Cleveland Controls
Division of UniControl Inc.

Model AFS–961

Adjustable Set Point Air Pressure Sensing Switch

AFS-961 in Standard Enclosure, rated NEMA-1.

AFS-961-1 in NEMA-4 rated Enclosure.

AFS-961-2 in NEMA-7 and NEMA-9 rated Enclosure.

DESCRIPTION & OPERATION

The **Cleveland Controls AFS-961 Differential Pressure Sensing Switch** is designed to provide precise operation and convenient features for industrial and commercial air handling applications. The **AFS-961** can monitor positive, negative, or differential pressure (flow) of air and non-combustible gases. It is commonly used to monitor combustion air, furnace pressure, ventilating blower operation, inflatable structure pressure, fume hood operation, bag house air flow, dirt accumulation in air filters, and heat-transfer air flow. The **AFS-961** has a field-adjustable set point range of 0.03"wc to 2.0"wc.

COMMON APPLICATIONS

The most common specific application for the **AFS-961** is **Low Draft (Negative Pressure) Cutoff Safety Switch** for combustion draft control systems.

The general applications of the **AFS-961** are:

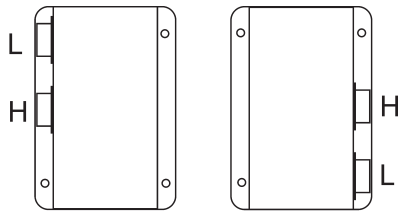
- **Low Positive Pressure Cutoff**. (Shut-down upon insufficient pressure.)
- **Low Negative Pressure Cutoff**. (Shut-down upon insufficient draft.)
- **Low Differential Pressure Cutoff**. (Shut-down upon insufficient difference between two samples.)

MOUNTING

The **AFS-961** is available in 3 enclosures designed for surface-mounting on any flat, relatively stable surface free of vibration. To obtain the lowest operating set point specification, the control must be mounted with the diaphragm in a vertical plane(Fig 1).

The standard NEMA-1 rated enclosure has mounting flanges with four $^{9}/_{32}$" mounting holes as shown on page 4. The NEMA-4 rated model has mounting flanges with four $^{5}/_{16}$" mounting holes as shown on page 3. The NEMA-7/NEMA-9 rated enclosure has two mounting slots as shown on page 3.

FIGURE 1



PIPING

The field sample line connectors, two ¼" - 18 NPT female fittings, labeled **H (high)** and **L (low)**, are located on the side of the enclosure as shown in Figure 1.

For sample lines up to 10 ft., use ¼" OD tubing or ⅛" pipe.

For sample lines up to 20 ft., use ¼" ID tubing or ¼" pipe.

For sample lines up to 60 ft., use ½" ID tubing or ½" pipe.

For sample lines up to 90 ft., use ³³¼" ID tubing or ¾" pipe.

For sample lines up to 120 ft., use 1" ID tubing or 1" pipe. For each right angle bend, add four feet to the computed line length in order to determine correct pipe or tubing size.

If either sample line connector is vented to the atmosphere, attach an elbow to it so that the open end of the connector points downward. This will help protect the switch from contamination.

SAMPLE LINE CONNECTIONS

Positive Pressure only:

Connect sample line to **H**;

L remains open to the atmosphere.

Negative Pressure only:

Connect sample line to **L**:

H remains open to the atmosphere.

Two Negative Samples:

Connect higher negative sample to **L**:

Connect lower negative sample to **H**.

Two Positive Samples:

Connect higher positive sample to **H**:

Connect lower positive sample to **L**.

One Negative and One Positive Sample:

Connect positive sample line to **H**:

Connect negative sample line to **L**.

ELECTRICAL CONNECTIONS

Three (3) terminals are provided for field wiring. Before pressure is applied to the diaphragm, the switch contacts will be in the normally closed position as shown in Figure 2.

To Prove Excessive Air Flow or Pressure:

Connect **Terminal 1** to a hot line, **Terminal 2** to an alarm circuit (if desired), and **Terminal 3** to the control circuit.

To Prove Insufficient Air Flow or Pressure:

Connect **Terminal 1** to a hot line, **Terminal 2** to the control circuit, and **Terminal 3** to an alarm circuit (if desired).

NOTE: When the switch is wired in this manner, an alarm circuit will be energized at start up, and will stay energized until the set point of the air switch is satisfied. To avoid nuisance alarm, a time delay, equal to the amount of time required for pressure to activate the air switch, should be wired in series between Terminal 3 and the alarm device.

FIELD ADJUSTMENTS

Field adjustments to the operating set point are made by removing the protective plug button on the side of the standard, NEMA1 rated enclosure and inserting a blade-type screwdriver, at least 3 inches long to rotate the set point adjustment screw.

