

**Installation & Maintenance Instructions**

**2-WAY INTERNAL PILOT-OPERATED SOLENOID VALVES NORMALLY CLOSED**  
**OPERATION - 3/4", 1", 1 1/4", 1 1/2", 2", 2 1/2" OR 3" NPT**  
**FUEL GAS SERVICE**

**SERIES**  
**8214(200)**

**NOTICE:** See separate solenoid installation and maintenance instructions for information on: Wiring, Solenoid Temperature, Causes of Improper Operation, and Coil Replacement.

For exploded views, see I&M No. V9564R5 - Section 2.

**DESCRIPTION**

Series 8214(200) valves are 2-way normally closed diaphragm-type solenoid valves designed for fuel gas service. Valve bodies are made of rugged aluminum with trim and internal parts made of steel and stainless steel. Series 8214 (200) valves may be provided with a general purpose, general purpose junction box or watertight solenoid depending upon basic valve construction. The valves feature mounting flanges on the inlet and outlet of the valve. These flanges allow like valves to be mounted together in series without the use of an intermediate pipe nipple. This feature is intended for applications where two redundant valves are required by a governing body. The mounting of the two valves in series is accomplished with an optional connecting hardware kit. Please see additional instructions for the use of this kit in the *Piping* section of this I&M sheet.

Valve catalog numbers with *Suffix C* have an integral electrical and visual position indicator and proof of closure construction. Valves with *Suffix VI* (in the catalog number) have a visual only position indicator. The position indicator gives visual indication of *Open* and *Shut* positions by means of a small ball. The ball travels up and down in a transparent holder between labels Open and Shut. Electrical indication is accomplished by the operation of a single pole single throw reed switch. Reed switch contact is closed when solenoid is de-energized; open when energized.

Note: Position indicators not available for DC valves.

**Provisions for Pressure and Seat Leakage Testing**  
(See Figure 1.)

Series 8214 (200) valves are provided with four 1/8" NPT tapped and plugged holes, two on either side of valve body. Two upstream for pressure testing; two downstream for seat leakage testing. Leakage testing frequency shall be at least annually in accordance with NFPA 86 or original equipment manufacturer recommendations. Testing is also required after valve disassembly and reassembly for inspection, cleaning or rebuilding.

**OPERATION**

**Normally Closed:** Valve is closed when solenoid is de-energized; open when energized.

Minimum 0 psig                      Maximum 5 psig

**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.

**ASCO Valves®**

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**I&M No. V9564R5**

**Temperature Limitations**

For valve ambient and fluid temperatures, refer to chart

Catalog Numbers *	Service AC or DC *	Insulation Class	Min. & Max. Ambient & Fluid Temp
8214235	AC or DC	F, H, B	Class F (AC) -40 °F (-40 °C) to 125 °F (52 °C)
8214240	AC	F	
8214250	AC or DC	F, H, B	
8214260	AC or DC	F, H, B	Class H (AC) -40 °F (-40 °C) to 140 °F (60 °C)
8214265	AC or DC	F, H, B	
8214270	AC or DC	F, H, B	
8214275	AC or DC	F, H, B	Class B (DC) -40 °F (-40 °C) to 77 °F (25 °C)
8214280	AC or DC	F, H, B	
8214285	AC	F	
8214290	AC	F	

Note:

\* Includes catalog numbers with or without *Suffix C* or *VI*.

**Positioning**

Catalog Numbers 8214235, 250, 260, 265, 270, 280 with AC voltage and without Suffix C or VI can be mounted with solenoid in any position horizontal and above.

Catalog numbers 8214240, 285, 290 must be mounted with solenoid in the vertical-upright position.

All Catalog Numbers with DC voltage must be mounted with solenoid in the vertical-upright position.

All Catalog Numbers with Suffix C or VI must be mounted with solenoid in the vertical-upright position.

**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 piping as close as possible to connection point. Locate wrenches applied to valve body per Figure 1. Valve should be checked for external leakage at piping connections after installation, see *Testing for External Leakage* section.

These valves feature mounting flanges on the inlet and outlet of the valve for direct connection to one another or connection in a valve train with an optional Flange Adapter Kit. The optional Flange Adapter Kit may also be used in place of direct piping for easy maintenance and disassembly of the valve without breaking any NPT pipe connections. This feature may only be used with an optional ASCO connecting hardware kit containing approved hardware and seals. The use of hardware and seals that are not part of the kit will void your warranty. Please refer to Installation & Maintenance Instructions, I&M No. V9567 for kit part numbers and contact ASCO for availability.

