

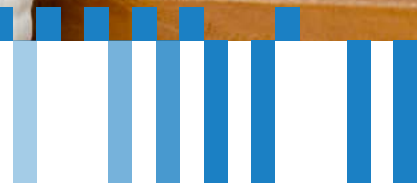


® Knowledge  
Beyond  
Measure.



# Driving Safety Through Efficient Lab Design

Teaching Laboratory

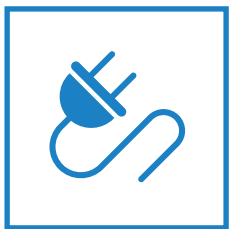


# Features & Benefits



## Increased Safety

- Flow measurements with best-in-class +/- 3% accuracy
- Closed Loop Control of fume hood face velocity and room air flows
  - Sidewall sensor actually measures fume hood face velocity for user safety
  - Thermal flowstations actually measure room air flows for user safety



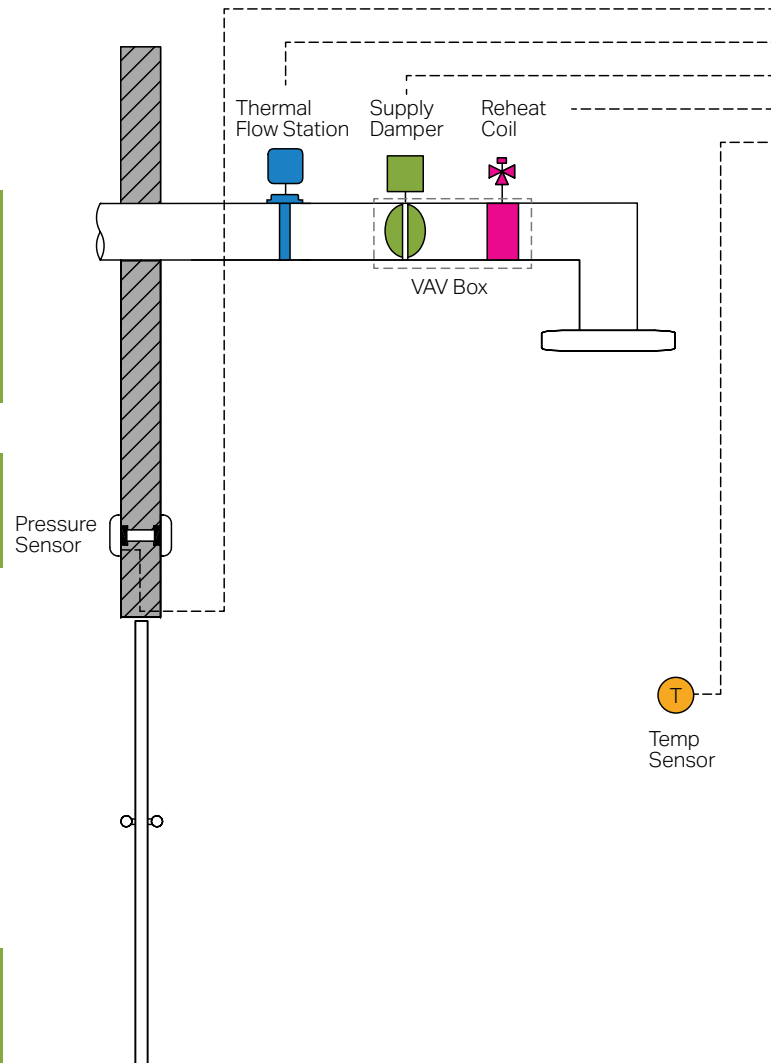
## Energy Savings

- VAV control reduces airflow
- Low-pressure drop dampers, as recommended by US EPA, reduce fan energy



## Initial Cost Savings

- Lower capital cost
- Decreased installation costs
- Reduced system pressure drop allows down-sizing of fans, air handlers and other HVAC equipment