The adjustment range is **0.03 ± .02" w.c. to 2.0" w.c.** To adjust the set point, turn the adjusting screw counterclockwise until motion has stopped. Next, turn the adjusting screw **4 complete turns** in a clockwise direction to engage the spring.

From this point, the **next 10 turns** the next ten turns will be used for the actual calibration. **Each full turn represents approximately 0.2" w.c.** As the operating set point increases, the switching differential also increases from 0.02 ± 0.01" w.c. at minimum set point, to approximately 0.1" w.c. at maximum set point. **Please note:** To properly calibrate an air pressure sensing switch, a digital manometer or other measuring device should be used to confirm the actual set point.

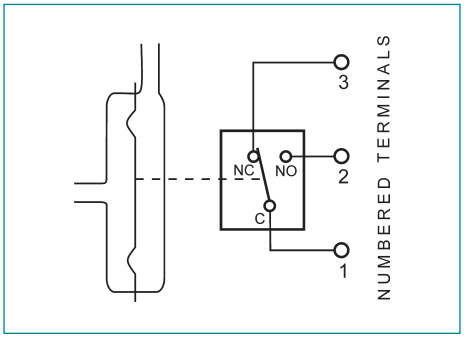


FIGURE 2: ELECTRICAL CONNECTIONS

SPECIFICATIONS

Models AFS-961, AFS-961-1 & AFS-961-2 Air Pressure Sensing Switches

ELECTRICAL RATING:

300 VA pilot duty at 277 VAC

260 VA pilot duty at 240 VAC

130 VA pilot duty at 120 VAC

15 amp noninductive to 277 VAC.

CONDUIT OPENING:

⅞" diameter opening accepts ½" conduit fitting.

ELECTRICAL SWITCH:

Contact Arrangement: SPDT NC. snap-action switch. Contacts in a normally closed position before pressure is applied.

CONTROL SET POINT / ADJUSTABLE OPERATING RANGE:

Field-adjustable, 0.03 ±0.02 to 2.0" w.c.; (0.8 ± 0.5 to 51 mm w.c.; 0 to 0.07 psi)

SWITCH DIFFERENTIAL:

Progressive, increasing from 0.02 ± 0.01" w.c. at minimum set point, to approximately 0.1" w.c. at maximum set point (0.5 ±.25 mm to approximately 20.3 mm).

MAXIMUM PRESSURE:

½ PSI (0.03 bar)

ELECTRICAL CONNECTIONS:

Numbered terminal panel

RECOMMENDED OPERATING POSITION:

Mount with the diaphragm in any vertical plane to obtain the lowest operating set point.

OPERATING TEMPERATURE RANGE:

-40 TO 180 ºF (- 40 to 82 ºC)

SAMPLE LINE CONNECTORS:

Two ¼"-18 NPT female fittings.

APPROVALS:

UL listed, CE and CSA approved.

