

VBL Volume Booster

The VBL volume booster is used in conjunction with a positioner on a throttling control valve to increase stroking speed.

The booster incorporates fixed deadband, soft seat construction, and an integral bypass restriction to eliminate positioner saturation problems that can occur with volume boosters that do not have these features. Adjustment of the integral bypass restriction is necessary for system stability. This adjustment does not affect the deadband of the volume booster, but does permit the control valve to respond to small input signal changes without sacrificing steady-state accuracy. It also allows the booster to deliver high-volume output for fast stroking when large, rapid input signal changes occur.

The volume booster is used to improve stroking speed. If precision valve control is required, the use of a positioner is recommended. If the volume booster is to be used only with an actuator, for on-off control, the integral bypass restriction on the booster must be closed (turned fully clockwise).


Connectors and piping can be installed with the VBL volume booster for diagnostic testing.



Features

- **Fast Response**—Booster delivers the volume needed for rapid actuator stroking when large input changes suddenly occur.
- **Adjustable Response**—Integral bypass restriction tunes the booster response so that smooth actuator motion follows the slow signal changes.
- **Efficient Operation**—Soft seats provide tight shutoff to reduce unnecessary air consumption and eliminate saturation of positioner relays.
- **Maintains Accuracy**—Booster permits high actuator stroking speeds upon demand without degrading the positioner steady-state accuracy.

Specifications

- **Input Signal**
Positioner output
- **Maximum Input Signal Pressure⁽¹⁾**
 - **VBL-1 and VBL-3:** 5.5 bar (80 psig)
 - **VBL-2 and VBL-4:** 10.3 bar (150 psig)
- **Input to Output Pressure Ratio**
Fixed at 1 to 1
- **Supply Pressure Ranges⁽¹⁾**
When used in conjunction with a positioner or other pneumatic accessory, always pipe the positioner and booster with one common supply through a regulator (see figure 2). A high-capacity filter should be installed in the supply line to the regulator. Supply pressure also must not exceed the maximum pressure rating of the actuator.
- **Operative Temperature Limits⁽¹⁾**
-40 to 93°C (-40 to 200°F)
- **Maximum Flow Coefficients**
See Table 1
- **Connections**
 - **Input Signal:** 1/4 NPT
 - **Supply and Output:** 1/2 NPT
- **Hazardous Area Classification**
Complies with the requirements of ATEX Group II Category 2 Gas and Dust

- **Construction Materials**
 - **Body:** Aluminum
 - **Diaphragms:** HNBR with nylon fabric
 - **Upper and Lower Valves:** HNBR
 - **O-Rings:** HNBR
 - **Connectors for Diagnostic Testing:** Stainless steel or brass
- **Approximate Weight**
Aluminum Body: 1.0 kg (2.2 lb)

NOTE: Specialized instrument terms are defined in ANSI/ISA Standard 51.1 - Process Instrument Terminology.
1. The pressure/temperature limits in this document, and any applicable code or standard limitation should not be exceeded.

Table 1. Maximum Flow Coefficients

Instrument	Supply Port Coefficients	Exhaust Port Coefficients
	C_v	C_v
VBL - 1 volume booster	2.5	1.1
VBL - 2 volume booster	2.5	1.1
VBL - 3 volume booster	2.5	1.8
VBL - 4 volume booster	2.5	1.8

Principle of Operation

Refer to figures 1, 2, and 3. Because of the restriction, large input signal changes register on the booster input diaphragm sooner than in the actuator. A large, sudden change in the input signal causes a pressure differential to exist between the input signal and the output of the booster. When this occurs, the diaphragms move to open either the supply port or the exhaust port, whichever action is required to reduce the pressure differential. The port remains open until the difference between the booster input and output pressures returns to within the deadband limits of the booster. With the bypass restriction

adjusted for stable operation, signals having small magnitude and rate changes pass through the bypass restriction and into the actuator without initiating booster operation.

Both the supply and exhaust ports remain closed, preventing unnecessary air consumption and possible saturation of positioner relays.

