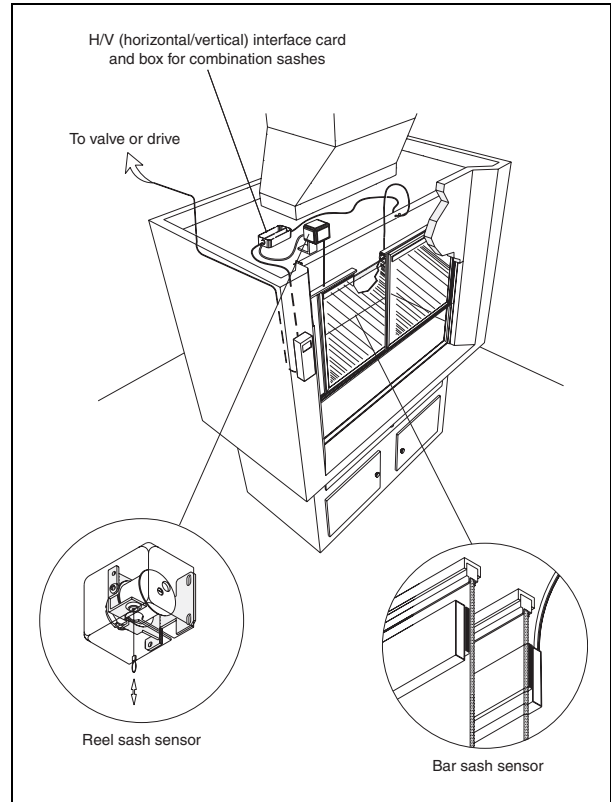


Phoenix Controls Sash Sensors detect a fume hood's sash position. Sensors can be configured to operate with the sash configurations found on most VAV fume hoods. The sash sensors are used together with a Phoenix Controls fume hood monitor and airflow control valve or drive to maintain a constant average face velocity at the sash opening (see drawing on right).

FEATURES

Phoenix Controls offers the following types of sash sensors:

- **Vertical sash sensors (VSS)** consist of a precision potentiometer coupled with a stainless steel, nylon-jacketed cable attached to the vertically-rising fume hood sash or counterweight cable. As the sash moves, the reel/potentiometer rotates and changes resistance. A variable sash position voltage is received by the fume hood monitor via this variable resistance.
- **Horizontal sash sensors (HSS)** measure horizontally-moving sashes with either sensor and magnet bars attached directly to the overlapping sashes, or magnet bars and blocking strips attached directly to the overlapping sashes and a sensor bar mounted within the hood behind the sashes. As the sashes overlap, the magnet bar closes or opens the magnetic switches spaced incrementally on the sensor bar. The sensor bar measures a change in resistance the further the sash panes are opened.
- **Combination sash sensors (CSS)** measure vertically- and horizontally-moving sash panes with both reel sensors and bar sensors. A horizontal-to-vertical (H/V) interface card combines all sash inputs and sends one signal representing overall sash position to the fume hood monitor.
- **Special sash sensors (SSS)** utilize reel and bar sensors in non-traditional sash configurations.



Sash sensor types.

SPECIFICATIONS

VSS

- Direct reel sash sensing technology
- Stainless steel, nylon-jacketed cable coupled to a ten-turn precision potentiometer. Maximum retraction of 41 in. (1041 mm).
- 0-10,000 ohm output proportionate to sash position
- 1, 2, 3 or 4 vertical sensors available for side-by-side configurations
- Tested for 475,000 life cycles
- 22 AWG two-wire, PVC-jacketed signal cable factory wired (12 ft., 3.6 meters)
- Surface or bracket mount (bracket not included) on top of hood
- Dimensions: 2.05" H, 2.00" W, 2.50" L (52 x 51 x 64 mm)
- 0-50 °C (32-122 °F) ambient
- Color: Light gray

HSS

- A sensor bar/magnet combination measures overlap between sashes.
- Sensor/magnet bars are 0.3 in. (8 mm) thick with tape and 1 in. (25 mm) wide.
- Standard and thin magnet bars must be mounted within 0.75 in. (19 mm) of the sensor bar.
- Strong magnet bars must be mounted within 1.25 in. (31.75 mm) of the sensor bar.
- 22 AWG two-wire, FEP-jacketed rigid plenum-rated cable factory wired (15 ft., 4.5 meters)
- Maximum sensor bar length of 75 in. (1905 mm) cumulative for HSS1xx and 120 in. (3048 mm) for HSS3xx.
- Bar lengths made to order
- Color: Light gray

