

Installation & Maintenance Instructions

3-WAY AND 4-WAY FUNCTION
 PAD MOUNTED SOLENOID PILOTED VALVES
 1/8" NPT – AIR SERVICE ONLY

SERIES

8401

I&M No.V6640R5 – Sec. 1
 (Section 1 of 2)

NOTICE: See I&M No. V6640R5 – Section 2 of 2 for exploded views.

DESCRIPTION

Series 8401 valves are solenoid operated, pad-mounted 3-way and 4-way function valves designed for air service. These valves are designed with a special base gasket which allows valve to function in a 3-way or 4-way mode depending upon requirements. When installed, the base gasket is indexed to the desired function (3 or 4 way) by locating a tab on the gasket in the appropriate slot in the sub-base. The sub-bases and main bodies are hard anodized die cast aluminum. The pilot bodies are made of molded nylon. Internal valve parts are designed for low friction, high strength, and long life. The upper valve body contains all working parts and is connected to the sub-base with screws. The sub-base contains the pressure, cylinder, and exhaust connections. A built-in manual operator allows manual operation when desired or during an electrical power outage. Series 8401 valves have an open-frame solenoid with a leaded or spade terminal coil depending upon requirements.

NOTE: See separate installation and maintenance instructions for General Purpose/Raintight/Watertight or Raintight/Watertight/Explosionproof solenoids.

Optional Electrical Connectors (Solenoid Piloted Valves)

Conduit Connector Kit No. K224735: The open-frame solenoid with lead wires may be provided with a gasket threaded conduit hub for watertight construction (see Figure 3).

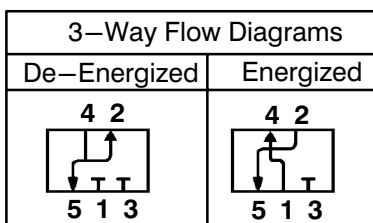
DIN Plug Connector Kit No. K226061: The open-frame solenoid with spade terminal connections may be used with the plug connector kit providing a 2-pole with grounding contact 3 x DIN 46244 (Pg 9P), Industrial Type (11 mm) construction (see Figure 4).

OPERATION

• 3-Way Function

Solenoid De-energized: Flow is from Port 4 to Ports 5 and 2. Ports 1 and 3 are closed.

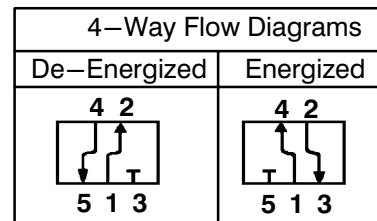
Solenoid Energized: Flow is from Port 2 to Port 5 and from Port 1 to Port 4. Port 3 is closed.



• 4-Way Function

Solenoid De-energized: Flow is from Port 4 to Port 5 and from Port 1 to Port 2. Port 3 is closed.

Solenoid Energized: Flow is from Port 1 to 4 and from Port 2 to Port 3. Port 5 is closed.



NOTE: A loss of main line pressure will not cause the valve to shift in either the energized or de-energized solenoid mode.

IMPORTANT: Main inlet pressure must be a minimum of 20 psig.

Manual Operation

Manual operator provides manual operation when desired or during an electrical power outage. To operate valve manually, insert a screwdriver into stem slot and push downward, then release. This action will operate the valve momentarily. To maintain this position, push down stem and rotate it clockwise 90°; stem will remain in the down position. Valve will now be in the same position as when the solenoid is energized. To disengage manual operator, rotate operator stem counterclockwise 90°; stem will return upward.

CAUTION: To prevent malfunction be sure to turn stem to the up position (disengaging manual operator) before operating valve electrically.

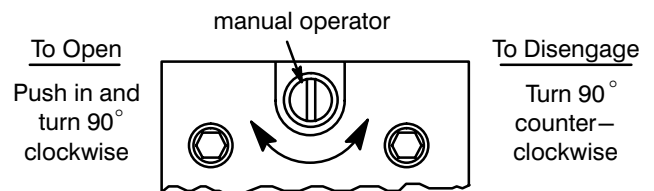
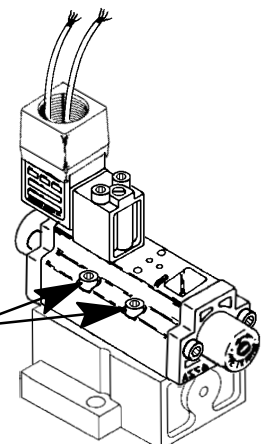


Figure 1. Partial view of pilot valve (top) to show location of manual operator.

