

DP Series Diaphragm Valve Installation and Maintenance Instructions

Swagelok®

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NOTE:

- Appropriate testing should be performed after reassembly is complete to assure proper installation.

Installation

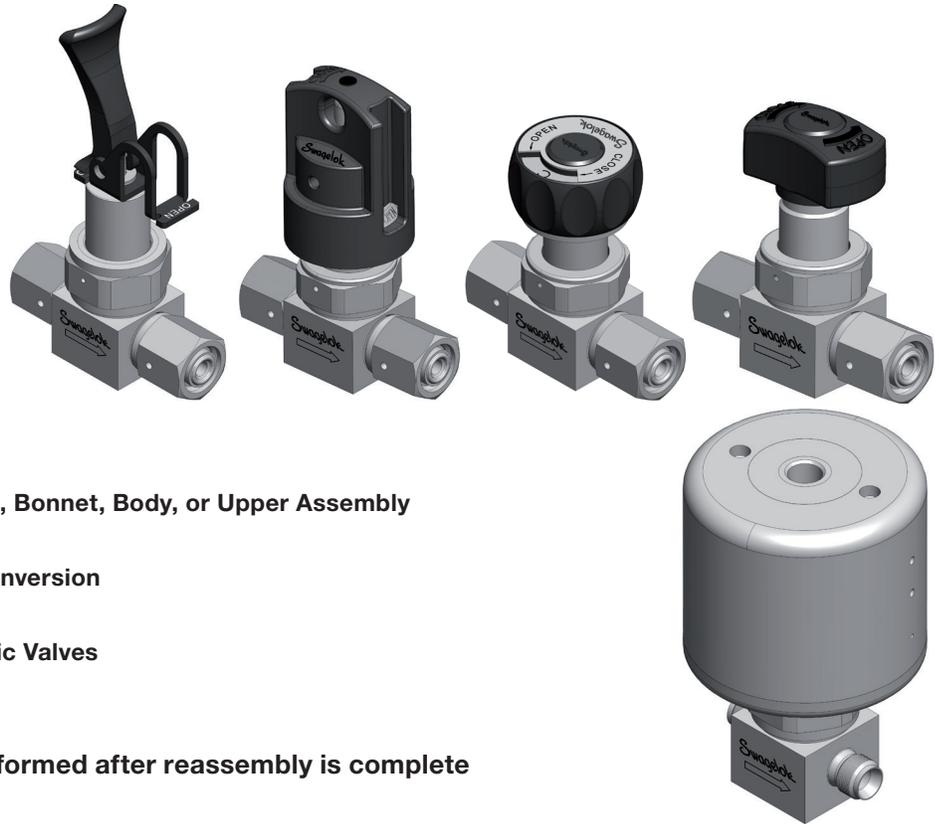
Actuation:

To actuate the valve to the **OPEN** position:

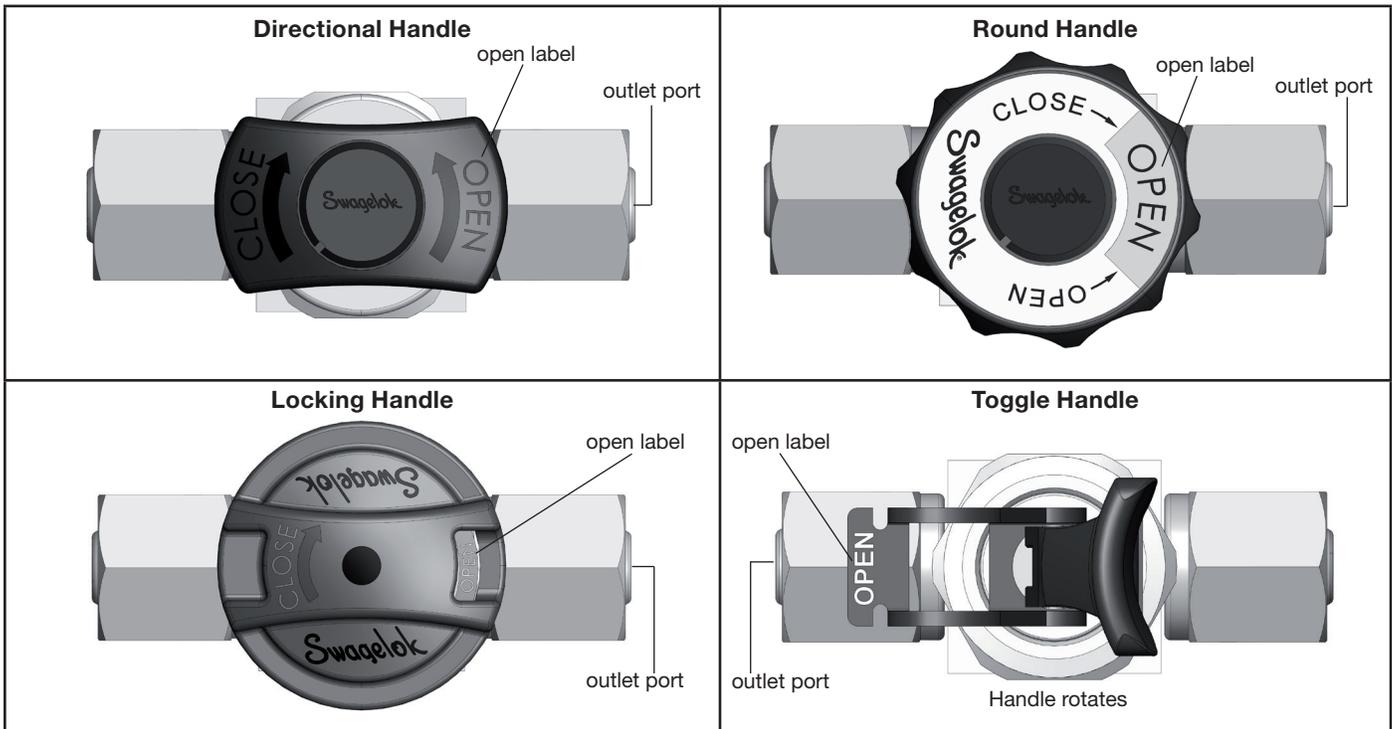
- **Pneumatic Valve—Normally Closed**
 - **Low-Pressure Model**, apply 60 to 120 psig (4.2 to 8.2 bar) to air inlet.
 - **High-Pressure Model**, apply 70 to 120 psig (4.9 to 8.2 bar) to air inlet.
- **Pneumatic Valve—Normally Open**, relieve the pressure to the actuator.
- **Manual Valves**
 - **Directional, Round and Locking Handles**, turn the handle counter-clockwise to full open.
 - **Toggle Handle**, lift up on handle.

To actuate the valve to the **CLOSED** position:

- **Pneumatic Valve—Normally Open**
 - **Low-Pressure Model**, apply 60 to 120 psig (4.2 to 8.2 bar) to air inlet.
 - **High-Pressure Model**, apply 70 to 120 psig (4.9 to 8.2 bar) to air inlet.
- **Pneumatic Valve—Normally Closed**, relieve the pressure to the actuator.
- **Manual Valves**
 - **Directional, Round and Locking Handles**, turn the handle clockwise to close.
 - **Toggle Handle**, push down on handle.



