DR Series Radial Diaphragm Valves
Service Instructions

Valves with Plastic Actuators
(1/2 through 1 inch)

Manual model

Pneumatic model

Valves with Aluminum Actuators
(1/2 through 2 inch)

Manual model

Pneumatic model

For product technical data, including materials of construction, see the *Radial Diaphragm Valves, DR Series* catalog.
These service instructions apply to DR series valves with both plastic and aluminum actuators.

Contents

Definitions

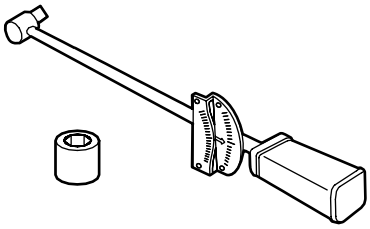
Statements and symbols are used in this document to identify safety concerns.

⚠ This symbol indicates information to avoid a potential hazardous situation that may be encountered during use of the product. Failure to follow the instructions may result in injury to person or property.

Tool Requirements

Torque Wrench(es)

See chart for torque requirements based on valve size.



Hex Socket

See chart for socket size requirements based on valve size.

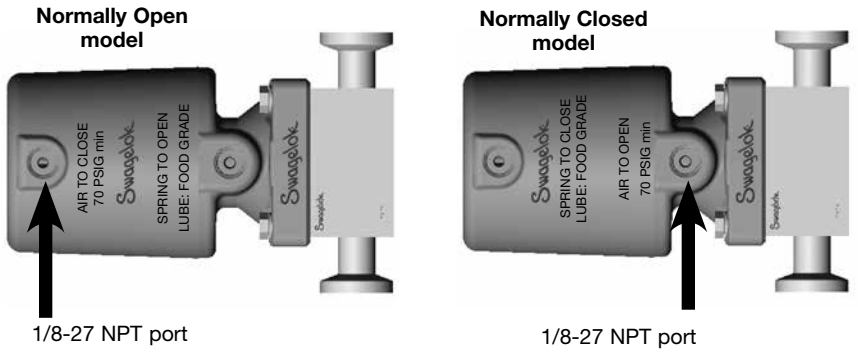
Valve Size in.	Torque in.·lb	Hex Socket Size in.
1/2	25	5/16
3/4	45	1/2
1	120	9/16
1 1/2	190	5/8
2	265	3/4

Operation

Manual Valve

To open, turn handle counterclockwise approximately 1 to 1 1/2 turns

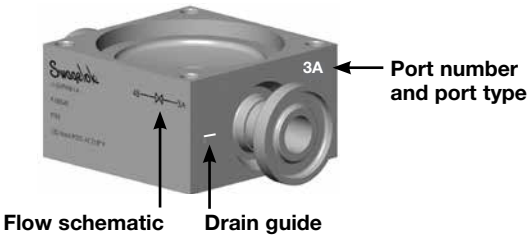
Pneumatically Actuated Valves



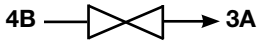
To actuate, apply 70 psig (4.8 bar) (0.48 MPa) minimum

Markings

1. The following information is marked on the valve body as a guide to proper installation.



2. Refer to the **flow schematic** to verify the flow path through the valve. Example:

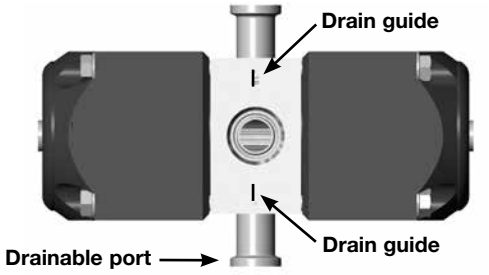


3. Each port is marked with a port number (**1, 2, 3, or 4**) followed by an **A** or **B** for port type.
   - **A** indicates a port *above* the seat, usually an outlet port.
   - **B** indicates a port *below* the seat, usually an inlet port.