Figure 1. Volume Booster Sectional View

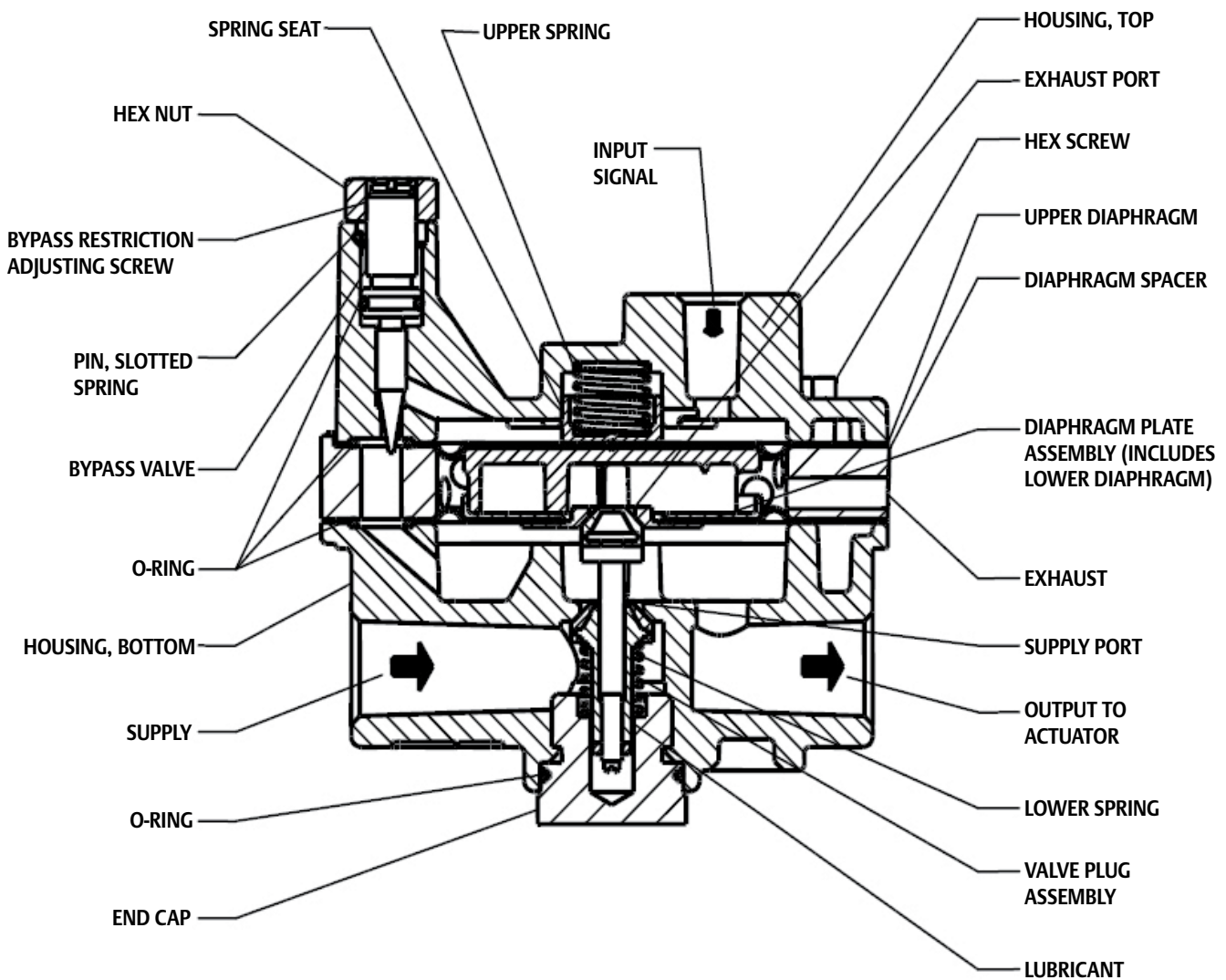


Figure 2. Typical Installation