

P-3800 Reset Volume Controller

Features and Benefits

- **Superior Performance**
 - **Furnishes a Constant Reset Span, Thus Eliminating Hunting and Improving Zone Comfort**
 - **Provides Controllable Flow Down to 0.01 in. WG Velocity Pressure, Meeting the Most Demanding VAV Specifications**
 - **Rugged Design Withstands Shock, Ensures Stable Operation**
- **Universally Applicable**
 - **Isolated Diaphragm Design Accepts Any Sensing Line Length/Diameter, Providing Universal Applicability**
 - **Multi Functional Device: Two Models Available, Satisfying All VAV Box/Thermostat Configurations in Both Cooling and Heating Applications**
 - **Fully Adjustable Reset Start Point, Reset Range, and Minimum and Maximum Flow Set Points; Allows Control Loop Customization**

- **Inherently Simple**
 - **Retrofit/Replacement is Easily Performed via a Universal Body Design that Enables the P-3800 to Fit into Most Competitor's Mounting Brackets**
 - **Barbed Fittings on All Ports, Providing Secure Air Line Connections**
 - **Replaceable Filter/Orifice Assembly Eliminates the Need for Complete Unit Changeout/ Recommissioning When Used in Contaminated Air Supply Systems**

The P-3800 Reset Volume Controller is a pressure independent, submaster device designed to regulate the flow of air in Variable Air Volume (VAV) boxes. The P-3800 controls the output volume, between adjustable minimum and maximum set points, in response to a reset signal from a thermostat or some other master controller. Two models of the P-3800 are available to satisfy all VAV/thermostat configurations, in both cooling and heating applications (see Table 1).

Both models of the P-3800 feature an isolated diaphragm design, allowing the unit to accept any sensing line length or diameter, simplifying installation.



**Fig. 1: P-3800
Reset Volume Controller**

In addition, the design of the P-3800 provides accurate air volume control, even down to a velocity pressure as low as 0.01 in. WG (2.5 Pa), despite the varying supply pressures found in many systems today. The constant reset span feature of the P-3800 means the unit will maintain the desired volume setting regardless of static pressure and/or zone load fluctuations, thus saving energy and improving the comfort level of the environment being controlled. In addition, the reset start point, reset range, and minimum and maximum flow set points of both models of the P-3800 are fully adjustable, allowing the installer to customize the unit to match the application, as dictated by the system drawing. Refer to the Specifications table for adjustment ranges and factory settings, as well as other reset controller specification information.

Operation

The P-3800 Reset Volume Controller senses the total and static pressures from the duct. The difference between the total and static pressures is the velocity pressure. The P-3800 compares this velocity pressure signal to the reset input signal from a thermostat or some other master controller. The force-balancing principle of the P-3800 allows the unit to produce a nominal 0 to 20 PSIG (0 to 140 kPa) output signal. This output signal is used by the damper actuator to position the damper within the VAV box, in order to control the volume of air flowing through the duct.

Installation

The P-3800 Reset Volume Controller is designed for installation on any flat surface in a vertical or horizontal plane. For most retrofit/replacement installations, because of the universal body design of the P-3800, the unit can simply snap into the existing reset volume controller mounting bracket. A mounting bracket is furnished with the P-3800 if the unit is to be used in a new installation or one in which the existing mounting bracket cannot be reused.

If the installation requires that the P-3800 mounting bracket be used, proceed as follows: Using the bracket as a template, mark the two mounting hole locations on the surface. Drill a pilot hole at each of the marked locations for #10 sheet metal screws (field furnished) and secure the bracket in place.

Refer to Figs. 2 and 3 for dimensional diagrams and additional mounting details. Continue with the Commissioning section that follows to complete the P-3800 installation and to adjust the unit to the desired settings dictated by the system drawing or job requirements.

