

**INSTALLATION, OPERATING & MAINTENANCE INSTRUCTIONS**  
**2-WAY N.O. DIRECT LIFT DIAPHRAGM SOLENOID VALVES**  
**3/8", 1/2", AND 3/4" NPT**  
**TYPE: 72228**



**DESCRIPTION**

These valves are 2-way, direct lift pilot assist diaphragm valves. They are offered in brass and stainless steel construction. Valves may be ordered with either NEMA 2, 4, 4X integrated coils for ordinary locations or NEMA 4, 4X, 7, and 9 for hazardous locations: Divisions I and II; Class I, Groups A, B, C, and D; Class II, Groups E, F, and G. Additional solenoid coils and enclosures are offered as described in our catalog.

**PRINCIPLES OF OPERATION**

**De-energized:** Pressure is connected to Port "P". The retainer/seal assembly is held away from the diaphragm pilot orifice by the return spring. This allows flow through the pilot orifice to the valve outlet and prevents the supply pressure from building up behind the diaphragm.

At zero or very low differential pressure, the upward force of the retainer/seal created by the return spring is transferred through the diaphragm spring. The diaphragm spring is attached to the diaphragm lifting it and opening the main orifice.

At higher differential pressure, the diaphragm spring force is too low to raise the diaphragm off the main orifice. The difference in the size of the pilot orifice and the diaphragm bleed hole results in a great enough pressure imbalance across the diaphragm to lift it off the main orifice permitting flow through the valve. The valve will remain open as long as the coil is de-energized and sufficient pressure differential is maintained.

**Energized:** The plunger pushes the retainer/seal down against the pilot orifice blocking this flow path. Flow through the diaphragm bleed hole will equalize the pressure on both sides of the diaphragm. The diaphragm assembly will be pressed against the body orifice by the force of the spring on the retainer/seal assembly and the fluid pressure.

**FLUID CODES**

Listed below are the codes utilized by Underwriters Laboratories (UL) and the Canadian Standards Association (CSA) for various common fluids. The codes for those fluids that are approved or certified by the agencies for use with each valve are printed on the outside of the individual packaging.

**CODE**

**FLUID**

A	- Air or nontoxic, nonflammable gases
Ac	- Acetylene
F	- Common refrigerants except ammonia
G	- City gas supplied by public utilities
Ga	- Gasoline
HO	- Petroleum based hydraulic oils having viscosities of 125 to 400 SSU at 100°F (38°C)
02	- Nos. 1 and 2 fuel oils, oils having viscosities not more than 40 SSU at 100°F (38°C)
02 - 06	- No. 2 through No. 6 oil
Ox	- Oxygen
S	- Steam
W	- Water or other aqueous nonflammable liquids

For the maximum fluid temperatures, as well as valve ambient limitations, check the valve part number on the nameplate and refer to the catalog or the outside of the shipping package.

**INSTALLATION INSTRUCTIONS**

**Mounting position and pressure limits:** Valves can be mounted directly on piping. The 72228 valves are designed to be multi-poised and so will perform properly when mounted in any position. However, for optimum life and performance the valves should be mounted vertically upright so as to minimize wear and reduce the possibility of foreign matter accumulating inside the sleeve area.

Line pressure must conform to nameplate rating.

**Piping:** Remove protective closures from the body ports. Connect line pressure to the inlet "P" port. Also an arrow on the body indicates direction of flow. Use of Teflon tape, thread compound or sealants is permissible, but should be applied sparingly to male pipe threads only. Loctite primer #764 and pipe sealant #567 are recommended when using stainless steel fittings with stainless steel valve bodies.

**CAUTION:** Do not allow foreign particles, Teflon tape, or thread compound to enter valve. Tightening torque should not exceed the following values for each port size: 3/8" NPT - 225 in-lbs., 1/2" NPT - 300 in-lbs., 3/4" NPT - 450 in-lbs. **Only the wrench flats provided on the body ports should be used in applying the torque. Do not use the sleeve or enclosure as a lever when applying torque.**

Connect the outlet line to the opposite port.