CSS

- Utilizes reel and bar sensors
- Interface card and box mounted on top of hood
- Requires a three-conductor cable from interface card to monitor

SSS—Requires factory consultation

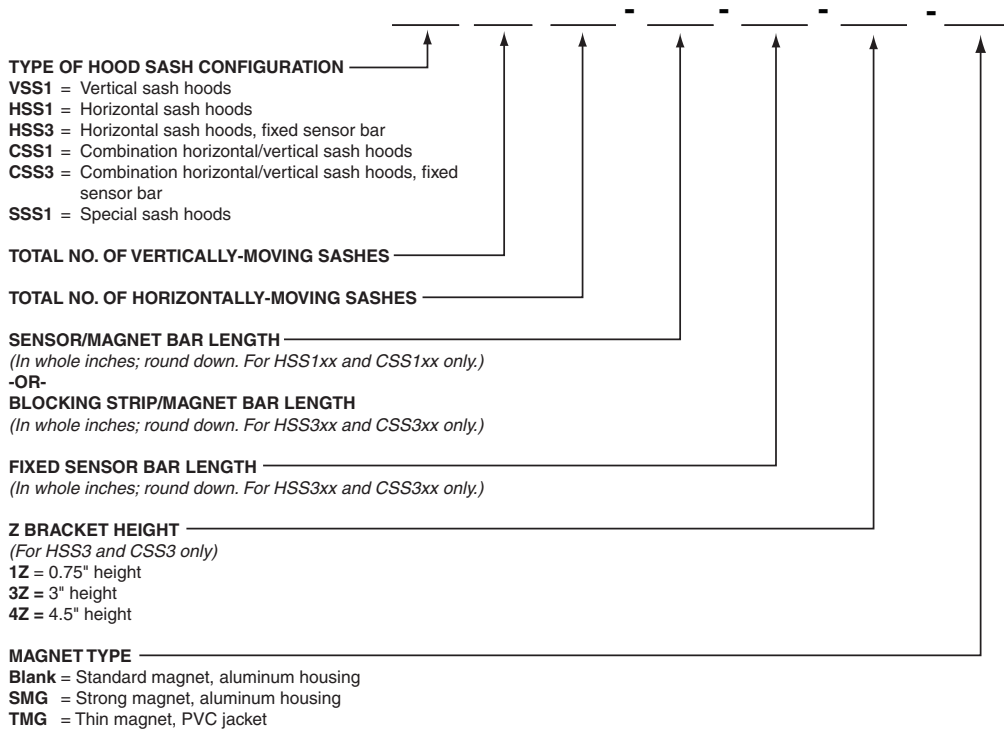


⚠ See wiring diagrams

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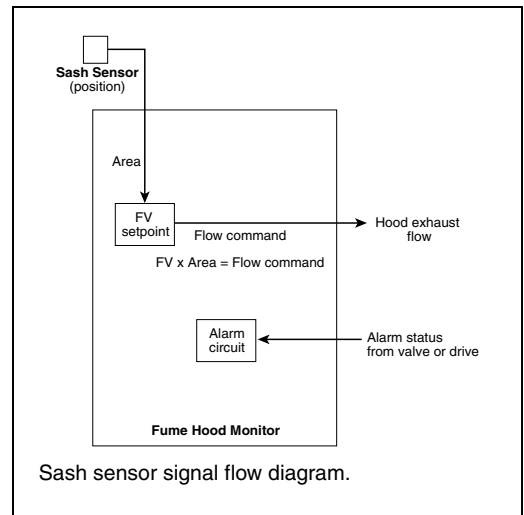
ORDERING GUIDE



APPLICATIONS

Phoenix Controls sash sensors are used with fume hood monitors and airflow control devices to accomplish:

- **Constant face velocity control**—The goal is to maintain a constant face velocity (FV) as the sash opening varies. A change in the sash area causes a linear change in exhaust volume (FV x Area = Flow command).
Example:
 $100 \text{ ft}^3/\text{min} \times 2 \text{ ft}^2 = 200 \text{ CFM}$ ($0.5 \text{ m/s} \times 0.5 \text{ m}^2 = 900 \text{ m}^3/\text{hr}$)
 $100 \text{ ft}^3/\text{min} \times 6 \text{ ft}^2 = 600 \text{ CFM}$ ($0.5 \text{ m/s} \times 1.0 \text{ m}^2 = 1800 \text{ m}^3/\text{hr}$)
- **Alarm indication**—A fume hood monitor, in conjunction with a sash sensor, generates the following alarms:
 - VAV fume hood monitors—Alarm indication when the feedback signal differs from the command signal.
 - Constant volume/two-position fume hood monitors—Optional sash opening alarm indication when sash position voltage exceeds the sash opening set point voltage.



