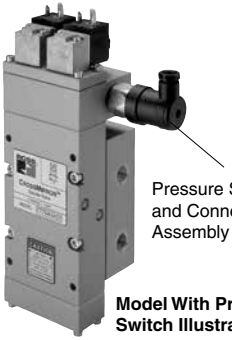
77 Series CrossMirror® Double Valves
Solenoid Pilot Controlled

Thank You!

You have purchased a premium quality ROSS® pneumatic valve. It is a 4-way double valve with precision, stainless steel spools as the main valve elements, and is designed to offer added safety to the operation of many pneumatically controlled machines.

IMPORTANT NOTE:
This Valve is Not Designed for Controlling Clutch/Brake Mechanisms on Mechanical Power Presses.

With care in its installation and maintenance you can expect it to have a long and reliable service life. Before you go any further, please take a few minutes to look over the information in this folder, and save it for future reference.



Model With Pressure Switch Illustrated

VALVE INSTALLATION

Please read and make sure you understand all installation instructions before proceeding with the installation.
Additional technical documentation is available for download at rosscontrols.com.
If you have any questions about installation or servicing your valve, please contact ROSS or your authorized ROSS distributor, see contact information listed at the back of this document, or visit rosscontrols.com to find your distributor.

Pneumatic equipment should be installed only by persons trained and experienced in such installation.

After installation is complete, refer to Valve Operation *on page 2 to ensure that the valve is functioning properly.*

Air Lines: Before installing a valve in a new or an existing system, the air lines must be blown clean of all contaminants. It is recommended that a 5-micron-rated air filter be installed in the inlet line close to the valve.

Valve Inlet (Port 1): Be sure that the supply line is of adequate size and does not restrict the air supply because of a crimp in the line, a sharp bend, or a clogged filter element. The air supply must not only provide sufficient pressure (see *Valve Specifications, page 3),* but must also provide an adequate flow of air on demand. Otherwise, the valve elements will be momentarily starved for air and the valve may fail to operate.

Valve Outlet (Ports 2 and 4): For faster pressurizing and exhausting of the mechanism being operated by the valve, locate the valve as close as possible to the mechanism. The lines must be of adequate size and be free of crimps and sharp bends. Port 2 is the normally open port (pressurized only when the valve is de-actuated), and port 4 is the normally closed port (pressurized only when both main valve elements have been actuated).

Valve Exhaust (Ports 3 and 5): Do not restrict air flow from the exhaust ports as this can adversely affect the operation of the valve.

Pilot Solenoid Electrical Supply: The valves get electrical power through plug-in connectors. The electrical supply must correspond to the voltage and hertz ratings of the solenoids. Otherwise, the solenoids are subject to early failure. If power is supplied by a transformer, it must be capable of handling the inrush current without significant voltage drop. See *Valve Specifications* on page 3 for inrush current data.

Operating Pressures and Temperatures: Allowable ranges for pressure and temperature are given in the *Valve Specifications* on page 3. Exceeding the values shown can adversely affect performance and shorten valve life.

Pipe Installation: To install pipe with tapered threads in the ports in the base, engage pipe one turn, apply pipe thread sealant (tape not recommended), and tighten pipe. This procedure will prevent sealant from entering and contaminating the valve. To install pipe with parallel threads (e.g., SAE, ISO 228–G, etc.) do not use sealant.

Pressure Switch: If redundant monitoring is desired, ROSS offers a pressure switch version that can be used to signal another monitoring device.

VALVE MAINTENANCE

Pneumatic equipment should be maintained only by persons trained and experienced in the maintenance of such equipment.

Supply Clean Air. Foreign material lodging in valves is a major cause of breakdowns. The use of a 5-micron-rated air filter located close to the valve is strongly recommended. The filter bowl should be drained regularly, and if its location makes draining difficult, the filter should be equipped with an automatic drain.

Check Lubricator Supply Rate. A lubricator should put a fine oil mist into the air line in direct proportion to the rate of air flow. Excessive lubrication can cause puddling in the valve and lead to malfunctions. For most applications an oil flow rate in the lubricator of one drop per minute is adequate. (Note that the double valve itself does not require air line lubrication.)

Compatible Lubricants. Although this valve does not require air line lubrication, it may be used with lubricated air being supplied to other mechanisms. Some oils contain additives that can harm seals or other valve components and so cause the valve to malfunction. Avoid oils with anti-wear or phosphate additives (e.g., zinc dithiophosphate), and diester oils; these substances can harm valve components. The best oils to use are generally petroleum base oils with oxidation inhibitors, an aniline point between 180°F (82°C) and 220°F (104°C), and an ISO 32 or lighter viscosity. Some compatible oils are listed above at the right. These oils, although believed to be compatible, could change without notice because manufacturers sometimes reformulate their oils. Therefore, use oils specifically compounded for air line service. If it is a synthetic oil, contact the oil manufacturer for compatibility information.

