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I & M Mark 56/560

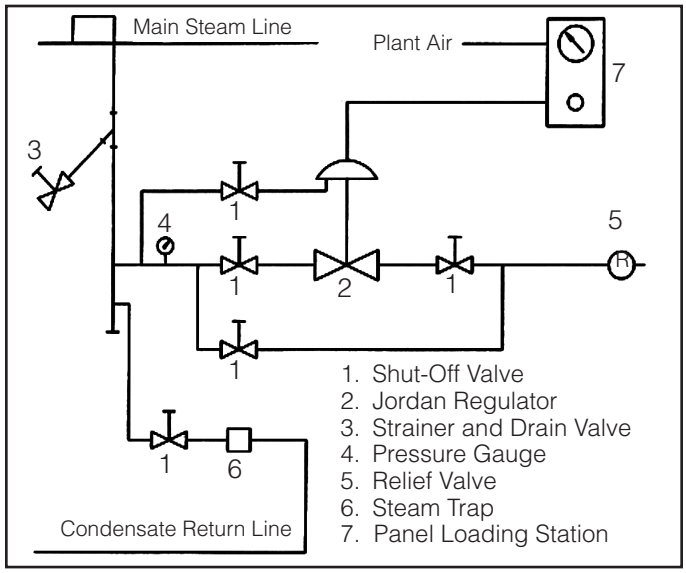
Installation & Maintenance Instructions for
Mark 56/560 Air Loaded Back Pressure Regulators

Warning: Jordan Valve pressure regulators must only be used, installed and repaired in accordance with these Installation & Maintenance Instructions. Observe all applicable public and company codes and regulations. In the event of leakage or other malfunction, call a qualified service person; continued operation may cause system failure or a general hazard. Before servicing any valve, disconnect, shut off, or bypass all pressurized fluid. Before disassembling a valve, be sure to release all spring tension.

Please read these instructions carefully!

Your Jordan Valve product will provide you with long, trouble-free service if it is correctly installed and maintained. Spending a few minutes now reading these instructions can save hours of trouble and downtime later. When making repairs, use only genuine Jordan Valve parts, available for immediate shipment from the factory.

Ideal Installation



1. Protect the regulator from grit, scale, thread chips and other foreign matter, by blowing out and thoroughly cleaning all pipe lines and piping components before the regulator is installed.
2. Shutoff valves, pressure gauges, and by-pass piping should be installed as indicated in the diagram above to provide easier adjustment, operation and testing.
3. When preparing threaded pipe connections, care should be exercised to prevent pipe sealing compound from getting into the pipe lines. Pipe sealing compound should be used sparingly, leaving the two lead threads clean.
4. A line strainer should be installed on the inlet side of the regulator to protect it from grit, scale, and other foreign matter. A 0.033" perforated screen is usually suitable. Line strainers are available from Jordan Valve.
5. Install the regulator in the highest horizontal line of piping to provide drainage for inlet and outlet piping, to prevent water hammer, and to obtain faster regulation.
6. The flow arrow on the regulator body must be pointed in the direction of flow. The regulator may be installed in any direction, but damage to the seating surfaces may occur if installed in a vertical line with the flow upwards.
7. For best control, 3'0" straight sections of pipe should be installed on either side of the regulator.
8. In hot vapor lines, upstream and downstream piping near the regulator should be insulated to minimize condensation.
9. Expand the outlet piping at least one pipe size if the controlled pressure (downstream) is 25 percent of the inlet pressure or less. A standard tapered expander connected to the outlet of the regulator is recommended.
10. Where surges are severe, a piping accumulator is recommended.