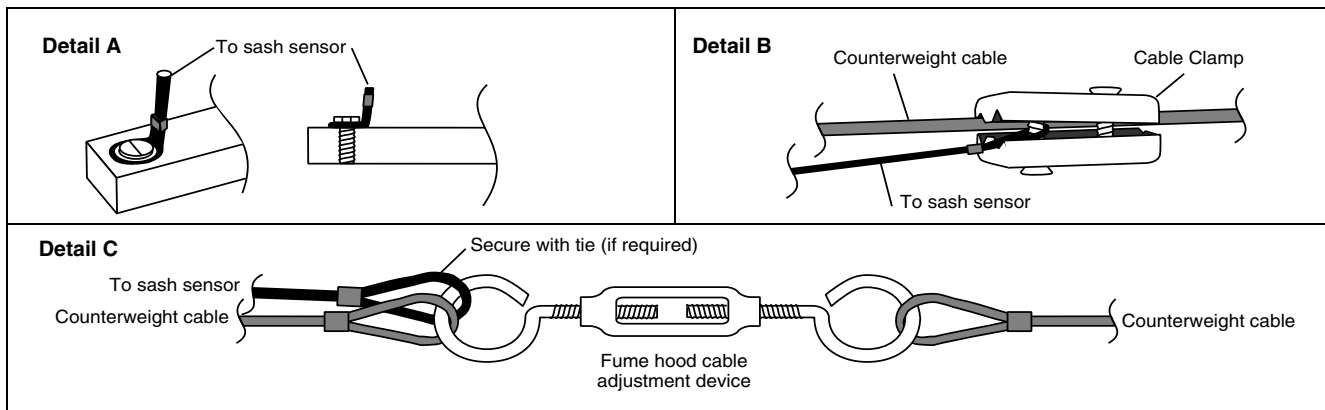
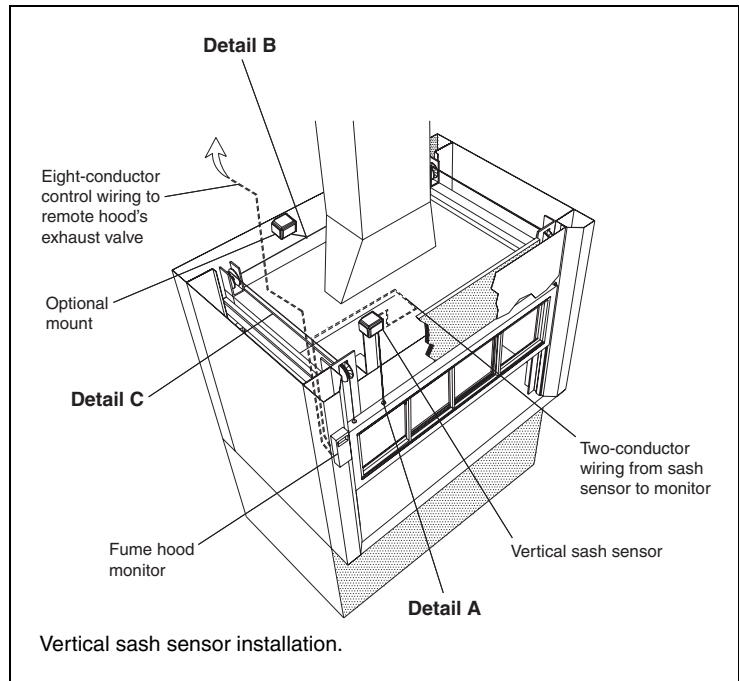
INSTALLATION

Materials and Procedures for Vertical Sash Sensor Installation

- Phoenix Controls sash sensor
- Two mounting screws*
- Optional:
 - Cable clamp
 - Mounting bracket*
 - Sheetmetal screw*

