DESCRIPTION / IDENTIFICATION
The SPV1 is an electronically controlled closed loop pressure regulator. The device converts a 0-10VDC command signal to a customer specified pressure range. The SPV1 consists of a control circuit board, a variable orifice two-way normally closed solenoid valve, an integral electronic pressure sensor, and a manifold. The control board compares the command signal to the integral pressure sensor, then drives the variable orifice solenoid valve so that desired pressure is maintained even if the required flow rate varies. No exhaust function is included. Exhaust must be through the consumption of the output media. The signal from the on board electronic pressure sensor is available as a 0-10 VDC monitor signal.

ELECTRICAL
POWER REQUIREMENT _____________ 15-24 VDC
COMMAND SIGNAL _________________ 0-10VDC
MONITOR SIGNAL __________________ 0-10VDC
CURRENT DRAW ___________________ 140mA Max

MECHANICAL
MAXIMUM INLET PRESSURE ________ 165 PSIG
PRESSURE RANGE _________________ 0 to 150 PSIG
ACCURACY _______________ +/- 0.25% F.S.
REPEATABILITY _______________ +/- 0.02% F.S.
RESOLUTION _______________ +/- .015% Typical
MATERIALS ________ Elastomers - Viton
Base Manifold - 304 Stainless Steel
Ind Manifold - Clearcoat Anodized Aluminum
Solenoid Valves - Nickel Plated Brass

PHYSICAL
MEDIA WORKING TEMPERATURE ___ -20 to 55 °C
AMBIENT TEMPERATURE ___________ -20 to 70 °C
There are two calibration adjustments for the on board pressure transducer, zero and span. They are used to set the pressure range of the unit.

There are three control circuit adjustments to set the behavior of the control circuitry to accommodate different downstream pneumatic systems. The setting of each of the potentiometers can be determined by measuring the resistance between the corresponding a pad on the back of the board to power supply common, (unit de-energized).

Bias: This adjustment adds a bias to the control signal to the valve. The purpose is to pre-stage the valve close to the point where it begins to open. The actual Bias set point is influenced by the supply pressure and calibrated range of the unit. A typical range of this adjustment is about 1000 ohms to 2500 ohms.

Proportional: This is the same as a proportional adjustment in a traditional PID control system. The Proportional adjustment sets the magnitude of the error signal for a given difference between the command and feedback. Excess Proportional Gain can cause the unit to oscillate.

Integral: This is similar to the Integral adjustment in a traditional PID control system, typically it works to eliminate any difference between the command and feedback over a period of time. On the SPV this adjustment has similar function but also helps control the drive signal to the valve in order to maintain pressure while the unit is under flow. Insufficient Integral will result in insufficient valve drive to maintain pressure at high flow rates. Excess Integral will result in low frequency ringing in the output pressure after a step change in the command signal.

DETERMINING CURRENT POTENTIOMETER SETTINGS

The control potentiometers are labeled on the outer edge of the PCB next to their actual location. On the back of the PCB there is a row of three pads approximately a tenth of an inch square. Each pad corresponds to its associated potentiometer. To determine the setting of any of the potentiometers, measure the resistance between the desired pad and common. The power to the unit must be shut off to do this.
TUNING PROCEDURE

1. Preset the tuning potentiometers on the SPV1 to the following settings: PROP = full CCW, BIAS = 2500 Ω, and INT = full CCW.
2. Set the command voltage to 1 VDC. Adjust the PROP as high as it can go without visible oscillation on the oscilloscope. Check this setting and back down if necessary the PROP at command voltages of 1, 2, 3, 4,...10V so that the PROP is as high it can be without oscillation at any of the voltages.
3. Set the command voltage to 10 VDC. Adjust the INT so that the external feedback voltage matches the command voltage. There may be a slight voltage offset between the command voltage, but this will be consistent through all command voltages. Adjust the INT very slightly CW (1/20th turn) of the necessary position to achieve this command voltage.
4. Record the actual final values for PROP, BIAS and INT along with the serial number and the test date & time.

OUTPUT PRESSURE CALIBRATION

The following test equipment is required to properly calibrate the unit.
Command signal source (0 – 10 VDC).
Volt meter(s).
Precision pressure gauge.
Needle valve. (only if integral bleed orifice is not installed on the unit).
15 - 24 VDC power supply.

Connect the pressure gauge and needle valve to the work port of the unit. Barely crack open the needle valve (if used) to create a small leak.
Connect supply power, command signal with a volt meter, and a volt meter on the analog monitor signal.
Connect supply pressure to the inlet port on the unit.
With zero command and zero output pressure adjust the Pressure Zero potentiometer until the volt meter on the Analog Monitor reads 0.00 VDC. An alternative way to set the Zero potentiometer is to give the unit a 0.5 VDC command signal and adjust the Zero potentiometer for an output pressure of 10% of desired full scale.
Give the unit a 10 VDC command signal. Adjust the Pressure Span potentiometer for an output pressure of 100% of the desired full scale. If the unit is unable to achieve the desired pressure and the Analog Monitor signal is significantly lower than the command signal, the leak rate is too high, close down on the needle valve.
Repeat steps 4.6 and 4.7 until further adjustments are not required.
ELECTRICAL CONNECTIONS

Looking at PCB

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WARNING: Installation and use of this product should be under the supervision and control of properly qualified personnel in order to avoid the risk of injury or death.