Actuator Orientation



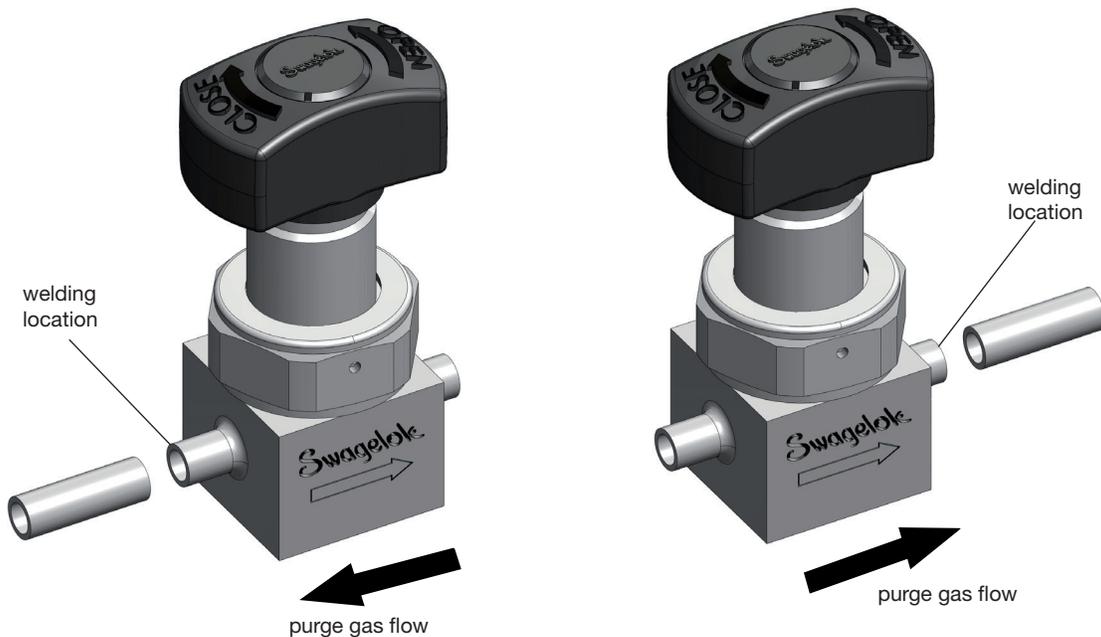
Welding

Notice:

- All welding should be done by qualified personnel.
- Disassembly of valve is not required for in-line welding if the steps listed below are followed. If valve disassembly is necessary, cover sealing surfaces to protect them from nicks and weld splatter.
- If not using Swagelok welding system, use a heat sink to prevent excess heating of internal components.

1. Actuate the valve to the OPEN position. See **Actuation** for instructions.
2. Connect the purge gas to exit out of the valve port being welded to keep the diaphragms and seat cool.
3. Perform welding procedure.
4. With valve in OPEN position, continue purging valve and system of contaminants.

NOTE: Use a high-purity purge gas to maintain cleanliness and reduce welding discoloration.



Testing

All Valves:

- With the valve in the OPEN position, verify that flow passes through the valve.
- With the valve in the CLOSED position, verify that no flow passes through the valve.
- Test the diaphragm seal and seat seal for leakage.
- Test the seat seal for leakage at application pressure.

Directional and Round Handle Valves:

- Turn handle to the OPEN then CLOSED positions to test for proper quarter-turn operation.

Locking Handle Valves:

- Turn the handle to the OPEN then CLOSED positions to test for proper quarter-turn operation.
- With the valve in the CLOSED position, pull up on the handle to test for proper locking function.

Toggle Handle Valves:

- Actuate handle to the OPEN then CLOSED positions to test for proper toggle operation.

Maintenance

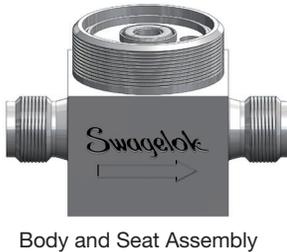
Kit Contents

Diaphragm Kit



Body Assembly Kits

- *High-Pressure & Low-Pressure*



Actuator Assembly Kits

- *High-Pressure Actuators*



• *Low-Pressure Actuators*



Directional Handle Kit



Round Handle Kit



Lockout Handle Kit

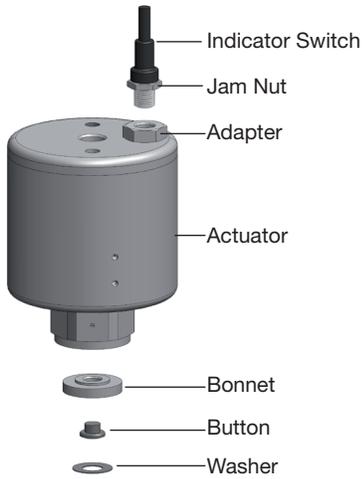


Round Handle Conversion Kit

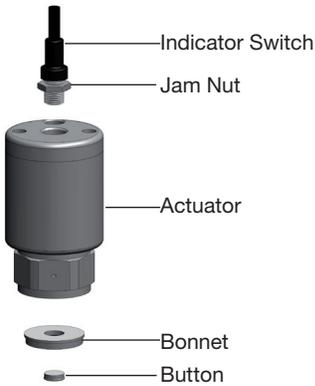


Actuator and Indicator Switch Kits

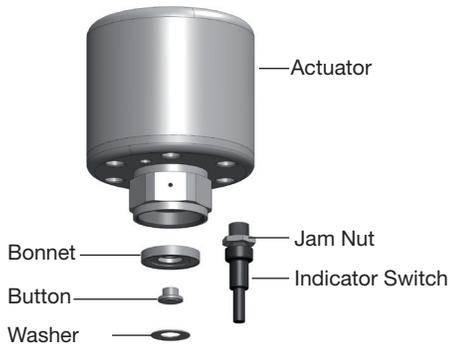
• **High-Pressure, Normally Closed**



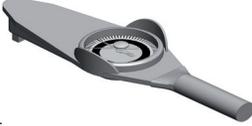
• **Low-Pressure, Normally Closed**



• **High-Pressure, Normally Open**



Tools Requirements

Tool	Size	Part
 Crow's Foot	1 1/8 in	Bonnet Nut
 Torque Wrench	0 to 600 in.-lb (0 to 67 N-m)	
 Open-ended wrench	1 1/8 in.	Bonnet Nut
	3/4 in.	VCR Fittings
	7/8 in.	Panel Nut
	9/16 in.	Adapter
 Nut Driver	11/32 in.	Nut/Lockwasher
 Hex wrench	3/32 in.	Set screw (Locking Handle)
 Torx® bit	T7 or 7IP Torx Plus®	Set screw (Round Handle)
 Hex Socket	18 mm	Sleeve Hex
 Hex Bit Adapter	3/32 in.	Set screw (Locking Handle)
 Splined Tool	-	MS-Tool-DPK-Spline
 Vacuum Pen	-	Diaphragm