**▲ WARNING:** To prevent the possibility of death, serious injury or property damage, only use the optional ASCO connecting hardware kit for the direct connection of these valves to one another. Complete instructions and guidelines for piping the valves together are included with the kit.

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

**▲ 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 and 8601 for strainers.

#### Testing for External Leakage

**▲ WARNING:** To prevent the possibility of death, serious injury or property damage, turn off electrical power, depressurize valve, extinguish all open flames and avoid any type of sparking or ignition. Vent hazardous or combustible fluid to a safe area before servicing the valve.

1. Block gas flow on downstream side of valve.
2. Apply pressure to valve within nameplate rating and energize solenoid.
3. Apply a soapy solution or a commercially available leak detecting solution to the pipe connections and check for bubbles. If the valve has been tested for seat leakage or disassembled and reassembled for inspecting, cleaning, or rebuilding apply the solution around solenoid base sub-assembly, bonnet/body joint and pipe plugs.
4. If leakage exists, depressurize valve and turn off electrical power supply. Tighten connections as required and retest following the above steps.

#### Wiring (Electrical Position Indicator)

Wiring must comply with local codes and the National Electrical Code. Switch housing has a 1/2" conduit connection. The position indicator switch has been preset at the factory. This switch is not to be field adjusted. Position indicator housing assembly can be rotated 360° for desirable visual position. Position indicator is furnished standard with one reed switch having a single contact to open when the valve is in the open position. The switch rating is 1 amp maximum, 120/60 AC maximum and 15 volts-amps maximum (Resistive Load) or 1 amp maximum, 120 volts DC maximum and 15 watts maximum (Resistive Load). For lamp and inductive loads, contact protection is required.

#### MAINTENANCE

**▲ WARNING:** To prevent the possibility of death, severe injury or property damage, turn off electrical power, depressurize valve, extinguish all open flames and avoid any type of sparking or ignition. Vent hazardous or combustible 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 open or close. Clean 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. Rebuild kits are not available for valves with Electrical Position Indicator Switch (Suffix 'C'). If parts are worn or damaged on (Suffix 'C') valves, replace valve.

#### Causes of Improper Operation

- **Incorrect Pressure:** Check valve pressure. Pressure to valve must be within range specified on nameplate.
- **Excessive Leakage:** Disassemble valve and clean all parts. If parts are worn or damaged, install a complete rebuild kit. Rebuild Kits are not available for valves with Electrical Position Indicator Switch (Suffix 'C'). If parts are worn or damaged on (Suffix 'C') valves, replace valve.

#### Valve Disassembly

NOTE: Determine valve construction AC (Figure 2 on page 4) or DC (Figure 5 on page 7) then proceed as follows:

1. Remove solenoid enclosure, see separate instructions. If position indicator construction is present, refer to appropriate instructions regarding disassembly, reassembly or adjustment.
2. For AC Construction, unscrew solenoid base sub-assembly. For DC Construction, unscrew solenoid base sub-assembly with special wrench adapter provided in ASCO Rebuild Kit. For wrench adapter only, order kit No. 218949. NOTE: For alternate type open end wrench, order kit No. 168146-001 which is available for solenoid base sub-assembly removal or replacement.
3. Remove bonnet screws, valve bonnet, bonnet gasket, core/diaphragm sub-assembly, and body gasket.
4. All parts are now accessible to clean or replace. If parts are worn or damaged, install a complete rebuild kit. Rebuild Kits are not available for valves with Electrical Position Indicator Switch (Suffix 'C'). If parts are worn or damaged on (Suffix 'C') valves, replace valve.

## Valve Reassembly

1. Lubricate bonnet gasket and body gasket with a light coat of DOW CORNING® 200 Fluid lubricant or an equivalent high-grade silicone fluid.
2. Apply a light coat of TFL 50® Dry Lube to:
  - Valve seat
  - Valve body flange where diaphragm assembly contacts the valve body and body gasket.
  - Internal surface of valve bonnet where diaphragm assembly contacts bonnet when valve is in the energized (open position).

**IMPORTANT: If valve has been disassembled for inspection and cleaning only and a Rebuild Kit is not being installed, lubricate the following with TFL 50® Dry Lube:**

- Diaphragm assembly on both sides.
- Main disc at base of core/diaphragm sub-assembly.
- Pilot disc at base of core assembly.

