Accessories

Most Valtek control valves are shipped with accessories. These may range from a simple air filter that cleans the supply air to extensive lock-up systems with volume tanks and solenoid valves designed to shut down a system upon loss of air supply. This section briefly describes the common accessories included with Valtek valves. Some of them are manufactured by Valtek while others are purchased from other suppliers. Before specifying a particular accessory, review pertinent product literature to be certain the accessory will meet the needs of the application. Parameters to be aware of may include: fluid compatibility, temperature ranges (fluid and ambient), electrical requirements, etc.

Air Filter

Valtek offers an air filter with ¼-inch NPT connections, a drip well, and a 5 micron element that can be either nipple-mounted or bracket-mounted to the actuator.

An air filter is recommended. Installed upstream from the positioner, Valtek filters feature high flow capacity and handle up to 150 psig supply air pressure. Easy access to the large drip well permits inspection and replacement of the filter cartridge. The integral drain valve allows removal of trapped oil, moisture and other foreign material.

Airsets

Airsets are used to regulate the air supply pressure to the actuator. Because of the relatively high allowable operating pressure (150 psig) of Valtek actuators and positioners, airsets are not normally required with Valtek valves unless the supply pressure exceeds 150 psig. Their use is usually discouraged because of the tendency of field personnel to limit the actuator supply pressures to diaphragm actuator levels (usually much lower than for cylinder actuators). This means less actuator stiffness. However, airsets are used in those few applications that require a lower supply pressure than normal (such as 60 psig).

Table I: Hazardous Location Certifications*

These Valtek accessories are listed for use in classified hazardous locations by the agencies below:

	Class I								
	Division 1 Group				Division 2 Group				Other
	A	B	C	D	A	B	C	D	
Explosion Proof									
IP 2000		FM CSA	FM CSA	FM CSA		FM CSA	FM CSA	FM CSA	NEMA 4X TYPE 4X
Position Pac									
TX			UL CSA	UL CSA			UL CSA	UL CSA	NEMA 4 TYPE 4
TA2			UL	UL			UL	UL	NEMA 4
A2		UL	UL	UL		UL	UL	UL	NEMA 4
H2TS		UL	UL	UL		UL	UL	UL	NEMA 4
A2TS		FM	FM	FM		FM	FM	FM	NEMA 4X
Intrinsically Safe									
IP 2000	FM CSA	FM CSA	FM CSA	FM CSA	FM CSA	FM CSA	FM CSA	FM CSA	NEMA 4X TYPE 4X
Non-Incendive									
IP 2000					FM CSA	FM CSA	FM CSA	FM CSA	NEMA 4X TYPE 4X

*See National Electric Code for complete descriptions of hazardous area classifications. For European and Australian certifications, contact factory.

Limit Switches

Limit switches are available to indicate a valve open or closed position. They come in two basic designs: a single pole/double throw design (for a signal to single receiver), or a double pole/double throw design (for a signal to two receivers). Three styles are available: weatherproof, explosion-proof, and hermetically sealed explosion-proof. Many configurations, makes, models and voltages are available.

Position Pac

The position of the valve stem may be transmitted remotely via current signals using Valtek's Position Pac, a position indicator. Internally, the Position Pac uses a two-wire loop, 4-20 mA transmitter to convey the valve stem position. It requires a 12.5 to 40 VDC power source and is used when signal indication, monitoring, logging of data or controlling another piece of equipment is required. Position Pac is available with two limit switches or four limit switches alone.

Position indicators are mounted on the yoke of a linear actuator, or on the transfer case of a rotary actuator.

Table II: Position Pac Specifications

Analog Output

Power supply range	12.5 to 40 VDC (24V DC typical)
Maximum load resistance	Maximum Resistance (ohms) = $\frac{\text{Supply Voltage - 12.5}}{.02}$
Current signal	4-20 mA
Span	Adjustable from 5° to 100° of angular rotation
Null	4 mA Position may be set at any angular position
Linearity	± 1.0% full scale
Repeatability	± 0.25% full scale
Hysteresis	± 1.0% full scale
Operating temperature range	-40° to + 185° F
Ambient temperature range	For a 100° F change in ambient temperature, maximum zero shift is ± 0.4% full scale, max span shift is ± 0.7% full scale
Power supply	Output signal changes less than 0.05% when supply voltage is varied between 12.5 and 40 volts dc

Limit Switches

(SPDT) UL/CSA Rating L23	20 amps, 120, 240, 480 VAC, ind. and res 1 Hp. 120 VAC; 2 Hp, 240 VAC, .5 amp. 125 VDC; 25 amp, 250 VDC res.

Mechanical

Input motion	± 105° from the center; spring loaded to return to the center.

Table III: I/P Transducer Specifications

Input range	4-20 mA
Input resistance	Approximately 200 ohms
Capacitance	Negligible
Output range	3-15 psi
Output characteristic	Linear, direct or reverse
Air capacity	1.6 scfm
Air supply (maximum)	20 psi, ± 1.5 psi (oil, water and dust-free)
Steady state air consumption	0.08 scfm
Linearity	≤ 0.5%
Hysteresis	≤ 0.3%
Response threshold	≤ 0.1%
Temperature influence	≤ 0.05% °F
Air supply influence	≤ 0.3%/1.5 psi
Position influence	≤ 0.5%
Vibration influence	≤ 0.5% for an acceleration ≤ 10 G's and a frequency ≤ 80 Hz
Influence of interfering radiation	Not measurable
Response time	10-90% or 90-10% = 0.3 seconds with a volume of 6.05 cubic inches 10-90% = 1.5 seconds with a volume of 60.5 cubic inches 90-10% = 2.5 seconds with a volume of 60.5 cubic inches
Ambient temperature limits	-20° F to +180° F
Connections – Air – Electrical	1/8-inch NPT 1/2-inch NPT
Weight (pounds)	1.34

Proximity Switches

Proximity switches indicate valve position using sensors without mechanical arms. The switch sensor cannot be further than .110 inch away from the sensing area.

The switch is UL and CSA approved for use in Class I, Division 2, Groups A, B, C and D locations; or Class II, Groups E, F and G locations. It is also UL and CSA approved for use in Class I, Division 1, Groups A, B, C and D locations; or Class II, Groups E, F and G when properly specified.

Proximity switches can be used with linear and rotary-motion actuators to indicate open or closed valve positions. Valtek uses Go Switches as a standard. Typical proximity switch installations are shown in Figure 19-4:

Solenoids

Where a positioner is not required, four-way solenoid valves are used as the control mechanism to open or close the valve in on/off applications. Solenoids provide fast, positive, four-way operation. They are available in a wide variety of operational voltages for both AC and DC. Standard four-way solenoid valves are equipped with a class F coil for continuous four-way duty at temperatures up to 310^{O} F / 155^{O} C. Optional class H coils are available for higher temperature service. Valtek stocks ASCO solenoids, but other brands are also available. Schematics 19-2 show a four-way solenoid configuration.

Three-way solenoids are used to interrupt an instrument signal to the pneumatic positioner or to control an on/off spring diaphragm operator.

Transducers

Transducers convert a current or voltage signal to a pneumatic signal. The most common transducer converts a 4-20 mA electric signal to a 3-15 psig pneumatic signal. They are commonly mounted on the control valve, but may be remotely mounted to avoid vibration from the piping system. A number of different enclosures are available, including weatherproof, explosion-proof, or intrinsically safe. When the application permits a valve-mounted transducer with a positioner, the Valtek Beta positioner with IP 2000 module is recommeded. Refer to the Beta Positioner sales bulletin or Section 17 for detailed specifications and performance. For remote-mounted transucer applications, the Valtek Electro-pneumatic (I/P) Transducer is supplied; and the pneumatic signal module is used with the Beta positioner mounted on the valve. Figure 19-1 is a diagram of the Valtek Electro-pneumatic (I/P) Transducer. See Table 19-III for specifications and performance of the remotely mounted Valtek I/P Transducer. Other makes of transducers can be provided by Valtek; contact the factory for price and availability.

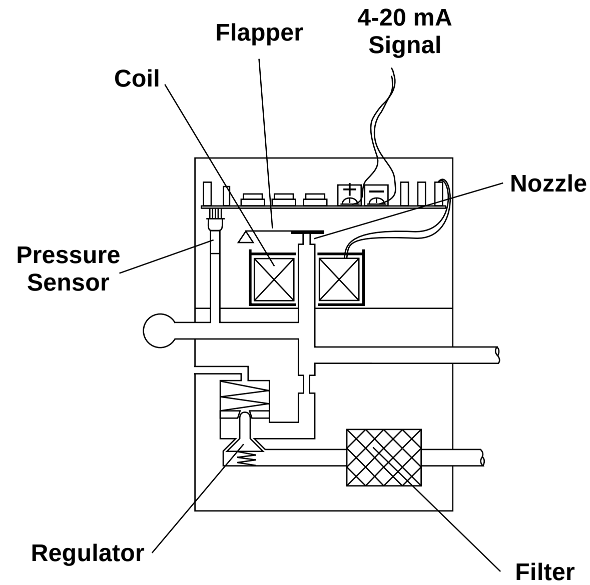


Figure 19-1: Valtek I/P 2000 Module Wiring/Piping Diagram

Flow Boosters

Flow boosters increase the stroking speed of large actuators, generally size 100 square-inch and larger. They have the advantage of responding rapidly to large changes in the input signal, while permitting smooth actuator response at smaller signal changes. This feature allows boosters to work well with positioners in throttling applications.

The output from the positioner is directed to the booster signal port and the booster is powered directly by the air supply. As long as a gradual change is received from the positioner, normal air flow is delivered to the cylinder through the positioner. Should the positioner be subjected to a step increase or decrease, a pressure differential is created in the booster which causes either the booster inlet or exhaust port to open (depending on the action required to reduce the differential). This continues until the pressure differential is again within the deadband limits in the bypass valve of the booster, thus closing the inlet or exhaust port and returning the valve to normal positioner operation.

For example, a size 50 cylinder actuator with a 3-inch stroke and ¼-inch tubing takes 3.7 seconds to fully stroke (from Table 19-VI). The same actuator equipped with one booster on each side of the piston fully strokes in less than one second. A size 300 actuator with a 4-inch stroke and ⅜-inch tubing takes 31.9 seconds to fully stroke without boosters. With one booster per side, the stroking time is reduced to 2.5 seconds. These stroking times assume starting at the full-closed or full-open position with an air supply of 80 psig / 5.5 Barg on one side of the piston and no pressure on opposite side.

Schematics 19-6 are schematics of a cylinder actuator with one booster per piston side. When two boosters per side are required, they are connected in parallel to the cylinder port, supply air and positioner output lines. Table 19-VI provides standard stroke times with and without flow boosters.

Table IV: Flow Booster Specifications

Input Signal Range	Maximum: 150 psig
Supply Pressure	Up to 150 psi (check actuator rating)
Ambient Temperature Limits	-40 to 165^{o} F
Supply Air	-40 to 165^{o} F
Temperature Limits	
Nominal Dead Band	5.5 percent of input signal span
Connections	Signal - 1/4-inch NPT; Supply - 3/4-inch NPT; Output - 3/4-inch NPT
Maximum C_v	Supply - 5.0; Exhaust - 3.0
Net Weight	Approximately 4.9 lbs

* Booster does not regulate the air. Actuators that use unregulated air must be rated to at least the above pressures, or air must be regulated to actuator rating.

Table V: Flow Booster Standard Materials of Construction

Component	Material
Body	Anodized aluminum
End Plug	Nickel plated brass (electroless)
Diaphragm Assembly	Annodized aluminum and Buna-N/nylon diaphragms
Poppet	Stainless steel and polyurethane
Needle Valve	Stainless steel
Springs	Stainless steel
Spring Cap	Stainless steel
Bolts, Nuts	Stainless steel

Quick Exhaust Valves

Quick exhaust valves allow the cylinder actuator to quickly vent one side to atmosphere, resulting in an almost immediate full-open or full-closed position. This sudden movement generally limits quick exhaust applications to on/off services where positioners are not used.