Specifications

Product	P-3800 Reset Volume Controller		
Models	See Table 1		
Supply Pressure	13 to 25 PSIG (91 to 175 kPa), Nominal 20 PSIG (140 kPa), Air Supply Must Be Clean, Dry, and Oil Free		
Output Pressure	Less Than 2 PSIG (14 kPa) Up To Supply Pressure Less 1/2 PSI (3.5 kPa)		
Air Connections	Inputs "I" & "II"	Barbed Fittings for 3/8 in. O.D. Poly tubing	
	All Others	Barbed Fittings for 1/4 or 5/32 in. O.D. Poly tubing	
Air Consumption	25 SCIM (6.8 mL/s) at 20 PSIG (140 kPa) Supply Pressure		
Reset Start Point	P-3800-1	Factory Set at Approximately 8 PSIG (56 kPa), Adjustable From 3 to 10 PSIG (21 to 70 kPa)	
	P-3800-2	Factory Set at Approximately 3 PSIG (21 kPa), Adjustable From 3 to 10 PSIG (21 to 70 kPa)	
Set Point Range*	P-3800-1	Min.: Adjustable From 0 to 1.6 in. WG (0 to 398 Pa) Max.: Adjustable From 0.15 to 3.2 in. WG (37.4 to 797 Pa)	
	P-3800-2	Min.: Adjustable From 0 to 0.9 in. WG (0 to 224 Pa) Max.: Adjustable From 0.15 to 2.5 in. WG (37.4 to 623 Pa)	
Reset Range	Factory Set at Approximately 1.2 in. WG (299 Pa), Adjustable From 0.15 to 1.6 in. WG (37.4 to 398 Pa)		
Minimum Controllable Velocity Pressure	0.01 in. WG (2.5 Pa)		
Sensitivity	Approximately 2.25 PSI/0.01 in. WG (6.3 kPa/1 Pa)		
Ambient Operating Temperature Limits	60 to 85°F (15 to 29°C)		
Ambient Storage Temperature Limits	-40 to 150°F (-40 to 66°C)		
Materials	Body	Noryl	
	Air Connections & Reset Range Slider	Polysulfone	
	Reset Cylinder Head	Polycarbonate	
Accessories (Order Separately)	A-4000-137 Inline Oil Removal Filter (Recommended for Heavily Contaminated Air Supply Systems)		
	F-300 Series Straight Couplers		
	F-1000 Series Sealing Caps		
Shipping Weight	1.0 lb (.45 kg)		

***The difference between the minimum and maximum set points must not exceed 1.6 in. WG (398 Pa).**

The performance specifications are nominal and conform to acceptable industry standards. For application at conditions beyond these specifications, consult the local Johnson Controls office. Johnson Controls, Inc. shall not be liable for damage resulting from misapplication or misuse of its products.

Table 1: P-3800 Models

VAV Box Type	Thermostat Action	Cooling Application	Heating Application
Normally Open (N.O.)	Direct Acting	P-3800-1 DADR	P-3800-2 DARR
Normally Closed (N.C.)	Reverse Acting	P-3800-1 RARR	P-3800-2 RADR
Normally Open (N.O.)	Reverse Acting	P-3800-2 DARR	P-3800-1 DADR
Normally Closed (N.C.)	Direct Acting	P-3800-2 RADR	P-3800-1 RARR

Table 2: Cross-Reference Guide

VAV Box/Thermostat Configuration	N.O. Box, Direct Acting Thermostat Cooling: DADR Heating: DARR	N.C. Box, Reverse Acting Thermostat Cooling: RARR Heating: RADR	N.C. Box, Direct Acting Thermostat Cooling: RADR Heating: RARR	N.O. Box, Reverse Acting Thermostat Cooling: DARR Heating: DADR
Johnson Controls	P-3800-1	P-3800-1	P-3800-2	P-3800-2
Kreuter	CSC-2001 CSC-2003 CSC-2007 CSC-3004* CSC-3011* CSC-3017*	CSC-2002 CSC-2004 CSC-2008 CSC-3011* CSC-3017* CSC-3004*	CSC-3011* CSC-3017* CSC-3004*	CSC-3011* CSC-3017* CSC-3004*
Robertshaw	R77-21* R77-23	R77-22* R77-24*	R77-22*	R76-1 R77-21*
Staefa	VCV2500-101	VCV2500-401	VCV2500-301	VCV2500-201
UPC	VCV-P-2100* VCV-P-2150 VCV2100-251 VCV2200-251	VCV-P-2100*	VCV-P-2100*	VCV-P-2100*
Titus	Titus II* CSC-3004*	Titus II* CSC-3004*	Titus II* CSC-3004*	Titus II* CSC-3004*
Honeywell	CP-980E Series**	CP-980D Series**	CP-980F Series**	CP-980C Series**
Barber-Colman	HYUR 2792 PPR-9102 PPR-9121	HYUR 2798 PPR-9101	HYUR 2791	HYUR 2790
Discontinued Johnson Controls	P-3100-1	P-3100-3	P-3100-4	P-3100-2

