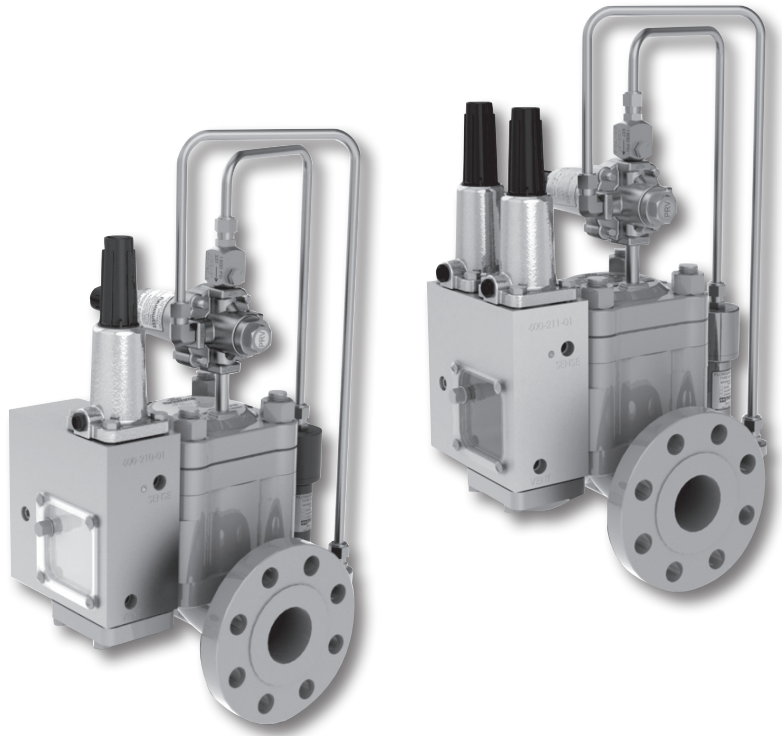


Flowgrid™ Slam Shut 2"/3"/4"/6" Valves

Instruction Manual (Rev.D)



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Scope

This manual provides the installation, operation, and maintenance for the Mooney, a stand alone valve and the Flowgrid Regulator with integral Slam Shut Valve.

Instructions for the Flowgrid regulator and Pilot are found in separate manuals.

The Flowgrid/Mooney Series 50/51 Slam Shut valves with the EN 14382 nameplate on them are considered as standard pressure equipment in accordance with 2014-68 EU Pressure Equipment Directive (PED), when used in pressure regulating stations complying with EN 12186 and EN 12279. These valves meet all the European Union Free Trade Association requirements.

The Flowgrid/Mooney Standard Production Series 50/51 Slam Shut valves do not have all the production testing and meet all the certification requirements of the EN 14382 certified valves and are not saleable into European Union Countries.

Product Description

The Slam Shut valve is an easy to maintain automatic shutoff device. The device is designed to shutoff the flow of gas when the sensed pressure in the system either exceeds or drops below the set point. It can be used as a stand alone device or integrated into the 2” through 6” Flowgrid regulators.

The **Mooney™** Slam Shut consists of a Flowgrid body, a shutoff valve assembly with a cover and a Slam Shut device and a controller.

The Series 50/51 and 50D/51D controller mounts on the side of the 2” through 6” shutoff valves.

The Flowgrid Regulator and shutoff valve consists of a Flowgrid regulator with a shutoff valve inserted between the Flowgrid body and the regulator with a side mounted Series 50/51 or 50D/51D Controller.

The controller can be supplied in three different configurations.

- 1) The single function controller (Figure 1) provides over or under pressure protection.
- 2) The Series 50D/51D dual function controller (Figure 2) provides over and under pressure protection with both functions connection to a common sense port.
- 3) The Series 50DS/51DS controller with dual sense ports provides over or under pressure protection at two different locations. Each function is connected to its own sense port. This allows the monitoring of two independent locations for over pressure or under pressure conditions, each with its own set point.

The following add on kits are available:

Functional Class A: A kit is available to convert a Series 50/51 Slam Shut from functional Class B to functional Class A.

If the diaphragm ruptures in a Functional Class B Slam Shut, the Slam Shut may fail to close when the set point is exceeded. On functional class A Slam Shuts if the diaphragm ruptures the Slam Shut will close.

Tamper Evident: The tamper evident kit provides a means of lock wiring the cover over the setpoint screw and the installation of a cover over the front and rear reset nuts.

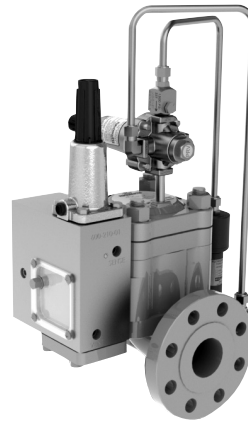


Figure 1 – 2” Flowgrid regulator with an integrated Shutoff Valve and a Series 50/51 single function controller providing under or over pressure protection.

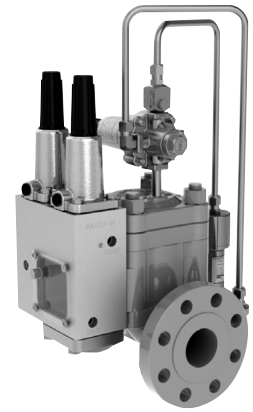


Figure 2 – 2” Flowgrid regulator with an integrated Shutoff Valve and a Series 50D/51D dual function controller providing under and over pressure protection.

Materials of Construction

Materials of Construction	
Housing Module	Carbon Steel
Flapper Valve	SST
Controller	Aluminum
Springs	SST
Diaphragms	Standard: Nitrile
O-Ring & Seals	Standard: Nitrile

Spring Range and Accuracy			
Spring Color	Outlet Pressure Range		Accuracy (% of Set Point)
	psig	Bar	
Plated	10-40	0.7 - 3	5
Blue	40-90	3 - 6	2.5
Purple	90-175	6 - 12	2.5
Black	175-250	12 - 17	2.5
White/Green	250-900 ¹	17 - 62 ¹	2.5

¹Class 300 Units limited to 450 psig (31 Bar)

Specifications

Specifications	
Sizes	2, 3, 4, 6 inch sizes
Types	Stand Alone or Integrated into Flowgrid Regulator
Pressure Protection	Standard: Over or Under (50/51) Optional: Over and/or Under (51D/51DS)
Temperature	-4°F to 150°F (-20°C to 65°C)
Maximum Operating Inlet Pressure	740 psig (50 Bar) 1480 psig (102 Bar) Class 600 Units
Operating Sense Pressure	10 to 450 psig (0.7 Bar to 62 Bar)
Response time	< .25 second

Valve Markings

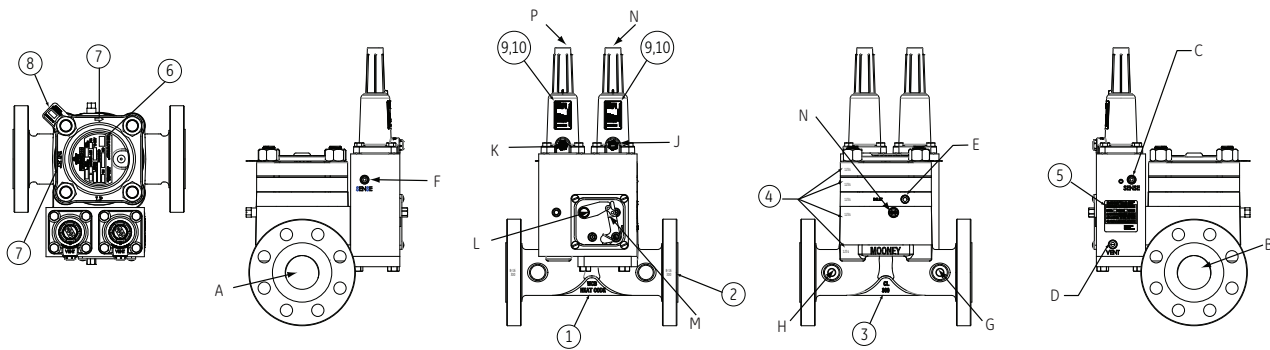


Figure 3 – Valve Markings

Valve Markings, Connections, Controls and Indicators

1. American National Standards Institute (ANSI) pressure class rating of the valve.
2. ANSI pressure class rating of the flange.
3. Indication that the valve has been hydrostatically tested according to code requirements.
4. The serial number for the Flowgrid Regulator and shutoff valve is stamped on the spring case, spacer, seal retainer, Slam Shut body, and body on Flowgrid regulators with integral Slam Shuts. On Mooney Slam Shut Valves (stand alone) the serial number is stamped on the cover, seal retainer, Slam Shut body, and body.
5. The Slam Shut Nameplate location.
6. The Flowgrid Nameplate location.
7. The flow direction is marked on the spring case or cover (“INLET” and/or a flow arrow). Proper alignment assures that the diaphragm guide on the Spring Case is aligned toward outlet side of the regulator.
8. The % Capacity tag indicates the capacity of the throttle plate (100%, 75%, 50%, & 35%) in the valve.

Note: On all 2” standard port valves the throttle plate itself is stamped. This tag is not installed on stand alone Slam Shuts.

9. Over pressure spring range nameplate. The factory marks the nameplate to indicate which spring is installed during manufacture. If the spring is changed make sure to note it on the nameplate.
10. Under pressure spring range nameplate. The factory marks the nameplate to indicate which spring is installed during manufacture. If the spring is changed make sure to note it on the nameplate.

