

CAMS™

Combustion Airflow Management System



AIR MONITOR
CORPORATION

CAMS™ – Combustion Airflow Management System

Product Description

The Air Monitor CAMS™ Combustion Airflow Management System is designed to fulfill the need for a reliable and accurate means of flow measurement in combustion airflow applications. Combined into a single engineered package are the CAMM™ Combustion Airflow Management Module containing the

microprocessor based instrumentation to measure the airflow and manage the purge cycle, and the AUTO-purge III to protect against any degradation in performance of the duct mounted measurement device(s) due to the presence of airborne particulate.

CAMM™ Performance Specification

Accuracy.

±0.1% of Natural Span, including non-linearity, hysteresis, and non-repeatability.

Stability.

±0.5% of Natural Span for six months.

Temperature Effect.

Zero: None; corrected by AUTO-zero.

Span: 0.015% of Full Span/°F.

Power Consumption.

54VA at 24VAC; 48VA at 24VDC; 108VA at 120VAC.

CAMM™ Functional Specification

Digital Output.

Separate Form "A" dry contacts (maintained) for AUTO-purge activation and acknowledgment.

Digital Inputs.

Separate dry contacts (momentary) for AUTO-purge external start and purge interrupt commands.

Analog Outputs.

Four standard outputs for flow, temperature, absolute pressure, and special function individually configurable via jumper for 0-5VDC, 0-10VDC, or 4-20mADC.

Analog Inputs.

Dual inputs are field configurable via jumper for 0-5VDC, 0-10VDC, or 4-20mADC. One is reserved for temperature input; the other for use with special function.

AUTO-purge Management.

AUTO-purge cycle is initiated via an external dry contact (momentary), or via an internal timer with field selectable frequencies of 1 to 24 hours, in 1 hour increments.

Low Pass Filtration.

Response time to reach 98% of a step change is adjustable from 2.0 to 250.0 seconds.

Power Supply.

Standard 24VAC (20-28VAC) or 24VDC (20-40VDC), with automatic selection. Optional 120VAC (100-132 VAC) via external UL listed transformer.

Overpressure and Static Pressure Limit.

25 psig.

Automatic Zeroing.

Accuracy. Within 0.1% of calibrated span.

Frequency. Every 1 to 24 hours selectable on 1 hour intervals.

Circuit Protection.

Power input is fused and reverse polarity protected.

Span and Zero Adjustment.

Digital, via internally located push-buttons.

Displays.

Standard 4 line x 20 character LCD provides four lines of data display.

Temperature Compensation Selection.

Push-button selection of linearized or nonlinear input.

Choice of thermocouple (Type E, K, J, and T) or 100 ohm platinum RTD temperature sensor type.

Pressure Compensation.

Absolute pressure (atmosphere or duct static), up to 60"Hg.

Humidity Limits.

0-95% RH, non-condensing.

Temperature Limits.

-20°F to 180°F Storage.

+40°F to 120°F Operating.

CAMM™ Construction Options

Special Functions

- Summed Flow
- Differential Flow

Certification

- Standard
- NIST Traceable

Rapid Stop

- Yes
- No

AUTO-purge III

Product Description

Air Monitor's AUTO-purge III is designed for applications where the presence of airborne particulate might impair the measurement accuracy of Air Monitor's Combustion Air Station or VOLU-probe array. When activated by a CAMM™ or distributed control system, a combination of fail-safe valves are operated to introduce high

pressure/high volume air to the flow measuring device's sensing ports for a short duration, while simultaneously isolating the CAMM™ from overpressurization. This periodic purging assists in maintaining the sensing ports of the total and static pressure manifolds in a clear, unobstructed condition.

Standard Construction

Brass and Copper Construction

- All wetted tubing, fittings, and valves constructed of copper and/or brass.

- Enclosure is NEMA 4 painted steel.
- External connection fittings are stainless steel FPT.

