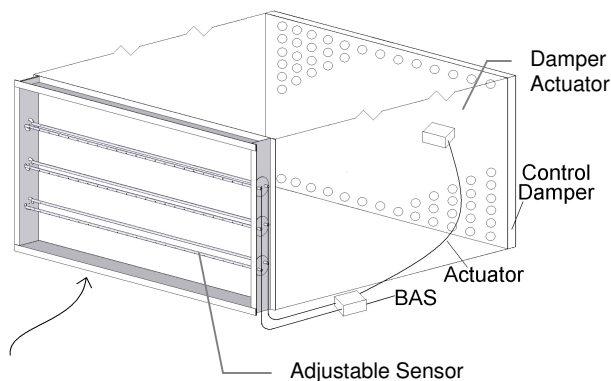


# Outside Air Flow Measurement and Control

## BULLETIN 866

### For a Variety of Applications

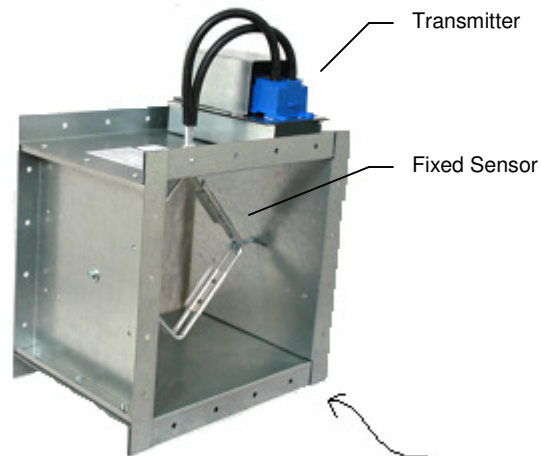


Field Adjustable Flow Sensor with Controller and Air Flow Damper For Rectangular Duct

#### Background & Challenges

Accurate OA measurement and control is a specialized application for several reasons:

- Very low flow rates are required - often from 200 ft/min to 700 ft/min on normal systems
- Very little space to develop for uniform flow contours
- OA temperatures vary widely, often requiring density correction
- Large variations in wind pressures (common test codes use 44 mph as a standard) will often require compensation to meet normal set point tolerances
- Current codes require accurate control of minimum OA flow for energy conservation.



Fixed Flow Sensor and Transmitter for Small Square and Round Duct

#### Advantages

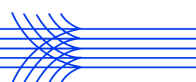
- Cost Effective Design
- Repeatable Flow Rates
- Field adjustment of vertical sensor direction to match flow contours

#### Benefits

- Maximum energy conservation by matching the building demand

#### Waddell Solutions

- Our low velocity transmitter and post conditioning circuit for flow sensing from 200 ft/min to 4000 ft/min (Other ranges available)
- A vertically field adjustable sensor to meet unusual flow velocity contours
- An OA temp sensor and a controller with density correction and BAS output
- Where required, a compact, linear damper to compensate for varying wind pressures
- System accuracies are within normal standards permitting dependable flow measurement



## Component design fundamentals

- The assembly includes a high precision transmitter (0.48% total accuracy) and a post conditioning circuit - minimizing any transmitted noise for a very clean, low-flow velocity signal.
- Upstream velocity contours are sizably affected by the louver or the air intake hood design on a roof top AHU. Our flow sensors are designed to be easily field matched to these velocity contours.
- Our assembly includes a temperature sensor (10k $\Omega$  RTD) mounted in the flow station to allow for software temperature compensation.

## Technical Specifications:

### Electronics

#### High Precision Differential Pressure Transmitter

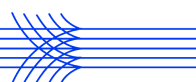
|                           |                                |
|---------------------------|--------------------------------|
| Response Time             | 250 ms                         |
| Zero and span             | field adjustable               |
| Temp calibrated range     | 0-140 F                        |
| Stability                 | < 0.25 % span/year             |
| LED                       | indicates power status         |
| CE Compliant              | to EN61326                     |
| UL                        | 94 5VA                         |
| Multiple Ranges Available | 200 - 2000 FPM, 400 - 3500 FPM |

#### Conditioning Circuit

Filtering and averaging to remove transient and random sources of pressure and electrical noise. Provides clean feedback of air velocity measurement as well as Zero and Span adjustments.

