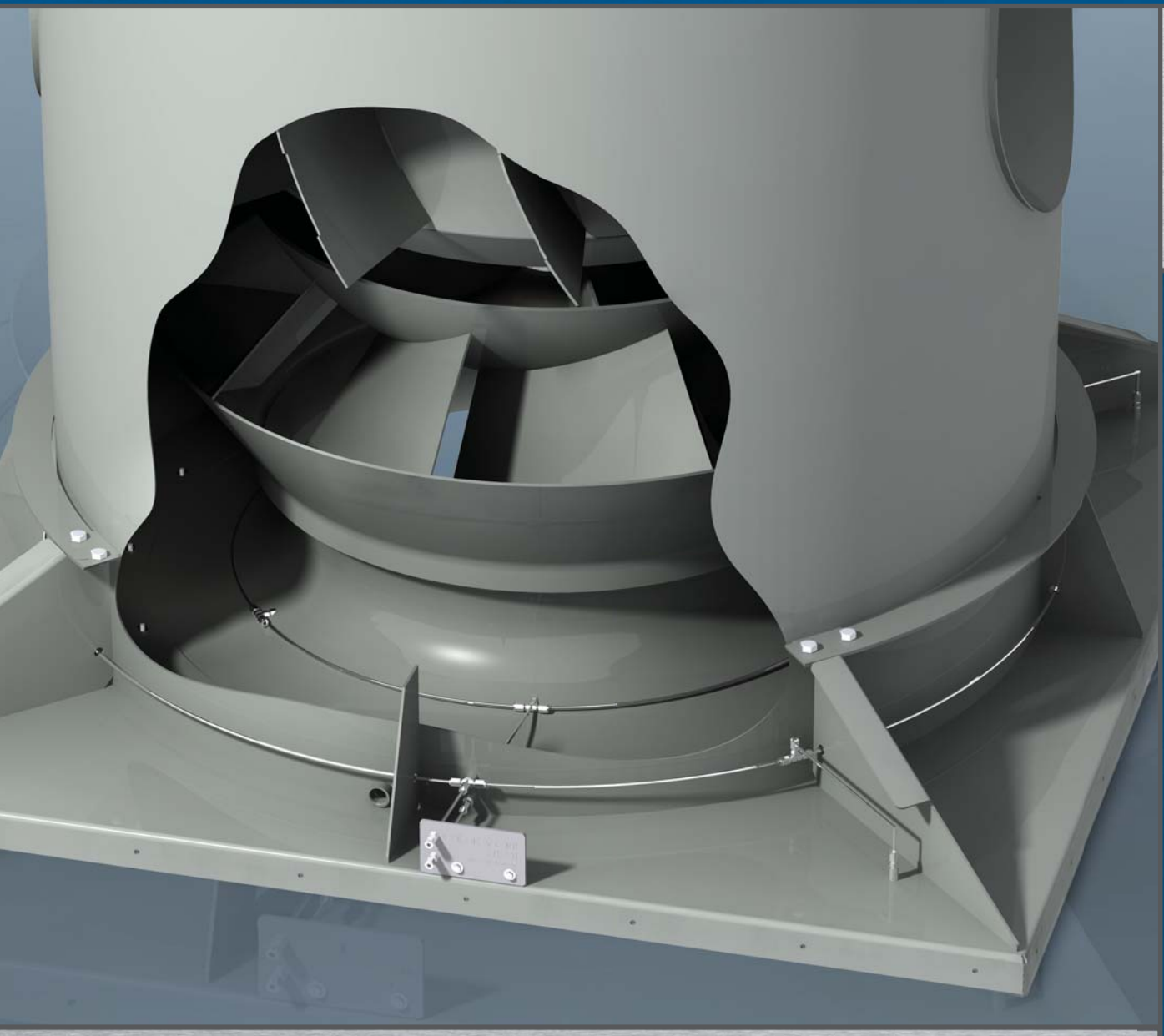
Laboratory Exhaust Systems

Vektor Sure-Aire™ Flow Measuring System

- Accurate Flow Measurement • Reduces Fan Energy and Fan Noise
- Eliminates Flow Measuring Probe Corrosion and Fouling