**▲ CAUTION: Do not distort hanger spring between core assembly and diaphragm assembly when lubricating pilot disc.**

3. Reassemble body gasket and core/diaphragm sub-assembly with closing spring attached. Locate bleed hole in core/diaphragm sub-assembly approximately 30° from the valve inlet.
4. Reassemble valve bonnet and bonnet screws (6). Torque screws in a crisscross manner to the values provided in the *Torque and Lubrication Chart* accordingly.
5. For AC construction, reassemble bonnet gasket and solenoid base sub-assembly and torque to the values provided in the *Torque and Lubrication Chart* accordingly. For DC construction refer to separate *Solenoid Installation and Maintenance Instructions* for lubrication instructions; then install bonnet gasket, housing and solenoid base sub-assembly, position solenoid base sub-assembly into housing and then engage with valve body using special wrench adapter and torque to the values provided in the *Torque and Lubrication Chart* accordingly.
6. Replace solenoid (see separate instructions) and make electrical hookup.

**▲ WARNING: To prevent the possibility of death, severe 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 if practical).**

7. Check valve for external leakage as indicated under the *Piping* section, and for internal (seat) leakage as follows.

**Testing for Internal (Seat) Leakage** (see Figure 6)

**▲ CAUTION: Be sure valve can be tested without affecting other equipment.**

1. Shut off upstream and downstream manual gas cocks. The downstream manual gas cock should remain closed throughout the entire test procedure.
2. Program the control system to operate the valve through five cycles. Listen carefully for a metallic *click* indicating proper operation.

3. Open the upstream manual gas cock. Program the control system to energize and maintain the valve in the open (energized) position. Check all valve and piping connections for external leaks with rich soap and water solution or a commercially available leak detection solution.
4. Shut off the upstream manual gas cock and de-energize valve. Remove the plugs from the leak test tap or downstream pressure tap in the valve body. Connect leak test equipment with the test petcock in the closed position (Figure 5).

**▲ WARNING: Some gas will be released to the atmosphere when the 1/8" NPT pipe plug is removed.**

5. Open the upstream manual gas cock. Program the control system to energize the valve to the open position, then immediately de-energize it to seal the valve operationally.
6. Immerse the 1/4" leak test tubing vertically into a jar of water to a depth of about 1/2". Slowly open the test petcock. Bubbles may appear in the water as the pressure equalizes.
7. After the rate of bubbles coming through the water stabilizes, count the number of bubbles appearing in a 10 second period. The allowable leakage in 10 seconds for an orifice diameter of 1 inch (25.4mm) or less is 6 bubbles (3 cc/min). For valves with an orifice diameter over 1 inch (25.4mm) the allowable leakage rate is 6 bubbles (3 cc/min) per inch (25.4mm) of orifice diameter. If the leakage exceeds this rate, rebuild or replace valve.

**NOTE:** The leakage rate above recognizes that some wear and contamination from use can result in a slight amount of leakage. The allowable leakage rate is well within the leakage limits as recognized by applicable approval agency.

8. Close the upstream manual cock and test petcock. Remove the test equipment. Apply a small amount of Loctite Corporation® Pipe Sealant 567 (or equivalent) to the pipe threads. Reinstall the pipe plug and tighten securely.

**▲ WARNING: Some gas will be released to the atmosphere when the 1/8" NPT pipe plug is removed.**

9. Turn on the gas supply at the upstream manual gas cock and energize the valve.
10. Open the upstream manual gas cock. Program the control system to energize and maintain the valve in the open (energized) position. Check 1/8" NPT pipe plug connection for external leaks with rich soap and water solution or a commercially available leak detection solution.
11. De-energize valve. Open the downstream manual gas cock.
12. Restore the system to normal operation.

## Electrical Position Indicator Switch

The optional electrical position indicator switch is set at the factory. This switch is not to be field adjusted.

**Disassembly and Reassembly of (Suffix VI) Visual Only Position Indicator** (Refer to Figure 3)

1. Remove retaining clip and slip end cap, holder, position indicator ball, end cap and spring washer off tube assembly.
2. Unscrew tube assembly and remove tube gasket. All parts are now accessible for cleaning or replacement.
3. Reassemble in reverse order of disassembly paying careful attention to exploded view provided in Figure 3 for identification and placement of parts.
4. Lubricate tube gasket with DOW CORNING® 200 Fluid lubricant or an equivalent high-grade silicone fluid.

5. Torque tube assembly per values provided in the *Torque and Lubrication Chart* accordingly.
6. After reassembly, operate the valve a few times to be sure of proper visual indication.

