

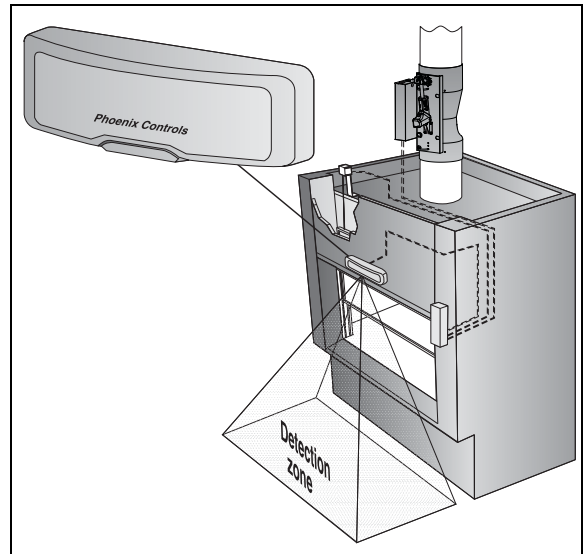
Phoenix Controls Zone Presence Sensor®, also known as ZPS® sensor, is a key element of the Phoenix Controls Usage Based Controls® solution, also known as UBC®. Used with the Phoenix Controls Fume Hood Monitor (FHM) and Accel® II venturi valve, it provides the safest, most energy efficient fume hood control system with no scheduled maintenance.

The ZPS sensor creates a detection zone in front of the fume hood to determine researcher presence or absence. If no one is present, the ZPS sensor sends a signal to the fume hood control system to reduce the face velocity to a value deemed appropriate by local health and safety personnel. Should a researcher move into the detection zone, the ZPS sensor sends a signal to the fume hood control system to return to the operational face velocity ensuring safety and fume hood containment is maintained. The Phoenix Controls UBC solution with less than 1-second speed of response provides the maximum energy saving for two-state and VAV fume hoods without compromising safety.

Research by ASHRAE and numerous independent firms have shown that when there is no person working in front of the fume hood, it is safe to reduce the face velocity from the industry norm of 100 ft./min. to a lesser value - as low as 60 ft./min. This can provide up to a 40% energy savings when sashes are left open and the fume hood is not occupied.

## FEATURES

- The ZPS sensor detects operator presence or absence and sends a Normal or Standby signal to the fume hood control system.
- The fume hood control system adjusts the airflow to achieve the desired Normal and Standby face velocity setpoints.
- Inanimate objects are mapped into the image background.
- Configurable detection zone accommodates various fume hood widths and corridor depths.
- Infrared emitting diodes (IRED) provide illumination for reliable detection in low or no light conditions.
- High resolution color image sensor technology and high speed algorithms ensure proper detection in a wide variety of lighting conditions.
- Less than 1-second speed of response ensures safe operation under all operating conditions.
- A single ZPS sensor provides protection for fume hoods up to 8' (2.4 m) in width.
- Multiple ZPS sensors may be used together for protection of double and four-sided fume hoods or fume hoods wider than 8'.
- Comprehensive fail-safe schemes return the fume hood to the safest state under fault conditions.



VAV system using a Zone Presence Sensor

The optical lens in the ZPS sensor is used to detect motion by a change in pixels from one frame to another. Images are not captured, stored, or transmitted.

**NOTE:** If the ZPS sensor is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

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## SPECIFICATIONS

### Power

- 24 Vac, +/-15%, 50/60 Hz, 7 VA
- ±15 Vdc, ±15%, 200 mA

### Dimensions

9.50" W x 2.95" H x 1.99" D (241 mm x 75 mm x 51 mm)

### Enclosure

- Rating: NEMA 1/IP-31
- Color: White with a blue base
- Material: Polycarbonate
- Flame Rating: 94V0

### Response Time

- ZPS Sensor Detection: Typically < 300 ms
- UBC Solution: < 1.0 second (detection to 90% of commanded flow)

