



UltimateAir, Inc.

178 Mill Street
Athens, Ohio 45701

Tel: 740-594-2277

Fax: 740-592-1499

www.ultimateair.com

Pressure Control for the *RecoupAerator 200DX* **Installation Guide**



The Pressure Transmitter option enables the **RecoupAerator®** to continuously and automatically maintain the indoor/outdoor pressure differential target of 2.5Pa max, dependent on the air tightness of your home or building.

Why Monitor Indoor and Outdoor Pressure?

Today houses are built more tightly to minimize energy losses. As a result, quality ventilation is vital. On average, a tightly built house has a slightly lower pressure relative to the outside. The signal to the 200DX Main Control is 0-10Vdc. **This pressure device is not intended to compensate for make-up air conditions**, but rather provides greater control over relative building pressure. Lower indoor pressure allows outdoor air to be pulled in through unintentional leaks in the building shell potentially containing excess amounts of heat cold, humidity and contaminants. A balanced or slightly positive indoor air pressure will minimize the amount of harmful contaminants (both harmful for occupants and the structure). Using the pressure transmitter option is an effective method to prevent mold growth inside the wall cavities and the building structure.

The *RecoupAerator®* is equipped with two blower motors, one controlling incoming air (Blower 1), and one controlling exhaust air (Blower 2). When the unit senses a negative indoor pressure, Blower Motor 2 will reduce airflow using a patented algorithm as necessary and attempt control to the pressure set point selected.

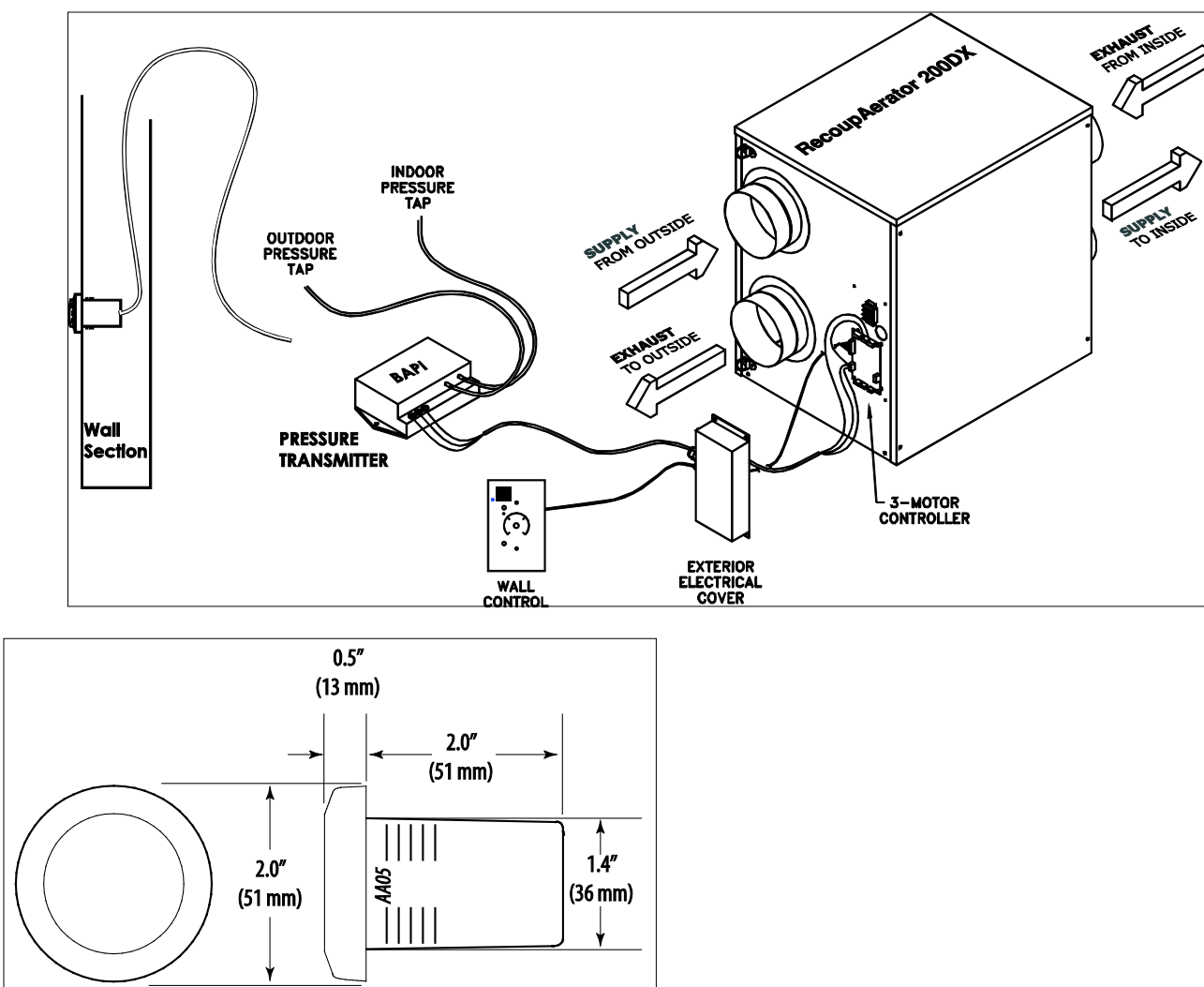
Note: The ability of the RecoupAerator® to maintain or control the pressure differential is directly dependant on the overall amount of negative/positive pressure it must overcome.