**ORDERING INFORMATION FOR ASCO REBUILD KITS**

Parts marked with an asterisk (\*) in the exploded view are supplied in Rebuild Kits. When ordering Rebuild Kits for ASCO valves, order the Rebuild Kit number stamped on the valve nameplate. If the number of the kit is not visible, order by indicating the number of kits required, and the Catalog Number and Serial Number of the valve(s) for which they are intended.

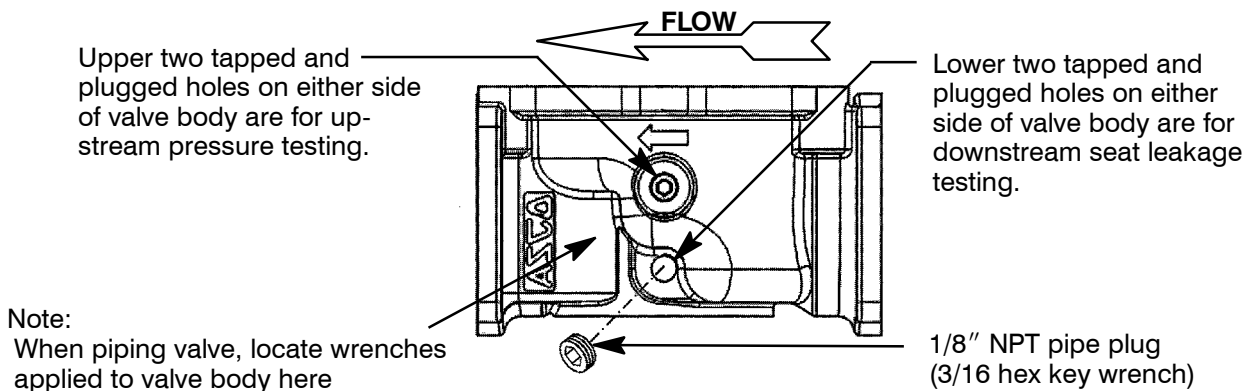
**Torque and Lubrication Chart**

Part Name	Tool	Torque Value, Ft-lbs (N-m)
Solenoid base sub-assembly	AC Construction	45 ± 5 ft-lbs (61,1 ± 6,8)
	DC Construction	30 ± 5 ft-lbs (41.0 +/- 7.0)
Tube assembly	All constructions	45 ± 5 ft-lbs (61.0 +/- 7.0)
Bonnet screws	For 3/4 , 1, 1-1/4, 1-1/2 and 2" ANPT Bodies	8.5 +/- 1.0 (11.5 +/- 1.5)
	For 2" HF, 2-1/2 and 3" ANPT Bodies	21.0 +/- 2.0 (28.5 +/- 3.0)

Lubrication	Parts to be lubricated
DOW CORNING® 200 Fluid lubricant or an equivalent high-grade silicone fluid	Solenoid base gasket, body gasket and tube gasket
TFL 50® Dry Lube or equivalent	Valve seat Valve body flange where diaphragm assembly seats against valve body and body gasket. Internal surface of valve bonnet where diaphragm assembly seats when valve is in the energized (open position). ② Diaphragm assembly on both sides ② Main disc at base of core/diaphragm sub-assembly ② Pilot disc at base of core assembly

Notes: ① Thread all parts by hand as far as possible. Then torque evenly in a crisscross manner where applicable.  
 ② Lubricate these parts if a rebuild kit is not installed.

**Partial side view of valve body showing location of wrench flats for piping valve and the location of tapped and plugged holes for pressure and seat leakage testing**