Exploded View—Low-Pressure Models

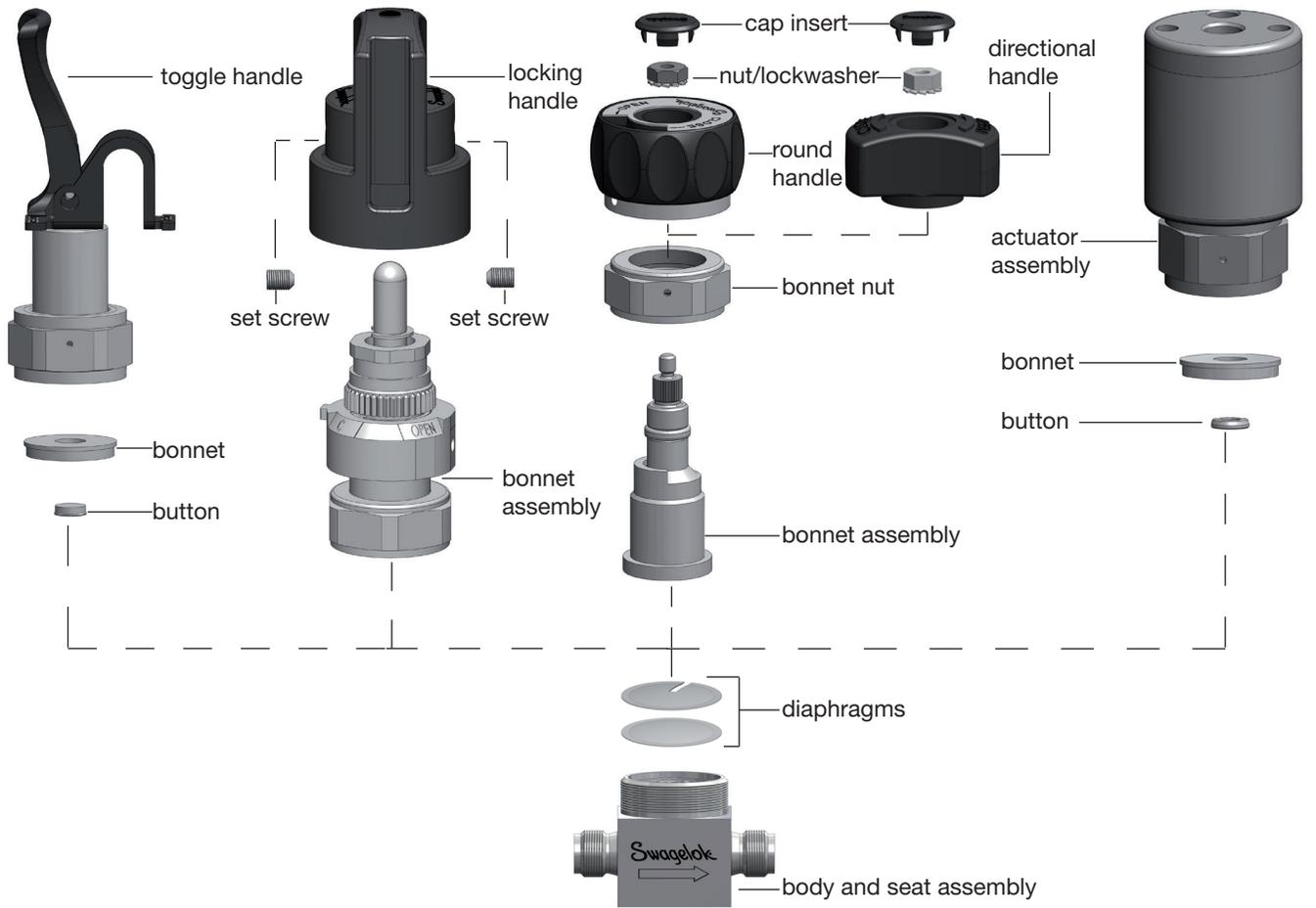
Toggle Handle

Locking Handle

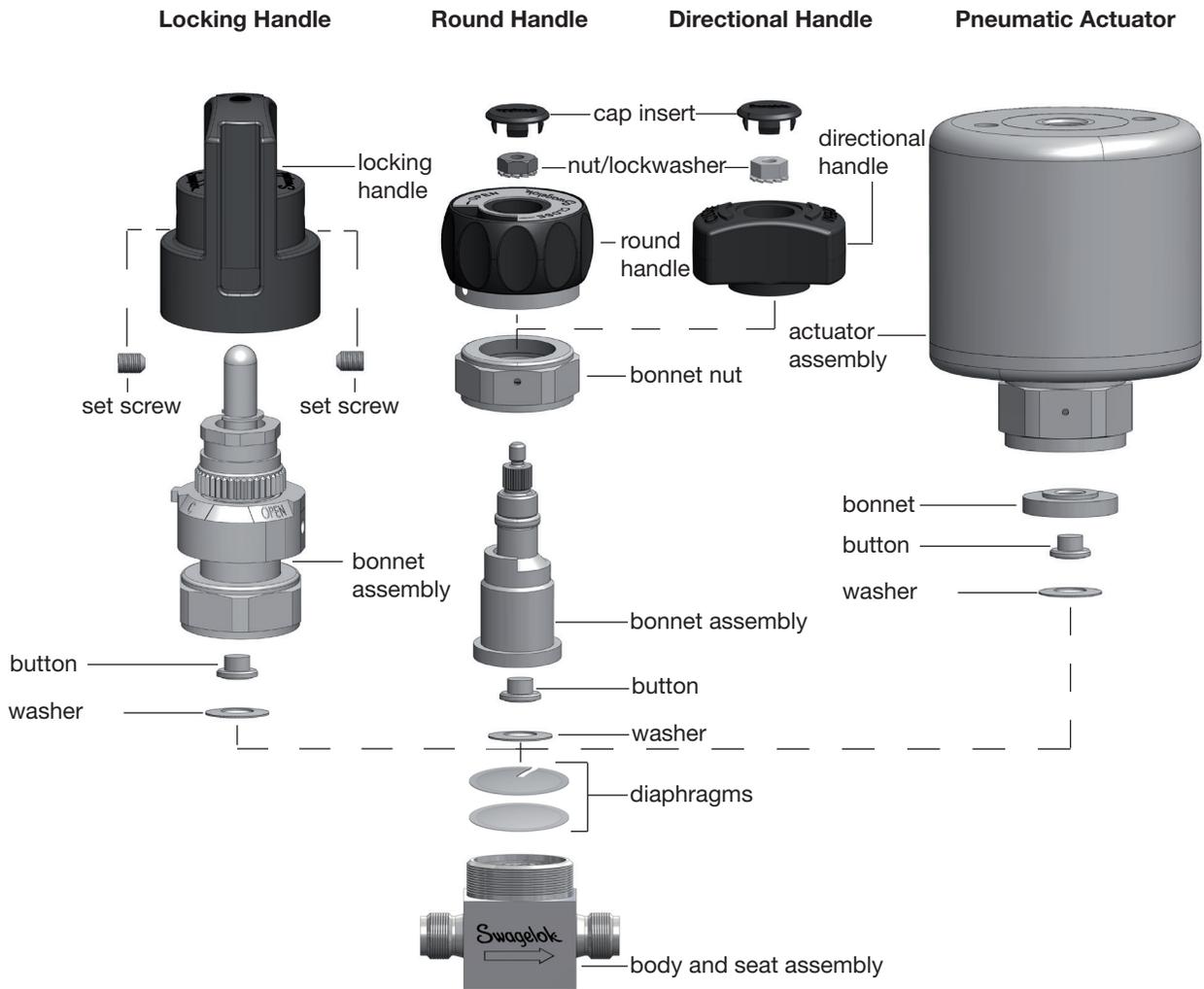
Round Handle

Directional Handle

Pneumatic Actuator



Exploded View—High-Pressure Models



⚠ WARNING

Before servicing any installed valve, you must:

- Depressurize the system.
- Cycle the valve.
- Purge the system to remove any residual system media left in the valve.

Replacing Diaphragms, Washer, Button, Bonnet, Body, or Upper Assembly

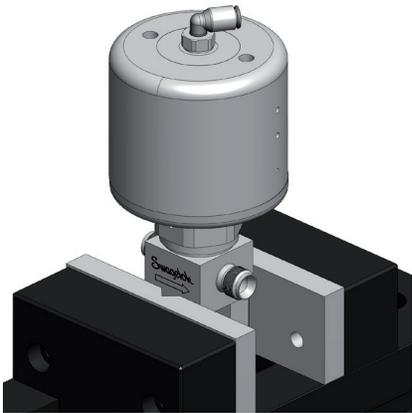
- When replacing diaphragms, discard the **diaphragms** only.
- When replacing the **actuator assembly**, discard all components except the body assembly.
- When replacing the **body assembly**, discard the diaphragms and the body assembly.

Disassembly:

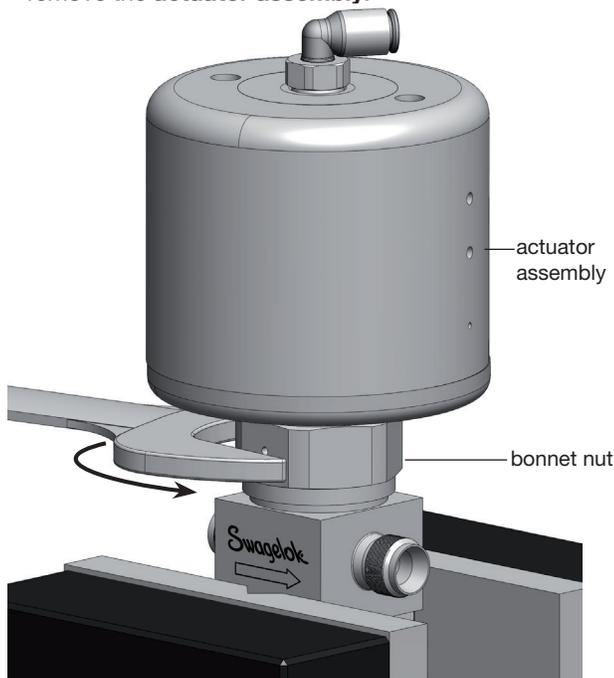
1. After depressurizing the system and purging the valve, remove the **valve** from the system, if possible.
2. Actuate the **valve** to OPEN position. See **Actuation** for instructions.

NOTICE

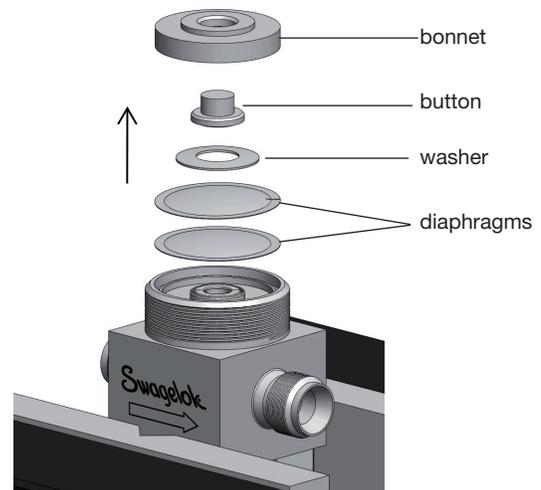
Disassembly or assembly of a valve with the actuator in the **CLOSED** position can damage the valve seat.