Control Line

Install a control line as follows:

1. Connect 3/8" O.D. tubing to the fitting under the diaphragm.
2. Connect the other end in a straight run of pipe three to five feet upstream from the regulator.
3. DO NOT locate the control line tap in an elbow, swage, or other changes in configuration of the pipeline where turbulence or abnormal velocities may occur. DO NOT locate the control line tap in a vessel, such as a deaerator, located immediately upstream of the regulator. Locate the tap in the pipeline leading to the vessel.
4. The control line should be sloped away from the regulator.
5. Install a shutoff valve (not a needle valve) in the control line.
6. Install a pressure gauge in the control line or near the inlet of the regulator to aid in setting the valve.

Start-Up Procedure

With the inlet, outlet and bypass shutoff valves closed, and no pressure in the downstream line:

1. Fully open the control line shutoff valve.
2. Fully open the outlet shutoff valve.
3. Slowly open the inlet valve just enough to start flow through the regulator. Observe the upstream pressure gauge. Increase the air-loading pressure slowly to gradually close the regulator.
4. Do not fully open the inlet valve until you are sure that the regulator has control of the system. Usually, the handwheel on the inlet valve will turn freely when this point is reached.
5. To change the controlled pressure, adjust the loading pressure supplied to the top of the diaphragm.

Trouble Shooting

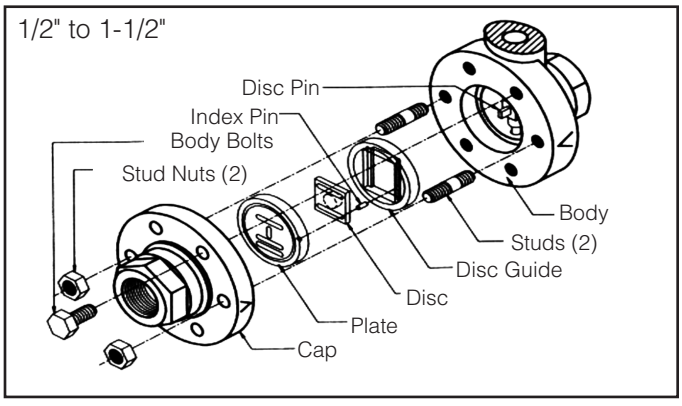
Erratic Control

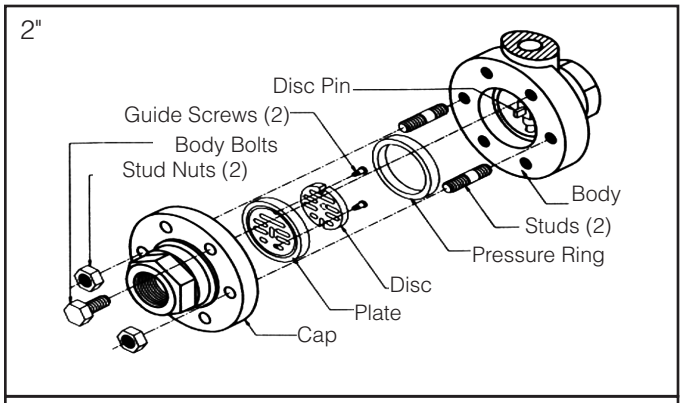
- Oversizing causes cycling and hunting, and reduces the rangeability of the regulator. Check sizing calculations to be sure that you have the proper size valve.
- Steam traps downstream may need attention and could be causing erratic control.
- Safety valve may be jammed open, disrupting the system. Repair as necessary.
- Excessive foreign matter on seats can cause erratic operation. Clean them as outlined under **Valve Seats**.
- Valve stroke may be out of adjustment. Readjust stroke.
- Valve disc may not be moving freely. Check disc guide clearance, and clearance of the stem to the bushings.

