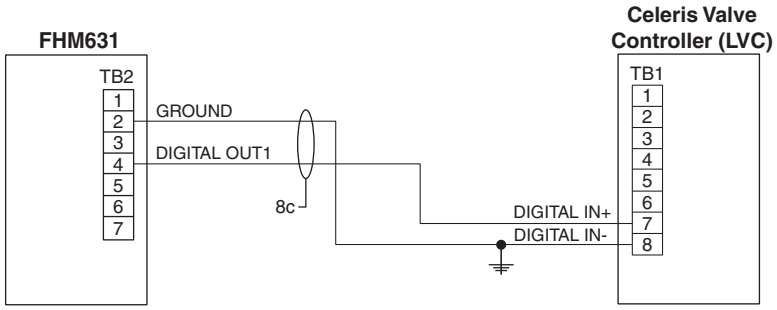
NOTE: ZPS100 series units can be powered by only DC voltage. If the FHM X30 is powered by AC, then separate power must be brought to the ZPS100 unit.

X30 Series: DC Wiring Details

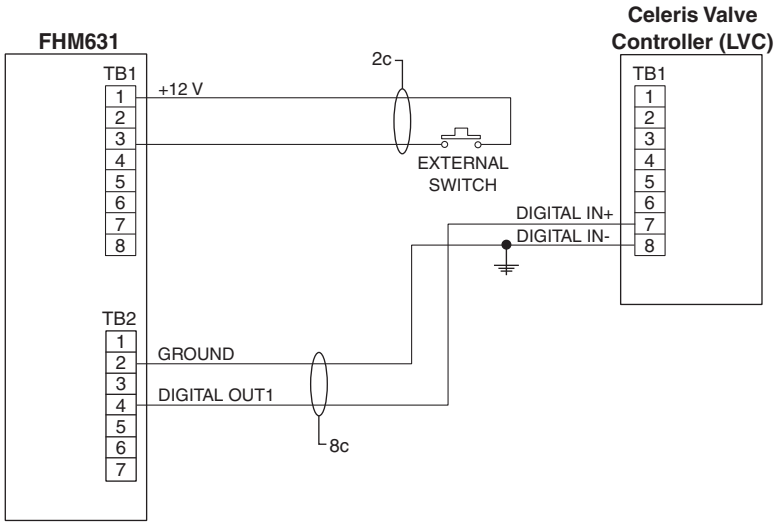


Hibernation Mode Wiring for FHM631 (in addition to the wiring shown on page 9)

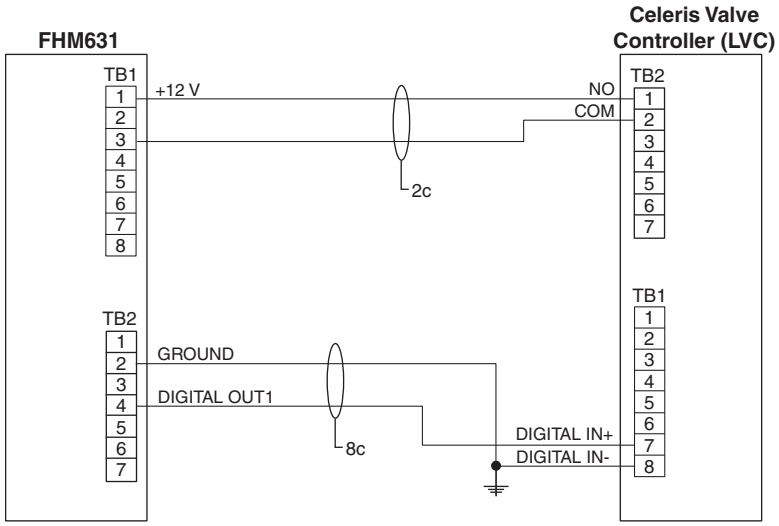
Hibernation Mode through the Fume Hood Monitor's Pushbutton



Hibernation Mode through a Momentary External Switch



Hibernation Mode through a BMS Command*



***Note:** Do not use this configuration if the LVC and fume hood monitor are using separate power sources.

MAINTENANCE

Phoenix Controls 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 Part	Part Number
FHM631 board	860-200-108
FHM630 board	860-200-102
FHM530 board	860-200-109
FHM430 board	860-200-111
FHM430 primary board	860-200-110
FHM430 secondary board	860-200-112
X30 recess mount retrofit kit (replaces X10 models with X30)	260-270-004
X30 recess mount kit	260-270-005

TROUBLESHOOTING

Phoenix Controls 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 monitor with a digital voltmeter and perhaps a magnehelic gauge.

Alarms

The types of alarms for the X30 Series Fume Hood Monitor, the audible and visual cues for each alarm, and the purpose for each alarm are listed in the table below.

