Fluid Control Division
Parker Hannifin Corporation
95 Edgewood Avenue
New Britain, CT 06051
Telephone (860) 827-2300

IOM7703
(REV0324)

INSTALLATION, OPERATING & MAINTENANCE INSTRUCTIONS
3-Way and 4-Way, Pilot Operated, Sealed Spool Solenoid Valves
NAMUR Mounted
Valve Types: 73417 and 74417

This document is intended for use as a complementary resource to the User Safety Responsibility Statements located in product literature and posted to www.parker.com/safety.

WARNING

FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF THE PRODUCTS AND/OR SYSTEMS DESCRIBED HEREIN OR RELATED ITEMS ("Products") COULD CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

Possible consequences of failure or improper selection, or improper use of these Products include, but are not limited to:

- Unintended or mistimed cycling or motion of machine members or failure to cycle
- Work piece or component parts being thrown off at high speeds
- Failure of a device to function properly, for example, failure to clamp or unclamp an associated item or device
- Explosion
- Sudden moving or falling objects
- Release of toxic or otherwise injurious liquids or gases
- Electrical shorts or burn out of equipment

Before selecting or using any of these Products, it is important that you read and follow the subsequent instructions.

This document and other information from Parker Hannifin Corporation, its subsidiaries, and authorized distributors provide Product and/or system options for further investigation by users having technical expertise. It is important that you analyze all aspects of the application, follow applicable industry standards, and follow the information concerning the Product in the current Product literature and in any other materials provided from Parker or its subsidiaries or authorized distributors. Due to the variety of operating conditions and applications for these Products or systems, the user, through its own analysis and testing, is solely responsible for making the final selection of the system and components and assuring that all performance, endurance, maintenance, safety, and warning requirements of the application are met.

To the extent that Parker, or its subsidiaries, or authorized distributors provide component or system options based upon data or specifications provided by the user, the user is responsible for determining that such data and specifications are suitable and sufficient for all applications and reasonably foreseeable uses of the components or systems.

The Products described herein, including without limitation, Product features, specifications, designs, availability and pricing, are subject to change by Parker Hannifin Corporation and its subsidiaries at any time without notice. Do not, at any time, make alterations or modifications to any Product without the express and written approval of Parker Fluid Control Division. Do not, at any time, make alterations or modifications to any Product without the express and written approval of Parker Fluid Control Division.

DESCRIPTION

These valves are pilot operated 2-position, 3 ported 3-way or 2 position 5 ported 4-way directional control solenoid models. They are offered in aluminum, brass, or stainless steel body construction. Valves may be ordered with either NEMA 2, 4, 4X integrated coils for ordinary locations or NEMA 7 and 9 for hazardous locations: Divisions I and II; Class I, Groups A, B, C, and D; Class 11, Groups E, F, and G. Additional solenoid coils and enclosures, including intrinsically safe coils and enclosures are offered as described in our catalog.

PRINCIPLES OF OPERATION

4-Way Valves

The valve is mounted using a thermoplastic conversion plate directly to a double acting pneumatic valve actuator which has been manufactured to accept the NAMUR pattern of mounting and port holes. The plate is positioned between the valve and actuator so that the embossed marking "5/2" appears between the body ports marked 1 and 5. The coding screw should be screwed into one of the two holes in the actuator so that the hole in the conversion plate, when assembled to the valve in the correct position, will accept the coding screw. Two screws are used to secure the valve and conversion plate to the actuator. In operation, the valve inlet flow is directed to the double acting cylinder as follows: valve port 2 (unmarked, but hidden beneath the valve between the valve body and conversion plate) is connected to one port of the double acting cylinder while valve port 4 (also unmarked and hidden beneath the valve between the valve body and conversion plate) is connected to the other port of the cylinder. The solenoid valve functions in such a way that pressure is applied to either side of the piston in the cylinder, and exhausted out of the opposite side of the pressurized cylinder. When de-energized, the valve pressure port 1 is open to the valve port 4, valve port 2 is open to valve exhaust port 3, and valve exhaust port 5 is isolated. The pilot orifice is sealed by the insert in the plunger. The pilot exhaust orifice is open to the valve piston assembly and atmosphere.