In most cases, the air supply is connected to the inlet side of the quick exhaust valve, while the exit port is connected to one side of the cylinder actuator. The quick exhaust valve is installed above the piston for fail-open action and below piston for fail-closed action. As long as a normal flow rate passes through the quick exhaust valve, normal supply is provided to the cylinder. However, if the air flow exhausts, differential pressure in the quick exhaust valve will cause an internal diaphragm to divert the exhaust flow from the cylinder through an enlarged exhaust port, thus quickly venting one side of the cylinder to atmosphere.

Quick exhaust valves can also be connected to both sides of the cylinder for those on/off applications where fast strokes are required in both directions. Stroking speeds are slightly faster than those listed for volume boosters (with one booster piston side) in Table 19-VI. Schematics 19-13 illustrate a typical fail-closed quick exhaust system

In special cases, a quick exhaust may be used in throttling applications with a positioner when the valve must stroke fast in only one direction. The use of a quick exhaust valve in parallel with a needle valve, as shown in Schematics 19-7, provides stable, fast stroking speeds. The separate needle valve allows the trip point of the quick exhaust valve to be adjusted so that it only trips on large signal changes.

Fail-in-place Lock-up System

This system is designed to hold the actuator in the last operating position upon air failure. A three-way switching valve is used to sense the air supply. Upon failure of the air supply (below a given set point), this valve operates to exhaust the pilots to the two lock-up valves. These lock-up valves, in turn, trip and hold the existing pressure on both sides of the piston, thus locking it in place. The system includes one Fisher model 164A switching valve and two Humphrey 250A pilot operated valves (commonly called lock-up valves). Schematics 19-9 provide a schematic of the fail-in-place lock-up system.

Note: *This type of fail-safe system does not influence the actuator size.*

TABLE 19-VI: Estimated Stroking Speeds(1)

Actuator Size (sq.in.)	Stroke (inches)	Without Boosters		With Boosters	
		Total Time To Open	Total Time To Close	Total Time To Open	Total Time To Close
50 (1/4-inch tubing)(2)	1	2.7	1.5	.3	.1
	2	3.7	2.6	.3	.2
	3	4.6	3.6	.4	.3
100 (1/4-inch tubing)(2)	2	9.2	5.6	.6	.4
	3	11.1	7.7	.8	.5
	4	12.8	9.6	1.0	.7
	6	15.8	13.0	1.2	.9
	8	18.6	16.2	1.4	1.1
	10	21.2	19.5	1.5	1.4
	12	23.6	22.8	1.7	1.6
	18	29.2	28.9	2.1	2.1
	24	32.3	32.1	2.4	2.3
200 (3/8-inch tubing)(2)	2	15.2	11.2	1.0	.8
	3	18.9	15.2	1.4	1.1
	4	22.3	18.8	1.7	1.3
	6	28.5	25.1	2.1	1.8
	8	34.3	30.9	2.6	2.3
	10	39.9	36.8	3.0	2.7
	12	45.1	42.6	3.4	3.2
	18	60.0	58.4	4.6	4.5
	24	68.9	68.1	5.3	5.2
300 (3/8-inch tubing)(2)	3	26.9	22.9	2.1	1.8
	4	31.9	28.3	2.5	2.3
	6	41.3	37.6	3.3	3.0
	8	50.1	46.1	4.1	3.7
	10	58.5	54.4	4.8	4.4
	12	66.6	62.8	5.6	5.2
	18	89.3	85.9	7.7	7.2
	24	103.1	99.9	9.1	8.6

NOTE: Data is based on tests with boosters connected to the top and bottom ports of a spring cylinder actuator with a fail-close, standard spring and Beta positioner with I/P module, calibrated at 4-20 mA; 80 psi supply air to positioner and boosters.

NOTE: Divide stroking times by two when using two boosters on each cylinder port and 3/4-inch NPT supply air pipes.

(1) Times are in seconds, are estimated and will vary slightly with different packing sets, plug, seals, failure modes, etc.

(2) Listed tubing size is from positioner to actuator on systems without boosters, or to booster input signal on systems with boosters. All supply air tubing to boosters is 3/4-inch.

Fail-Safe Air Springs

An air spring may be used in cases where fail-safe operation cannot be achieved by means of a mechanical spring. It uses the pressurized volume of air stored in the cylinder or in an external volume tank as a power source to move the valve to the fail-safe position. An external volume tank may be used for either fail-open or fail-closed operation. However, an air spring using actuator cylinder volume may only be used for fail-closed operation of linear valves, or for fail-extend operation of rotary actuators, due to the small cylinder volume under the piston.

When an air spring using cylinder volume is selected, the valve positioner is operated as a three-way valve positioner to supply air only to the bottom of the cylinder. A pressure regulator, or filter regulator, and a three-way switching valve supply air to the top of the cylinder. See Schematics 19-12. During normal operation the pressure regulator maintains a constant pressure in the top of the cylinder. The three-way switching valve is used to trap the air in the top of the cylinder if the air supply pressure should drop below the setpoint of the switching valve. The air pressure trapped in the cylinder is sufficient to stroke the actuator to the fail-safe position as air bleeds from the other side of the cylinder through the positioner. The setpoint of the three-way switching valve and pressure regulator (P_1) is determined using Equations 19.1 to 19.3. The setpoint must be less than 80 percent of the air supply pressure. If the calculated setpoint exceeds 80 percent of supply pressure, an external volume tank must be used.

When an air spring with an external volume tank is selected, the valve positioner operates normally as a four-way valve positioner and a pilot-operated three-way lockup valve is connected between each positioner output port and the cylinder. A three-way switching valve controls the pilot air to the two lockup valves. See Schematics 19-10. During normal operation the lockup valves allow air to flow between the positioner and the actuator cylinder. The switching valve will vent the pilot to the lockup valves if the air supply pressure drops below the setpoint of the switching valve. This allows the volume tank to pressurize one side of the cylinder and vents the other side of the cylinder, causing the actuator to stroke to the fail-safe position. The size of the volume tank and setpoint for the switching valve are determined using Equations 19.1, 19.2, and 19.4 or 19.5.

The basic equation used to calculate set pressure or tank volume is:

$$(P_1)(V_1) = (P_2)(V_2) \qquad (19.1)$$

Where :

P_1 = Initial air pressure (absolute)
P_2 = Final air pressure (absolute)
V_1 = Initial volume
V_2 = Final volume

Use the worst-case required actuator force (F) and the cylinder area (A_u for fail-closed, or A_L for fail-open, from Section 16, Table 16-III) to calculate the final pressure in the cylinder needed for fail-safe operation of the actuator:

$$P_2 = \frac{F}{A_u} + 14.7 \quad \text{(psia)}$$

or

$$P_2 = \frac{F}{A_L} + 14.7 \quad \text{(psia)} \qquad (19.2)$$

For an air spring using cylinder volume calculate the initial pressure, or switching valve setpoint:

$$P_1 = \frac{(P_2)(V_M)}{V_M - (A_u)(S)} - 14.7 \qquad (19.3)$$

Where:

P_1 = (psig) initial upper cylinder pressure and switching valve setpoint
V_M = (in^3) maximum upper cylinder volume, piston extended (see Section 16, Table 16-III)
A_u = (in^2) upper cylinder area (see Section 16, Table 16-III)
S = (inch) valve stroke

If P_1 exceeds 80 percent of the air supply pressure, an external volume tank must be used. An external volume tank will also be required in cases where the combined force of a mechanical spring and the air spring would prevent the cylinder from retracting.

For an air spring with an external volume tank calculate the required size of the volume tank:

For fail-closed operation:

$$V_T = \frac{(P_2)(V_M)}{(P_1 + 14.7 - P_2)} \qquad (19.4)$$

Where:

V_T = (in^3) volume of volume tank
V_M = (in^3) maximum upper cylinder volume, piston extended (see Section 16, Table 16-III)
P_1 = (psig) switching valve setpoint
P_2 = (psia) final air pressure (absolute) from Equation 19.2

For fail-open operation:

$$V_T = \frac{(P_2)(S)(A_L)}{(P_1 + 14.7 - P_2)} \qquad (19.5)$$

Where:

- V_T = (in^3) volume of volume tank
- P_1 = (psig) switching valve setpoint
- P_2 = (psia) final air pressure (absolute) from equation 19.2
- S = (in) valve stroke
- A_L = (in^2) lower cylinder area (see Table 16-III)

To obtain tank volume in units of gallons, divide the volume, in cubic inches, by 231.

Safety Relief Valves

In some cases, customers are required by local codes to install safety valves as over-pressure protection on volume tanks and high pressure actuator supply systems. Volume tanks are installed by Valtek so that safety valves can be added in the field if necessary. When the safety valve is sized and specified by the customer, Valtek can supply and install the safety valve at the factory. Because of actuator supply system information normally unavailable to Vatlek for safety valve sizing and variations in local code requirements, Valtek does not size or recommend specific safety valves.

Switching Valves

Pneumatically operated switching valves are generally used with fail-safe systems or simple volume tank configurations. They are activated when a predetermined pressure is attained. The switching valves are usually set at about 10 psi below minimum operating line pressure and activate when the line pressure falls to this pre-set value. They are generally Fisher models 164A or 168 and are available either mounted or unmounted, and with a manual reset.

Dual (Heavy-duty) Springs

Valtek offers heavy duty springs with all sizes of linear and rotary actuators. Such springs are used when additional thrust (beyond the capabilities of the standard spring) is necessary to close the valve.

Valtek's design involves two springs – one inside another – and is only available in the air-to-retract (air-to-open) configuration. Retrofitting a standard cylinder actuator to a dual (heavy-duty) spring design requires several different parts: a spring button, spring assembly, spring guide and adjusting screw. Actuators equipped with dual (heavy-duty) springs are not field reversible. For dual (heavy-duty) spring thrusts, refer to Section 16.

Lubricator Fittings

A lubricator fitting can be used to supply many common lubricants to the packing box. A lantern ring must be supplied as part of the packing box to allow the passage of the lubricant. A purge port is drilled and tapped into the bonnet to permit installation of the lubricator. (When used without a lubricator, the bonnet purge port may be used to monitor packing emissions.) Refer to Table VII for a list of common valve lubricants and their applications. Valtek does not supply the lubricant unless specifically requested to do so by the customer.

Table 19-VII: Common Control Valve Lubricants

Lubricant	Manufacturer	Temperature Range (°F)	Description Applications
Krytox 206	E.I. DuPont	-5° to 550°	Fluorinated general purpose grease; handles common liquids and gases; good lubricity in harsh mediums; non-flammable, chemically inert; will not harm plastic or metal parts
GP 460	Graphite Products Co.	32° to 1000°	Graphite in petrolatum; high pressures; anti-galling, graphite remains above 600° F
Aeroshell Grease 7	Shell Oil Co.	-100° to 300°	Synthetic oil based; low temperature applications
Garlock Luball	Garlock Inc.	32° to 500°	General purpose molybdenum disulfide lubricant economical; good in water, steam and common chemicals; not good in harsh mediums where Krytox 206 is recommended

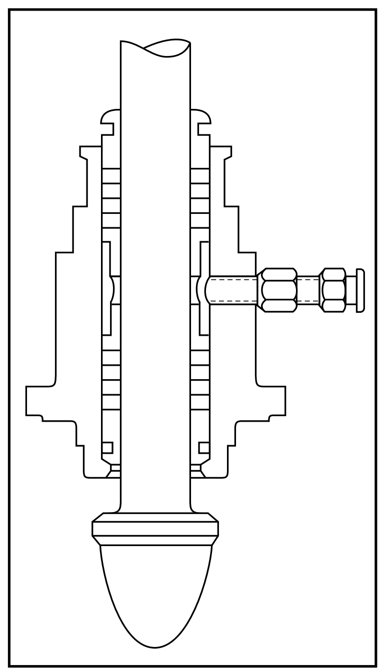


Figure 19-2: Lubricator With Isolating Valve

Special Tubing and Fittings

In addition to the standard ¼-inch tubing and fittings, Valtek offers ⅜ and ¾-inch tubing for faster stroking speeds. PVC coated copper tubing and other special types of tubing are also available. Swagelok or Hoke fittings can also be used, if necessary.

O-rings

Valtek's standard Buna-N O-ring material is used at ambient temperatures of -20 to 120 degrees Fahrenheit. Viton-A O-rings are used for higher or lower temperatures..

Sealant

RTV Silicon sealant can be placed around the cylinder retaining ring to prevent moisture from entering the yoke/cylinder/retaining ring interface. See Figure 19-3.