Valve Connections, Controls and Indicators

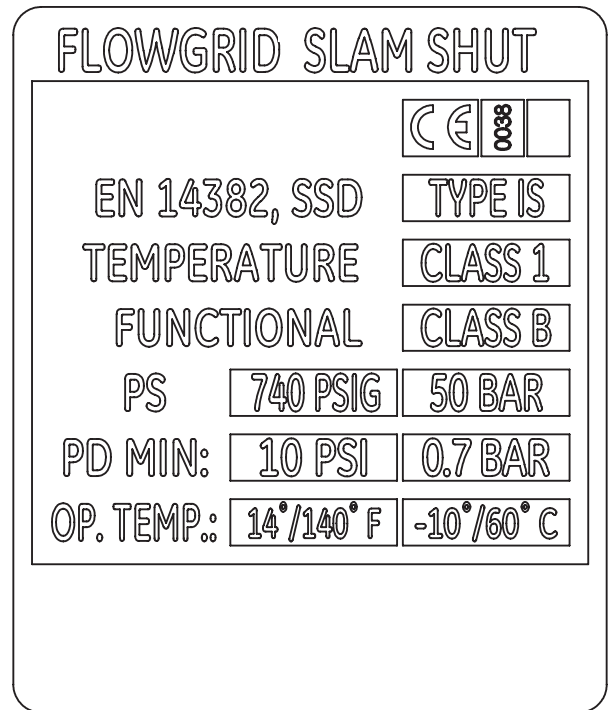
- A. Inlet Line Connection, size and type specified in order
- B. Outlet Line Connection, size and type specified in order.
- C. Slam Shut Sense Port, 1/4 inch NPT.
- D. Breather/Exhaust Port, 1/4 inch NPT.
- E. Center Port, 1/4 inch NPT. Connection for pilot supply on orders with integral regulator.
- F. Optional Second Slam Shut Sense Port, 1/4 inch NPT.
- G. Inlet Pressure Port, 1/4 inch NPT (plugged).
- H. Outlet Pressure Port, 1/4 inch NPT.
- J. Breather Port, 1/4 inch NPT.
- K. Breather Port (optional), 1/4 inch NPT.
- L. Relatching Device, 1/2” SAE or 13 mm. Rotate counter clock wise to open the Slam Shut.
- M. Slam Shut Open or Closed Indicator.
- N. Trip Set Point Adjusting Screw with dust cover, adjusting screw 9/16 SAE or 15 mm and locknut 3/4” SAE or 19 mm.
- P. Optional Second Trip Set Point Adjusting Screw with dust cover, adjusting screw 9/16 SAE or 15 mm and locknut 3/4” SAE or 19 mm.

Nameplate Information

Nameplate Information for PED Production

Mooney Flowgrid Slam Shut Nameplate

Item	Definition
EN 14382, SSD : TYPE IS	All pressure containing parts are designed to withstand the maximum allowable pressure (PS).
TEMPERATURE	Class 1 operating range
FUNCTIONAL	Class B Slam Shut valves do not close when the pressure sensing diaphragms develop a substantial leak and may not close when the set pressure is exceeded.
PS	Maximum inlet pressure psig/bar
PD MIN	Minimum difference in outlet and downstream pressure required for the Slam Shut to operate.
OP. TEMP.	Operation Temperature range



Principle of Operation

During normal operation, the latch mechanism holds the closure element (flapper) open as shown in Figure 5. The sense or downstream pressure is monitored by the high and/or low trip controller diaphragms. The controller diaphragms convert the sense pressure into a force proportional to the pressure. The

force produced by the controller diaphragm is counter balanced by the set point adjustment spring located in the spring case. The adjusting screw is used to vary the spring force and control the over pressure set point, or the under pressure set point.

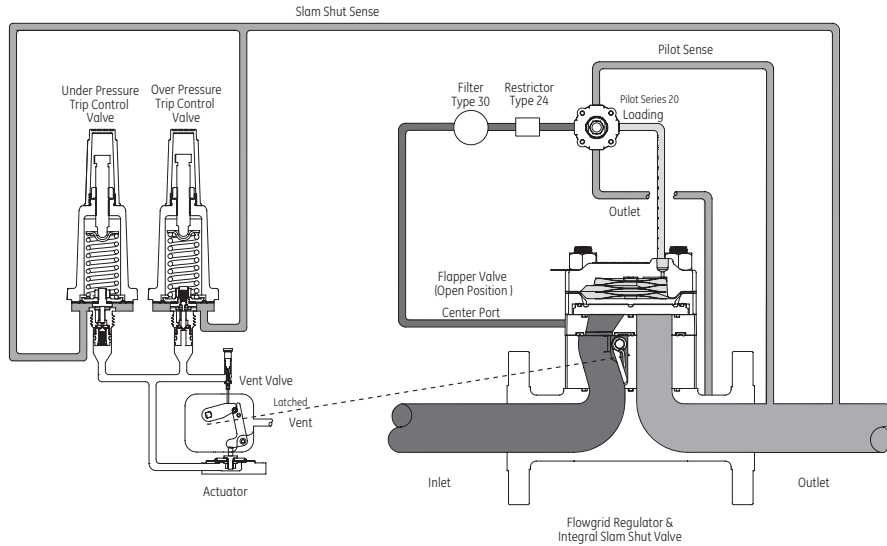


Figure 5 – Actuator & Latch Mechanism Open

When the downstream pressure exceeds the over pressure set point, or is less than the optional under pressure set point, the controller diaphragm and spring move, opening a valve. The open valve allows the sense pressure to flow under the latch diaphragm, see Figure 6. The pressure acts on the diaphragm

which pushes on the pin. The pin moves the “L” shaped pawl lever and releasing the flapper lever. When the flapper lever is released, a set of springs pushes the flapper valve closed and provides the initial force to seal the valve.

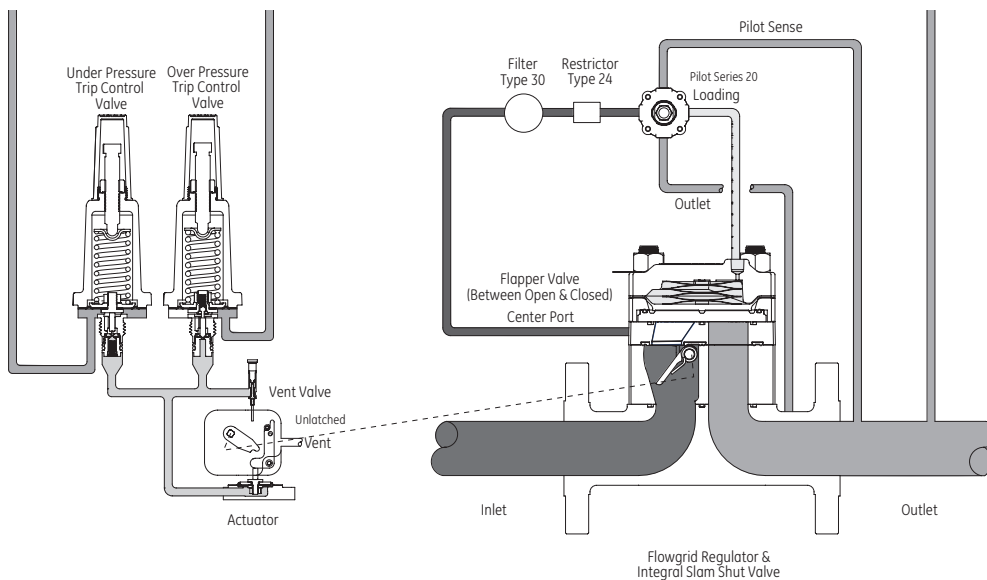


Figure 6 – Actuator & Latch Mechanism Midway

Principle of Operation (contd.)

Once the flapper valve closes, the inlet pressure is cut off as shown in Figure 7. To return the system to operation, the technician closes the upstream and downstream block valves to isolate the system. Then repairs are made as required to correct the cause of the over or under pressure condition. Resetting the Slam Shut requires equalizing the pressure up and downstream of the flapper valve. The flapper valve can then be rotated open and re-latched.

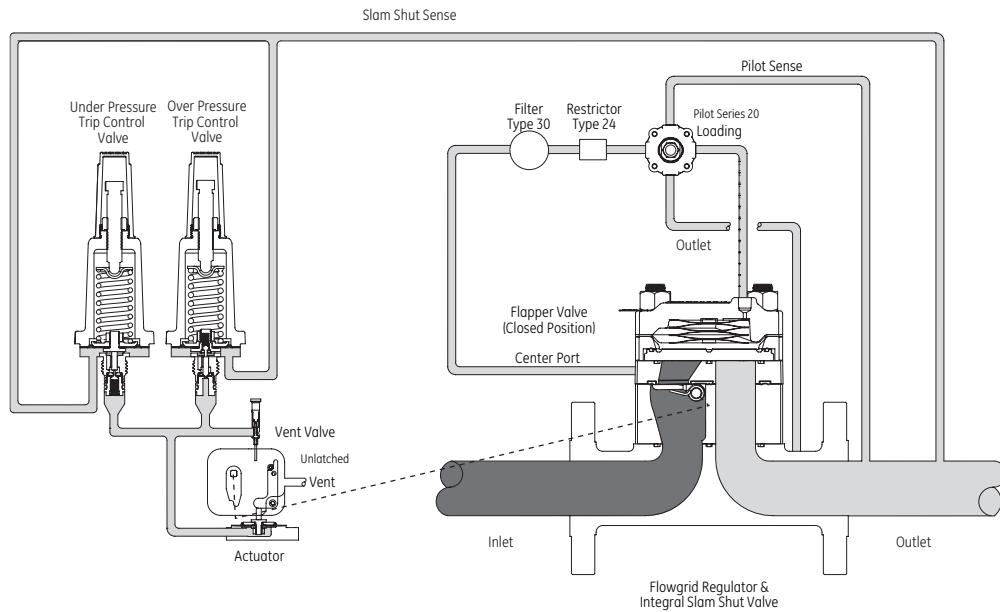


Figure 7 - Actuator & Latch Mechanism Closed

Hydrostatic Testing

All Slam Shut valves and Slam Shut valves integrated into Flowgrid valves are hydrostatically tested at the factory prior to shipment according to EN 334, EN 14382, SA-S75.19-1989 and MSS-SP-61 standards.

WARNING

Installation

Personal injury, equipment damage, or leakage due to explosion of accumulated gas or bursting of pressure containing parts may result if this Slam Shut is over pressured, or is installed where service conditions could exceed the limits given in the specification of this manual or on the nameplate, or where conditions exceed any ratings of the adjacent piping or piping connections. Verify the limitations of the Flowgrid regulator, Slam Shut valve and pilot to ensure none of the devices are over pressured. To avoid such injury or damage, provide pressure relieving or pressure limiting devices, as required by applicable codes to prevent service conditions from exceeding those limits. Additionally, physical damage to the regulator could result in damage such as breaking the pilot (if supplied) off the main valve, causing personal injury and/or property damage, due to explosion of accumulated gas.

To avoid such injury and damage, install the Slam Shut and regulator in a safe location.

NOTE: The Slam Shut may be supplied as a stand alone unit or integrated into a Flowgrid regulator with filters, restrictors and pilots. This procedure covers the installation of the Slam Shut and may refer to components not ordered with the Slam Shut. Consult the proper IOM for the installation of Flowgrid regulator, filters, restrictors and pilots.