**Figure 1. Provisions for wrench flats for piping valve and pressure and seat leakage testing**

# Installation & Maintenance Instructions

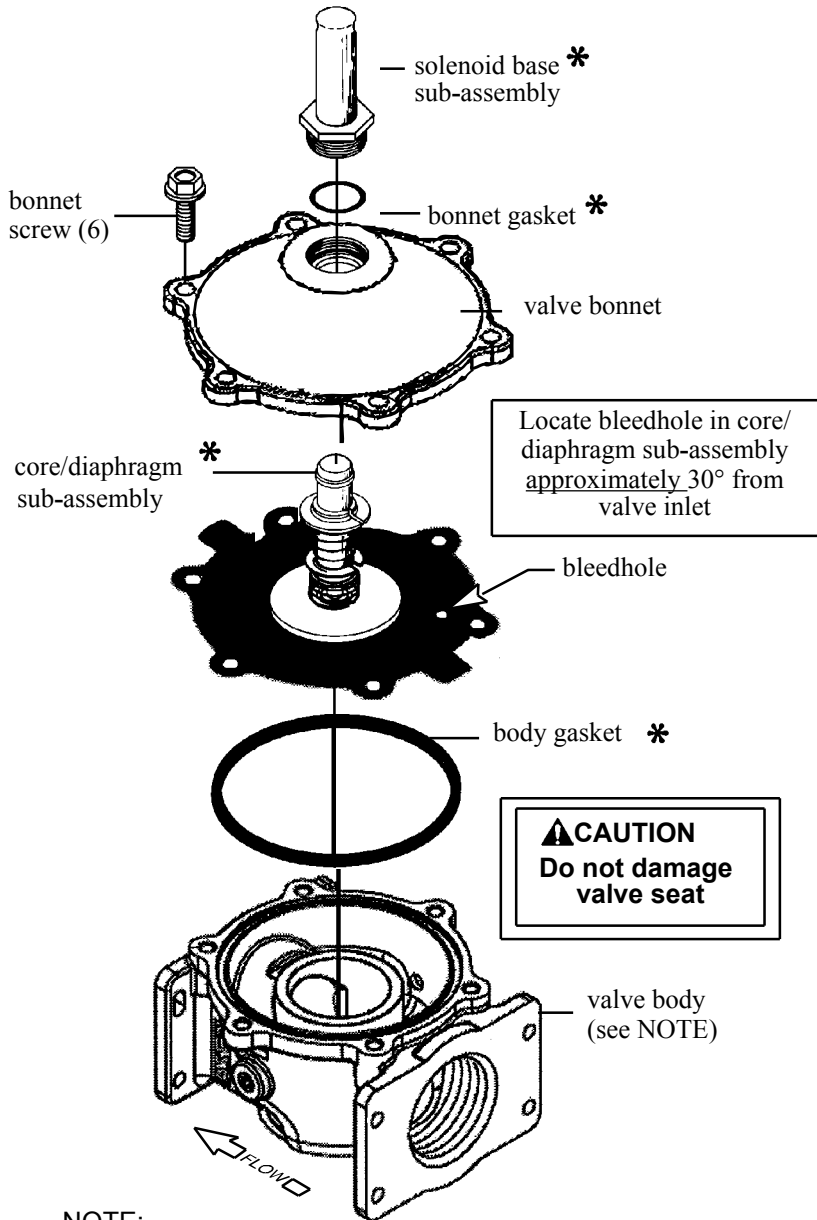
2-WAY INTERNAL PILOT-OPERATED SOLENOID VALVES NORMALLY CLOSED  
 OPERATION - 3/4", 1", 1 1/4", 1 1/2", 2", 2 1/2" OR 3" NPT  
 FUEL GAS SERVICE

SERIES  
 8214(200)

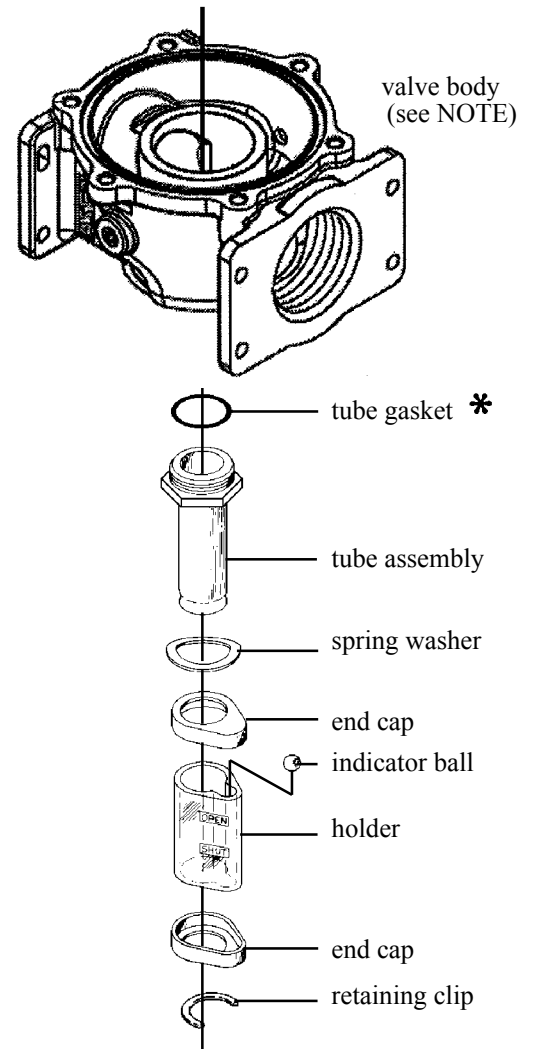
NOTICE: For instructions and exploded view, see I&M No. V9564R5 - Section 1.