3. Loosen the **bonnet nut** using a 1 1/8 in. wrench and remove the **actuator assembly**.



4. Remove the **bonnet, button, washer, diaphragms**, as applicable.

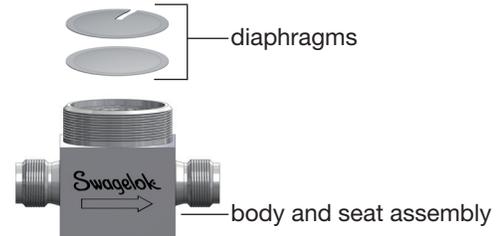


NOTICE

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

Reassembly:

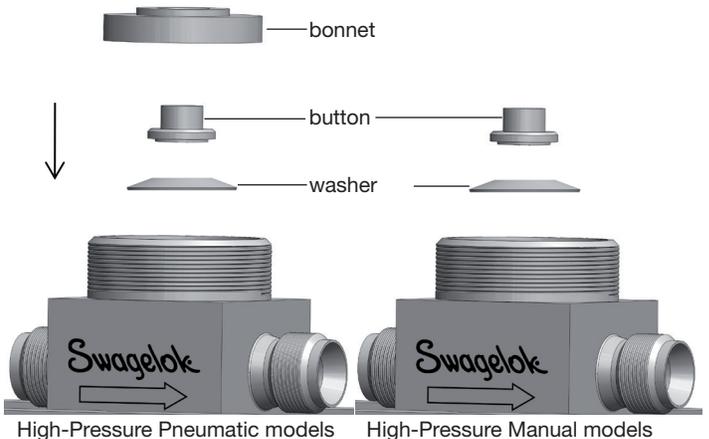
1. Using a vacuum pen or similar tool, place a clean **diaphragm** onto the body, dome side up. Using a vacuum pen or similar tool place a **support diaphragm** on top of the clean diaphragm, dome side up.



2. For **high-pressure** models, center the parts on top of the diaphragm in order shown.

NOTICE

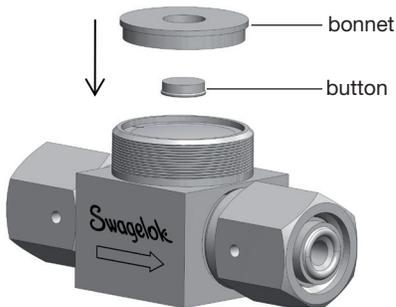
Incorrect orientation of washer can damage seat.



For **low-pressure** models, center the parts on top of the diaphragm in order shown.

NOTICE

- **Button** is to be placed flange side down
- **Bonnet** is to be placed concave side down



Low-Pressure Pneumatic models

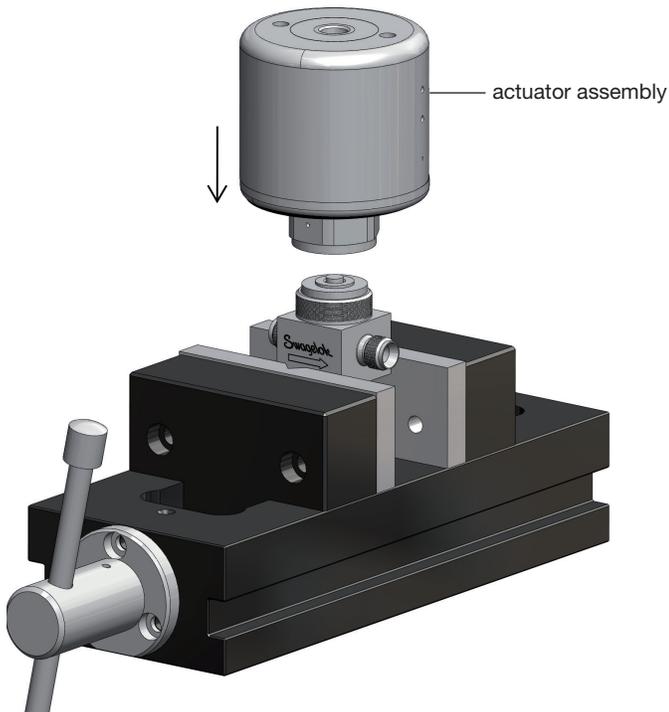
3. Actuator to be in the OPEN position. See **Actuation** for instructions.

NOTICE

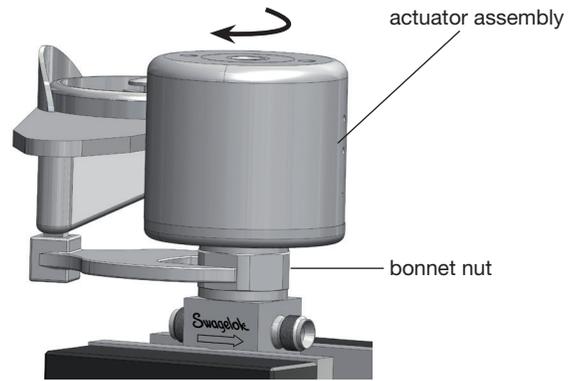
Disassembly or assembly of a valve with the actuator in the CLOSED position can damage the valve seat.

4. **Manual Actuator:** Place the **actuator assembly** on the body. Correct orientation is necessary. See **Actuation Orientation** for proper orientation.

Pneumatic Actuator: Place the **actuator assembly** on the body. No specific alignment is required.



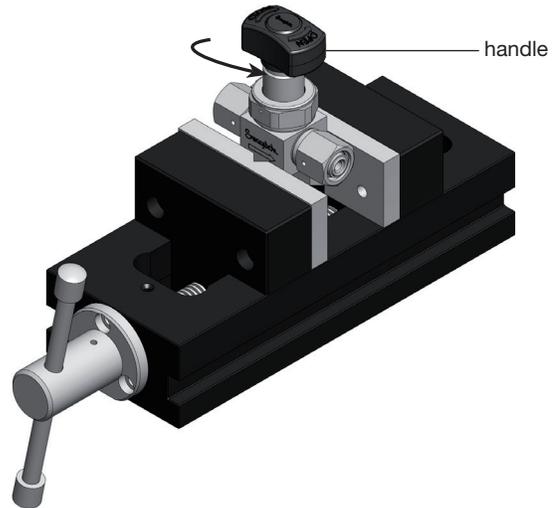
5. Hold the **actuator assembly** firmly against body and thread the **bonnet nut** onto the body hand-tight.
6. Tighten the **bonnet nut** with a 1 1/8 in. wrench. Torque **bonnet nut** to 500 - 550 in.-lb (56.5 - 62.1 N-m).



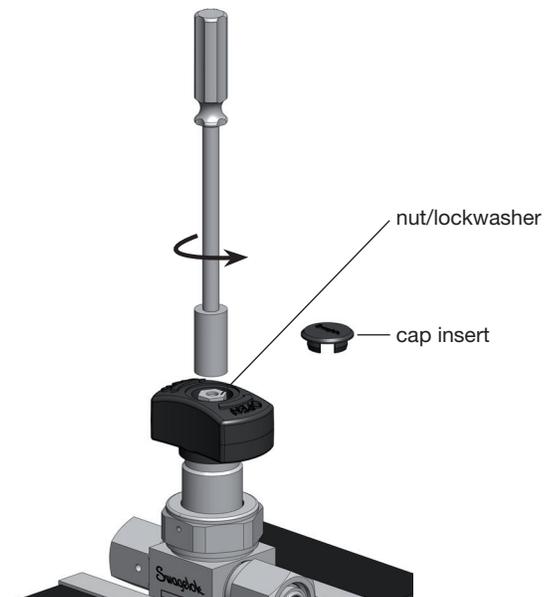
Handle Replacement

Directional and Round Handles:

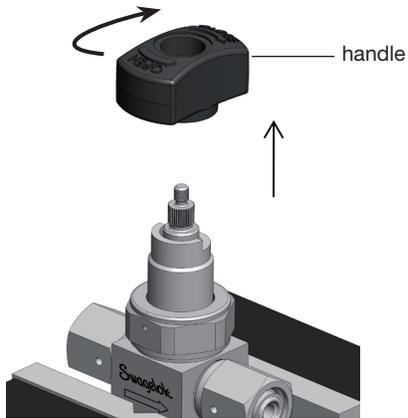
1. Turn the **handle** to the OPEN position. See **Actuation** for instructions.



