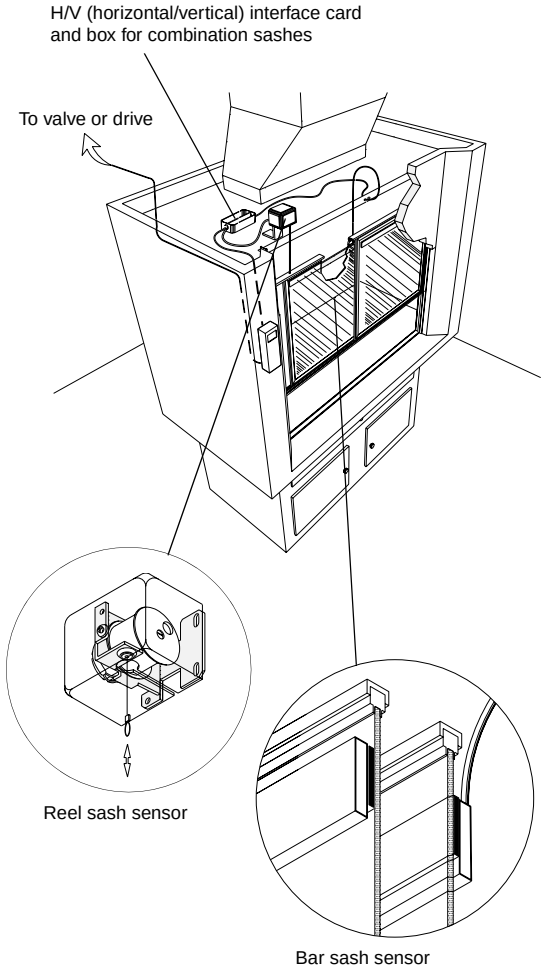
Phoenix Controls Sash Sensors detect a fume hood's sash position. Sensors can be configured to operate with the sash configurations found on most VAV fume hoods. The sash sensors are used together with a Phoenix Controls fume hood monitor and airflow control valve or drive to maintain a constant average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



Sash sensor types.

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**) consist of a sensor bar and a magnet bar, attached directly to overlapping sash panes. As the sashes overlap, the magnet bar closes the magnetic switches spaced incrementally on the sensor bar. The sensor bar measures a lower 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.

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, PCV-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 grey

SSS—Requires factory consultation

HSS
- A bar sensor/magnet pair measures overlap between two sashes
- Sensor/magnet bars are 0.3 in. (8 mm) thick with tape and 1 in. (25 mm) wide
- Magnet bar must be mounted within ¾ in. (19 mm) of the sensor bar
- 22 AWG two-wire, PVDF-jacketed rigid plenum-rated cable factory wired (15 ft.; 4.5 meters)
- Maximum sensor bar length of 75 in. (1905 mm) cumulative
- Bar lengths made to order
- Color: light grey

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

CE

TABLE OF CONTENTS

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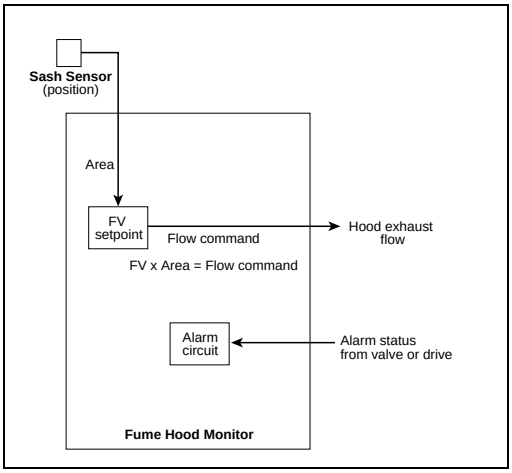
APPLICATIONS

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

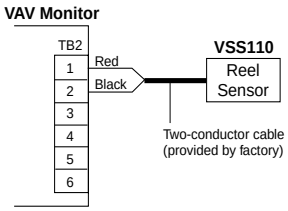
- **Constant face velocity control:** The goal is to maintain a constant face velocity (FV) as the sash opening varies.
  A change in the sash area causes a linear change in exhaust volume (FV x Area = Flow command).*Example:*
  100 ft³/min x 2 ft² = 200 cfm (0.5 m/s x 0.5 m²=900 m³/hr)
  100 ft³/min x 6 ft² = 600 cfm (0.5 m/s x 1.0 m²=1800 m³/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 setpoint voltage.



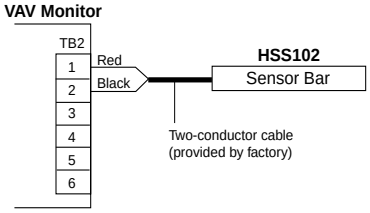
Sash sensor signal flow diagram.

