

VOLU-flo / OAM

Outside Air Monitor



Accurate airflow measurement for demanding applications



AIR MONITOR
CORPORATION

VOLU-flo/OAM

How It Works

The measurement of Outside Air presents a variety of challenges that cannot be overcome utilizing the standard Pitot and thermal technologies. Among these challenges are:

- The total absence of any upstream/downstream straight duct run to obtain accurate and/or repeatable measurement.
- The potential for outside air temperature variances of 150+ °F in certain climatic zones and installed locations ranging from sea level to 5,000+ feet elevation make a temperature and altitude air density compensating system necessary.
- Airborne particulate and condensing moisture transported by outside air will impair the functionality and accuracy of both thermal and standard Pitot based technologies.
- Varying directional wind loads and gusts cause fluctuating airflow measurements.

- Airflow velocities often down to 150 FPM are below the recommended operating range of standard Pitot technologies.

The VOLU-flo/OAM has been specifically designed to measure the airflow rate within $\pm 5\%$ of actual airflow in all of these challenging conditions by measuring the *pressure drop* across a fixed inlet resistance device, such as a louver, layer of expanded metal, etc.

The VOLU-flo/OAM consists of an Outside Reference Sensor and an Inlet Airflow Sensor, both specially designed to be unaffected by dirt or moisture, plus a temperature sensor and a microprocessor-based Monitor/Controller which converts the measured pressure drop and temperature to actual airflow utilizing proprietary algorithms, density compensation, and signal conditioning.

Components and Features



Monitor/Controller Module

Standard and Expanded Ranges. With its 4:1 range of measurement, the Standard VOLU-flo/OAM is ideally suited for *minimum outside air* applications, while the Expanded VOLU-flo/OAM's 16:1 range of measurement will cover the full range of outside air, from the *minimum set-point* to design *maximum*.

Microprocessor Based Functionality. All functions of monitor configuration, output and display scaling, calibration, and controller tuning are performed by the VOLU-flo/OAM's on-board microprocessor. All input to the microprocessor is via four pushbuttons and menu selections.

Air Density Correction. The VOLU-flo/OAM corrects measured inlet airflow for ambient temperature variances by means of an integral 100 ohm platinum RTD temperature sensor and corrects for atmospheric pressure by entering site altitude into the microprocessor during initial system start-up.

Continuous Display of Process. A standard 2x20 liquid crystal display (LCD) is used during the configuration and calibration of the VOLU-flo/OAM, and provides a means to display two measured processes (volume, velocity, temperature) during normal operation.

BAS Interface. While the VOLU-flo/OAM is capable of operating as a stand-alone monitor/controller, a wide variety of inputs and outputs were designed into the Monitor/Controller Module to

facilitate coordinated operation with a facility building automation system (BAS). Interfaces with the BAS include:

- Digital inputs for fan system start status, switching to economizer setpoint, or to use the BAS provided adjustable operating setpoint.
- Digital outputs for high and low alarms, triggered when the measured airflow falls outside of a user selectable deadband around the control setpoint.
- Dual analog output; a 4-20mADC output corresponding to measured inlet airflow, and a damper controller output field configurable for 0-5VDC, 0-10VDC, or 4-20mADC via jumpers.
- An analog input, field selectable for 0-5VDC, 0-10VDC, or 4-20mADC via jumper, that is used as the controller setpoint.

Enclosures. The VOLU-flo/OAM is offered in four different enclosure packages to fit any application and installation:

- NEMA 1 rated, painted carbon steel enclosure designed to be located indoors or inside the air handler.
- NEMA 4 rated, painted carbon steel enclosure designed for outdoor locations where the ambient temperature is consistently at 32°F and above.
- NEMA 4 rated and insulated enclosure which includes a thermostatically controlled enclosure heater. For outdoor locations where the ambient temperatures may go as low as -40°F.
- OEM mounting arrangement that permits the Monitor/Controller Module to be mounted into an existing OEM enclosure.