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July
2008

Laboratory Exhaust Airflow Measuring System

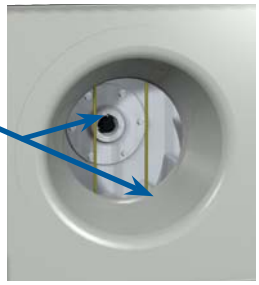
Quantifying the laboratory facility exhaust flow is critical in maintaining room containment, ensuring researcher and student safety, and safe exhaust effluent dispersion. In addition, measuring exhaust flow expedites facility commissioning and validates the integrity of the laboratory exhaust control system.

System Static Pressure Effect

Traditional flow probes create a system static pressure effect. In the past, measuring and monitoring the exhaust flow of laboratories has been difficult, not only because of the challenges of locating the flow measurement probes, but also of probe corrosion concerns. The primary problem with flow measurement probes is that they are invasive to the flow, obstructing the flow area of a fan. This obstruction, when applied to fan inlets, adds a system static pressure effect (see Figure 1) that must be added to the operating static of the fan.

Figure 1

Invasive flow measurement probes



This additional system static pressure effect must be compensated for by increasing the fan RPM and horsepower, resulting in greater energy consumption and greater fan noise. The magnitude of this additional system effect depends on the fan inlet flow, fan size, and the size and type of the probes. These increased static pressures can range from approximately 0.5 in. wg to greater than 3.0 in. wg (Table 1).

SWSI Size	Max Class I	Max Class II	Max Class III
	Static Pressure (in. wg)		
20	1.2	2.0	3.2
36	0.8	1.3	2.1
73	0.4	0.7	1.1

Table 1

Performance taken at 70% wide open volume (%WOV) and at max. class RPM

Benefits of the Vektor Sure-Aire™ System

- No system effect or resistance to airflow
- No additional pressure drop
- No increase in RPM, sound, or brake horsepower
- No additional energy cost for the building owner
- No probe corrosion to cause fan failure

Vektor Sure-Aire™ Operation

The Greenheck Vektor Sure-Aire™ airflow measuring system utilizes a non-invasive measuring system by using the inlet venturi of the fan as a calibrated nozzle (orifice). This flow measuring technique is used by accredited laboratories for certifying fan performance. Measuring the pressure drop across this calibrated nozzle accurately determines the inlet flow of the fan. The pressure drop is measured by using non-invasive static taps at the throat of the venturi.

Non-invasive pitot type probes and static pressure taps are installed to measure the pressure drop through the inlet venturi.

CFM is predictable based on the resulting pressure drop through the venturi.

Pressure static taps around the throat of the fan inlet venturi.

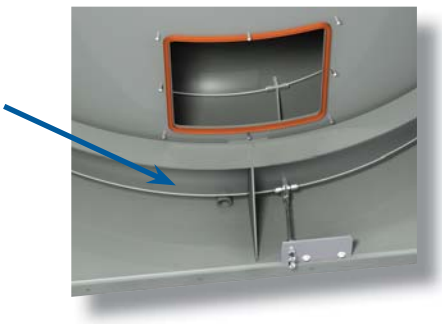


Figure 2

Sure-Aire™ Fan Flow Measuring Venturi

Vektor Sure-Aire™ can be factory provided on any Vektor fan system.

Measuring Lab Exhaust Airflow

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Variable Air Volume (VAV) Systems

On VAV exhaust systems that use bypass air dampers to modulate building flow, the flow measured at the fan inlet is not equal to the building exhaust.