Setup: Pressure Transmitter

Install the pressure transmitter in a conditioned space in the most convenient location for wiring to the *RecoupAerator®*, and connecting to the pressure taps. The transmitter may be screwed to a wall, floor joist, or any indoor stationary location. The Pressure Transmitter includes two pressure taps (static pickup tubes).

The Indoor Pressure Tap- HI port on Transmitter- mounted to an interior wall which is considered to be the most central open point in the residence.

The Outdoor Pressure Tap- LOW port on Transmitter- located on a wall exposed to the outdoor environment. A garage, crawl space or attic are good locations, so long as these spaces are open to the outside and not considered part of the conditioned envelope. Avoid mounting the outdoor pressure tap in a windy location.



Page 3 of 7

Setup: *RecoupAerator*® Main Control Board (3motor-controller)

The Main Control Board is located inside the 110vac Power Connection Box mounted on the *RecoupAerator*®, and is *programmed specifically* for use with the BAPI Pressure Transmitter.

Select Pressure Set Point on the *RecoupAerator*® Main Control Board (3motor-controller)

While wiring to the *RecoupAerator*® Main Control, consider what pressure differential you want the *RecoupAerator*® to maintain*, then change the jumper positions according to the diagram below. The objective is to keep humidity from entering the wall cavities. For the *RecoupAerator*® to have pressure influence, the unit should be run continuously set at a flow above medium.

Set Point = 0 Pa

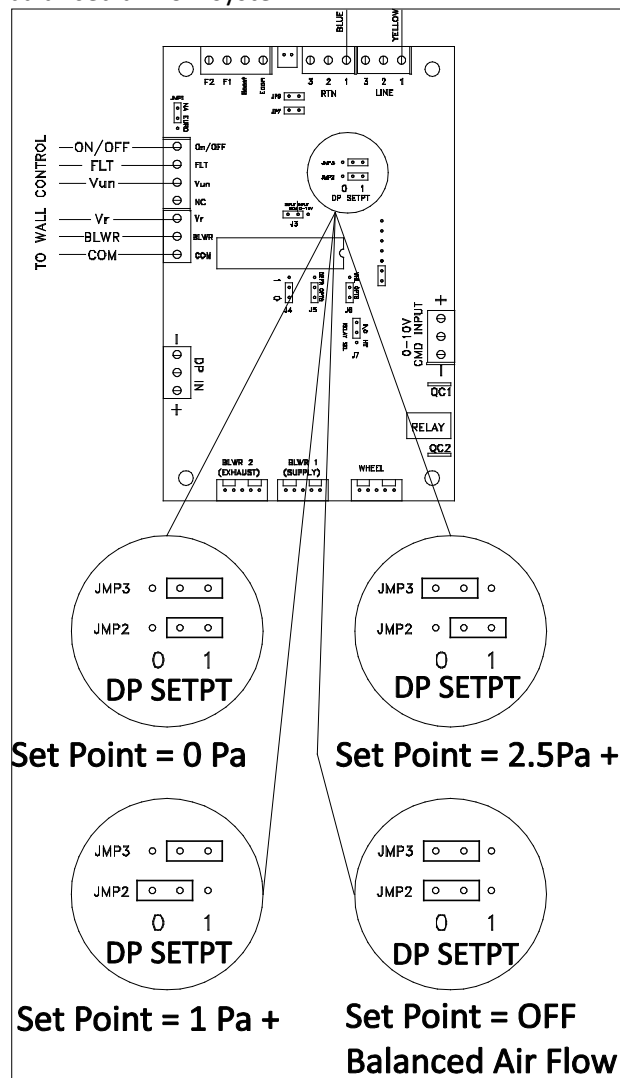
Zero pressure differential for most installations because humidity levels oscillate from inside to outside during the year in any given climate. The 200DX will still adjust the blower flow to maintain the 0Pa relative to outside.