Pressure Conversion Table

1"wc = 0.0361psi or 0.0736"Hg

1"Hg = 0.491psi or 13.6" wc

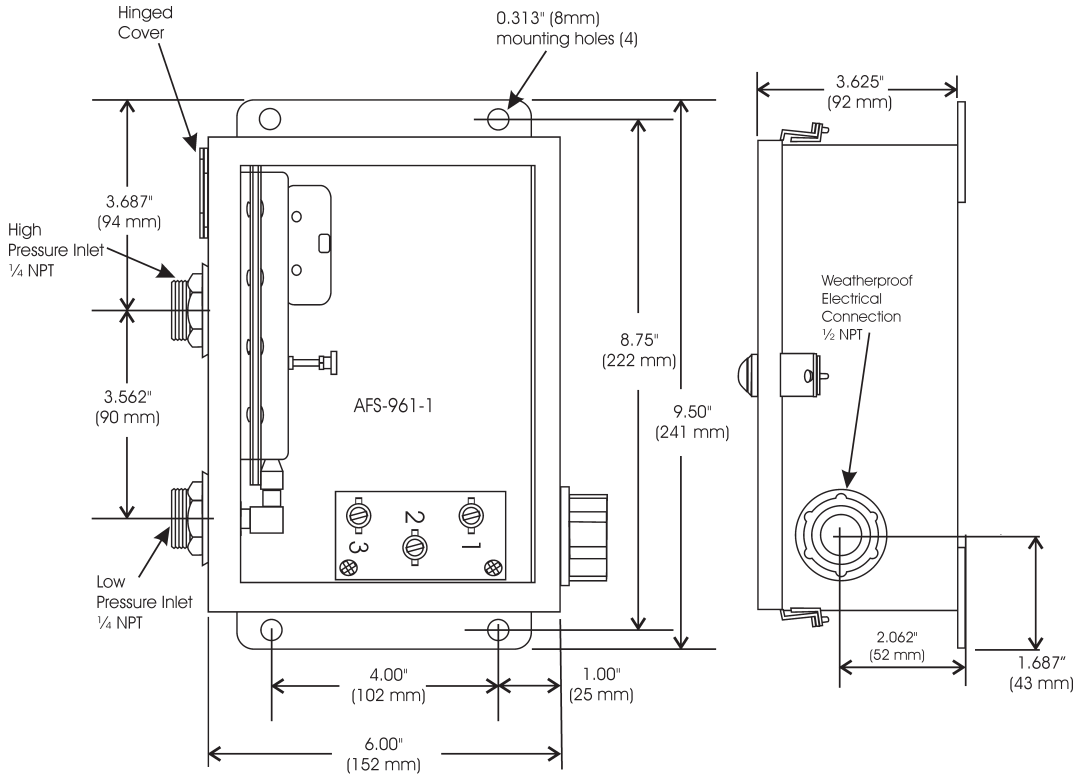
1psi = 27.7"wc or 2.036"Hg

ENCLOSURE SPECIFICATIONS & DIMENSIONS

Model AFS-961-1:

14-gauge grey hammertone enameled steel with neoprene gasketed clamped cover hinged on the left side. NEMA 4 rated: provides protection from dust, dirt, oil, and water.

Shipping Weight: 8 lbs.

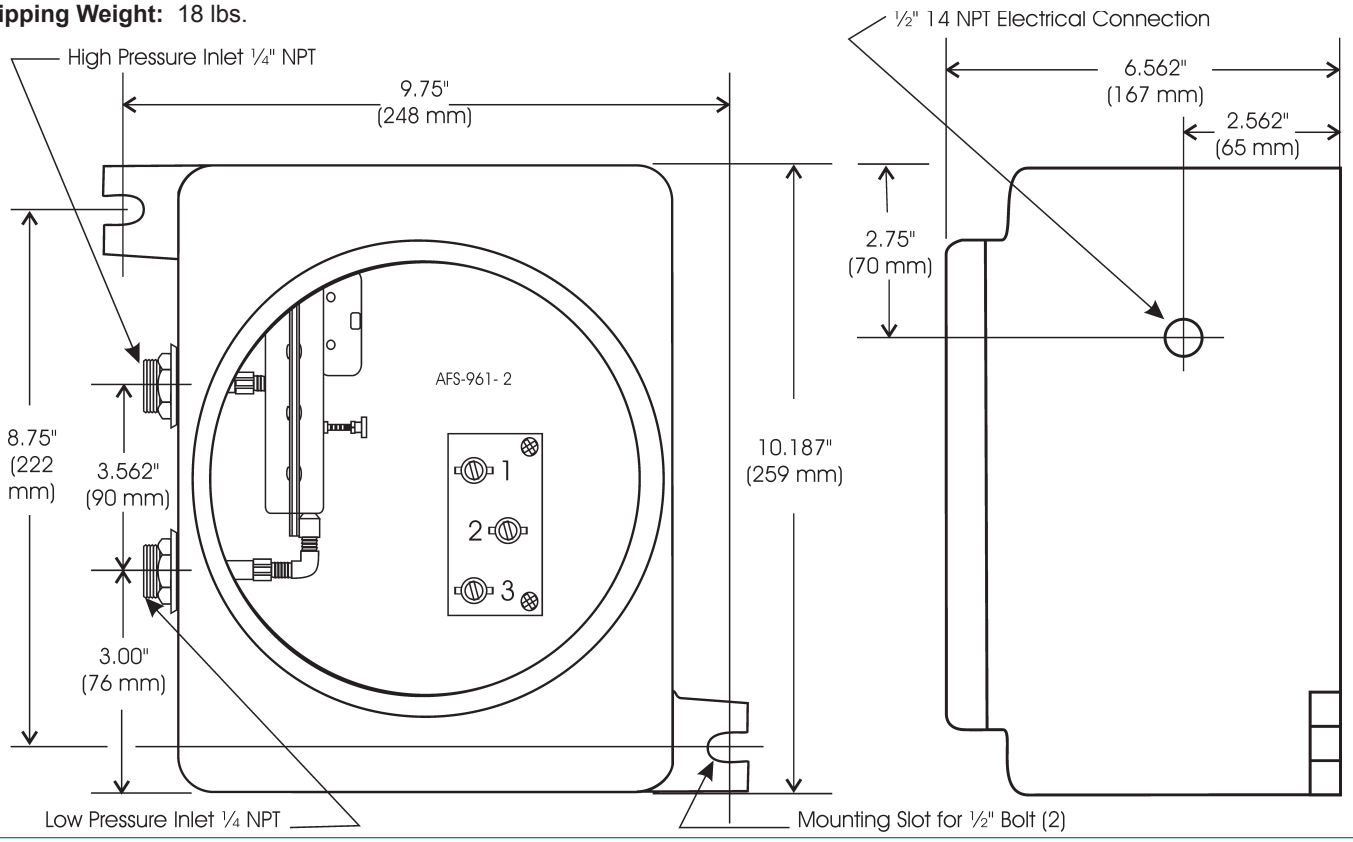


Model AFS-961-2:

Cast aluminum alloy, nonmagnetic, non-sparking, and non-rusting. NEMA 7 and NEMA 9 rated. UL approved for Class 1, Group D; Class II, Groups E, F, G.