- PERSONNEL:** Installation of the Slam Shut valve and/or Flowgrid regulator should be made by qualified personnel, familiar with high pressure piping and pilot operated regulators.
- PRIOR INSPECTION:** Inspect the Slam Shut valve, regulator, pilot, and tubing for any damage that might have occurred in shipping. Make sure the body, pilot lines, and inlet piping are clear and free from foreign material.
- ORIENTATION:** Stand alone Slam Shuts must be installed up stream of the pressure regulator to provide secondary protection. The Slam Shut valve or Slam Shut integrated into a Flowgrid regulator may be installed in any position, the best position being one that provides easiest access for the Slam Shut, pilot adjustment and maintenance.

- SCREWED END VALVES:** Apply pipe compound to the male threads starting one or two threads back from the end prior to assembling the joint.
- FLANGED END VALVES:** Use suitable line gaskets and good bolting practices with flanged bodies. A crisscross pattern of incrementally tightening the line bolts is recommended.
- WELD END BODIES:** Before welding a butt weld and/or a socket weld valve body, disassemble the valve. On stand alone Slam Shuts, remove the bonnet, Slam Shut body assembly and all O-rings. On Slam Shuts integrated into Flowgrid valves, remove the Slam Shut body assembly, Spring Case, and all trim parts including diaphragm and O-rings. Reassemble the valve (refer to the MAINTENANCE section of this manual for Disassembly and Assembly procedures) and pressurize to check for leaks prior to putting the valve in service.
- SLAM SHUT SENSE LINE:** Install a 3/8 inch OD tube from the sense port to a port on the pipe line located 8 to 10 pipe diameters minimum of straight pipe downstream of the final regulator in the run. The sense port is located on the downstream side of the controller and latch module, just above the Slam Shut label, see Figure 8.
Note: The sense line connection should be away from areas of turbulence (such as valves, reducers, and elbows) and should have a full opening into the pipe free from burrs, drill peels, and weld slag. Shutoff valves should be of the full opening type.
- INLET PRESSURE LINES:** All pilots or other devices requiring a supply of inlet pressure that can result in a flow of gas downstream of the Slam Shut must be connected to the center port (port inlet) on the Slam Shut body assembly shown in Figure 8. A shutoff valve may be installed in the vent line to prevent the SSV from closing during setup of regulators and other equipment, and to aid in setting up the Slam Shut valve.

WARNING

Connection of any device, such as a pilot to the inlet port on the valve body, can result in the flow of gas downstream of the Slam Shut, canceling the secondary downstream pressure protection of the Slam Shut. This may result in personal injury, death, equipment damage, and/or bursting of pressure containing parts and/or leakage of gas resulting in explosion of accumulated gas.

Installation (contd.)

⚠ WARNING

This equipment is designed for use in a Group II explosive atmosphere caused by mixtures of air and gases, vapors or mists as defined in EN ISO 80079-36 Section 4. Effective ignition sources have been met for Equipment Protection Level Gb. To comply with EN ISO 80079-36, the user has the responsibility to:

- Ensure the inlet fluid temperature and the ambient temperature are maintained within the ranges specified on the equipment nameplate.
- Adequately ground the equipment to prevent stray electrical currents, cathodic protection and static electrical charges from being generated.
- Ensure coating and paint thickness is maintained at less than 2 mm (0.078 inches). Gas Regulators installed in confined or enclosed spaces should be provided with adequate ventilation to prevent the possibility of gas buildup or accumulation from leaks and venting. Leaks or vented gas may accumulate causing personal injury, death, or property damage. Pilot spring cases and the regulator enclosure should be vented to a safe area away from air intakes, or any hazardous location. The vent lines and stacks must be protected against condensation and clogging.

9. **PILOT SUPPLY LINES:** Run a 3/8 inch or 1/2 inch pilot supply line from the valve body connection on the inlet side of the shutoff valve center port to the pilot supply Filter or directly to the pilot Restrictor.

Note: A shutoff valve is not required in the supply to the pilot, but if one is installed, it should be a full opening ball valve type.

10. **A TYPE 30 FILTER** in the pilot supply line is recommended to clean dirt and other particulates that could affect the restrictor or variable orifice in the pilot. Use a 1/4" nipple to mount the filter to the shutoff valve to the center port.

11. **FILTER OUTLET:** Run 3/8 inch tubing or 1/4 inch pipe from the filter OUTLET port to the INLET side of the restrictor in the pilot system of the regulator. The TYPE 30/30A/30S FILTER has two OUTLET ports for ease of tubing. Block the other port with the plug provided or mount a gauge to monitor inlet pressure if desired.

Note: To avoid galling when stainless steel to stainless steel connections are made, use a lubricant (such as NEVER SEEZ by Bostik¹). For best results, lightly lubricate the female threads. Mixing the lubricant with pipe dope is also acceptable. Do not exceed more than 1/4 turn past the point the threads start to bind.

12. **PILOT GAS HEATERS (OPTIONAL):** Pilot supply gas can be heated to prevent the formation of ice or hydrates in the pilot system. Pilot supply gas heaters should be connected after the pilot filter (if one is used). Do not directly heat the entire Flowgrid valve to prevent freezing; internal rubber components can be heated beyond their max temperature rating, causing potential damage.

13. **CONTROL LINES:** Control lines should be run from the pilot mounted on the Flowgrid valve to a point 8 to 10 pipe diameters minimum of straight pipe downstream from the valve (Refer to Piping Schematics). Use Table 1 as a guide for the ideal tubing to use. Reduce as necessary to connect to the pilot.

Table 1

	Outlet Pressure		
Pilot Regulator with:	Inches W.C. to 2 psi	2 psi to 5 psi	5 psi & Above
Static Sense Line (No Flow)	1/2" Pipe Minimum	1/2" Tubing	3/8" Tubing
Sense Line with Flow ⁽¹⁾	3/4" to 1" Pipe	1/2" Pipe	1/2" Tubing

(1) The Flowgrid Series 20 Pilot has a static sense line.

Note: The control line connection should be away from areas of turbulence (such as valves, reducers, and elbows), and should have a full opening into the pipe free from burrs, drill peels, and weld slag. Shutoff valves are not required in the control line(s), but if installed, they should be of the full opening type.

14. **PILOT discharge:** Run 3/8 inch tubing from the pilot OUTLET port to the downstream piping, or to the connection provided on the outlet of the Flowgrid valve, as shown in the piping schematics.

STANDBY MONITOR-NOTE: To ensure full capacity of a Standby Monitor regulator station, it is important that the pilot discharge of the upstream regulator be connected downstream of the station, if the minimum pressure drop (across the entire station) is below 60 psig.

15. **VENT VALVES AND GAUGE CONNECTIONS:** Vent valves and gauge connections are recommended in the inlet and outlet piping to the Flowgrid valve. A gauge connection may be installed on the loading pressure connection to the spring case of the Flowgrid valve. These would be a great convenience during start up, maintenance, and operation.

16. **INTERSTAGE PIPING (WORKING MONITOR):** On working monitor regulator stations, the recommended length of the interstage piping is 6 pipe diameters or 36-inches, whichever is greater. It is also recommended that the interstage piping be swaged up 1 pipe diameter over the nominal port size of the valve.

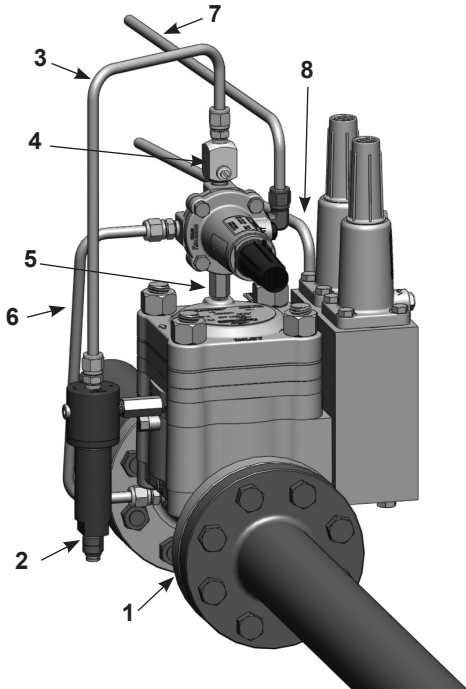
FOR EXAMPLE:

If a station has two 3" Single Port Flowgrid valves, the interstage piping should be at least 36-inches in length and swaging up to a 4 inch pipe.

Piping Schematics

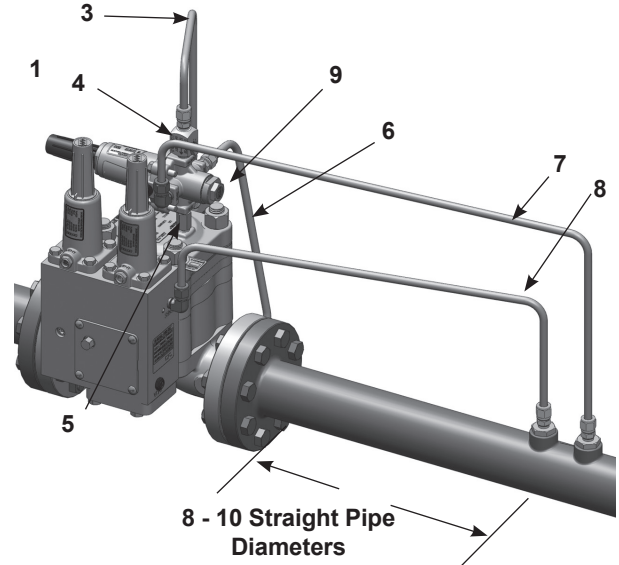
1. Regulators with Integrated Slam Shuts
2. Regulators with Slam Shut (pressure reducing)
3. Regulators with Slam Shut (back pressure control)
4. Standby Monitor with Slam Shut (differential pressure greater than 60 psig)
5. Standby Monitor with Slam Shut (differential pressure less than 60 psig)
6. Working Monitor with Slam Shut
7. Mooney Slam Shut (stand alone)
8. Mooney Slam Shut (stand alone) with Downstream Regulator

1. Regulators with Integrated Slam Shuts (piping detail applies to schematics 2 - 3)

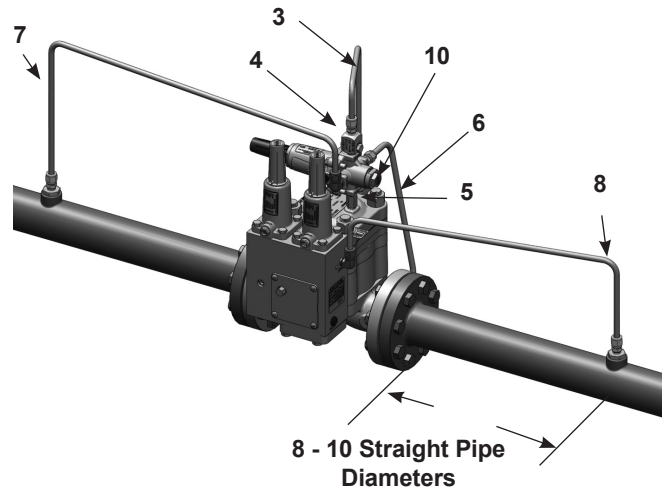


1. Flowgrid inlet port tap on valve body plugged (hidden).
2. Type 30 Filter inlet connected to the center port on the shutoff valve.
3. Type 30 Filter outlet connected to the inlet of the Type 24 Restrictor.
4. Type 24 Restrictor mounted to the inlet port of the Series 20 Pilot.
5. Series 20 Pilot loading port connected to the Flowgrid regulator inlet port.