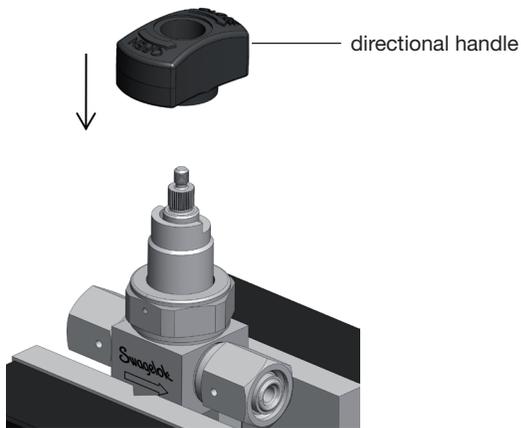
2. Remove the **cap insert**. Then remove the **nut/lockwasher** with an 11/32 in. nut driver. **DO NOT REMOVE HANDLE.**



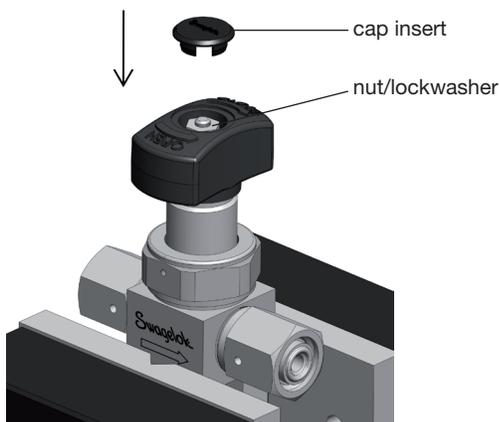
- Turn **handle** to CLOSED position. Lift up on **handle** and remove it from the valve.



- Place the new **Directional** or **Round Handle** onto the actuator. See **Actuation Orientation** for proper orientation.

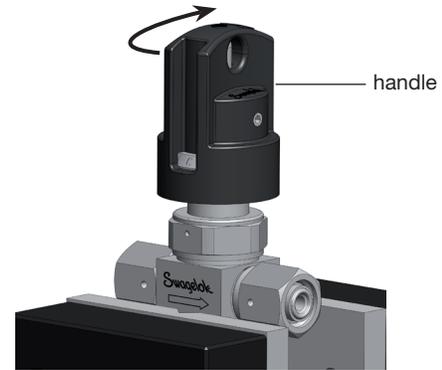


- Reinstall the **nut/lockwasher**. Tighten with an 11/32 in. nut driver to a torque of 25 ± 2.0 in.-lb (2.8 ± 0.23 N-m).
- Place **cap insert** back onto top of handle.

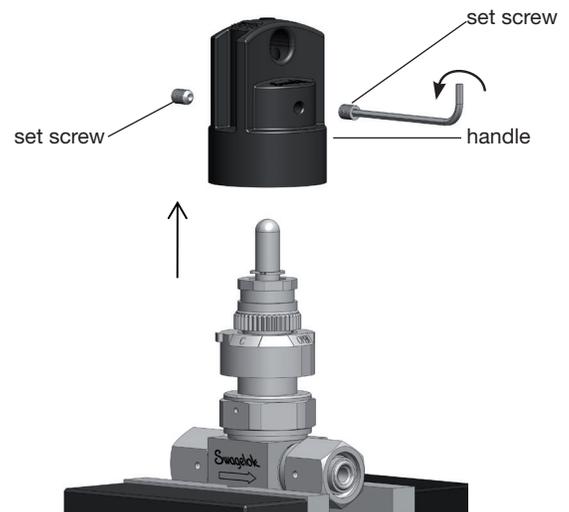


Locking Handle:

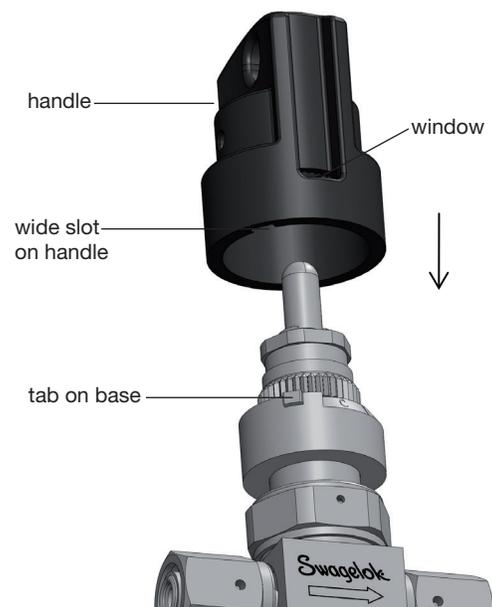
- Turn the **handle** to the CLOSED position. See **Actuation** for instructions.



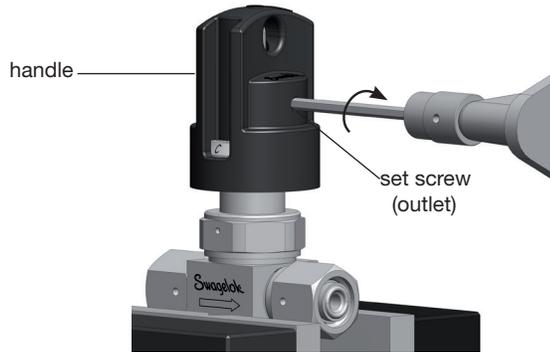
- Loosen **set screw (2)** in the side of the **handle** with a 3/32 in. hex wrench.
- Lift up on **handle** and remove from valve.



- Place new **handle** on the actuator. Align the **wide slot** on the inside diameter of the handle with the **tab** on the base. The **wide slot** is on the **window** side of the handle.

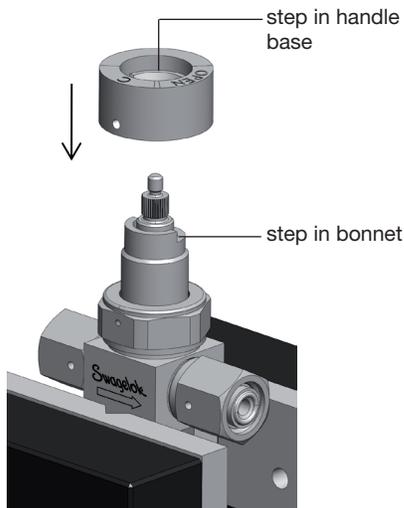


- Slide the **handle** down until the bottom of the **handle** is level with the bottom of the **base**.
- Tighten the inlet **set screw** with a 3/32 hex wrench, finger-tight. Tighten the outlet **set screw** to a torque of 10 ± 2.0 in.-lb (1.1 ± 0.23 N-m).

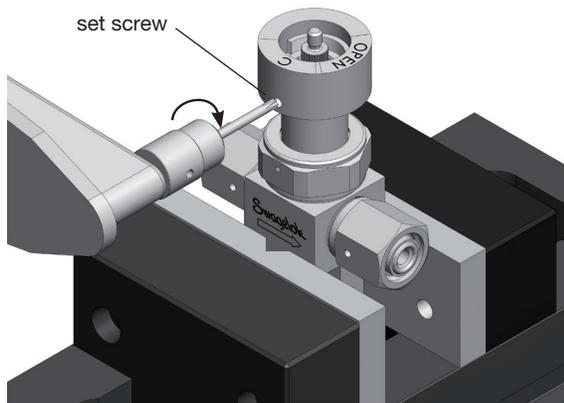


Directional Handle to Round Handle Conversion

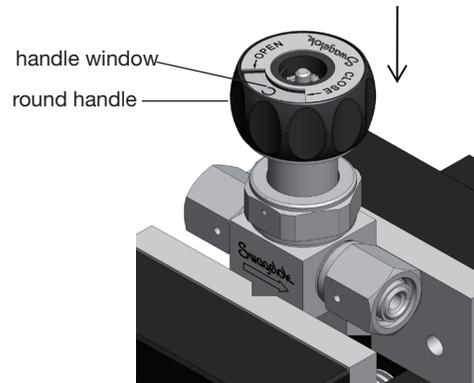
- Remove directional handle. Follow steps 1 through 3 from **Handle Replacement, Directional and Round Handles**.
- Install the **handle base** by aligning the step in the **handle base** with the step in the **bonnet**.



