

77 Series CROSSMIRROR® Double Valves

Pressure Controlled



Thank You!

You have purchased a premium quality ROSS® pneumatic valve. It is a control reliable pressure control 4-way double valve that is controlled by two separate pneumatic signals essentially providing AND gate control for the output ports. Both air pilot signals must be provided within approximately 500 milliseconds of each other to actuate the valve. If the valve is not actuated, not provided appropriate pneumatic signals within the discordance window, or if the valve actuates abnormally, inlet pressure will only be passed to port 2. Proper actuation shifts output pressure to port 4.

This valve is constructed with precision, stainless steel spools as the main valve elements, and is designed to offer added safety to the operation of many pneumatic 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.



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 www.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 www.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 due to 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 2*), 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 when the valve is de-actuated or when the redundant valve elements are not actuated within 500 milliseconds of each other), and port 4 is the normally closed port (pressurized only when both main valve elements have been actuated within 500 milliseconds of each other).

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. Any flow control requirements should be installed between the actuator and the valve (ports 2 & 4) at the cylinder and not in the valve exhaust ports.

Signal Ports (Ports S1 and S2): The valves supplying air to these ports should be 3-way normally closed valves and must have a Cv rating of not less than 0.3. The pilot valves must have an adequate supply to provide consistent pressure greater than or equal to the main valve supply in Port 1 (see *Valve Specifications, page 2*). Ensure that the lines supplying air to the Signal Ports are of equal length, and no less than 3/16" (5mm) inside diameter.

Operating Pressures and Temperatures: Allowable ranges for pressure and temperature are given in the *Valve Specifications* on page 2. 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 feedback is desired Ross offers a version of the valve with a pressure switch feedback device that can be used to provide feedback to other electrical controls for valve ready-to-run status.

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

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

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.*

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 SPECIFICATIONS

Construction: Double spool and sleeve.

Mounting Type: Base mounted.

Ambient Temperature: 40° to 120°F (4° to 50°C).

Media Temperature: 40° to 175°F (4° to 80°C).

Flow Media: Filtered air.

Inlet Pressure: 40 to 100 psig (2.7 to 7 bar).

Pilot Pressure: Must be equal or greater than inlet pressure, but should not exceed maximum inlet pressure.

Pressure Switch Rating: Max Current 4A, Max 250 volts AC.
Max Current 50 mA, Max 24 volts DC.

Pressure Switch: Pressure Switch signal indicates when the input signals or parts movement is asynchronous.

Functional Safety Data: Category 4 PL e; B10D: 20,000,000; PFHD: 7.71x10⁻⁹; MTTFD: 301.9 (n_{op}: 662400).

Certifications: CE Marked for applicable directives, BG.

Vibration/Impact Resistance: Tested to BS EN 60068-2-27.

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

VALVE OPERATION

Normal Operation: After installation the valve is operated by pressurizing both pilot supply ports (S1 and S2) 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.

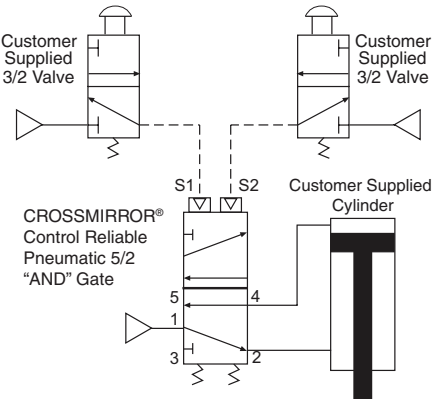
When the pilot supply ports are de-pressurized, both valve elements are de-actuated, and air then flows from inlet port 1 to outlet port 2, but no longer to outlet port 4. Air downstream of port 4 is exhausted through port 5.

Safety Function: If the two main valve elements are not actuated or de-actuated synchronously, within 500 milliseconds, the valve defaults so that outlet port 2 receives full inlet pressure, and outlet port 4 is exhausted through port 5. If this abnormal operation is the result of a temporary circumstance, the valve will be ready to resume normal operation as soon as both pilot signal ports have been de-pressurized and both main valve elements have returned to their normal “ready-to-run” position. Applying pressure to both signal ports simultaneously will resume normal operation.

If the cause of the abnormal operation is still present, the valve will either remain in the default position (pressure on port 2 and not port 4) or will again go into this position on the next actuation attempt. The source of the abnormality must be investigated and corrected before further operation.

Pressure Switch: Valves with model numbers ending in the number 1 have a pressure switch to provide user feedback when movement of the main valve elements was asynchronous.

Typical 2-Hand-Anti-Tie-Down Application

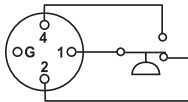


Status Indicator (pressure switch)

Terminals 1 and 4 are connected when air pressure is present and the valve is “Ready-to-Run”. If an abnormal operation has occurred 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 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 www.rosscontrols.com for available downloadable technical documentation.

If you service 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 *CROSSMIRROR® Series 77* double valves, as well as replacement valve and base assembly, replacement accessories, and electrical connectors information.