\* Indicates parts supplied in ASCO Rebuild Kit

**IMPORTANT**  
 See Torque and Lubrication Chart



**Suffix VI**



NOTE:  
 Wrench flats for piping valve and provisions (tapped & plugged holes) for pressure and seat leakage testing not shown in this view, see Figure 1.

Figure 2. Series 8214(200) valve without solenoid AC Construction

Figure 3. Visual position indicator (partial view)

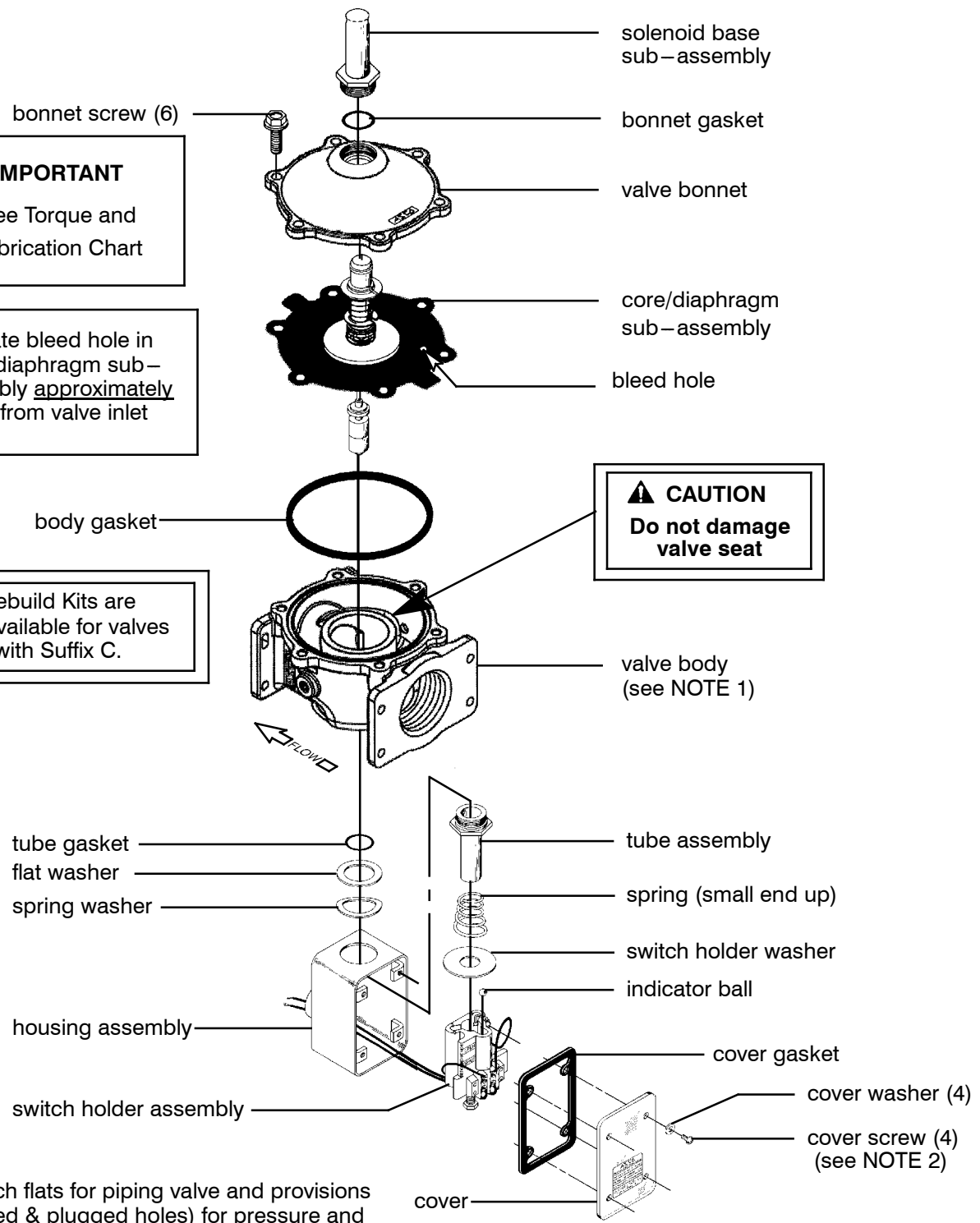
**Suffix C**

**IMPORTANT**  
See Torque and Lubrication Chart

Locate bleed hole in core/diaphragm sub-assembly approximately 30° from valve inlet

Rebuild Kits are not available for valves with Suffix C.