* If a reversing relay is present along with the old reset volume controller, it should also be removed since it is not needed when replacing with a P-3800. To select the proper P-3800 model, consider the thermostat action (direct or reverse), VAV box type (normally open or normally closed), and the type of application (cooling or heating), then refer to Table 1.

** Changing out the old reset volume controller and replacing with a P-3800 will also require flow pickup sensor removal, as well as new flow pickup lines.

Application and Drawing Identification

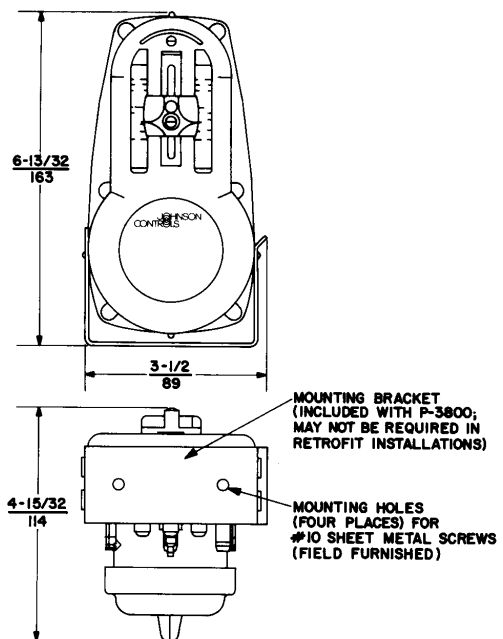
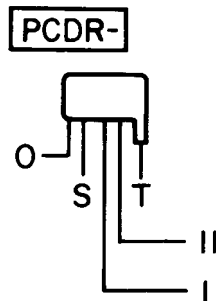


Fig. 2: P-3800 Reset Volume Controller
Dimensions in./mm

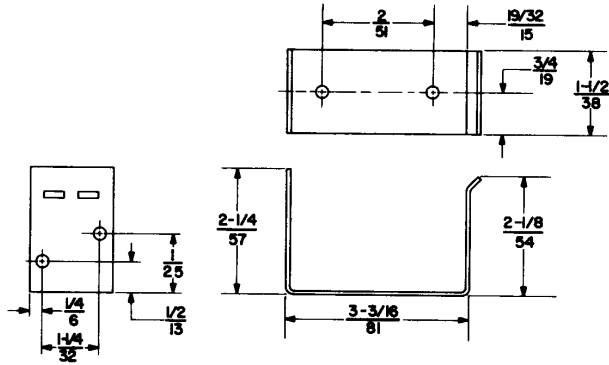


Fig. 3: P-3800 Mounting Bracket
Dimensions $\frac{\text{in.}}{\text{mm}}$

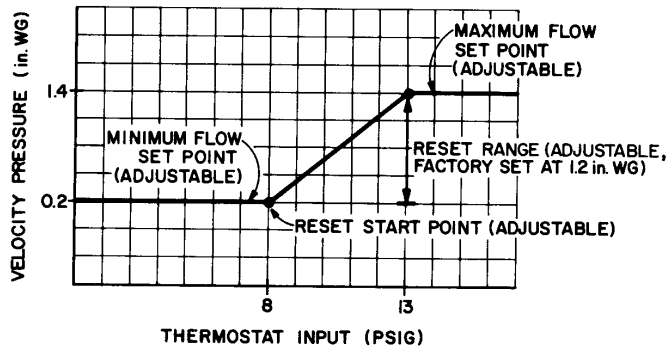


Fig. 4: Set Point Function with Reset
(P-3800-1, DADR, Cooling Application)

