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**INSTALLATION, OPERATING & MAINTENANCE INSTRUCTIONS**  
**2-WAY N.C. AND N.O. SOLENOID VALVES**  
**3/8", 1/2", 3/4", 1" NPT**  
**VALVE TYPE: 73212, 73222**

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**DESCRIPTION**

These valves are 2-way, pilot operated diaphragm models requiring a minimum operating pressure differential to insure valve operation. They are available in normally closed (N.C.) and normally open (N.O.) versions. The 73212 and 73222 are offered in a combination of 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**

**Normally closed type: 73212**

These valves utilize a plunger to open and close a pilot orifice. Opening the pilot orifice causes pressure above the diaphragm to decrease, and the diaphragm lifts off the main orifice. This opens the valve's main orifice until the valve is de-energized.

**De-energized:** Pressure is connected to the inlet port and is trapped by the plunger on the pilot orifice and by the diaphragm on the main valve orifice.

**Energized:** The plunger moves, which opens the pilot orifice, causing the pressure below the diaphragm to exceed the pressure above the diaphragm forcing the diaphragm up. This pressure differential enables the diaphragm to open the main orifice, allowing flow through the valve.

**Normally open type: 73222**

These valves utilize a push operator to open and close the pilot orifice. Closing the pilot orifice causes a pressure differential shift and subsequent diaphragm assembly shift to close the valve's main orifice.

**De-energized:** Pressure is connected to the inlet port and is free to flow out the outlet port. The push operator is allowing flow through the pilot orifice, and subsequently the diaphragm is lifted allowing full flow.

**Energized:** The inverted sleeve design pushes the seal onto the pilot orifice when energized, causing the seal to block the normally open orifice. Closing the pilot orifice causes a build up of pressure above the diaphragm which shifts the diaphragm to close the main valve orifice. Flow between the inlet and outlet ports is then stopped.

**CAUTION:** A minimum operating pressure differential of 5 psi is required for proper valve operation.

**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.

<u>CODE</u>	<u>FLUID</u>
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 up from 125 to 400 SSU at 38°C
02	- Nos. 1 and 2 fuel oils, oils having viscosities not more than 40 SSU at 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 temperature 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. Mounting brackets are available for the 3/8" and 1/2" NPT ported valves.

The 73212 and 73222 valves are designed to be multi-ported 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.

Minimum and maximum line pressure must conform to the nameplate rating.

**Piping:** Remove protective closures from the ports. Connect line pressure to the inlet port. Use of Teflon tape, thread compound or sealants is permissible, but should be applied sparingly to male pipe threads only.

The inlet and outlet ports of the valves are identified on the valve body. The ports on the 3/8" 1/2" and 3/4" valves are marked "IN" and "OUT". The 1" valves ports are identified as "P" for inlet and "A" for outlet.

**CAUTION:** Do not allow foreign particles, Teflon tape, or thread compound to enter valve. Tightening torque should not exceed the following values at the stated port sizes: 3/8" NPT - 225 in-lbs., 1/2" NPT - 300 in-lbs., 3/4" NPT - 450 in-lbs, 1" NPT - 600 in-lbs. When provided, wrench flats on the body should be used when applying torque. Do not use sleeve or enclosure as a lever.

**Media filtration:** Filtration of 100 microns or better is recommended. Install the filter on the inlet side as close to the valve as possible. Dirt or foreign material in the media may cause leakage, excessive wear, or in exceptional cases, malfunction. Clean periodically depending on service conditions.

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

**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 / Option Codes D1DB, D2DB, D3DB, D4DB, D5DB):** 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 90° C or greater. Snap the plastic block back into place inside the metal enclosure. Replace the cover and hand-tighten the cover screws. 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 20 to 30 in-lbs. torque to the mounting screw.

**Screw Terminal Coil and Terminal Box Assembly (Coil / Option Codes S1TB, S2TB, S3TB):** Loosen cover screws and swing cover 90° toward the conduit boss 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 90° C or greater. Replace the cover and hand-tighten the cover screws. Press the terminal box and coil together. Secure the terminal box to the coil using the mounting screw provided. Apply 20 to 30 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 to determine the maximum temperatures.