Set Point = 1 or 2.5 Pa

If the climate has a higher year-round outdoor humidity

Set Point = OFF

Air flow is Balanced (Factory Default)- Jumpers in the 'off' position disable the BAPI Pressure Control and allow the *RecoupAerator* to operate as a balanced airflow system



Operation and Testing:

Operate the RecoupAerator as normal, but please keep in mind the most effective pressure offset will occur at midrange and higher flow rates set on the Wall Dial. A lower flow rate will result in lower possible pressure influence.

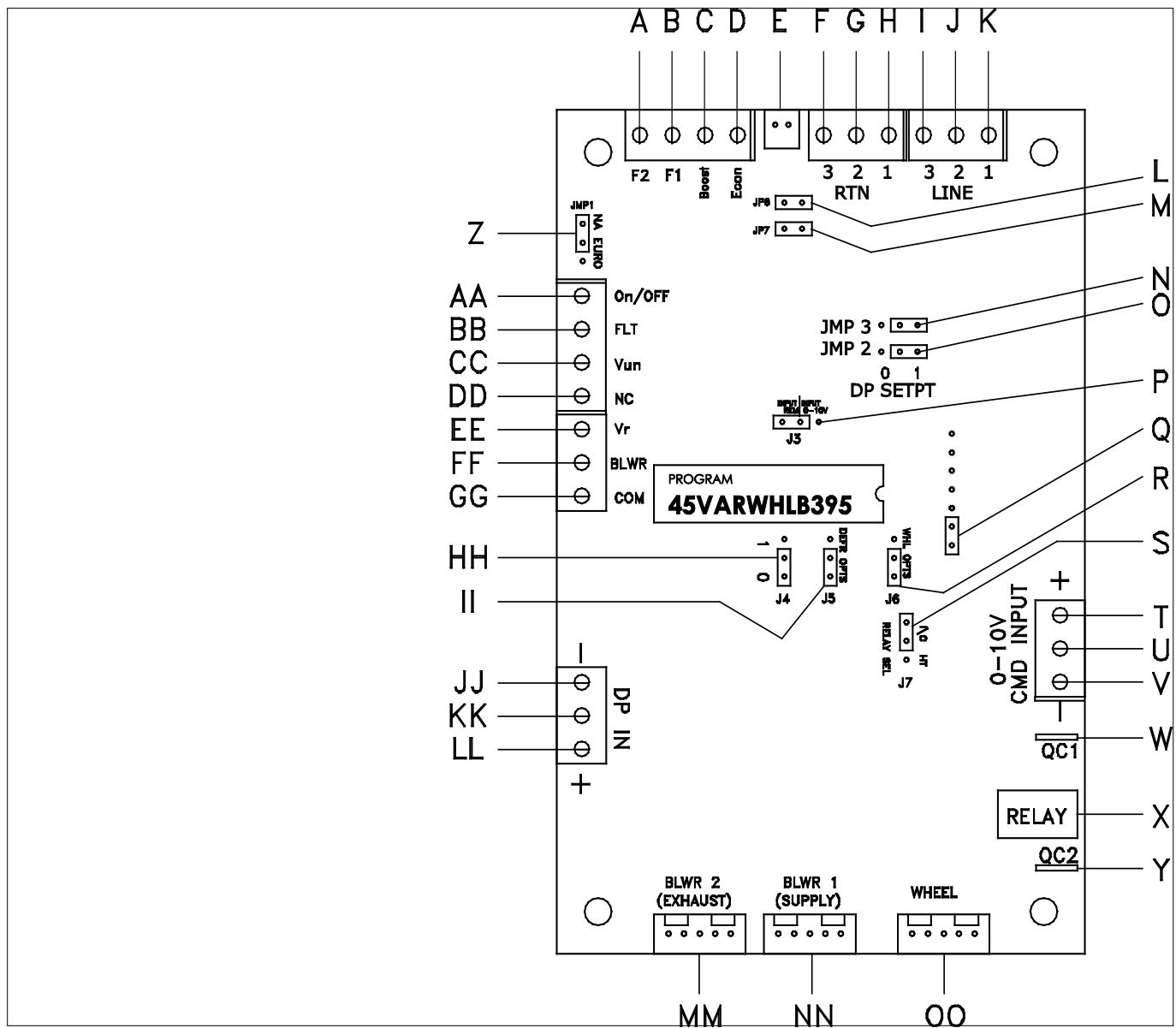
Boost Mode will override the Pressure Transmitter. This means the *RecoupAerator*® ignores the Pressure Transmitter when Boost is activated and the two blowers will run with equal max air flow.