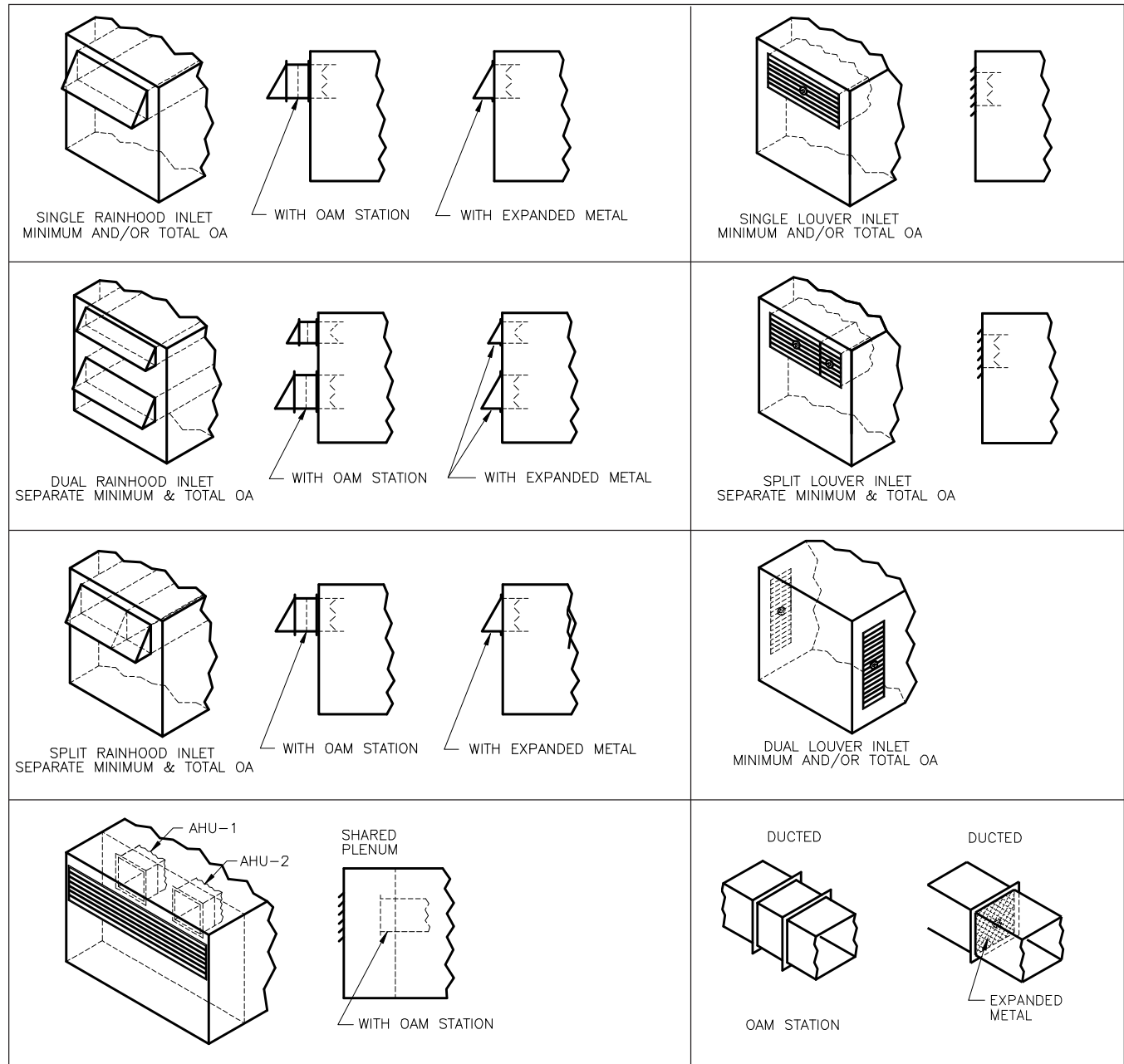
NEMA 1 Enclosure

Outside Air Monitor

Typical Application Guide

The VOLU-flo/OAM Monitor/Controller can be applied to most single, dual, and split inlets found on air handlers and built-up systems. Depicted below are the most commonly encountered

inlet configurations. Contact the Factory with any unique configuration or those that do not meet the stated Minimum Installation Requirements.