2. Regulators with Slam Shut (pressure reducing)



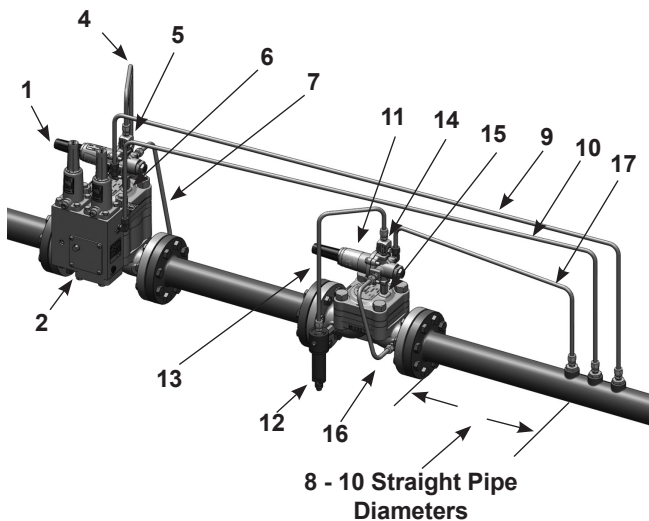
3. Regulators with Slam Shut (back pressure control)



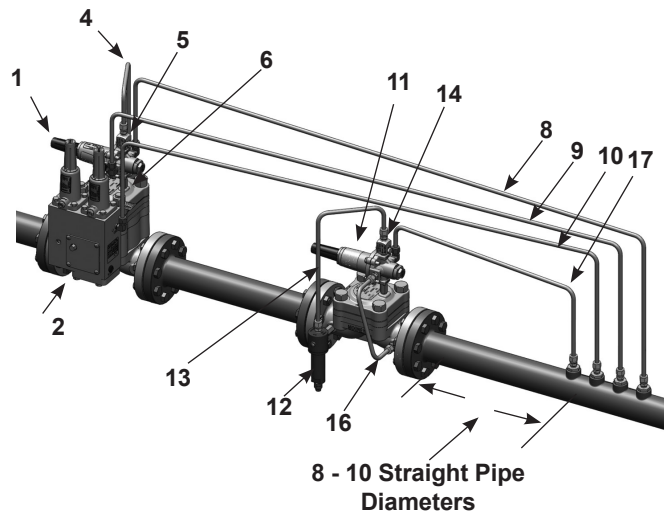
6. Series 20 Pilot outlet port connected to the outlet port tap on the Flowgrid regulator.
7. Series 20 Pilot sense port connected to the piping the regulator is controlling the pressure.
8. Series 50/51 Controller sense port connected to the piping the Slam Shut is protecting.
9. Pilot Cartridge assembled in PRV mode (pressure reducing).
10. Pilot Cartridge assembled in BPV mode (back pressure relieving).

Piping Schematics (contd.)

4. Standby Monitor with Slam Shut differential pressure greater than 60 psig)



5. Standby Monitor with Slam Shut (differential pressure lesser than 60 psig)



Monitor Regulator and Slam Shut

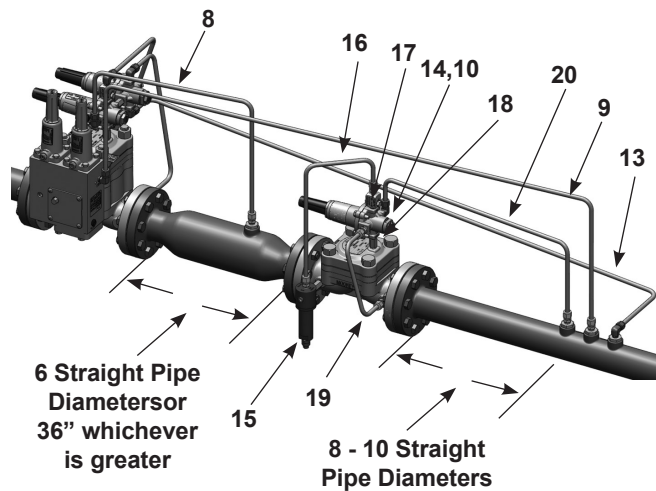
1. Pilot, controls the down stream pressure if the operating regulator fails.
2. Slam Shut inlet port tap on the valve body plugged (hidden).
3. Type 30 Filter inlet connected to the center port on the shutoff valve. (Not shown)
4. Type 30 Filter outlet connected to the inlet of the Type 24 Restrictor.
5. Type 24 Restrictor mounted to the inlet port of the Series 20 Pilot.
6. Series 20 Pilot loading port connected to the Flowgrid regulator loading port.
7. Series 20 Pilot outlet port connected to the outlet port tap on the Flowgrid regulator.
8. Series 20 Pilot outlet port connected to the outlet line port tap.
9. Series 20 Pilot sense port connected to the piping downstream of the operating regulator.
10. Series 50/51 Controller sense port connected to the piping the Slam Shut is protecting.

Operating Regulator

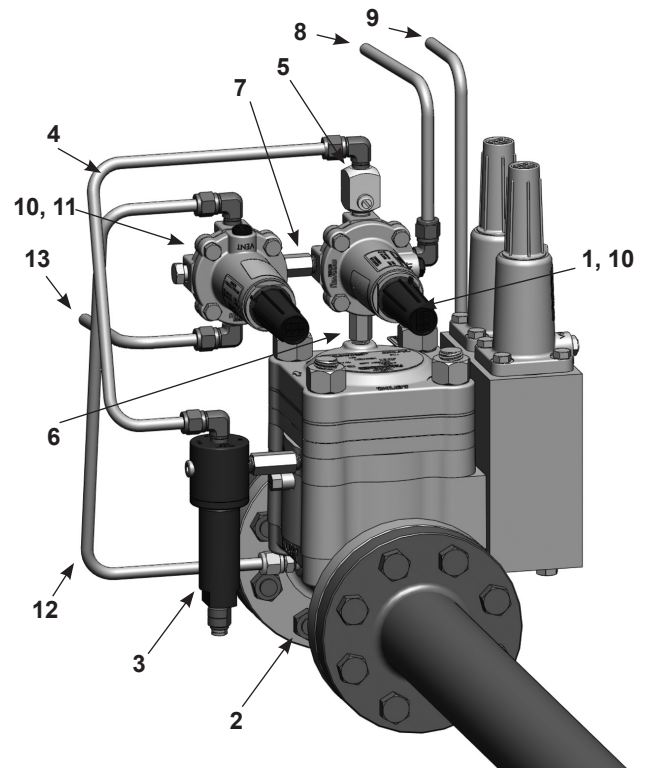
11. Series 20 Pilot Cartridge controls the downstream pressure.
12. Type 30 Filter inlet connected to the inlet port tap on the Flowgrid regulator.
13. Type 30 Filter outlet connected to the inlet of the Type 24 Restrictor.
14. Type 24 Restrictor mounted to the inlet port of the Series 20 Pilot.
15. Series 20 Pilot loading port connected to the Flowgrid regulator loading port.
16. Series 20 Pilot outlet port connected to the outlet port tap on the Flowgrid regulator.
17. Series 20 Pilot sense port connected to the downstream piping.

Piping Schematics (contd.)

6. Working Monitor with Slam Shut



1st Stage Regulator and Slam Shut Details



1st Stage Regulator and Slam Shut

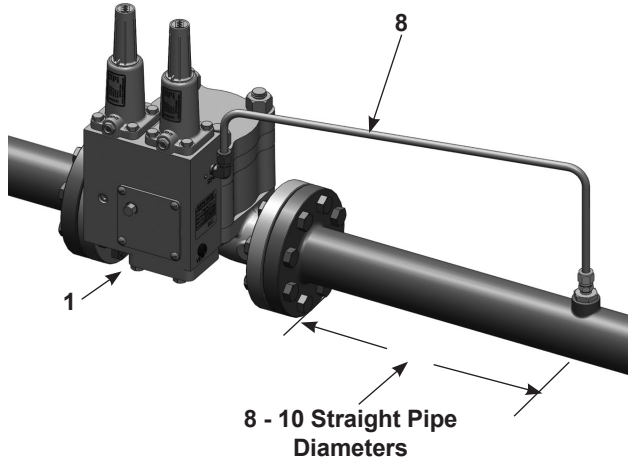
1. Pilot #1, controls the Interstage pressure
2. Inlet port tap on the valve body plugged (hidden).
3. Type 30 Filter inlet connected to the inlet port on the Flowgrid regulator.
4. Type 30 Filter outlet connected to the inlet of the Type 24 Restrictor.
5. Type 24 Restrictor mounted to the inlet port of the Series 20 Pilot #1.
6. Series 20 Pilot #1 loading port connected to the Flowgrid regulator loading port.
7. Series 20 Pilot #1 outlet port connected to the inlet port on Series 20 Pilot #2.
8. Series 20 Pilot sense port connected to the Interstage.
9. Series 50/51 Controller sense port connected to the piping the Slam Shut is protecting.
10. Pilot Cartridge assembled in PRV mode (pressure reducing).
11. Series 20 Pilot #2, controls the downstream pressure if the 2nd stage regulator fails.
12. Series 20 Pilot #2 outlet port connected to the Flowgrid regulator outlet port tap.
13. Series 20 Pilot #2 sense port connected to the piping downstream of the 2nd regulator.

