Outdoor Airflow Measurement System

Engineered for accuracy, applicability, durability and simplicity in HVAC air systems
Model OAFE-1500
Outdoor Airflow Measurement System

DESCRIPTION

The OAFE-1500 is an airflow measurement station with integral signal processor that is capable of producing an overall ±0.5% accuracy through the velocity range of 200 to 1,200 fpm and ±5% accuracy at 100 fpm.

The airflow measurement station consists of multiple airflow elements, factory mounted and pre-piped in a casing designed for flanged connection to ductwork, control dampers, louvers, etc. An optional inlet bell is available for plenum applications. Standard materials consist of a G90 galvanized casing and 6063-T5 anodized aluminum flow sensors, suitable for most HVAC applications. The airflow averaging elements are head type devices, which generate a differential (velocity) pressure signal similar to the orifice, venturi, and other head producing primary elements. The airflow measurement station is constructed so as to comply with ASHRAE Standard 111 for equal area traversing of an airflow measurement plane. Multiple elements are manifolded together for connection to the integral airflow signal processor.

The signal processor utilizes current state-of-the-art digital microprocessor technology capable of producing unequaled 20-bit (1,048,576 steps) A/D and 12 bit (4,096 steps) D/A signal conversion resolution. Having a twelve-point linearization capability, the signal processor can be field calibrated to accurately determine true airflow rates even when the primary airflow measurement stations do not meet their minimum installation requirements. The ultra low 0.04”w.c. differential pressure, 800 fpm full scale operating ranges and the auto zeroing function of the signal processor provides accurate airflow measurement down to 100 fpm. The signal processor accepts a temperature input signal for air temperature indication, temperature signal transmission for remote readout, and air density compensation for standard or actual airflow calculations. A password protected configuration menu provides quick and simple field configuration by authorized personnel. Field configuration of engineering units, process noise filtering, operating range, alarm set points, etc, are performed via user friendly menus and a six button touch pad.

An optional temperature sensor and transmitter with 4 to 20mA output and temperature range of -30 to 130°F is available to provide the temperature input signal to the signal processor for air density compensation.

Features

- AMCA certified ±0.5% accuracy through the velocity range of 200 to 1,200 fpm and ±5% accuracy at 100 fpm
- Multiple total and static pressure sensing ports to comply with ASHRAE Standard 111 for duct traversing
- Not susceptible to condensation or moisture
- Aerodynamically designed to resist fouling by airborne particulates
- Factory mounted and pre-piped in a flanged duct section (casing)
- Optional inlet bell for plenum applications
- Standard construction includes a galvanized casing and 6063-T5 anodized aluminum flow sensors
- All airflow stations can be operated in humidity ranges of 0 to 100% with no effect on the station
- Standard airflow stations have good salt air resistance and are suitable for most HVAC applications
- Full scale ranges as low as 800 fpm (4.06 m/s) velocity
- Excellent AD/DA resolution:
  - 20 bit (1,048,576 steps) A/D
  - 12 bit (4,096 steps) D/A
- Twelve point linearization and four point flow correction
- Large back lit LCD for configuration and local indication of the measured process
- Auto zeroing function
- Temperature compensation for air density correction
- Temperature sensor and transmitter (optional)
- NEMA 4 rated enclosure
- High and low airflow alarms (optional)
- Simple field configuration menus with controlled access
- Field configurable for either English or SI engineering units
- Integral power switch
TECHNICAL SPECIFICATIONS

Outdoor Airflow Measurement System

1. Accuracy
   Within ±0.5% of actual flow through the velocity range of 200 to 1,200 fpm when installed in accordance with published recommendations and within ±5% at a velocity of 100 fpm

2. Operating Velocity Range
   100 to 2,800 fpm

Airflow Measurement Station

3. Material
   Elements
   6063-T5 anodized aluminum (standard)
   Casings
   16 ga G90 galvanized steel (standard)

4. Temperature
   350°F continuous operation (in air)
   400°F intermittent operation (in air)

5. Humidity
   0 to 100%

6. Corrosion Resistance
   Galvanized Casings
   Widely used for most air handling systems; not recommended for corrosive atmospheres
   Aluminum Elements
   Good salt, air, and mild acid gas resistance; excellent solvent and aromatic hydrocarbon resistance

Signal Processor

7. Temperature Limits
   Operating: 32 to 122°F (0 to 50ºC)
   Storage: -20 to 158°F (-29 to 70ºC)

8. Humidity Limits
   0 to 95% RH, non-condensing

9. Display
   A backlit, graphical LCD providing 8 lines of data display. Also used for programming

10. Analog Outputs
    Process output signal and optional temperature output signal. All are jumper selectable 0 to 5 VDC, 0 to 10 VDC, or 4-20 mA.
    Note: 0-5 VDC voltage output selection must be the same for process and temperature.