### Setback Time

5 to 3,600 second (software configurable)

### Remap Time

30 to 3,600 second (software configurable)

### Lighting Requirements

0 to 13,000 lux

### 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.

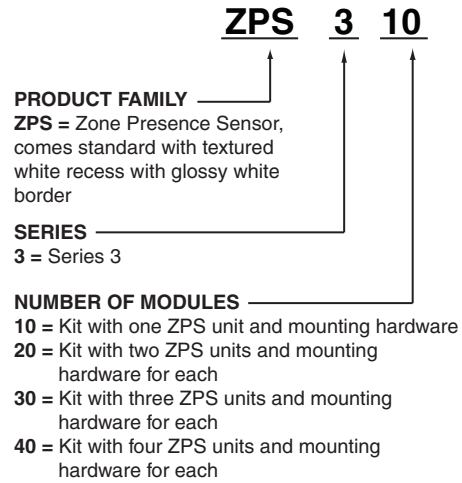
- EU Contact Address:  
Honeywell GmbH  
Boebling Str. 17  
71101 Schoenaich  
Germany

## INSTALLATION

Mount the ZPS sensor on the vertical face of the fume hood using 2 sheet metal screws (included) above the sash opening.

- Mounting height: between 6 and 12 feet (1.8 and 3.7 m) from the floor
- Mounting orientation: the ZPS sensor must be mounted as level as possible to achieve the full 8 foot wide detection zone at a 6 foot mounting height
- Detection Zone Dimensions\*
  - Minimum - 2' W x 1' D (0.6 m x 0.3 m)
  - Maximum - 8' W x 2' D (2.4 m x 0.6 m)
- One ZPS sensor module for each 8' (2.4 m) fume hood width

## ORDERING GUIDE



**Note:** One ZPS for fume hoods up to 8', multiple units (up to 4) may be used to protect larger or multi-sided hoods.

## APPLICATIONS

It is a generally accepted practice to design fume hood flow to maintain a face velocity of 80 to 100 ft/min (0.4 to 0.5 m/sec) to ensure proper capture and containment when the fume hood is in use. The most common face velocity set point is 100 ft/min.

When there is no user in front of the sash opening, it is deemed acceptable to reduce the face velocity to a lower value of 60 to 80 ft/min (0.3 to 0.4 m/sec). This allows for a substantial energy savings should a researcher walk away from a fume hood leaving the sash open. This is based on the condition that there is no activity immediately in front of the fume hood that would cause disturbances in the air flowing through the sash opening.

The ZPS sensor uses an imaging sensor to create a detection zone in front of the fume hood.

- If a user enters the detection zone, the image sensor detects a change in the pixel pattern and commands the fume hood monitor and associated valve to the occupied (higher) face velocity setpoint. As long as the researcher remains in the detection zone, the ZPS sensor will detect minute movements (as slight as a person breathing) and remain in the Normal or Occupied mode.
- If the ZPS sensor detects no motion for a pre-determine time period (5 to 3600 sec), it will send a signal to the fume hood monitor to reduce the face velocity to the *Setback* or Unoccupied setpoint value. The setback face velocity setpoint is set in the fume hood monitor.

The Phoenix Controls fume hood control system may include the ZPS sensor, Horizontal and/or Vertical Sash Sensors, Fume Hood Monitor and Accel II fume hood valve to provide sub 1-second speed of response from the moment a user enters the detection zone to when the face velocity has achieved 90% of the commanded value.

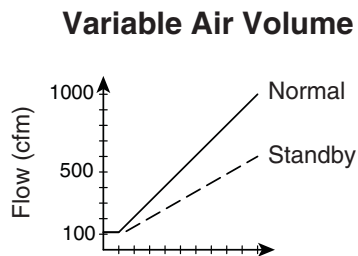
The sub 1-second speed of response is important to ensure that once a researcher enters the detection zone that the fume hood face velocity is at a safe level before they begin working in the hood. The ZPS sensor provides the opportunity for substantial energy savings when the fume hood sash is left in the open position and no one is in front of the hood.