2nd Stage Regulator

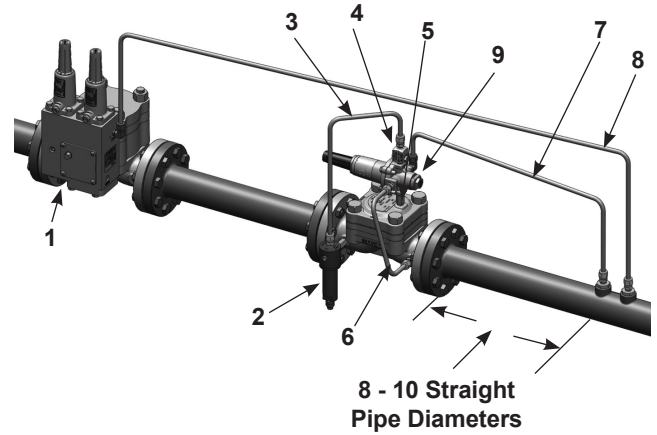
14. Series 20 Pilot #3, controls the downstream pressure.
15. Type 30 Filter inlet connected to the inlet port tap on the Flowgrid regulator.
16. Type 30 Filter outlet connected to the inlet of the Type 24 Restrictor.
17. Type 24 Restrictor mounted to the inlet port of the Series 20 Pilot #3.
18. Series 20 Pilot #3 loading port connected to the Flowgrid regulator loading port.
19. Series 20 Pilot #3 outlet port connected to the outlet port tap on the Flowgrid regulator.
20. Series 20 Pilot #3 sense port connected to the downstream piping.

Piping Schematics (contd.)

7. Mooney Slam Shut (stand alone)



8. Mooney Slam Shut (stand alone) with Downstream Regulator



1. Slam Shut inlet port on the valve body plugged (hidden).
2. Type 30 Filter inlet connected to the inlet port on the Flowgrid regulator.
3. Type 30 Filter outlet connected to the inlet of the Type 24 Restrictor.
4. Type 24 Restrictor mounted to the inlet port of the Series 20 Pilot.
5. Series 20 Pilot loading port connected to the Flowgrid regulator loading port.

6. Series 20 Pilot outlet port connected to the outlet port tap on the Flowgrid regulator.
7. Series 20 Pilot sense port connected to the piping the regulator is controlling the pressure.
8. Series 50/51 Controller sense port connected to the piping the Slam Shut is protecting.
9. Pilot Cartridge assembled in PRV mode (pressure reducing).

17. **VENT VALVES AND GAUGE CONNECTIONS:** Vent valves and gauge connections are needed in the inlet and outlet piping to the Slam Shut and downstream regulator. The vent valves allow adjusting and equalization of the inlet and outlet pressure during start up, maintenance, and operation.
18. **TOKEN RELIEF VALVES:** Installation of a token relief valve in the line downstream of the Slam Shut is recommended. The relief valve should be set to open before the Slam Shut valve is set to close. Minor over pressure problems, such as gas thermal expansion or seat leakage due to dirt moving through the system will be handled by the relief valve, while maintaining a supply of gas to your customers. Major malfunctions of the regulator beyond the flow capacity of the token relief will activate the Slam Shut valve.
19. **EQUALIZATION VALVE:** A valve installed between inlet and the center port of the Slam Shut will simplify resetting the Slam Shut, if allowed by local regulations and codes. Equalization valves should close automatically or be manually held open.

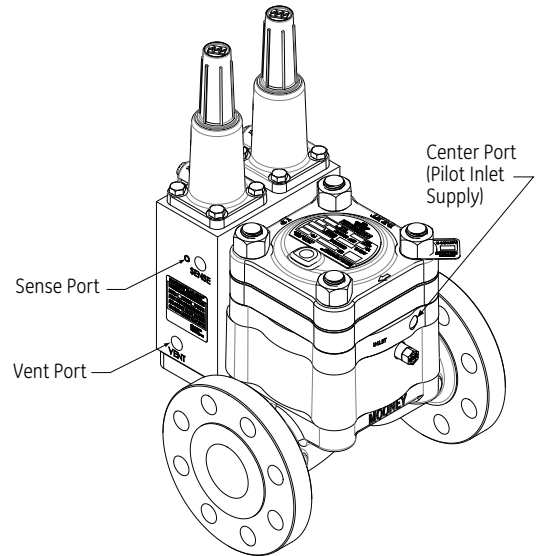


Figure 8 - Connections

Setup



When the flapper valve is in the open position, the flapper and the flapper lever can suddenly close. Hands and fingers caught in between the flapper and flapper seal, or in the way of the flapper lever when the valve closes may result in bruises, cuts and/or broken bones.

Regulator Setup:

The Slam Shut repeatedly closing during setup can be a nuisance. The Slam Shut can be held open by putting a 1/2 inch or 13 mm box end wrench on the reset nut, and propping the wrench handle on a 1/4 inch or 6 mm hex wrench installed in the controller mounting screw.

The Slam Shut sense line may be shutoff with a valve while the downstream regulators are setup and put into operation. Shutting off the Slam Shut sense line will prevent the Slam Shut from repeatedly closing during regulator setup. A three-way valve will allow the sense port to be loaded externally for calibration.

Note: If the sense port is loaded externally to calibrate the set point, the pressure source must provide a small flow of gas.



If the Slam Shut is installed with a shutoff valve or a 3 way valve in the sense line, failure to set the valve to the proper position will prevent the Slam Shut valve from closing when the set point is reached.

In addition to meeting the local codes and regulations, the overpressure set point of the Slam Shut shall be set above the peak operating pressure by an amount that is equal to or greater than the values listed in Table 2 below. Conversely, the under pressure setpoint of the Slam Shut shall be set below the minimum operating pressure by an amount that is equal to or greater than the values listed in Table 2 below.

Table 2

Spring Range psig (bar)	Minimum Delta P, psig (mbar)
10 - 40 (0.7 - 3)	4 (28)
40 - 90 (3 - 6)	5 (35)
90 - 175 (6 - 12)	9 (62)
175 - 250 (12 - 17)	13 (90)
250 - 450 (17 - 31)	13 (90)

1. Prior to starting check label located on the spring case for single function controllers, or labels on the spring cases for dual functions controllers, verify that the controller has the correct functions, over pressure and/or under pressure for the application. Also verify that the desired set points are, within the spring ranges, marked on the Over Pressure Spring Range and/or Under Pressure Spring Range labels. If the functions or spring ranges are incorrect, the label,

spring and/or valve may need to be changed out. See the maintenance section for instructions in making the changes.

2. On dual function controllers equipped with over pressure and under pressure protection, the over pressure set point should be made first with the under pressure protection screw completely backed out.

Setting the Over Pressure Set Point

1. Remove the cover on top of the over pressure spring case which can be identified by the gold Over Pressure Protection Spring Range label. Tighten the set point adjusting screw located on top of the spring case.
2. If the Slam Shut valve is closed, it will need to be opened. To open the valve, first reduce the inlet and outlet pressure to the normal operating pressure. The inlet pressure should be equal to or slightly lower than the outlet pressure. As an alternative, the inlet and outlet lines can be completely bled down. Then using a 1/2 inch SAE or 13 mm wrench, turn the front reset nut counter clock wise or the rear reset nut clock wise into the latched position.

Note: If the wrench does not easily turn the reset nut, reduce the upstream pressure. Hold the flapper lever in the latched position until the pawl lever latches the flapper lever.

3. Adjust the sense pressure to the required over pressure set point.

Note: If the Slam Shut valve closes at a lower pressure than the required over pressure set point, then the set point is too low. Increase the set point by tightening the adjusting screw on top of the spring case and then return to step 2.

4. Adjust the over pressure set point by loosening the adjusting screw until the Slam Shut closes. When the Slam Shut closes, the controller is set at the approximate set point.
5. Open the Slam Shut valve by first reduce the inlet and outlet pressure to the normal operating pressure. The inlet pressure should be equal to or slightly lower than the outlet pressure. As an alternative, the inlet and outlet lines can be completely bled down. Then using a 1/2 inch SAE or 13 mm wrench, turn the front reset nut counter clock wise or the rear reset nut clock wise into the latched position.

Note: If the wrench does not easily turn the reset nut, reduce the upstream pressure. Hold the flapper lever in the latched position until the pawl lever latches the flapper lever.

6. Increase the sense pressure until the Slam Shut valve closes, noting the pressure it closes at. Adjust the set point if required and tighten the jam nut.
7. Repeat steps 5 and 6 until the slam shut valve repeatedly closes at the required pressure. Install the cover over the adjusting screw.

Setting the Under Pressure Set Point

1. Remove the cover on top of the under pressure spring case which can be identified by the gold Under Pressure Protection Spring Range label. Loosen the set point adjusting screw located on top of the spring case.
2. If the Slam Shut valve is closed, it will need to be opened. To open the valve, first reduce the inlet and outlet pressure

to the normal operating pressure. The inlet pressure should be equal to or slightly lower than the outlet pressure. As an alternative, the inlet and outlet lines can be completely bled down. Then using a 1/2 inch SAE or 13 mm wrench, turn the front reset nut counter clock wise or the rear reset nut clock wise into the latched position.

Note: If the wrench does not easily turn the reset nut, reduce the upstream pressure. Hold the flapper lever in the latched position until the pawl lever latches the flapper lever.

3. Adjust the sense pressure to the required over pressure set point.
4. Adjust the under pressure set point by loosening the adjusting screw until the Slam Shut closes. When the Slam Shut closes, the controller is set at the approximate set point.
5. Open the Slam Shut valve by first reduce the inlet and outlet pressure to the normal operating pressure. The inlet pressure should be equal to or slightly lower than the outlet pressure. As an alternative, the inlet and outlet lines can be completely bled down. Then using a 1/2 inch SAE or 13 mm wrench, turn the front reset nut counter clock wise or the rear reset nut clock wise into the latched position.

Note: If the wrench does not easily turn the reset nut, reduce the upstream pressure. Hold the flapper lever in the latched position until the pawl lever latches the flapper lever.

6. Slowly decrease the sense pressure until the Slam Shut valve closes, noting the pressure it closes at. Adjust the set point if required and tighten the locknut.
7. Repeat steps 5 and 6 until the Slam Shut valve repeatedly closes at the required pressure. Install the cover over the adjusting screw.

Testing

1. Testing Regulator Lockup:

Once the Slam Shut valve and the regulator are set up, lockup can be tested on the regulator. The regulator should be tested for lockup according to the regulator's Installation, Operation and Maintenance Manual. The Slam Shut valve must be in the open position during the regulator lockup test.

2. External Leak Test:

Pressurize the inlet, downstream and sense line of the Slam Shut with the valve in the latched open position to the normal operating pressure. Apply a leak detection solution to the outside of the valve and controller assembly.

Requirements: The valve exterior shall be bubble tight for two minutes minimum.

3. Internal Leak Test:

Install a gauge downstream of the Slam Shut in the line to detect leakage as evidenced by the pressure increasing. Open the upstream block valve; close the downstream block valve. With the Slam Shut valve open, make sure gas is flowing downstream of the slam shut. If required, adjust the regulator so gas will flow through it. On the Flowgrid regulators, this can be accomplished by backing off the pilot set point adjusting screw. Remove the cover from the front of the controller. Close the Slam Shut by inserting a flat

bladed screw driver under the bottom of the pawl lever and lifting. The flapper valve should close. Bleed the pressure off downstream of the Slam Shut. Pressurize the Slam Shut inlet to 15 psig minimum or higher pressure as desired. Monitor the pressure gauge downstream of the Slam Shut for two minutes minimum.

