

The Two-State Controller is intended for use in applications where fume hood monitoring is provided by others.

The Phoenix Controls Two-State Controller modulates a fume hood exhaust between minimum and maximum flows. It is mounted on and works in conjunction with a Phoenix Controls BEV or PEV two-position airflow control valve equipped with on-board solenoid. Switching between states is initiated by either a Phoenix Controls Zone Presence Sensor, a Phoenix sash sensor or a sash switch (provided by others).

**SPECIFICATIONS**

**Operating Range**

0-50 °C (32-122 °F)

**Power Requirements**

±15 Vdc, ±5% @

Solenoids:

- Single valve body, 0.075 amps
  - Dual valve body, 0.170 amps
- Controller: 0.100 amps

**Inputs**

- Normally open sash switch.
- Sash position indication from Phoenix Controls variable sash sensor.
- Operator occupancy signal from Zone Presence Sensor for two-state control.

**Output**

- 24 Vdc relay output commands two-position Phoenix Controls air valve.

**Monitoring Points**

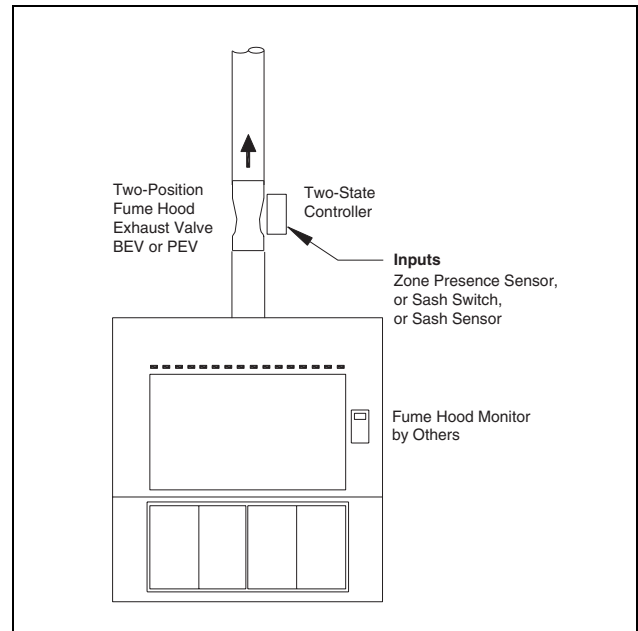
- Form C relay de-energizes during the following alarm conditions.
- Sash opening alarm condition (when sash switch or sash sensor is used)
- Low differential static pressure (when valve pressure switch is used)
- 0-10 Vdc represents sash position (when sash sensor is used)
- 0 (standard) or 12 Vdc (standby) indicates user status (when ZPS is used)

**ORDERING GUIDE**

The Two-State Controller is mounted in an electronics enclosure on the valve that it controls. Therefore, it must be ordered as part of the valve. To order the Two-State Controller use one of the “Valve Controller Designations” shown in the abbreviated Valve Ordering guide below.

**Valve controller designations:**

- G** = Two-State Controller, flow feedback and high wattage 24 Vdc solenoid valve (BEV, BSV only)
- T** = Two-State Controller and high wattage 24 Vdc solenoid valve



The Two-State Controller as part of a fume hood exhaust system.

FEATURE/OPTION		ANCILLARY EQUIPMENT REQUIRED				
		2 state controller	Sash switch	Sash sensor	ZPS	Pressure switch
CONTROL	N.O. microswitch input	✓	✓			
	Sash position input	✓		✓		
	Two-state switchpoint setting	✓		✓		
	Standby mode input	✓			✓	
	Standby mode logic	✓			✓	
	24 Vdc relay output to two-state valve	✓	✓	✓	✓	
	Pressure switch alarm	✓				✓
MONITORING	Form C alarm relay	✓		✓		✓
	Sash position	✓		✓		
	User status	✓			✓	

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## APPLICATIONS

### Two-State Controller Functions

**Two-Position Control:** The Two-State Controller, together with a Phoenix Controls PEV or BEV series airflow control valve with an on-board solenoid provides two-position exhaust control based on one of three acceptable input types.

**Sash Sensor:** In this application, the modulation between flow levels is based on degree of sash opening only. When the sash position signal exceeds the controller's two-position set-point voltage, the valve modulates to max flow, and vice versa. The set point voltage can be adjusted to switch between flows at any desired sash opening.