Minimum Installation Requirements

The VOLU-flo/OAM was designed for installation on packaged air handlers and built-up systems where the outside air intake is outfitted with an OAM Station, inlet louver or some fixed resistance device that produces at least 0.06" w.c. pressure drop at 600 FPM. For systems not so equipped, contact the Factory for application suitability.

- The Outside Reference Sensor is to be located upstream of, and mounted in the center of the louver or fixed resistance device.
- The Inlet Airflow Sensor must be located downstream of any inlet louver or fixed resistance device, and upstream of the outside air intake control damper.
- The OAM Station must be positioned upstream of the outside air intake control damper.

VOLU-flo/OAM

Sensors

Outside Reference Sensor. The patented design of the Outside Reference Sensor is unaffected by wind gusts or directionality, thus providing an accurate point of reference for measuring the differential pressure created by the airflow entering the inlet.



Outside Reference Sensor

Unaffected by Dirt and Moisture. The VOLU-flo/OAM does not utilize heated thermal sensors or pressure measuring ports that face into the airstream, thereby avoiding measurement instability caused by the variable presence of moisture, and measurement accuracy degradation due to

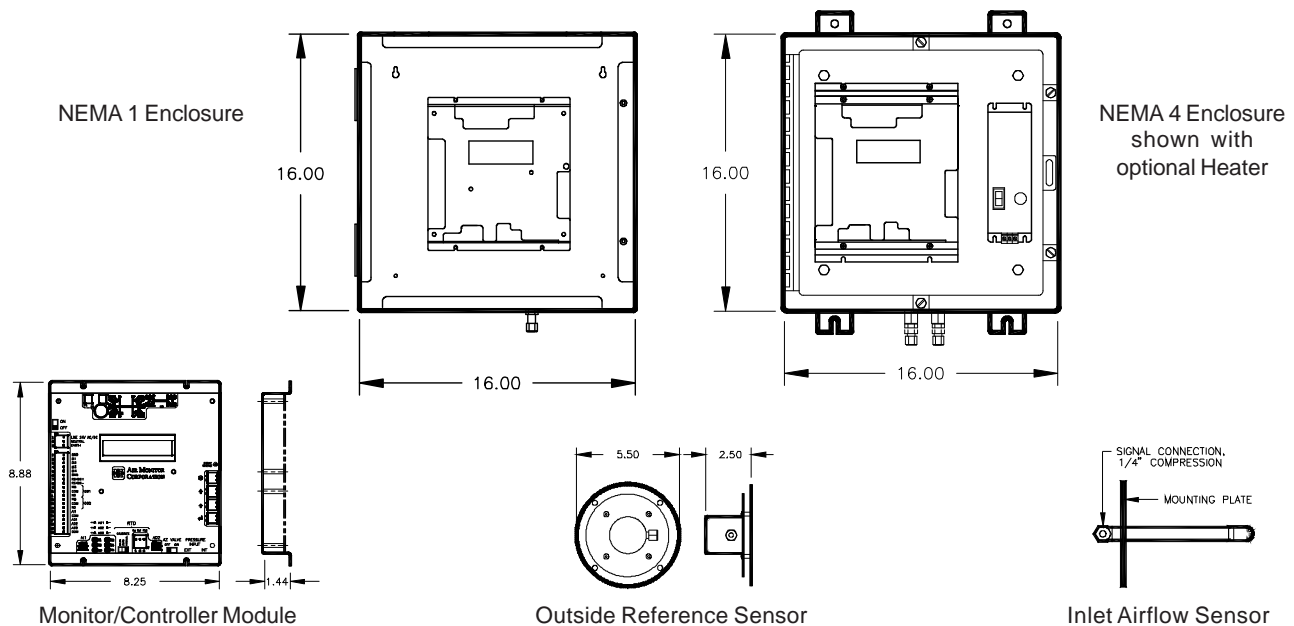
dirt build-up around pressure sensor ports or on thermal sensor surfaces.

Stainless Steel Construction. The Outside Reference Sensor and Inlet Airflow Sensor are both constructed of Type 316 stainless steel materials to resist corrosion due to the presence of salt or chemicals in the air. In addition, the signal connections on these two sensors and those on the NEMA enclosure are stainless steel, as is the exterior of the platinum RTD.