**Media filtration:** Normally filtration is not required, but dirt or foreign material in the media may cause excessive leakage, wear, or in exceptional cases, malfunction. If filtration is used, install the filter on the inlet side as close to the valve as possible. Clean periodically depending on service conditions.

**Lubrication:** Lubrication is not required although air line lubrication will substantially increase valve life.

**CAUTION:** *Valves which have seals or other components made from ethylene propylene rubber must not be exposed to petroleum based lubricants or other hydrocarbons.*

**Electrical connection:** Electrical supply must conform to nameplate rating. Connect coil leads or terminals to the electrical circuit using standard electrical practices in compliance with local authorities and the National Electrical Code.

**WARNING:** *Valves to be installed in Hazardous Locations, must be outfitted with Hazardous Location coils only. Verify nameplate data and coil part number before installing the valve.*

**WARNING:** *Turn off electrical power before connecting the valve to the power source.*

If the coil assembly is located in an inconvenient orientation, it may be reoriented to facilitate installation. Loosen coil assembly nut, rotate coil assembly to desired position, then retighten the nut with an input torque of 43-53 in-lbs.

**DIN Coil and Terminal Box Assembly (Coil Code D100, D200 or D300; Option Code DB):** Loosen cover screws and swing cover 90° toward the conduit hub in order to access the interior space. Separate the plastic block containing the screw terminals from the metal enclosure using a small flat head screwdriver. Feed the lead wires through the conduit hub and attach them to the appropriate screw terminal. For electrical connection within the terminal box, use field wire that is rated for 90° C or greater. Snap the plastic block back into place inside the metal enclosure. Replace the cover and tighten the cover screws with an input torque of 2 to 4 in-lbs. Place the gasket over the DIN spades on the coil and press the terminal box and coil together. Secure the terminal box to the coil using the mounting screw provided. Apply 4 to 8 in-lbs. torque to the mounting screw.

**Screw Terminal Coil and Terminal Box Assembly (Coil Code S100, S200, or S300; Option Code TB):** Loosen cover screws and swing cover 90° toward the conduit hub in order to access the interior space. Feed the lead wires through the conduit hub and attach them to the appropriate screw terminal. For electrical connection within the terminal box, use field wire that is rated for 90° C or greater. Replace the cover and tighten the cover screws with an input torque of 2 to 4 in-lbs. Press the terminal box and coil together. Secure the terminal box to the coil using the mounting screw provided. Apply 12 to 20 in-lbs. torque to the mounting screw.

**CAUTION:** *When the DIN or Screw Terminal coils are used with the Terminal Box Assembly, be sure to apply a wrench to the wrench flats on the conduit hub when installing electrical conduit.*

**Coil/enclosure temperature:** Standard valves are supplied with coils designed for continuous duty service. Normal free space must be provided for proper ventilation. When the coil is energized continuously for long periods of time, the coil assembly will become hot. The coil is designed to operate permanently under these conditions. Any excessive heating will be indicated by smoking and/or odor of burning coil insulation.

For the maximum valve ambient conditions, as well as the fluid temperatures, check the valve part number on the nameplate and refer to the catalog.

## **MAINTENANCE**

Note: Depending on service conditions, fluid being used, filtration, and lubrication, it may be required to periodically clean and/or replace worn components. See Disassembly Instructions.

**CAUTION:** *Do not expose plastic or elastomeric materials to any type of commercial cleaning fluid. Parts should be cleaned with a mild soap and water solution.*

## **DISASSEMBLY INSTRUCTIONS**

**WARNING:** *Depressurize system and turn off electrical power to the valve before attempting repair.*

The valve need not be removed from the line.

### **To remove the coil assembly:**

For both ordinary and hazardous location constructions, unscrew the nut on the top of the coil assembly. The wave washer and coil assembly can now be removed.

### **To disassemble the pressure vessel:**

**CAUTION:** *If the sleeve assembly does not have a hex style flange, do not use a pipe wrench directly on the sleeve. Instead, use a Skinner U99-011 wrench nut to remove and install the sleeve assembly.*

Slide the Skinner U99-011 wrench nut over the sleeve tube. To unscrew the sleeve assembly, mate the wrench nut to the sleeve flange and turn the wrench nut. The plunger, snubber, flange seal, wave washer and stop may now be removed. With a small screw driver pry the small end of the return spring from the seal retainer. Do not over expand spring.