Flow Controls (Metering)

Orientation for Adjustment: Face the side of the valve body that has two sub-base socket head cap screws. These screws hold the valve body (with all moving parts) to the sub-base containing all pipe connections (see below).

FRONT SIDE OF VALVE
 TWO SCREWS



Adjustment

When the valve leaves the factory, the metering stem is backed out counterclockwise (toward plus +) as far as possible giving full unrestricted flow. Before starting, check this adjustment to verify that the metering stem is backed out fully counterclockwise.

CAUTION: Metering stem will turn easy and should not be forced once it stops.

- **Metering Stem Adjustment “Left Side” when facing valve:**

With solenoid de-energized, turn metering stem clockwise (toward minus -) to meter flow from Port 4 to Port 5 and from Port 1 to Port 2.

- **Metering Stem Adjustment “Right Side” when facing valve:**

With solenoid energized, turn metering stem clockwise (toward minus -) to meter flow from Port 1 to Port 4 and from Port 2 to Port 3.

INSTALLATION

Check nameplate for correct catalog number, pressure, voltage, frequency, and service. Never apply incompatible fluids or exceed pressure rating of the valve. Installation and valve maintenance to be performed by qualified personnel.

Future Service Considerations

Provision should be made for performing seat leakage, external leakage, and operational tests on the valve with a nonhazardous, noncombustible fluid after disassembly and reassembly.

Temperature Limitations

- Maximum ambient temperature 135°F for AC service; 77°F for DC service.
- Maximum fluid temperature 135°F; minimum 0°F.

Note: For temperatures below 32°F moisture free air must be used.

Positioning

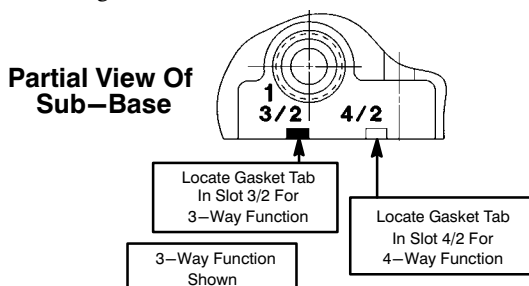
Valve may be mounted in any position.

Mounting

Pad mount to actuator according to manufacturers instructions prior to making piping connections.

Positioning of Base Gasket for 3-Way or 4-Way function See *Partial View of Sub-Base* below.

- For 3-Way function locate gasket tab in slot in sub-base under marking 3/2.
- For 4-Way function locate gasket tab in slot in sub-base under marking 4/2.



Piping

Connect piping to valve according to markings on valve body. Apply pipe compound sparingly to male pipe threads only. If applied to valve threads the compound may enter the valve and cause operational difficulty. Avoid pipe strain by properly supporting and aligning piping. When tightening the pipe, do not use valve or solenoid as a lever. Locate wrenches applied to valve body or piping as close as possible to connection point.

* DuPont's Registered Trademark

CAUTION: To avoid damage to the valve body, DO NOT OVERTIGHTEN PIPE CONNECTIONS. If TEFLON* tape, paste, spray or similar lubricant is used, use extra care when tightening due to reduced friction.

NOTE: The exhaust and/or cylinder lines may be restricted to control cylinder speed.

CAUTION: To protect the solenoid valve, install a strainer or filter, suitable for the service involved, in the inlet side as close to the valve as possible. Clean periodically depending on service conditions. See ASCO Series 8600, 8601 and 8602 for strainers.

Wiring

Wiring must comply with local codes and the National Electrical Code. Open-frame solenoid may be rotated in 90° increments by removing retaining clip or cap and coil. Then reposition coil and reinstall retaining clip or cap. Torque retaining cap to 10–12 in-lb [1,1–1,3 Nm] with a 21/32" socket.