Fluid behind the valve actuator cylinder is exhausted into valve port 2, through the valve, and out of valve exhaust port
3. A passageway in the valve connects the valve inlet port 1
to the spring cavity and the pilot orifice. This provides pressure to the pilot and the air assisted spring return. The seals, which are positioned on the spool by cages, prevent internal leakage between ports or external leakage. The air assisted spring return keep the spool in position.

Energized: The pilot plunger moves against the return spring
and contacts the stop, opening the pilot orifice. The top insert seals the pilot exhaust orifice. Pilot fluid flows through the pilot orifice to the piston assembly. The pilot pressure on the piston is sufficient to overcome the force of the mechanical spring and air assisted spring return, shifting the spool. This creates a flow path between the valve inlet port 1 and valve port 2, as well as between valve port 4 and valve exhaust port
5. The spool and seals isolate1 valve exhaust port 3. This allows pressure to be applied to one side of the piston in the cylinder, causing the piston to move, and exhaust the fluid on the other side of the piston of the cylinder into port 4, through the valve and out of valve exhaust port 5.

De-energized: the plunger now seals the valve pilot orifice and opens the valve exhaust orifice. The air assisted-spring shifts the spool to its original position. This allows fluid to flow from the valve inlet port 1, through the valve, and into the opposite side of the piston in the cylinder through valve port 4, causing the piston to move to its original position. Fluid on the other side of the piston in the cylinder is now exhausted out of the cylinder into valve port 2, through the valve, and out through valve exhaust port 3.

3-Way Valves

The valve is mounted using a thermoplastic conversion plate directly to a spring return pneumatic valve actuator which has been manufactured to accept the NAMUR pattern of mounting and port holes. The plate is positioned between the valve and actuator so that the embossed marking "3/2" appears between the body ports marked i and 5. The coding screw should be screwed into one of the two holes in the actuator so that the hole in the conversion plate, when assembled to the valve in the correct position, will accept the coding screw. Two screws are used to secure the valve and conversion plate to the actuator. This position of the conversion plate seals port 4 (unmarked, but hidden beneath the valve between the valve body and conversion plate), effectively eliminating it as a valve port. In operation, the valve inlet flow is directed to the spring return cylinder as follows: valve port 2 (unmarked, but hidden beneath the valve between the valve body and conversion plate) is connected to the pressure port of the spring return cylinder while valve port 4 (also unmarked and hidden beneath the valve between the valve body and conversion plate) is sealed by an O-ring in the conversion plate.

When de-energized, the valve inlet port 1 is closed and the valve port 2 is open to valve exhaust port 3. The spring in the cylinder forces the piston to the end of the cylinder, exhausting fluid in the cylinder into valve port 2, through the valve, and out of valve exhaust port 3. The conversion plate directs this exhaust to the spring cavity of the actuator.

A passageway in the valve connects valve port 1 to the spring cavity and the pilot orifice. This provides pilot pressure and pressure for the air assisted spring return. The seals, which are positioned by cages, prevent internal leakage between ports or external leakage. The air assisted spring return keeps the spool in position.

Energized: The pilot plunger moves against the return spring and contacts the stop, opening the pilot orifice. The top insert seals the pilot exhaust orifice. Pilot fluid flows through the pilot orifice to the piston assembly. The pilot pressure on the piston is sufficient to overcome the force of the air assisted spring return, and moves the spool. This provides pressure to port 2, which flows through the valve, into the cylinder port, and forces the piston against the cylinder return-spring, stroking the cylinder. The spool and seals isolate valve port 3.

De-energized: the plunger now seals the valve pilot orifice and opens the pilot exhaust orifice. The air assisted-spring shifts the spool to its original position. This closes the valve inlet port 1, and opens the valve port 2 once again to the valve exhaust port 3. The spring in the cylinder again forces the piston to the end of the cylinder, exhausting fluid in the cylinder into valve port 2, through the valve and out of the valve exhaust port 3. The conversion plate directs this exhaust to the spring cavity of the actuator.

