



## PCS-PFC Quick Set-up Instructions

### Bimba Model PCS Pneumatic Control System



#### Learn how to:

- Recognize the components required for a PCS system.
- Understand how the PCS components are interconnected.
- Be able to adjust Zero, Span, Deadband, Decel.
- Understand basic PCS operation.

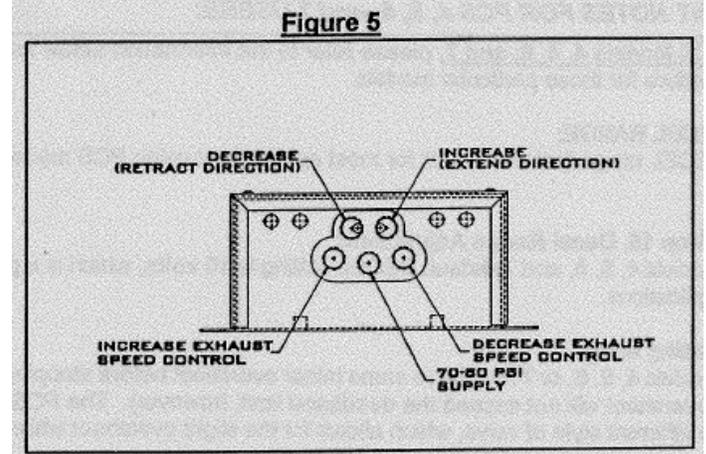
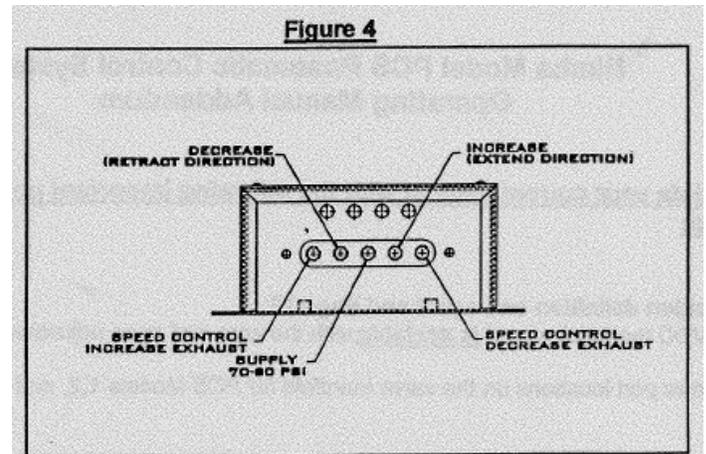


#### Components required for a complete closed loop system:

- PCS electro-pneumatic controller (includes valves).
- PFC, PFCN, PTF, or PTFN cylinder.
- Air supply (70-80 psi required for proper operation).
- 24 VDC fixed for PCS (regulated and filtered).
- 0-10 VDC variable control voltage (clean, stable, noise free).
- DPM panel meter (for direct positioning readout).
- 120 VAC line power for DPM if used.

# Getting Started

1. Fittings should be firmly attached to the PCS manifold and PCS ports. Teflon tape must be used to seal the threads.
2. Connect air hoses from the PCS control to the PFC. Use Figures 4 and 5 on the right. “Decrease” in Fig. 4 goes to the front of the cylinder, and “Increase” goes to the rear. The air supply is connected to the middle port. The end ports are exhaust ports with no connections.



3. Remove cover to expose the PCS control. Review all positions in the top three terminal blocks. They are clearly marked. Electrical connection to valves is not required of customer for encased controls. Identify trim pots and LEDs, which are also clearly labeled.
4. Connect the feedback cable from the cylinder to TB2, 24 VDC power to TB1, and the 0-10 V control signal to TB4. Power up the DC power source, then zero and power up the control voltage.



The information presented is in Bimba's best engineering opinion and should be used for reference only. Recommendations derived should be verified under actual operating conditions. Bimba reserves the right to change specifications without prior notice.