## **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 valves need not be removed from the line.

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

**Normally Closed and Normally Open Valves** - 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:** 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.

**Normally Closed Valves** - Slide the Skinner U99-011 wrench nut over the sleeve tube. Mate the wrench nut to the sleeve flange and turn the wrench nut. The plunger, return spring, and flange seal may now be removed. Unscrew the four (4) or six (6) cover screws. The cover and spindle spring can now be removed. On the 3/4" and 1" valves remove seal retainer guide and gasket. Remove the diaphragm and spindle assembly from the body. Unscrew the end nut holding the assembly together. The diaphragm retainer, diaphragm, seal retainer and main orifice seal can be removed from the spindle. On the 3/4" and 1" valves the "O" ring and spindle snubber are also removed.

**Normally Open Valves** - Slide the Skinner U99-011 wrench nut over the sleeve tube. Mate the wrench nut to the sleeve flange and turn the wrench nut. The snubber, plunger, wave washer, stop, seal retainer, and return spring can now be removed. Unscrew the four (4) or six (6) cover screws. The cover and spindle spring can now be removed. On the 3/4" and 1" valves remove seal retainer guide and gasket. Remove the diaphragm and spindle assembly from the body. Unscrew the end nut holding the assembly together. The diaphragm retainer, diaphragm, seal retainer and main orifice seal can be removed from the spindle. On the 3/4"

and 1" valves the "O" ring and spindle snubber are also removed.

**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:

**Diaphragm and Spindle Assembly for both Normally Open and Normally Closed Valves:**

Refer to exploded view drawings. Components must be replaced in the order shown. Place the seal, seal retainer, diaphragm, and diaphragm retainer on the threaded end of the spindle. Add the nut and tighten to 20-22 inch pounds of torque for 3/8" and 1/2" valves.

For 3/4" and 1" sizes - place the spindle snubber larger diameter down, seal, "O" ring, seal retainer, diaphragm, and diaphragm retainer on the threaded end of spindle. Add

the nut and tighten to 30-35 inch pounds of torque for 3/4" valves, 45-50 inch pounds for 1" valves.

