STACK-probe
In-Stack Flow Traverse Probes

Proven solutions for the Power industry

Air Monitor
Precision Airflow Measurement
An ONICON Brand

STACK-probe

Product Description

The STACK-probe Stainless Steel Pitot Airflow Traverse Probe is ideally suited to provide continuous, accurate, and reliable volumetric flow monitoring for stacks and ducts of any size and configuration. This product can be used as an integral part of a continuous emissions monitoring (CEM) system used to comply with the Clean Air Act's stringent emission measurement standards.

How It Works

Required is the means to accurately monitor the average flow rate and temperature of the stack emissions. Flow rate monitoring is performed by sensing individual flow components at multiple points (traversing) across one or more diameters for circular stacks or along multiple parallel traverses for rectangular stacks, and averaging the obtained values. Average temperature measurement is achieved using one or more temperature probes to obtain a single full traverse of a stack.

The Air Monitor STACK-probe is an airflow traverse probe based on differential pressure (Pitot-Fechheimer) technology for measuring airflow; the same technology that will be used during the certification process to verify relative accuracy of the flow monitoring system. Each STACK-probe consists of two separate round tube self-averaging manifolds; one to measure the stack total pressure, and the other to measure stack static pressure. Multiple Pitot-Fechheimer ports are positioned on each manifold on an equal area basis (for rectangular stacks) or on an equal concentric area (for circular stacks). Similarly, average stack temperature is measured using a temperature probe with multiple sensing elements spaced along the probe length.

The engineered truss type design of the STACK-probe utilizes tubular structural materials welded to a 6", 150# raised face pipe flange, permitting cantilever probe mounting in even extremely large stacks. Standard Type 316 stainless steel construction ensures long-term durability and continuing accuracy in most installations, with materials such as Hastelloy C22 and Inconel available for extreme temperature and/or severely corrosive applications.

As a basic instrument, the STACK-probe does not require anyinitial or periodic calibration to measure flow accurately. As a passive device with no moving parts or active electrical circuits, removal of the STACK-probe from the stack after installation for repair or calibration is not required.

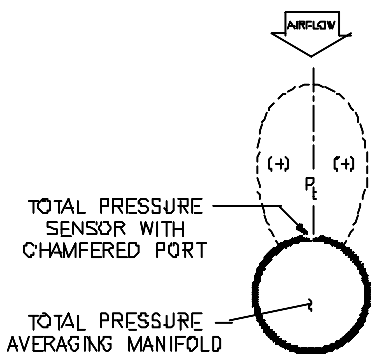


Figure 1

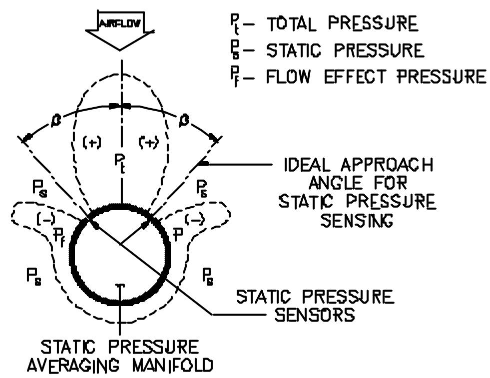


Figure 2

Accuracy

All recognized flow measurement standards (ASHRAE Fundamentals, AMCA Publication 203, Industrial Ventilation Manual, 40CFR60, etc.) agree that accurate airflow measurement is highly dependent upon the quantity and pattern of sensing points in the airstream, and the relative position of the sensing points to upstream/downstream flow disturbances.

When installed per Air Monitor's Minimum Installation Requirements (see back page), the minimum quantity and placement of STACK-probe airflow traverse probes shown below will produce assured measuring accuracies of ±2-3% of actual airflow.

Measurement Location

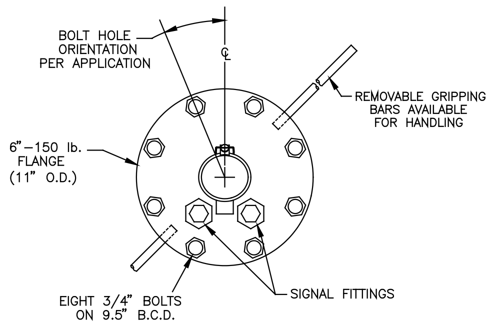
EPA defines an appropriate location for installation of a CEM System by referencing 40 CFR 60, Appendix A, Method 2. The desired location would be one with a minimum of eight stack or duct diameters downstream and two diameters upstream of any flow disturbance. Minimum siting requirements are two downstream diameters and one-half upstream diameter of any flow disturbances. Provisions are made in 40 CFR 75 to petition the EPA for an alternate monitoring location when the minimum site requirements cannot be met.

