antrumX™

Chemical-Monitored Laboratory Exhaust

Recent regulatory updates, including ANSI Z9.5, California Energy Code, and I2SL Best Practices Guide, have significantly modified the suggested operation of laboratory exhaust fans. Specifically, as stated in the 2022 version of ANSI Z9.5, "Maintaining a constant exit velocity or assigning a prescriptive minimum allowable minimum exit velocity is not sufficient to meet this standard."

When a VAV strategy is implemented, a chemical-monitored exhaust air stream is one strategy that can be used to comply with the aforementioned updates.

Introducing AntrumX™, a scalable centralized sensing solution that uses duct static pressure to draw air samples from the exhaust fan stacks back to a single sensor. This design allows laboratories to take advantage of energy saving opportunities by closing the bypass damper and reducing the fan speed when exhaust airstream contaminants are below the concentration trigger level.

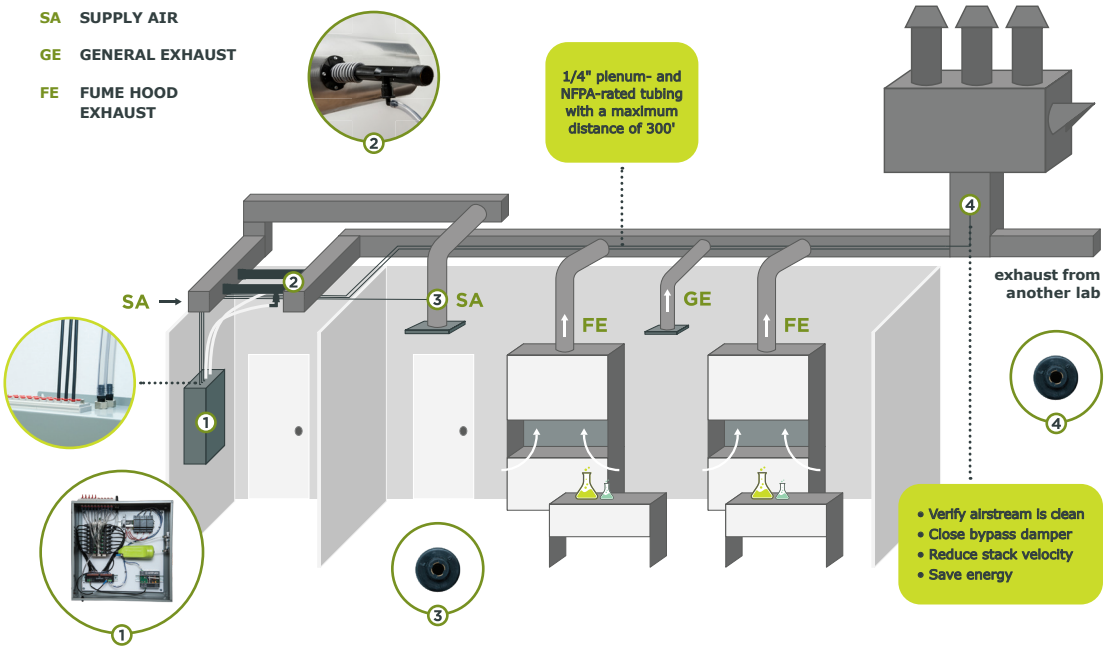
SAMPLE INSTALLATION

1. **CONTROL PANEL** Contains the sensor pack.
2. **AIR ACCELERATOR** Uses building differential pressure to create a vacuum.
3. **DUCT PROBE – SUPPLY AIR PICKUP** Air samples are drawn from the probe to the control panel.
4. **DUCT PROBE – EXHAUST FAN RISER**

SA **SUPPLY AIR**

GE **GENERAL EXHAUST**

FE **FUME HOOD EXHAUST**



According to a recent study, a laboratory exhaust system may account for up to 40% of the ventilation system's energy consumption and about 30% of the laboratory building's total electrical energy consumption (I2SL, 2020; Kaushansky & Maine, 2002). Data collected at operating research laboratories with air quality monitors in the exhaust manifold indicate that emission events capable of triggering the higher volume flow rate typically occur no more than one hour per month (12 hours per year; 0.1% of the time) (Cochran & Sharp, 2008).

Benefits of Antrum's Centralized Sensing

Safety
The AntrumX centralized sensing platform utilizes zero moving parts and a clean supply air reference to reduce the probability of failure and avoid the re-entrainment of hazardous exhaust back into the laboratory building and/or nearby buildings.

Maintainability
Unlike other centralized solutions, which require each sensor to be replaced and calibrated individually, the patented AntrumX solution provides independently calibrated sensors in a single sensor pack so that 16 zones can be calibrated in under 1 minute.

Total Cost of Ownership
Engineered on a scalable sensing platform that streamlines maintenance and doesn't require pumps allows AntrumX to provide significant value to laboratory facilities at a fraction of the cost of other centralized sensing solutions.

Energy Savings
Using AntrumX to monitor the exhaust stack for VOCs allows laboratory facilities to stop recirculating outside air to maintain a prescriptive minimum exhaust velocity and safely reduce exhaust airflows.

System Inputs

3 Fans (N + 1)	CFM	KW
Total System	70,000	73.44
100% Speed (ea.)	35,000	36.72
50% Speed (ea.)	17,500	15.03

Operation	Reduced Speed	Total KWh
7 days	0 hours	643,304
7 days	12 hours	453,278
7 days	16 hours	389,937

Energy Savings Outputs

Cities	Rates	12-Hour Setback Annual Savings	16-Hour Setback Annual Savings
KC	$0.1154	$21,929	$29, 239
Detroit	$0.1234	$23,449	$31,266
Boston	$0.1944	$36, 941	$49,255
NYC	$0.2005	$38,100	$50,800
SF	$0.2462	$46,784	$62,379

Based on average regional KWh rates: https://www.eia.gov/

Common Sensing Options Include:

Parameter*	Point(s)
Total Volatile Organic Compounds	TVOC Index, TVOC (MOx), TVOC (PID)
Carbon Dioxide	CO_2
Carbon Monoxide	CO
Ammonia	NH_3
Formaldehyde	CH_2O
Particulate Matter	PM0.1, PM0.3, PM0.5, PM1.0, PM2.5

**Contact local Antrum representative for custom sensing configurations*