NOTE: Valves can be converted from alternating current (AC) to direct current (DC), or vice-versa, by changing the coil.

Installation of Conduit Connector Kit No. K224735

(Refer to Figure 3)

1. Thread coil lead wires through connector gasket and conduit connector.
2. Position gasket and conduit connector against coil and install center screw. Torque center screw to 5 ± 1 in lbs [$0,6 \pm 0,1$ Nm].

Installation of DIN Plug Connector Kit No. K226061

(Refer to Figure 4)

1. Remove center screw from plug connector. Using a small screw driver, pry terminal block from connector housing.
2. Use #12–18 AWG stranded copper wire rated at 90°C or greater for connections. Strip wire leads back approximately 1/4" for installation in socket terminals. The use of wire-end sleeves is also recommended for these socket terminals. Maximum length of wire-end sleeves to be approximately 1/4". Tinning of the ends of the lead wires is not recommended.
3. Thread wire through gland nut, gland gasket, washer and connector housing.

NOTE: Connector housing may be rotated 180° from position shown in Figure 4 for alternate positioning of cable entry.

4. Check DIN connector terminal block for electrical markings. Then make electrical hookup to terminal block. Snap terminal block into connector housing and replace center screw.
5. Position gasket on coil and install plug connector. Torque center screw to 5 ± 1 in-lbs [$0,6 \pm 0,1$ Nm].

Solenoid Temperature

Series 8401 valves are supplied with coils designed for continuous duty service. When the solenoid is energized for a long period, the solenoid coil becomes hot and can be touched with the hand only for an instant. This is a safe operating temperature. Any excessive heating will be indicated by the smoke and odor of burning coil insulation.

MAINTENANCE

WARNING: To prevent the possibility of death, personal injury or property damage, turn off electrical power, depressurize valve, and vent fluid to a safe area before servicing the valve.

Cleaning

All solenoid valves should be cleaned periodically. The time between cleanings will vary depending on the medium and service conditions. In general, if the voltage to the coil is correct, sluggish valve operation, excessive noise, or leakage will indicate that cleaning is required. In the extreme case, faulty valve operation will occur and the valve may fail to shift. Clean valve strainer or filter when cleaning the valve.

Preventive Maintenance

- Keep the medium flowing through the valve as free from dirt and foreign material as possible.
- Periodic exercise of the valve should be considered if ambient or fluid conditions are such that corrosion, elastomer degradation, fluid contamination build up, or other conditions that could impede solenoid valve shifting are possible. The actual frequency of exercise necessary will depend on specific operating conditions. A successful operating history is the best indication of a proper interval between exercise cycles.
- Depending on the medium and service conditions, periodic inspection of internal valve parts for damage or excessive wear is recommended. Thoroughly clean all parts. If parts are worn or damaged, install a complete rebuild kit.

Causes of Improper Operation

- **Faulty Control Circuits:** Check the electrical system by energizing the solenoid. A metallic *click* signifies that the solenoid is operating. Absence of the *click* indicates loss of power supply. Check for loose or blown fuses, open-circuited or grounded coil, broken lead wires or splice connections.
- **Burned-Out Coil:** Check for open-circuited coil. Replace coil as necessary; see **Coil Replacement**. Check supply voltage; it must be the same as specified on nameplate.
- **Low Voltage:** Check voltage across the coil leads. Voltage must be at least 85% of nameplate rating.
- **Incorrect Pressure:** Check valve pressure. Pressure to valve must be within range specified on nameplate.
- **Excessive leakage:** Disassemble valve, and install a complete ASCO Rebuild Kit and pilot valve.

Coil Replacement (Refer to Figures 2 & 5)

1. Disconnect coil lead wires and rigid conduit. Remove center screw from conduit hub and conduit hub gasket. For constructions with plug connector, loosen center screw and pull plug connector from coil.
2. Remove retaining clip or cap and slip coil off plugnut/core tube sub-assembly.

⚠ CAUTION: When metal retaining clip disengages, it will spring outward.