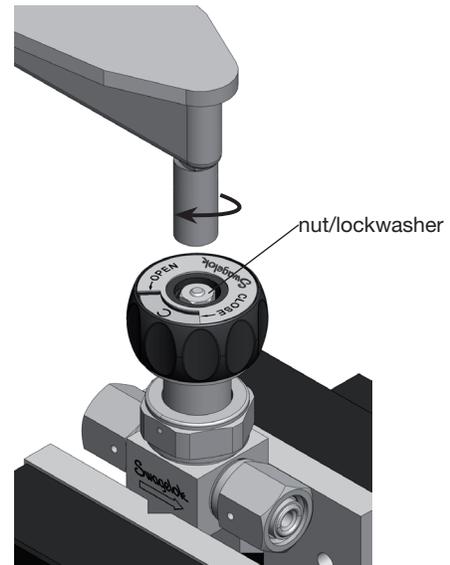
- Tighten the **set screw** with a T7 or 7IP Torx Plus bit to 10 ± 2.0 in.-lb (1.1 ± 0.23 N-m).



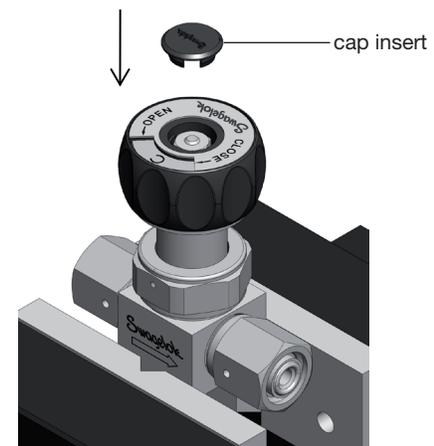
- Slide the **round handle** onto the actuator. Align the **handle** so the letter "C" is centered in the **handle window**.



- Reinstall the **nut/lockwasher** and tighten using 11/32 in. nut driver to a torque of 25 ± 2.0 in.-lb (2.8 ± 0.23 N-m).



- Install the new **cap insert** onto the handle.



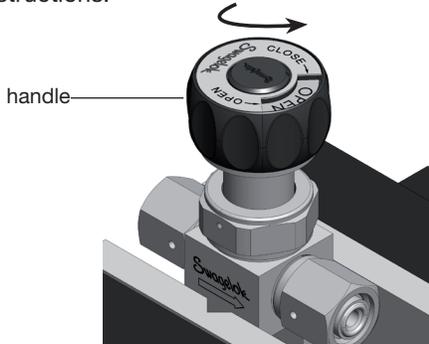
Resetting the Handles

Directional or Round Handles:

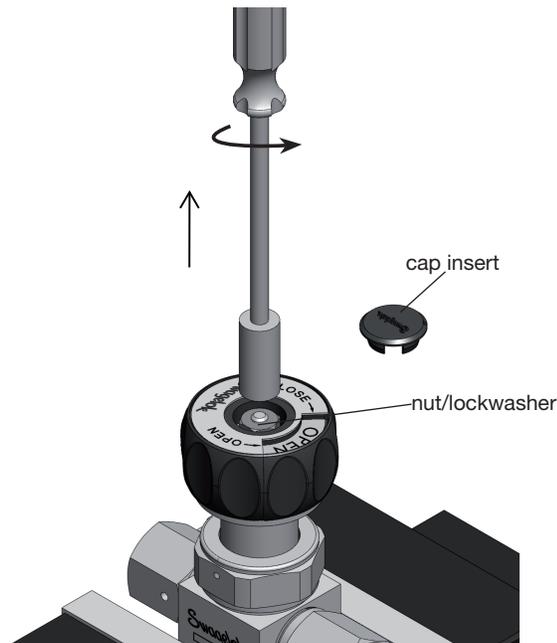
- Option 1 resets the handle ONLY.
- Option 2 resets the handle and the actuator torque applied to the diaphragms. (Preferred method)

Option 1

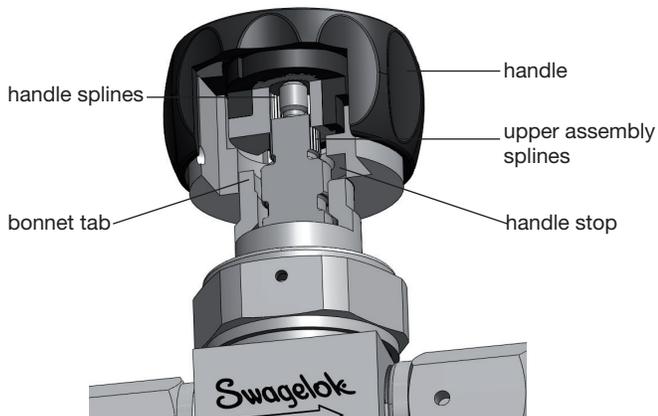
1. Turn the **handle** to the OPEN position. See **Actuation** for instructions.



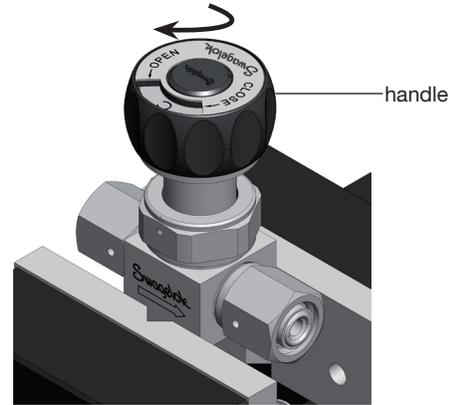
2. Remove the **cap insert**. Then remove the **nut/lockwasher** with an 11/32 in. nut driver. DO NOT REMOVE HANDLE.



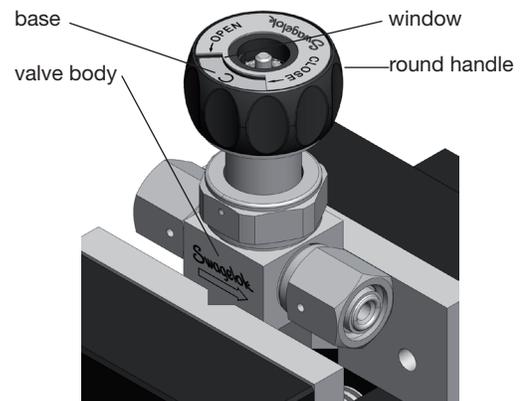
3. Keep the **handle splines** engaged with the **upper assembly splines** and lift the **handle** up approximately 1/8 in. to allow **handle stop** to clear the **bonnet tab**.



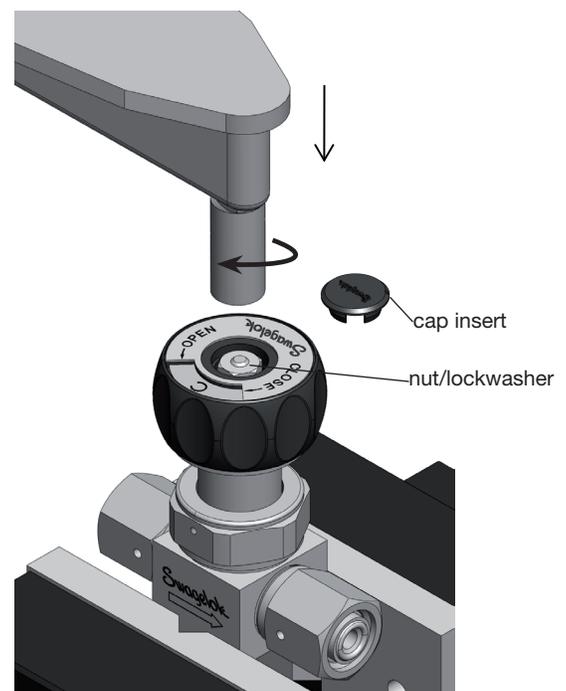
4. Turn the **handle** to a tightly CLOSED position 18 ± 2.0 in.-lb (2.0 ± 0.23 N-m). See **Actuation** for instructions.



5. **Round Handle:** Lift up and reposition handle on **valve body** such that "C" on the **base** is centered in the **window**. **Directional Handle:** Lift up on **handle** and reposition such that the OPEN label is over the **front** of the valve body.