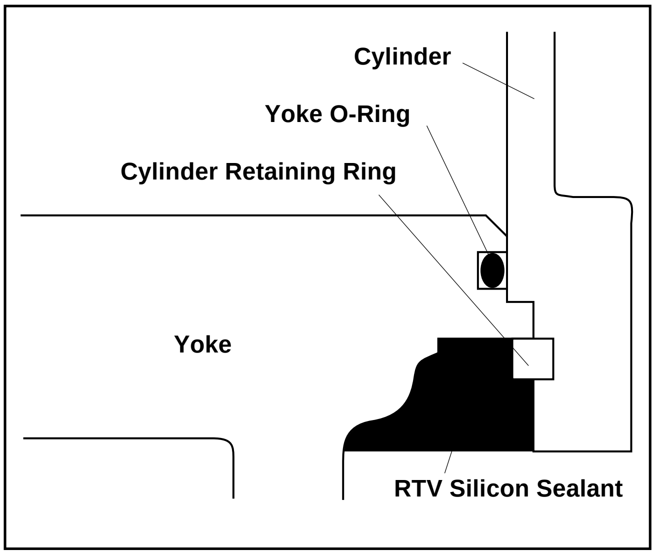


Figure 19-3: Sealant Placed Around Retaining Ring

Speed Control Valves

Speed control valves are used to control or limit valve stroking speed by restricting the flow of air in or out of the cylinder of the actuator. They are available in either brass or stainless steel in ¼ or ⅜-inch size.

They are unidirectional and control or slow the stroking speed in only one direction. For bi-directional control (stroking speed in both directions) two speed control valves are required. Two unidirectional speed control valves may also be used to control speeds in both directions. See Schematics 19-8.

Tags

Special metal tags can be applied to the actuator or valve body when required by the user.

Table 19-VIII: Extended Temperature Applications

Valtek accessories are often installed in extended temperature applications. The following information has been prepared to assist in the application of these accessories:

Valtek Actuators and Positioners

	Temperature Limit (°F)
Standard Cylinder Actuator	-20° to 180°
Cylinder Actuator w/ Viton O-rings	0° to 350°
Beta Positioner	-20° to 180°
Extended Temp Beta Positioner	-50° to 250°
Beta I/P	-20° to 180°
Extended Temp Beta I/P	-40° to 180°
System 80-R Pneumatic	-20° to 180°
System 80-R E/P	-40° to 180°
Moore Positioner 74-G or SG with Viton	-40° to 180° 0° to 350°
Position Pac	-40° to 185°

Filters, Filter Regulators, Boosters

Valtek Standard Filter (Norgren)	0° to 150°
Bellofram 51 FR	0° to 125°
Fisher 67 AFR with Viton	-20° to 180° 0° to 300°
Valtek Flow Booster	-40° to 165°
Humphrey Model QE-4 and 5 with Viton (QE-4-VAI)	-25° to 180° 0° to 350°

Note: On a throttling valve application, air is usually flowing through a filter, cooling the filter and allowing it to operate in slightly higher temperatures.

Lock-up Systems

Fisher 164A Swithcing Valve with Viton	-20° to 140° 0° to 250°
Humphrey 250A Lock-up Valve	0° to 225°

Limit Switches

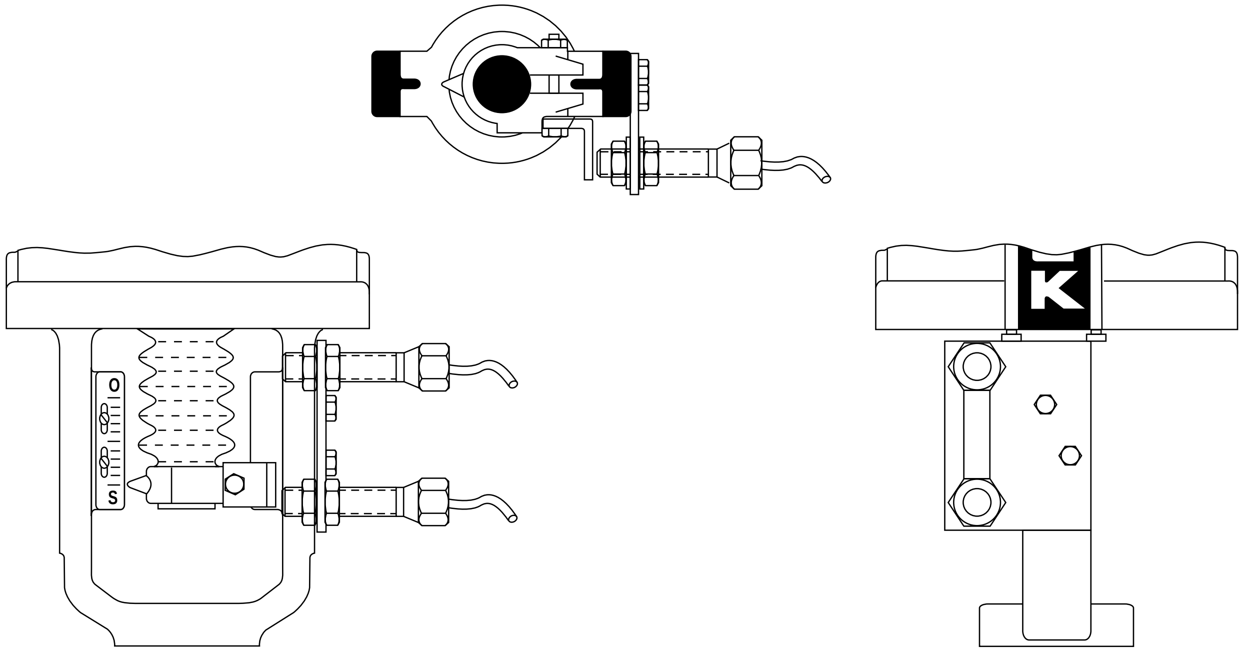
NAMCO EA 170	0° to 200°
Micro Switch	
EXAR-SPDT	-40° to 160°
LSXB3K-SPDT	10° to 200°
EXHAR3-SPDT	-40° to 160°
EXDAR-DPDT	-40° to 160°
LSXB4L-DPDT	10° to 200°
OPAR-SPDT	-25° to 160°
LSB3K-SPDT	-20° to 160°
OPDAR-DPDT	-25° to 160°
LSB4L-DPDT	-20° to 160°
Go Switch 70 Series	-40° to 221°

Solenoid Valves

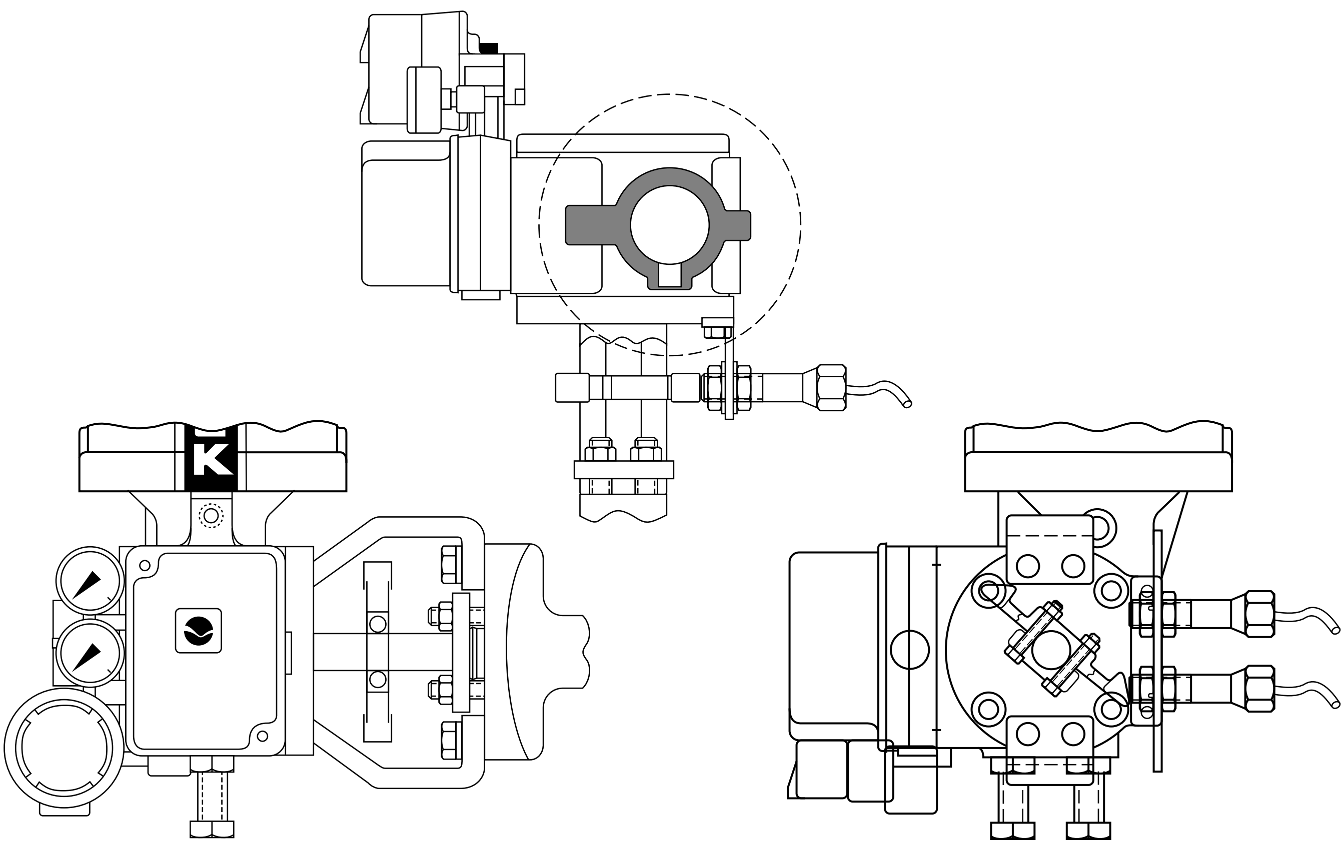
Ambient temperature limits for solenoid coils:

Skinner 700 Series	
Class F (standard)	15° to 122°
Class H	15° to 122°
ASCO Red-Hat	
Class FT	0° to 171°
Class FB	0° to 125°
Class FF	0° to 77°
Class HT	0° to 213°
Class HB	0° to 160°
Class HP	0° to 77°
Red-Hat II	
Class FT	0° to 245°
Class FB	0° to 173°
Class FF	0° to 125°
Class HT	0° to 269°
Class HB	0° to 197°
Class HP	0° to 125°

For temperatures in excess of these limits, contact factory. When placing an order, be sure to verify that the specified solenoid valve is available with the coil.