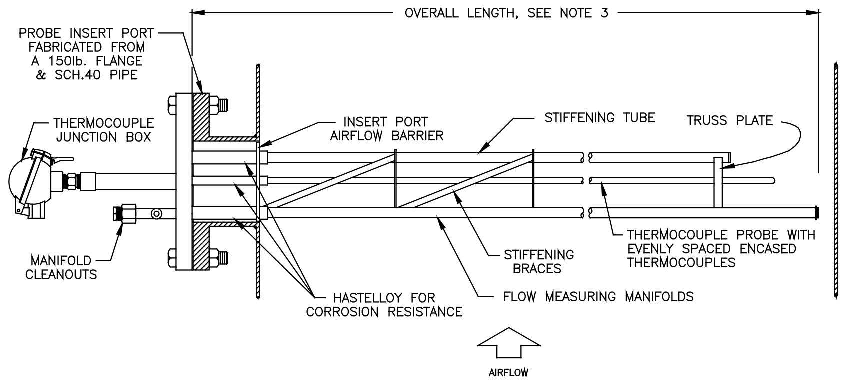
Pre-RATA Traverse Services

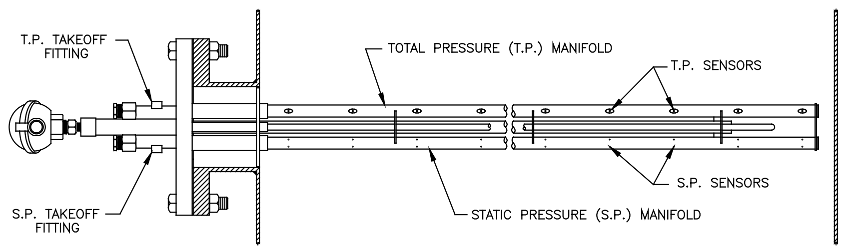
Air Monitor offers pre RATA traverse services using a 5 hole pitot tube, transducers, and data acquisition system to automate many aspects of the relative accuracy test audit traverse test and eliminate errors caused by pitch and yaw components of velocity. This is the most accurate field verification test available.

Typical Installation

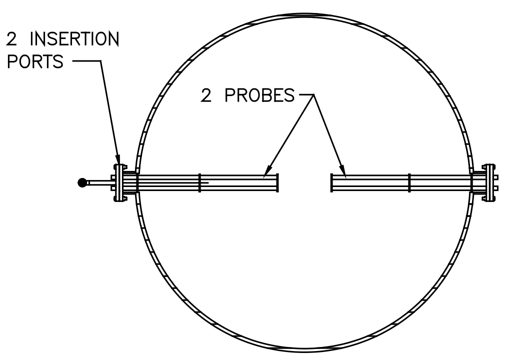
STACK-probe w/Temperature and Insert Port



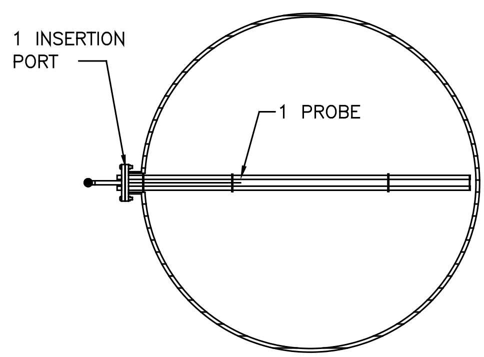




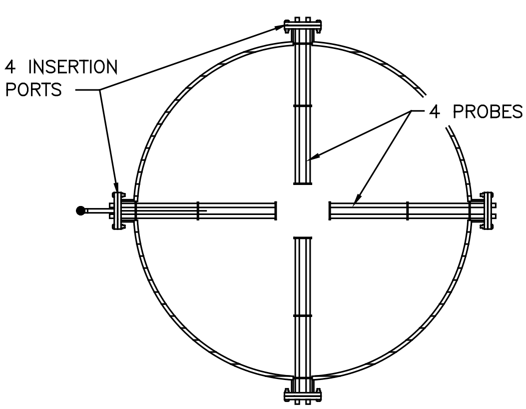
In-Stack Probe Configurations – Single-Wall Stacks



