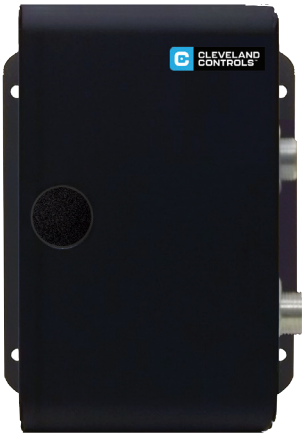
AIRFLOW PRESSURE SENSING SWITCH
(ADJUSTABLE SET POINT 0.03" WC TO 2.0" WC)

MODEL AFS-961



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 **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 noncombustible 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**. (Shutdown upon insufficient pressure.)
- **Low Negative Pressure Cutoff**. (Shutdown upon insufficient draft.)
- **Low Differential Pressure Cutoff**. (Shutdown upon insufficient difference between two samples.)

MOUNTING (FIGURE 1)

The **AFS-961** is available in 3 enclosures designed for surface mounting on any flat, relatively stable surface free of vibration. With any enclosure, to obtain the lowest operating set point specification, mount the **AFS-961** with the silicone diaphragm in any vertical plane.

The standard NEMA 1-rated enclosure has mounting flanges with four $^{9}/_{32}$" mounting holes as shown in Figure 3 on page 3.

The NEMA-4 rated model has mounting flanges with four $^{5}/_{16}$" mounting holes as shown in Figure 4 on page 3.

The NEMA-7/NEMA-9 rated enclosure has two mounting slots as shown in Figure 5 on page 4.

PIPING (FIGURE 1)

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 $^{3}/_{4}$" ID tubing or $^{3}/_{4}$" 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.

Note: Cleveland Controls products combine weatherproof and explosion proof NEMA-rated housings with UL-rated air switches. The combination of these components must be approved for use in each weatherproof and explosion proof application at the installation site by the end user.

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CLEVELAND CONTROLS™

SAMPLE LINE CONNECTIONS (FIGURE 1)

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 (FIGURE 2)

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 alarms, a time delayer, 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.

PRESSURE CONVERSION

	" wc	" Hg	mm wc	psi	Pa
1" wc		0.07	25.4	0.036	248.8
1" Hg	13.6		345.3	0.491	3376.9
1 mm wc	0.04	0.003		0.001	9.81
1 psi	27.7	2.04	703.1		6894.6
1 Pa	0.004	0.0002	0.102	0.0001	

FIELD ADJUSTMENTS

To adjust the operating set point on the standard model in NEMA-1 housing, remove the protective plug button on the side of the control enclosure and insert a standard blade-type screwdriver, at least 3 inches long.

The adjustment range is **0.03 +.02/- 0.00" wc to 2.0" wc**. 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.

For the **next 10 turns, each full turn represents approximately 0.2" wc.** At higher operating pressures, there is a slight increase in the switching differential. **Please note:** To properly calibrate an air pressure sensing switch, use a digital manometer or other measuring device to confirm the actual set point.

FIGURE 1: SAMPLE LINE CONNECTIONS

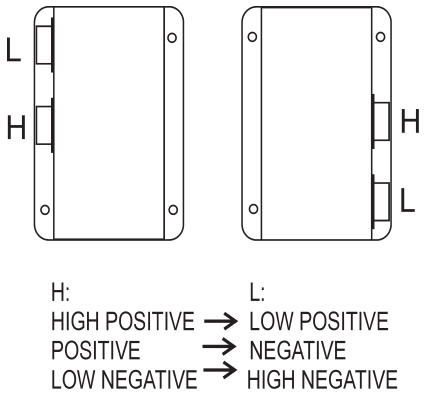
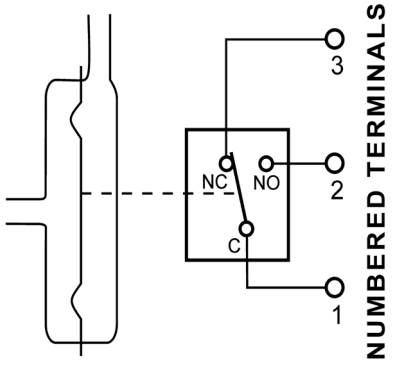


FIGURE 2: ELECTRICAL CONNECTIONS



SPECIFICATIONS MODEL AFS-961 AIR PRESSURE SENSING SWITCH

Mounting Position:
Mount with the silicone diaphragm in any vertical plane.

