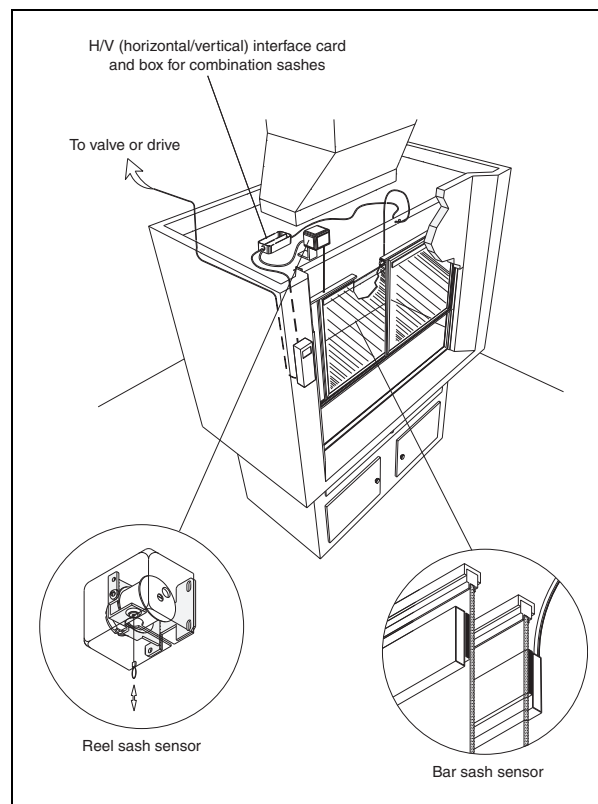


Phoenix Controls Sash Sensors detect a fume hood's sash position. Sensors can be configured to operate with the sash configurations found on most VAV fume hoods. The sash sensors are used together with a Phoenix Controls fume hood monitor and airflow control valve to maintain a constant average face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

## FEATURES

Phoenix Controls offers the following types of sash sensors:

- **Vertical sash sensor (VSS)** — A precision potentiometer coupled with a stainless steel, nylon-jacketed cable that attaches 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. Multiple sashes are located side-by-side and can be of unequal width.
- **Horizontal sash sensor (HSS)** — Either sensor and magnet bar sets attached directly to overlapping panes or magnet bars and blocking strips attached directly to the overlapping panes with a fixed sensor bar mounted across the entire horizontal sash opening. As the sashes are moved, the magnet bar covers part of the sensor bar, closing the magnetic switches it overlaps. The sensor bar changes resistance and a variable sash position voltage is received by the fume hood monitor. Multiple horizontal frames can be arranged side-by-side, above or below each other, and unequal in area.
- **Combination sash sensors (CSS)** — Measures vertically moving sashes that contain horizontally moving panes within each sash. Both reel and bar sensors are used in conjunction with a digital horizontal-to-vertical (DH/V) card that combines all inputs. The DH/V card sends one signal representing overall sash position to the fume hood monitor. Multiple sashes are located side-by-side and must have identical dimensions.
- **Double-hung sash sensors (DSS)** — Reel and bar sensors with a DH/V card measure vertical/combination sashes in multiples of two arranged one on top of the other like a double-hung window. Multiple double-hung sashes must have identical components and dimensions.
- **Triple-hung sash sensors (TSS)** — Similar to DSS but in multiples of three, one on top, in the middle and on the bottom. Multiple triple-hung sashes must have identical components & dimensions.
- **Special sash sensors (SSS)** — For sash configurations that can't be handled by other sash sensor products. Consult with Phoenix Controls when considering a customized, special sash sensor.



**Types of Sash Sensors.**

## SPECIFICATIONS

### VSS

- Direct reel sash sensing technology
- Stainless steel, nylon-jacketed cable coupled to a ten-turn precision potentiometer. Available in two types:
  - Standard throw: maximum retraction of 41 in. (1041 mm).
  - Long throw: maximum retraction of 100 in. (2540 mm).
- 0-10,000 ohm output proportionate to sash position
- Two to eight 10K ohm reels are provided with a DH/V for multiple 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:
  - Standard throw: 2.10" H x 2.50" L x 2.00" W (52 x 64 x 51 mm)
  - Long throw: 4.75" H x 4.70" L x 3.10" W (121 x 119 x 79 mm)
- 0-50 °C (32-122 °F) ambient
- Color: Light gray