On these applications it is necessary to measure the bypass airflow, as well as the fan flow, to determine the building exhaust. On systems that use bypass air, the building exhaust (or lab exhaust airflow) can be calculated by:

Lab Exhaust Airflow	=	Exhaust Blower Airflow	–	Bypass Airflow

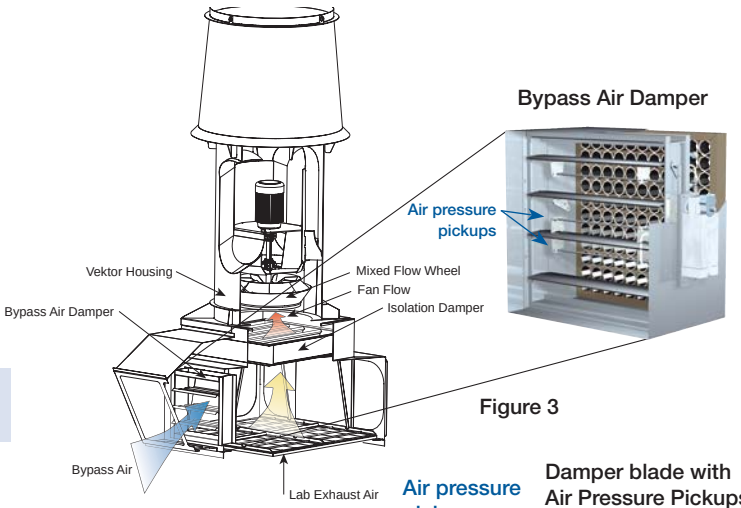


Figure 3

Bypass Airflow Measurement

The Vektor Sure-Aire™ laboratory airflow measuring system utilizes Speciflow Measurement Technology to accurately measure the bypass airflow by applying static pressure sensors on each bypass damper blade. The configuration of pressure sensors on the damper blades (Figure 3) makes the measurement insensitive to non-uniform flow conditions. This results in a flow measurement accuracy of ± 3 percent, regardless of the bypass damper position, velocity, or flow.

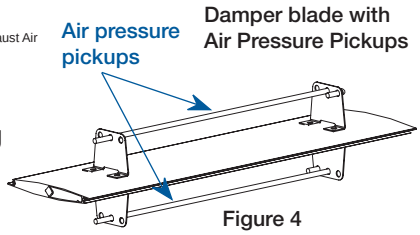
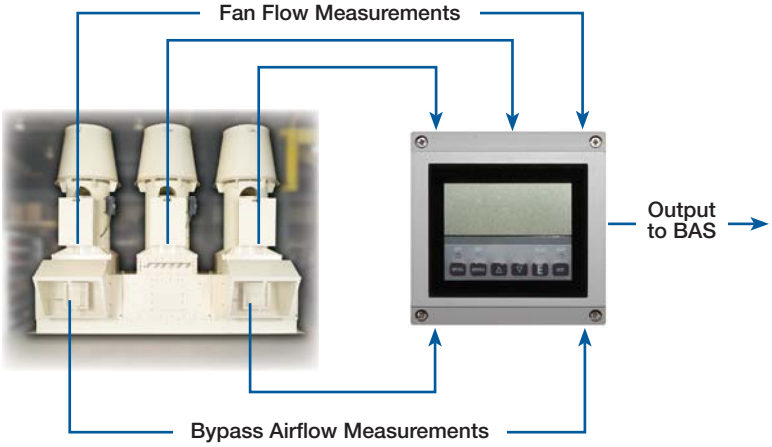


Figure 4

The bypass airflow measurement is accomplished by utilizing air pressure pickup sensors mounted on each blade of the bypass air damper (Figure 4). Bypass dampers are corrosion resistant coated steel airfoil blades that are designed to withstand velocities up to 6,000 fpm and differential pressures of up to 15 in. wg.

Control Features

The Greenheck Vektor Sure-Aire™ laboratory flow measurement system includes a digital keypad/display for reading all fan and bypass damper flows. The display calculates the total system exhaust flow and can be integrated with the facility Building Automation System (BAS).