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# Set-up and adjustments

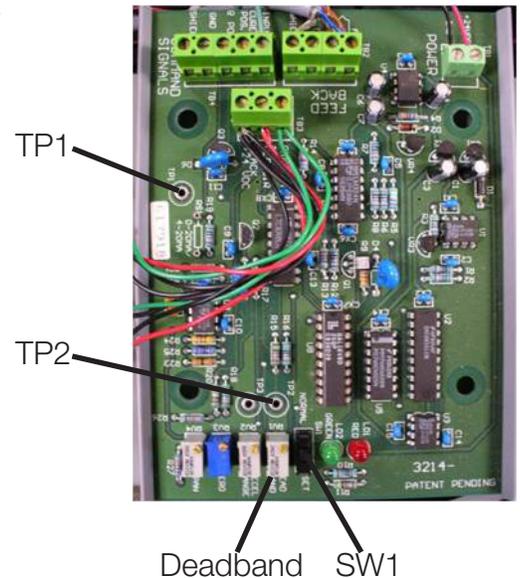
**Set the deadband** - The deadband adjustment changes the tolerance on the ending position of the PFC rod. Smaller deadbands mean a tight tolerance and higher positioning accuracy. Higher deadbands are required for greater loads.

1. Application sizing chart (PCS manual page 23, below) identifies “Zero Friction Deadband Voltage” for setting deadband. The deadband setting can be varied from 0.005 to 0.500 VDC.
2. Locate TP1, TP2, SW1, and the deadband adjustment pot.
3. Move SW1 to SET position.
4. Set DMM to DC volts and measure between TP1 and TP2.
5. Adjust deadband setscrew to 100 mV initially.
6. Move SW1 to NORMAL position.

## Application Sizing and “Rules of Thumb”

### PFC Cylinder/PCS Valve System Matching and Sizing Recommendations<sup>1</sup>

Bore Size	PCS Model	Stroke Range	Maximum Payload @ Average Velocity (lbs.)	Maximum Average Velocity without overshoot (in/sec)	Maximum External Friction (lbs.)	Zero Friction Deadband Width per inch of stroke	1/2 Maximum Friction Deadband Width per inch of stroke	Maximum Friction Deadband Width per inch of stroke	Minimum Step (in.)
1-1/16" (PFC-09)	PCS-1	2" to 7"	1	2.75	0	0.005"	N/A	N/A	0.08
1-1/16" (PFC-09)	PCS-1	8" to 24"	30	4.00	5	0.004"	0.008"	0.016"	0.2-0.39
1-1/2" (PFC-17)	PCS-1	1" to 3"	2	2.50	0	0.0025"	N/A	N/A	0.04



Span Zero LEDs

**Identify LEDs and Span and Zero adjustments.**

### LEDs indicate valve operation

1. Green LED means rod is being extended: Air is exhausted from Valve 1 (front) and pressure is applied at Valve 3 (rear).
2. Red LED means rod is being retracted: Air is exhausted from Valve 3 (rear) and pressure is applied at Valve 1 (front).

### Set the zero position

1. Set control voltage to 0.
2. Turn ZERO adjust CW until rod is in the desired retracted position (not necessarily fully retracted).
3. Red LED should not be on continuously.

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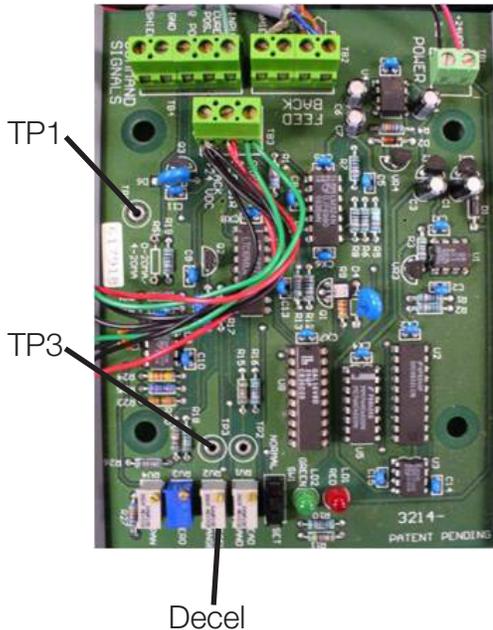
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## Set the Span adjustment or end position

1. Set control voltage to maximum (10 VDC).
2. Turn SPAN CCW until rod is in the desired fully extended position.
3. The green LED should not be on continuously.