Requirements: The pressure should remain at zero psig.

4. Controller Leak Test:

The Slam Shut should be in the open position. Pressurize the sense line to the Slam Shut to the normal operating pressure. Monitor the vent port on each the spring case, and the vent breather/exhaust port on the right side (also the left side on Series 50DS/51DS controllers) of the controller housing for leakage.

Requirements: The valve ports should be bubble tight for a period of two minutes minimum.

Startup and Operation

1. The Slam Shut valve will need to be open in order to do startup. Once the Slam Shut is open, follow the startup procedures in the pilot and regulator IOM.
2. For Slam Shuts equipped with only over pressure protection, the Slam Shut can be opened by first equalizing the pressure across the flapper valve and bleeding off the sense pressure. Then using a 1/2 inch SAE or 13 mm wrench, turn the flapper lever counter clockwise into the latched position. Hold the flapper lever in the latched position until the actuator pressure is bled off and the pawl lever latches the flapper lever.
3. If the Slam Shut is equipped with under pressure protection, the Slam Shut can be opened by first equalizing the pressure across the flapper valve and bleeding off the sense pressure. Then using a 1/2 inch SAE or 13 mm wrench, turn the flapper lever counter clockwise into the latched position. Hold the flapper lever in the latched position and increase the sense pressure over the under pressure set point. When the pressure is high enough, the top of the pawl lever will rotate to the left and latch the flapper lever.

Maintenance

The maintenance requirements of a system and individual components are dependent on a number of factors. Consideration should be given to the risks and costs of a failure of the system and its components, the service conditions the product is subjected to, and the applicable codes, standards, and government regulations. In addition, a system with very clean dry gas and minimal duty may require minimal service while another system with high contamination levels may require the replacement of all seals and diaphragms multiple times a year. EN 12279 recommends "A structured decision-making process shall be used to identify the optimum maintenance requirements.

WARNING

The Slam Shut and associated components should be subjected to regular maintenance and inspection to insure: 1) sufficient reliability for the purpose intended; 2) are in sound mechanical condition with no leaks; 3) is set at the correct pressure, is correctly installed and protected against dirt, liquids, freezing and other effects that may impair its function.

WARNING

Before disassembly, make sure the Slam Shut and optional integrated regulator have been isolated by closing upstream and downstream block valves. Safely release the pressure in the lines. Failure to complete these steps may result in personal injury and property damage.

Refer to the parts list for the appropriate part names, number and rebuild kits required to disassemble and reassemble the regulators, shutoff valves and controllers. The exploded diagrams should also be used as a reference to these instructions.

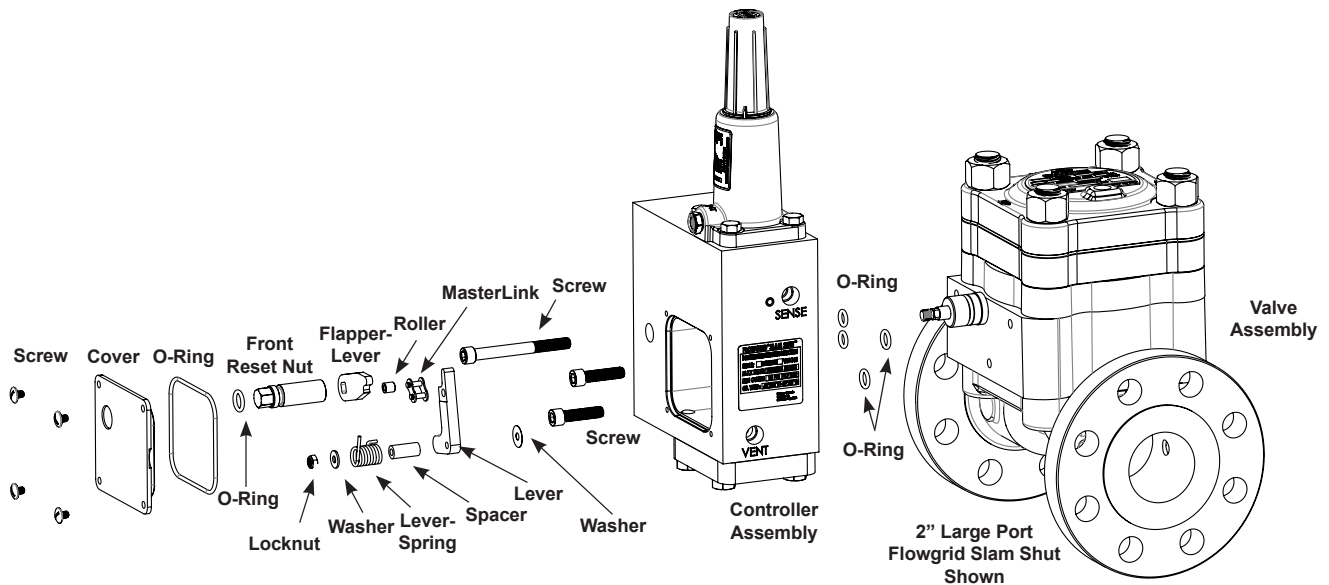


Figure 9 - Controller Installation and Removal

Maintenance of the Shutoff Valve

Controller Removal from the Shutoff Valve

1. Remove the sense line from the controller.
2. Remove the cover off of the latch cavity. Remove the cover o-ring and discard.
3. If the shutoff valve (flapper valve) is open using a screw driver, lift up the short leg of the pawl lever causing the valve to close.
4. Remove the locknut, washer, spring, spacer and pawl lever.
5. Remove the front reset nut holding the flapper lever on the flapper shaft.

Note: The threads on the nut are left hand. Discard the o-ring on the front reset nut.

6. With a ¼ inch hex wrench, remove the three cap screws holding the controller and latch module to the shutoff valve body.
7. The flapper lever is press fit on the shaft, making removal difficult. The lever is easily pulled off by using the controller housing to drive it off the shaft. Grab the controller on each side, and rapidly pull the housing so it drives the lever off. If necessary, repeat the action.
8. Remove and discard the o-rings from the mating face of the Slam Shut body, bushing and the controller and latch module.

Maintenance (contd.)

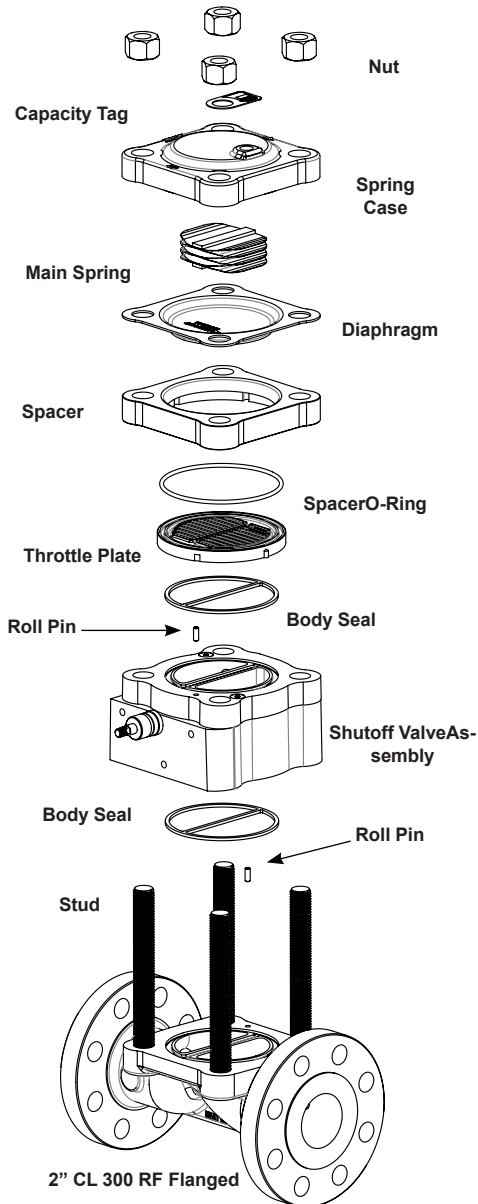


Figure 10 - Removal and installation of the shutoff valve from the regulator or valve body. (2" shown)

Removal of the Shutoff Valve from the Body and/or Regulator (2" Large Port Regulator Shown)

1. On Slam Shut valves integrated into a Flowgrid regulator, remove the pilots, filter and control lines from the inlet, and sense ports on Slam Shut valves and the Flowgrid regulator.
2. Remove the four nuts on top of the spring case. Disassemble the Flowgrid regulator according to the instructions in the Flowgrid IOM manual ref. 19583. On stand alone Slam Shut valves, remove the cap and cap o-ring. Discard the o-ring.
3. Remove the shutoff valve assembly and body seal from the Flowgrid body.

Disassembly of the Shutoff Valve

1. Remove the rear reset nut and discard o-ring. The threads are right hand on the rear reset nut and must be turned counter clockwise.
2. Using a hex wrench, remove the two flat head screws holding the seal retainer and Slam Shut body together.
3. Remove the seal retainer and flapper seal. Discard the flapper seal.
4. Hold the top face of the flapper flush with the top of the valve body. Using a punch, drive the two press fit pins out of the flapper and shaft. Discard the shaft and pins.
5. Remove the shaft from the valve body. The front reset nut can be used as a handle. Discard the shaft.
6. Remove and discard the o-ring from the shaft bore in the flapper valve body.
7. Inspect the sealing surface of the flapper. Replace the flapper if the surface that mates with the seal is worn or pitted.