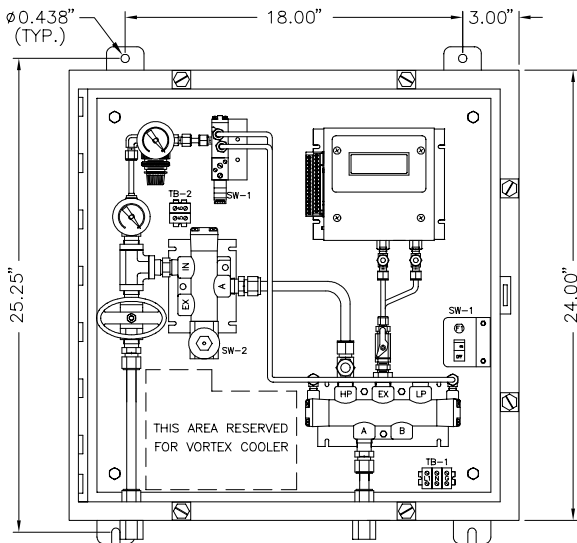
Optional Construction

- NEMA 4X Stainless Steel Enclosure
- Vortex Cooler. Requires 80-100 psi air supply.
- Rapid Stop™

- Power
- 24VAC
 - 24VDC
 - 120VAC

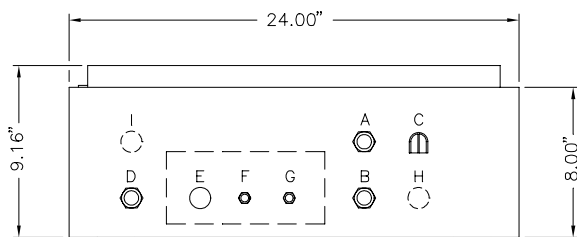
Dimensional Specifications

NOTE: CAMS™ with Rapid Stop™ option requires an enclosure that is 24" wide by 30" high.



CONNECTION CODE:

A. STATIC PRESSURE, FROM FLOW STATION	1/2" FPT	
B. TOTAL PRESSURE, FROM FLOW STATION	1/2" FPT	
C. CABINET VENT	ø0.75"	
D. SUPPLY AIR 80-125 PSIG	1/2" FPT	
E. VORTEX COOLER MOUNTING HOLE	ø1.125" I.D.	OPTIONAL
F. VORTEX COOLER FILTER DRAIN	1/4" FPT	
G. VORTEX COOLER AIR SUPPLY	1/4" FPT	
H. ELECTRICAL CONNECTION POWER WIRING	3/4" K.O. (BY OTHERS)	
I. ELECTRICAL CONNECTION SIGNAL WIRING	3/4" K.O. (BY OTHERS)	



BOTTOM VIEW

AUTO-purge III

Sequence of Operation

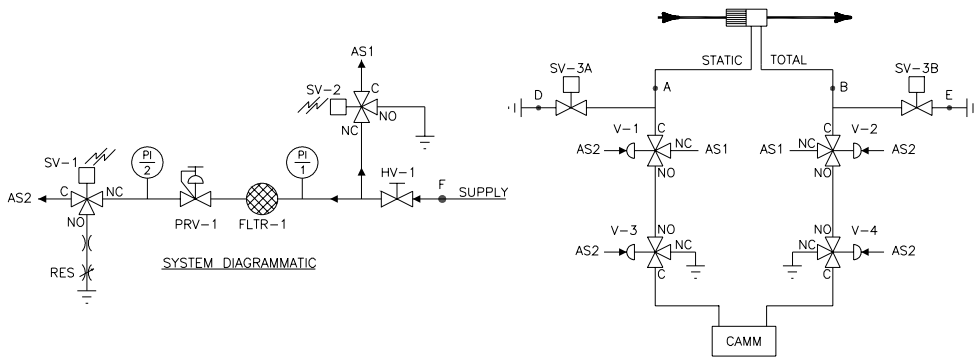
Automatic line purging disconnects the CAMM™ from the process signal lines at regular field selectable intervals and purges the airflow station or probe array with up to 125 psig air for short periods. This periodic purging assists in maintaining the sensing orifices of the total and static pressure manifolds in a clean, unobstructed condition.