Cleaning the Valve. If the air supplied to the valve has not been well filtered, the interior of the valve may accumulate dirt and varnish which can affect the valve's performance by causing sluggish or erratic valve action which can result in the valve defaulting. A schedule should be established for cleaning all valves, the frequency depending on the cleanliness of the air being supplied. To clean the valve, use a solvent which will dry without leaving a residue. This is especially important for the spool and sleeve assembly. Do not use a chlorinated solvent or abrasive materials which can damage seals or metal parts. Do *not* scrape varnished surfaces. To reassemble the spool and sleeve, put one drop of Anderol 735 (or equivalent lubricant) on each spool land. Insert the spool into the sleeve and rotate it several times to ensure even distribution of the lubricant. If the valve is used in a non- lubricated application, do not use a lubricant for reassembly which can dry out or leave a residue. Dry assembly of the spool and sleeve is preferable. Each spool and sleeve is a matched set, so care must be taken not to reverse the position of the spool in the sleeve. Before inserting the spool-and-sleeve into the valve body, very lightly lubricate the O-rings with a lubricant such as those shown above. *Do not use Anderol; it causes the O-rings to deteriorate.*

COMPATIBLE LUBRICANTS

Maker	Brand Name
Amoco	American Industrial Oil 32 Amoco Spindle Oil C, Amolite 32
Citgo	Pacemaker 32
Exxon	Spinesstic 22, Teresstic 32
Mobil	Velocite 10
Non-Fluid Oil	Air Lube 10H/NR
Shell	Turbo T32
Sun	Sunvis 11, Sunvis 722
Texaco	Regal R&O 32
Union	Union Turbine Oil

Electrical Contacts. In the electrical circuits associated with the valve solenoids, keep all switches or relay contacts in good condition to avoid solenoid malfunctions.

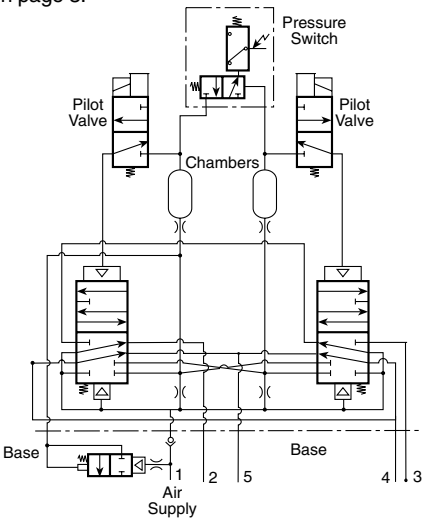
Replace Worn Components. In most cases it is not necessary to remove the valve from its installation for servicing. However, turn off the electrical power to the valve, shut off the air supply, and exhaust the air in the system before beginning any disassembly operation. Service kits are listed on page 3.

VALVE OPERATION

Normal Operation: After installation the valve is operated by energizing both pilot solenoids simultaneously. This causes both main valve elements to be actuated so that air from inlet port 1 flows to outlet port 4, but not to port 2. Air downstream of port 2 is exhausted through port 3. When the solenoids are de-energized, both valve elements are de-actuated, and air then flows from inlet port 1 to outlet port 2, but no longer to outlet port 4. Air downstream of port 4 is exhausted through port 5.

Detecting a Malfunction: If the main valve elements are not both actuated or de-actuated at the same time, the valve defaults so that outlet port 2 receives full inlet pressure, and outlet port 4 is exhausted through port 5. If the malfunction was the result of a temporary circumstance, the valve will be ready to resume normal operation as soon as both solenoids have been de-energized.

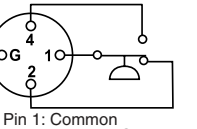
Pressure Switch: Valves with model numbers ending in the number 1 have a pressure switch to aid in detecting when the main valve elements did not move together. Out-of-step movement of the valve elements causes a pressure signal to close electrical contacts. This can be used to complete an electrical circuit in an external monitoring system.



Status Indicator (pressure switch)

Terminals 1 and 4 are connected when air pressure is present and the valve is "Ready-to-Run". If an abnormal operation has occured or pressure is removed from the valve inlet, terminals 1 and 2 are connected.