Linear Actuator



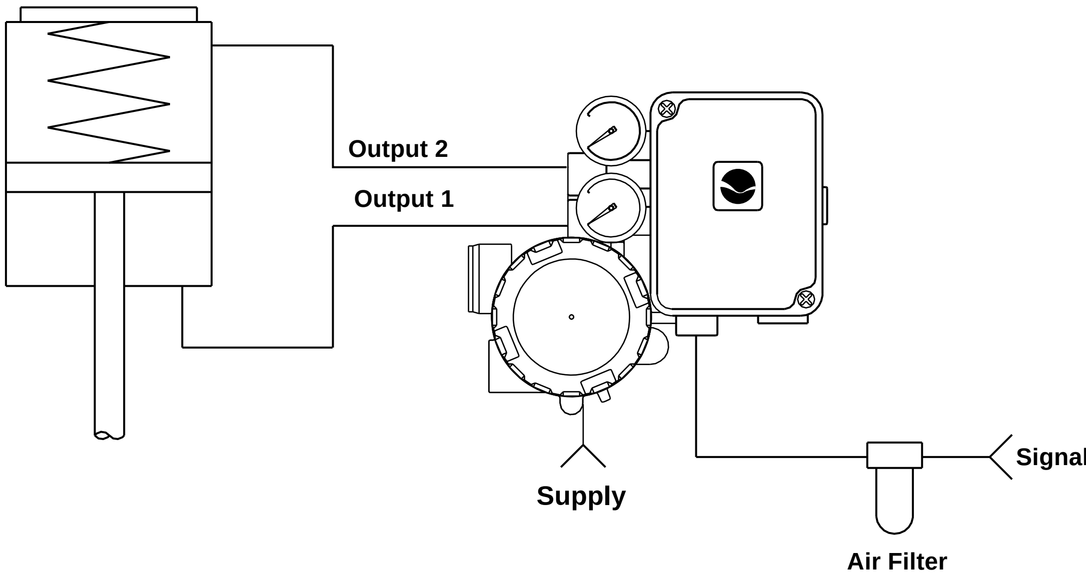
Rotary Actuator

Figure 19-4: Proximity Switch Installation

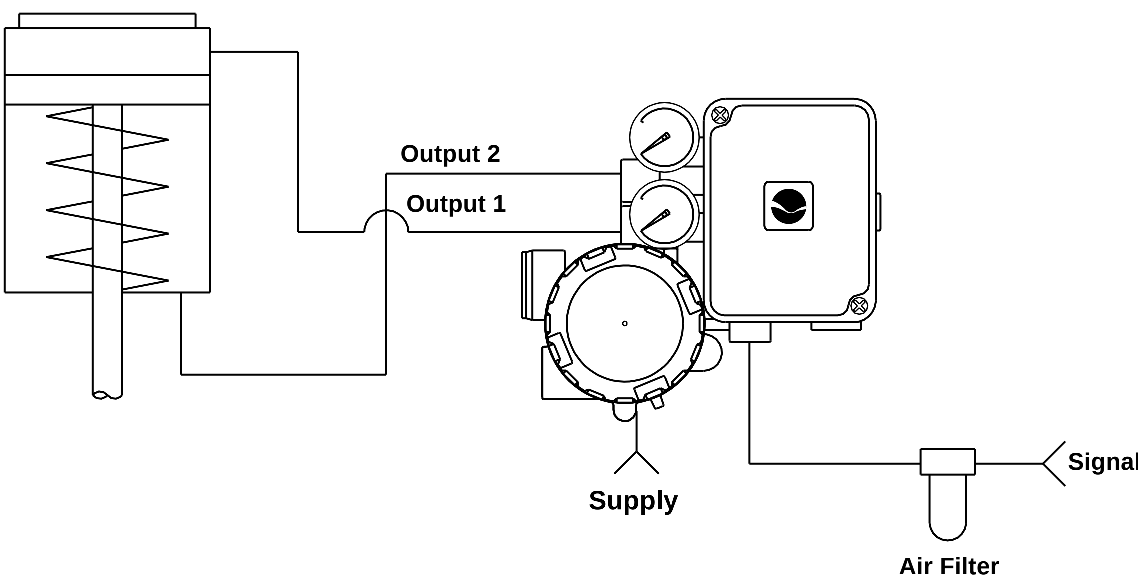
Accessory Schematics

These drawings are helpful in determining what accessories are needed and their proper arrangement for a particular application. The following engineering schematics are used by Valtek when attaching accessories to control valves.

Standard Positioner Control

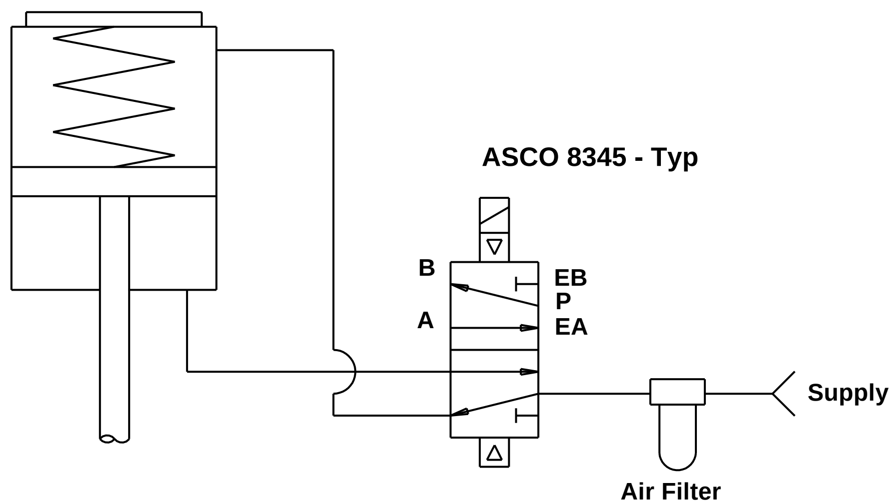


Schematic 19-1A:
Positioner Signal-to-open, Fail-closed

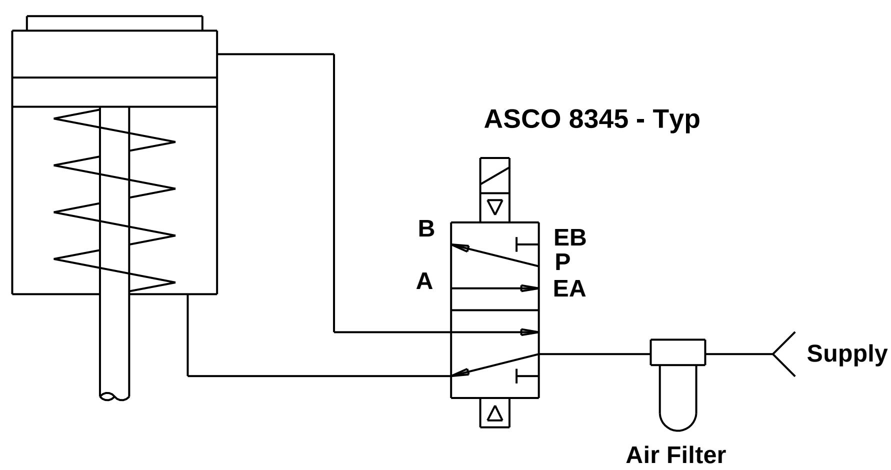


Schematic 19-1B:
Positioner Signal-to-close, Fail-open

Solenoid Operated On-Off

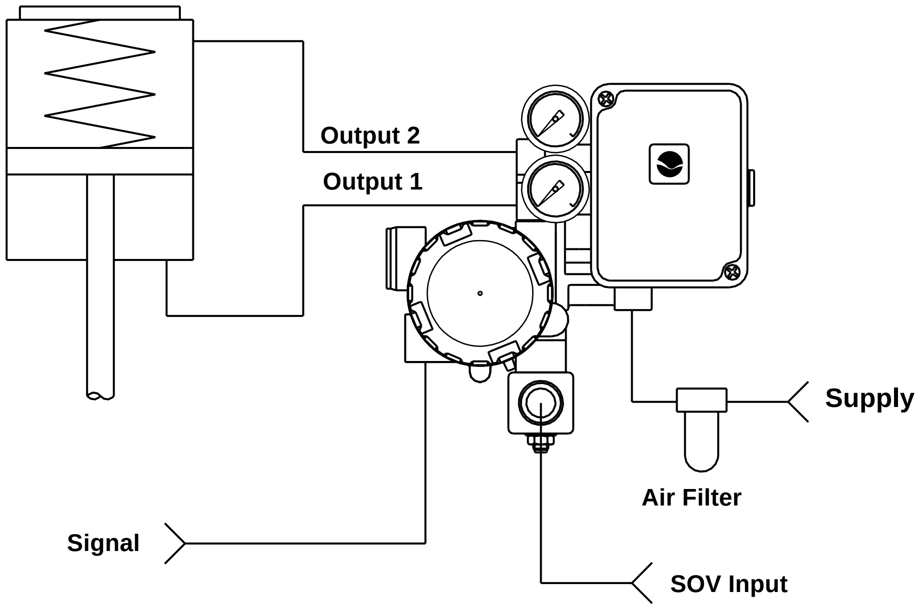


Schematic 19-2A:
Four-way Solenoid, De-energize-to-close, Fail-closed

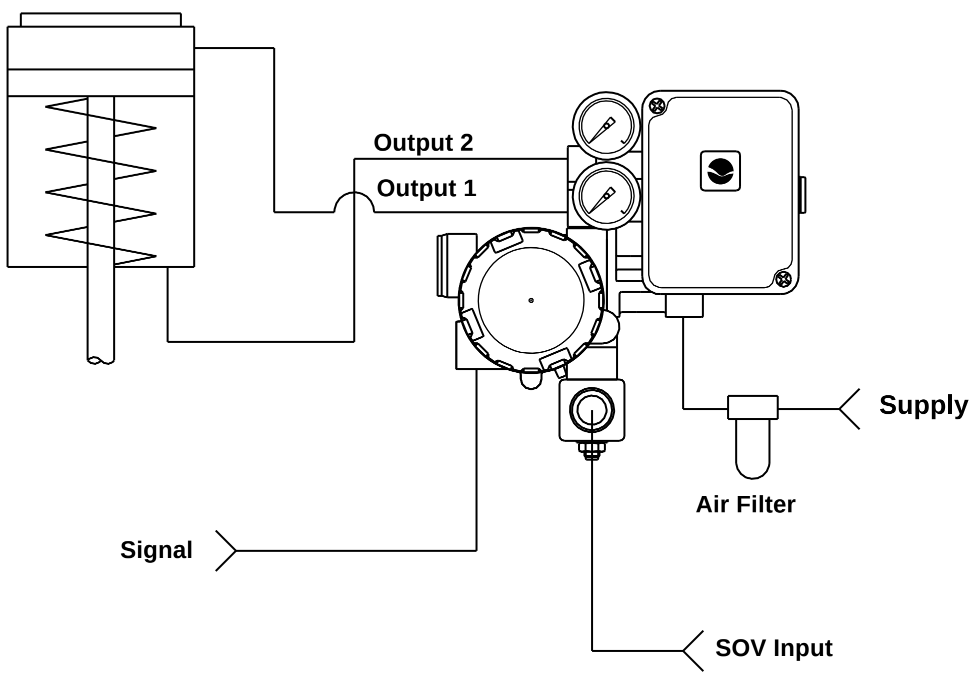


Schematic 19-2B:
Four-way Solenoid, De-energize-to-open, Fail-open

Postitoner with Solenoid Override



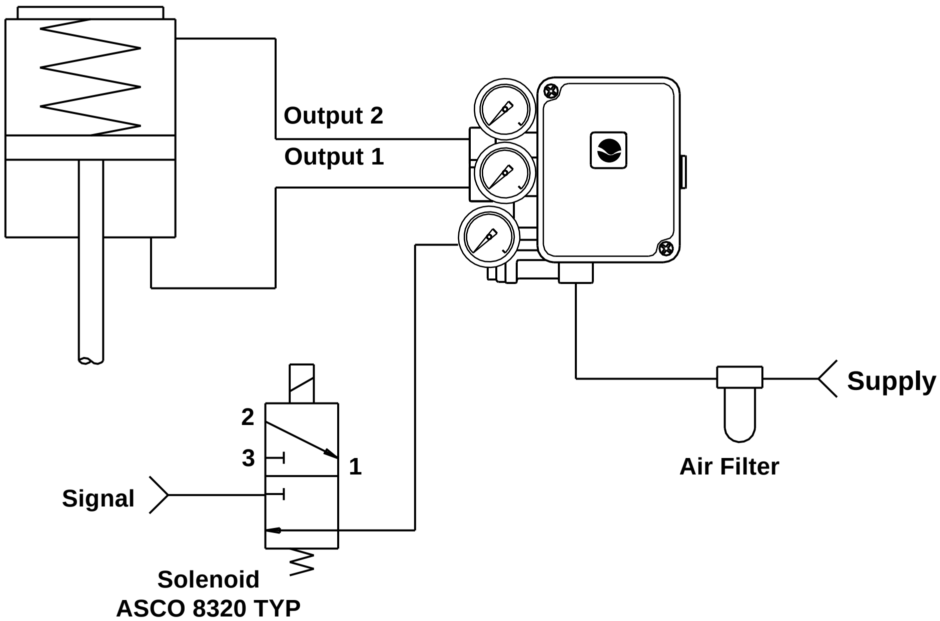
Schematic 19-3A:
Signal-to-open, Fail-closed, I/P 2000 SOV Signal Interrupt, De-energize-to-close