WIRING

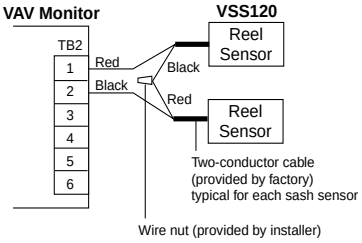
Vertical (VSS) single sash



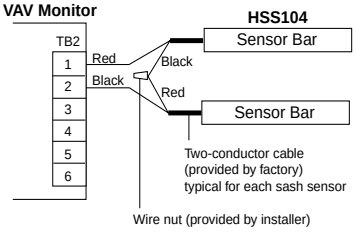
Horizontal (HSS) single sash



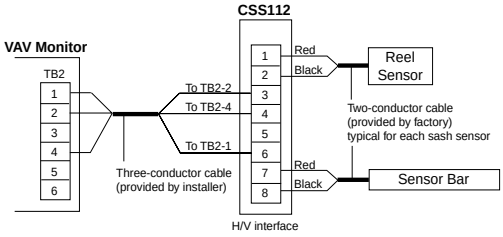
Vertical (VSS) multiple sash



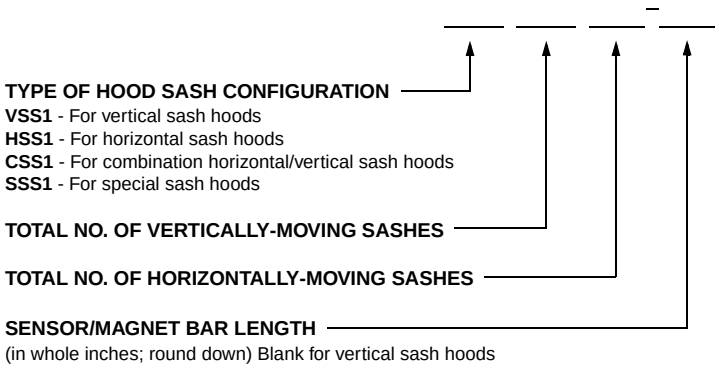
Horizontal (HSS) multiple sash



Combination (CSS)



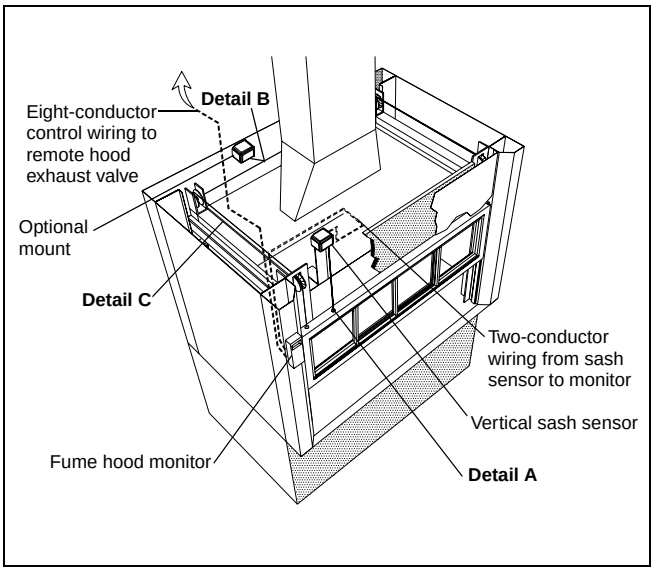
ORDERING GUIDE



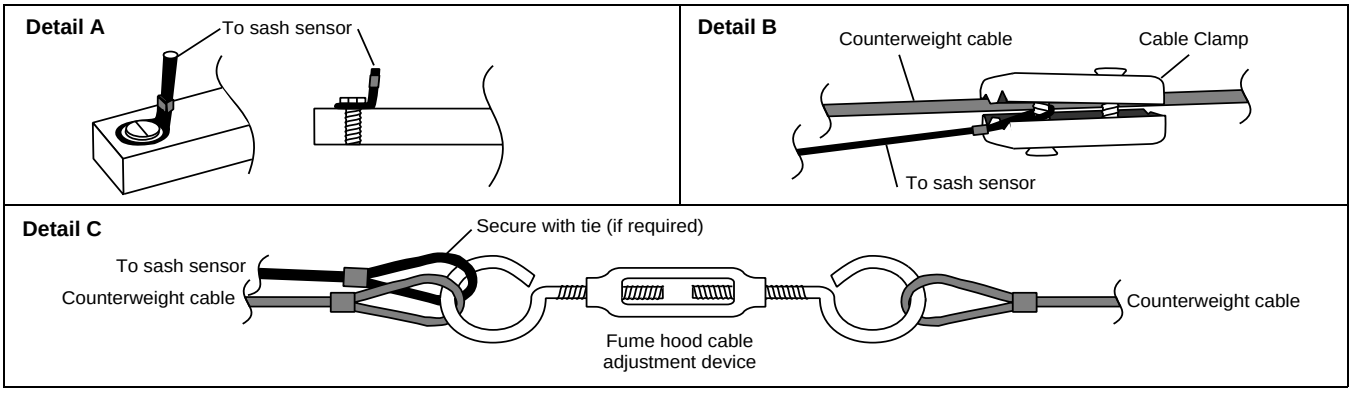
Materials/Procedure for Vertical Sash Sensor Installation:

- Phoenix Controls sash sensor
- Two (2) mounting screws*
- Optional: cable clamp, mounting bracket*, sheetmetal screw* *(*not provided by Phoenix)*

1. Sensor should always be mounted on top of fume hood using two mounting screws. Use optional mounting bracket if desired (see right). Avoid front and inside mounting.
2. Attach the retracting cable to the sash or the counterweight cable (see below). Cable must not rub or chafe against any surface. The sash cable should retract as the sash is raised.



Vertical sash sensor installation.

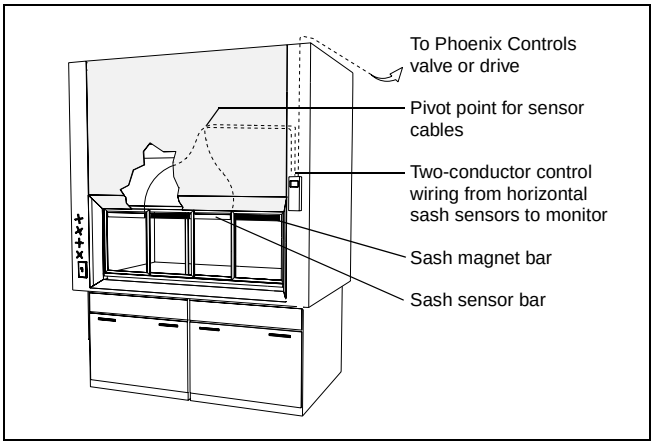


Sash sensor cable fastening options.

Materials/Procedures for Horizontal Sash Sensor/ Combination Sash Sensor Installation:

- Phoenix Controls sash sensor magnet and sensor bars
- Double-sided tape
- Tie wraps *(not provided by Phoenix)*

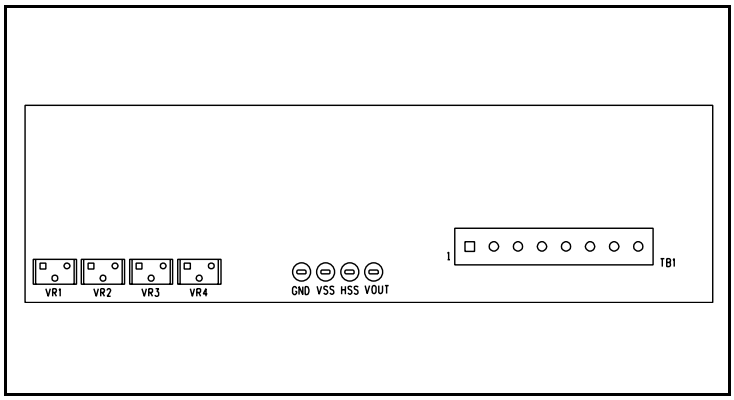
1. Verify each bar has a proper flat-glass fit to its sash.
2. Position the sensor bar wire-side-up on the inside sash near the top, leaving enough clearance to allow the sash panes to be removed. Securely mount the bar with double-sided tape. Use extreme caution—removal of bar is very difficult.
3. Position the magnet bar in a similar fashion, only it mounts on the outside sash parallel to the sensor bar. The magnetic side must face the sensor bar and be within ¾ in. (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 which 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.



Horizontal sash sensor installation (HSS104 shown).

POINTS

CSS (H/V Interface Board)



H/V interface board.

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

MAINTENANCE

Phoenix Controls sash sensors require no ongoing preventative maintenance. Once the field set up 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*
CSS H/V interface board	800-220-005

*Sensor bar length determines part number.

TROUBLESHOOTING

Problem	Possible Causes	Solutions
1. Fume Hood Monitor 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: • **VSS series:** if >10Kohm, sensor must be replaced. • **HSS series:** if ohm reading is infinite, sensor must be replaced.
2. Volume remains constant throughout sash travel	A. VSS cable retracted B. H/V Interface Board (CSS)	Re-install or replace cable. Recalibrate or replace board.*

*Contact your local Phoenix Controls Service Group for assistance.