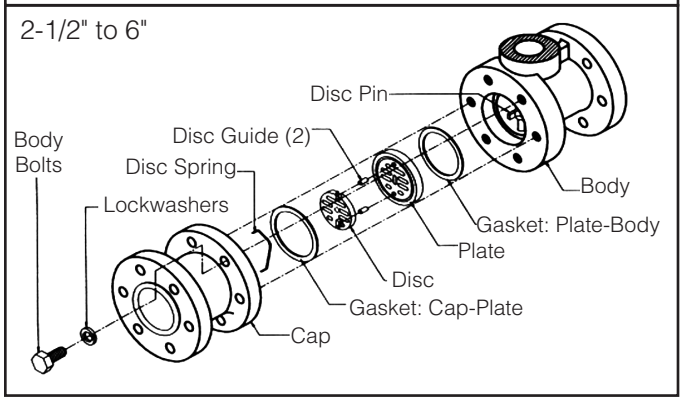
Will Not Operate

- Diaphragm may be ruptured and need replacement.

Valve Seats







Disassembly (All Sizes)

The sliding gate valve seat is the key to the excellent control and tight shutoff provided by a Jordan valve. Maintaining these seats in good condition is critical to valve performance, so care in handling is imperative. NEVER USE METALLIC OBJECTS IN REMOVING THE SEATS. Improper handling can result in leakage and poor control.

1. Close the shutoff valve on each side of the valve, and remove the valve from the line.
2. Note scribed "<" on the side of the body and cap for 1/2" - 2" sizes. Secure the body in a vise. Remove the body bolts and stud nuts and lift the cap straight up.
3. Before removing, note the locating pin that aligns the plate with the disc guide on 1/2" to 1-1/2" sizes. This pin should be on the same side as the "<" on the body and cap. Remove the plate and disc (on 2" valves, the disc will be attached to the plate, and the screws should now be removed to separate the two parts; on 2-1/2" - 6" valves, place the body on its side to remove the plate). Place the disc on the bench with lapped surfaces facing up. Protect the lapped surfaces on both sides of the disc guide.

It is important that the disc pin is not rotated when disassembling, cleaning, or reassembling, since this affects the stroke adjustment.

4. Lightly tap on the body to remove the disc guide (2" valve uses a pressure ring instead of a disc guide). Invert the body, let the disc guide drop

out into your hand, and place it on the bench with lapped surface facing up.

5. Clean all parts, including body and cap, with solvent. Place a piece of 4/0 polishing cloth or jewelers cloth on a smooth, flat surface such as a surface plate, and polish the lapped seating surfaces of the disc, plate and disc guide using a “figure 8” motion. If the parts are scarred, do not attempt to relap them, but return them to the factory for repair or replacement. If the seats are not scarred deeply, they can be repaired at a nominal cost.
6. The vertical sections of the disc guide (on 1/2" to 1-1/2" sizes) serve as guides for the disc while stroking. A 0.005” feeler gauge should be used to check for clearance between this surface, and the side of the disc. If the clearance is less, clean the guide surfaces in the disc guide with a fine file.

Reassembly

Sizes 1/2" to 1-1/2"

1. Place the disc guide in the body bore with the index pin on the same side as the “<” on the body
2. Place the disc in the aperture of the disc guide with the arrow pointing to the index pin and engage the index pin.
3. In placing the plate in the body, notice that the index pin hole in the lapped surface of the plate engages the index pin of the disc guide.
4. Align the “>” on the cap with the “<” on the body and place the cap over the two studs in the body.
5. Install the nuts to the two studs and proceed to Stroke Adjustment to check the orifice alignment of the seats. Next, torque the body bolts as outlined under Torque Procedure.

2" Size

1. Place the disc on the plate and replace the guide screws. Tighten the screws but do not allow them to bind the disc against the plate.
2. Install the pressure ring and disc and plate assembly in the body so that the disc pin engages the disc, and the plate is seated firmly in the body.
3. Place a straight edge across the body bolt holes on the horizontal center line of the valve (perpendicular to the valve movement). Gently rotate the disc and plate assembly until the edges of the orifice slots are parallel to the straight edge.
4. Remove the straight edge and reinstall the cap, being careful not to rotate the disc and plate assembly.
5. Proceed to Stroke Adjustment to check the orifice alignment of the seats and then torque the body bolts as outlined under Torque Procedure on the back page.