Inlet Airflow Sensor

Dimensional Specifications



Suggested Specification

The monitor/controller shall be capable of direct measurement of airflow through an outside air inlet and produce dual outputs; one representing the measured airflow, and the other to control the inlet damper.

The monitor/controller shall contain an integral multi-line liquid crystal display for use during the configuration and calibration processes, and to display two measured processes (volume, velocity, temperature) during normal operation. All configuration, output scaling, calibration, and controller tuning will be performed digitally in the on-board microprocessor via input pushbuttons.

The monitor/controller shall measure inlet airflow with an accuracy of $\pm 5\%$ of reading over a range of 150-600 FPM, 250-1,000 FPM, 500-2,000 FPM, and 150-2,000 FPM and not have its reading affected by the presence of directional or gusting wind. Measured airflow shall be density corrected for ambient

temperature variances, and atmospheric pressure due to site altitude.

The monitor/controller shall interface with existing building automation systems (BAS), accepting inputs for fan system start, economizer mode operation, and an external controller setpoint, and provide flow deviation alarm outputs.

The sensors shall be constructed of materials that resist corrosion due to the presence of salt or chemicals in the air; all non-painted surfaces shall be constructed of stainless steel. The electronics enclosure shall be NEMA 1 [NEMA 4; NEMA 4 with enclosure heater and insulation].

The monitor/controller shall be the VOLU-flo/OAM as manufactured by Air Monitor Corporation, Santa Rosa, California.

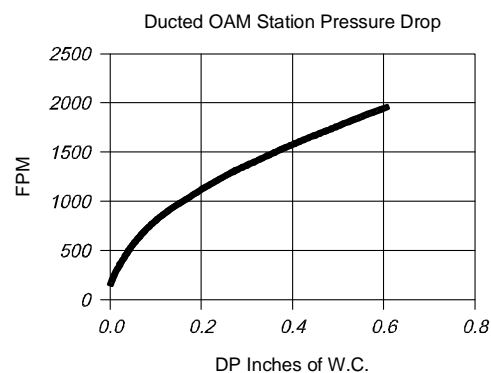
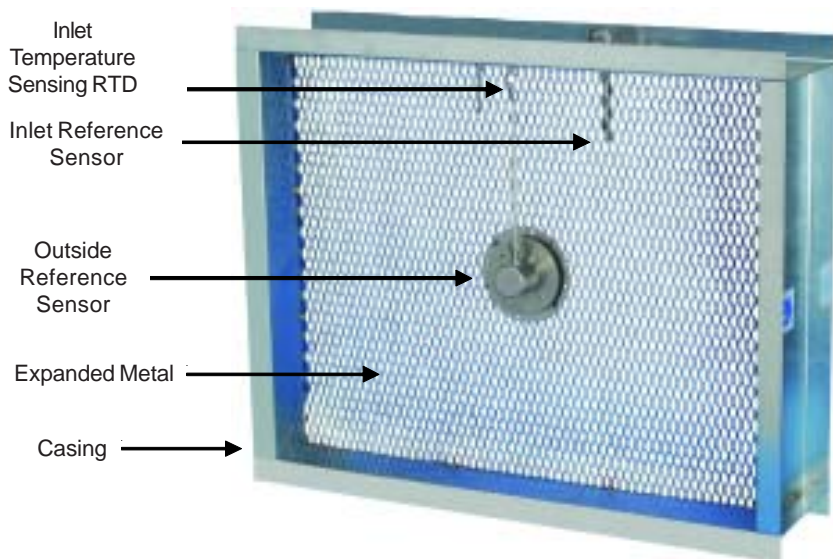
Outside Air Monitor

VOLU-flo/OAM Station

The VOLU-flo/OAM Station has been designed for ease of installation and commissioning by Factory mounting its sensors onto a layer of expanded metal of known fixed resistance welded into a galvanized sheet metal casing. In selected applications,

the known fixed resistance of the VOLU-flo/OAM Station allows the overall System to be pre-calibrated at the Factory for plug-n-play operation.