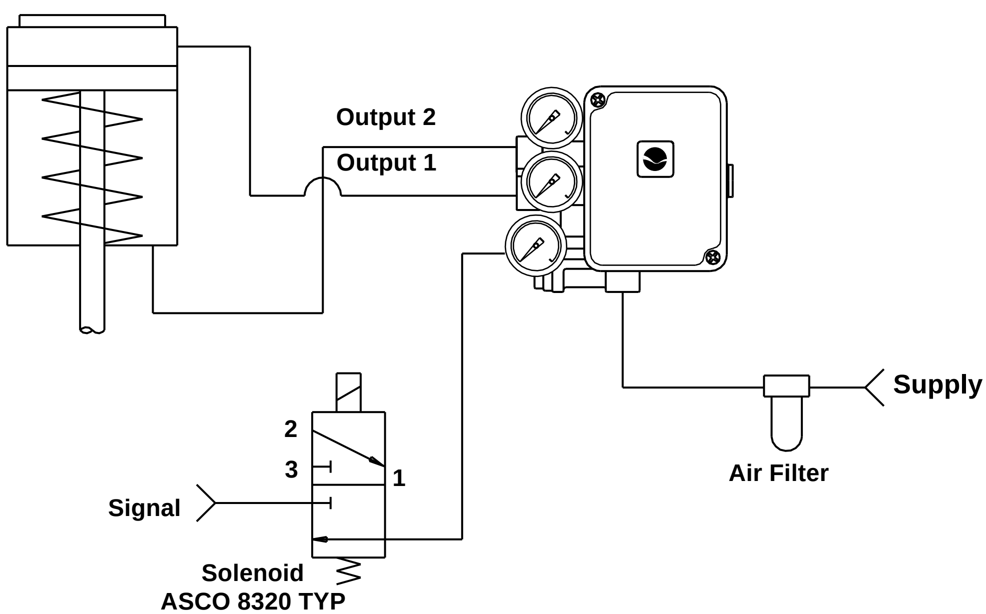
Schematic 19-3B:
Signal-to-close, Fail-open, I/P 2000-SOV Signal Interrupt, De-energize-to-open

De-energizing solenoid valve interrupts the signal to the positioner and drives the actuator to the low signal position. This is dependent on the proper functioning of the positioner and the integrity of the feedback linkage.

Positioner With Solenoid Override

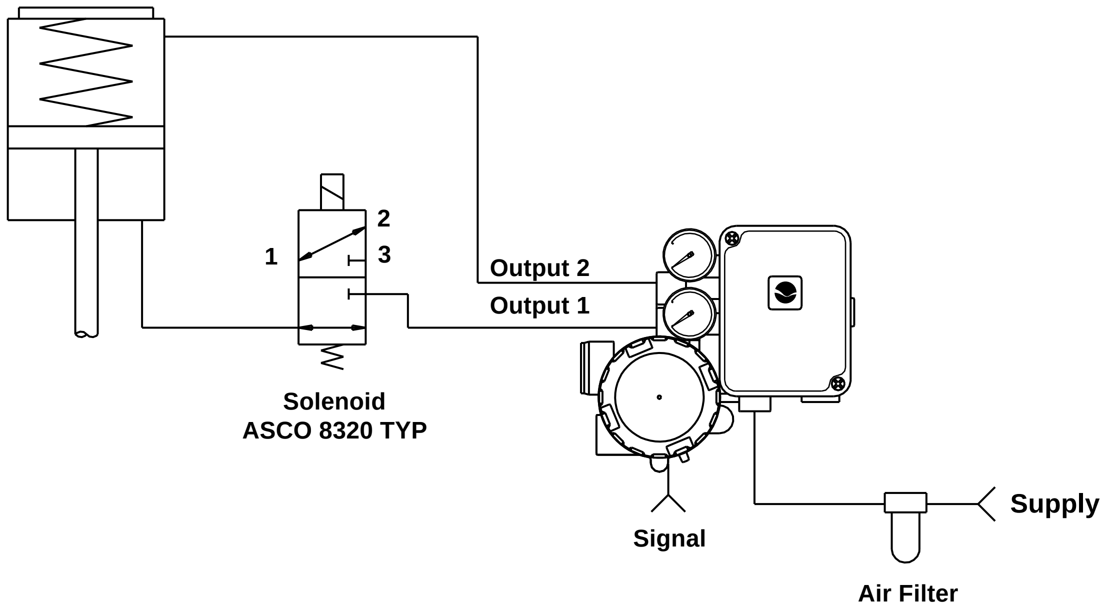


Schematic 19-4A:
Signal-to-open, Fail-closed, Three-way Solenoid Signal Interrupt, De-energize-to-close

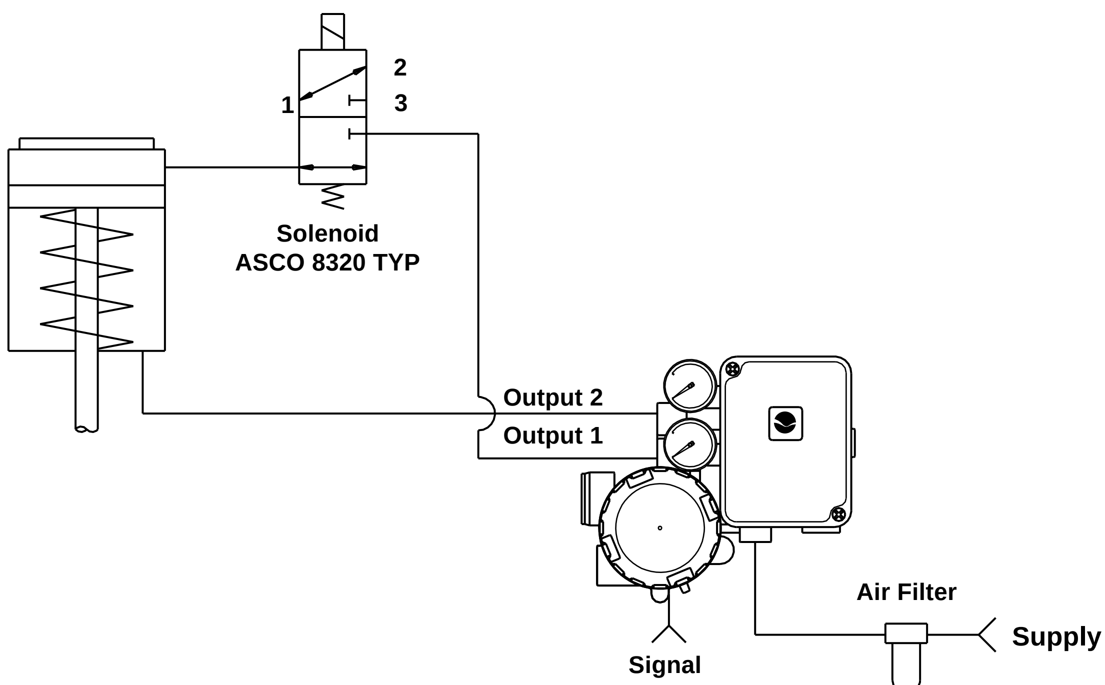


Schematic 19-4B:
Signal-to-close, Fail-open, Three-way Solenoid Signal Interrupt, De-energize-to-open

De-energizing solenoid valve interrupts the signal to the positioner and drives the actuator to the low signal position. This is dependent on the proper functioning of the positioner and the integrity of the feedback linkage.



Schematic 19-5A:
Signal-to-open, Fail-closed, Three-way Solenoid Override, De-energize-to-close

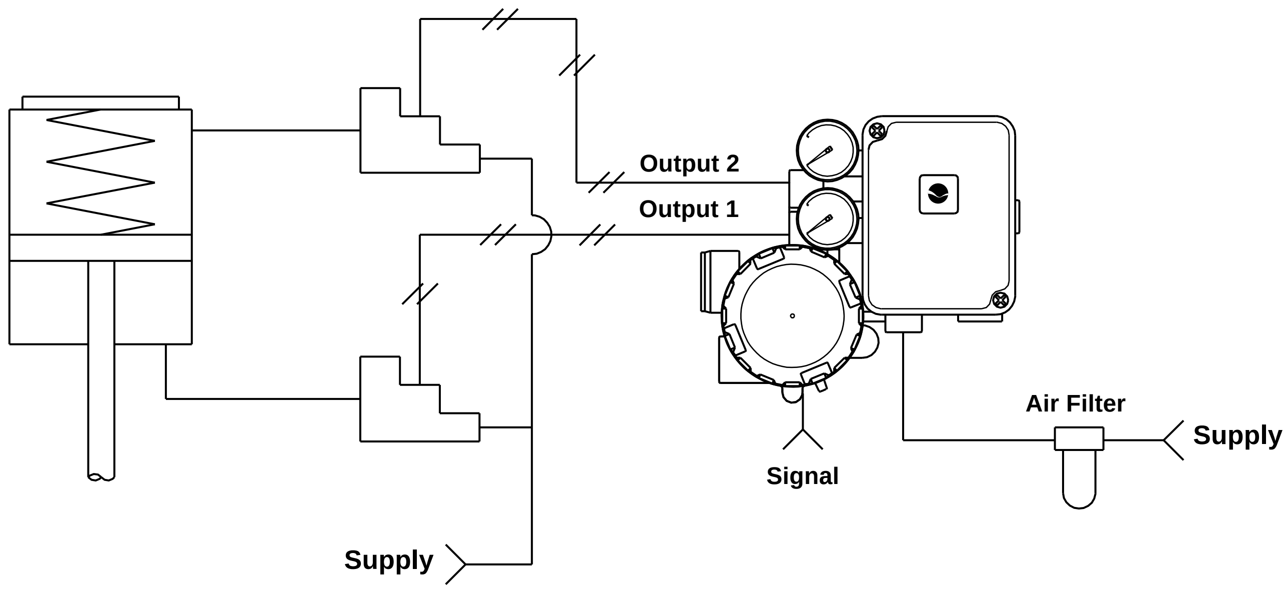


Schematic 19-5B:
Signal-to-close, Fail-open, Three-way Solenoid Override, De-energize-to-open

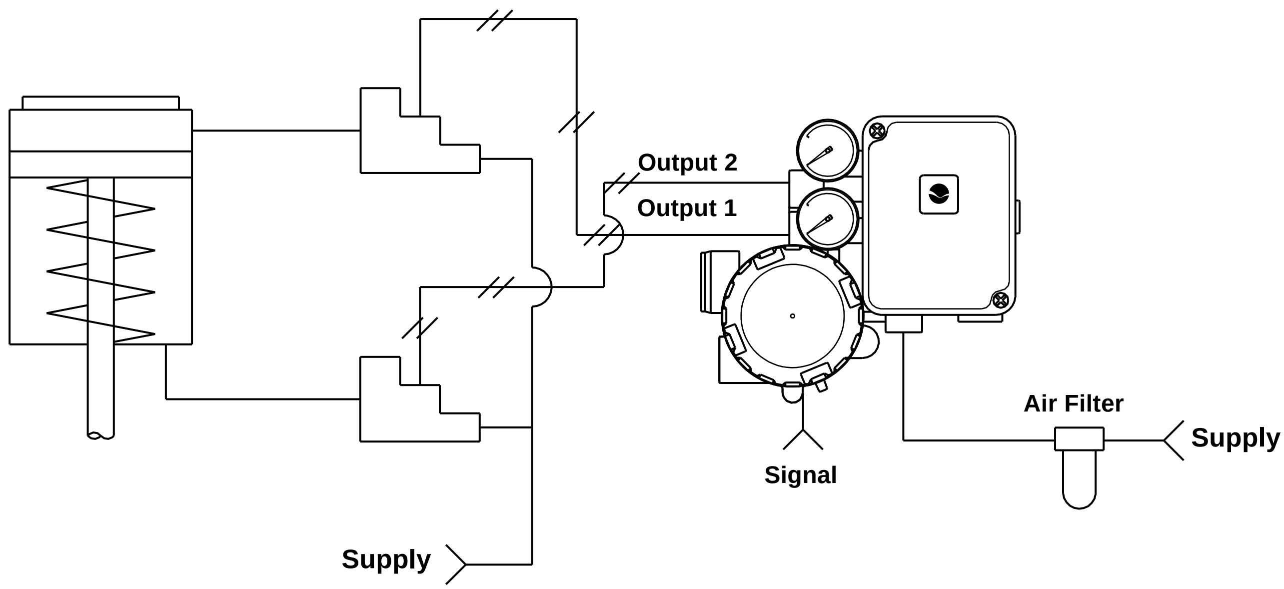
Soleniod must be rated for maximum supply pressure at all ports.