2-1/2" through 6" Sizes

1. Place the plate in the body so the disc pin protrudes through the center slot in the plate. The marking “TOP DIRECT” on the back of the plate must be toward the diaphragm. Use new seat gaskets.
2. Place the disc on the disc guides in the plate, engaging the disc pin arm protruding through the center of the plate. The arrow on the disc must point away from the diaphragm.
3. Install the cap to the body using only two body bolts 180° apart. Be sure the disc spring is installed in the center web of the cap and install the cap with the center web parallel to the stem. Use a new seat gasket.
4. With no air pressure applied to the upper diaphragm case, apply 20 psi minimum air pressure to the 3/8 NPT sensing line hole under the diaphragm and check the orifice alignment of the disc and plate. The orifices should be fully open and in perfect alignment. If they are not, proceed to Stroke Adjustment before torqueing the body bolts per Torque Procedure on the back page.

Diaphragm Replacement

Disassembly

1. In removing the diaphragm, first remove the disc and plate as previously covered under Valve Seats.
2. Remove the upper diaphragm case.
3. Hold the disc pin with an open end wrench and remove the diaphragm assembly by rotating counterclockwise. The diaphragm assembly consists of the upper diaphragm plate, diaphragm, and lower diaphragm plate.
4. If the diaphragm must be replaced:
   - 1/4" - 2" sizes — secure the upper diaphragm plate in the vise. A face spanner wrench should be used to remove the lower diaphragm plate from the assembly. If a face spanner wrench is not available, use a punch and hammer, but make certain to remove all burrs prior to reassembly.
   - 2-1/2" - 6" sizes — secure the lower diaphragm plate in the vise. Use a wrench on the hex of the upper diaphragm plate and turn counterclockwise to remove. If the packing needs to be replaced, follow these procedures:
     a) Remove packing bolts, packing flange, and packing follower.
     b) Remove the packing. The packing may have a tendency to stick in the packing cavity if the valve has been in service for some time. Movement of the stem may help.
     c) The packing retainer and spring may be removed if needed.
     d) Be certain that all packing material has been removed. Check the stem for scratches and replace if necessary. If the stem must be replaced, remove the seats as shown in Valve Seats.
     e) Replace the packing. Refer to the drawing for proper orientation of the packing.
     f) Insert the packing follower, place the pack-

ing flange over the packing follower and insert the packing bolts. Pull the bolts down, one turn each, alternating from one to the other until the packing follower is snug against the body and the packing flange is parallel to the body surface.

5. Remove the diaphragm and replace with a new one in reverse order. Tighten. For elastomer diaphragms, clean (degrease) threads and apply one drop of Loctite #290. Thread the parts together and tighten 1/8 to 1/4 turn. Proceed to Stroke Adjustment.

Stem and Disc Pin Replacement

1. Remove the disc and plate, following the procedures outlined under Valve Seats.
2. Remove the diaphragm as outlined under Diaphragm Replacement.
3. Holding the disc pin assembly with an open end wrench, loosen the stem locknut. The stem can now be unscrewed from the disc pin and removed.
4. Remove the disc pin and locknut.
5. Check the condition of and clean all parts. Clean the stem guide bushing in the body and replace defective parts.
6. Reassemble in reverse order. Follow the procedures outlined under Stroke Adjustment.

Stroke Adjustment

Note: the valve adjustment is determined by how far the diaphragm assembly is screwed onto the stem.