Unscrew the four (4) cover screws. The diaphragm assembly, O-ring and seal retainer can now be removed. Disassemble the seal retainer from the diaphragm assembly by carefully pulling the diaphragm spring over the lip on the plunger assembly. Do not over expand spring.

**Replacement Parts:** When ordering replacement parts kits, specify valve number and voltage from nameplate. Parts kits are available for each valve. Parts included in each kit are marked with an asterisk (\*). See exploded views.

**REASSEMBLY INSTRUCTIONS**

**WARNING:** When replacing coils, valves equipped with **Hazardous Location** coils must use **Hazardous Location** replacement coils only. Verify nameplate data and coil part number before installing the replacement coil.

**To reassemble the pressure vessel:**

Refer to exploded view drawings. Parts must be replaced in the order shown.

Assemble the O-ring in the body groove.

Assemble the diaphragm spring to the diaphragm assembly. Now assemble this assembly to the seal/retainer. Be sure the diaphragm spring is seated on their spring seats. Avoid damaging the pilot orifice surface when assembling the seal retainer to the diaphragm assembly.

Place the diaphragm/seal retainer assembly onto the body.

The diaphragm bleed hole is oriented 45 degrees from the out port. Place cover onto the diaphragm and body. The diaphragm should be installed as concentric to cover and body as possible and no undue side loads should be applied to the diaphragm when tightening the cover screws. Tighten screws with a torque of 65-85 in-lbs. Avoid damaging the main orifice when placing the diaphragm assembly in the valve.

Attach the return spring to the retainer/seal assembly. Note: position the large end of the return spring down in the cover. Assemble the flange seal, stop, wave washer, plunger, snubber and sleeve assembly to the cover as shown in exploded view. Tighten the sleeve assembly with an input torque of 130-150 in-lbs.

With coil assembly repositioned on the sleeve, slide the wave washer over the sleeve and tighten coil assembly nut with an input torque of 43-53 in-lbs.

Refer to the Installation Instructions for remaining installation procedures.

TROUBLE SHOOTING	
PROBLEM	PROCEDURE
Valve fails to operate	<ol style="list-style-type: none"> <li>1. Check electrical supply with voltmeter. Voltage must agree with nameplate rating.</li> <li>2. Check coil with ohmmeter for shorted or open coil.</li> <li>3. Make sure that pressure complies with nameplate rating.</li> </ol>
Valve is sluggish or inoperative - electrical supply and pressure check out	<ol style="list-style-type: none"> <li>1. Disassemble valve as per the Disassembly Instructions. Clean out extraneous matter. The plunger/seal retainer must be free to move without binding.</li> <li>2. Check diaphragm for tears and for clogged or obstructed bleed hole or pilot orifice. Torn diaphragm must be replaced.</li> <li>3. Check all springs. If broken, replace.</li> <li>4. Check that the seal retainer is attached to the diaphragm assembly.</li> </ol>
External leakage at sleeve flange to body joint	<ol style="list-style-type: none"> <li>1. Check that sleeve is torqued to 130 - 150 in-lbs. If leakage persists, remove sleeve and check flange seal for damage. Replace if defective.</li> </ol>
External leakage at flange joint between body and cover	<ol style="list-style-type: none"> <li>1. Check that cover screws are torqued with an input of 65-85 in-lbs. If leakage persists replacement of the diaphragm assembly or body O-ring may be required. Bodies or covers with damaged sealing surfaces may have to be replaced.</li> </ol>
Internal leakage	<ol style="list-style-type: none"> <li>1. Disassemble valve. See Disassembly for instructions. Examine seal retainer, pilot orifice, main orifice and diaphragm sealing surface in contact with main orifice. Remove all dirt. Inspect orifices for nicks. Damaged parts must be repaired or replaced.</li> <li>2. Check all springs. Replace if broken.</li> </ol>