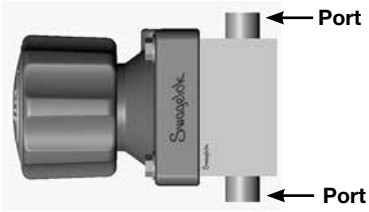
Installation

1. To maximize drainability in horizontal tubing runs,
   - install the valve with the **actuator** in the **horizontal** position.
   - if a valve has **one drain guide**, install the valve with the drain guide in a **vertical** line *above* the port.

2. The **2A** body style has **two drain guides** and should be installed with drain guides in a **vertical** line *above* and *below* the port. Only the port facing *down* is drainable.



3. The **1A** body style should be installed with the ports in a **vertical** position to optimize drainability.



4. For valves with TS series sanitary fitting end connections, see the **TS Series Sanitary Fitting Installation and Assembly** card**,** MS-CRD-TS.
5. For valves with butt weld end connections, see the **Welding** section on page 5.

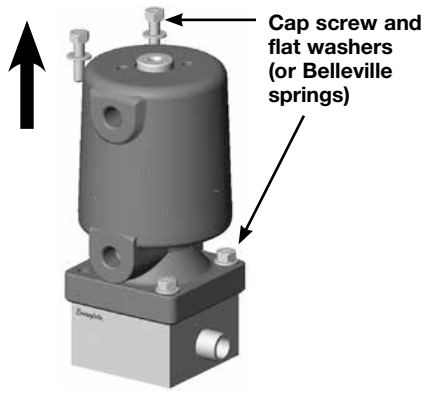
Valve Disassembly

⚠ **Before servicing any installed valve you must**

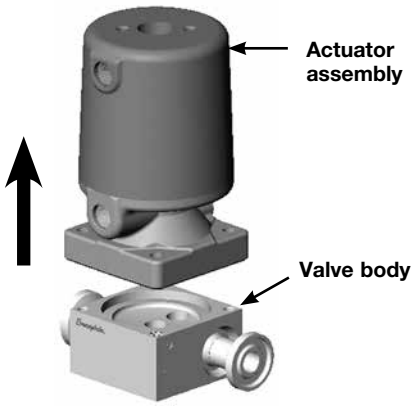
- **depressurize the system**
- **purge the valve.**

⚠ **Do not disassemble the pneumatic actuator. The normally closed and normally open actuators are under high spring load.**

1. After depressurizing the system and purging the valve, remove the valve from the system, if possible.
2. Actuate the valve to the OPEN position.
   - For **normally closed** and **double-acting** valves, use 70 psig (4.8 bar, 0.48 MPa).
   - For **normally open** valves, relieve the pressure to the actuator.
   - For **manual** valves, rotate the handle counterclockwise until fully opened.
3. Remove the four **cap screws** and **washers** (or Belleville springs). See **Fastener Usage Guide** on page 4.

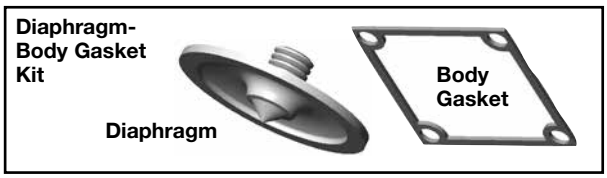


4. Remove the **actuator assembly** from the valve body.

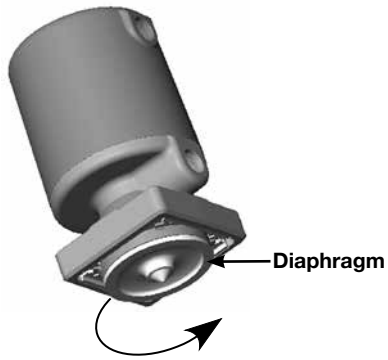


5. Proceed to **Replacing the Diaphragm** or **Welding** sections.

Replacing the Diaphragm



1. Follow steps 1 through 4 in the **Valve Disassembly** section.
2. Actuate the actuator **assembly** to the CLOSED position.
   - For **normally closed** assemblies, relieve the pressure to the actuator.
   - For **normally open** and **double-acting** assemblies, use 70 psig (4.8 bar, 0.48 MPa) minimum.
   - For **manual** assemblies, rotate the handle clockwise until closed.
3. Hold the outer edge of the **diaphragm** and rotate *counterclockwise* to remove the diaphragm from the actuator assembly.