with Piston Actuator

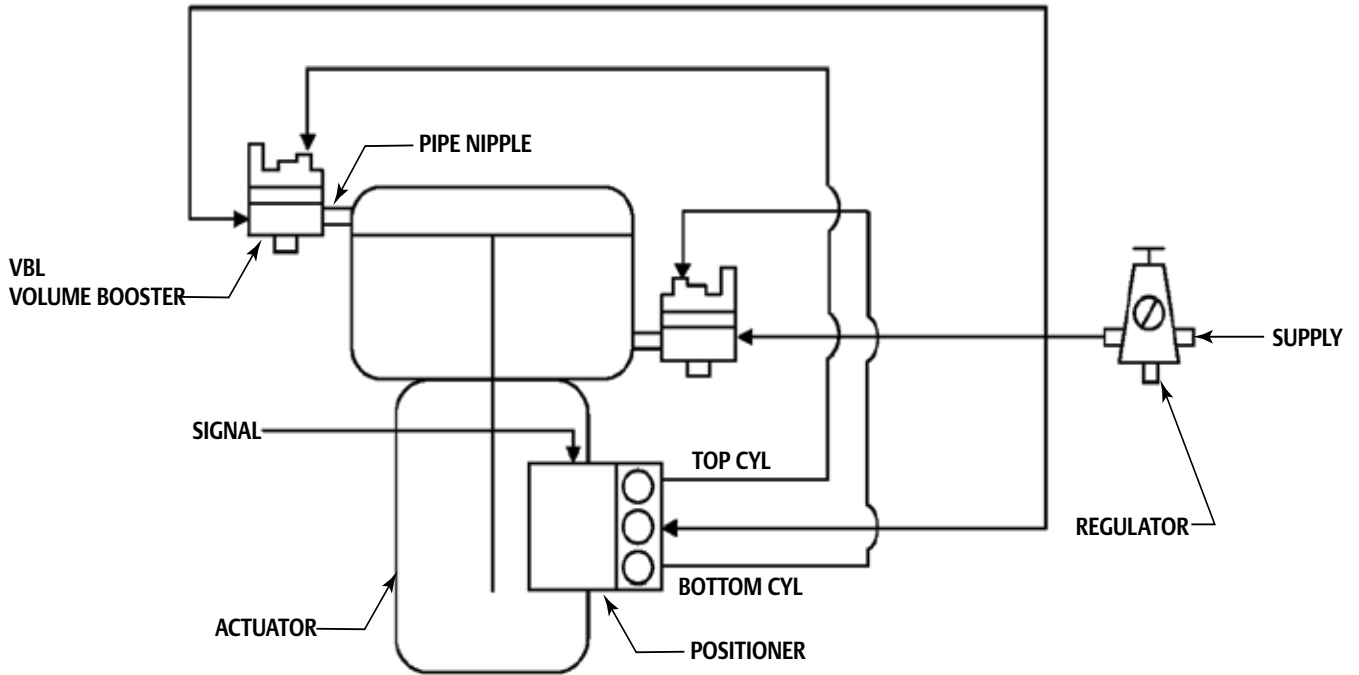
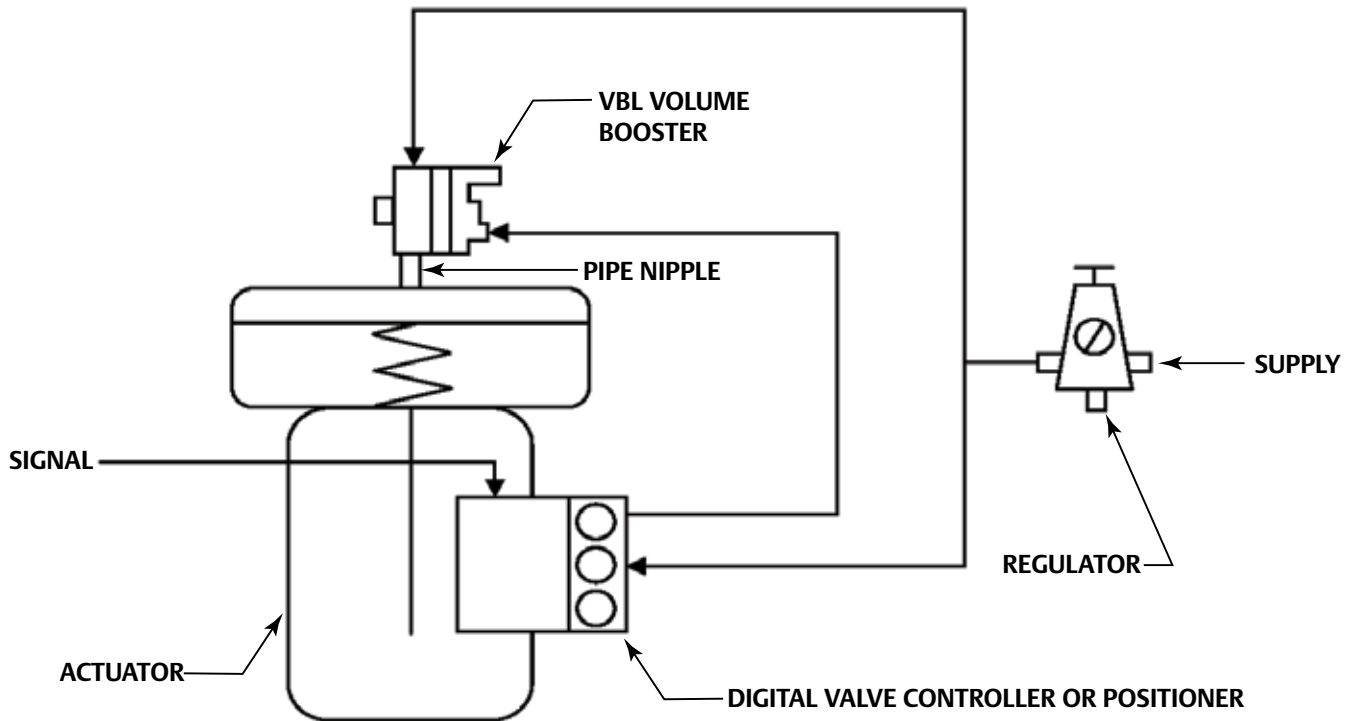