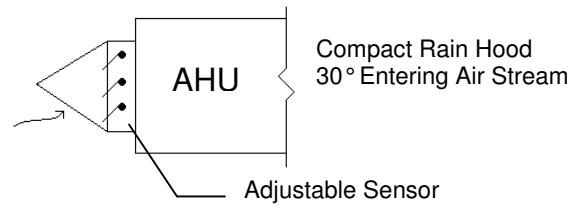
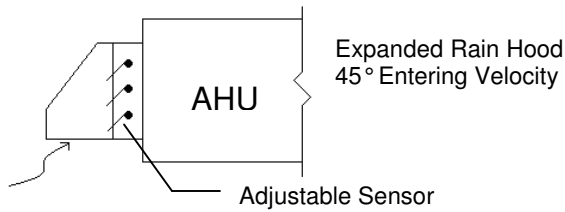
#### Controller

|                       |                                   |
|-----------------------|-----------------------------------|
| BAS Integration       | BACnet MS/TP or Analog Signals    |
| Damper Control Output | 0-10 V or 2-10 V Analog Output    |
| Air Volume Feedback   | 0-10 V or 4 - 20 mA Analog Output |
| Input Power           | 24 VAC                            |

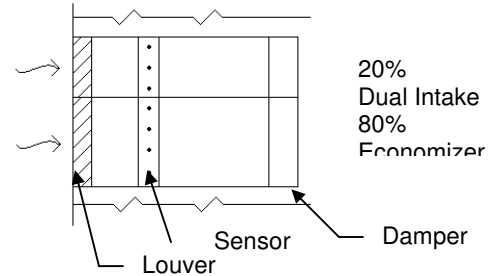
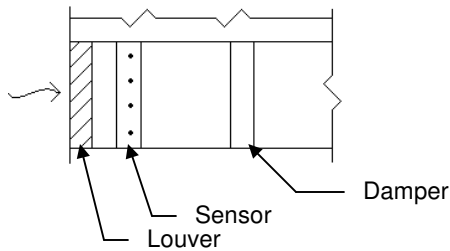


## Application Suggestions

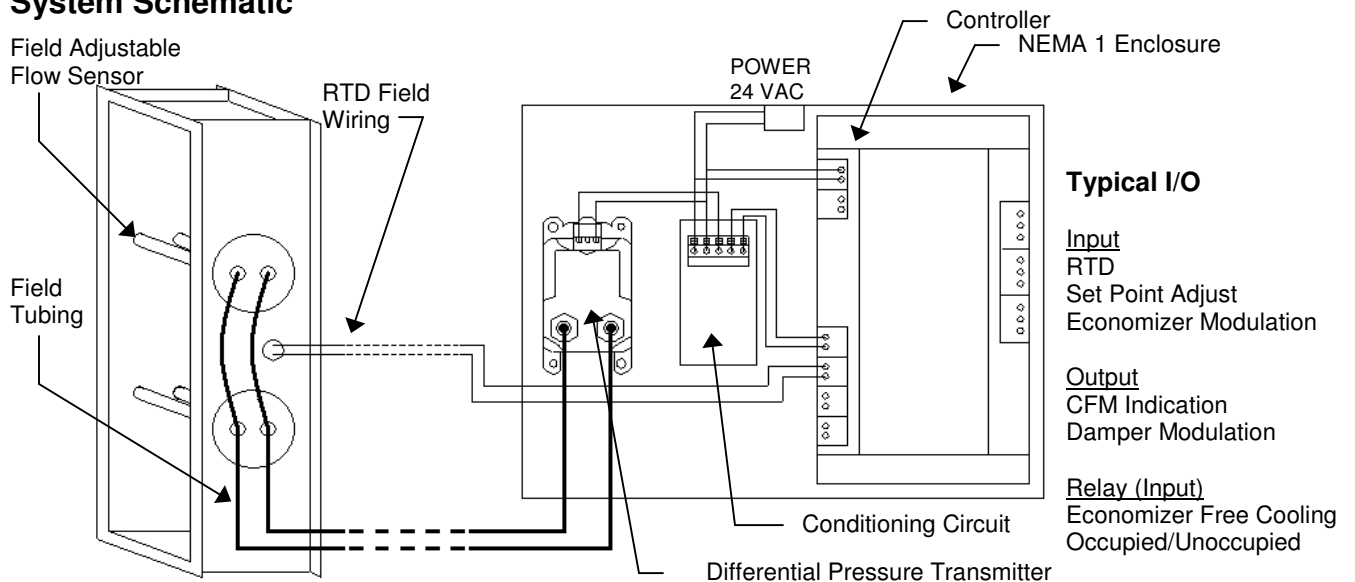
### Air Handling Units



### Flush Mounting



## System Schematic



## System Description

The Waddell outside air measurement system includes specially designed differential pressure probes evenly spaced across the face of the outside air inlet - inside the intake hood or louver of the air handler. The probes can be individually rotated in the field to match non-uniform velocity profiles.

The differential pressure signal from the probes is converted to an electrical signal using a high-accuracy transmitter. The output from this transmitter is processed through a conditioning circuit to remove transient and aerodynamic noise, providing a clean signal to the input of the outside air controller.

The controller will linearize the differential pressure signal and correct for the current temperature as measured by the RTD. The controller will then output a signal to the outside air damper actuator to maintain a setpoint that is selected by an analog input or using the BACnet communication protocol.