Sudden changes in pressure will not cause instantaneous changes in flow by the *RecoupAerator*®. The BAPI Pressure Transmitter tracks and records indoor/outdoor pressure changes over 10 minute intervals. The signal to the *RecoupAerator*® Main Control ranges from 0-10Vdc. A 5Vdc signal to the DP-IN terminal on the *RecoupAerator*® Main Control means balanced pressure inside to outside being measured by the BAPI transmitter. A signal voltage above or below 5V tells the *RecoupAerator*® to make the necessary adjustments to airflow in 8CFM steps every 10 minutes. With approximately 18 steps to the largest offset flow rate.

Rough Testing for pressure correction by the *RecoupAerator*® may be possible by feeling for a flow difference with a hand in the airstream at the exhaust and supply ducts.

Accurate measurement of air flow rate changes can only be tested and verified with proper duct pressure gauges mounted in the duct work.

*The RecoupAerator® Main Control Board is Programmed Specifically for use with the BAPI Pressure Transmitter
Please use this RecoupAerator® Main Control Board for reference*



Main Control Board (Three-motor controller) Programmed for use with the Pressure Transmitter

- A. F2: Wiring input from furnace. 24 VAC common (in some cases “C” post from thermostat wiring on the furnace). If wiring to furnace, REMOVE jumpers at L and M.
- B. F1: Wiring input from furnace. 24 VAC line (in some cases “G” post from thermostat wiring on the furnace). If wiring to furnace, REMOVE jumpers at L and M.
- C. Boost input. When this post receives a 24 VAC signal (from I, J, or K), the unit will be turned on, and commanded to high speed (max air flow).
- D. EconoCool input: When this post receives a 24 VAC signal (from I, J, or K), the EconoCool function will be enabled. See EconoCool in this manual for further information.

- E. Temperature thermistor input. Temperature information from the temperature thermistor located in the incoming air stream (duct 1) is fed to the controller through this input.
- F. RET 3: 24 VAC return post. Common terminal from the internal transformer.
- G. RET 2: 24 VAC return post. Common terminal from the internal transformer.
- H. RET 1: 24 VAC return post. Common terminal from the internal transformer.
- I. LINE 3: 24 VAC line post. Line voltage from the internal transformer.
- J. LINE 2: 24 VAC line post. Line voltage from the internal transformer.
- K. LINE 1: 24 VAC line post. Line voltage from the internal transformer.
- L. JP6: Jumper connecting 24 VAC line voltage from internal transformer to F1.
- M. JP7: Jumper connecting 24 VAC return from internal transformer to F2.
- N. JMP3: Offset / DP Set point jumper. Selects the pressure differential between the inside and outside that the ERV will try to maintain.**
- O. JMP2: Offset / DP Set point jumper. Selects the pressure differential between the inside and outside that the ERV will try to maintain.**
- P. J3: Control Input jumper. Selects control input from either the remote wall controller, or a 0-10V DC input voltage (at T and V).
- Q. Programming jumper. Must be in place for unit operation.
- R. J6: Wheel Options. Selects control for heat wheel rotation. (default '0' position)
- S. J7: Relay selection. This jumper selects whether the normally open relay (X) closes when the unit turns on (position I/O), or when the temperature thermistor reads below 10°F (position HT). Default is position I/O.
- T. 0-10V DC input post. When J3 is in the 0-10V position, this post accepts the positive line voltage 0-10V DC command from an outside control source.
- U. Not connected. Empty socket.
- V. 0-10V DC input post. When J3 is in the 0-10V position, this post accepts the negative side 0-10V DC command from an outside control source.
- W. QC1: Quick Connect 1. Used as an auxiliary output control option. QC1 will be electrically connected to QC2 when the relay (X) is closed. Max rating: 1A@24VAC.
- X. Low voltage pilot duty relay. Normally open. Closes according to selection made at J7 (S). Default: closes when the ERV is turned on.
- Y. QC2: Quick Connect 2. Used as an auxiliary output control option. QC2 will be electrically connected to QC1 when the relay (X) is closed. Max rating: 1A@24VAC.
- Z. JMP1: Remote control input selection. Default wall controller in the North American remote wall control (NA position). J3 (P) must be in the REM INPUT position. When J3 is in the 0-10V position, JMP1 MUST be in the EU position for the 0-10V input to work.
- AA. On/Off terminal. For wiring to mating terminal on NA wall controller.
- BB. FLT terminal. For wiring to mating terminal on NA wall controller.
- CC. Vun terminal. For wiring to mating terminal on NA wall controller.
- DD. NC terminal. Empty terminal. Do not wire to this terminal.
- EE. Vr terminal. For wiring to mating terminal on NA wall controller.
- FF. BLWR terminal. For wiring to mating terminal on NA wall controller.
- GG. COM terminal. For wiring to mating terminal on NA wall controller.
- HH. J4: Blower control jumper. Default is '0' position for CFM control.
- II. DEFR OPTS: Defrost Options jumper. Default position is the '0' position. Unit will be in defrost mode between 18°F - 8°F, and OFF when outside temperatures are below 8°F.
- JJ. DP IN: Delta pressure control input, negative side. Input from pressure transmitter.**
- KK. Not connected. Empty socket.
- LL. DP IN: Delta pressure control input, positive side. Input from pressure transmitter.**