4. Thread the *new* **diaphragm** into the actuator assembly by holding the diaphragm on the outer edge and rotating the diaphragm *clockwise*.

5. Thread the *new* **diaphragm** into the actuator assembly until it is finger-tight.

⚠ **Do not overtighten the diaphragm.**

Valve Reassembly

1. Actuate the **actuator assembly** to the OPEN position.
   - For **normally closed** and **double-acting** assemblies, use 70 psig (4.8 bar, 0.48 MPa).
   - For **normally open** assemblies, relieve the pressure to the actuator.
   - For **manual** assemblies, rotate the handle counter-clockwise until fully opened.

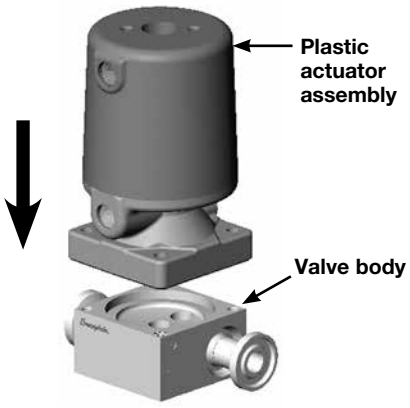
2. Aluminum Actuators ONLY: Place the square **body gasket** on body. Align the **mounting holes** in the gasket with the **mounting holes** in the body.

   Plastic Actuators ONLY: No square **body gasket** is required.

3. Place the **actuator assembly** onto the valve body, seating the diaphragm in the body opening.

⚠ **Actuator must be in the OPEN position before installing it on the valve body.**

   - Orient the **actuator** in the desired position before placing it on the body.



   Align the **mounting holes** in the actuator with the **mounting holes** in the valve body.

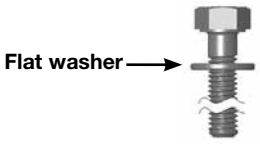
⚠ **Aluminum Actuators ONLY: The diaphragm should fit *inside* the body gasket. Make sure the body gasket is not pinched between the diaphragm and the body.**

Fastener Usage Guide

B = Belleville spring F = Flat washer

Actuator Material	Valve Size, in.				
	1/2	3/4	1	1 1/2	2
Aluminum	Not needed	B	B	B	B
Plastic	F	F	F		

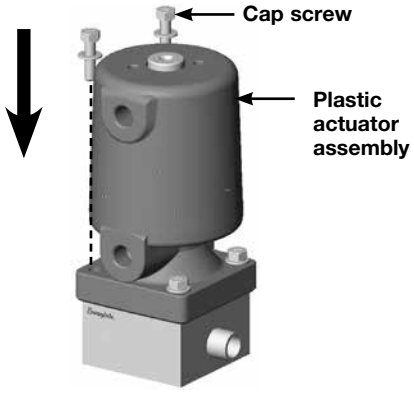
4a. Plastic Actuators ONLY: Place a **flat washer** on each cap screw. See **Fastener Usage Guide**.



4b. Aluminum Actuators ONLY: Place a **Belleville spring** on each cap screw as required. See **Fastener Usage Guide**. Note: The raised center of the spring must be against the head of the screw.

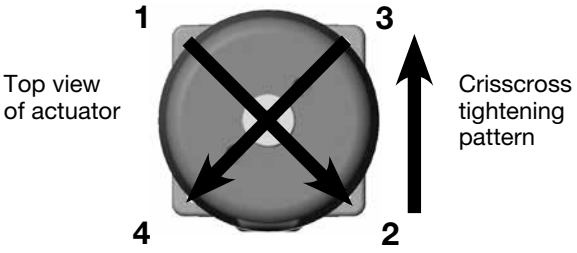
5. Apply a **food-grade lubricant** to the lower 3 to 4 threads of each cap screw. Exception: No lubricant is required on screws for 1/2 in. manual or pneumatic valves.

6. Thread the cap screws into the mounting holes of the actuator and the valve body until finger-tight.



7. Tighten the **cap screws** with a torque wrench in a series of three passes as listed in the appropriate chart below. Use a crisscross-tightening pattern for each pass.