1/2" - 2" sizes

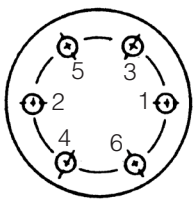
1. With the upper diaphragm case off and seats out of the body, hold the disc pin with an open end wrench and screw the diaphragm assembly onto the stem all the way, and then back off two turns initially.
2. Place the disc guide, disc and plate in the body, as outlined under Valve Seats.
3. Install the upper diaphragm case with only two bolts 180° apart, and tighten these bolts.
4. Carefully use a tool to pry up on the disc pin from upstream side of body. Stroke the stem upward until the upper diaphragm plate stops against the upper diaphragm case.
5. The orifices should be fully open and in perfect alignment. If they are not, remove the upper diaphragm case and rotate the diaphragm assembly counterclockwise to lower the disc, or clockwise to raise the disc. Repeat steps 3,4 & 5 until the seats are in perfect alignment.
6. Install all the bolts in the upper diaphragm case and torque as outlined under **Torque Procedure** on the back page.

2-1/2" to 6" sizes

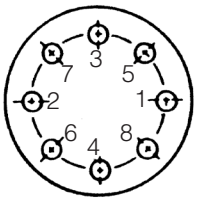
1. With the upper diaphragm case off and the seats out of the body, loosen the stem locknut and move the disc pin to the center of the threaded section of the stem.
2. Hold the stem lightly with pliers and thread the diaphragm assembly approximately four turns onto the stem. Center the disc pin in the body waterway and tighten stem locknut.
3. Place the plate in the body as outlined under **Valve Seats**, but temporarily install the disc on the disc pin with the arrow pointing towards the diaphragm.
4. Hold the parts so they don't fall out, and push down on the diaphragm assembly until it bottoms out in the body.
5. The orifices should be fully open and in perfect alignment. If they are not, rotate the diaphragm assembly counterclockwise to lower the disc, or clockwise to raise the disc, until the seats are in perfect alignment.
6. After the seats are aligned, remove the disc and turn it 180° and reinstall with the arrow pointing away from the diaphragm. The seats are now fully closed with overlap.
7. Install the upper diaphragm case and torque the bolts as outlined under **Torque Procedure**.

Caution: do not rotate the upper diaphragm case on the diaphragm before installing the bolts because this will change the stroke adjustment.

Torque Procedures



6 bolts
(or multiples)



8 bolts
(or multiples)

1. Install all bolts hand-tight.
2. Torque the bolts in order of the bolt pattern to a value equal to ¼ of the recommended torque value.
3. Re-torque each bolt to the recommended value using the same bolt pattern as shown.

Torque for Bolts Connecting Cap to Body (in. - lbs.) (1/2" - 2")

Valve Size	Valve Body Material	
	Bronze	Ductile Iron, Carbon Steel, or Stainless Steel
1/2" through 2"	140	200

Torque for Diaphragm Case Bolts

Valve Size	Torque (in. - lbs.)
1/2" through 2"	200

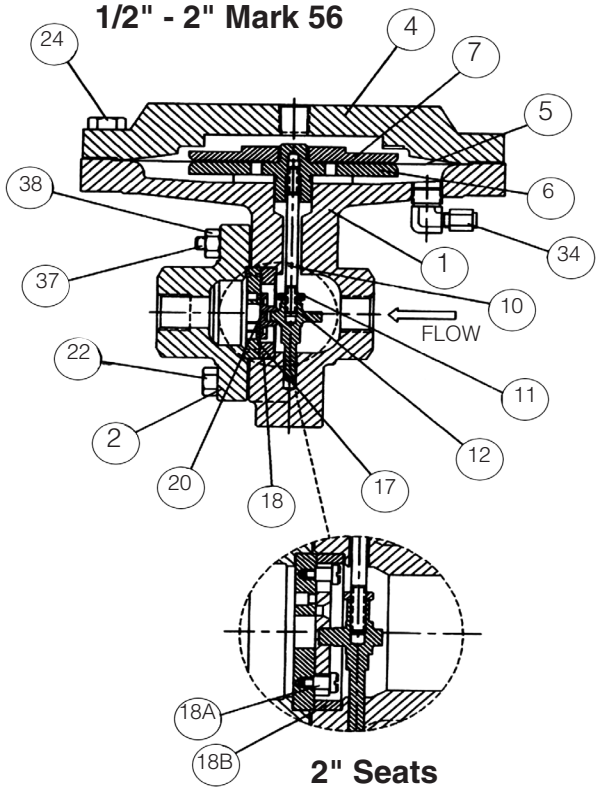
Torque for Bolts (ft. - lbs.) (2-1/2" - 6")

Recommended Bolt Torque	
Body to Cap	90 ft./lbs.
Diaphragm Case	85 ft./lbs.