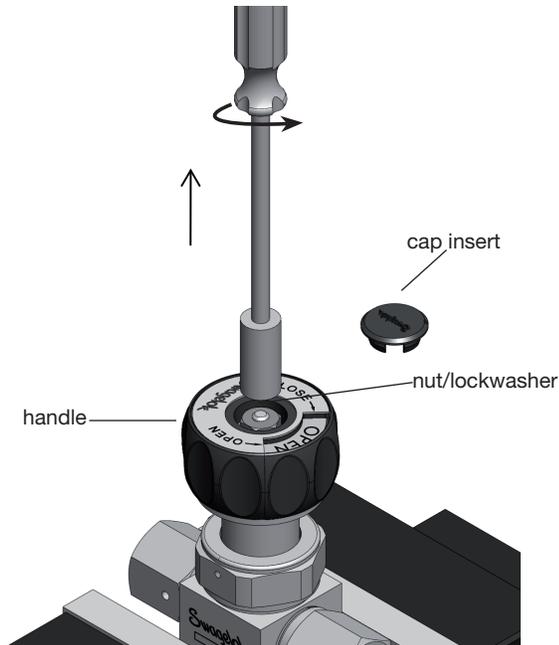


6. Reinstall the **nut/lockwasher** and torque to 25 ± 2.0 in.-lb (2.8 ± 0.23 N-m). Press the **cap insert** into place on the handle.

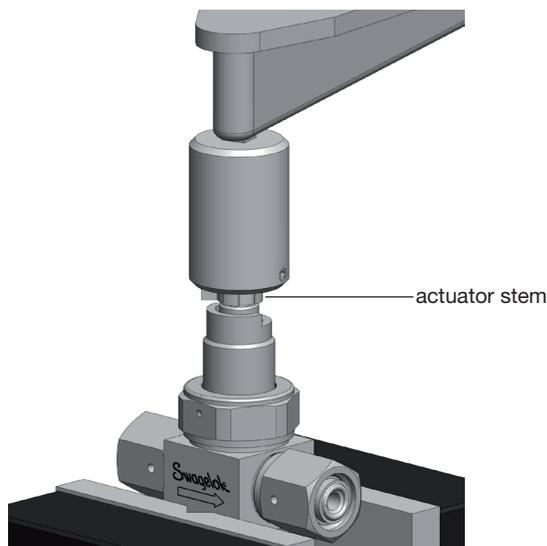


Option 2

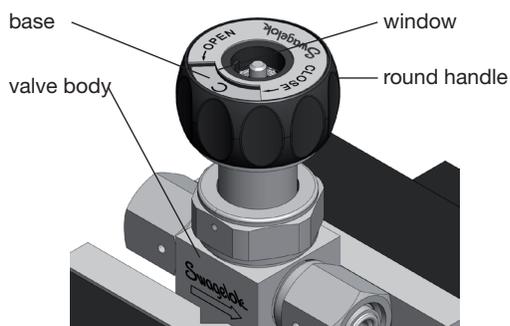
1. To disassemble the valve, follow steps 1 and 2 of Option 1. Remove **handle**.



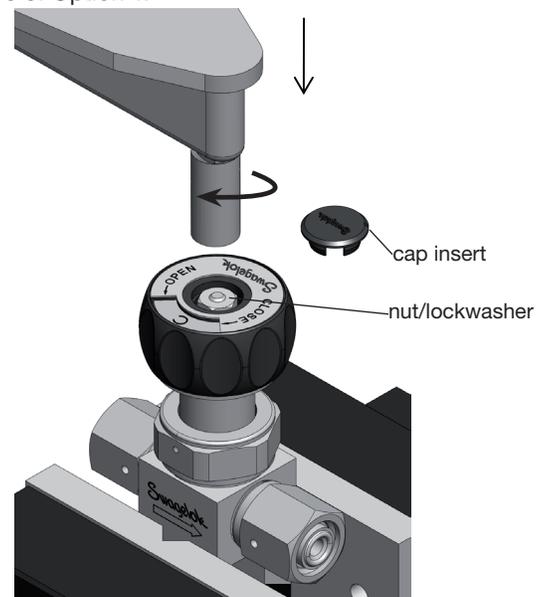
2. Using the spline tool and torque wrench, torque **actuator stem** to 18 ± 2.0 in.-lb (2.0 ± 0.23 N-m).



3. Place the **handle** on the **valve** in the CLOSED position.
 - For the round handle, center the C on the base in the window.
 - For directional handle, center the OPEN label over the front of the valve body.

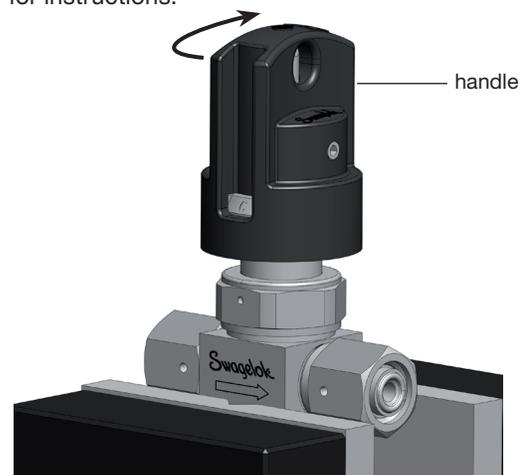


4. To assemble the **nut/lockwasher** and **cap insert**, follow step 6 of Option 1.

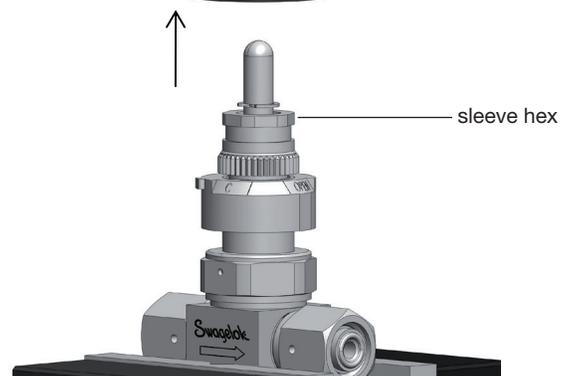


Locking Handle:

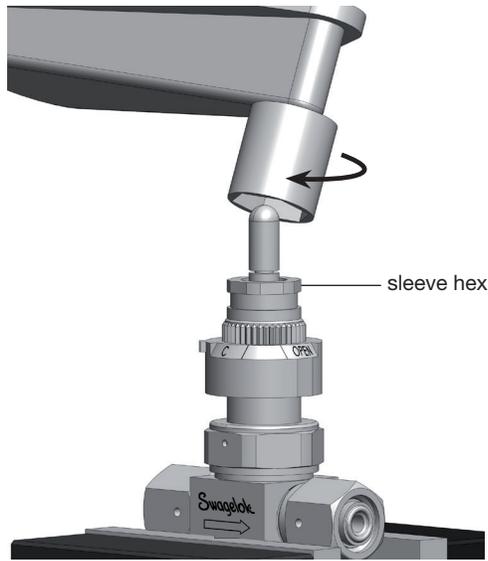
1. Turn the **handle** to the CLOSED position. See **Actuation** for instructions.



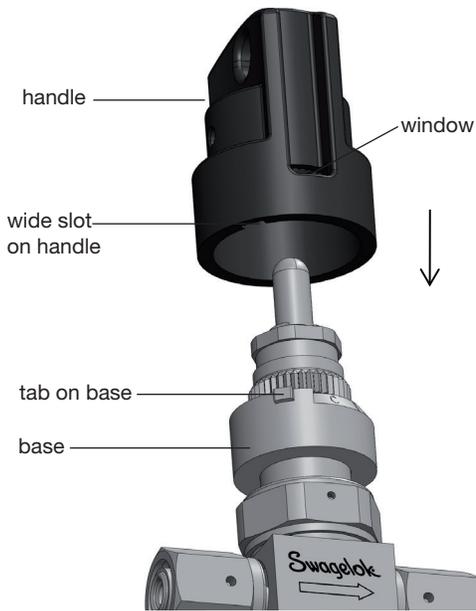
2. Loosen **set screw (2)** in the side of the handle with a 3/32 in. hex wrench. Lift up on **handle** and remove from valve body.