Product Identification

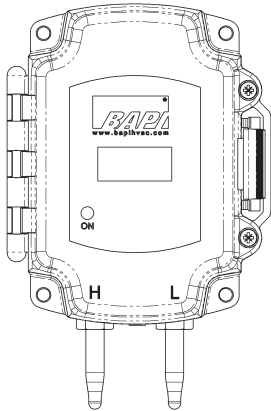


Fig. 1: ZPS with Display in a BAPI-Box

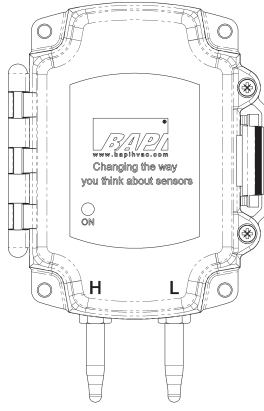


Fig. 2: ZPS with No Display in a BAPI-Box

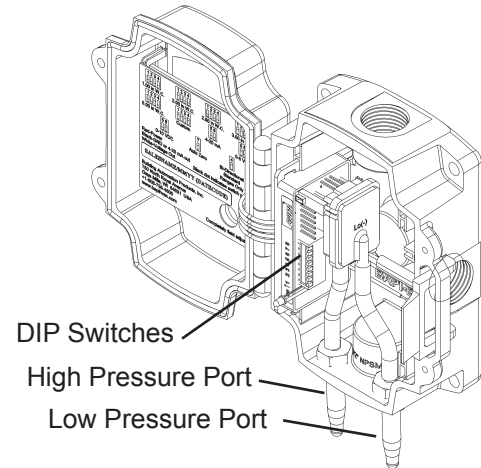


Fig. 3: ZPS Display Unit Open

Specifications

Power:

7 to 45 VDC (4 to 20 mA Output)
7 to 45 VDC or 7 to 32 VAC (0 to 5 VDC Output)
13 to 45 VDC or 13 to 32 VAC (0 to 10 VDC Output)

Power Consumption:

20 mA max, DC only at 4 to 20 mA Output
4.9 mA max DC at 0 to 5 VDC or 0 to 10 VDC Output
0.12 VA max AC at 0 to 5 VDC or 0 to 10 VDC Output

Load Resistance:

4 to 20 mA Output 850 Ω Maximum @ 24 VDC
0 to 5 VDC or 0 to 10 VDC output 1K Ω minimum

Accuracy at 72°F: $\pm 0.25\%$ of range

Stability: $\pm 0.25\%$ F.S. per year

Environmental Operation Range: 32°F to 140°F (0°C to 60°C)

Storage Temperature: -40°F to 203°F (-40°C to 95°C)

Temperature Error: $\pm 2\%$ of Span max (± 5.0 in W.C. @ 50°F to 104°F [10 to 40°C])

Overpressure: Proof 27.68 in W.C. (1 PSI), Burst 41.52 in W.C. (1.5 PSI)

Wiring: 2 wires (4-20mA Current loop) 3 wires (AC or DC powered, Voltage out)

Humidity: 0 to 95% RH, non-condensing

Port Connection: 1 High Pressure & 1 Low Pressure for push-on 1/4-inch tubing (1/8" – 3/16" I.D.)