A selectable timing sequence provided by the CAMM™ activates solenoid pilot valve SV-1 which shuttles the CAMM™ isolation valves (V-3 and V-4) and purge valves (V-1 and V-2). A simultaneous output signal hold corresponding to the last measured input is initiated by the CAMM™ and maintained until the purge cycle is complete.

When valves V-1/V-3 and V-2/V-4 operate, velocity pressure signal lines to the CAMM™ are isolated, and high pressure purge air (AS1) is routed via the process signal lines (A and B) to the station/probe array, cleaning the total and static pressure sensing ports.

At the end of the purge cycle the CAMM™ withdraws its purge signal, de-energizing SV-1 and causing valves V-1/V-2 and V-3/V-4 to reset after a short time delay to their normal position, thereby reconnecting the process signal lines to the CAMM™. After a short timed interval the CAMM™ signal hold is terminated and on-line signal processing resumes.

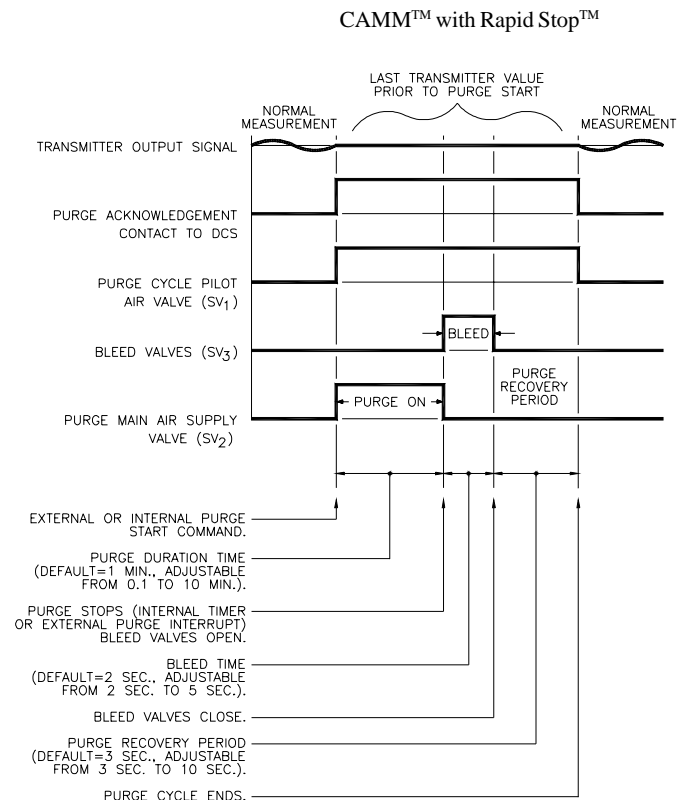
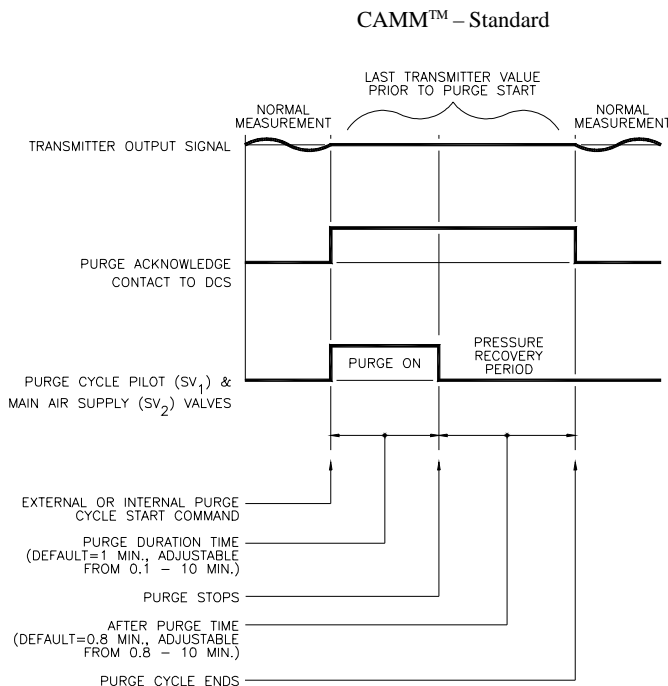
Schematic