Manual Overrides

Note: Manual Overrides described below are optional - these descriptions and operating instructions apply only to valves that have been equipped with the appropriate manual override.

Field convertible manual override - The unit is shipped as both a latching and momentary manual override. For momentary operation, apply force to the slotted screw component. For a latching override, apply force to the slotted screw component, turn clockwise to lock. To unlock, turn counterclockwise.

To convert the override to a momentary configuration, remove set screw located on side of manual override mechanism.
To convert the override to a non-functioning override, remove set screw located on side of manual override mechanism, rotate slotted screw component 180°, reinstall set screw.

Momentary manual override - Apply force to the center component of the override mechanism.

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 non-toxic, nonflammable gases

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.

INSTALLATION INSTRUCTIONS

Mounting position and pressure limits: Valves are mounted directly to the actuator using the two holes in the valve body. Make certain that the conversion plate is assembled between the valve and the actuator, and is in the correct position. For 3-way function, the tab on the conversion plate reading "3/2" should protrude from the valve body directly below the ports marked 1 and 5, while for 4-way function the tab reading "5/2" should be located below the ports marked 1 and 5. Also make certain that the coding screw is threaded into the proper hole in the actuator so that the hole in the conversion plate lines up with the coding screw when the valve and plate are assembled to the actuator. The line pressure must not be below 30 psig in order for the valve to operate properly. Maximum line pressure should not exceed 150 psig. For valves with an external pilot (74417), connect the pilot pressure to the port in the top of the body using the appropriate fitting. Note that for externally piloted valves, the pilot pressure must be a minimum of 30 psi, but the operating pressure of the valve may be as low as 0 psi.

The valves are multi-poised and 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 and spool area.

Line pressure must conform to nameplate rating.

Piping: Connect line pressure to the inlet port. Use of tape sealant, thread compound or sealants is permissible, but should be applied sparingly to male pipe threads only.

CAUTION: *Do not allow foreign particles, tape sealant, or thread compound to enter valve. Tightening torque should not exceed the following values for each port size: 1/4" NPT - 175 in-lbs., 112" NPT - 350 in-lbs.* ***Do not use the sleeve or enclosure as a lever when applying torque.***

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. The valves do include a pilot filter to help prevent clogging of the pilot orifice. The internal filtration is 40 microns. If additional 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.

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 the coil assembly nut, rotate coil assembly to desired position, then re-tighten the nut with an input torque of 30-43 in-lbs.
DIN Coil and Terminal Box Assembly (Coil Code D400 or D500; Option Code TB): Loosen cover screws, remove one screw, and swing the 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. 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 Code S100, S200, or S300; Option Code TB): Loosen cover screws, remove one screw, and swing the cover goo 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. 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, filtration, and lubrication, it may be required to periodically clean and/or replace worn components. See Disassembly Instructions.

Valve should be exercised (cycled from de-energized to energized position several times) if stored in inventory or if inactive for a lengthy period of time (more than a month).

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: *De-pressurize system and turn off electrical power to the valve before attempting repair.*

To remove the coil assembly:

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

To disassemble the operator assembly:

CAUTION: *For conventional (not intrinsically safe) sleeves, 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. Intrinsically safe sleeves should not be removed from the valve - there are no components in the sleeve assembly that can be replaced or repaired.*

Sleeve Assembly (for non-intrinsically safe valves only)

Slide the wrench nut (U99-011) over the sleeve tube and position to engage drive pins and two holes provided at sleeve assembly flange. Unscrew sleeve assembly from the pilot body. The plunger return spring, plunger assembly and flange seal can then be removed.

To disassemble the valve body assembly:

Disassembly must be completed in the order shown.
Remove the two screws from the end cover of the valve body to allow separation of the end cover, gasket and spool return spring.

Remove the spool by pulling it through the seals.

Without damaging the seals and the body bore, remove the retainer, seals, and cages from the valve body.

To disassemble the pilot body assembly:

Remove the two screws from the pilot body and separate the valve body assembly from the pilot body assembly.