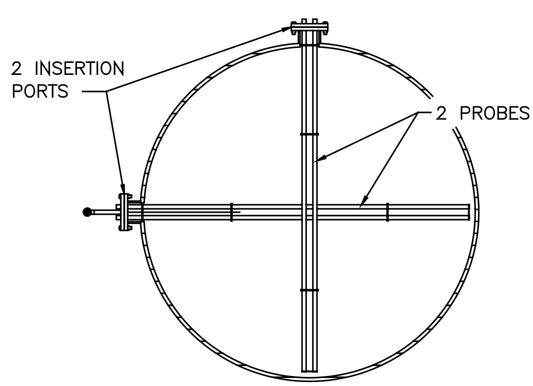
TWO CANTILEVERED STACK–probes
(ONE WITH TEMPERATURE SENSOR)



ONE FULL–LENGTH STACK–probe
(WITH TEMPERATURE SENSOR)



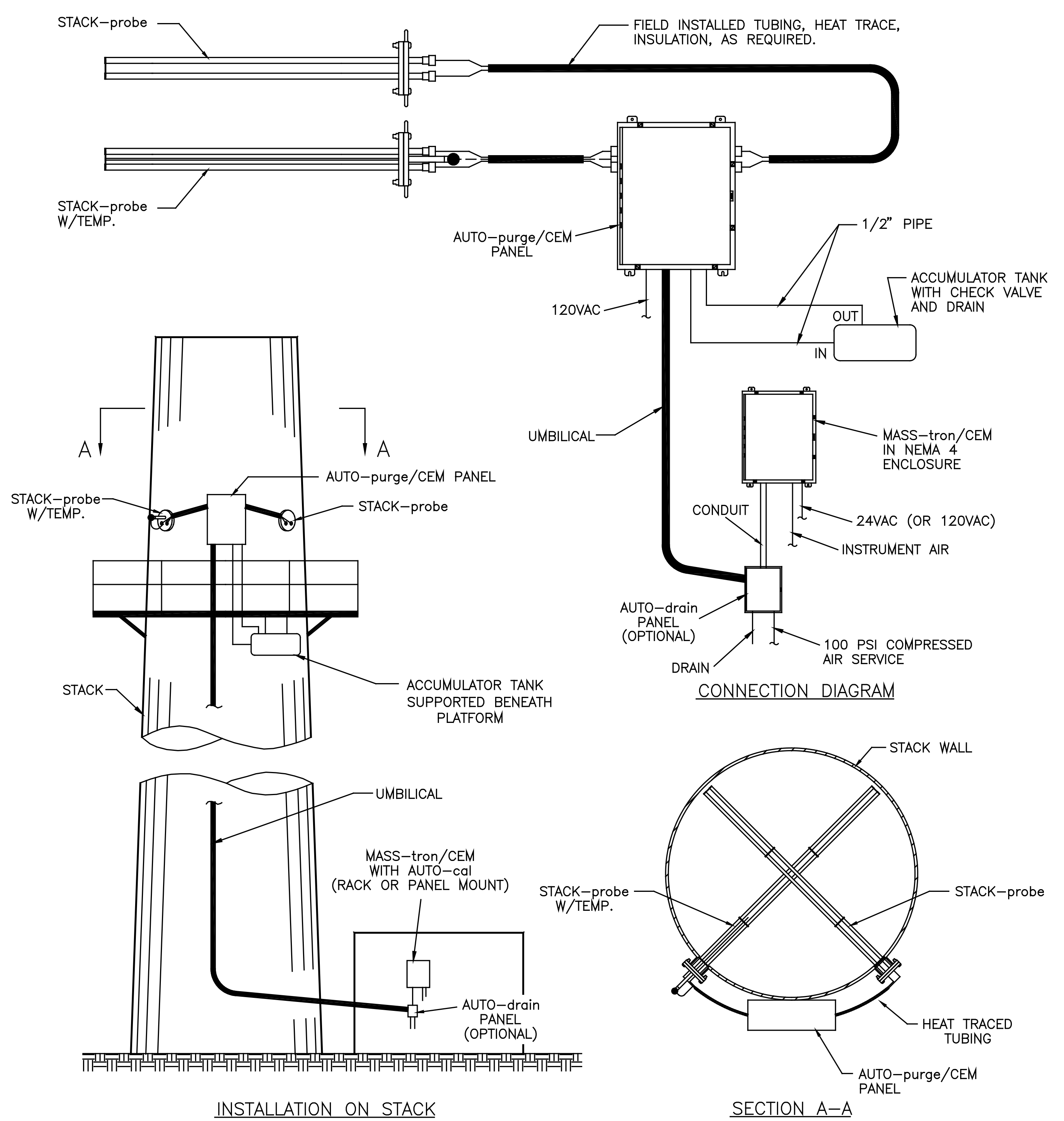
FOUR CANTILEVERED STACK–probes
(ONE WITH TEMPERATURE SENSOR)