3. Install new coil and replace retaining clip. Torque retaining cap to 10–12 in-lb [1,1–1,3 Nm] with a 21/32" socket.
4. Make electrical hookup; see **Wiring** section.

Service Note: Some valves are built with metric hardware. Refer to torque chart on page 4 of 5 (Section 1 of 2) for proper tool sizes and torque values.

Pilot Valve Replacement

1. If necessary, disconnect coil lead wires and rigid conduit. For constructions with plug connector, loosen center screw and pull connector from coil.
2. Remove two pilot valve screws, pilot valve and port gaskets (2) from valve body.
3. Install new port gaskets (2), pilot valve, and pilot valve screws.

Valve Disassembly (Refer to Figure 2)

1. Disassemble valve using exploded view for identification of parts.
2. Disconnect coil lead wires and rigid conduit. For constructions with plug connector, loosen center screw and pull plug connector from coil.
3. Remove piping from sub-base.
4. Remove sub-base mounting screws (2) using a 5/32" hex key wrench.
5. Remove entire valve with sub-base gasket for bench inspecting, cleaning or rebuilding.

6. Remove pilot valve screws, pilot valve and port gaskets (2) from valve body.

⚠ CAUTION: Exercise care when removing valve body from sub-base. Internal parts are now loose and may fall from cavity resulting in loss or damage.

7. Remove sub-base screws (3) and valve body from sub-base.
8. Turn valve body upside-down and remove the following parts: plate retaining clips (2), plate, slide, upper gasket, and spring.
9. From either end of valve body, remove end cap screws, end caps, and one end cap gasket.
10. Remove spool with large and small u-cups from valve body by pushing inward from small diameter end.
11. Remove large and small u-cups from spool.
12. All parts are now accessible for replacement. Clean valve and install a complete ASCO Rebuild Kit.

Valve Reassembly

1. Lubricate all gaskets, u-cups, slide (face), and bores of valve body (where spool seats) with Key Lube manufactured by Key Industries Inc. or equivalent lubricant.
2. Install large and small u-cups on spool. Be sure mouth or open end of u-cup faces inward, toward the center of the of the spool.
3. Install spool (small diameter end first) into large bore of valve body. Be sure flat cut (notch) on bottom of spool is facing valve body opening for the slide.
4. Carefully install spring and slide into notch in spool.

⚠ CAUTION: Do not force slide in place.

5. Install upper gasket, plate and plate retaining clips (2) in valve body.

NOTE: Hold this assembly together and push spool back and forth. Spool should slide easily.

6. Install sub-base gasket and valve body assembly on sub-base. Then replace sub-base screws (3).
7. Replace end cap gasket (one only at large diameter end), end cap, and end cap screws at either end of valve body.
8. Replace pilot valve port gaskets, (2) pilot valve, and pilot valve screws (2).
9. Position base gasket at bottom of sub-base. Be sure base gasket tab is oriented to the proper location for either 3-way or 4-way function. See section on **Positioning of Base Gasket for 3-Way or 4-Way Function**.
10. Reinstall valve to actuator according to manufacturer's instructions.
11. Make up piping and electrical hookup to the coil.

⚠ WARNING: To prevent the possibility of death, personal injury or property damage, check valve for proper operation before returning to service. Also perform internal seat and external leakage tests with a nonhazardous, noncombustible fluid.

12. Restore line pressure and electrical power supply to valve.
13. After maintenance is completed, operate the valve a few times to be sure of proper operation. A metallic *click* signifies the solenoid is operating.

ORDERING INFORMATION FOR ASCO REBUILD KITS, PILOT VALVES AND COILS

Parts marked with an asterisk (*) in the exploded view are supplied in Rebuild Kits. When ordering, specify catalog number, serial number, voltage, frequency, and service. For coil replacement also specify number printed on coil, if possible.