Valve Body Service Kits. These kits contain all parts needed for complete reconditioning of a valve body. Included are spools, gaskets and seals kits, and instructions for use.

Valve Body Gasket Kits. These kits are needed when valve bodies are disassembled for cleaning. They include all necessary gaskets, O-rings and other seals.

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.

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	2216K77	2218K77	1694K77	N/A	N/A	N/A
	Y7786A3401	2216K77	2218K77	1694K77	798E30	518E30	522E30
4	Y7786A4400	2217K77	2219K77	1695K77	N/A	N/A	N/A
	Y7786A4401	2217K77	2219K77	1695K77	798E30	518E30	522E30

If you have any questions about installing or servicing your valve, call ROSS *Technical Services* at your nearest ROSS location (see page 4) or in the U.S.A. at: **1-888-TEK-ROSS(835-7677).**

CAUTIONS And WARNINGS



PRE-INSTALLATION or SERVICE

1. Before servicing a valve or other pneumatic component, be sure that all sources of energy are turned off, the entire pneumatic system is shut off and exhausted, and all power sources are locked out (ref: OSHA 1910.147, EN 1037).
2. All ROSS® products, including service kits and parts, should be installed and/or serviced only by persons having training and experience with pneumatic equipment. Because any installation can be tampered with or need servicing after installation, persons responsible for the safety of others or the care of equipment must check every installation on a regular basis and perform all necessary maintenance.
3. All applicable instructions should be read and complied with before using any fluid power system in order 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 location listed in the table below.
4. Each ROSS product should be used within its specification limits. In addition, use only ROSS parts to repair ROSS products.

WARNINGS: *Failure to follow these directions can adversely affect the performance of the product or result in the potential for human injury or damage to property.*

FILTRATION and LUBRICATION

5. 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. ROSS recommends a filter with a 5-micron rating for normal applications.
6. All standard ROSS filters and lubricators with polycarbonate plastic bowls are designed for compressed air applications only. Do *not* fail to 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, hazardous leakage, and the potential for human injury or damage to property. Immediately replace a crazed, cracked, or deteriorated bowl. When bowl gets dirty, replace it or wipe it with a clean dry cloth.

7. Only use lubricants which are compatible with materials used in the valves and other components in the system. Normally, compatible lubricants are petroleum based 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 human injury, and/or damage to property.

AVOID INTAKE/EXHAUST RESTRICTION

8. Do not restrict the air flow in the supply line. To do so could reduce the pressure of the supply air below the minimum requirements for the valve and thereby cause erratic action.
9. 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:

ROSS expressly disclaims all warranties and responsibility for any unsatisfactory performance or injuries caused by the use of the wrong type, wrong size, or an inadequately maintained silencer installed with a ROSS product.

POWER PRESSES

10. 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.

ENERGY ISOLATION/EMERGENCY STOP

11. Per specifications and regulations, ROSS **L-O-X®** valves and **L-O-X®** valves with **EEZ-ON®** operation are defined as energy isolation devices, NOT AS EMERGENCY STOP DEVICES.

STANDARD WARRANTY

All products sold by ROSS CONTROLS are warranted for a one-year period [with the exception of all Filters, Regulators and Lubricators ("FRLs") which are warranted for a period of seven years] from the date of purchase to be free of defects in material and workmanship. ROSS' obligation

under this warranty is limited to repair or replacement of the product or refund of the purchase price paid solely at the discretion of ROSS and provided such product is returned to ROSS freight prepaid and upon examination by ROSS is found to be defective. This warranty becomes void in the event that product has been subject to misuse, misapplication, improper maintenance, modification or tampering.

THE WARRANTY EXPRESSED ABOVE IS IN LIEU OF AND EXCLUSIVE OF ALL OTHER WARRANTIES AND ROSS EXPRESSLY DISCLAIMS ALL OTHER WARRANTIES EITHER EXPRESSED OR IMPLIED WITH RESPECT TO MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. ROSS MAKES NO WARRANTY WITH RESPECT TO ITS PRODUCTS MEETING THE PROVISIONS OF ANY GOVERNMENTAL OCCUPATIONAL SAFETY AND/OR HEALTH LAWS OR REGULATIONS. IN NO EVENT IS ROSS LIABLE TO PURCHASER, USER, THEIR EMPLOYEES OR OTHERS FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES WHICH MAY RESULT FROM A BREACH OF THE WARRANTY DESCRIBED ABOVE OR THE USE OR MISUSE OF THE PRODUCTS. NO STATEMENT OF ANY REPRESENTATIVE OR EMPLOYEE OF ROSS MAY EXTEND THE LIABILITY OF ROSS AS SET FORTH HEREIN.

ROSS CONTROLS	USA	Tel: 1-248-764-1800	web site: www.rosscontrols.com
ROSS EUROPA GmbH	Germany	Tel: 49-6103-7597-0	web site: www.rosseuropa.com
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ROSS UK Ltd.	UK	Tel: 44-1543-671495	web site: www.rossuk.co.uk
ROSS SOUTH AMERICA Ltda.	Brazil	Tel: 55-11-4335-2200	email: vendas@rosscontrols.com
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