Enclosure Material: UV-resistant Polycarbonate, UL94, V-0

Enclosure Rating: IP66, NEMA 4

Mounting: Four external tabs with holes for #10 screws

Ranges: Imperial or metric units are available at the time of order

Table 1: Pressure Ranges							
Inches Unit				Pascal Unit			
Range	Pressure	Range	Pressure	Range	Pressure	Range	Pressure
71	0 to 1.00 in W.C.	76	± 1.00 in W.C.	81	0 to 250 Pa	86	± 250 Pa
72	0 to 2.00 in W.C.	77	± 2.00 in W.C.	82	0 to 300 Pa	87	± 300 Pa
73	0 to 2.50 in W.C.	78	± 2.50 in W.C.	83	0 to 500 Pa	88	± 500 Pa
74	0 to 3.00 in W.C.	79	± 3.00 in W.C.	84	0 to 1,000 Pa	87	$\pm 1,000$ Pa
75	0 to 5.00 in W.C.	80	± 5.00 in W.C.	85	0 to 1,250 Pa	90	$\pm 1,250$ Pa

Mounting

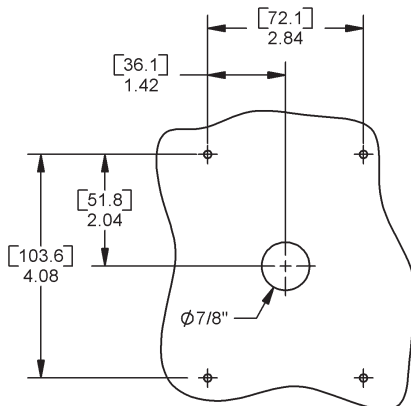


Figure 4: Mounting Hole Pattern

Note: BAPI recommends using #10 screws that require 5/32" pilot holes.

Attach the unit to its mounting surface with four #10 screws through the holes in the mounting feet. The preferred mounting orientation is with the pressure ports facing down.

Note: Remove Blue Dust Shields from pressure ports before use. Push tubing onto the port nipple. Avoid kinks and holes in the tubing or accuracy will be affected.

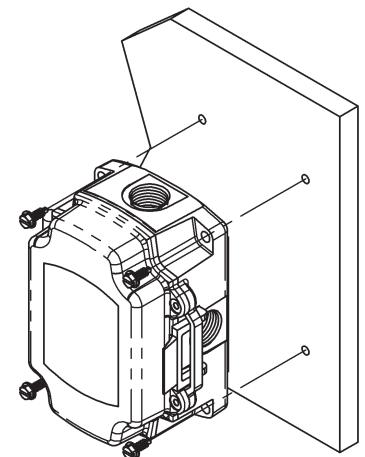


Figure 5: Mounting Screws Location

Specifications subject to change without notice.



Tools & Material List

Screwdriver	#10 Screws	Sealant Filled Connectors
Drill with 5/32" bit	Wire	

Output Termination

Desired Output

4 to 20 mA

0 to 5 V or 0 to 10 V

Wire connections

Red (V+); Black (Return{ 4 to 20 mA Signal}); White (Not used)

Red (V+); Black (Ground); White (Output Voltage)

Current Loop Connection – 4 to 20 mA is “two wire” operation, the ZPS’s red wire connects to a positive direct current voltage of 7 to 45 VDC, the ZPS’s black wire becomes the return of the 4 to 20 mA signal and the ZPS’s white wire, while unused, must be insulated from accidental contact with ground or any other potential. For 4 to 20 mA signaling only direct current can be used to power the ZPS.

Voltage Signal Connection – 0 to 5 V or 0 to 10 V is “three wire” operation, the ZPS’s red wire connects to either 7 to 45 VDC or 7 to 32 VAC (0-5 VDC output) or 13 to 45 VDC or 13 to 32 VAC (0-10 VDC output), the ZPS’s black wire is connected to ground and the ZPS’s white wire is connected to an analog input of the controller. BAPI insulates the white wire in the factory before shipping to you, please remove the connector and strip the insulation from the white wire as desired.

To ensure that all wires are properly terminated, twist the stripped ends of each circuit together before inserting into the splice terminals. Gently tug on the wire after terminating to make sure of a good connection. If the wire comes out of the termination repeat the splice procedure.