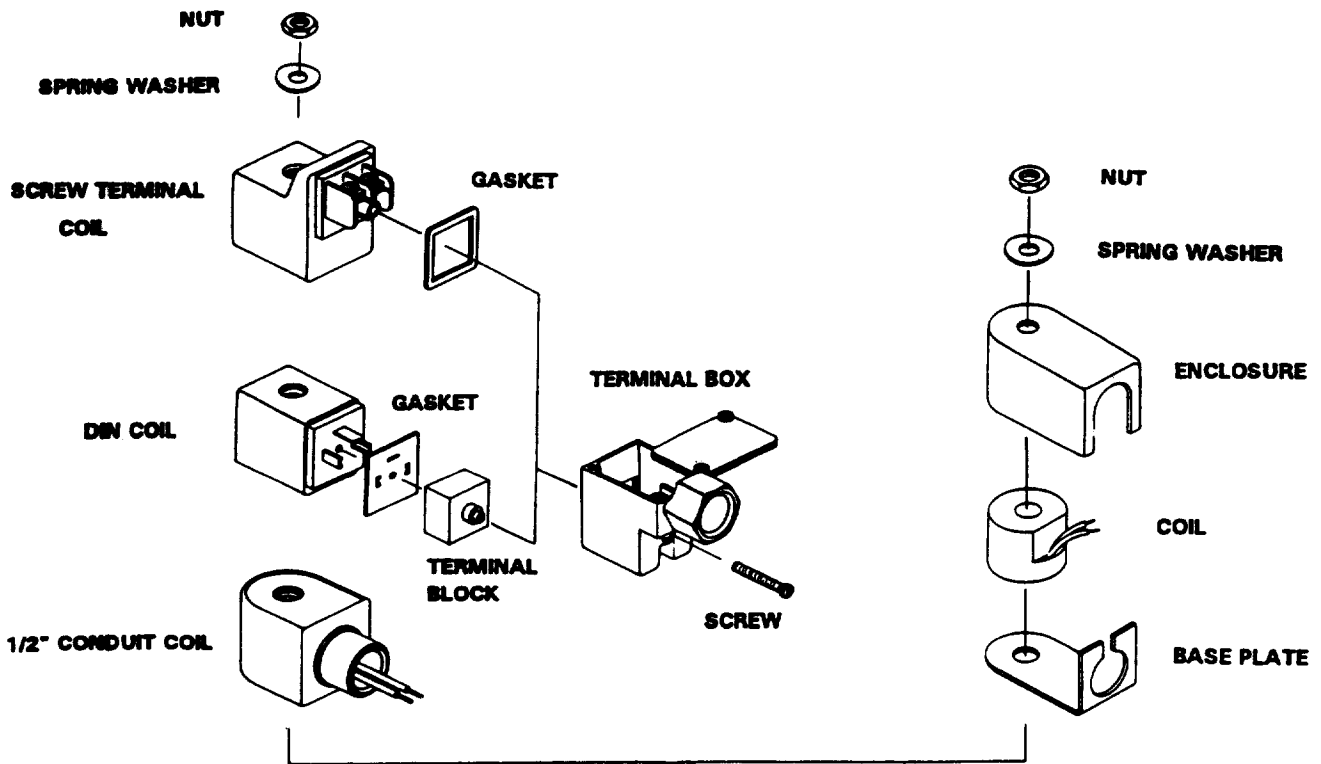
**DECLARATION**

Parker's Skinner Valve Division certifies its valve appliance products complies with the essential requirements of the applicable European Community Directives. We hereby confirm that the appliance has been manufactured in compliance with the applicable standards and is intended for installation in a machine or application where commissioning is prohibited until evidence has been provided that the machine or application is also in compliance with EC directives.

The data supplied in the Skinner valve catalogs and general Installation, Operating & Maintenance Instructions are to be

consulted and pertinent accident prevention regulations followed during product installation and use. Any unauthorized work performed on the product by the purchaser or by third parties can impair its function and relieves Parker of all warranty claims and liability for any misuse and resulting damage.

A separate Declaration of Conformity or Manufacturer's declaration is available upon request. Please provide valve identification numbers and order serial numbers of products concerned.



\*WRENCH NUT U99-011  
REQUIRED FOR SLEEVE REMOVAL

