

AF-SPS Space Pressure Sensor

DESCRIPTION

The Space Pressure Sensor (AF-SPS) is a flush mount, brushed stainless steel sensor designed to measure the space pressure in rooms, hallways, or equipment. A minimum of two sensors are used to determine the pressure differential between two areas that are measured or controlled. The sensor can be mounted directly into the wall or ceiling, or in a standard electrical junction box (2 x 4 x 1.5 in. - 5.1 x 10.2 x 3.8 cm).

The AF-SPS is designed to be used with a Slack Membrane™ transmitter (AF-SPR) of the appropriate span or other pressure metering device. It is also used in conjunction with the Hood Static Probe™ (AF-HSP) for fume hood applications.

A pressure differential of 4 to 8 in-mil wc (1 to 2 Pa) is the normal optimum amount to hold across a wall boundary to prevent contaminant migration against the pressure. This pressure differential should be modified if unusually large temperature differentials, room heights, or extraneous air currents are encountered. Pressures in excess of this range will generally result in loss of control or crosstalk with other areas when a door is opened, or excessive air migration through apparently solid walls.

Space pressure is the total pressure in a room or open space and not just the static pressure. From the well known relationship: Total Pressure = Velocity Pressure + Static Pressure, we can see that the only case where the total pressure equals the static pressure is when the velocity is zero. The AF-SPS measures total pressure normal to the face of the sensor when the velocity is zero. Optimum location would be on the walls of the pressure boundary, away from any air ducts or any other source of air flow, and as high as practical to prevent accidental pressurization.

The principal reason for measuring space pressure or total pressure instead of static pressure is that the static pressure measurement is effected by arbitrary air current and disturbances which can be a very high percentage of the total measurement, particularly at these low levels.



FEATURES

- ▼ Optimized for 1 to 50 in-mil wc (0.25 to 12.5 Pa) space pressurization
- ▼ Can be sealed to prevent contamination between any two spaces

ADVANTAGES

- ▼ Allows operation at minimum safe volume, reducing energy cost
- ▼ Prevents damage by moisture and other contaminants

APPLICATIONS

- ▼ Control laboratory pressure reversals/variations caused by fume hood operation
- ▼ Isolate room pressure from exhaust/supply flow variations
- ▼ Clean room and medical facilities pressurization
- ▼ Building pressurization
- ▼ Control airflow direction between building spaces

CALCULATIONS

The equation for velocity (fpm) through openings at standard conditions and pressure (in. wc) is:

$$V_{\text{OPENING}} = C \times 4005 \sqrt{\Delta p}$$

For a velocity of 250 fpm through an opening with a C of 0.75, then:

$$\Delta p = \left\{ \frac{V_{\text{OPENING}}}{C \times 4005} \right\}^2 = \left\{ \frac{250}{0.75 \times 4005} \right\}^2 = 6.9 \text{ in-mil wc}$$

For an AF-SPR-1a (10 in-mil wc) transmitter (6.9/10) = 69% full scale

APPLICATION NOTES

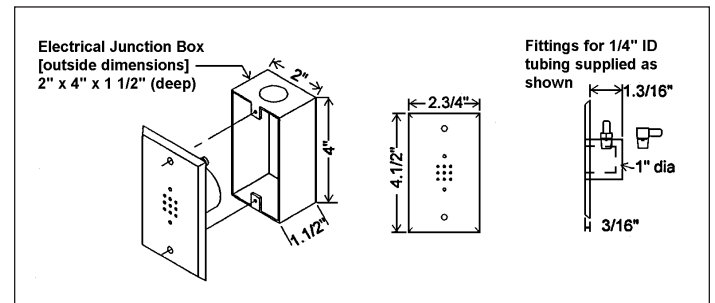
Suggested pressure differentials are given in the table below. They are intended to be used as a guide only. Parameters which may affect these values include the design of the exhaust/supply system, the distance between the exhaust/supply fan and the measured area, airflows in corridors, outside wind velocity and direction, porosity of the walls, room height, temperature differentials, and ceiling type. The minimum pressure differential required to maintain design objectives is typically recommended.

Normally only one area, such as a corridor or large open space with minimal net airflow, should be chosen as the outside air reference zone. The outside measurement is the most difficult to make. A measurement strategy should be adopted such as making the measurements at all four outside walls and averaging the multiple pressures. Flows should be limited to some maximum predetermined amount when windy conditions are encountered. Multiple stories or floors should be treated as separate spaces.

There is no distance limit on the separation of the high and low sensors. Since air is basically incompressible at these pressures, response time is near the speed of sound with the proper tubing size. Refer to the transmitter specification sheet for tubing size at different distances.

	Minimum	Nominal
room to room	2 in-mil wc (0.5 Pa)	8 in-mil wc (2.0 Pa)
room to outside	8 in-mil wc (2.0 Pa)	40 in-mil wc (10 Pa)
common corridor or open space to room	4 in-mil wc (1.0 Pa)	8 in-mil wc (2.0 Pa)

MOUNTING DIMENSIONS



ORDERING INFORMATION

AF-SPS-1 (1) Space Pressure Sensor with 1/4 in. barbed fitting



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American Auto-Matrix
One Technology Lane
Export, PA 15632
1-877-AAM-HVAC (226-4822)

aam@aamatrix.com
www.aamatrix.com

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