Dip Switch Settings - Inches, Pascals, Display and No Display

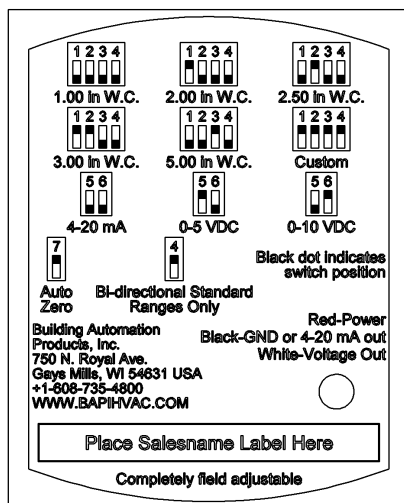


Figure 6:
DIP Switch Settings,
ZPS with No Display,
Inches W.C.

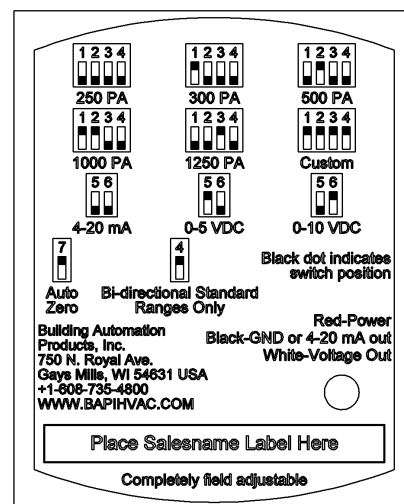


Figure 7:
DIP Switch Settings,
ZPS with No Display,
Pascals

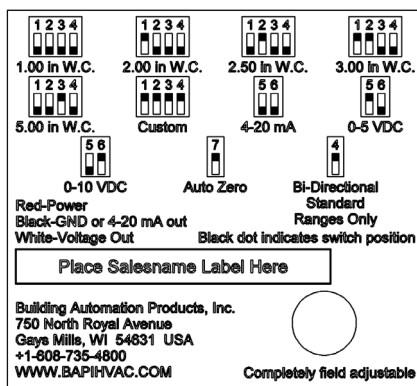


Figure 8:
DIP Switch Settings,
ZPS with Display,
Inches W.C.

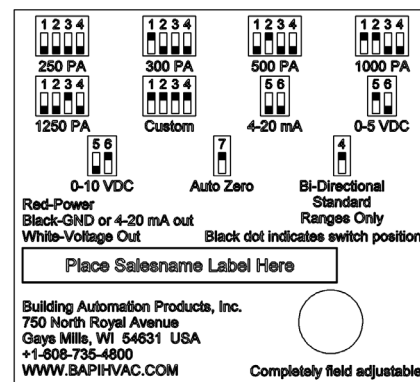


Figure 9:
DIP Switch Settings,
ZPS with Display,
Pascals

Specifications subject to change without notice.

Pressure Range Select

To adjust the pressure range, set dip switches 1-4 to the desired pressure range using the the label found inside the cover of the ZPS unit (See Figures 6-9). Moving the Bi-Directional dip switch (#4) to the up position doubles the pressure range. For example, the 0 to 2.5" W.C. range becomes -2.5" to 2.5" W.C. if the Bi-Directional dip switch is in the up position.

Note: If any of the switches are placed in an undefined combination the LED will blink at a fast rate and the output will be forced to 4mA or zero volts.

Output Range Select

To adjust the output range, set dip switches 5 & 6 to the desired output range using the the label found inside the cover of the ZPS unit (or shown on pg 2).

Note: If any of the switches are placed in an undefined combination the LED will blink at a fast rate and the output will be forced to 4mA or zero volts.

Auto-Zero Select

To auto-zero the BAPI ZPS, remove the tubing from the pressure ports (to remove the normal pressure source). Make sure that the pressure ports are sheltered from any drafts, including the technician's breath. Ideally the two ports should be connected together with a short piece of tubing. Turning on switch 7 starts the auto-zero process. Switches 1 through 6 may be in any allowed configuration. The LED will blink at a fast rate and the output will be forced to zero (4mA or 0V) while the auto-zero is being performed. When the LED blinks at a slow rate, turn off switch 7 and reconnect the pressure source.