Set Point Range:
0.03" wc + 0.02" wc / -0.00" wc to 2.0" wc (0.76 to 51 mm wc; 0 to 0.07 psi)

Approximate Switching Differential:
Progressive, increasing from 0.02± 0.01" wc at minimum set point to approximately 0.1" wc at maximum set point. (0.5 ± .25 mm to approximately 2.0 mm)

Operating Temperature Range:
-40 °F to 180 °F (-40 °C to 82 °C)

Measured Media:
Air or combustion by-products that will not degrade silicone

Maximum Pressure:
½ psi (0.03 bar)

Life:
100,000 cycles minimum at ½ psi maximum pressure each cycle and at maximum rated electrical load

Electrical Rating:
300 VA pilot duty at 277 V ac
260 VA pilot duty at 240 V ac
130 VA pilot duty at 120 V ac
15 amp noninductive to 277 V ac

Power consumption: 4.5 watts at 120 V ac

Contact Arrangement:
SPDT- NC (Single pole, double-throw snap action switch; contacts are in normally closed position before pressure is applied to the diaphragm.)

Electrical Connections:
3 numbered terminals, pressure clamp screw type

Conduit Opening:
⅞" diameter, accepts ½" conduit

Sample Line Connectors:
Two ¼"-18 NPT female fittings

Approvals:
UL listed, CE and CSA approved

Shipping Weight:
AFS-961 (NEMA-1 enclosure): 5 lbs.
AFS-961-1 (NEMA 4 enclosure): 8 lbs.
AFS-961-2 (NEMA 7/9 enclosure): 18 lbs.

Note: Cleveland Controls products combine weatherproof and explosion proof NEMA-rated housings with UL-rated air switches. The combination of these components must be approved for use in each weatherproof and explosion proof application at the installation site by the end user.

ENCLOSURE SPECIFICATIONS & DIMENSIONS

Figure 3: Model AFS-961 in Standard NEMA-1 rated housing:

- Flat black epoxy powder coated steel finish
- Shipping Weight: **5 lbs.**

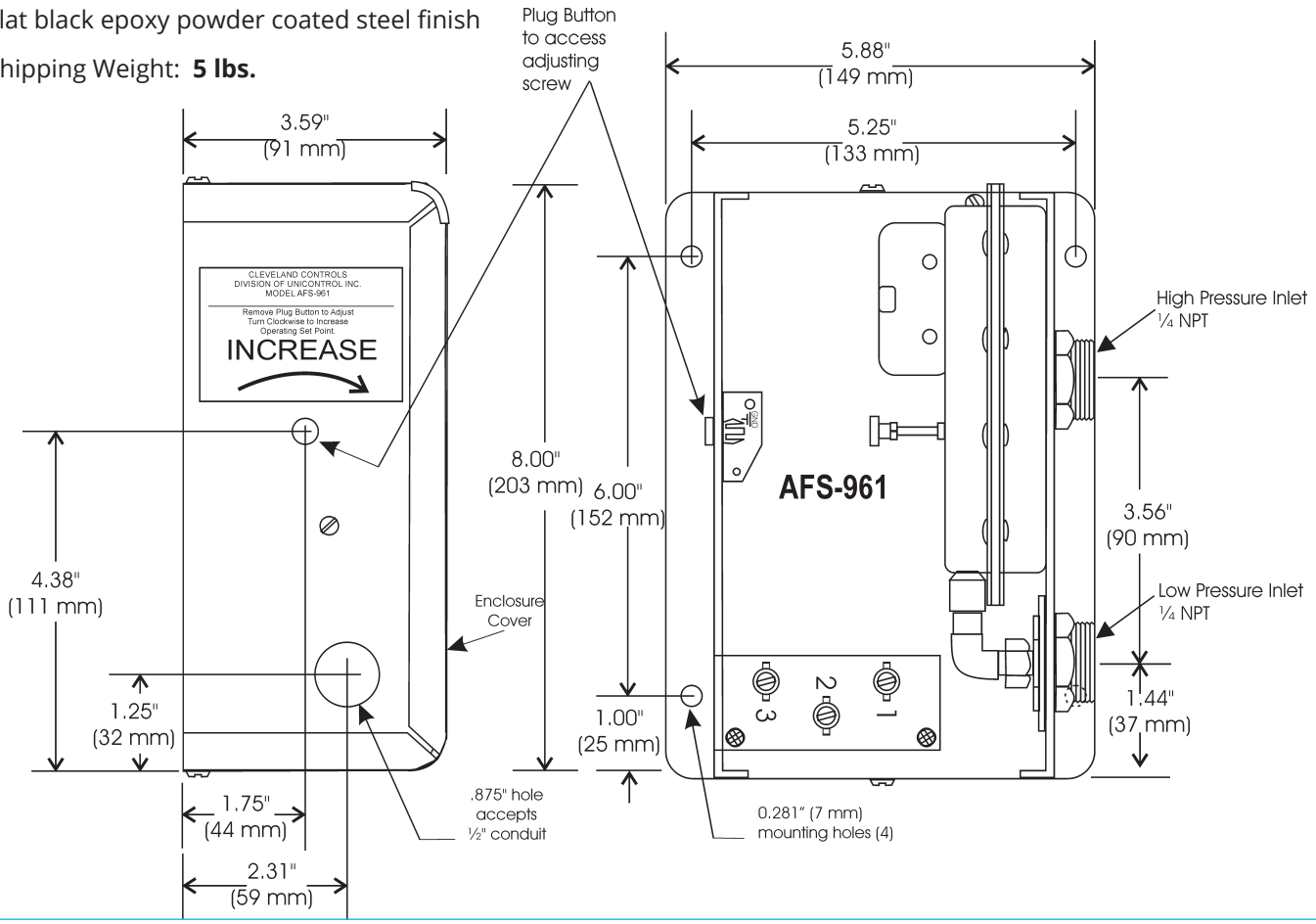
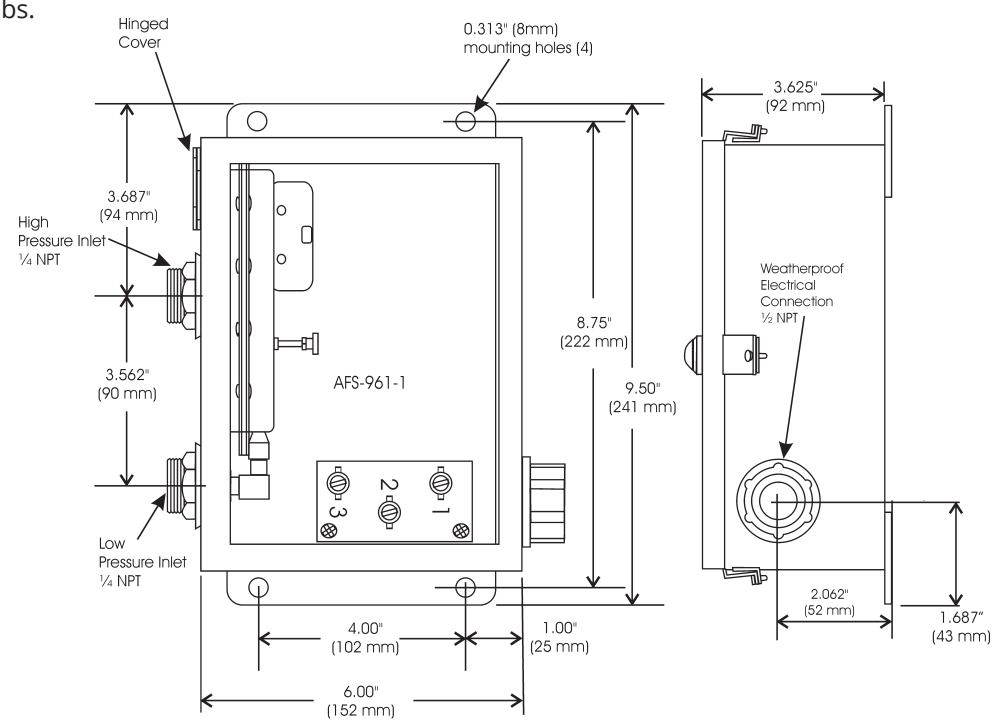