**CAUTION**  
Do not damage valve seat



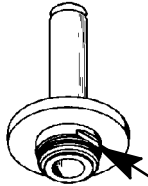
**NOTES:**

1. Wrench flats for piping valve and provisions (tapped & plugged holes) for pressure and seat leakage testing not shown in this view, see Figure 1.
2. Tamper seal applied to bottom 2 screws to prevent field access to electrical enclosure.

**Figure 4. Series 8214(200) with electrical and visual position indicator**

## DC Construction

Open end wrench available for solenoid base sub-assembly (order no. K168146-1)



solenoid base sub-assembly \*

Pin holes for special wrench adapter supplied in ASCO Rebuild Kit. For wrench adapter only order no. K218949 (standard wrench)

housing

wrenching flat

1/2" NPT conduit connection

bonnet screw (6)

bonnet gasket \*

valve bonnet

Indicates parts supplied in ASCO Rebuild Kit.

Locate bleed hole in core/diaphragm sub-assembly approximately 30° from valve inlet

core/diaphragm sub-assembly \*

bleed hole

body gasket \*

**CAUTION**  
Do not damage valve seat

### NOTES:

1. Wrench flats for piping valve and provisions (tapped & plugged holes) for pressure and seat leakage testing not shown in this view, see Figure 1.
2. DC Construction is not available with **Suffix C** or **VI**

valve body (see NOTE 1)