Type of Alarm	Alarm Indicators			Reason for Alarm
	Visual Alarm (LED blink rate*)	Audible Alarm (beep rate**)	Signals (as seen in analog valve systems)	
Not commissioned	Standard Operation—Fast Flow Alarm—Fast 631 Display—Er-c	None	N/A	The unit requires commissioning.
Low differential static pressure	Flow Alarm—Slow FHM631 display—Blank	Fast	TB1, 6 = 10 Vdc	The hood's pressure switch is open *(FHM631 and 430 only).*
	Flow Alarm—Slow	Fast	N/A	The hood's pressure switch is open *(FHM530 only).*
Incorrect airflow (i.e., valve jam)	Flow Alarm—Fast	Slow	TB1, 6 = 5 Vdc	The valve's position is jammed *(FHM631 and 430 only).*
Sash opening alarm	Flow Alarm—Slow	Slow	TB1, 6 = 0 Vdc***	The sash opening exceeds the calibrated alarm set point.
Broken sash sensor alarm	Flow Alarm—Fast	Fast	TB1, 6 = 0 Vdc*** TB1, 8 $\geq$ 10.4 Vdc	The sash input is greater than the maximum resistive input for the application, or the sash sensor signal cable is broken or loose.
Emergency exhaust override alarm (local)	Emerg Exh—Slow	Slow	TB1, 6 = 0 Vdc TB1, 4 $\geq$ 10.4 Vdc	The emergency exhaust button was pushed.
Emergency exhaust override alarm (BMS external)	Emerg Exh—Fast	Slow	TB1, 6 = 0 Vdc*** TB1, 4 $\geq$ 10.4 Vdc	The externally controlled emergency input is in emergency state.
Energy waste alert	FHM631 display—ENRG	Slow	N/A	The sash is open and room lights are off *(FHM631 only).*
Power fail alarm	Power loss LED on every 4 seconds	3 beeps every 10 seconds	N/A	The fume hood monitor lost ±15 Vdc power.
Optional alarm	Optional alarm LED driven by customer	None	TB1, 6 = 0 Vdc	Customer specific alarm or diversity alarm
Loss of alarm line	Flow Alarm—Slow 631 Display—Blank	Fast	TB1, 6 = 12 Vdc	The alarm signal cable is broken.
Loss of feedback signal	Standard Operation—Solid Flow Alarm—Slow 631 Display—Low value	Slow	TB1, 6 = 0 Vdc	Feedback signal cable is broken.

Notes:

* A fast blink rate resembles a flashing light, while a slow rate resembles a fluttering light.

** A fast beep rate is 10 beeps per second, while a slow rate is 2 beeps per second.

*** 5 Vdc will be detected when these alarms are generated by a Celeris system. If the fume hood monitor generates this condition first, the Celeris signal will supercede after it is generated.

Troubleshooting Guide

Use the information in the tables below to troubleshoot the X30 Series Fume Hood Monitor.

Variable Air Volume (VAV) Valve Systems (FHM430 and 631 only)

Problem at Fume Hood Monitor	Voltage at TB1-6 in Monitor	Possible Cause/Solution
1. The monitor is in flow alarm.	> 10 V 5 V Voltages may vary.	A. Low static pressure across valve • 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. B. Incorrect valve position • Valve failed open. • Sash open beyond the maximum allowable position—Lower sash. • A broken sash cable—Check all sash sensor connections. C. Equipment/connection problems • 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. The monitor indicates normal operation, but the actual face velocity has been measured high or low.	0 V	A. Low static pressure • Differential pressure between the pressure switch set point 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 it is low, see Possible Cause/Solution 1A above. B. Monitor miscalibration—Recalibrate.*
3. The monitor has malfunctioned. • No display. • Cannot mute alarm.	Voltages may vary.	A. Loss of power • Check power at monitor TB4-1 (24 Vac H/+15 Vdc) and TB4-3 (24 Vac N/-15 Vdc). • Check wiring connections at monitor, valve, and power supply. • Verify power supply has input voltage (120 Vac or 240 Vac). B. Defective monitor—Replace board on monitor.*
4. The flow remains constant through sash travel.		A. Broken sash sensor cable—Replace sensor. B. Monitor miscalibration—Recalibrate.*

* Contact Phoenix Controls Product Support Center for assistance.

Constant Volume (CV) and Two-state Valve Systems (FHM530)

Problem	Possible Cause/Solution
1. The monitor is in flow alarm.	Low static pressure across valve. • Loss of airflow. Check fan operation and duct blockage. • Blocked or kinked pressure switch tubing. Correct the tubing.
2. The airflow was measured improperly in a: A. Constant volume system. B. Two-position system.	A. Incorrect valve position. Realign the pivot arm. B. Incorrect valve position. Check pneumatic tubing and pressure. Also check solenoid valve operation.

TROUBLESHOOTING (CONTINUED)

Variable Air Volume (VAV) Drive Systems (FHM430 and 631 only)

Problem	Possible Cause/Solution
1. The monitor is in flow alarm.	A. Loss of airflow • Check fan operation and duct blockage. • Check the drive for proper operation. B. Monitor/connection problems • The wiring terminations between monitor and control device are incorrect. Correct the terminations. • The monitor was miscalibrated. Recalibrate the monitor as needed.* • The monitor is defective. Replace the board on the monitor.*
2. The monitor indicates normal operation, but actual face velocity has been measured high or low.	The monitor was miscalibrated. Recalibrate the monitor as needed.*
3. The monitor is malfunctioning. • No display • Cannot mute alarm	A. Loss of power • Check the wiring connections at the monitor, drive and power supply. • Verify that the power supply has input voltage. • Check power at the monitor. B. The monitor is defective. Replace the board on the monitor. Recalibrate the monitor as needed.*

* Contact Phoenix Controls Product Support Center for assistance.

Energy-saving Options (FHM631 only)

Problem	Possible Cause/Solution
1. The monitor will not enter energy waste alert.	A. The low-light level setting is too high. Recalibrate the monitor. B. The energy waste alert is not enabled. Recalibrate the monitor.
2. The monitor will not exit energy waste alert.	The high-light level setting is too high. Recalibrate the monitor.
3. The monitor will not enter hibernation mode.	A. The sash is not fully closed. Close the sash. B. Hibernation mode is not enabled. Recalibrate the monitor. C. Check the wiring to the valve.
4. The monitor will not exit hibernation mode.	A. The digital input (DI) on the valve is not configured properly. Reconfigure this input. B. The monitor is defective. Replace and recalibrate the monitor.