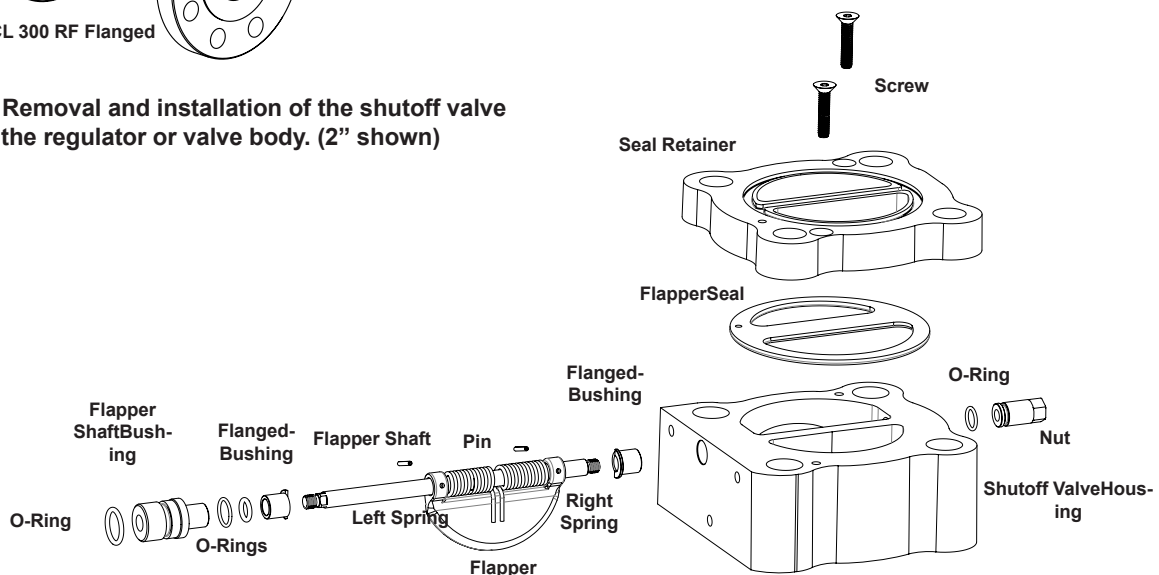


Figure 11 - Shutoff Valve Assembly and Disassembly (2" Shown)

Assembly of the Shutoff Valve

WARNING

The pins and shaft are a one-time press fit assembly. Reuse of the pins and shaft may result in the pins not being secure in the shaft and moving while in service; thus:

- The pins could jam the assembly or drop out of the assembly resulting in shutoff valve not closing or opening.
- The pins could stick up above the flapper and cut the seal, causing the shutoff valve to leak.

Refer to Figure 11 for this operation.

1. Install the (two) shaft bushings into the valve housing. Align the cutaway section of the bushing toward center wall of the housing so the bushing shoulder sits against the housing wall.
2. Hold the flapper so the lugs are down and slide them between the two bushings just installed. Slide the shaft into the valve housing, through the bushing and the first lug on the flapper.
3. Place the left flapper spring between flapper lugs. The straight spring leg should be against the bushing and the center wall of the housing. The bent spring leg should be against the back side of the flapper in the center. Slide the shaft through the spring. Repeat the process for the right flapper spring. Slide the shaft through the second lug in the flapper and into the second bushing.
4. Have a second person hold the top face of the flapper flush with the top of the valve body. Align the shaft so the two pin holes align with the pin holes in the flapper. Install the two split pins using a pin punch larger than the pin hole in the flapper. Drive the top of the pins flush with the top of the flapper surface when the flapper is pushed down.

CAUTION

Do not damage the sealing bead on the flapper or the shutoff valve will leak. If the pins stick up above the flapper, they will cut the seal and cause the shutoff valve to leak.

5. Lube the o-rings with lubricant supplied in the rebuild kit.
6. Install the appropriate o-ring on the rear reset nut. Screw the nut on the end of the shaft.
7. Install the flapper seal into the seal retainer making sure it is seated in the groove.
8. Using a 1/2 inch or 13 mm wrench, turn the shaft clockwise so the top of the flapper is flush or below the top of the valve housing.
9. Install the seal retainer with the flapper seal down onto the Slam Shut body. The small flow hole in the seal goes on the flapper side of the Slam Shut body. Install two flat head screws through the seal retainer and into the Slam

Shut body using a hex wrench. Make sure the screws are tightened, eliminating the gap between the Slam Shut body and the seal retainer. Insure the tops of the screw are below the surface of the seal retainer.

10. Slide the o-ring onto the flapper shaft. Being careful not to damage the o-ring, install it into the bore in the Slam Shut body.
11. Install the o-rings on the bushing. Slide the bushing onto the shaft and push it into the Slam Shut body as far it will go.

Assembly of the Shutoff Valve onto the Body and/or Regulator

Refer to Figure 10 for this operation.

1. Install the body seal in the Flowgrid body.
2. Slide the Slam Shut valve assembly over the studs and onto the Flowgrid body.
3. If the Slam Shut valve is integrated into a Flowgrid regulator, assemble the Flowgrid regulator according to the instructions in the Flowgrid IOM manual (19583) in the same orientation it was removed.
4. If the Slam Shut is not integrated into a Flowgrid regulator, then install the o-ring and cap on top of the shutoff valve assembly.
5. Install and tighten the four nuts. Torque 2" valves to 65 ft-lbs, 3", 4" and 6" valves to 125 ft-lbs.

Installation of the Controller onto the Shutoff Valve.

Refer to Figure 9 for this operation.

1. Lubricated the o-rings with the lubricant supplied in the rebuild kit.
2. Install the o-rings in the proper grooves, in the controller and latch module where it mates with the shutoff valve body.
3. Being careful to keep the o-rings in the grooves slide the controller and latch module over the end of the shaft and bushing onto the Slam Shut body. Align the bolt holes, install and tighten the three bolts.
4. Slide the washer, pawl lever, bushing, pawl spring, and washer on the stud. Install the spring with the bent leg of the spring between the two legs of the "L" shaped pawl lever.
5. Install and tighten the nut, enough to remove the slack in the assembly. Be careful not to over tighten and damage the threads. Using a pair of plyers, lift the bent end of the spring over the pawl lever into the position shown in Figure 12.
6. Install the flapper lever so the end of the lever is pointing down. Install the o-ring on the front reset nut. Install and tighten the left hand threaded front reset nut on the shaft.
7. Position the cover o-ring on the cover and install the cover on the front of the lever cavity. Install and tighten the four cover screws.

Maintenance of the Controller

Spring Case Disassembly

1. Remove the over or under pressure set point adjusting screw cover located on top of the spring case. Loosen the adjusting screw.
2. Remove the four bolts from the spring case and controller and latch module.
3. Remove the spring case and spring.

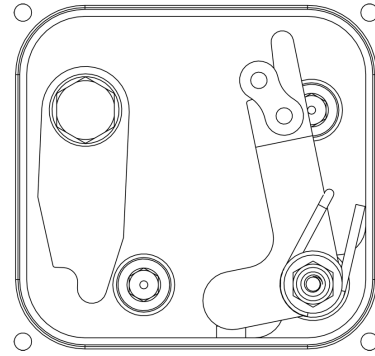


Figure 12 - Final spring leg position.

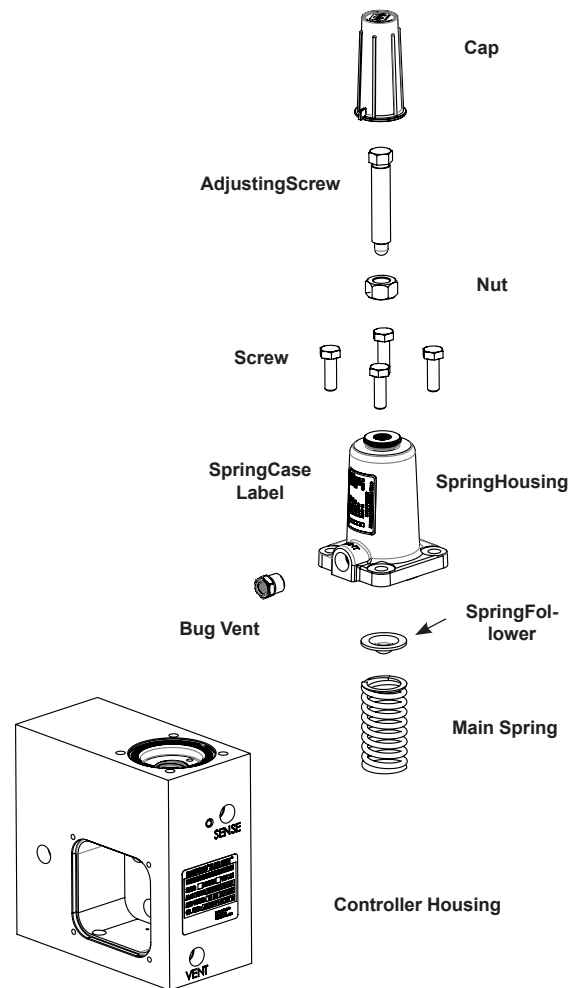


Figure 13 – Controller Assembly and Disassembly (Single Function Shown)

Diaphragm Disassembly and Assembly

1. Remove the diaphragm assembly.
2. Remove the nut, diaphragm plate and diaphragm.
3. Install a new diaphragm with the convolutions toward the diaphragm plate.
4. Install the nut and torque to 5 to 6 ft-lbs. Over tightening the nut will distort the diaphragm.

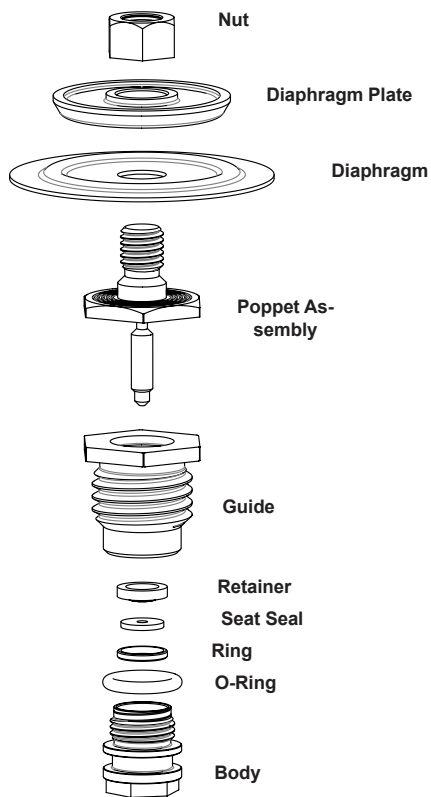


Figure 14 – Over Pressure Assembly and Disassembly

Over and Under Pressure Valve Cartridge Disassembly

Refer to Figure 14 and 15 for this operation.

⚠ WARNING

Working on this assembly, except in a clean environment, may result in internal leakage. Any dirt or debris on or that migrates onto the valve seat or poppet may cause permanent damage to the seat and will cause the valve to leak.

1. Remove the cartridge from the controller housing.
2. Disassemble the cartridge. Remove and discard the seat and body o-ring.
3. Install a body o-ring and seat seal from the rebuild kit.
4. Reassemble the cartridge and torque to 120 inch-lbs.

