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I & M Mark 66/660 Series

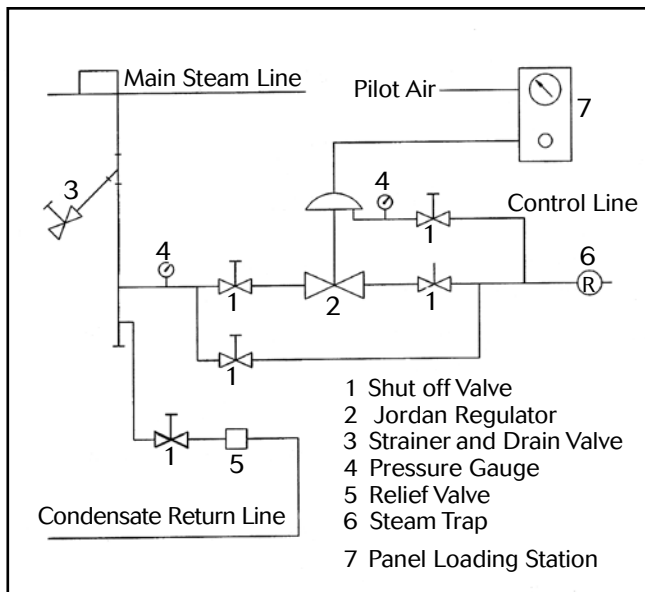
Installation & Maintenance Instructions for Mark 66/660 Air-Loaded Pressure Regulators

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. To protect the valve from grit, scale, thread chips, and other foreign matter, all pipe lines and piping components should be blown out and thoroughly cleaned before the valve is installed.
2. Shutoff valves, pressure gauges, and bypass piping should be installed as indicated in the diagram to provide easier adjustment, operation, and testing.
3. 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.
4. For best control, 3'0" straight sections of pipe should be installed on either side of the valve.

5. In preparing threaded pipe connections, care should be exercised to prevent pipe-sealing compound from getting into the pipelines. Pipe-sealing compound should be used sparingly, leaving the two end threads clean. Jordan uses, and recommends, thread sealer Teflon ribbon.
6. The flow arrow on the valve body must be pointed in the direction of flow. Ideally, the valve should be installed in the highest horizontal line of piping to provide drainage for inlet and outlet piping, to prevent water hammer, and to obtain faster response.
7. If possible, install a relief valve downstream from the valve. Set at 15 psi above the control point of the valve.
8. In hot vapor lines, upstream and downstream piping near the valve should be insulated to minimize condensation.
9. In gas service, if the control pressure (downstream) is 25% of the inlet pressure or less, expand the outlet piping at least one pipe size. A standard tapered expander connected to the outlet of the valve is recommended.
10. Where surges are severe, a piping accumulator is recommended.
11. On steam control applications, install a steam trap with sufficient capacity to drain the coil or condenser. Be sure to have a good fall to the trap, and no back pressure. Best control is maintained if the coil or condenser is kept dry.

Control Line

A control line must be installed 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 downstream from the valve.
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.
4. DO NOT locate the control line tap in a vessel, such as a deaerator, located immediately downstream of the regulator. Locate the tap in the pipeline leading to the vessel.
5. The control line should be sloped away from the valve.

- Install a shutoff valve (not a needle valve) in the control line. Install a pressure gauge in the control line or near the outlet of the valve to aid in setting the valve and for checking for inlet pressure during maintenance procedures. (There is a 1/4" tapped opening in the lower bonnet).

Start Up

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

- Fully open the control line shutoff valve.
- Fully open the outlet shutoff valve.
- Slowly open the inlet valve just enough to start flow through the valve. Observe the downstream pressure gauge. Increase the downstream pressure slowly by gradually opening the inlet valve.
- 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.
- To change the controlled pressure, adjust the loading pressure supplied to the top of the diaphragm.