Construction Features



Performance Specifications

Monitor

Accuracy. $\pm 5\%$ of actual airflow for velocities above 150 FPM.

Range.

Standard: Provides 4:1 range of measurement.

Expanded: Provides 16:1 range of measurement

Temperature Limits.

-20 to 180°F Storage.

+32 to 120°F Operating, standard.

-40 to 120°F Operating, with optional enclosure heater.

Signal Connections. 1/4" compression type, stainless steel.

Analog Input/Outputs

Analog Input. A single input is field configurable via jumper for 0-5VDC, 0-10VDC or 4-20mADC. For use as the external controller setpoint.

Analog Outputs. Dual outputs; one 4-20mADC and the other configurable via jumper for 0-5VDC, 0-10VDC, or 4-20mADC. For measured airflow and damper controller outputs.

Digital Inputs/Outputs

Digital Inputs. Three dry contact inputs; fan system status, economizer mode, and external controller setpoint.

Digital Outputs. Dual Form C dry contacts rated for 3 amps at 24VDC for alarm outputs to the BAS.

Indication

Display. Standard 2x20 character LCD provides two lines of data display.

Power

Power Supply.

Standard: 24VAC (20-28VAC) or 24VDC (20-40VDC).

Optional: 120VAC (100-132VAC), with enclosure heater.

Power Consumption.

Standard: 18VA @ 24VAC; 13VA at 24VDC.

Optional: 336VA @ 120VAC, includes enclosure heater.

Circuit Protection. Power input is isolated, fused, and reverse polarity protected.

Model Selection Guide

VOLU-flo OAM –



S – Single Inlet
D – Dual Inlet

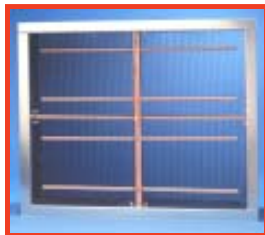


O – For mounting in OEM cabinet
1 – NEMA 1
4 – NEMA 4
H – NEMA 4 with heater



S – Standard 4:1 Range
E – Expanded 16:1 Range

Air Monitor's Product Families of Flow Measurement and Pressure Sensors



FAN-E AIRFLOW MEASURING STATION.

Multi-point, self-averaging, Pitot traverse station with integral air straightener-equalizer honeycomb cell. Capable of continuously measuring fan discharges or ducted airflow with an accuracy of 2% or better.

AMCA CERTIFIED in accordance with Standard 610 for airflow measurement station performance.



VOLU-PROBE /1, 2, 3, 4 AIRFLOW TRAVERSE PROBES & STATIONS.

Multi-point, self-averaging, Pitot Fechheimer airflow traverse probes and stations with integral airflow direction correcting design ensures accurate measurement. Various mounting configurations to fit every application.

AMCA CERTIFIED in accordance with Standard 610 for airflow measurement station performance.



VOLU-PROBE/FI FAN INLET AIRFLOW PROBES.

Multi-point, self-averaging, Pitot Fechheimer airflow probes with integral airflow direction correcting design.

For mounting directly in the inlet cones or bellmouth of centrifugal or vane-axial fans to measure fan capacities within 3% of actual flow.



VELTRON DPT 2500-plus TRANSMITTERS.

Microprocessor based differential pressure and flow transmitters offering high accuracy ($\pm 0.25\%$ F.S.) and ultra-low ranges (0-0.05 IN w.c.).

Standard features include backlit graphical LCD, AUTO-zero, and electronic re-spanning.



S.A.P. /B, P, S, R STATIC PRESSURE SENSORS.

Available in four separate mounting configurations, the S.A.P. family of static pressure sensors generate a steady, non-pulsating output of room, space or plenum pressure.

S.A.P. sensors are available in aluminum or stainless steel construction.



ELECTRA-flo THERMAL AIRFLOW MEASUREMENT SYSTEM.

Multi-point thermal dispersion airflow measurement probes, stations, and stations with integral air straightening honeycomb cell.

Capable of measuring fan and ducted airflow and temperature with an accuracy of 2-3% or better.