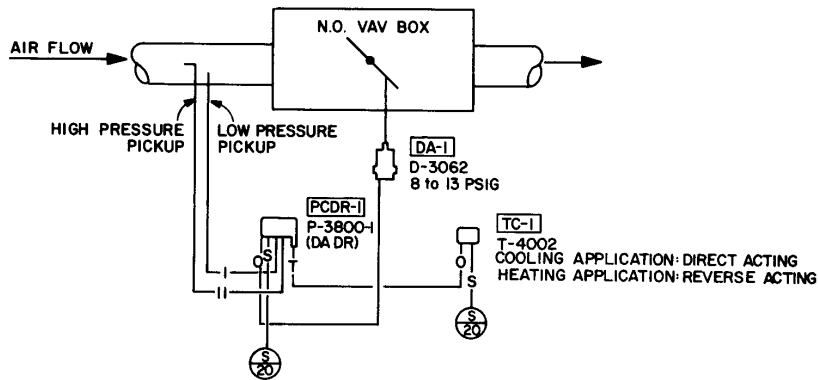


Fig. 5: Typical P-3800-1 Application

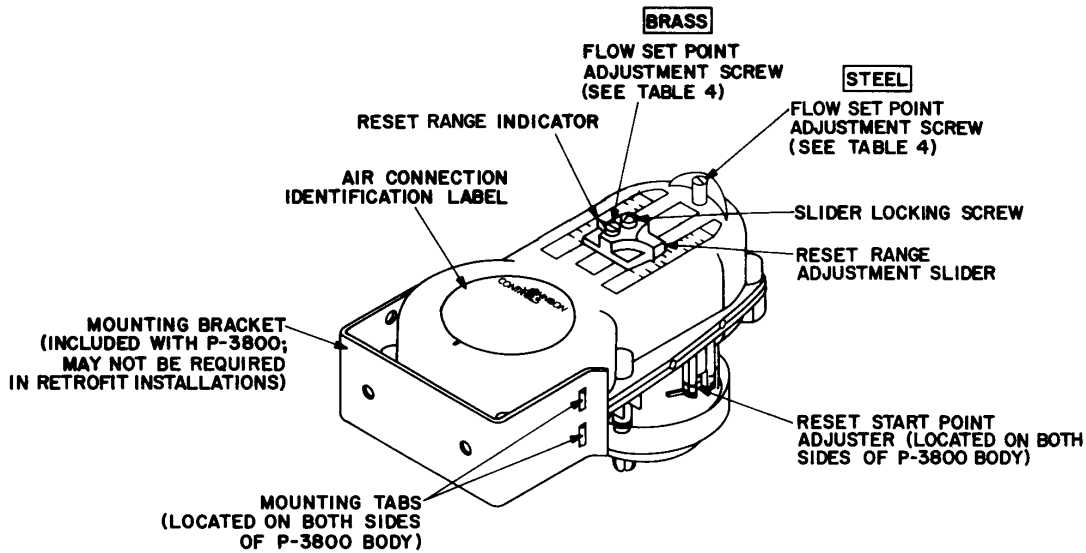


Fig. 6: P-3800 Adjustments

Commissioning

The following instructions assume that the P-3800 Reset Volume Controller to be installed is for a retrofit/replacement installation.

If the P-3800 is for a new (OEM) installation, proceed directly to Step 4.

Pre-Commissioning Setup

1. Before removing the existing reset volume controller, identify the five air lines connected to the device (supply, output, high pressure pickup, low pressure pickup, and thermostat) and label them appropriately.
2. With the HVAC system ON, remove the existing reset volume controller from its mounting bracket and disconnect the air lines. Leave the existing mounting bracket in place for use when installing the new P-3800.
3. Using the supply source available (typically 20 PSIG), blow out the high and low pressure pickup lines (identified in Step 1) to remove any contaminants that may interfere with proper system air flow and delivery to the P-3800.
4. Tee a magnehelic gage or manometer into the high

and low pressure pickup lines leading from the duct. Doing so will provide pressure indication required in future steps.

