DF Series Diaphragm Valve
Service Instructions

⚠️ WARNING
Before servicing any installed valve, you must
● depressurize the system
● cycle valve.

⚠️ WARNING
Residual material may be left in valve and system.

The valves are shown with tube butt weld ends. These instructions also apply to valves with any other end connection.

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Tool Requirements

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<tr>
<th>Part</th>
<th>Tool</th>
<th>Size</th>
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<tbody>
<tr>
<td>Bonnet nut</td>
<td>Open-end extension</td>
<td>1 5/16 in.</td>
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<td>Torque wrench</td>
<td></td>
<td>0 to 600 in.·lb (0 to 67.8 N·m, 0 to 691 cm·kg)</td>
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| VCR® fittings                             | Open-end wrench                      | Male 15/16 in.
|                                            |                                     | Female 1 1/16 in.    |
| “H” Type VCR fittings                     | Open-end wrench                      | Male 5/8 in.
|                                            |                                     | Female 3/4 in.       |
| Nut / lock washer (round handle only)     | Nut driver                           | 11/32 in.             |
| Sleeve hex (Integral lockout handle only) | Open-end extension or hex socket (deep well) | 18 mm               |
| Set screw ( Integral lockout handle only) | Hex wrench                           | 3/32 in.              |
Operation

Manually Actuated (Round Handle) Valve

⚠️ CAUTION
Do not turn the handle past three-quarters turn or valve could be damaged.

Manually Actuated (Integral Lockout Handle) Valve

⚠️ CAUTION
Do not turn the handle past three-quarters turn or valve could be damaged.

Pneumatically Actuated Valve

Air Inlet: Apply 70 psig (4.9 bar) to actuate

Turn counterclockwise three-quarters turn to open Turn clockwise three-quarters turn to close

Normally Open Pneumatic Valve

Turn counterclockwise three-quarters turn to open Turn clockwise three-quarters turn to close

To lock in the closed position, pull up on handle. Insert padlock (0.18 in. minimum shank diameter) through the hole.

Note: Hole diameter is 0.33 in. (8.3 mm).
Installation
To maintain original cleanliness, all valves are packaged in double bags. Remove outer bag prior to entering cleanroom. Remove inner bag in cleanroom.

Panel Mounting (Round Handle Valve)
1. Close the valve.
2. Pry upward on the cap insert to remove it.
3. Remove the nut/lock washer.
4. Lift upward on the round handle to remove it.
5. Pry upward on the outside edge of the base, opposite the bonnet tab, and remove.
6. Remove the panel nut.
7. Insert the valve through the panel.
8. Using the flow direction arrow on the valve, orient the valve to the proper flow direction.
9. Install the panel nut.
10. Position the slot in the base over the bonnet tab, then press the base onto the bonnet.
11. Slide the round handle onto the valve. Position the handle to center the C on the base in the window.
   Note: If the C cannot be centered in the window, offset the C slightly to the right (toward the word Open).
12. Install the nut/lock washer and tighten to 25 in-lb (2.8 N·m, 28.8 cm·kg).
13. Press the cap insert into place on the round handle.
**Welding (All Valve Types)**

⚠️ **WARNING**
Welding should be done by qualified personnel as outlined in Section IX of the ASME Boiler Code.

⚠️ **CAUTION**
Disassembly of the valve is not required for inline welding if proper precautions are taken. If the valve is disassembled, cover the sealing surfaces to protect them from nicks and weld spatter.

1. If necessary, use a heat sink to prevent excessive heating of internal components.
2. Actuate the valve to the OPEN position.
3. Connect the purge gas supply so that the gas exits out of the valve port being welded.

⚠️ **CAUTION**
Use a high quality purge gas to maintain cleanliness and reduce welding discoloration.

4. Perform the weld.
5. With the valve in the open position, purge the valve and system of contamination.
6. Test the valve for proper operation and leak-tight integrity. See **Testing**.

**Testing**

**All Valves**
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 and the seat seal for leakage by performing an inboard helium leak test to a rate of $1 \times 10^{-9}$ std cm$^3$/s.
4. Test the seat seal for leakage at the application pressure.

**Manually Actuated (Round Handle) Valves**
1. Turn the handle to the open position, then the closed position to test for proper three-quarters turn operation.

**Manually Actuated (Integral Lockout Handle) Valves**
1. Turn the handle to the open, then the closed position to test for proper three-quarters turn operation.
2. With the valve in the closed position, pull up on the handle to test for proper locking function.
Replacing Diaphragms, Upper Assembly or Body (All Valve Types)

**Disassembly**

⚠️ **CAUTION**
Whenever the valve is disassembled, new diaphragms must be installed.