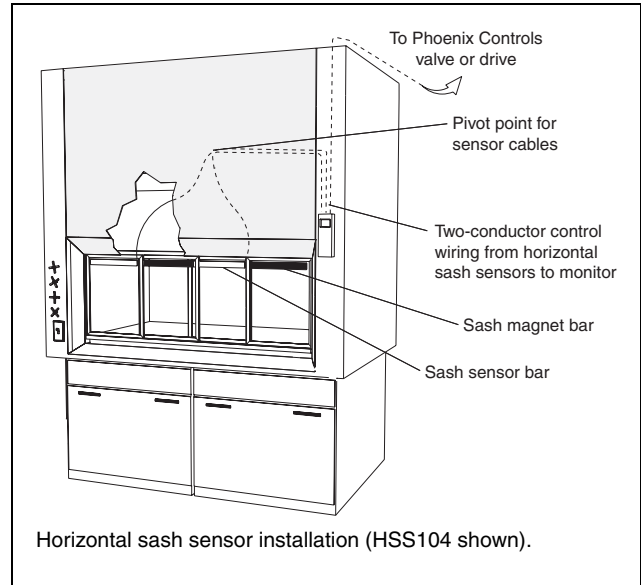
*not provided by Phoenix

1. Always mount the sensor on top of the fume hood with two mounting screws. Use optional mounting bracket if desired (see drawing on right). Avoid front and inside mounting.
2. Attach the retracting cable to the sash or the counterweight cable (see detailed drawings below). The cable must not rub or chafe against any surface. The sash cable should retract as the sash is raised.



Materials and Procedures for Horizontal Sash Sensor/Combination Sash Sensor Installation (HSS1xx and CSS1xx only)

- Phoenix Controls sash sensor magnet and sensor bars
 - Double-sided tape
 - Tie wraps (*not provided by Phoenix*)
1. Verify that each bar has a proper flat-glass fit to its sash.
 2. Position the sensor bar wire-side-up on the inside sash near the top, leaving enough clearance to allow the sash panes to be removed. Securely mount the bar with double-sided tape. Use extreme caution; removing the bar is very difficult.
 3. Position the magnet bar in a similar fashion, except mount it on the outside sash parallel to the sensor bar. The magnetic side must face the sensor bar and be within 0.75" (1.9 cm). Carefully secure the bar with double-sided tape.
 4. Cable installation—The cable must be held in place at a pivot point that allows total sash movement. The ideal point is behind the bypass cover approximately one-half the distance of vertical and horizontal movement. Avoid cable droop or the potential of it catching on moving parts.
 5. For combination sensors, mount the horizontal/vertical interface box on the top of hood.



Materials and Procedures for Horizontal Sash Sensor/Combination Sash Sensor Installation (HSS3xx and CSS3xx only)

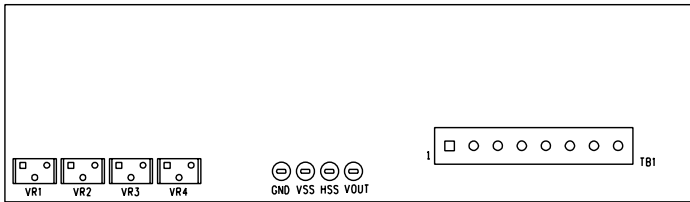
- Phoenix Controls sash sensor magnet, blocking strips, sensor bar, and sensor bar Z-bracket
 - Double-sided tape
 - Tie wraps (*not provided by Phoenix*)
1. Position the sensor bar wire-side-up on the 1-1/8" dimension step of the supplied Z-bracket using double-sided tape. Center the bar width on the bracket. In some cases, the ends of the bar may overhang the bracket by a few inches.
 2. Position the Z-bracket inside the hood against the inside of sash frame. Ensure that the sensor bar height is completely visible through the sash pane. Securely mount the bracket with double-sided tape. On combination hoods, the Z-bracket is mounted to the vertically moving sash frame.
 3. Position the blocking strip on the inside sash near the top, leaving enough clearance to allow the sash panes to be removed. Securely mount the strips with double-sided tape.
 4. Position the magnet bar in a similar fashion, except mount it on the outside sash parallel to the sensor bar. The magnetic side must face the sensor bar and be within 0.75" (1.9 cm) for standard and thin magnets or within 1.25" (3.2 cm) for strong magnets. Carefully secure the bar with double-sided tape.
 5. For combination sensors:
 - The cable to the sensor bar must be held in place at a pivot point allowing total vertical sash movement on a combination hood. Avoid cable drop or the potential of it catching on moving parts.
 - Mount the horizontal/vertical interface box on the top of hood.

Procedures for Strong and Thin Magnet Installations (All HSSs and CSSs)

The strong magnet (-SMG) and thin magnet (-TMG) must be offset vertically from the sensor bar by 0.25 in. (6.4 mm).