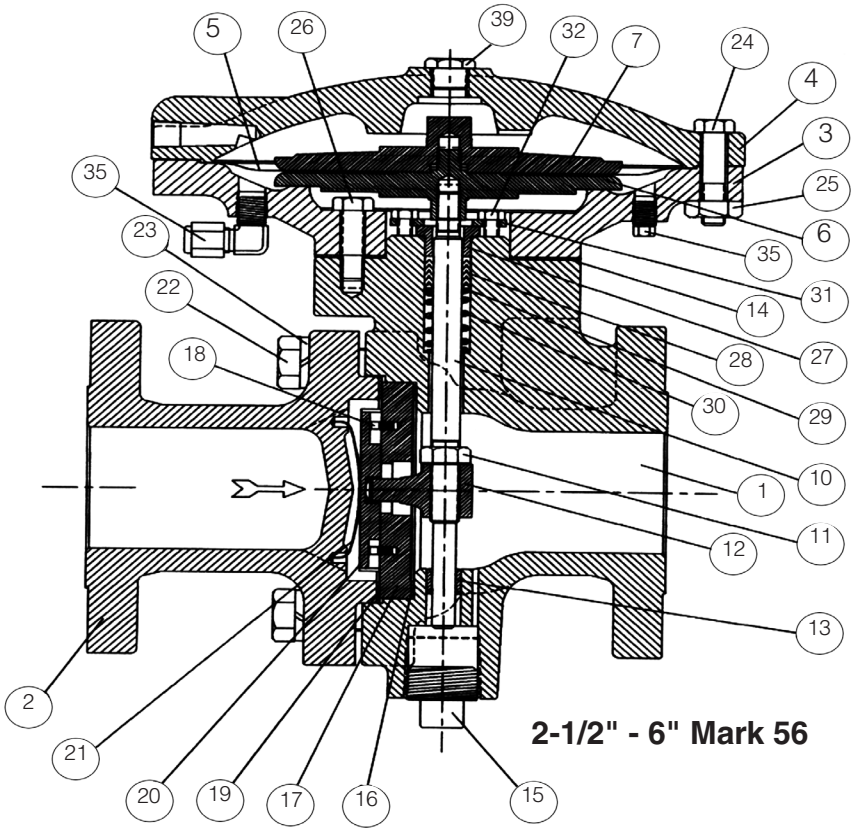
Illustration and Parts List

Item	Description
1	Body
2	Cap
3	Lower Case
4	Upper Case
*5	Diaphragm
6	Lower Diaphragm Plate
7	Upper Diaphragm Plate
10	Stem
11	Stem Locknut
12	Disc Pin
13	Stem Guide Bushing
14	Gasket (Lower Case Body)
15	Pipe Plug
*16	Gasket (Plate-Body)
*17	Plate
*18	Disc Guide
*19	Gasket (Cap-Plate)
*20	Disc
*21	Disc Spring
22	Cap Screw
23	Lockwasher
24	Bolt
25	Nut
26	Cap Screw
27	Packing Follower
*28	Packing
29	Packing Washer
30	Packing Spring
31	Packing Flange
32	Packing Bolts
35	1/4” NPT Pipe Plug
39	1/2” NPT Pipe Plug
*	Recommended Spare Parts

1/2" - 2" Mark 56



2" Seats



2-1/2" - 6" Mark 56

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