### DH/V

- Material: compatible with PPC flame retardant black box part number 520-000-011LF
- Enclosure:
  - Dimensions: 1.9" H x 6" W x 3.2" D (48 x 12 x 81 mm)
  - Weight with PCB: > 6 oz. (170 grams)
  - Color: blackOne DH/V interface board is mounted in this enclosure.
- Power requirements with 24 VAC input =  $\pm 15\%$ ; 50/60 Hz; 6 VA, or  $\pm 15$  VDC input =  $\pm 15\%$ ; 200 mA
- 8 Inputs
  - Voltage: 0.0 - 10.5 Vdc;  $\pm 1\%$  FS; jumper position = OUT, or
  - Resistance: 0 - 10K ohms;  $\pm 1\%$  FS; jumper position = IN (default)
- 2 Outputs
  - OUT: 0.0 - 10.0 Vdc; 1% FS (Total Sash Signal)
  - EMERG: Unused
- Operating Range
  - Ambient Temperature: 0 to 50 °C (32 to 122 °F)
  - Storage Temperature: -20 to 70 °C (-4 to 158 °F)

### HSS

- A sensor/magnet bar or sensor/magnet/blocking strip combination measures overlap between sashes.
- Magnets available in three types:
  - Standard: aluminum housing; 1" (25 mm) high by 0.30" (8 mm) thick with tape
  - Thin: PVC jacket; 1" (25 mm) high by 0.17" (4 mm) thick with tape
  - Powerful: aluminum housing; 1" (25 mm) high by 0.30" (8 mm) thick with tape
- Standard and thin magnet bars must be mounted within 0.75 in. (19 mm) of the sensor bar
- Powerful magnet bars must be mounted within 1.25 in. (32 mm) of the sensor bar
- Bar lengths made to order
- Sensor bar length limits:
  - When wired into fume hood monitors: 75" (1905 mm) cumulative
  - When wired into DH/V:
    - Moveable sensors: 75" (1905 mm) each
    - Fixed sensors: 150" (3810 mm) each
- 22 AWG two-wire, FEP-jacketed rigid plenum-rated cable factory wired (15 ft., 4.5 meters)
- Color: Light gray

### Regulatory Compliance



- RoHS
- FCC  
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.
- EU Contact Address:  
Honeywell GmbH  
Boeblinger Str. 17  
71101 Schoenaich  
Germany

If the digital H/V assembly is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