**Decel adjustment** - The decel adjustment regulates the distance over which the PFC rod slows to a stop. Low Decel settings provide fastest speeds. High Decel settings provide the most stability for high loads. If deadband is set too low for the load, the rod will overshoot and undershoot the target position, oscillating before settling to a stop.

1. Locate TP1, TP3, and Decel adjustment.
2. The DECEL setting can be varied from 0.5 to 13.5 VDC.
3. Adjust DECEL trim pot to 3 V between TP1 and TP3 initially.
4. Turn DECEL adjust and monitor voltage with DMM.

## General Procedure

1. Set-up the PCS control under load, installed in the machine. If it is not under load it will need to be readjusted.
2. Under load, vary the control voltage from 0 to 10 V. Movement should be smooth between end positions with minimal chatter.
3. If there is chatter, adjust decel and deadband for optimal performance.
4. Leaks in air hoses and fittings or cracked fittings will cause erratic operation.
5. Air pressure may cause erratic operation. Pressures from 60-80 psi should yield good results.

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## **Troubleshooting Hints...**

1. Air pressure should be 70-80 PSI. Lower air pressures may produce erratic operation.
2. If there is noise on the AC power applied to the electronics, the noise will be superimposed on the DC power supplied to the PFC. Most of the time this will not be an issue. For the occasions where it is an issue, an AC line filter will solve the problem.
3. High amounts of ambient EMI may also cause erratic operation. Select an environment for your demonstration away from potential sources of EMI, such as fluorescent lights, switching power supplies, power lines, and electric motors.

To ensure top performance in field applications, always ask your customers:

**Is the air clean? Are you using filters and desiccant driers? Are there contaminants in the environment?** The PFC is designed to operate using clean, dry, non-lubricated air. Moisture, dirt, and lubricants, especially silicon, will shorten life when they work their way inside the cylinder. Conductive inks silk screened onto the probe are eroded quickly when water or contaminants condense onto the probe. In moist or dirty environments, filters and desiccant driers must be used, and failure in these applications is a result of improper air prep, not defects in workmanship or materials.

**Is your PCS control connected properly?** Fittings should be air tight, not cracked or leaking, sealed with Teflon® tape. Avoid small diameter air hoses; they reduce force. Avoid long lengths of hose between the PCS valve ports and the PFC; long lengths slow response. All electrical connections, especially the control voltage to the PCS and the feedback signal from the PFC, must be shielded. Inadequate shielding results in erratic response. The simplest way to ensure adequate shielding and circumvent EMI interference problems is to order a PCS control with the Q option and companion shielded cables. Power supplied to the PCS should be clean.

**Is your PCS control adjusted properly?** Erratic operation is often caused by improper adjustment of the PCS control. For smoother operation, increase the deadband and decel settings. If the control is set up under no load and a load is applied, the deadband and decel may need to be increased. Trying to stop the load TOO SUDDENLY will result in overshoot, which will cause a correcting position signal to be applied, which will cause overshoot, and so on. The piston will buzz for a while back and forth before settling into position. The adjustments on the PCS circuit board are via multi-(many)-turn pots. The pots do not have hard stops, so they can be turned dozens of times; users sometimes lose track of what they are doing, and keep turning them. To fix this problem, just follow the adjustment procedure in the enclosed instructions.

**Have you specified the low friction option?** For accurate positioning, always specify the low friction option. If the customer complains about rough operation and the cylinder being used is not low friction, a low friction option will help a lot.

**What is your air pressure?** At 70-80 psi, the PCS control and PFC cylinder operate normally. At low pressures, operation will be rough and erratic.

**Are you using flow controls?** If flow controls are installed in the cylinder ports, erratic operation may result.

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