Hood usage patterns, sash management, and acceptable setback face velocity setpoints dictate the potential energy savings in both VAV and 2-State fume hood applications. Be certain to engage Health, Safety, and Environmental Officers in determining acceptable reduced face velocity setpoints.

### Adaptive Face Velocity Fume Hoods (Variable Air Volume)

The ZPS sensor operates with Phoenix Controls FHM 420, 430, and 631 series fume hood monitors; VSS, HSS, CSS, or SSS sash sensors; and EXV Accel II series hood exhaust valves to provide face velocity control.

When an operator is present, the ZPS sensor signals the fume hood system into the normal mode. When the operator is absent, the ZPS sensor sends a setback signal to the fume hood monitor, which commands the hood exhaust valve to a reduced flow, thereby providing a lower, standby face velocity. It may be possible to contain fumes with a reduced face velocity when the operator has vacated the hood area.



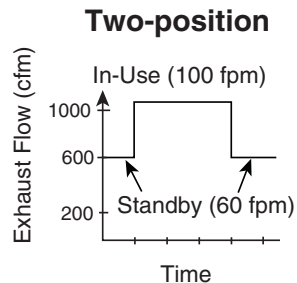
Graph represents the reduction in flow of a typical VAV fume hood using the ZPS sensor in Normal and Standby mode over a full range of sash openings.

The minimum flow is based on pending changes to ANSI/AIHA z9.5 Laboratory Ventilation Standards. This represents a potential 10:1 turn-down for the fume hood flow.

## Adaptive Constant Volume Fume Hoods (2-State)

The ZPS sensor also operates with the FHM530 for two-position control of Phoenix Controls valves configured for 2-state operation; see the FHM530 Product Data Sheet for additional interactive options.

When an operator is present, the ZPS sensor signals the fume hood system into the standard, maximum two-position, mode. When the operator is absent, the ZPS sensor sends a setback signal to the fume hood monitor, which commands the hood exhaust valve to the standby minimum two-position flow. The ZPS sensor can also be coupled with the sash sensor to provide two-state control.



Graph represents the reduction in flow of a typical two-state fume hood using the ZPS sensor. With no operator present, the airflow is reduced to a safe standby level—regardless of sash position. The fume hood would require a bypass.

## INSTALLATION

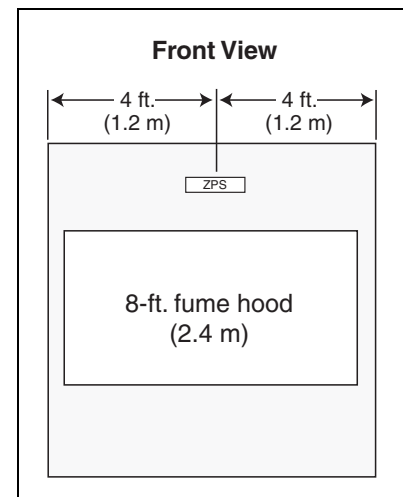
Zone Presence Sensors are surface mounted on the hood by the hood manufacturer or the field controls electrician.

### Physical Installation

Materials required:

- Two sheet metal screws per ZPS sensor (provided)
- Tape measure (*not provided by Phoenix*)
- Level (*not provided by Phoenix*)

1. Mark a point between 6-12' (1.8 - 3.7 m) above the finished floor centered laterally on the hood.
2. Remove the ZPS sensor cover and hold the sensor assembly centered, just above the mark, level to the floor.
3. Using the assembly as a template, mark the mounting holes at both ends and the cable hole onto the hood panel. Be certain the ZPS sensor assembly is oriented as indicated in the sensor's mounting assembly. Set the ZPS sensor aside.
4. Drill pilot holes at the marked mounting holes (recommended sizes are from .128" to .148", or 3.25 mm to 3.76 mm). Drill a 3/4" (19 mm) hole for the cable.
5. Install ZPS sensor assembly using two sheet metal screws.