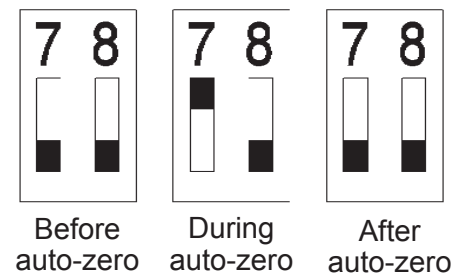
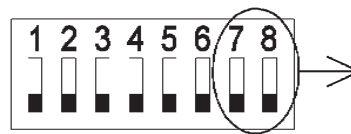


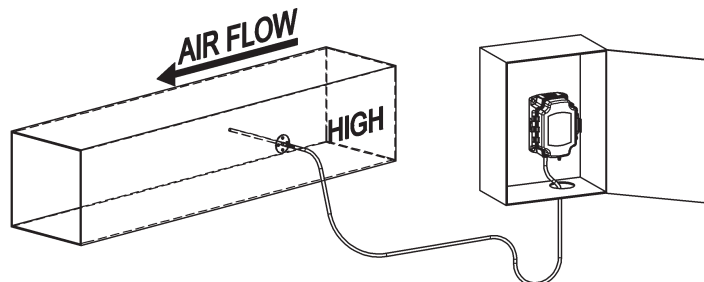
Fig. 10: Auto-Zero

Switch 8

Switch 8 is reserved for Factory use, leave in the off position.

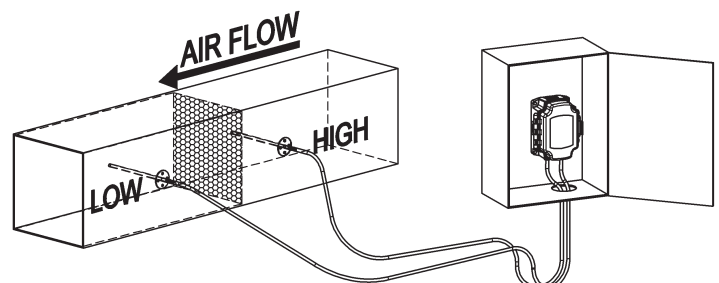
Typical Applications

Fig. 11
Duct static pressure monitoring, BAPI ZPS Pressure Transmitter mounted in a panel with ZPS-ACC07 in duct.



NOTE: Best practice is to form a drip loop in the tubing to prevent condensation from reaching the ZPS.

Fig. 12
Air filter pressure drop monitoring, ZPS Pressure Transmitter mounted in a panel with two ZPS-ACC07 in duct.

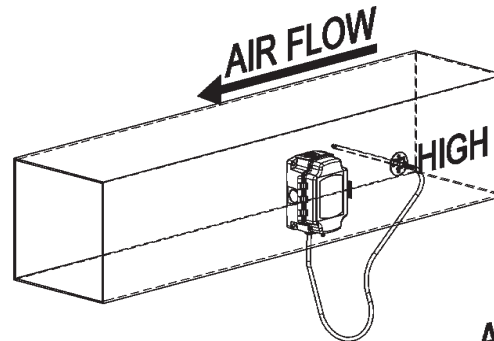


Specifications subject to change without notice.

Typical Applications continued...

Fig. 13

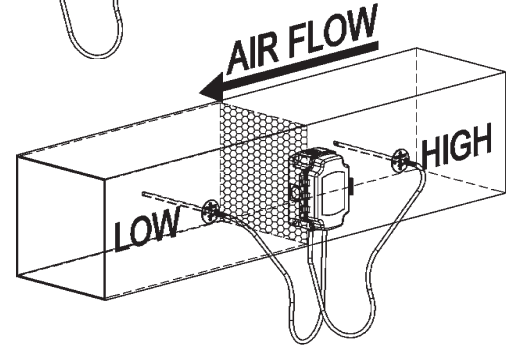
Duct static pressure monitoring, BAPI ZPS Pressure Transmitter mounted on the duct with ZPS-ACC07 in duct.



NOTE: Best practice is to form a drip loop in the tubing to prevent condensation from reaching the ZPS.

Fig. 14

Air filter pressure drop monitoring, BAPI ZPS Pressure Transmitter mounted on the duct with two ZPS-ACC07 in duct.



Troubleshooting

PROBLEMS:

LED does not light

LED is blinking fast
(1/2 second on, 1/2 second off)

Output stuck (high or low)

Output not tracking pressure properly

POSSIBLE SOLUTIONS:

- Check power connections for proper power

- The unit may be performing an auto-zero. Wait 10 seconds and check again.

- The dip switches are in an unsupported configuration, check the dip switch settings, both pressure and output, and change them to ranges desired

- Remove pressure from ports and perform auto-zero procedure

- Check dip switches for proper pressure range selection

- Check dip switches for proper output range selection

LED Operation

LED off	No Power
LED Blinking 1/2 sec on, 1/2 sec off	Auto-zero or dip switch in undefined configuration
LED on	Normal operation
LED Blinking 1/2 sec on, 4 sec off	Auto-zero complete

Specifications subject to change without notice.