Reset Range Adjustment

5. The indicator on the reset range adjustment slider of the P-3800 (see Fig. 6) is factory set at approximately 1.2 in. WG (299 Pa). The desired reset range is the difference between the desired maximum and minimum flow set points, as measured in inches water gage velocity pressure (see Fig. 4). Before connecting any of the existing air lines to the P-3800, loosen the slider locking screw and move the reset range adjustment slider to the desired reset range (as indicated on the VAV box or the system drawing). Tighten the slider locking screw to secure the reset range adjustment slider at the desired setting.

Thermostat Reset Start Point Adjustment

6. The thermostat reset start point adjuster on the P-3800 (see Fig. 6) is factory set at approximately 8 PSIG (56 kPa) for the P-3800-1 and 3 PSIG (21 kPa) for the P-3800-2, as indicated by the hash mark located on the adjustment cam (see Fig.

7), and will likely not require additional adjustment. If adjustment is required, using a 1/4 in. blade screwdriver, rotate the thermostat reset start point adjuster to the desired setting, in the direction indicated by the arrow molded into the P-3800 body. To do so, carefully pry up on the adjustment cam using the integral pivot until a soft "click" is heard.

Check that the adjustment cam is rotating with each "click" by noting a change in position of the hash mark. Each "click" represents an increase of 1 PSI (7 kPa).

Note: If the desired thermostat reset start point setting is passed, continue rotating the thermostat reset start point adjuster in the direction indicated by the arrow until a loud "click" is heard. At this point, the thermostat reset start point adjuster is now set at approximately 3 PSIG (21 kPa) and the adjustment can be restarted.