⚠ **Do not overtighten actuator screws. Use the torque values listed in the appropriate chart.**



⚠ **<u>Plastic Actuators ONLY</u>: After the cap screws have been torqued, no gap should be visible between the actuator housing and the body. If there is a gap, tighten the cap screws.**

Torque Values for Cap Screws

Valves with Plastic Actuators

Valve Size in.	Torque, in. • lb		
	First Pass	Second Pass	Third Pass
1/2	10	20	25
3/4	15	30	45
1	30	80	120

Valves with Aluminum Actuators

Valve Size in.	Torque, in. • lb		
	First Pass	Second Pass	Third Pass
1/2	10	20	25
3/4	10	25	30
1	30	80	120
1 1/2	50	120	190
2	70	190	265

8. Test the **valve** for proper operation before installing it into the system. See **Testing** section.

Testing

1. With the valve in the OPEN position, verify that flow passes through the valve.
2. With the valve in the CLOSED position, verify that NO flow passes through the valve.
3. Test the diaphragm seal for leakage to the atmosphere.

Welding

1. All welding should be done by qualified personnel.
2. Use a high-purity purge gas to maintain cleanliness and reduce welding discoloration.
3. Disassemble the **actuator assembly** from the valve body. See the **Valve Disassembly** section on page 3.
4. Perform the welding procedure on the **body** according to standard industrial practices.
5. Reassemble the **actuator assembly** to the valve body. See the **Valve Reassembly** section on page 4.
6. Test the **valve** for proper operation before installing it into the system. See **Testing** section.

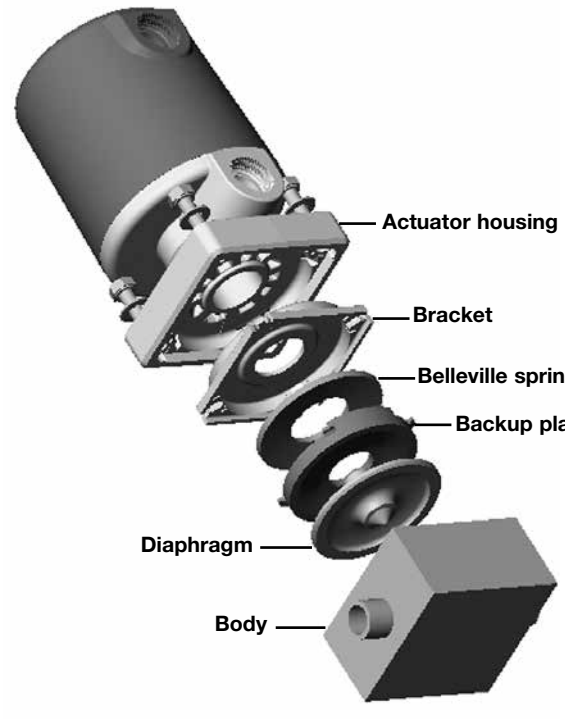
Torque Conversions

Torque Values		
in. • lb	N • m	cm • kg
10	1.1	12
15	1.7	17
20	2.3	23
25	2.8	29
30	3.4	35
45	5.1	52
50	5.7	58
70	7.9	81
80	9.0	92
120	13.6	138
125	14.1	144
190	21.5	219
265	29.9	305