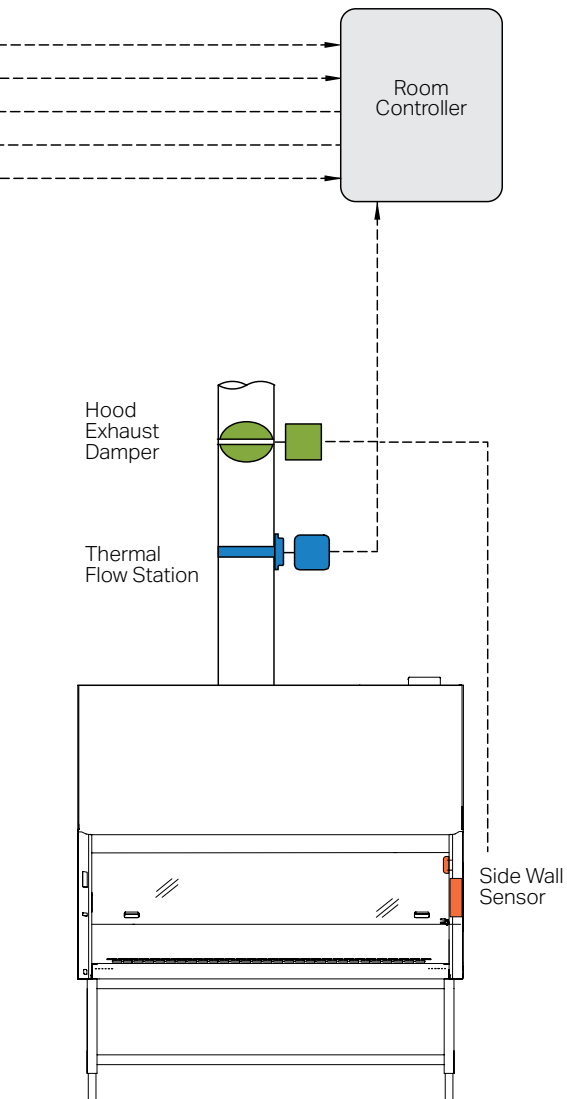


## Teaching Lab

- Enclosed lab with commonly-open door
- VAV reduces airflow to save energy
- High density of fume hoods, snorkels, and biosafety cabinets
- Fume hoods, snorkels, and biosafety cabinets provide primary containment
- Negative air balance provides secondary containment
- Minimum fume hood exhaust sufficient for minimum ventilation; general exhaust not required
- Space temperature maintained for occupant comfort and experiment integrity

## General Sequence of Operation

The room controller simultaneously controls room balance, ventilation and temperature in the laboratory.



## Room Balance Control Sequence of Operation

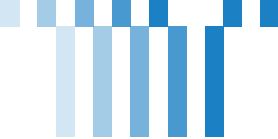
The room controller continuously measures supply and exhaust volumes in order to maintain a constant flow offset. If the offset becomes too large, indicating that the room balance is too negative, the room controller closes the general exhaust and then opens the supply to its maximum setpoint. If the offset becomes too small, indicating that the room balance is not negative enough or positive, the room controller closes the supply to its minimum ventilation or cooling flow and then opens the general exhaust.

## Ventilation Control Sequence of Operation

Minimum fume hood exhaust is sufficient to maintain minimum ventilation.

## Temperature Control Sequence of Operation

The room controller continuously measures the room temperature. If the room temperature rises above setpoint, the room controller closes the heating valve until room temperature achieves setpoint. If the room temperature falls below setpoint, the room controller opens the heating valve until room temperature achieves setpoint.