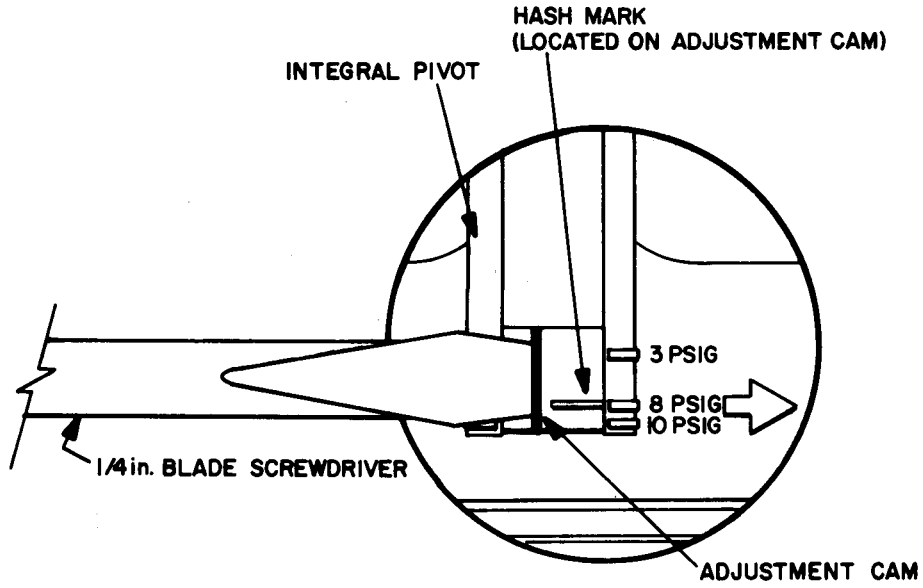


Fig. 7: Enlarged View of Reset Start Point Adjuster

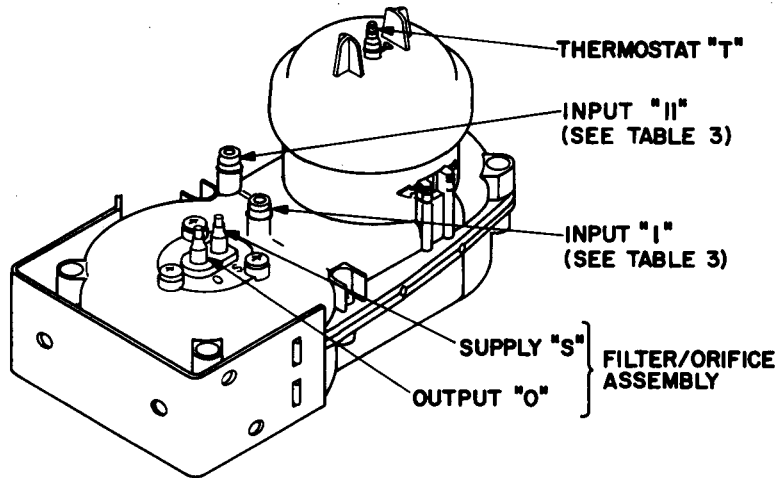


Fig. 8: P-3800 Barbed Air Connections

Table 3: Connecting Inputs "I" and "II"

VAV Box Type	High Pressure Pickup Line	Low Pressure Pickup Line
Normally Open (N.O.)	Connect to Input "II"	Connect to Input "I"
Normally Closed (N.C.)	Connect to Input "I"	Connect to Input "II"

Table 4: Flow Set Point Adjustment Screw Identification

VAV Box and Thermostat Configuration	Application	Model (Action and Readjustment)	Set Point Screw Rotation to Increase Flow*								
			Maximum Flow				Minimum Flow				
			Steel, CW to Incr.	Steel, CCW to Incr.	Brass, CW to Incr.	Brass, CCW to Incr.	Steel, CW to Incr.	Steel, CCW to Incr.	Brass, CW to Incr.	Brass, CCW to Incr.	
N.O. Box, Direct Acting Thermostat	Cooling	P-3800-1 (DADR)		X						X	
	Heating	P-3800-2 (DARR)			X				X		
N.O. Box, Reverse Acting Thermostat	Cooling	P-3800-2 (DARR)			X				X		
	Heating	P-3800-1 (DADR)		X						X	
N.C. Box, Direct Acting Thermostat	Cooling	P-3800-2 (RADR)	X								X
	Heating	P-3800-1 (RARR)				X		X			
N.C. Box, Reverse Acting Thermostat	Cooling	P-3800-1 (RARR)				X		X			
	Heating	P-3800-2 (RADR)	X								X

*The brass screw must be adjusted first with the thermostat air line disconnected, then reconnect the air line and adjust the steel screw.

Air Line Connections

- Referring to the air connection identification label attached to the surface of the P-3800 (see Fig. 6) and the notations made in Step 1, connect all air lines EXCEPT THE THERMOSTAT AIR LINE to the appropriate barbed air connections on the P-3800 (see Fig. 8).

Note: To ensure leak-free connections, cut off 1/2 in. (13 mm) of the old tubing ends before making the air line connections. Also, the P-3800 requires 3/8 in. O.D. polytubing for the high and low pressure pickups; straight couplers (F-300 Series, ordered separately) may be required to connect to the existing pressure pickup lines.

Connect the supply air line to the supply "S" connection and the output air line to the output "O" connection.

In addition, connect the high and low pressure pickup lines to inputs "I", and "II" for the specific application, as indicated in Table 3.

- Note:** A later step covers connecting the thermostat air line to the thermostat "T" connection.
- Locate the two sets of mounting tabs on both sides of the P-3800 body (see Fig. 6) and install the P-3800 into the existing mounting bracket retained in Step 2, until the mounting tabs "click" into the slots on the mounting bracket.

Note: After the P-3800 is installed in the existing mounting bracket, check that there are no kinks in any of the air lines leading to the controller.

**BRASS SCREW
Flow Set Point Adjustment**

- Referring to Fig. 6, adjust the brass screw to the desired set point (either maximum or minimum flow as identified in Table 4) to correspond to the value indicated on the VAV box or the system drawing. Turn the screw in small increments until the magnehelic gage or manometer (teed into the high and low pressure pickup lines) reads the desired flow set point.