De-energizing the solenoid blocks off the positioner output and vents the cylinder opposite the spring, allowing the spring to fail the valve.

Flow Boosters

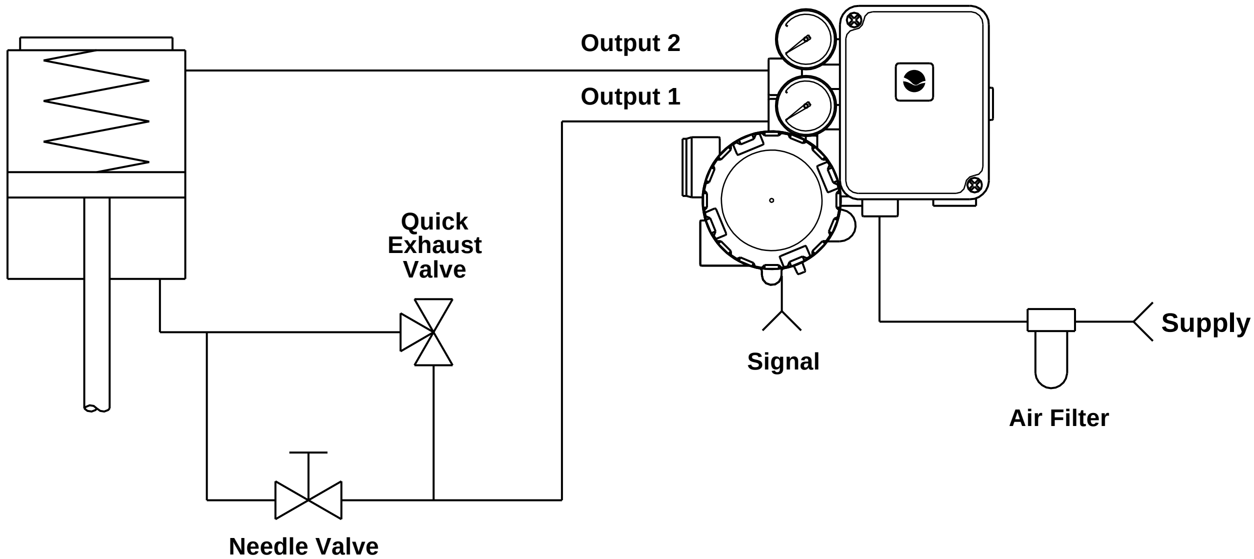


Schematic 19-6A:
Signal-to-open, Fail-close, Flow Boosters

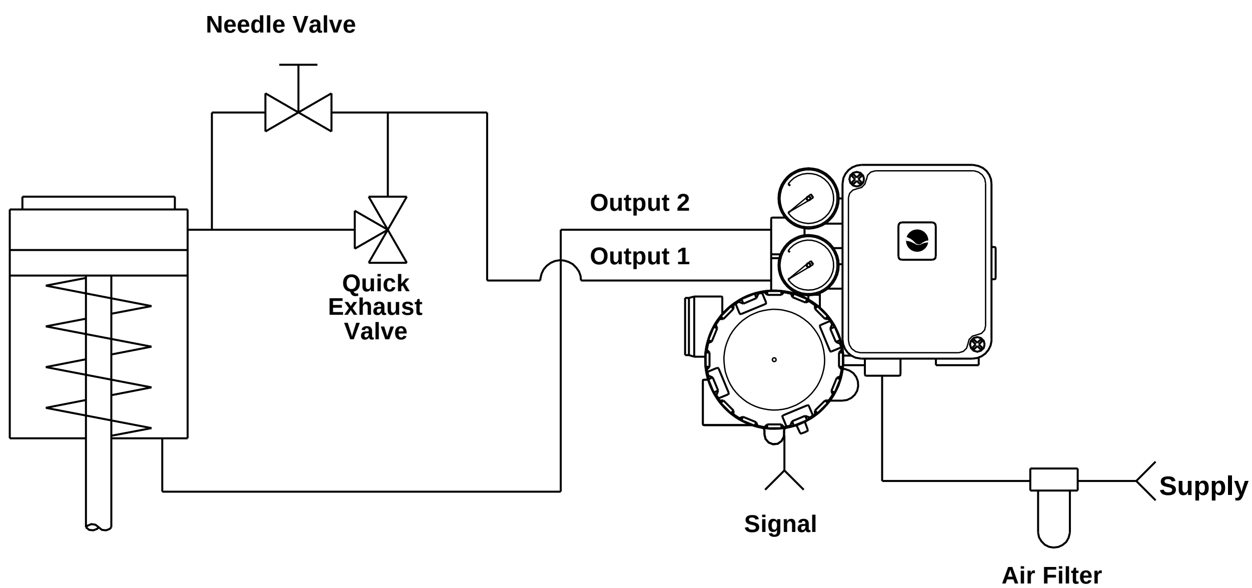


Schematic 19-6B:
Signal-to-close, Fail-open, Flow Boosters

Positioner with Quick Exhaust

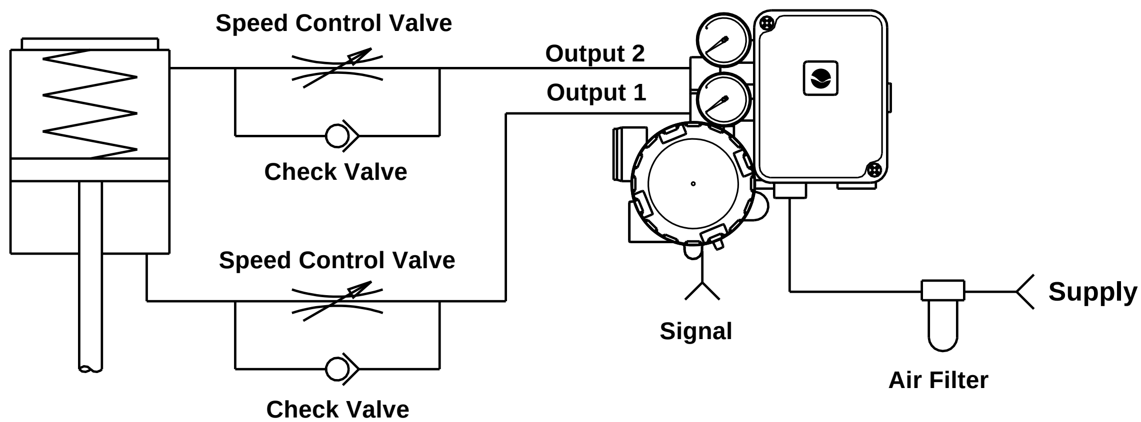


Schematic 19-7A:
Signal-to-open, Fail-closed, Quick Exhaust-to-close

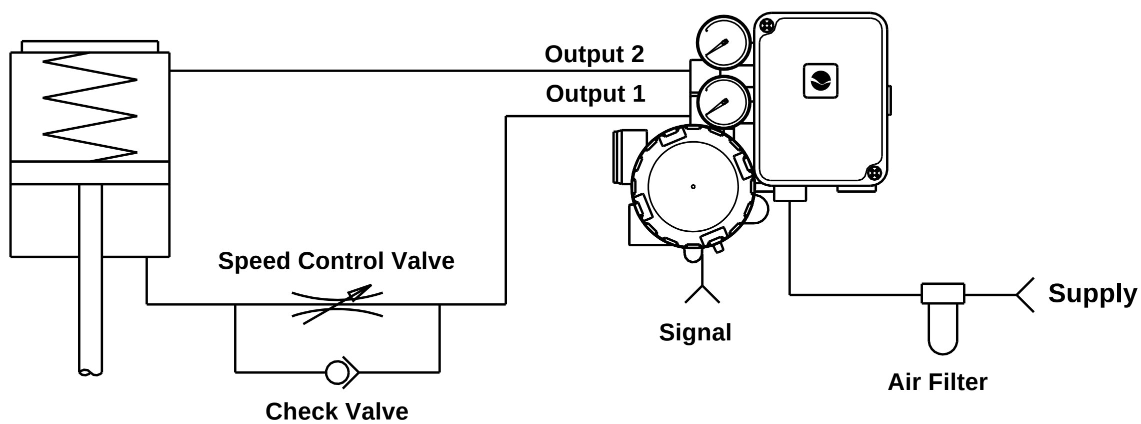


Schematic 19-7B:
Signal-to-close, Fail-open, Quick Exhaust-to-open

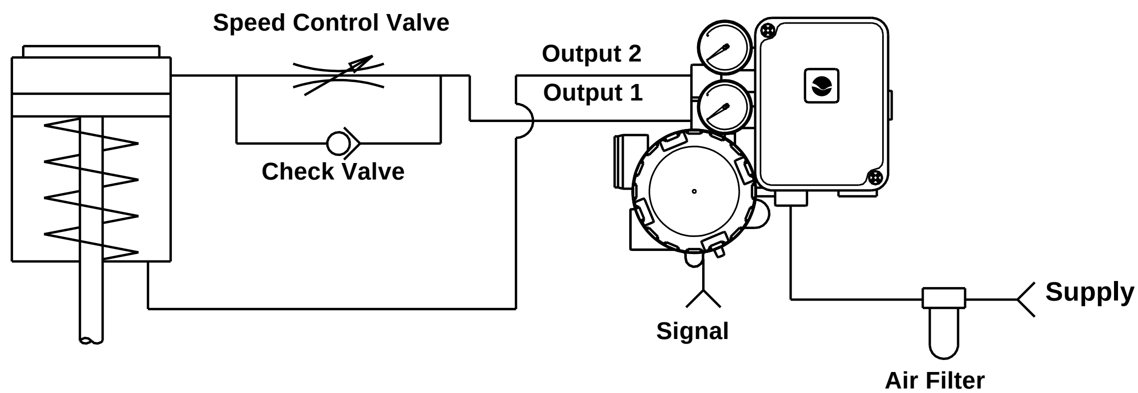
Speed Control System