ZPS sensor position on an 8' (2.4 m) hood

### Retrofit Installation

The ZPS110 sensor had a larger footprint than either the ZPS200 or ZPS300 sensors, so previous mounting holes may need to be filled for aesthetic purposes. The ZPS200 sensor is slightly smaller than the ZPS300 sensor, but uses same mounting holes.

1. Remove the existing ZPS sensor. All wiring may be reused.
2. Follow step 3 through 5 in **Physical Installation**.

## PHOENIX CONTROLS WIRING RECOMMENDATIONS

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- All circuits must conform to the requirements of an NEC Class 2 (dry) circuit.
- Use multiple transformers instead of larger transformers when more than 100 VA is required.
- Each pressurization zone should have either a dedicated single-phase primary circuit, or a secondary circuit disconnect.
- Use cable sizes recommended by Phoenix Controls (See "Phoenix Recommended Cabling" on page 10).
- Use stranded wire for ease of installation.
- Follow good wiring practices:
  - Locate cables away from sources of electrical interference (EMI/RFI).
  - Do not run signal or communication cable in the same conduit or wire way as power cables.
  - If signal cable must cross power cables place these 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.
  - Power supply and signal isolation on I/O devices vary from manufacturer to manufacturer. Verify the wiring device manufacturer's recommendations for isolating power and signal common connections and maintain polarity.
  - Local and national electrical codes take precedence.
- Strip 0.25" (6.4 mm) of insulation from each conductor, twist the strands, insert the conductor fully into the terminal block, and tighten the terminal.
  - Test the wire connection by pulling on each conductor.

### Electrical Installation

The ZPS sensor can be powered by either 24 Vac or  $\pm 15$  Vdc power sources. Use of a 2-conductor or 3-conductor, twisted cable for power is recommended. Consider the location of the transformer/power supply, the total connected load, and cable length and gauge to ensure proper operating voltage at the ZPS sensor.

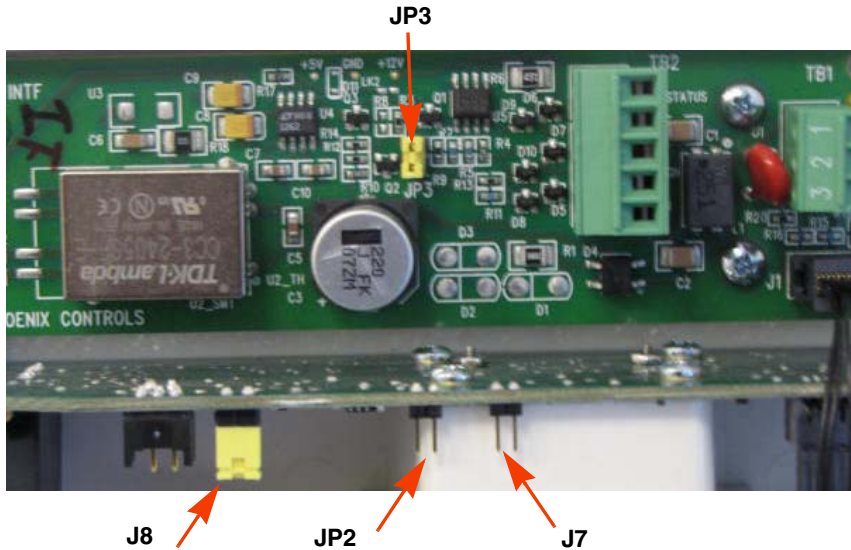
The ZPS sensor provides a User Status signal (0 Vdc = Normal/10.5 Vdc = Standby) to the Fume Hood Monitor (FHM) to indicate the presence or absence of a user in the detection zone. A 2-conductor twisted pair cable is recommended between the ZPS sensor and the FHM. This cable should not exceed 150 feet (45.7 m) in length.