In the main body, remove the O-ring and pilot air filter.

Remove the U-cup and piston assembly from the pilot body.

Overrides

Field convertible manual override removal (where applicable) - Using a wrench, rotate entire override mechanism counterclockwise to remove from the body. Remove stem, o-rings and spring from cavity.

Momentary manual override removal (where applicable) - Using a screwdriver, rotate override mechanism counterclockwise to remove from the body. Remove stem, o-rings and spring from cavity.

RE-ASSEMBLY INSTRUCTIONS

To reassemble the pressure vessel:

WARNNG: *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.*

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

Clean the bore in both the pilot body and the main body and all internal parts.

Prior to assembly, lubricate the pilot body and main body bores. Lubricate the seals and the spool. The required lubricant is Christo Lube® mcg 303 grease.

To reassemble the pilot body assembly:

Insert the U-cup and piston assembly into the pilot body.

In the main body, insert the pilot air filter and O-ring. Assemble the pilot body to the valve body assembly.

Overrides

Field convertible manual override (where applicable) - Insert spring, stem and O-rings into cavity. Using a wrench, rotate entire override mechanism clockwise into the body. Maximum torque is 35 in-lbs.

Momentary manual override (where applicable) - Insert spring, stem and a-rings into cavity. Using a screwdriver, rotate override mechanism clockwise into the body. Maximum torque is 35 in-lbs.

To reassemble the valve body assembly:

Without damaging the seals, insert the retainer, seals, and cages into the valve body as indicated in the drawing.

Insert the spool through the seals.

To reassemble the valve body assembly:

Without damaging the seals, insert the retainer, seals, and cages into the valve body as indicated in the drawing.

Insert the spool through the seals.

Assemble the end cover, gasket and spool return spring. Note that the spool and seals may extend beyond the end of the body. Carefully use the cover to press the spool and seals into the body.

To reassemble the operator assembly:

Sleeve Assembly (for non-intrinsically safe valves only)

Place the plunger return spring, plunger assembly and flange seal into the sleeve. Slide the wrench nut (U99-011) over the sleeve tube and position to engage drive pins and two holes provided at sleeve assembly flange. Screw the sleeve assembly into the pilot body. Torque to 150-170 in-lbs.

With the coil assembly repositioned on the sleeve, slide the wave washer over the sleeve and tighten the coil assembly nut with an input torque of 30-43 in-lbs.

TROUBLE SHOOTING

SYMPTOM	PROCEDURE
1. Valve fails to operate.	1. Check electrical supply with voltmeter. Voltage must agree with nameplate rating. 2. Check coil with ohmmeter for shorted or open coil. 3. Make sure that pressure complies with nameplate rating. Pressure must not be less than 30 PSIG. 4. Remove plunger assembly. Examine the rubber seals at both ends. If either seal is damaged, replace plunger assembly. 5. Remove pilot body. Check filter in main body. Clean or replace if necessary.
2. Valve is sluggish or inoperative - electrical supply and pressure check out (conventional valves only - NOT intrinsically safe valves).	1. Disassemble valve as per the Disassembly Instructions. Clean out extraneous matter. The plunger must be free to move without binding. Check filter in main body, clean or replace if necessary. 2. The plunger spring must not be broken. Replace spring if necessary. 3. Make sure that pressure complies with nameplate rating. Pressure must not be less than 30 PSIG. 4. Check to determine whether the valve is receiving adequate lubrication from the pressure supply line. 5. Disassemble valve and inspect all internal seals for excessive wear or swell. Spool seals must be replaced with complete set (six seals) only. All seals must be lubricated.
3. External leakage at sleeve flange to body joint (conventional valves only - NOT intrinsically safe valves).	6. Check that sleeve is torqued to 150-170 in-lbs. 7. If leakage persists, remove sleeve and check flange seal for damage. Replace if defective.
4. External leakage at manual override (where available).	8. Rotate override until free to be removed. Check O-rings and the surface it contacts. Clean or replace worn or damaged O-rings as required.