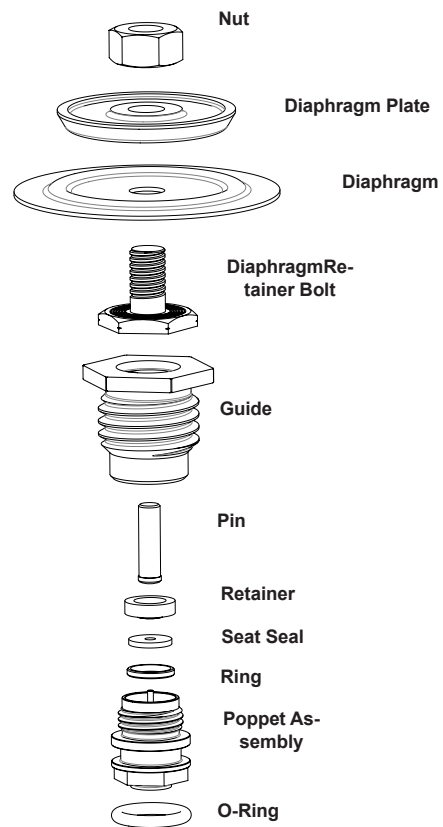


Figure 15 – Under Pressure Assembly and Disassembly

Vent Valve Disassembly and Assembly

Refer to Figure 16 for this operation.

1. Remove the stem retainer, stem, washer and spring from the controller housing. Discard the o-ring and stem.
2. Lubricate and install a new o-ring on the valve stem retainer.
3. Insert the long end of the stem into the retainer. Slide the washer and then spring on the short end of the new stem.
4. Insert the stack into the controller housing and tighten to 120 to 130 inch-lbs.

Installation of the Cartridge

Refer to Figure 16 for this operation.

1. Start the cartridge into its bore.
2. Tighten the cartridge to 120 to 130 inch-lbs.

Spring Case Assembly

Refer to Figure 16 for this operation.

1. Install the diaphragm assembly into the diaphragm counter bore.
2. Lubricate the depression in spring follower with Lubriplate 105 or equivalent.
3. Place the spring for the set point range required on top of the diaphragm assembly. Set the spring follower on top of the spring.
4. Make sure the diaphragm assembly, spring and spring follower are oriented correctly and install the spring case with the bug vent facing forward. Install the four bolts and torque to 120 to 130 inch-lbs.

Actuator Disassembly and Assembly

Refer to Figure 16 for this operation.

1. Remove the four cap screws, actuator cap, diaphragm, restrictor pin and o-rings. Disassemble the diaphragm assembly. Discard o-rings and diaphragm.
2. Remove the pawl lever actuator pin from the controller housing. Discard the pin if damaged or worn. Install the pin in the controller housing.
3. Lubricate the o-rings in the rebuild kit with the lubricant provided.
4. Install an o-ring on the diaphragm bolt followed by the diaphragm plate. Install a diaphragm on the diaphragm retainer bolt. Make sure the convex side of the diaphragm is toward the diaphragm plate.
5. Install the washer followed by the nut on the bolt and torque the nut to 120 to 130 in-lbs.
6. Install an o-ring on each end of the restrictor pin. Install the restrictor pin with the o-rings into the diaphragm cap.
7. Place the diaphragm assembly in the housing. Install the diaphragm cap and torque the four screws to 120 to 130 inch-lbs.

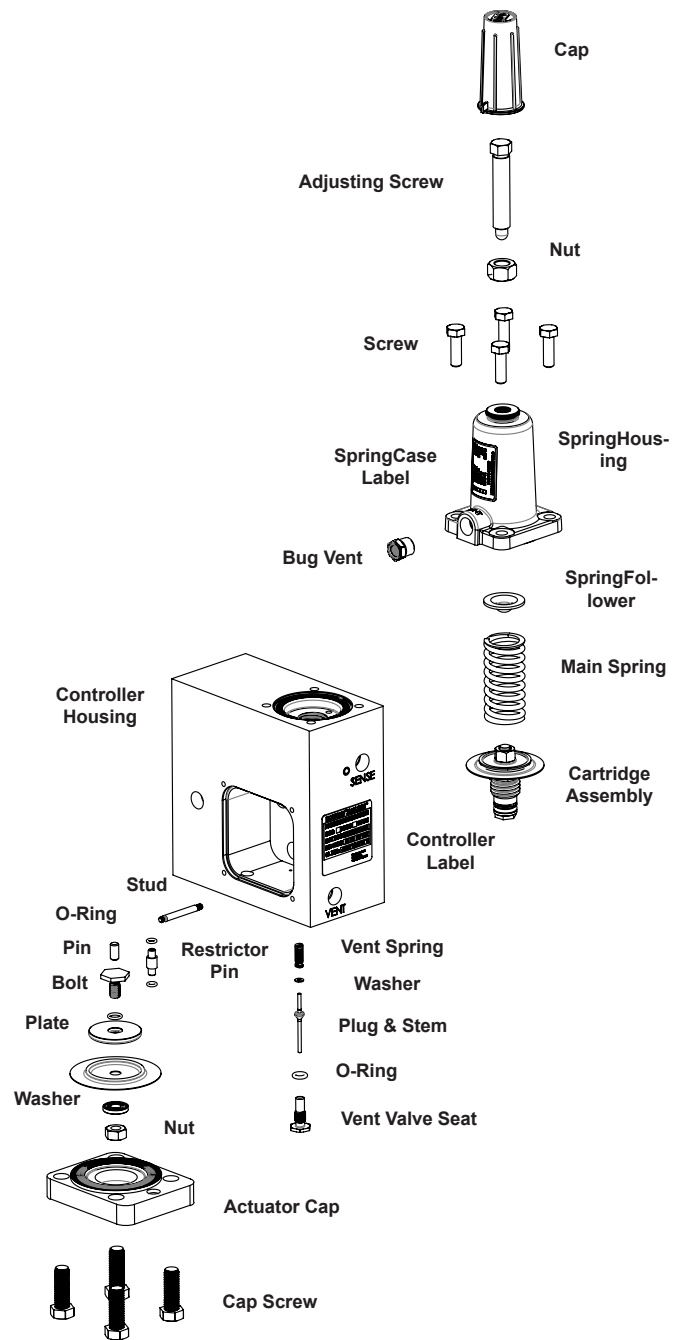


Figure 16 – Controller Assembly

Troubleshooting

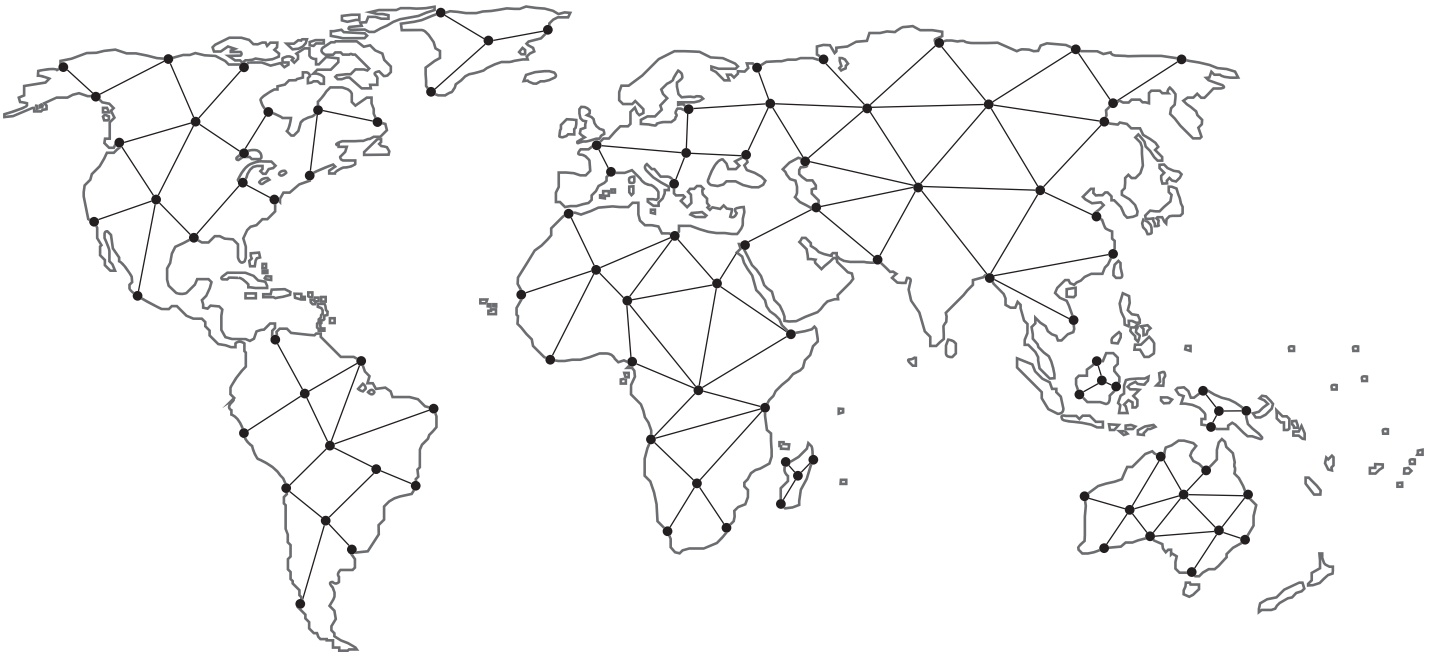
Troubleshooting	
Problem	Likely Cause
Fails Internal Leakage Test.	<p>Flapper Seal is damaged.</p> <p>Flapper sealing surface is damaged.</p> <p>The external equalization valve is open or leaking.</p> <p>The inlet supply to the pilot is not connected to the center port on the SSV.</p>
Fails External Leakage Test.	<p>Damaged o-ring or seal.</p> <p>Damaged seal groove.</p>
Pawl lever stays in the unlatched position when valve inlet is pressurized.	<p>The over pressure or under pressure set points have not been adjusted correctly:</p> <ul style="list-style-type: none"> – over pressure set point too low – under pressure set point too high – under pressure set point higher than the over pressure set point – under pressure set point is set too close to the over pressure set point. <p>The downstream (sense) pressure is not between the over and under pressure set points.</p> <p>Over or under pressure valve dirty or damaged.</p> <p>Over or under pressure valve o-ring damaged.</p> <p>Vent valve plugged.</p>
Pawl lever does not unlatch the flapper.	<p>The over pressure or under pressure set points have not been adjusted correctly:</p> <ul style="list-style-type: none"> – over pressure set point too high. – under pressure set point too low. <p>The convex side of the convolution on the actuator diaphragm is installed in the wrong direction.</p>
Slam Shut closes during start up.	The downstream pressure momentarily spiked over or under the Slam Shut set points.

Notes

Notes

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