Multiple ZPS sensor units can be wired in series to provide protection of hoods wider than 8 feet (2.4 m), or sashes on more than one side. By connecting the sensor units as an array, the hood will react to lighting and detection of users from any individual unit. A 3-conductor, twisted cable is required to interconnect the sensor units. This cable should not exceed 25 feet (7.6 m) in length.

### **IMPORTANT:**

- Jumper JP2 is used for firmware upgrades only. **Do not use this jumper unless instructed to do so by Phoenix Controls.**
- Jumper J7 is only used for putting the ZPS sensor in TEST mode to verify proper operation. **Do not use this jumper unless instructed to do so by Phoenix Controls.**
  - To enable this mode, power down the ZPS sensor. Install the J7 jumper and power up the ZPS sensor. You are now in TEST mode.

- To return to normal operation, power down the ZPS sensor, remove the J7 jumper, and power the sensor back up.



JUMPER TABLE

Jumper	Description
JP2	Firmware upgrade. <i>Contact Phoenix Controls for use.</i>
JP3	Multiple ZPS sensor instances on same fume hood.
J7	TEST mode. <i>Contact Phoenix Controls for use.</i>
J8	Factory setting. <i>Do Not Change.</i>

For any questions or if assistance is required, contact Phoenix Controls Product Support.

### Power Connections - Use Terminal block TB1

- For 24 Vac source:
  - Connect the L1 conductor to TB1-1
  - Connect the L2 conductor to TB1-3
- For  $\pm 15$  Vdc source:
  - Connect +15 Vdc to TB1-3
  - Connect power supply common (-) to TB1-2
  - Connect -15 Vdc to TB1-1

TERMINAL BLOCK POINTS

	1	2	3
TB1	L1/-15 V	PGND	L2/+15 V

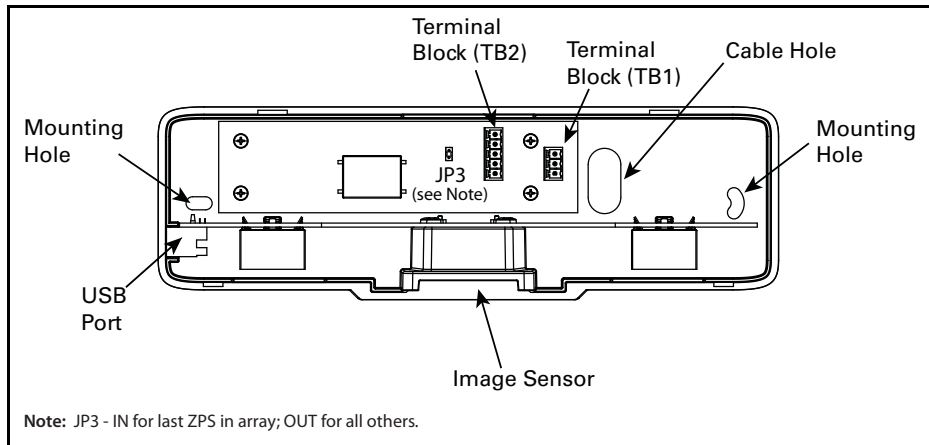
### Signal Connections - Use Terminal Block TB2