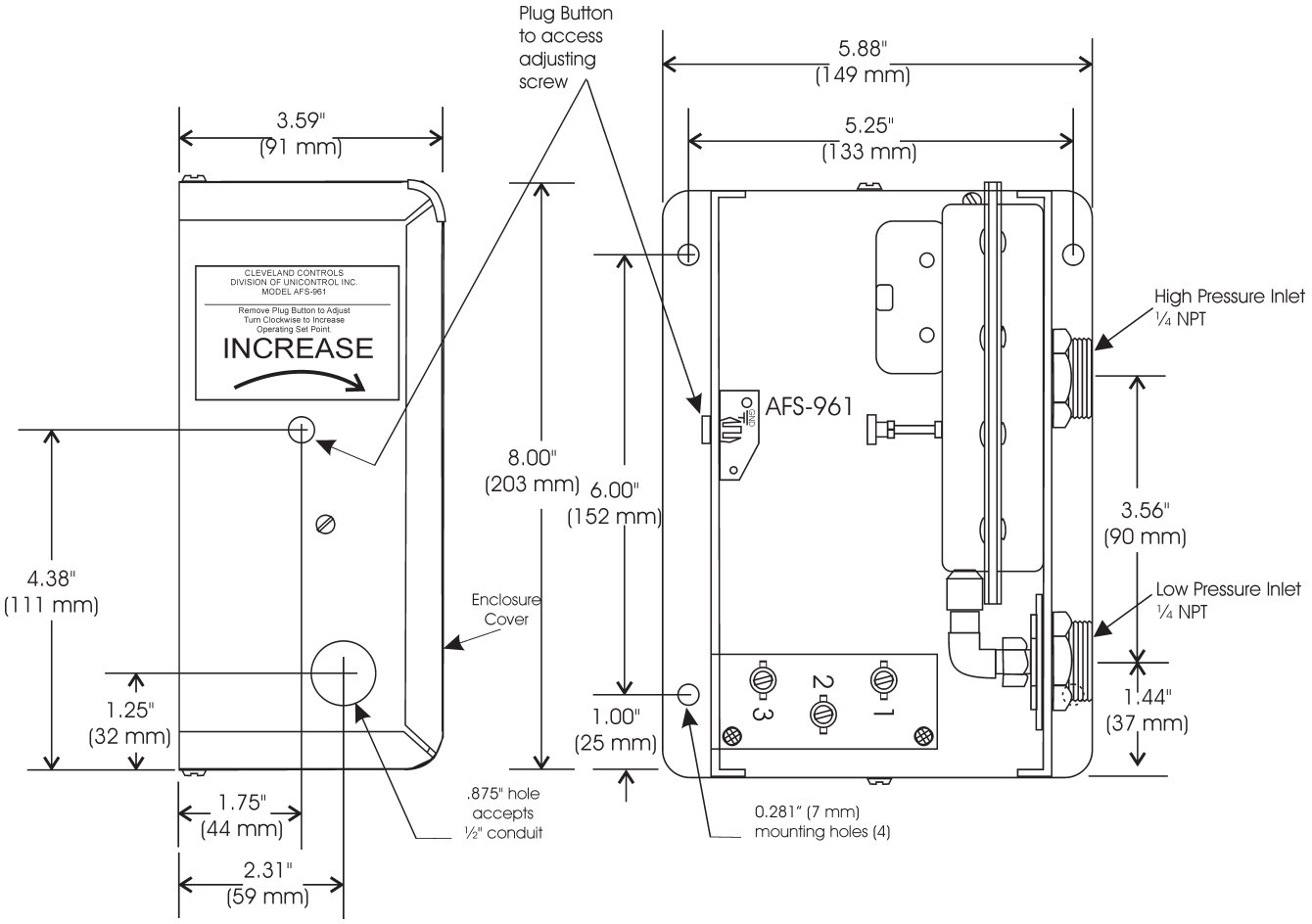
Piping: Either pressure inlet, if not connected to a pressure sample, must be piped and vented to a nonhazardous area.

Shipping Weight: 18 lbs.



Model AFS-961 in Standard NEMA-1 rated housing:

- Coated steel finish.
- Shipping Weight: **5 lbs.**



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