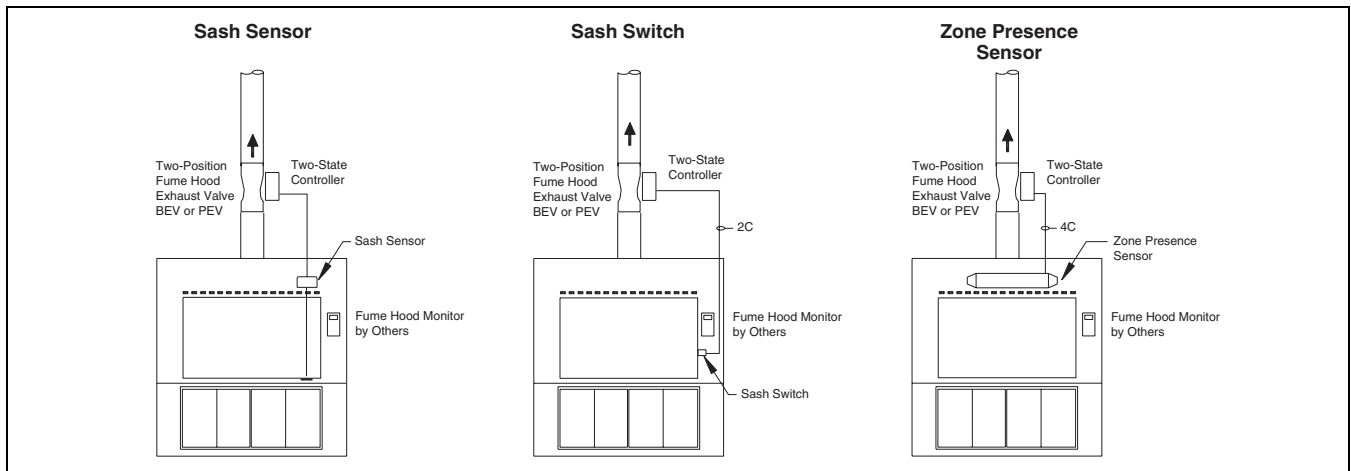
**Sash Switch (by others):** In this application, the modulation between flow is based on sash physical sash position. When the sash is opened beyond the sash switch location the valve modulates to max flow, and vice versa.

**Zone Presence Sensor:** In this application, modulation between max and min flow is based on an operator's presence or absence, respectively, at the fume hood.

**Monitoring Alarm Conditions:** The Two-State Controller, together with ancillary equipment provides a switched contact (Form C relay) for external monitoring of alarm conditions.

**Sash Opening Alarm:** This condition is initiated either by a sash switch (by others) or by a Phoenix Controls sash sensor. With a micro switch, an alarm is generated when the switch opens. With a sash sensor, an alarm is generated whenever the sash position signal exceeds the sash opening set point voltage.

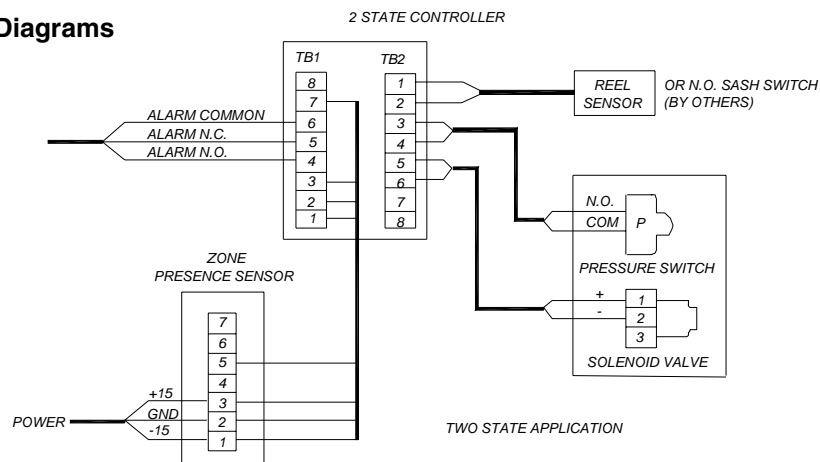
**Differential Static Pressure Alarm:** This condition is detected by having a pressure switch mounted on the hood exhaust valve. The pressure switch contact opens when a low static pressure condition exists in the exhaust duct.



Two-State Controller options.

### POINTS & WIRING (see submittal wiring diagram for project-specific details.)

#### Typical Wiring Diagrams



## MAINTENANCE

The Phoenix Controls Two-State Controller requires no ongoing maintenance. Once the field engineer has completed the field setup, the controllers will provide years of continuous operation.

Replacement parts are available.

Replacement Part	Part Number
Two-state controller	800-100-120
Flow feedback board	800-000-006
Pressure switch	Contact factory*

\* Pressure switch dependent on pressure operating range of valve.

## TROUBLESHOOTING

The Two-State Controller incorporates a Form C relay for alarm interface to DDC systems. This alarm may be caused by a problem condition in the exhaust duct (e.g., fan failure) or by the sash being raised above the adjustable maximum sash height.

Problem	Possible Cause/Solution
1. Form C relay de-energized (alarm condition)	A. Low static
	<ul style="list-style-type: none"><li>• Loss of airflow. Check fan operation and duct blockage.</li><li>• Sash height alarm.</li><li>• Blocked or kinked pressure switch tubing. Correct tubing.</li></ul>
2. Improper measured airflow.	Incorrect valve position. Check pneumatic tubing and pressure. Check solenoid operation.