11. Digital Outputs
    Optional Hi/Lo Alarm: two single (1 form C) dry contacts rated for 2 amps at 30 VAC/DC and 0.6 amps at 120 VAC/110 VDC resistive load

12. Field Connections
    When the airflow signal processor is to be remotely mounted ¼” compression fittings, suitable for use with thermoplastic or copper tubing will be furnished at the primary element; ¼” barbed fittings for thermoplastic tubing will be provided at the airflow signal processor. When using thermoplastic tubing with compression fittings at the primary element, tubing inserts (supplied with the fittings) are required.

13. Power Supply
    20 to 28 VAC/DC

14. Power Consumption
    Standard Unit: 4.6 VA at 24 VAC, 2.7 VA at 24 VDC
    Full Options: 10 VA at 24 VAC, 5.5 VA at 24 VDC

15. Circuit Protection
    Power input is isolated, reverse polarity protected and supplied with an easily accessible PICA fuse

16. UL & CSA Rating
    NEMA 4X
    Material: impact and corrosive resistant
    Dimensions: 6.65"H x 4.69"W x 2.72"D

AMCA CERTIFICATION TEST RESULTS

Paragon Controls Inc. certifies that the Outside Airflow Measurement System shown herein is licensed to bear the AMCA Certified Ratings Seal – Airflow Measurement Station Performance. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 611 and comply with the requirements of the AMCA Certified Ratings Program.

Test Data
Model: OAFE-1500-48x30x10-2-3-1-1-2
Type: Differential Pressure
Conversion Formula: \( V = \frac{1096.7 \cdot \text{Density} \cdot \text{Pressure}}{\text{Velocity} \cdot \text{Density}} \)
Size Tested: 48” x 30” Rectangular
Test Setup: AMCA Standard 610-06, Figure 4

<table>
<thead>
<tr>
<th>Test No.</th>
<th>Reference Velocity (FPM)</th>
<th>Indicated Velocity (FPM)</th>
<th>% Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1,149</td>
<td>1,152</td>
<td>0.26</td>
</tr>
<tr>
<td>2</td>
<td>837</td>
<td>835</td>
<td>-0.24</td>
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<tr>
<td>3</td>
<td>662</td>
<td>662</td>
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<tr>
<td>4</td>
<td>404</td>
<td>405</td>
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<tr>
<td>5</td>
<td>196</td>
<td>195</td>
<td>-0.51</td>
</tr>
<tr>
<td>6</td>
<td>105</td>
<td>100</td>
<td>-4.76</td>
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</tbody>
</table>
Model OAFE-1500
Dimensions

FLANGED STATIONS FOR DUCTED APPLICATIONS

<table>
<thead>
<tr>
<th>Station Size</th>
<th>Flange Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>8” – 72”</td>
<td>1½”</td>
</tr>
<tr>
<td>73” &amp; Over</td>
<td>2”</td>
</tr>
</tbody>
</table>

STATIONS WITH OPTIONAL INLET BELL FOR PLENUM APPLICATIONS

<table>
<thead>
<tr>
<th>Station Size</th>
<th>Flange Size</th>
<th>Inlet Bell Radius</th>
</tr>
</thead>
<tbody>
<tr>
<td>8” – 72”</td>
<td>1½”</td>
<td>4”</td>
</tr>
<tr>
<td>73” &amp; Over</td>
<td>2”</td>
<td>4”</td>
</tr>
</tbody>
</table>

Note: Inlet bell custom radiuses available.
SIGNAL PROCESSOR

MOUNTING SCREW UP TO 1/4" DIA. (TYP OF 2)

PG13.5(1/2")

5.03"

PG13.5(1/2")