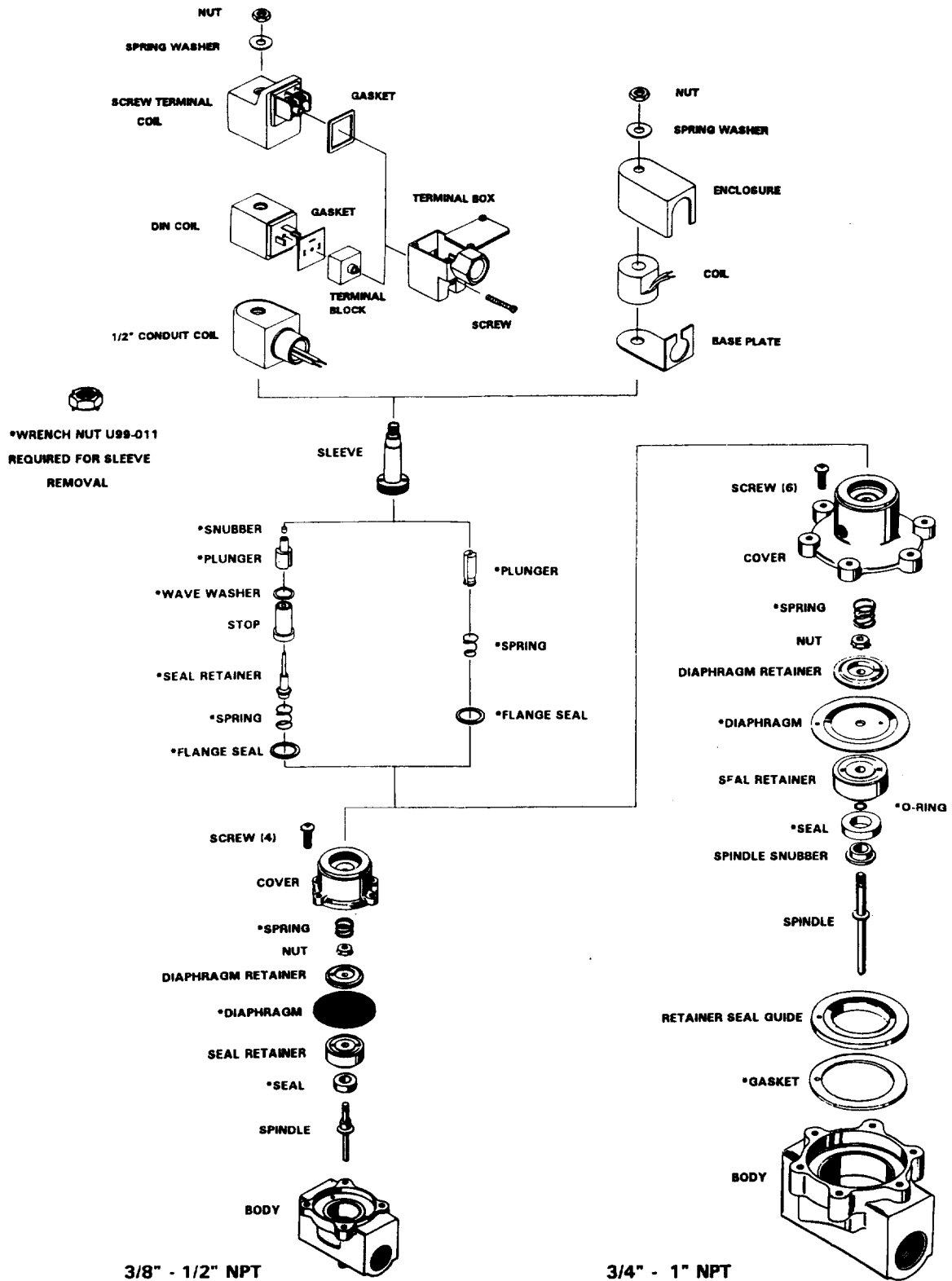
Replace diaphragm and spindle assembly in the body. For 3/8" and 1/2" sizes only, make sure the diaphragm bleed hold is properly located over the body bleed passage. For 3/8" and 1/2" tighten screws with an input torque of 20-25 in-lbs. For 3/4" and 1", tighten screws with an input torque of 65-85 in-lbs. Caution - if this bleed hole does not line up with the passageway, internal flow will be restricted. The cover is located on the body by means of a small hole which fits over the diaphragm locating pin.

**Normally Open valves** - Refer to exploded view drawings. The snubber, plunger, wave washer, stop, seal retainer, and return spring must be replaced in the order shown. Replace the flange seal in the top cover recess. Screw the entire assembly into valve body. Using a wrench nut, tighten sleeve on body 90 - 180 in lbs. torque.

**Both Versions** - 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.

<b>TROUBLE SHOOTING</b>	
<b>PROBLEM</b>	<b>PROCEDURE</b>
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 and that the minimum differential exceeds 5 psi.</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. Caution must be exercised not to damage diaphragm assembly. Check for clogged or obstructed bleed passageway in seal retainer, diaphragm retainer, valve cover and valve body. Clean out all extraneous matter ensuring passages are clear. Clean with compressed air, do not push wire into passageways.</li> <li>2. The plunger assembly must be free to move without binding. The springs must not be broken. Replace springs if broken or damaged.</li> </ol>
External leakage at sleeve flange to body joint.	<ol style="list-style-type: none"> <li>1. Check that sleeve is torqued with 90-180 in-lbs. If leakage continues, replace flange seal.</li> <li>2. Remove gasket and flange seal. Check for imperfections - replace if defective.</li> </ol>
Internal leakage.	<ol style="list-style-type: none"> <li>1. Disassemble valve as per the Disassembly Instructions. Remove extraneous matter. Clean parts in a mild soap and water solution.</li> <li>2. Examine surface of the diaphragm. If damaged or worn, replace.</li> <li>3. Inspect orifices in the body for nicks or dirt. Damage may require a new valve or replacement parts.</li> <li>4. Check all springs. If broken, replace.</li> <li>5. Inspect the pilot seat for imbedded foreign matter and dirt accumulation. Also inspect the seat for wire drawing. Worn or dirty seat may require replacement of valve body. Inspect the pilot for nicks or scratches. Replace if damaged.</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.