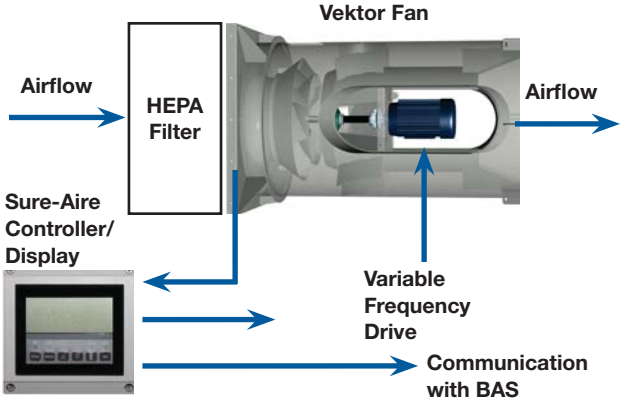
- Real time digital LCD display that shows each fan flow, bypass airflow, and total lab system exhaust flow
- NEMA-4 enclosures are suitable for indoor or outdoor mounting
- Provides a 0-10 VDC linear signal for interfacing
- Accuracy to 0.5% of full scale at 70°F
- Voltages: 115/60/1 or 230/60/1
- Compatible with most Building Automation Systems (BAS)

Application to HEPA Filters

Biocontainment/isolation room exhaust using Sure-Aire™ to maintain constant flow

Benefits:

- Displays and reports actual critical fan flow
- Maintains constant flow as HEPA filter loads
- Flow measuring technique saves energy... "Green"



Model Comparison and Warranty

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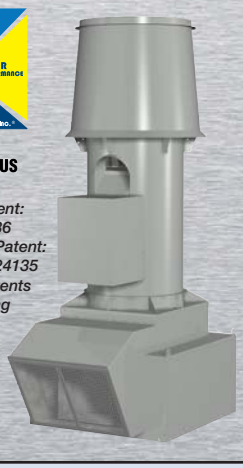
VEKTOR™ Family of Lab Exhaust Systems



U.S. Patent: 7320636
Singapore Patent: 124106, 124135
Other Patents Pending

U.S. Patent: 124105
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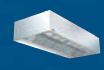
	Vektor-H	Vektor-MD	Vektor-CD
Housing Style	Inline Centrifugal	Inline Mixed Flow	Centrifugal
Stack Style	High Plume Nozzle	High Plume Dilution Nozzle	High Plume Dilution Nozzle
Min Flow	270 cfm (850 m^3/hr)	1,500 cfm (2,550 m^3/hr)	500 cfm (850 m^3/hr)
Max Flow	24,000 cfm (40,750 m^3/hr)	80,000 cfm (135,900 m^3/hr)	100,000 cfm (170,000 m^3/hr)
Max ESP	Up to 3.5 in. wg (875 Pa)	Up to 8 in. wg (2000 Pa)	Up to 14 in. wg (3500 Pa)
c UL us	Listed for Electrical 705 (File no. 40001) and Grease Removal 762 Power Ventilators for Restaurant Exhaust Appliances (File no. MH11745)	Listed for Electrical 705 (File no. 40001)	Listed for Electrical 705 (File no. 40001)
AMCA Certification	Sound and Air Performance	Air Performance	Induced Flow Fan Air and Sound Performance
Warranty	1 Year	3 Years	3 Years



Our Warranty

Greenheck warrants this equipment to be free from defects in material and workmanship for a period of one year (Vektor-H) three years (Vektor-MD, Vektor-CD) from the purchase date. Any units or parts which prove defective during the warranty period will be replaced at our option when returned to our factory, transportation prepaid. Motors are warranted by the motor manufacturer for a period of one year. Should motors furnished by Greenheck prove defective during this period, they should be returned to the nearest authorized motor service station. Greenheck will not be responsible for any removal or installation costs.

As a result of our commitment to continuous improvement, Greenheck reserves the right to change specifications without notice.

U.S. GREEN BUILDING COUNCIL MEMBER

Prepared to Support Green Building Efforts

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