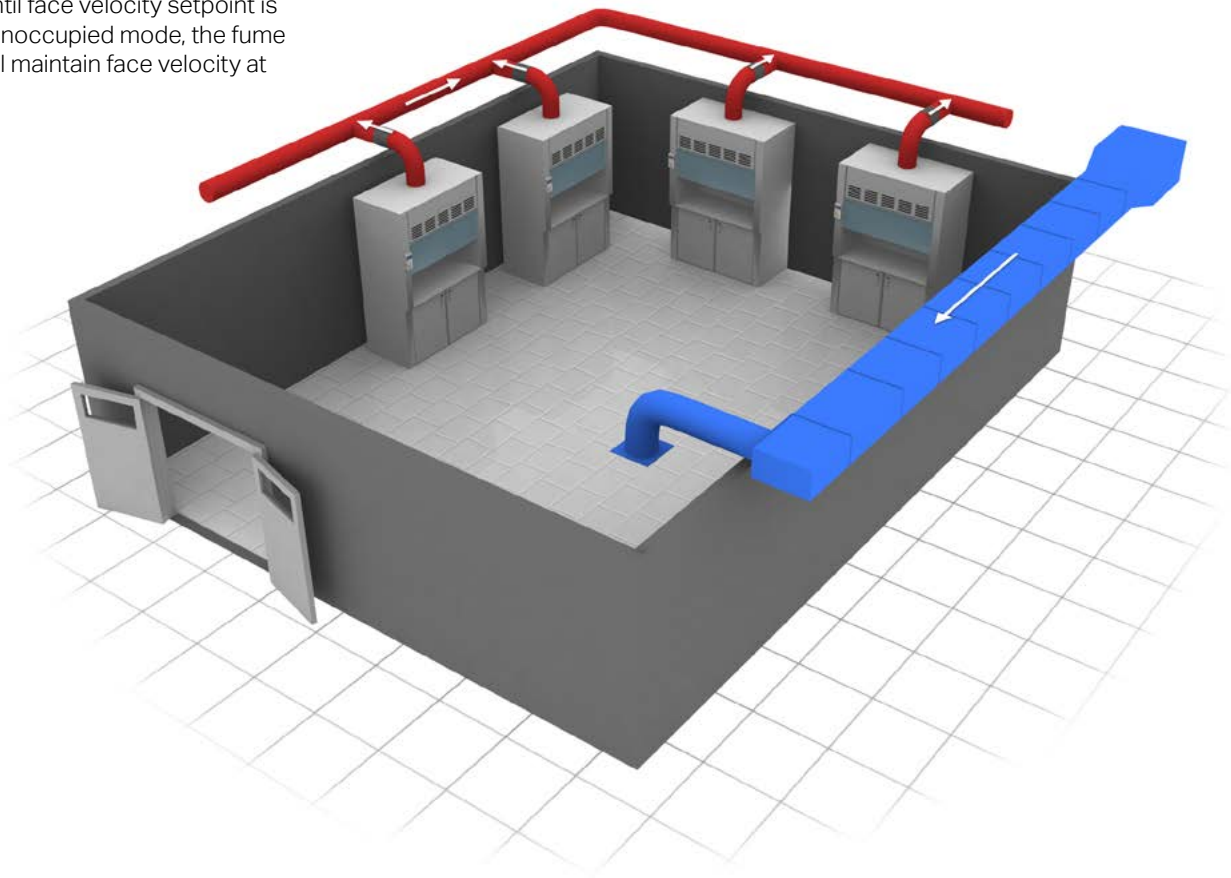


# Teaching Laboratory

## Driving Safety Through Efficient Lab Design

### Fume Hood Controller Sequence of Operation

The fume hood controller continuously measures average fume hood face velocity using a sidewall sensor. If average face velocity rises above setpoint, the fume hood controller will reduce the exhaust volume until face velocity setpoint is achieved. If average face velocity drops below setpoint, the fume hood controller will increase exhaust volume until face velocity setpoint is achieved. During unoccupied mode, the fume hood controller will maintain face velocity at setback setpoint.



Specifications are subject to change without notice.

TSI, the TSI logo are registered trademarks of TSI Incorporated in the United States and may be protected under other country's trademark registrations.



**Knowledge Beyond Measure.**

**TSI Incorporated** - Visit our website [www.tsi.com](http://www.tsi.com) for more information.

<b>USA</b>	Tel: +1 800 874 2811	<b>India</b>	Tel: +91 80 67877200
<b>UK</b>	Tel: +44 149 4 459200	<b>China</b>	Tel: +86 10 8219 7688
<b>France</b>	Tel: +33 1 41 19 21 99	<b>Singapore</b>	Tel: +65 6595 6388
<b>Germany</b>	Tel: +49 241 523030		