Schematic 19-8A:
Signal-to-open, Fail-closed, Speed Control in Both Directions

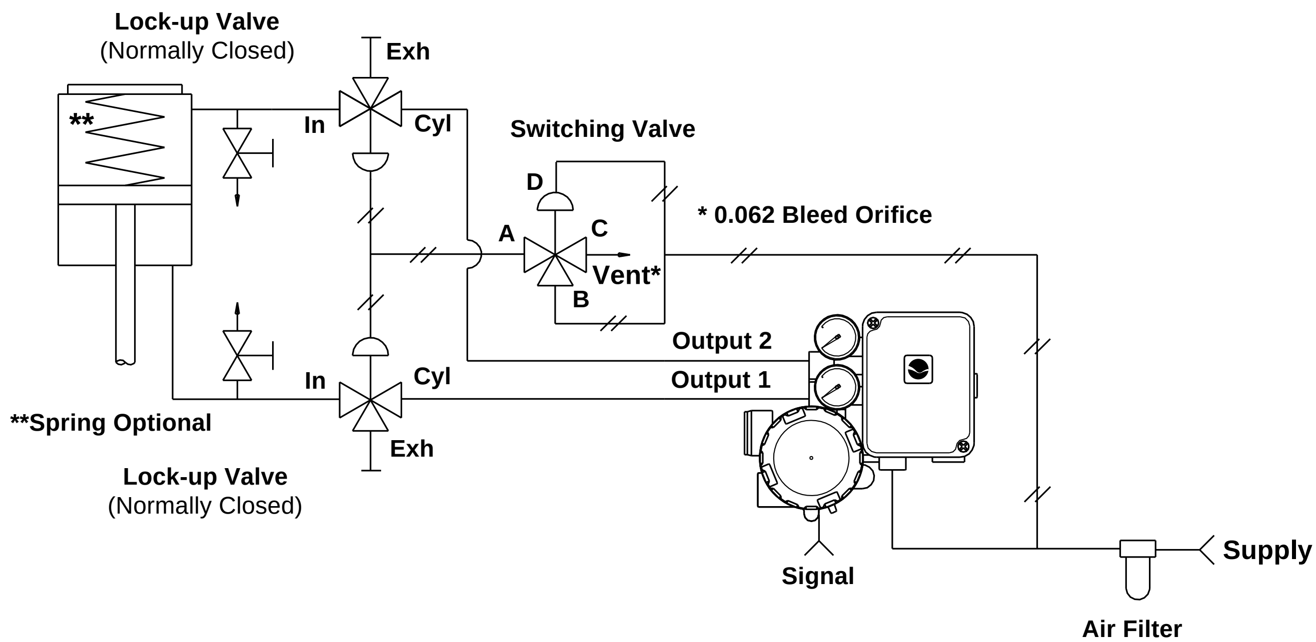


Schematic 19-8B:
Signal-to-open, Fail-closed, Speed Control in Closed Direction

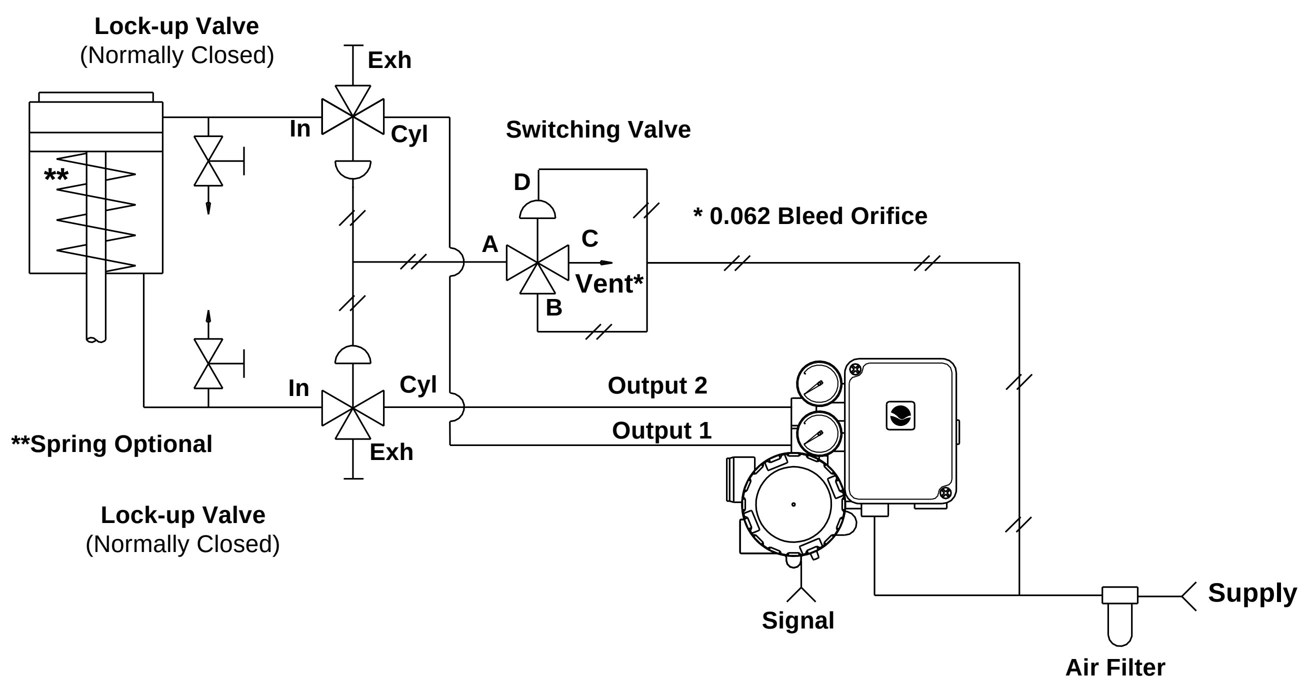


Schematic 19-8C:
Signal-to-close, Fail-open, Speed Control in Open Direction

Lock-up System

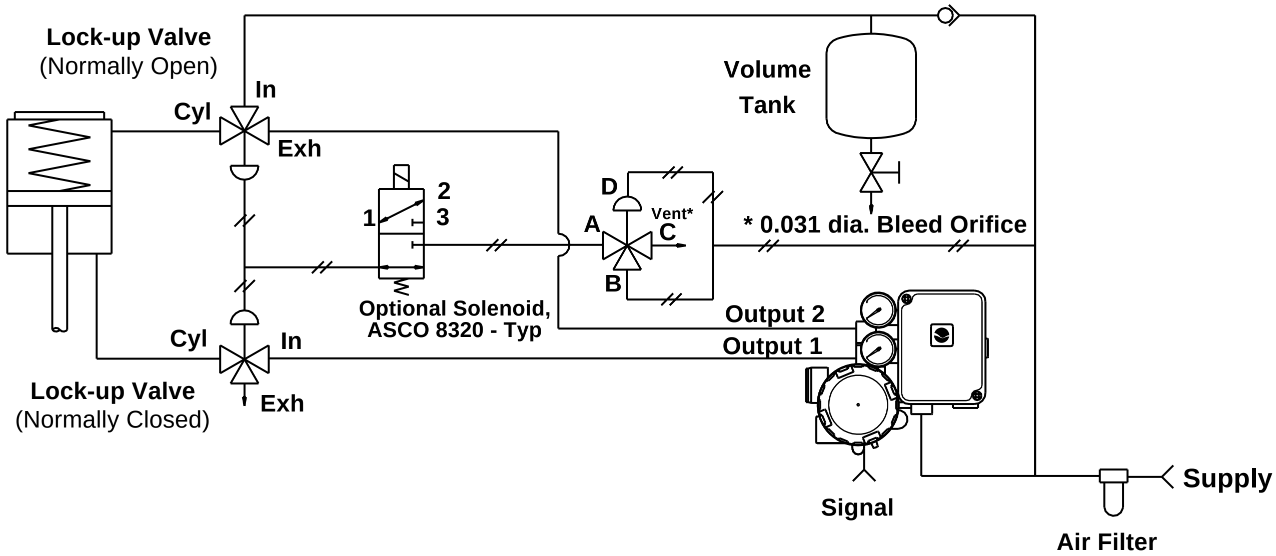


Schematic 19-9A:
Signal-to-open, Fail-in-place

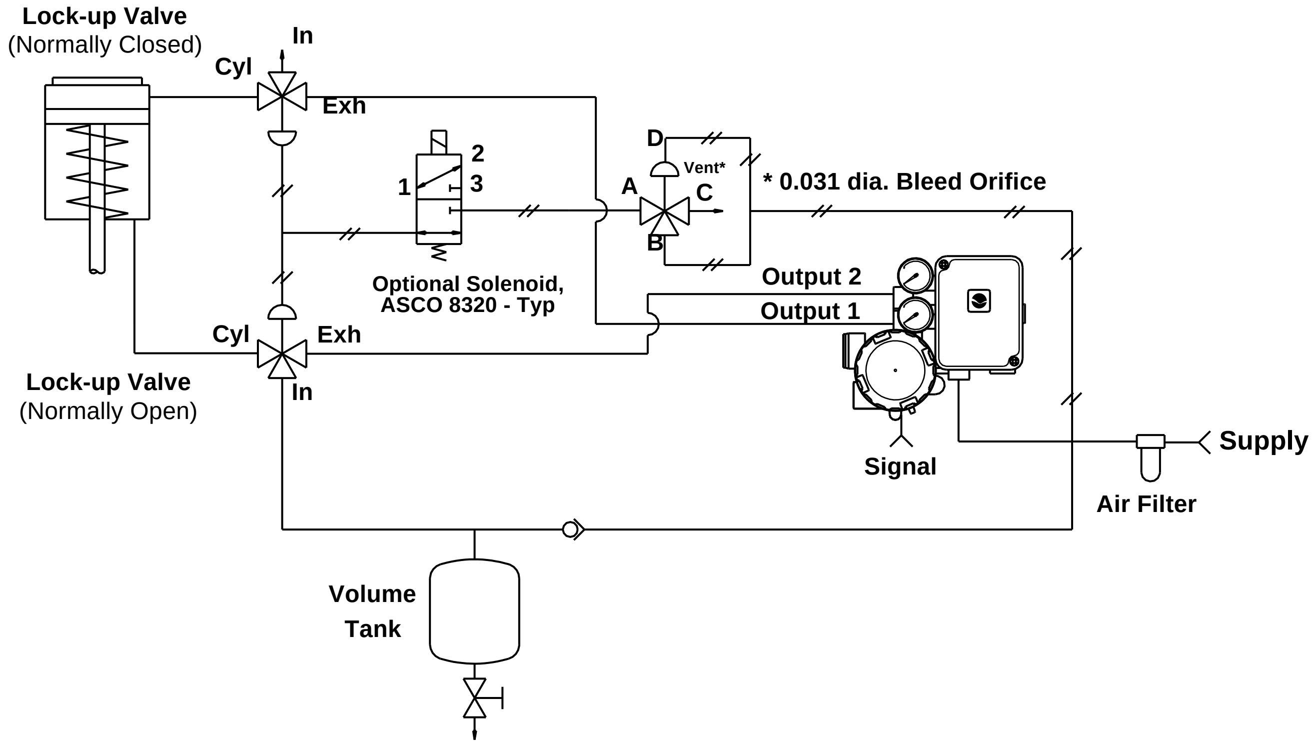


Schematic 19-9B:
Signal-to-close, Fail-in-place

Volume Tank Fail-Safe System

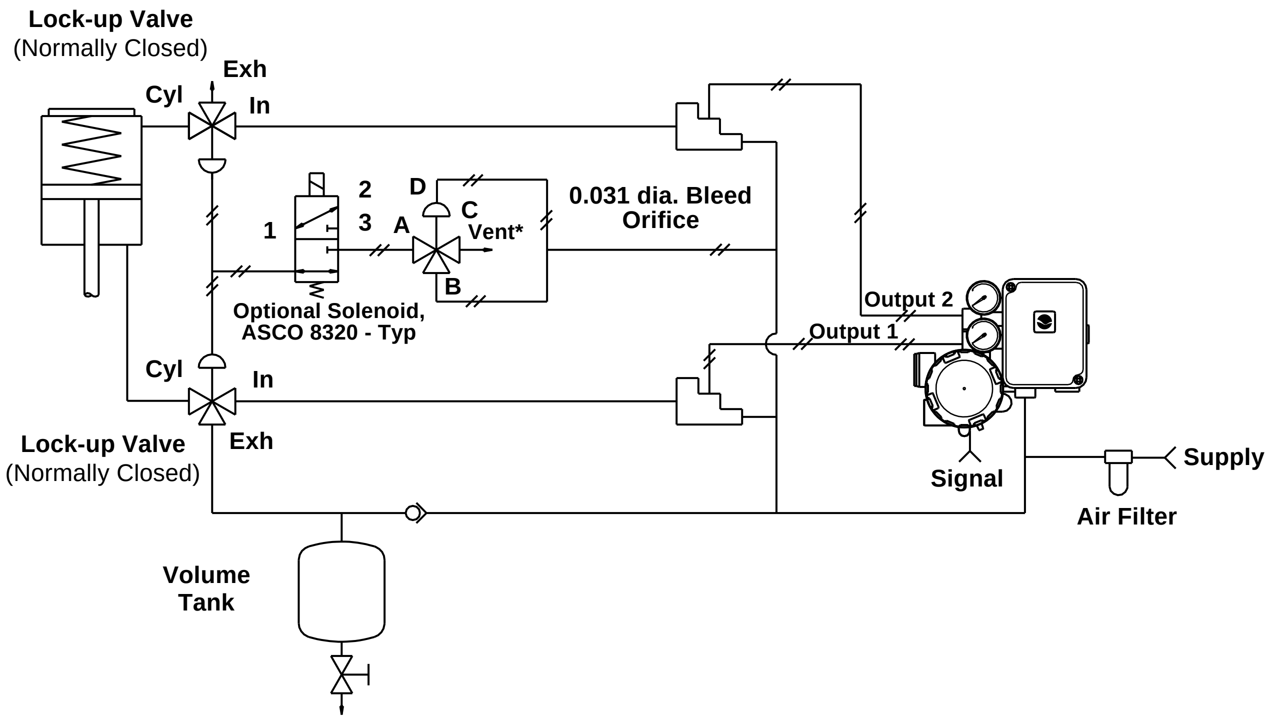


Schematic 19-10A:
Signal-to-open, Fail-closed, Volume Tank