ITEM	DESCRIPTION	QTY (REF)
1	SCREW, PILOT BODY	2
2	BODY, PILOT	1
3	U-CUP	1
4	PISTON	1
5	RETAINER, SEAL	2
6	O-RING	1
7	FILTER, PILOT AIR	1
8	BODY	1
9	SEAL, SPOOL	6
10	CAGE	5
11	SPOOL	1
12	SPRING, SPOOL	1
13	GASKET	1
14	END COVER	1
15	SCREW, END COVER	2
16	FLANGE SEAL	1
17	PLUNGER ASSEMBLY	1
18	SPRING, PLUNGER RETURN	1
19	SLEEVE ASSEMBLY	1
20	LABEL	1
21	COIL	1
22	WASHER	1
23	NUT	1
24	LABEL	1
25	NAMEPLATE	1
26	RETAINER	1

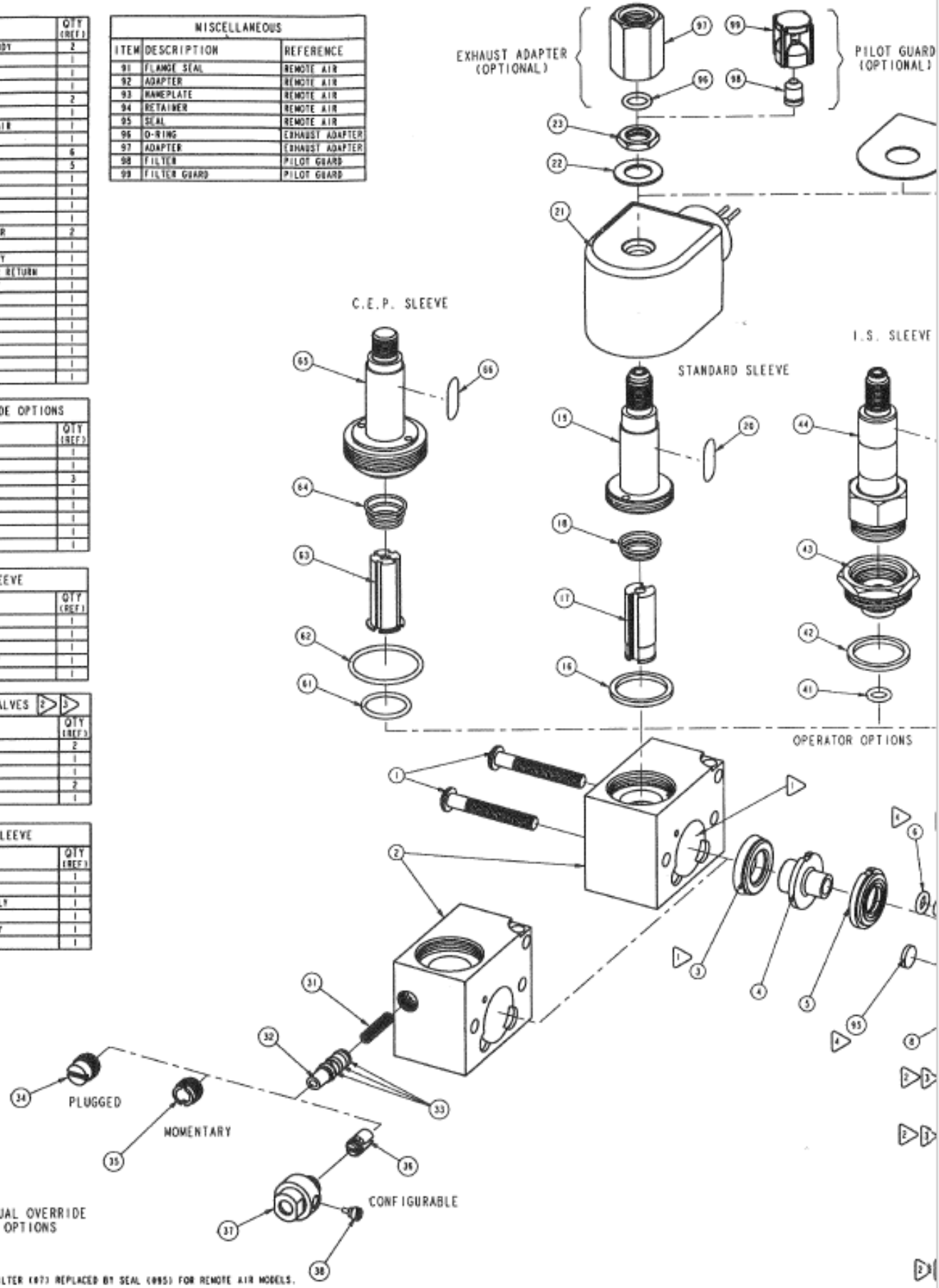
MISCELLANEOUS		
ITEM	DESCRIPTION	REFERENCE
91	FLANGE SEAL	REMOTE AIR
92	ADAPTER	REMOTE AIR
93	NAMEPLATE	REMOTE AIR
94	RETAINER	REMOTE AIR
95	SEAL	REMOTE AIR
96	O-RING	EXHAUST ADAPTER
97	ADAPTER	EXHAUST ADAPTER
98	FILTER	PILOT GUARD
99	FILTER GUARD	PILOT GUARD