### CSS/DSS/TSS

- Utilize 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

## ORDERING GUIDE

	CSS	5	-02	08	-A	2	A	-ZZ	M	-	YYY	S	-XX	B	-WZ	-	NVS
<p><b>SASH FAMILY</b></p> <p>DHV = Digital H/V assembly      CSS = Combination sashes  VSS = Vertical only sashes      DSS* = Double-hung sashes  HSS = Horizontal only sashes      TSS* = Triple-hung sashes  * = no WebPro single catalog number; use Sash Pro for list of catalog numbers</p>																	
<p><b>PRODUCT SERIES</b></p> <p>4 = When present, moveable sensor bars, digital H/V  Note: HSS Reverse Acting signal without INT  5 = When present: fixed sensor bars, digital H/V  Note: HSS Direct Acting signal</p>																	
<p><b>TOTAL NO. OF VERTICALLY MOVING SASHES</b></p> <p>00 to 08 = Allowable maximums:  VSS4 = 08, CSS4 = 04, DSS4 = 08, TSS4 = 06, CSS5 = 04,  DSS5 = 04, TSS5 = 03</p>																	
<p><b>TOTAL NO. OF HORIZONTALLYMOVING PANES</b></p> <p>00 and 02 to 32 = Excludes 01. Allowable maximums:  HSS4 = 16, CSS4 = 14, DSS4 = 13, TSS4 = 11  HSS5 = 16, CSS5 = 32, DSS5 = 32, TSS5 = 24</p>																	
<p><b>THROW OF VERTICAL SASHES</b></p> <p>N = No vertical sashes  A = All reels have a standard throw  B = All reels have a long throw  C = Top reel has standard throw, for DSS and TSS only – remaining lower-hung reels have long throw</p>																	
<p><b>FOR MOVEABLE AND FIXED SENSOR PRODUCTS</b></p>																	
<p><b>NO. OF TRACKS IN ALL HORIZONTAL FRAMES</b></p> <p>0 = Not applicable  2 = Two tracks in all horizontal frames  3 = Three tracks in all horizontal frames</p>																	
<p><b>LOCATION OF COMBINATION SASHES</b></p> <p>N = No combination sashes  A = All; DSS5 and TSS5 must have Sensor Bar Type = R  B = Bottom only; DSS5 and TSS5 must have Sensor Bar Type = R  T = Top only  M = Middle only; TSS5 must have Sensor Bar Type = R  X = Top and middle only; TSS5 must have Sensor Bar Type = R  Y = Middle and bottom only; TSS5 must have Sensor Bar Type = R  Z = Top and bottom only; TSS5 must have Sensor Bar Type = R</p>																	
<p><b>MAGNET BAR LENGTH</b></p> <p>06 to 75 inches, or ZZ = From 06 to 75 whole inches only, rounded down; or ZZ when length not yet known</p>																	
<p><b>MAGNET BAR TYPE</b></p> <p>M = Standard magnet bar; not applicable for fixed sensor bars (Series = 5) with 3 tracks (Tracks = 3)  P = Powerful magnet bar; mandatory for fixed sensor bars (Series = 5) with 3 tracks (Tracks = 3)  T = Thin magnet bar; not applicable for fixed sensor bars (Series = 5) with 3 tracks (Tracks = 3)</p>																	
<p><b>SENSOR BAR LENGTH</b></p> <p>006 to 150 inches, or YYY = From 006 to 150 whole inches only, rounded down; or YYY when length not yet known  – Lengths over 75 inches will be provided as two sensor bars  – HSS 4 and 5 over 75 inches require option INT</p>																	
<p><b>SENSOR BAR TYPE</b></p> <p>S = Standard sensor bar  R = Sensor bar with integral take-up reel (for fixed sensor products only) is limited to length 000 because it is physically excluded from the HSS5 or CSS5 and must be ordered separately as ENG-250-220-xxx.  Note: Type R contains a non-RoHS compliant component - use only on North American projects where lack of RoHS compliance is acceptable. Contact your Applications Engineer for assistance choosing the correct quantity and length of individual ENG-250-220-xxx for each hood.</p>																	
<p><b>FOR FIXED SENSOR PRODUCTS ONLY</b></p>																	
<p><b>BLOCKING STRIP LENGTH</b></p> <p>06 to 75 inches, or XX = From 06 to 75 whole inches only, rounded down; or XX when length not yet known</p>																	
<p><b>BLOCKING STRIP TYPE</b></p> <p>B = 2-inch wide blocking strip</p>																	
<p><b>BACKET HEIGHT AND TYPE</b></p> <p>WW = Either Height or Type not yet known  NO = No bracket provided by factory  SF = 2.5" total height FLAT bracket      SZ = 2.5" total height Z bracket  MF = 4.5" total height FLAT bracket      MZ = 4.5" total height Z bracket  LF = 6.5" total height FLAT bracket      LZ = 6.5" total height Z bracket</p>																	
<p><b>OPTIONS</b></p> <p>INT = Add an interface assembly  – Mandatory for HSS4 and 5 with total sensor length &gt; 75 inches  – Optional for HSS4 to create Direct Acting signal  NHV = No H/V assembly; remove the DHV from a CSS or HSS5 (not in Sash Pro, contact your AE about using this option)  NVS = No Vertical Sensor; remove the reel sensor from a CSS, DSS, or TSS (when VSS is already in the field)  3WP = Three-wire Vpot on reel sensor potentiometer; for single vertical sash only</p>																	

## APPLICATIONS

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

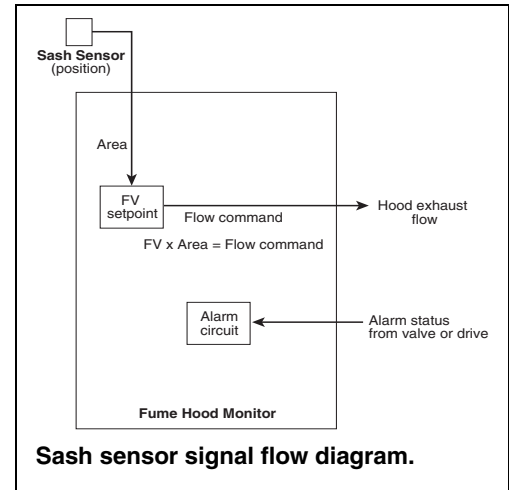
- **Constant face velocity control**—The goal is to maintain a constant face velocity (FV) as the sash opening varies. A change in the sash area causes a linear change in exhaust volume ( $FV \times \text{Area} = \text{Flow command}$ ).

*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.



**Field Verification of Sash Sensor Components** — *Due to the unique construction characteristics of fume hoods, clearances should be reviewed in the field with the demonstration components provided in a Phoenix Controls DMO-KIT-SBAR. This ensures that sensor, magnet, and fixed bracket types are selected that work with the hood's clearances.*