Torque Chart

Part Name	Wrench Size or Tool	Torque Value Inch–Pounds	Torque Value Newton–Meters
Pilot Valve Screws	7/64" Hex key or Phillips head screwdriver	12 ± 2	1,4 ± 0,2
Sub–base Screws End Cap Screws (with standard end cap)	9/64" Hex key or † 3mm Hex key	30 ± 2	3,4 ± 0,2
End Cap Screws (with metering end cap)		14 ± 2	1,6 ± 0,2

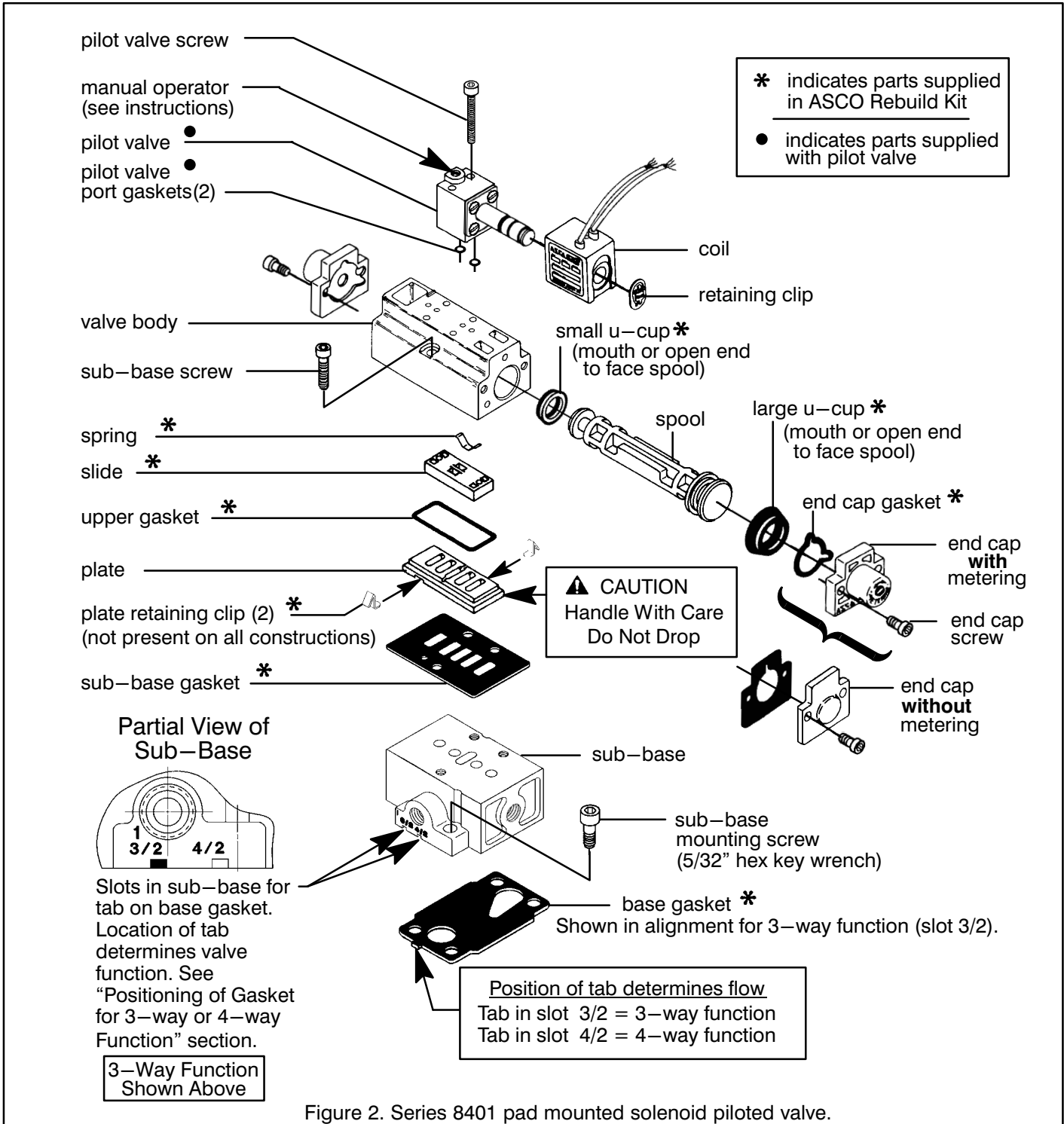


Figure 2. Series 8401 pad mounted solenoid piloted valve.