#### USER STATUS

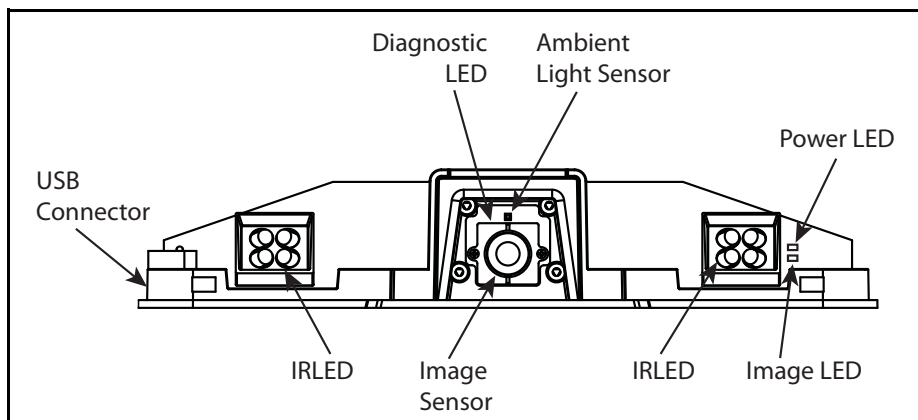
- In a single (ZPS310 sensor) application the User Status signal is connected directly to the Fume Hood Monitor (FHM) User Status input.
  - Connect the USER STATUS output signal to TB2-4.
  - Connect the USER STATUS signal GND to TB2-5.
- In dual (ZPS320 sensor), triple (ZPS330 sensor) and quad (ZPS340 sensor) arrays, only the primary ZPS sensor unit is connected to the FHM while all successive units are connected in series from one to the other.
  - Connect the previous USER STATUS to SEC IN TB2-1
  - Connect the previous AMB SGN conductor to AMB SGN TB2-2
  - Connect the previous GND conductor to GND TB2-3
- Insert cable(s) through cable entry hole.
- Terminate individual conductors as identified above and in the wiring diagrams on pages 7 and 8.
- Secure cables with three (3) cable mounts (provided).
  - Attach one directly behind the ZPS sensor to act as a strain relief and provide an adequate service loop
  - Apply remaining 2 to locations that will prevent the cables from tangling with moving sash components

TERMINAL BLOCK POINTS

	1	2	3	4	5
TB2	SEC IN	AMB SGN	GND	USER STATUS	GND

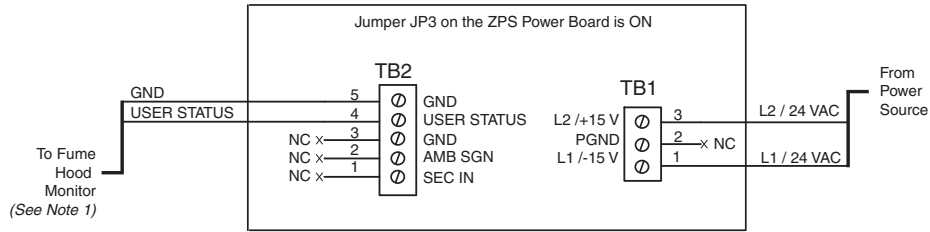


ZPS Sensor Assembly (mounting)

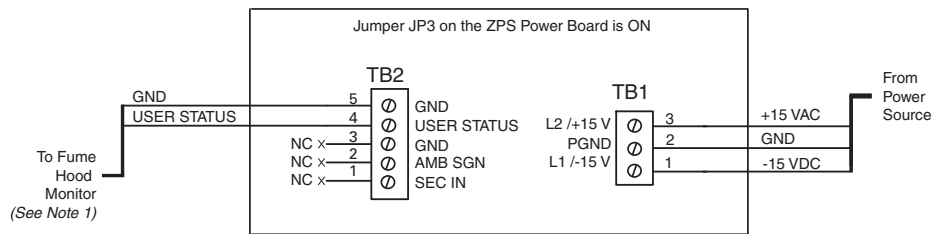


ZPS Sensor Assembly (bottom)