Note: DC voltage pressure switches do not have a ground terminal.



Pin 1: Common
Pin 2: Normally Closed
Pin G: Not used
Pin 4 : Normally Open

VALVE SPECIFICATIONS

Construction Design	Double Spool and Sleeve
Mounting Type	Base
Solenoids	According to VDE 0580. Enclosure rating according to DIN 400 50 IP 65. Three (with pressure switch) or two solenoids (without pressure switch), rated for continuous duty
Voltage	24 volts DC; 110 volts AC, 50 Hz; 120 volts AC, 50/60 Hz
Power Consumption (each solenoid)	6.5 watts maximum on DC, 6.5 watts on 50/60 Hz
Enclosure Rating	IP65, IEC 60529
Electrical Connection	EN 175301-803 Form A. Uses cord-grip connectors at solenoids

Temperature	**Ambient:** 40° to 122°F (4° to 50°C) **Media:** 40° to 175°F (4° to 80°C)
Flow Media	Filtered air
Inlet Pressure	40 to 150 psig (2.5 to 10.3 bar)
NOTE: Main solenoids must be off when performing reset procedure.	
Construction Material	**Valve Body:** Cast Aluminum **Spool:** Stainless Steel **Seals:** Buna-N
Functional Safety Data: Category 4, PL e; B_{10D}: 20,000,000; PFH_D: 7.71x10-9 ; $MTTF_D$: 301.9 (nop: 662400). **Certifications:** CE Marked for applicable directives, DGUV Test **Vibration/Impact Resistance:** Tested to BS EN 60068-2-27	
Conformity	ISO 13849-1

IMPORTANT NOTE: Please read carefully and thoroughly all the WARNINGS and CAUTIONS on page 1 and 4.

VALVE SERVICE

ROSS would be happy to service this valve for you at its factory repair center. If you purchased your valve from ROSS please contact ROSS customer service, if you purchased your valve thru an authorized ROSS distributor please contact the distributor for return instructions. However, if you choose to service this valve yourself, it is strongly recommended that you visit our website at rosscontrols.com for available downloadable technical documentation.

When servicing the valve yourself, be sure to turn off electrical power to the valve, shut off the air supply, exhaust the air in the system, and lock-out all power sources before beginning any disassembly operation. Listed below are kits for servicing your valve, as well as replacement components.

Valve Body Service Kits. These kits contain all parts needed for complete reconditioning of a valve body. Included are spools, gaskets, seals, and instructions for use.
Base Service Kits. These kits contain the seals and other parts required to recondition the valve's base.
Pressure Switch Assembly Kits. These kits contain the parts necessary to recondition the pressure switch assembly.

Replacement Pressure Switches and Switch Connectors. Part numbers for these components are shown in the chart below.
Solenoids. Order replacement solenoids or solenoid coils by the following part numbers. Be sure to specify voltage and hertz when ordering.
Solenoid coil only, **411B33**.
Complete pilot assembly, **1526C79**.

Valve Basic Size	Valve Model Number (without base)	Valve Body Seal and Gasket Kit	Valve Body Service Kit	Pressure Switch Assembly Service Kit	Pressure Switch		Pressure Switch Connector
					24 Volts DC	120 Volts AC	
2	Y7786A3400	1575K77	1576K77	1696K77	N/A	N/A	N/A
	Y7786A3401	1575K77	1576K77	1696K77	798E30	518E30	522E30
4	Y7786A4400	1577K77	1578K77	1696K77	N/A	N/A	N/A
	Y7786A4401	1577K77	1578K77	1696K77	798E30	518E30	522E30

Electrical Connector Form	Electrical Connector Type	Cord Length meter (feet)	Cord Diameter	Electrical Connector Model Number		
				Without Light	Lighted Connector	
					24 Volts DC	120 Volts AC
EN 175301-803 Form A	Connector Only	–	–	937K87	936K87-W	936K87-Z
	Connector for threaded conduit (1/2 inch electrical conduit fittings)	–	–	723K77	724K77-W	724K77-Z
	Prewired Connector (18 gauge)	2 (6½)	10-mm	371K77	383K77-W	383K77-Z
	Prewired Connector (18 gauge)	2 (6½)	6-mm	721K77	720K77-W	720K77-Z

CAUTION: Do not use electrical connectors with surge suppressors, as this may increase valve response time when de-actuating the solenoids.

If you need additional information, or have any questions about installing or servicing your valve, call ROSS *Technical Services* in the U.S.A. at: **1-888-TEK-ROSS(835-7677)**.