POINTS AND WIRING

Horizontal/Vertical (H/V) Interface Board for Combination Sash Sensor



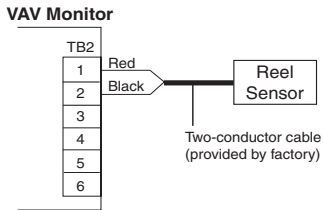
TERMINAL BLOCK POINTS

TB1	Point
1	VSS input
2	VSS input
3	Ground
4	V+
5	Sum
6	Vout
7	HSS input
8	HSS input

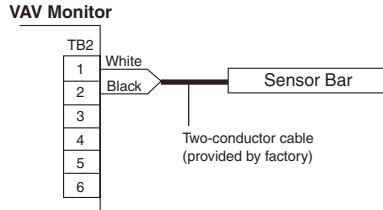
COMPONENTS

Device	Function
VR1	VSS start
VR2	VSS gain
VR3	HSS start
VR4	HSS gain
GND	Ground test point
VSS	VSS test point
HSS	HSS test point
VOUT	Output test point

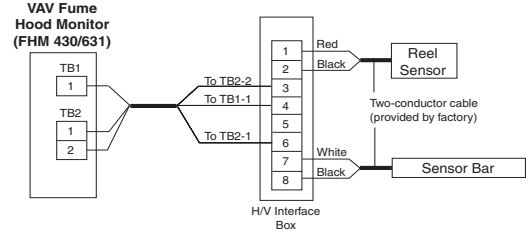
**Vertical (VSS110)
single sash**



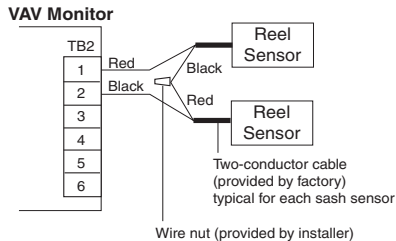
**Horizontal (HSS)
single sash or single fixed sensor**



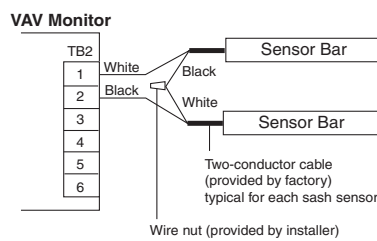
**Combination (CSS)
single sash or single fixed sensor**



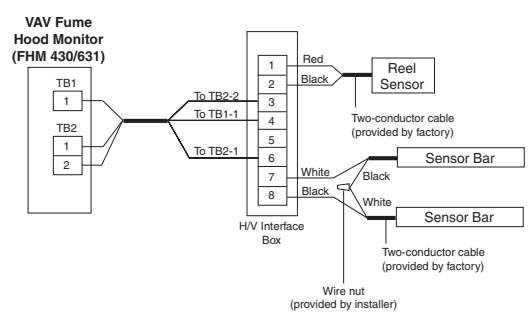
**Vertical (VSS110)
multiple sashes**



**Horizontal (HSS)
multiple sashes or multiple fixed sensors**



**Combination (CSS)
multiple sashes or multiple fixed sensors**



MAINTENANCE

Phoenix Controls sash sensors require no ongoing preventive maintenance. Once the field setup has been completed, the sensors will provide years of continuous operation. Replacement parts are available.

Replacement Part	Part Number
VSS110 (QTY: 1)	VSS110
VSS120 (QTY: 2)	250-220-008 (per sensor)
VSS130, VSS140 (QTY: 3, 4)	250-220-009 (per sensor)
HSS H/V sensor bar	Contact factory*
CSS1 H/V interface board	800-220-017
CSS3 H/V interface board	800-220-022

*Sensor bar length determines part number.

TROUBLESHOOTING

Problem	Possible Causes	Solutions
1. The Fume Hood Monitor is in constant alarm.	A. Broken sash sensor wire B. Fan problem C. Control problem	See Fume Hood Monitor data sheet for complete troubleshooting guide. To check sash sensor, remove circuit connections and connect ohm meter to sensor cables: <ul style="list-style-type: none">• VSS series: If >10 Kohm, sensor must be replaced.• HSS series: If ohm reading is infinite, sensor must be replaced.
2. The volume remains constant throughout sash travel.	A. VSS cable retracted B. H/V Interface Board (CSS)	Reinstall or replace cable. Recalibrate or replace board.*

* Contact Phoenix Controls Product Support for assistance.