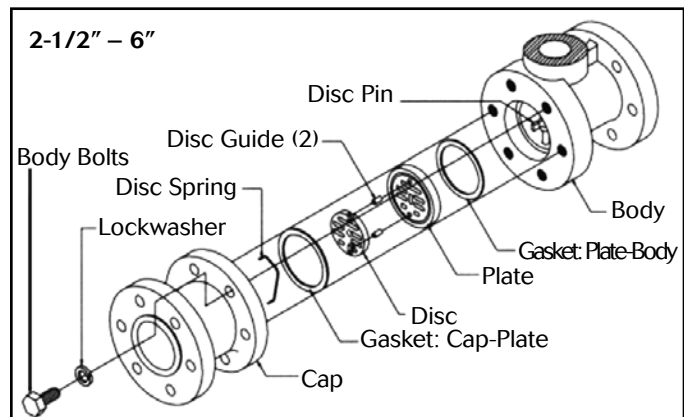
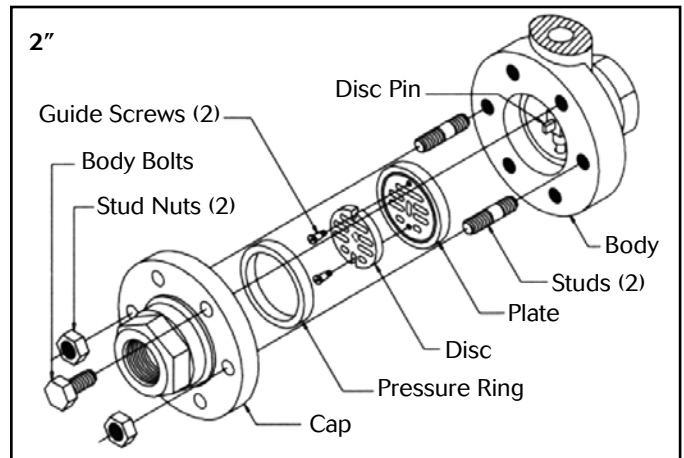
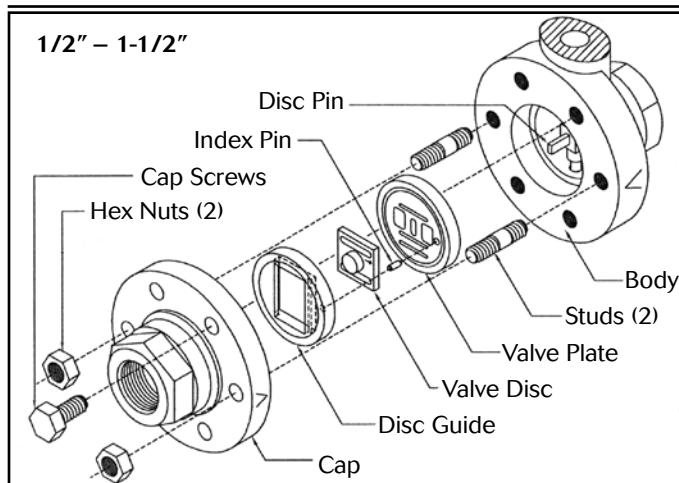
Maintenance

Caution: Ensure that the valve is de-pressurized before loosening any fittings or joints. The following steps are recommended before performing any maintenance on the valve:

- Close the inlet shut-off valve.
- Allow pressure to bleed off through the downstream piping. Do not attempt to reverse the flow through the valve by bleeding pressure from the upstream side of the valve.
- When the pressure gauges indicate that all pressure has been removed from the system, close the outlet shut-off valve. The valve may be removed from the line and serviced.

Note: Refer to the drawing at the end of this document for description and proper orientation of parts.

Valve Seats



A. Disassembly

The sliding gate seats of Jordan Valve are lapped to light band flatness. Maintaining such tolerances is of paramount importance for your assurance of excellent control and tight shutoff. Do not use metallic objects in removing the seats. Care in handling is imperative.

- Follow procedures under maintenance to remove the valve from line.
- Note the scribes "<" on the side of the valve body and cap. Secure the body flats in a vise. Remove the cap bolts and two nuts. Lift the cap straight up.
- Before removing, check the disc for a stamped arrow. This arrow points to the "<" on the body.

(Note: certain discs that can be rotated 180° without affecting the stroke might not have an arrow).

Remove the disc guide by lifting straight up. Also lift straight up on the disc. Place the disc on the bench, lapped surface facing up. Protect the lapped surfaces on both sides of the disc guide.

It is imperative that the disc pin assembly (disc pin, stem and locknut) is not rotated when disassembling, cleaning or reassembling, since this will affect the stroke adjustment of the valve.

- Invert the body and lightly tap on the exterior to remove the plate. Let the plate drop out into your hand, and place it on the bench with the lapped surface facing up.
- Clean all of the parts, body and cap with solvent.

Place a piece of 4/0 polishing cloth or jewelers cloth on a smooth, flat surface, 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. Often parts can be repaired at a minimal cost if the parts are not scarred too deeply.

6. The vertical sections of the disc guide 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.

B. Reassembly

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

1. Place the plate in the body, lapped surface facing the cap. The index pin hole should be on the same side as the "<" on the body. Align the disc pin so that it is centered in the body bore and protrudes through the center slot in the plate.
2. Place the disc on the plate, engaging the disc pin. The arrow on the disc should point to the index-pin hole. Insert the index-pin in the hole.
3. Place the disc guide onto the plate, engaging the index pin. Rotate the assembly slightly until slot openings in the disc are parallel to the openings in the plate, and perpendicular to the stem. Stroking the valve will aid in this alignment.
4. Align the ">" on the cap with "<" on the body, and place the cap over the two studs in the body.
5. Install the nuts and cap bolts. Hand tighten. Proceed to STROKE ADJUSTMENT to check the orifices alignment of the seats, when properly aligned torque the body bolts as outline under TORQUE PROCEDURE.