MANUAL OVERRIDE OPTIONS		
ITEM	DESCRIPTION	QTY (REF)
31	SPRING	1
32	SPOOL	1
33	O-RING	3
34	PLUG	1
35	RETAINER	1
36	STEM	1
37	RETAINER	1
38	STEM	1

I.S. SLEEVE		
ITEM	DESCRIPTION	QTY (REF)
41	O-RING	1
42	FLANGE SEAL	1
43	ADAPTER	1
44	SLEEVE ASSEMBLY	1
45	LABEL	1

NAMUR VALVES ▷2◁ ▷3◁		
ITEM	DESCRIPTION	QTY (REF)
51	SCREW	2
52	GASKET	1
53	PLATE	1
54	O-RING	2
55	SCREW - CODING	1

C.E.P. SLEEVE		
ITEM	DESCRIPTION	QTY (REF)
61	O-RING	1
62	O-RING	1
63	PLUNGER ASSEMBLY	1
64	RETURN SPRING	1
65	SLEEVE ASSEMBLY	1
66	LABEL	1



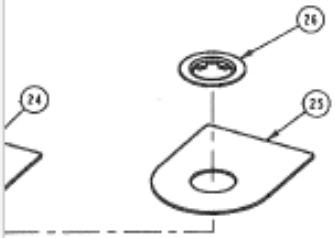
▷4◁ O-RING (86) AND FILTER (97) REPLACED BY SEAL (095) FOR REMOTE AIR MODELS.

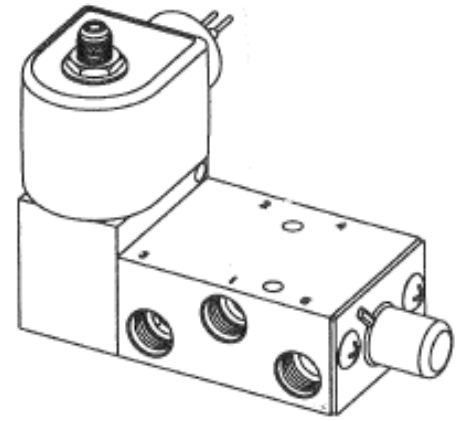
▷3◁ PARTS AUTO BAGGED.

▷2◁ NAMUR OPTION ONLY.

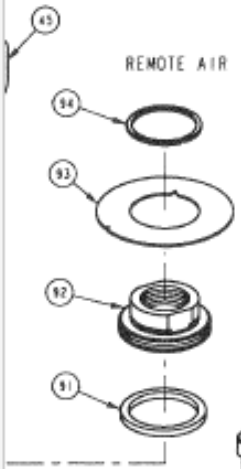
▷1◁ APPLY CHRISTO LUBE 0MCG-120 TO PARTS BEFORE ASSEMBLY.