1. Remove the valve from system if possible.
2. Place the valve in the open position. Normally closed valves, apply 70 psig (4.8 bar) minimum actuator pressure.
3. Loosen the bonnet nut.
4. Remove the upper assembly and both diaphragms.

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**Maintenance**

**Kit Contents**

- Diaphragm Kit
  - Diaphragms

- Body Kit
  - Body Assembly

- Upper Assembly Kit
  - Manually Actuated (Round Handle) Assembly
  - Manually Actuated (Integral Lockout Handle) Assembly
  - Pneumatically Actuated Assembly
Maintenance (contd)

Reassembly

Caution

Seal surfaces on the body, seat assembly, and diaphragms must be clean before reassembly. Particles can damage the seat and seal surfaces.

1. Place the two new diaphragms inside the lip on the body with the convex side of the diaphragms facing up.

2. Place the upper assembly on the body.
   - Pneumatically actuated assemblies: No alignment is required.
   - Manually actuated (round handle) assemblies: Align the word open in the handle window over the outlet port on the body.
   - Manually actuated (integral lockout handle) assemblies: Align the word open in the handle window over the outlet port on the body.

3. Hold the upper assembly down firmly against the body assembly and thread the bonnet nut onto the body hand-tight.
4. Torque the bonnet nut to 550 in.-lb (62.1 N·m, 633 cm·kg).
5. Test the valve for proper operation and leak-tight integrity. See Testing. If a manual valve leaks across the seat, reset handle. See Resetting the Round Handle or Resetting the Integral Lockout Handle.

Resetting the Round Handle

1. With the handle in the open position, pry off the cap insert and remove the nut/lock washer.
2. Keep the handle splines engaged with the upper assembly splines and lift the handle up approximately 1/8 in. to allow the handle stop to clear the bonnet tab.
3. Turn the handle clockwise until the valve is fully closed.
4. Test the valve for proper operation and leak-tight integrity. See Testing. Repeat steps 1 through 3 until valve passes testing.

Note: Base removed for clarity
**Resetting the Round Handle (contd)**

5. Reposition the handle on the valve body, making sure the C on the base is centered in the window.
   
   Note: If the C cannot be centered in the window, offset the C slightly to the right (toward the word OPEN)

6. Reinstall the nut/lock washer and torque to 25 in.-lb (2.8 N·m, 28.8 cm·kg).

7. Press the cap insert into place on the handle.

8. Reinstall valve in system.

**Resetting the Integral Lockout Handle**

1. With the handle in the closed position, loosen the set screw using a hex wrench.

2. Lift up on handle and remove from valve.

3. Turn the sleeve hex counterclockwise one-half turn.

4. Turn the sleeve hex clockwise to the closed position and torque to 25 in.-lb (2.8 N·m, 28.8 cm·kg).

5. Align the slot on the inside diameter of the handle with the tab on the base and place the handle on the valve.

6. Slide the handle down until the bottom of the handle is level with the bottom of the base.

7. Tighten the set screw to 10 in.-lb (1.1 N·m, 11 cm·kg).

7. Test the valve for proper operation and leak-tight integrity. See Testing.

   If valve fails any of the testing, repeat steps 1 through 7.
Accessories for Pneumatic Valves (Normally Closed Only)

*Indicator Switch Kit Contents*

![Diagram of Indicator Switch Kit Contents]

**Indicator Switch Installation**

⚠️ **CAUTION**
Whenever the valve is disassembled, new diaphragms must be installed.

**Disassembly**
1. If possible, remove the valve from the system.
2. Actuate the valve to the open position. Apply 70 psig (4.8 bar) minimum actuator pressure.
3. Loosen the **bonnet nut**.
4. Remove the **upper assembly** and both diaphragms.

**Reassembly**
1. Using the modified actuator assembly, reassemble the valve. See steps 1 through 4 of **Maintenance Reassembly**).
2. Thread the **indicator switch** into the **threaded hole** on the cap until the **plunger** rests on top of the internal piston.
3. Connect switch leads to a continuity tester.
4. Thread the **indicator switch** into **cap** until the continuity tester indicates that the switch is actuated.
5. Thread the **jam nut** against the **cap** and tighten.
6. Test the valve for proper operation and leak-tight integrity. Test the indicator switch by actuating the valve open and closed.
7. Install the valve into the system and connect the switch wire leads.

**Caution:**
Do not mix or interchange parts with those of other manufacturers.

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