IDENTIFICATION CODE

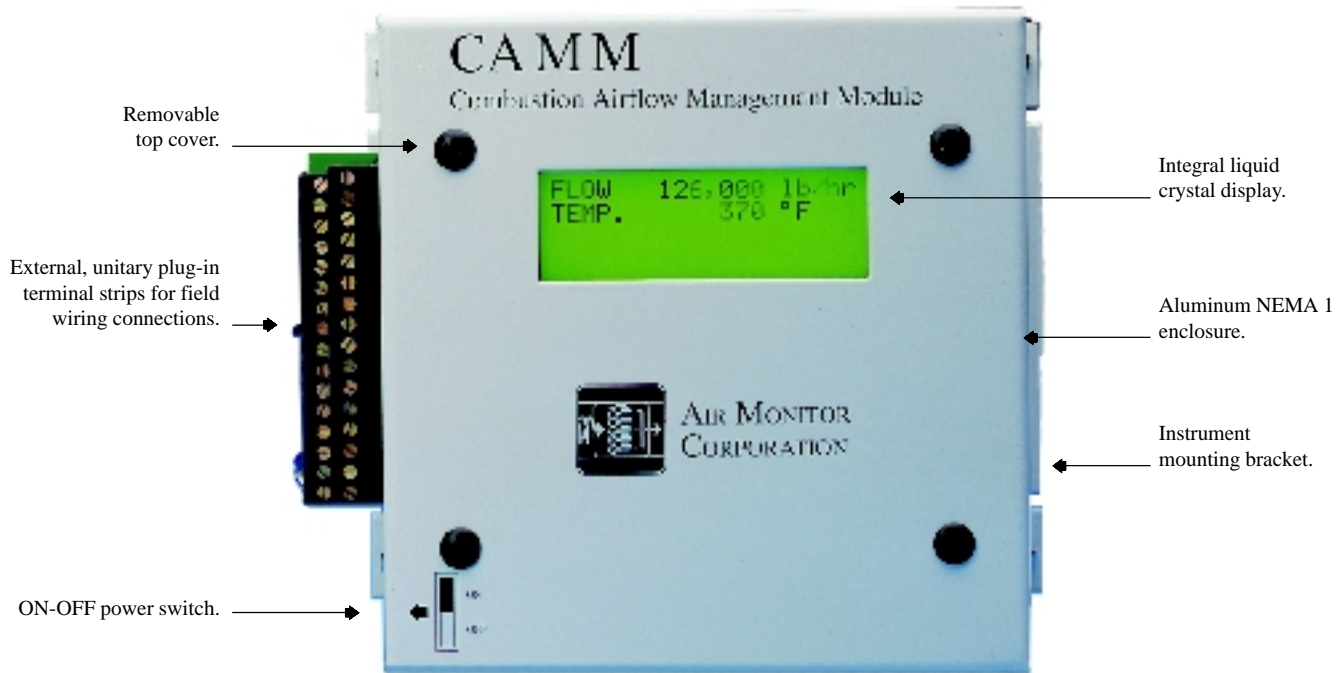
- V-1,3 Pneumatically Piloted, 5-Way Valve, Static (low) Pressure
- V-2,4 Pneumatically Piloted, 5-Way Valve, Total (high) Pressure
- SV-1 Solenoid Operated, 5-Way Valve
- SV-2 Solenoid Operated, 3-Way Valve
- HV-1 Supply Air Shut Off Valve
- PI-1,2 Gauge, Supply Air Pressure, 0-160 psig
- PRV-1 Pressure Regulator
- SV-3A,3B Solenoid Operated, 3-Way Valve (Optional for Rapid Stop)

Purge Cycle Timing



CAMM™ – Combustion Airflow Management Module

Construction Features



Features

Accuracy. The CAMM™ is designed to maintain a measurement accuracy of $\pm 0.1\%$ of natural full span. For a span of 0 to 0.05 IN w.c., this accuracy is equivalent to an output accuracy of ± 0.00005 IN w.c. differential pressure or ± 0.90 FPM velocity.