[Note: All drawings are for





7300 (STANDARD) MODELS
SINGLE SOLENOID
SCALE 1:1

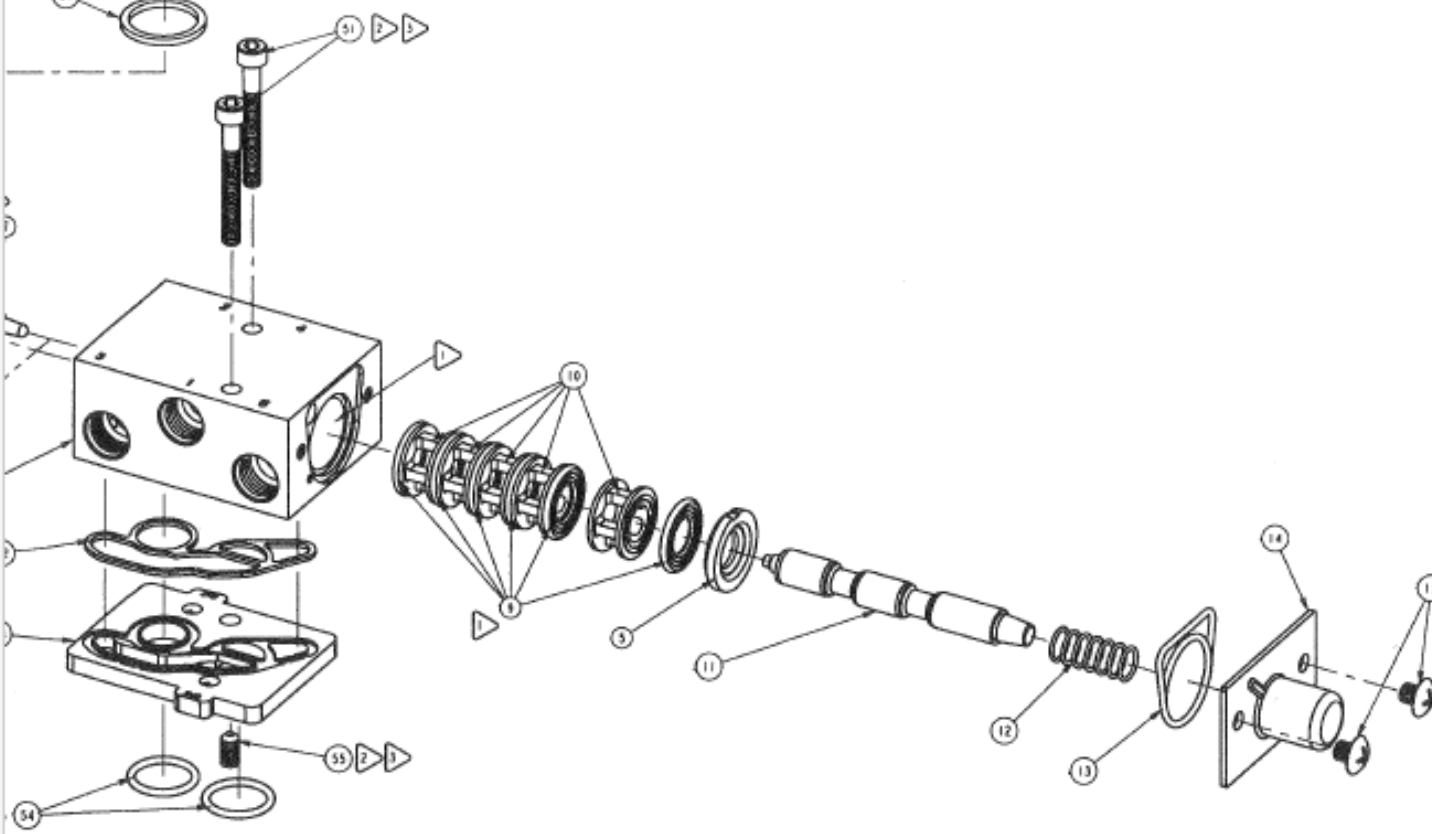


DECLARATION

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.



epresentative purposes only.]