* 2" size

1. Place the plate in the body and replace the guide screws. Tighten the screws but do not allow them to bind the disc against the plate.
2. Replace disc and plate assembly in the body so the disc pin engages the disc, and the plate is seated firmly in the body.
3. Rotate the assembly slightly so that the slot openings in the disc are parallel to the openings in the plate and perpendicular to the stem. Stroking the valve will aide in this alignment.
4. Replace the pressure ring and cap. Install the nuts and cap bolts, hand tighten.
5. Proceed to STROKE ADJUSTMENT to check the orifices alignment of the seats. When properly aligned torque the body bolts as outlined under TORQUE PROCEDURE.

* 2-1/2" through 6" sizes

1. Install the new "plate-body" gasket. Place the plate in the body so the disc pin protrudes through the center slot in the plate. The marking "TOP REVERSE"

must be towards the diaphragm.

2. Place the disc on the guide pins in the plate, engaging the disc pin arm protruding through the center of the plate. The arrow on the disc must point towards the diaphragm.
3. Install the "cap-body" gasket. 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. Install the cap to the body using only two body bolts 180° apart.
4. Apply 20 psi minimum air pressure to the 3/8 NPT hole in the side of the upper diaphragm case and check the orifice alignment of the disc and plate. The orifices should be fully open and in perfect alignment. If they're not, proceed to STROKE ADJUSTMENT before torquing the body bolts per TORQUE PROCEDURE.

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. Holding the disc pin with an open end wrench, loosen the locknut 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 reassembling.
***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.
5. Remove the diaphragm and replace with 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.

Stem & 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 the locknut removed from the stem.
4. Remove the stem upward through the diaphragm area and the disc pin through the body orifice.

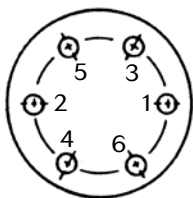
5. Check the condition and clean all parts with solvent, blow dry. Replace all defective parts.
6. Reassemble in reverse order. Follow the procedures outlined under DIAPHRAGM REPLACEMENT and VALVE SEATS for proper adjustment.

Stroke Adjustment

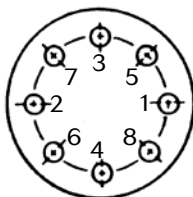
Note: the valve adjustment is determined by how far the diaphragm assembly is screwed onto the stem.

1. **a. 1/2" - 2" sizes:** With the upper diaphragm case off and the seats out of the body, hold the disc pin with an open end wrench and screw the diaphragm assembly onto the stem until the disc pin is centered in the body.
 - b. 2-1/2" - 6" sizes:** 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 on the stem. Hold the stem lightly with pliers and screw the diaphragm assembly onto the stem until the disc pin is centered in the body. Tighten locknut.
2. Place plate and disc in body as outlined under Valve Seats.
3. Push the diaphragm assembly down against the body and check the orifice alignment of the disc and plate. The orifices should be fully open and in perfect alignment.
4. If the orifices are not in perfect alignment, rotate the diaphragm assembly counterclockwise to lower the disc and clockwise to raise the disc.
5. After the seats are in alignment, replace the upper diaphragm case making certain it is centered with the diaphragm in the body recess. If the diaphragm is elastomer and the seats are in alignment, but the diaphragm and the bolt holes are not aligned, turn the diaphragm assembly counterclockwise to align the holes.
6. Torque bolts per TORQUE PROCEDURE

Torque Value



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 1/4 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.

Trouble Shooting

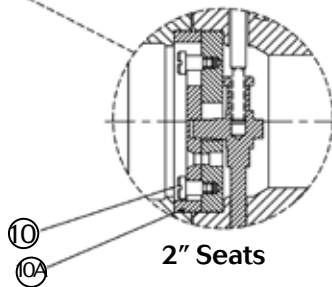
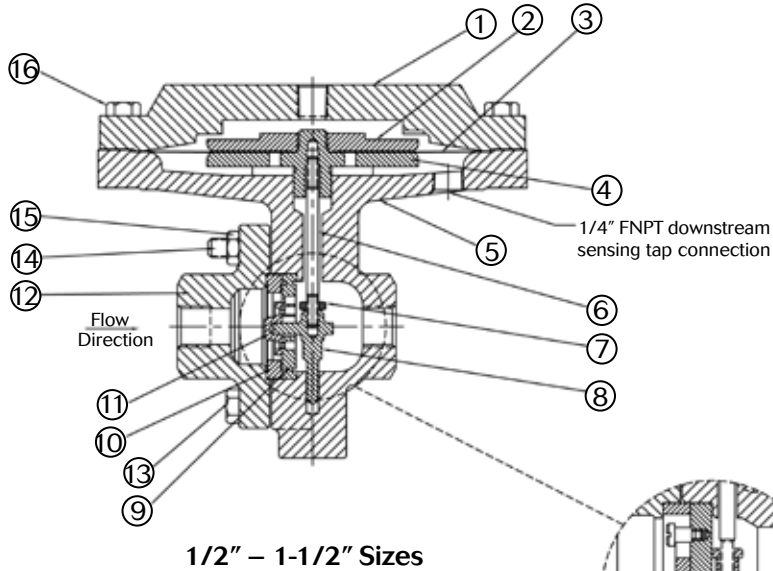
Erratic Control