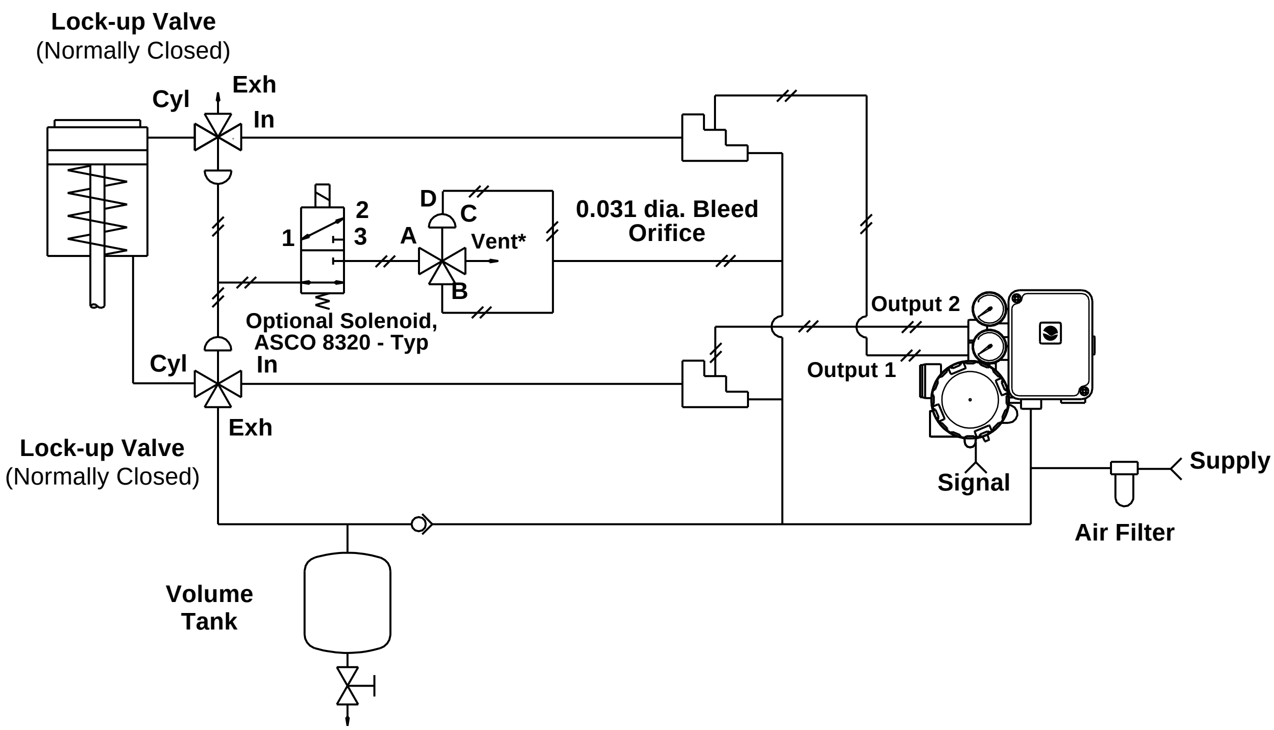


Schematic 19-10B:
Signal-to-close, Fail-open, Volume Tank

Volume Tank Fail-Safe System with Boosters

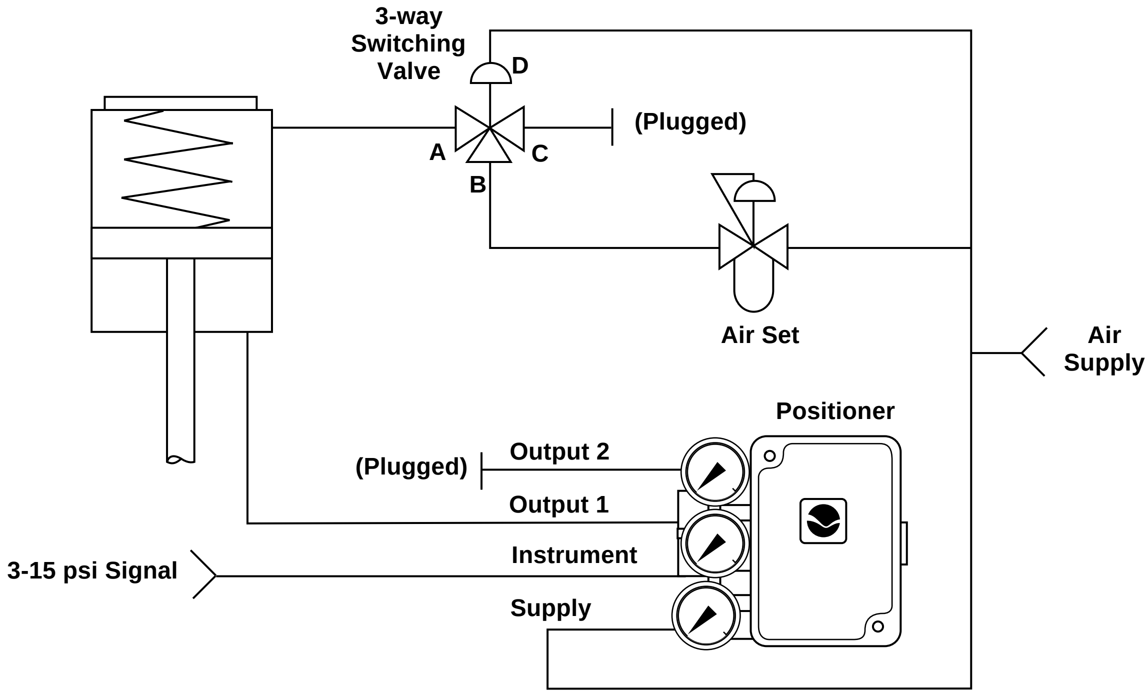


Schematic 19-11A:
Signal-to-open, Fail-closed, Volume Tank

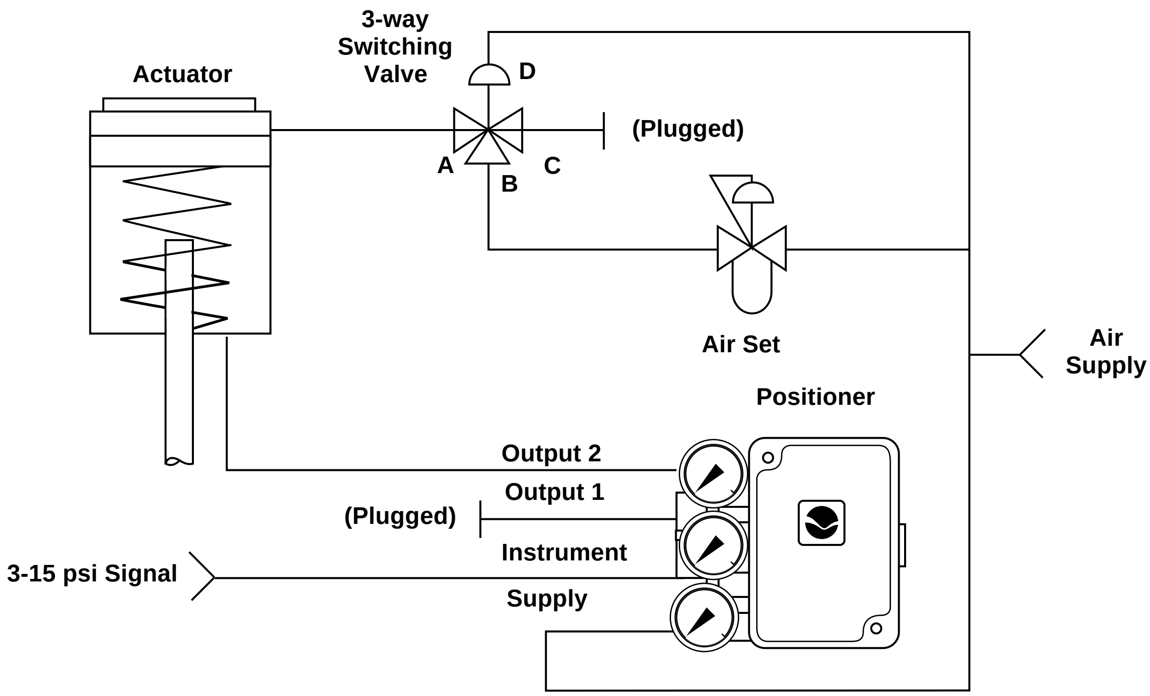


Schematic 19-11B:
Signal-to-close, Fail-open, Volume Tank

Air Spring System Using Cylinder Volume

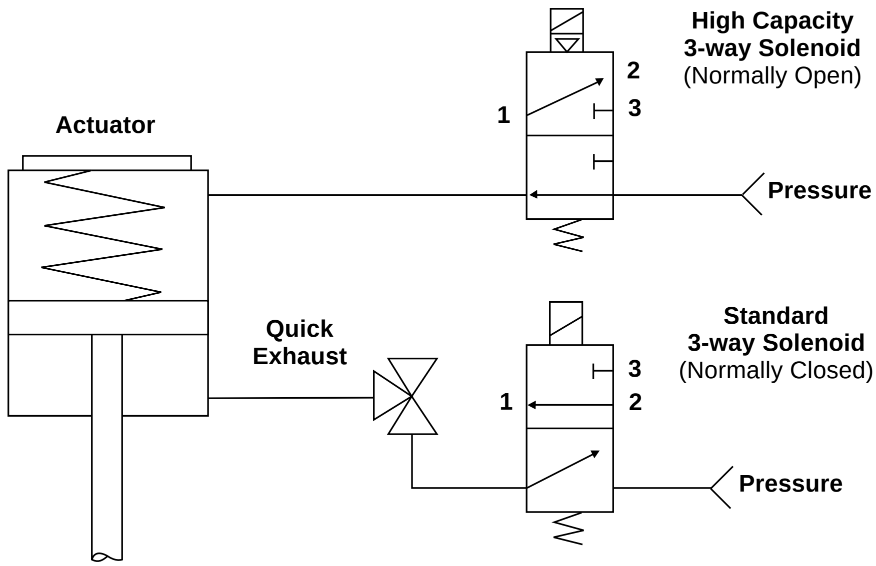


Schematic 19-12A:
Signal-to-open, Fail-closed

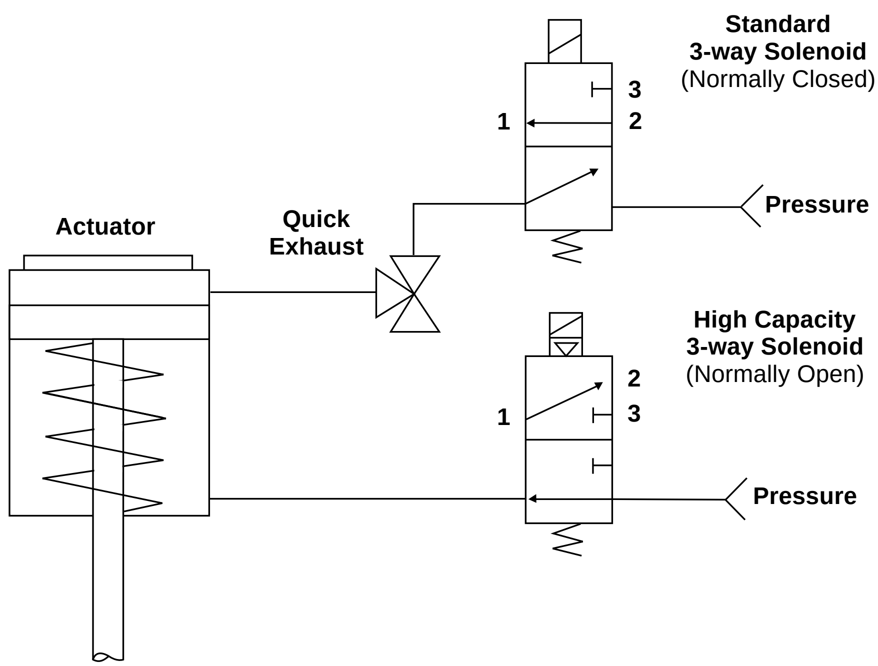


Schematic 19-12B:
Signal-to-close, Fail-open

On-Off System with Quick Exhaust



Schematic 19-13A:
Fast-closing, Fail-closed



Schematic 19-13B:
Fast-opening, Fail-open