**IMPORTANT**  
See Torque and Lubrication Chart

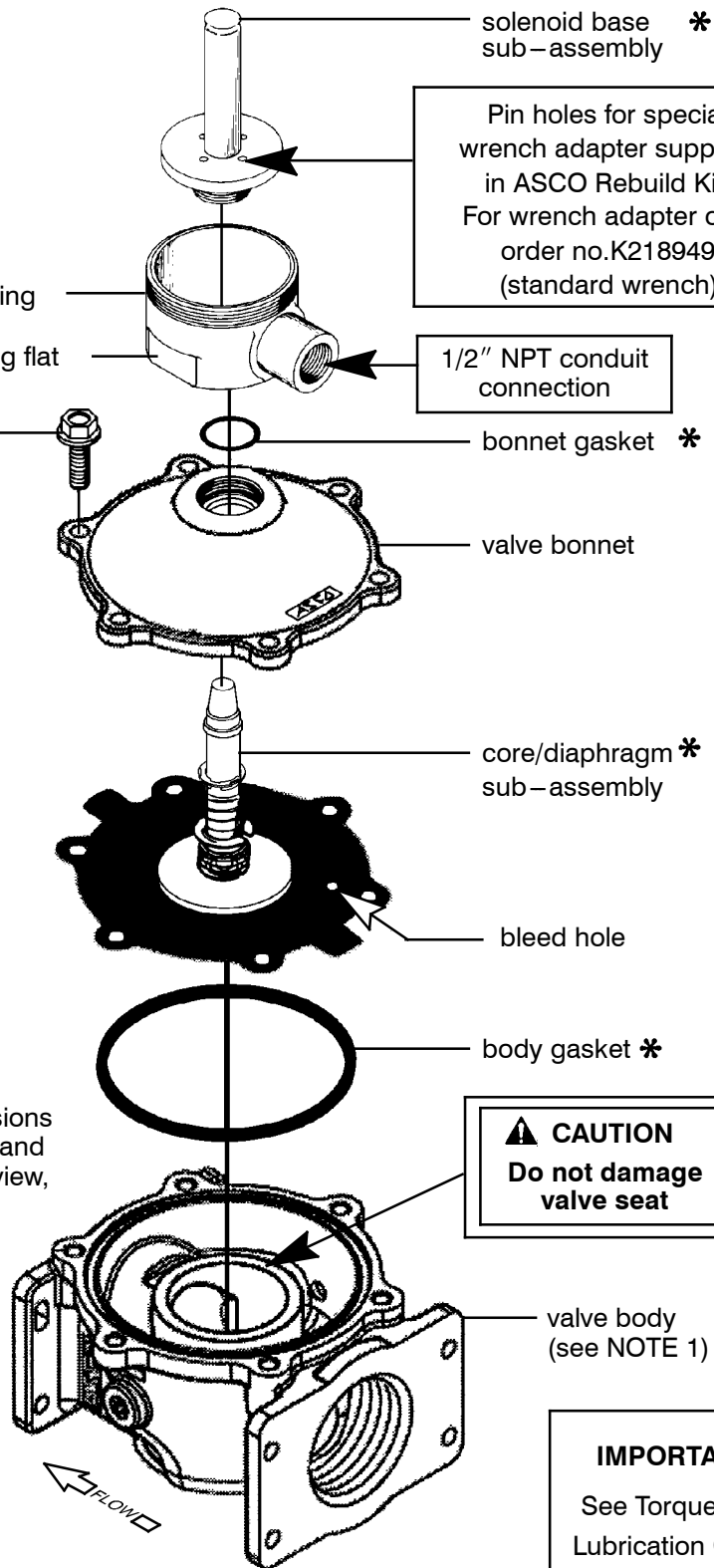


Figure 5. Series 8214(200) valves without solenoid, DC construction

To illustrate leakage testing only.  
Not for system layout.

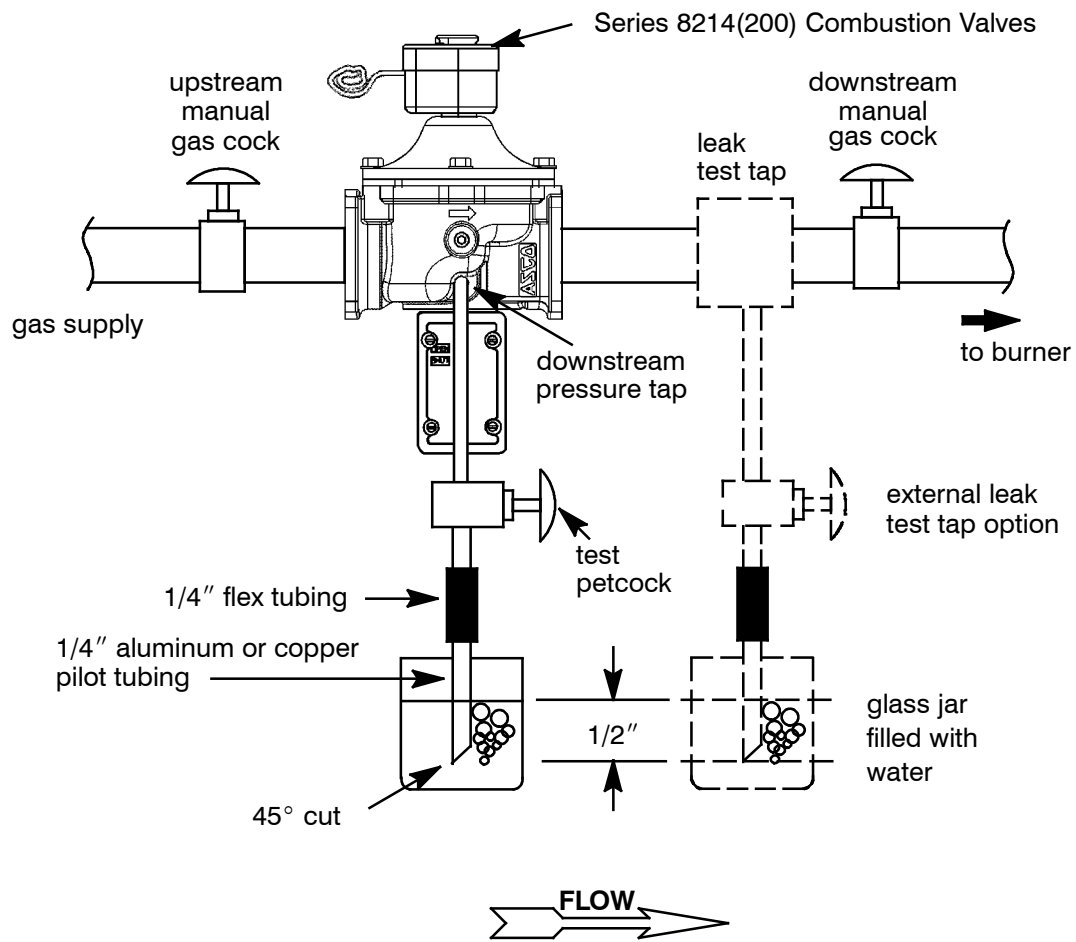


Figure 6. Testing for Internal Seat Leakage