PG21(3/4")

3.02"

7.0"

8.2"

SIGNAL PROCESSOR FIELD CONNECTIONS

J1
1 24VAC / DC
2 EARTH GROUND
3

J2
1 + PROCESS OUTPUT
2 - PROCESS OUTPUT(GND)
3 + TEMPERATURE OUTPUT
4 - TEMPERATURE OUTPUT(GND)

J3
1 +15VDC (TO POWER TEMP. LOOP)
2 + TEMPERATURE INPUT
3 - TEMPERATURE INPUT(GND)
4 UNUSED
5 UNUSED

J4
1 COM
2 NO REMOTE ALARM
3 NC
4 COM HIGH ALARM
5 NO NC
6 NC
7 COM LOW ALARM
8 NO
9 NC
Model OAFE-1500
Typical Installations

ROOFTOP AHU WITH RAIN HOOD
EXTERIOR MOUNTED AIRFLOW STATION

ROOFTOP AHU WITH RAIN HOOD
INTERIOR MOUNTED AIRFLOW STATION

OUTDOOR AIR PLENUM MOUNTED
AIRFLOW STATION

OUTDOOR AIR PLENUM MOUNTED
AIRFLOW STATION

PLENUM MOUNTED MINIMUM OUTDOOR
AIRFLOW STATION

DUCTED OUTDOOR AIRFLOW STATION
FOR DUCTED OUTDOOR AIR APPLICATIONS

The elements may be installed in any duct configuration. However, the accuracy of the installation is dependent on the flow conditions in the duct. The minimum installation requirements for the elements based upon a uniform velocity profile approaching the duct disturbance for flow rates less than 2,500 fpm are shown below. These are not ideal locations. It is always best to locate the elements as far as possible from all duct disturbances, with upstream disturbances being the most critical consideration.

Notes:

Rectangular Ducts:
\[ D = \sqrt{\frac{4HW}{\pi}} \]
\[ H = \text{Duct height} \]
\[ W = \text{Duct width} \]

Model OAFE-1500
Ordering Information

<table>
<thead>
<tr>
<th>OAFE-1500-x</th>
<th>x</th>
<th>-</th>
<th>-</th>
<th>-</th>
<th>-</th>
</tr>
</thead>
</table>
| Options:     | 1 = Inlet Bell
              | 2 = Temperature sensor and transmitter
              | 3 = High/Lo Alarm

Note: For multiple options, separate each option code with a dash.

<table>
<thead>
<tr>
<th>Output:</th>
<th>1 = 4-20 mA  2 = 0-5 VDC  3 = 0-10 VDC</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Signal Processor Mounting Location:</th>
<th>1 = Left  2 = Right  3 = Remote Mount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Note: Signal processors mounted to the station will be mounted on the casing height. Specify left or right when looking at the station from the air entering side.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Probe Direction:</th>
<th>1 = Casing Width  2 = Casing Height</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Casing Length (Inches):</th>
</tr>
</thead>
<tbody>
<tr>
<td>Casing Height (Inches):</td>
</tr>
<tr>
<td>Casing Width (Inches):</td>
</tr>
</tbody>
</table>
Model OAFE-1500
Resistance to Airflow

Furnish and install an airflow measurement system for monitoring and controlling the minimum outdoor airflow rate. The minimum outdoor airflow measurement system shall measure the minimum amount of outside air as recommended by ANSI/ASHRAE Standard 62.1-2004, Ventilation for Acceptable Air Quality, and shall provide an input to the building automation system that is linear to the measured airflow rate. The airflow measurement system shall be tested in accordance with ANSI/AMCA Standards 610-06, Figure 4, Methods of Testing Airflow Measurement Stations for Rating, and AMCA Standard 611-06, Certified Ratings Program – Airflow Measurement Performance, in an AMCA-registered testing facility. The airflow measurement system shall be accurate to ±1% over an operating range of 200 to 1200 feet per minute, and within ±5% for operating ranges as low as 100 feet per minute. The airflow measurement system shall bear the AMCA International Certified Ratings Seal for Airflow-Measurement Station Performance. The airflow measurement system shall be model OAFE-1500 as manufactured by Paragon Controls, Inc., Santa Rosa, California, (707) 579-1424.