### Wiring Detail for ZPS310 - Powered by AC Voltage



### Wiring Detail for ZPS310 - Powered by DC Voltage

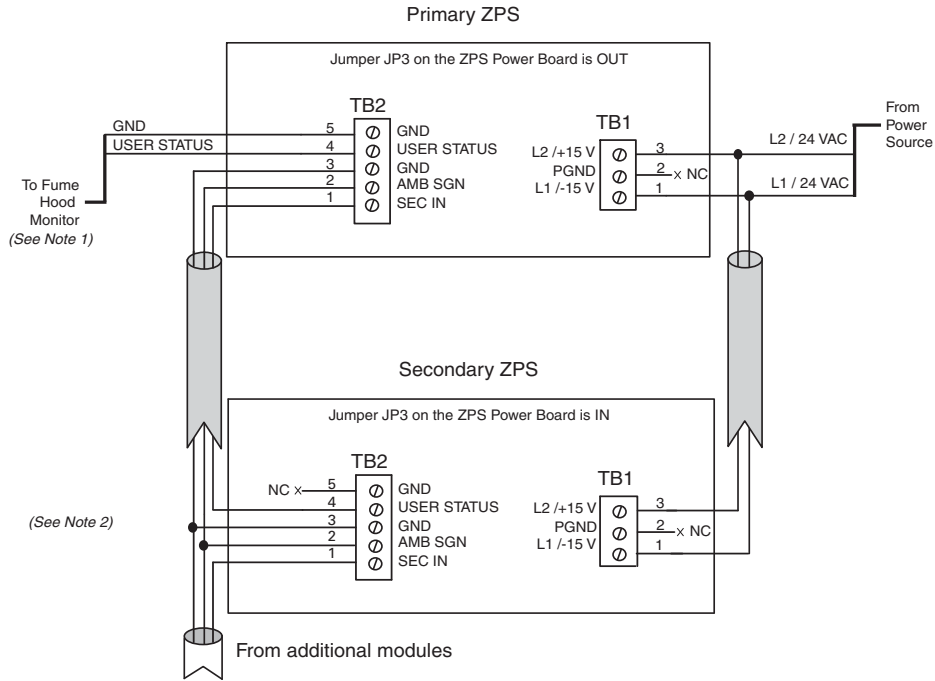


**Note:**

1. Maximum ZPS to FHM cable length is 150 feet (45.7 m).



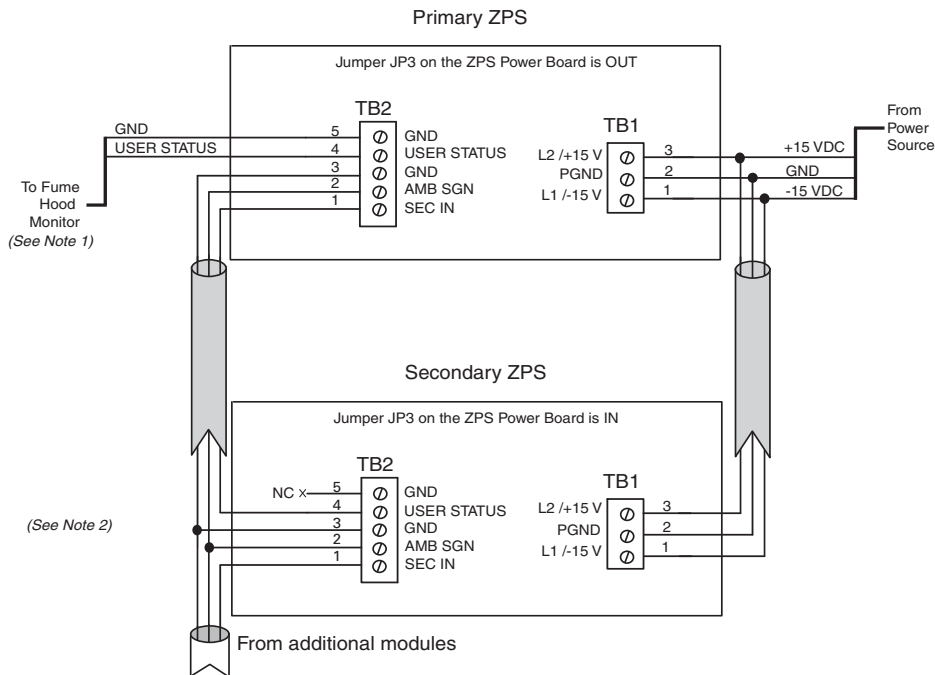
## Wiring Detail for ZPS320 - Powered by AC Voltage