Continuous Display of Process. All CAMMs™ are equipped with a 4x20 backlit liquid crystal display (LCD) for use during the configuration and calibration process, and to display four lines of output data (Flow, Temperature, Absolute Pressure, or Special Function) during normal operation, with each line individually scalable in user selectable units of measure.

Special Functions Capability. Built into the CAMM™ microprocessor is the capability to perform special application functions involving two transmitters. Using a second transmitter as an input, the CAMM™ can compute the sum of, or differential between the two measured flows. The special function output can be both displayed and provided as an analog output signal.

Microprocessor Based Functionality. The CAMM's™ on-board microprocessor performs the functions of operating parameter selection, transmitter configuration, input/output and display signal scaling, density correction, and transducer calibration. Input to the microprocessor is via pushbutton.

High Turndown Ratio Operation. The CAMM™, with its high level of accuracy and automatic zeroing circuitry, can maintain linear output signals on applications requiring flow measurement turndown of 10 to 1.

Analog Communication. Each analog input and output signal can be individually configured for 0-5VDC, 0-10VDC, or 4-20mADC by means of a single jumper.

Primary Signal Noise Filter. To eliminate background noise and pulsations from the flow signal, the CAMM™ is equipped with a user selectable digital low pass filter.

Air Density Correction. The CAMM™ is capable of performing both air temperature and air pressure correction. Temperature input is an analog signal from a remote temperature transmitter; non-linear temperature inputs can be linearized by the microprocessor. Process pressure is measured by means of an internal absolute pressure transducer connected to the transmitter static pressure signal input.

AUTO-purge Management. The CAMM™ provides the capabilities of establishing purge frequency and duration while giving the user a choice of either internally timed cycle frequency or externally triggered purge initiation. During the purge cycle all transmitter outputs are maintained at their last value prior to the start of the purge cycle. Upon receipt of a dry contact input, the CAMM™ will interrupt a purge cycle in progress and return to normal operation.

Optional Rapid Stop™. The Rapid Stop™ valving combined with purge sequence timing in the CAMM™ permits a reduction of the recovery portion of an AUTO-purge cycle from a typical 30 seconds to as short as 5 seconds.

CAMS™ – Combustion Airflow Management System

Installation Guide

Air Requirement

- 80 to 125 psig at 100 CFM, oil and dirt free.
- 1 to 24 purge cycles per day, with a field selectable duration between 30 and 120 seconds during which compressed air is released.

Line Size

- If distance from CAMS™ Panel to Flow Measuring Station or Probes is less than 25', tube size to be 1/2" O.D. Wall thickness no greater than 0.065".
- If distance from CAMS™ Panel to Flow Measuring Station or Probes is 25' to 50', tube size to be 3/4" O.D. Wall thickness no greater than 0.065".
- If distance from CAMS™ Panel to Flow Measuring Station or Probes is greater than 50', tube size to be 1.0" O.D. Wall thickness no greater than 0.065".

Purge Frequency

- Dependent upon the particulate concentration in each application.
- Adjustable in hourly increments; once per day the minimum frequency, and once per hour the maximum frequency.

Purge Cycle Duration

- Dependent on sensing line size, length, and routing.
- Minimum: 60 seconds normal; 5 seconds with Rapid Stop™.
- Maximum: 150 seconds.

Ambient Temperature

- 40°F to 120°F.
- For ranges above or below this ambient temperature, use of panel heater and/or cooler is required.

Accumulator Tank (strongly recommended)

- Requires coalescing filter, pressure regulator, and check valve at the tank inlet.
 - 120 gallons – All CA stations.
 - 120 gallons – Multiple VOLU-probes having a combined length greater than 10'.
 - 80 gallons – One or more VOLU-probes having a combined length less than 10'.

Line from Accumulator Tank to AUTO-purge Panel

- 25' maximum length, 1/2" pipe (minimum).
- Recommend locating accumulator tank as close as possible to CAMS™ Panel.

Electrical Power Requirement

- 54VA at 24VAC; 48VA at 24VDC; 108VA at 120VAC.
- 120VAC, 10 amp when an optional enclosure heater is installed.

Field Wiring Diagrams