TWO FULL–LENGTH STACK–probes
(ONE WITH TEMPERATURE SENSOR)

Typical Installation

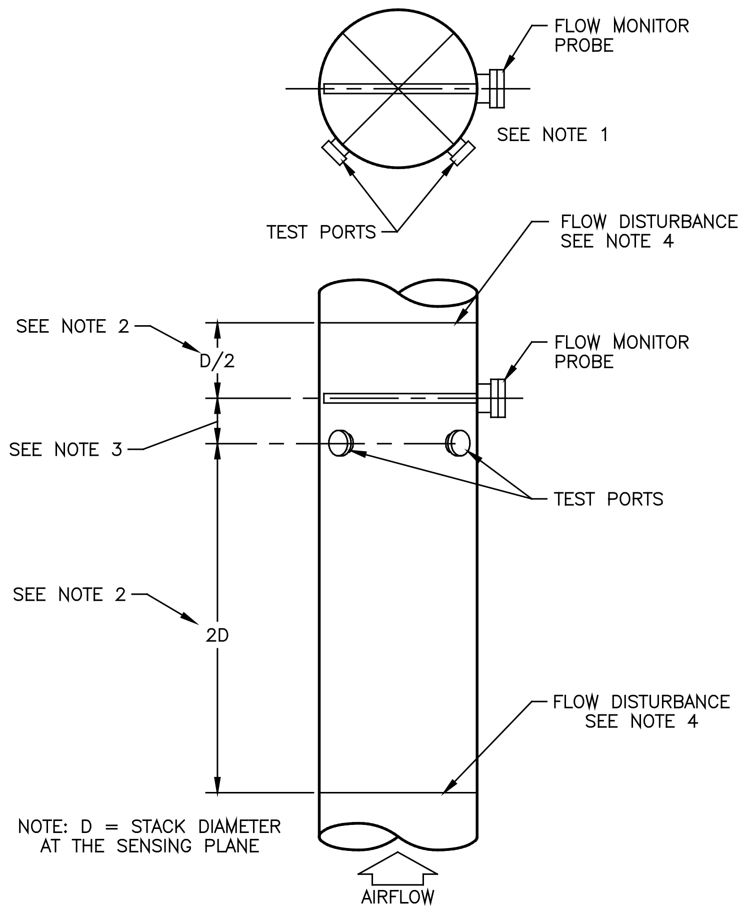
Dual Traverse Schematic



AUTO-purge/CEM Located on the Stack Platform
MASS-tron/CEM Located in the Instrumentation Enclosure

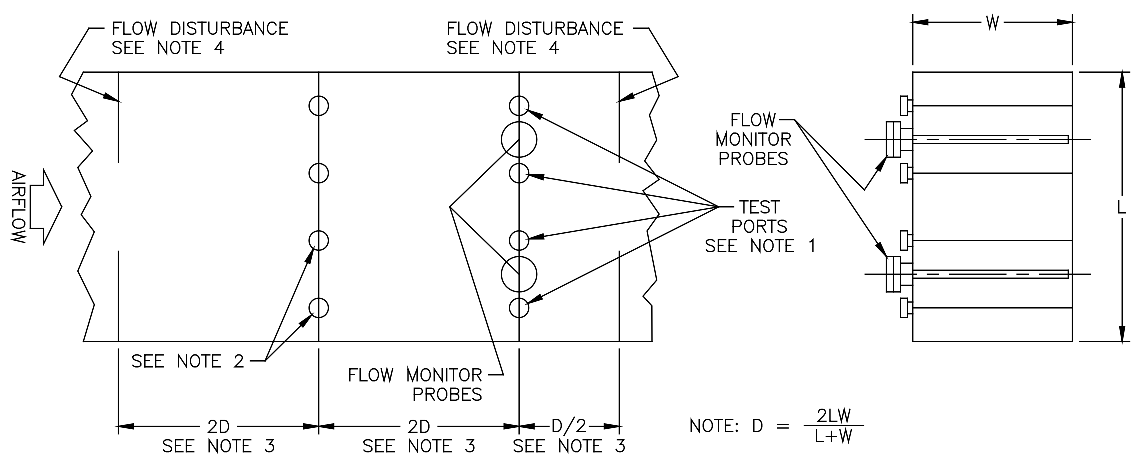
STACK-probe Locations

Flow Monitor Probe and Test Port Locations



NOTES:

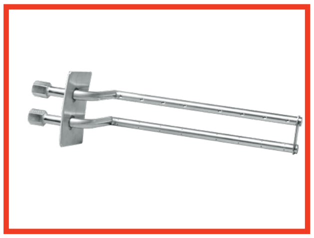
1. Test ports should be located on a different axis than flow monitor probe(s) to minimize disturbing the flow being sensed by the probe(s) during 40CFR60, Appendix A, Method 2 testing.
2. The distance from the flow monitor probe(s) or test ports to an upstream flow disturbance is 2D minimum, 8D desirable. The distance from the flow monitor probe(s) or test ports to downstream flow disturbance is D/2 minimum, 2D desirable.
3. The distance between the flow monitor probe(s) and the test port planes is usually only 6" to 12" due to practical limitations relative to stack platform access. Flow disturbances created by the test probe may affect flow monitor readings during 40CFR60, Appendix A, Method 2 testing.
4. Considered as flow disturbances are:
   - Any stack mounted equipment or structure that protrudes or extends out into the air stream.
   - Any dimensional changes in the stack.
   - Any directional changes in the stack.



NOTES:

1. Test ports should be located on the same plane or elevation as the flow monitor probe(s) to minimize disturbing the flow being sensed by the flow monitor probe(s) during 40CFR60, Appendix A, Method 2 testing.
2. If test ports cannot be located on the same plane or elevation as the flow monitor probe(s) due to insufficient space or clearance, locate the test ports 2D upstream of the flow monitor probe(s).
3. The distance from the flow monitor probe(s) or test ports to an upstream flow disturbance is 2D minimum, 8D desirable. The distance from the flow monitor probe(s) or test ports to downstream flow disturbance is D/2 minimum, 2D desirable.
4. Considered as flow disturbances are:
   - Any stack mounted equipment or structure that protrudes or extends out into the air stream.
   - Any dimensional changes in the stack.
   - Any directional changes in the stack.

Air Monitor Power's Product Families of Air Flow Measurement Systems



IBAM™ – Individual Burner Airflow Measurement

The IBAM™ – Individual Burner Airflow Measurement probe is ideally suited for new or retrofit applications where a reduction in plant emissions and improvement in efficiency can be obtained through accurate measurement of burner secondary airflow. The IBAM™ probe has been designed to accurately measure in the particulate laden, high operating temperature conditions found in burner air passages.

VOLU-probe/SS™ Stainless Steel Airflow Traverse Probes.

Multi-point, self-averaging, Pitot-Fechheimer airflow traverse probes with integral airflow direction correcting design. Constructed of Type 316 stainless steel and available in externally and internally mounted versions for harsh, corrosive or high temperature applications such as fume hood, laboratory exhaust, pharmaceutical, and clean room production and dirty industrial process applications.

CA™ – Combustion Airflow Measuring Station & VOLU-probe/SS™ Traverse Probes. Air Monitor's duct mounted airflow measurement devices have been designed to accurately and repeatedly measure air mass flow in power plants. The Combustion Air (CA) Station™ includes honeycomb air straightener to accurately measure in shorter straight duct runs than any other flow measurement device. The VOLU-probe/SS™ delivers accurate airflow measurement performance in the form of an insertion probe. Both devices feature Type 316 stainless steel flow sensing arrays.

CAMS™ – Combustion Airflow Management Systems.

The CAMS™ – Combustion Airflow Management System has been designed to reliably and accurately measure airflow in combustion airflow applications. The CAMS™ contains the microprocessor based instrumentation to measure the airflow and manage the AUTO-purge. The AUTO-purge is a high pressure air blowback system that protects the duct mounted flow measurement device from any degradation in performance due to the presence of airborne particulate (flyash).

CEMS™ – Continuous Emissions Monitoring System

Air Monitor Power's CEMS™ – Continuous Emissions Monitoring Systems assist in complying with the Clean Air Act's stringent emission measurement standards and the requirements of 40 CFR 75. Air Monitor has assembled a cost effective integrated system consisting of in-stack flow measurement equipment and companion instrumentation to provide continuous, accurate, and reliable volumetric airflow monitoring of stacks and ducts of any size and configuration.

Engineering & Testing Services. Air Monitor Power offers complete engineering and testing to analyze air and coal delivery systems. Air Monitor Power's field testing services use 3D airflow traversing and flow measurement systems for the highest possible accuracy. To ensure cost effective and accurate solutions, Air Monitor Power has full scale model fabrication and certified wind tunnel testing is used to develop application specific products that will measure accurately where no standard flow measurement can.

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