Thermostat Air Line Connection

- Connect the thermostat air line (identified in Step 1) to the thermostat "T" barbed air connection on the P-3800 (see Fig. 8).

Note: This air line (whether coming from a thermostat, reversing relay, or some other master controller) must be furnishing at least 15 PSIG (105 kPa) to the P-3800 "T" barbed air connection; temporarily adjust the thermostat to provide this required 15 PSIG. To ensure a leak-free connection, cut off 1/2 in. (13 mm) of the old tubing end before making the air line connection.

**STEEL SCREW
Flow Set Point Adjustment**

- Referring to Fig. 6, adjust the steel screw to the desired set point (either maximum or minimum flow as identified in Table 4) to correspond to the value indicated on the VAV box or the system drawing. Turn the screw in small increments until the magnehelic gage or manometer (teed into the high and low pressure pickup lines) reads the desired flow set point.

Maximum Flow Set Point: 1.5 in. WG

Minimum Flow Set Point: 0.8 in. WG

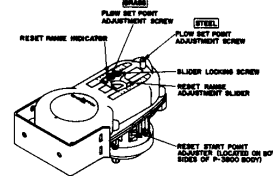
Application: Cooling or Heating
(circle one)

Thermostat Action: Direct Acting or Reverse Acting
(circle one)

VAV Box Configuration: Normally Open (N.O.) or Normally Closed (N.C.)
(circle one)

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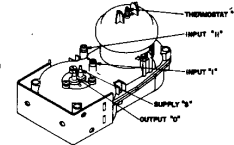
P-3800 Identification Sticker
(Affix to VAV Box after P-3800 Installation)



Flow Set Point Adjustment Screw Identification

VAV Box and Thermostat Configuration	Applica-tion	Set Point Screw Rotation to Increase Flow*							
		Maximum Flow				Minimum Flow			
		Steel, CW to Incr.	Steel, CCW to Incr.	Brass, CW to Incr.	Brass, CCW to Incr.	Steel, CW to Incr.	Steel, CCW to Incr.	Brass, CW to Incr.	Brass, CCW to Incr.
N.O. Box, Direct Acting Thermostat	Cooling		X					X	
	Heating			X			X		
N.O. Box, Reverse Acting Thermostat	Cooling			X			X		
	Heating		X					X	
N.C. Box, Direct Acting Thermostat	Cooling	X							X
	Heating				X	X			
N.C. Box, Reverse Acting Thermostat	Cooling				X	X			
	Heating	X							X

*The brass screw must be adjusted first with the thermostat air line disconnected, then reconnect the air line and adjust the steel screw.



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Fig. 9: Sample Identification Sticker

- If desired, check the minimum and maximum flow set point settings by disconnecting the thermostat air line and repeating Steps 9 through 11.
- Return the room thermostat (or other master controller) dial setting to the desired temperature.
- Remove the magnehelic gage or manometer that is teed in the high and low pressure pickup lines and cap the open end of each tee using F-1000 Series Sealing Caps (ordered separately).

- Mark the self-adhesive identification sticker (see Fig. 9) included with the P-3800 as indicated. Apply the sticker to an available surface near the controller for future identification.

Repair Information

To avoid entire unit changeout and recalibration should an air supply system oil contamination problem arise, the P-3800 is equipped with a replaceable filter/orifice assembly (see Fig. 8). This filter/orifice assembly is also available separately as a repair part; order P-3800-600.

In heavily contaminated air supply systems, it is recommended that an A-4000-137 Oil Removal Filter (ordered separately) be used inline before the P-3800, to slow the need for replacing the P-3800-600 Filter/Orifice Assembly. Contact the local Johnson Controls branch office for advice on how to alleviate this contamination in the air supply system.

Other than the filter/orifice assembly, field repairs to the P-3800 Reset Volume Controller must not be made. For a replacement P-3800, contact the nearest Johnson Controls branch office.

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