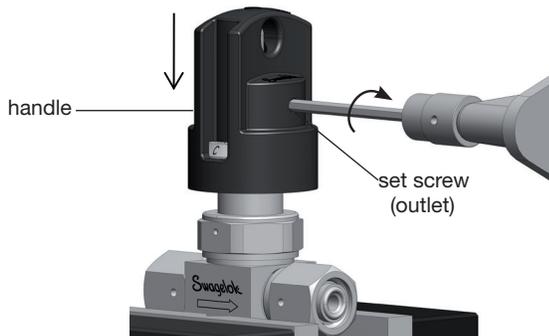
- Turn the **sleeve hex** counter-clockwise 1/2 turn using an 18 mm deep-well hex socket.
- Turn the **sleeve hex** clockwise to the closed position and torque to 18 ± 2.0 in.-lb (2.0 ± 0.23 N-m).



- Align the **wide slot** on the inside diameter of the **handle** with the **tab** on the **base**, and place **handle** on valve. The **wide slot** is on the **window** side of the handle.



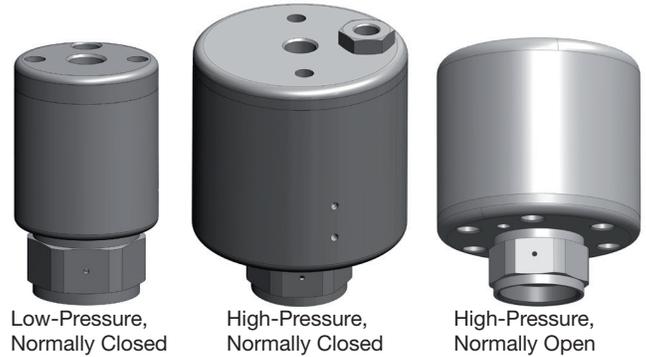
- Slide the **handle** down until the bottom of the handle is level with the bottom of the **base**.
- Tighten the inlet **set screw** with a 3/32 hex wrench, finger-tight. Tighten the outlet **set screw** to a torque of 10 ± 2.0 in.-lb (1.1 ± 0.23 N-m).



Indicator Switch Installation—Pneumatic Valves

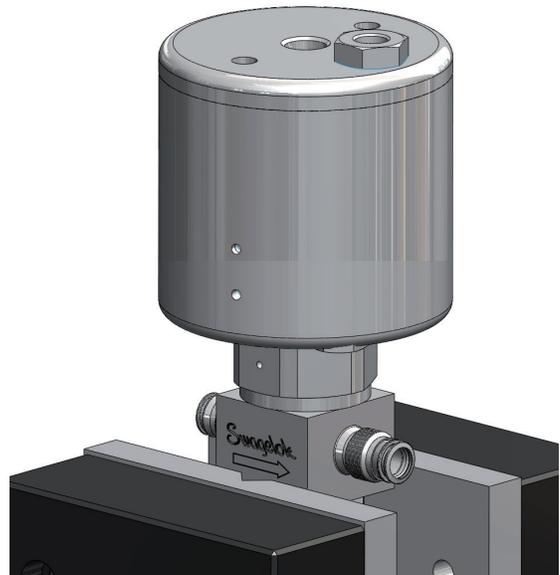
- Remove the **actuator assembly** from the valve. See steps 1 through 4 of *Replacing Diaphragms, Washer, Button, Bonnet, Body, or Upper Assembly—Disassembly*.
- Place **modified actuator assembly** on valve body. See steps 1 through 6 of *Replacing Diaphragms, Washer, Button, Bonnet, Body, or Upper Assembly—Reassembly*.

Modified Actuator Assembly



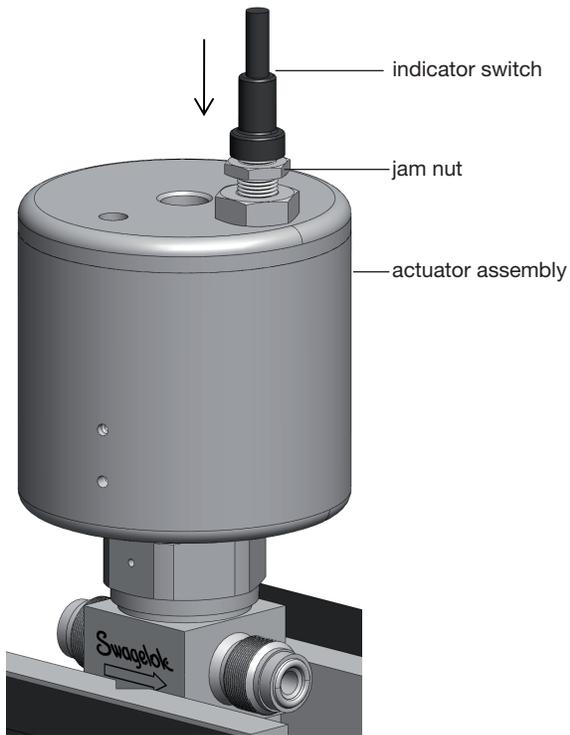
- For normally CLOSED valves, actuate to the OPEN position. For normally OPEN valves, actuate to the CLOSED position. See *Actuation* for instructions.

Actuate using 60 psig (4.2 bar) for low-pressure actuators, 70 psig (4.9 bar) for high-pressure actuators.

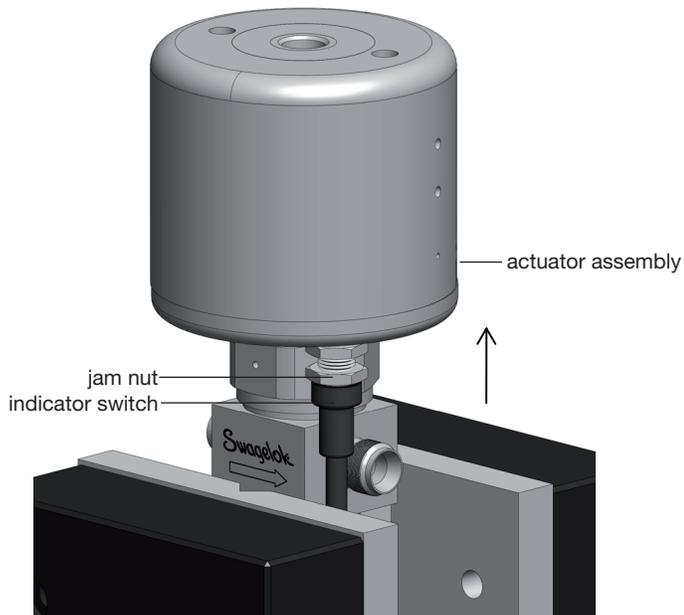


4. Thread the **indicator switch** into the **actuator assembly** approximately 4 full turns.

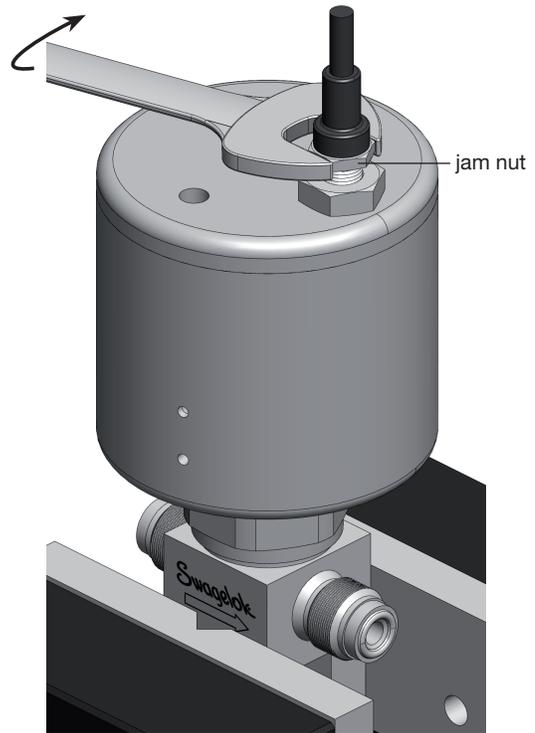
High- and Low-Pressure, Normally Closed



High-Pressure, Normally Open



5. Connect the **indicator switch wires** to a continuity tester.
6. Thread the **switch** into the assembly until the continuity tester is actuated. Thread an additional 1/4 to 1/2 turn to ensure continuity.
7. Thread the **jam nut** against the cap with a 7/16 in. wrench. Torque **jam nut** to 18 - 25 in.-lb (2.0 - 2.8 N-m).



Indicator Switch Test:

Actuate the valve OPEN and CLOSED to verify the switch operates correctly. Disconnect wires from continuity tester.

*For additional information, see **swagelok.com**.*