- Oversizing causes cycling and hunting, and reduces the rangeability of the regulator. Check sizing calculations to be sure that you have installed 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 of the MK66. 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

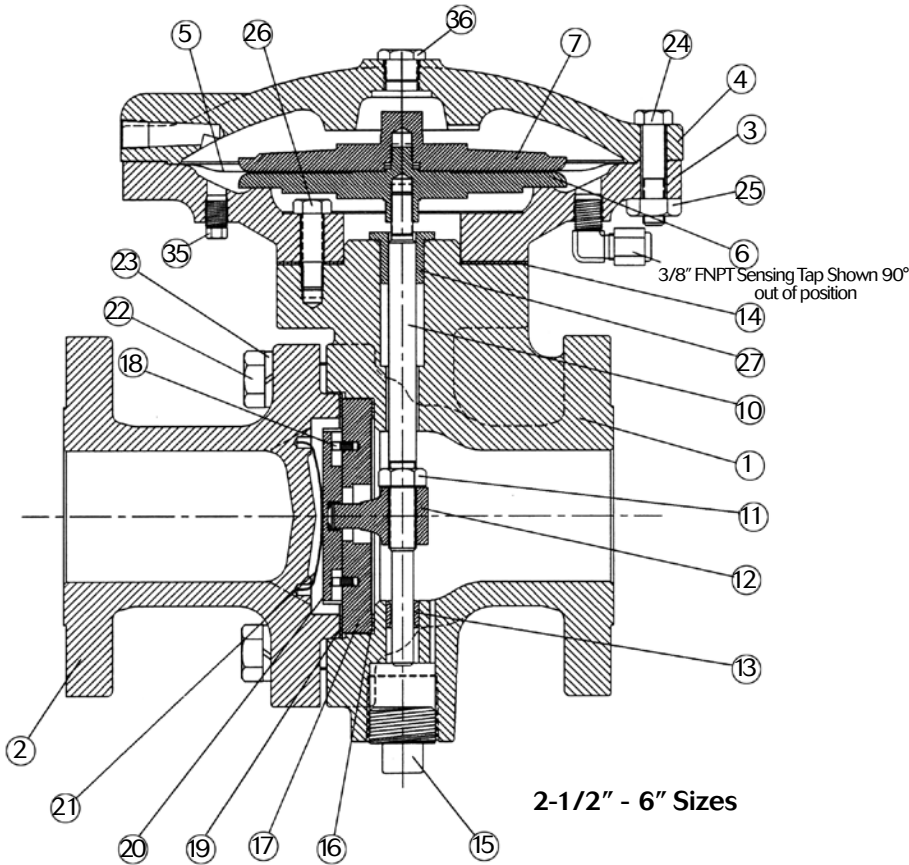
- Diaphragm may be ruptured and needs replacement.

Cross Section View



Item	Description	Qty
1	Upper Diaphragm Case	1
2	Upper Diaphragm Plate	1
3*	Diaphragm	1
4	Lower Diaphragm Plate	1
5	Body	1
6*	Stem	1
7*	Locknut	1
8*	Disc Pin	1
9*	Plate	1
10*	Disc Guide 1/2" - 1-1/2"	1
	Guide Screws 2"	2
10A*	Pressure Ring 2"	1
11*	Disc	1
12	Cap	1
	Body Bolts 1/2" - 3/4"	4
	Body Bolts 1" - 1-1/2"	6
	Body Bolts 2"	8
14	Body Studs 1/2" - 1-1/2"	2
15	Stud Nuts 1/2" - 1-1/2"	2
16	Dome Bolts	12
-	Index Pins (not shown) 1/2" - 1-1/2"	1

* Recommended spare parts



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-Body
20*	Disc
21*	Disc Spring
22	Cap Screw
23	Lockwasher
24	Bolt
25	Nut
26	Cap Screw
27	Stem Bushing (Upper)
35	Pipe Plug - 1/4" NPT
36	Pipe Plug - 1/2" NPT

* Recommended spare parts