CAUTIONS And WARNINGS

ROSS OPERATING VALVE, ROSS CONTROLS®, ROSS DECCO®, and AUTOMATIC VALVE INDUSTRIAL, collectively the "ROSS Group".

PRE-INSTALLATION or SERVICE

1. Before servicing a valve or other pneumatic component, be sure all sources of energy are turned off, the entire pneumatic system is shut down and exhausted, and all power sources are locked out (ref: OSHA 1910.147, EN 1037).

2. All ROSS Group Products, including service kits and parts, should be installed and/or serviced only by persons having training and experience with pneumatic equipment. Because any product can be tampered with and/or need servicing after installation, persons responsible for the safety of others or the care of equipment must check ROSS Group Products on a regular basis and perform all necessary maintenance to ensure safe operating conditions.

3. All applicable instructions should be read and complied with before using any fluid power system to prevent harm to persons or equipment. In addition, overhauled or serviced valves must be functionally tested prior to installation and use. If you have any questions, call your nearest ROSS Group location.

4. Each ROSS Group Product should be used within its specification limits. In addition, use only ROSS Group components to repair ROSS Group Products.

WARNINGS: Failure to follow these instructions can result in personal injury and/or property damage.

FILTRATION and LUBRICATION

1. Dirt, scale, moisture, etc., are present in virtually every air system. Although some valves are more tolerant of these contaminants than others, best performance will be realized if a filter is installed to clean the air supply, thus preventing contaminants from interfering with the proper performance of the equipment. The ROSS Group recommends a filter with a 5-micron rating for normal applications.

2. All standard ROSS Group filters and lubricators with polycarbonate plastic bowls are designed for compressed air applications only. Use the metal bowl guard, where provided, to minimize danger from high pressure fragmentation in the event of bowl failure. Do not expose these products to certain fluids, such as alcohol or liquefied petroleum gas, as they can cause bowls to rupture, creating a combustible condition and hazardous leakage. Immediately replace crazed, cracked, or deteriorated bowls.

3. Only use lubricants which are compatible with materials used in the valves and other components in the system. Normally, compatible lubricants are petroleum base oils with oxidation inhibitors, an aniline point between 180°F (82°C) and 220°F (104°C), and an ISO 32, or lighter, viscosity. Avoid oils with phosphate type additives which can harm polyurethane components, potentially leading to valve failure which risks personal injury, and/or damage to property.

WARNINGS: Failure to follow these instructions can result in personal injury and/or property damage.

AVOID INTAKE/EXHAUST RESTRICTION

1. Do not restrict air flow in the supply line. To do so could reduce the pressure of the supply air below minimum requirements for the valve and thereby causing erratic action.

2. Do not restrict a valve's exhaust port as this can adversely affect its operation. Exhaust silencers must be resistant to clogging and must have flow capacities at least as great as the exhaust capacities of the valves. Contamination of the silencer can result in reduced flow and increased back pressure.

WARNINGS: Failure to follow these instructions can result in personal injury and/or property damage.

SAFETY APPLICATIONS

1. Mechanical Power Presses and other potentially hazardous machinery using a pneumatically controlled clutch and brake mechanism must use a press control double valve with a monitoring device. A double valve without a self-contained monitoring device should be used only in conjunction with a control system which assures monitoring of the valve. All double valve installations involving hazardous applications should incorporate a monitoring system which inhibits further operation of the valve and machine in the event of a failure within the valve mechanism.

2. Safety exhaust (dump) valves without a self-contained monitoring device should be used only in conjunction with a control system which assures monitoring of the valve. All safety exhaust valve installations should incorporate a monitoring system which inhibits further operation of the valve and machine in the event of a failure within the valve mechanism.

3. Per specifications and regulations, the ROSS L-O-X® and L-O-X® with EEZ-ON®, N06 and N16 Series operation products are defined as energy isolation devices, NOT AS EMERGENCY STOP DEVICES.

WARNINGS: Failure to follow these instructions can result in personal injury and/or property damage.

STANDARD WARRANTY All products sold by the ROSS Group are warranted for a one-year period [with the exception of Filters, Regulators and Lubricators ("FRLs") which are warranted for a period of seven (7) years] from the date of purchase. All products are, during their respective warranty periods, warranted to be free of defects in material and workmanship. The ROSS Group's obligation under this warranty is limited to repair, replacement or refund of the purchase price paid for products which the ROSS Group has determined, in its sole discretion, are defective. All warranties become void if a product has been subject to misuse, misapplication, improper maintenance, modification or tampering. Products for which warranty protection is sought must be returned to the ROSS Group freight prepaid.

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