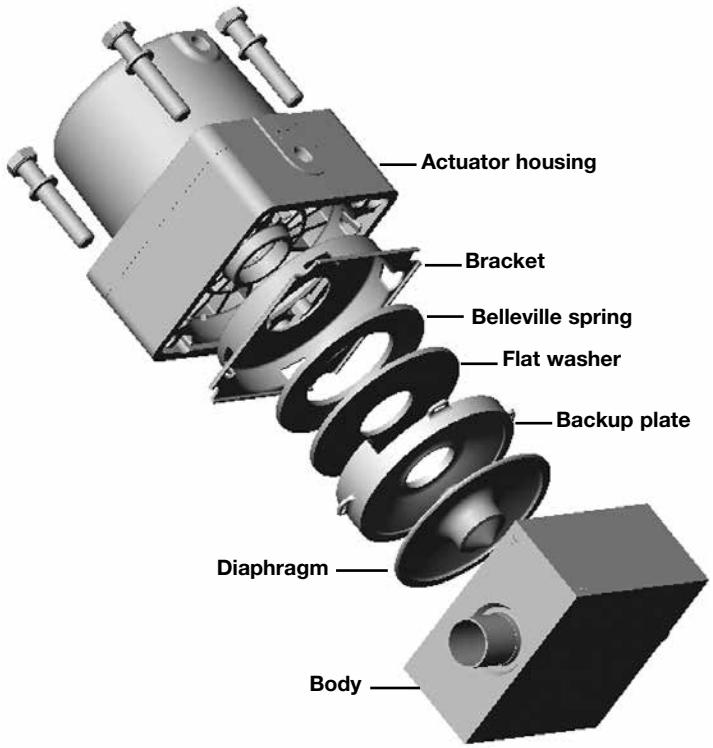
Exploded Views of Valves with Plastic Actuators

Note: Plastic actuators are not user-serviceable

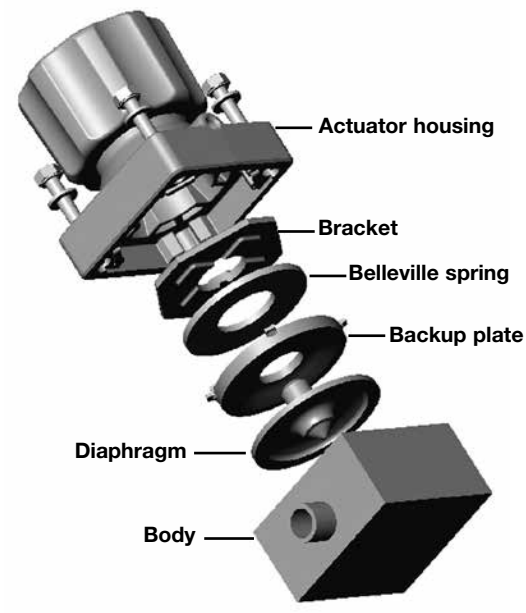
1/2 inch Valve with a Pneumatic Actuator



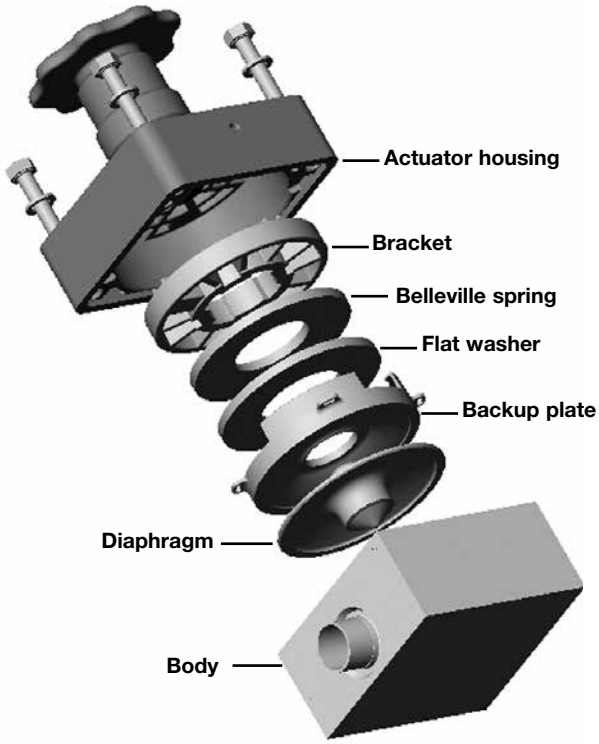
3/4 and 1 inch Valves with a Pneumatic Actuator



1/2 and 3/4 inch Valves with a Manual Actuator



1 inch Valve with a Manual Actuator



⚠ WARNING
Do not mix/interchange Swagelok products or components not governed by industrial design standards, including Swagelok tube fitting end connections, with those of other manufacturers.

Printed in U. S. A.
MS-CRD-0081, RevC, October 2021