Figure 4: Model AFS-961-1:

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

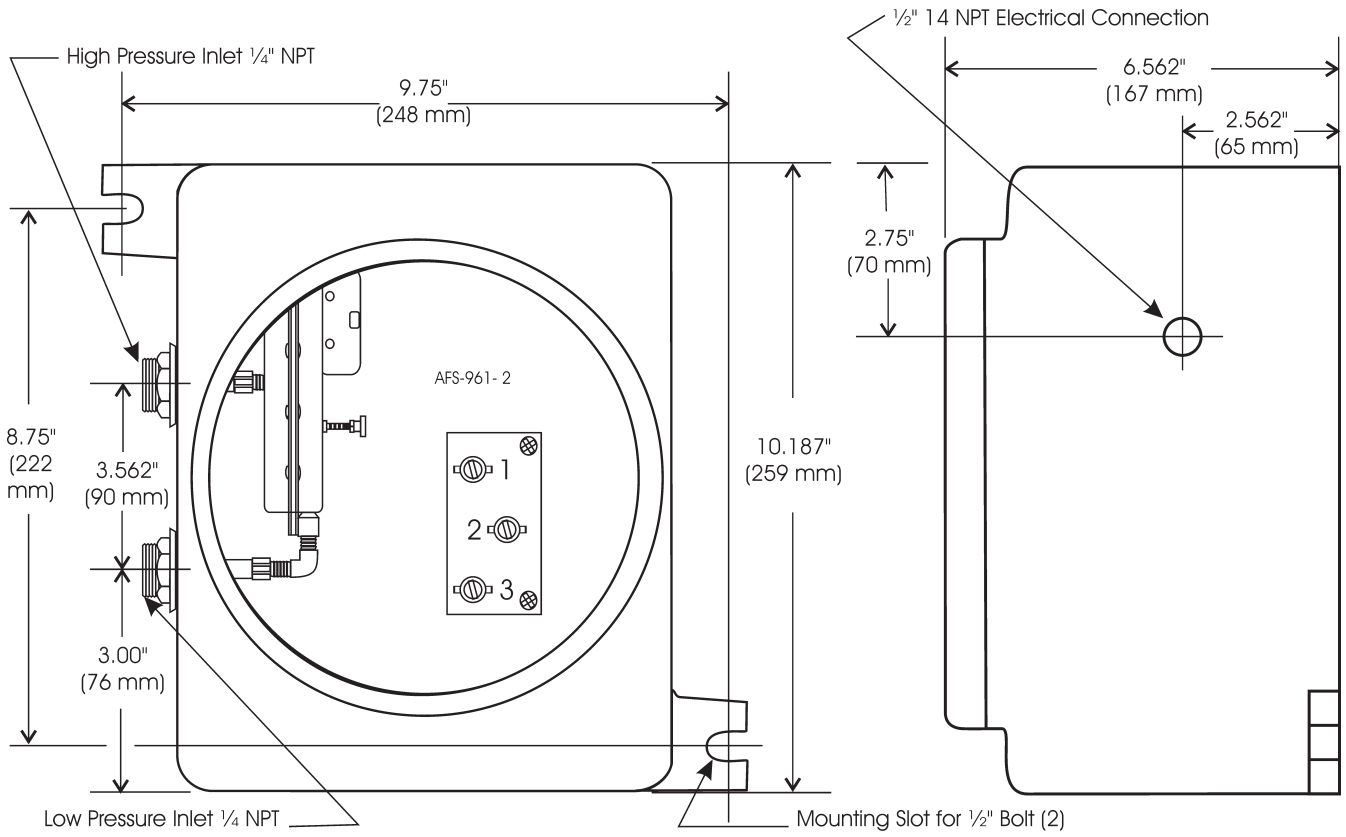
Shipping Weight: 8 lbs.



ENCLOSURE SPECIFICATIONS & DIMENSIONS

Figure 5: 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.