Figure 3. Typical Installation with Diaphragm Actuator



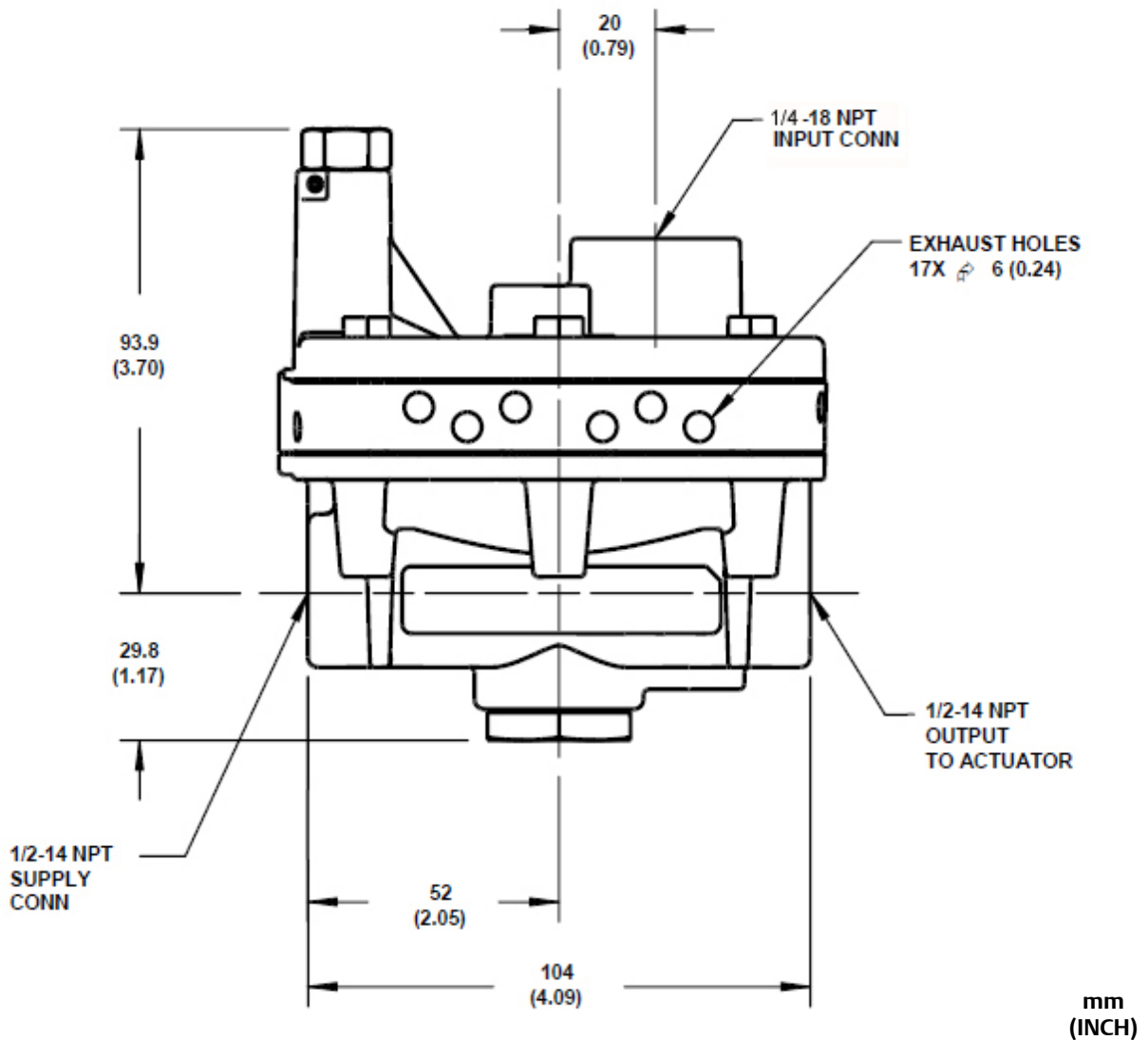
Installation

Figures 2 and 3 show typical installations for the VBL volume booster on piston and diaphragm actuators. A single regulator that supplies both the positioner and booster (or boosters) is recommended. The supply medium must be clean, dry, oil-free air or non-corrosive gas.

Keep in mind that many actuators require larger casing or cylinder connections to take full advantage of the booster's ability to deliver its high-volume output. Dimensions are shown in figure 4. Ensure that the supply pressure is connected to correspond with the flow arrow on the booster.

Verify that the capacity of the regulator meets the stroking capacity requirements.

Figure 4. Dimensions



Ordering Information

Specify stroking speed information when being mounted at the factory, for proper tuning of the instruments. Specify either critical or non-critical stroke speed time.

NOTE:

Critical stroke speed time example: valve to stroke in both directions in 4 seconds or less.

Non-critical stroke speed time example: valve to stroke in approximately 4 seconds in both directions.

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