### Notes:

1. Maximum ZPS to FHM cable length is 150 feet (45.7 m).
2. Maximum ZPS to Secondary cable length is 25 feet (7.6 m).
3. For ZPS 330/340 wiring contact Phoenix Controls Application Engineering.

## Wiring Detail for ZPS320 - Powered by DC Voltage



### Notes:

1. Maximum ZPS to FHM cable length is 150 feet (45.7 m).
2. Maximum ZPS to Secondary cable length is 25 feet (7.6 m).
3. For ZPS 330/340 wiring contact Phoenix Controls Application Engineering.

**PHOENIX RECOMMENDED CABLING**

Cable Type	Plenum Rated	Function	Wire Gauge	Primary Vendor/Part #	Alternate Vendor/Part #	Color Code	Notes
2C Round	No	24 Vac power	18	Belden 9409		1: Red 2: Black	Must be stranded
2C Round	Yes	24 Vac power	18	Belden 82740	Windy City NP002360	1: Red 2: Black	Must be stranded
3C Round	No	Signal	22	Belden 8443		1: Red 2: Black 3: Green	Must be stranded
3C or 4C Round	Yes	Signal	22	Belden 88444	Windy City 004380	1: Red 2: Black 3: Green 4: White (not used as 3C)	Must be stranded
4C Round	No	Signal	22	Belden 8444	Manhattan M13304	1: White 2: Green 3: Black 4: Red	Must be stranded
5C Round	No	Signal	22	Belden 8445	Manhattan M13305	1: White 2: Brown 3: Black 4: Red 5: Green	Must be stranded
8C	No	Signal	22	Belden 9421	Manhattan M13308	1: White 2: Orange 3: Black 4: Red 5: Green 6: Yellow 7: Blue 8: Brown	No substitutes
8C	Yes	Signal	22	Comtran 4956		1: White 2: Orange 3: Black 4: Red 5: Green 6: Yellow 7: Blue 8: Brown	No substitutes

## MAINTENANCE

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Phoenix Controls Zone Presence Sensors require no ongoing preventive maintenance. Once the field engineer has completed the field setup, the ZPS sensor will provide years of continuous operation.

If you use the ZPS Sensor Commissioning Software to adjust settings on the ZPS sensor, you will also need to purchase a USB cable to connect your laptop computer to the ZPS sensor. The type of cable you will need is an A-to-B, male-to-male cable assembly. These cables are available from any store that carries electronic accessories.

The recommended cable length is 10 feet or less. If cables are too long, signal degradation and communication loss can occur.

Detailed instructions for using the ZPS Sensor Commissioning Software are available in the *Hood Configuration Tool User's Guide*.

## TROUBLESHOOTING

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In the event of a circuit failure within the ZPS sensor, indication of user status will be at the fume hood monitor. A trained facilities person may troubleshoot the system using the guide below.

Problem	Possible Cause/Solution
Hood does not go into standby operation after operator leaves zone.	A. ZPS sensor cable break or wires have been disconnected. Check cable and termination. B. ZPS sensor has been miscalibrated. Check the calibration settings.

Fault Condition	Diagnostic LED (visible through window)	Image LED (under ZPS sensor assembly cover)
No image detected	Blink	Off - Triggered after 1 second
Invalid image detected	Off	Blink - Only after 10 consecutive invalid images
Infrared Diodes (IRED) open or shorted	On	Blink
Microprocessor halted	On	Off
<b>NOTE:</b> ZPS sensor <i>always</i> defaults to the Normal (safe) mode.		