

CM Series CROSSMIRROR® Double Valves

Pressure Controlled

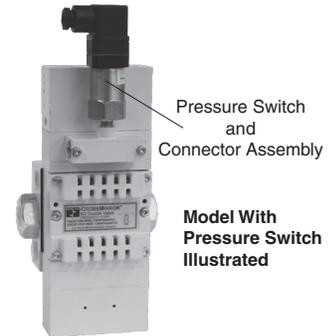


Thank You!

You have purchased a premium-quality ROSS® pneumatic valve. It is a high quality CM Series CROSSMIRROR®, pressure return double valve with dynamic monitoring and inherent lockout capability. The valve is designed for base mounting for ease of installation and maintenance. With care in its installation and maintenance you can expect it to have a long and economical service life. Before you install this valve, read the information in this folder completely, and save it for future reference.

Meets Standards EN13736 and B11.2, Safety requirements for Pneumatic Cylinder Presses and other hazardous pneumatic cylinder applications.

This valve is not designed for controlling clutch/brake mechanisms on mechanical power presses.



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 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): The silencers for ports 3 and 5 have been integrated into these valves. Do not restrict air flow from the exhaust ports as this can adversely affect the operation of the valve.

Reset Port (RESET): The RESET port should be supplied, externally, from a 3/2 normally closed valve. The lines must be of adequate size and be free of restrictions (e.g., a crimp in the line, a sharp bend, or a clogged filter element). Reset signals must be momentary.

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 in base ports, engage the pipe by one turn, then 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. After installing pipe into the base ports, use compressed air to blow any debris out of the piping, then install the valve onto the base.

Test: After installation or repair, and prior to normal use, the internal lockout feature of the CROSSMIRROR® Series CM double valve must be tested for proper functioning. Observe normal safety precautions during these tests to avoid personal injury or damage to equipment.

Note: Reset may need to be performed prior to beginning the test procedure. Also, both air signals must be de-energized prior to reset and must remain de-energized until after the reset signal is removed.

A) Energize both *air signals* simultaneously, then de-energize one air pilot. This should result in a valve lockout and prevent the valve from operating.

B) Energize both *air signals* and the valve should remain in the lockout condition.

C) De-energize both *air signals* and reset the valve.

D) Energize both *air signals* simultaneously again. De-energize the other *air signal* this time. Again, this should result in a lockout.

E) Energize both *air signals*. The valve should remain in a lockout condition.

F) De-energize both pilot *air signals* and then reset the valve.

After satisfying these tests, energizing both *air signals* simultaneously should result in normal operation.

Fault Indication: If fault indication is desired, ROSS offers a status indicator option that can be used to signal that a fault has occurred. The status indicator utilizes a pressure switch. The pressure switch has 4 electrical contacts. During normal operation the pressure switch is pressurized.

A lockout condition depressurizes the switch until the valve is reset. Contacts 1 and 2 are closed when the switch is depressurized (normally closed) and contacts 1 and 4 are closed when an adequate pressure signal is applied to the switch (normally open).

VALVE OPERATION

Normal Operation: The valve is operated by pressurizing both pilot supply ports 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. On first operation, or after repair, the pilot valve supply circuit and inherent monitoring elements may need to be reset.

Valve Locked-out: Whenever the valve elements operate in a sufficiently asynchronous manner, either on actuation or de-actuation, the valve will move to a locked-out position. In the locked-out position, one crossover and its related timing chamber will be exhausted, and the other crossover and its related timing chamber will be fully pressurized.

The valve element (side B) that is partially actuated has pilot air available to fully actuate it, but no air pressure on the return piston to fully de-actuate the valve element.

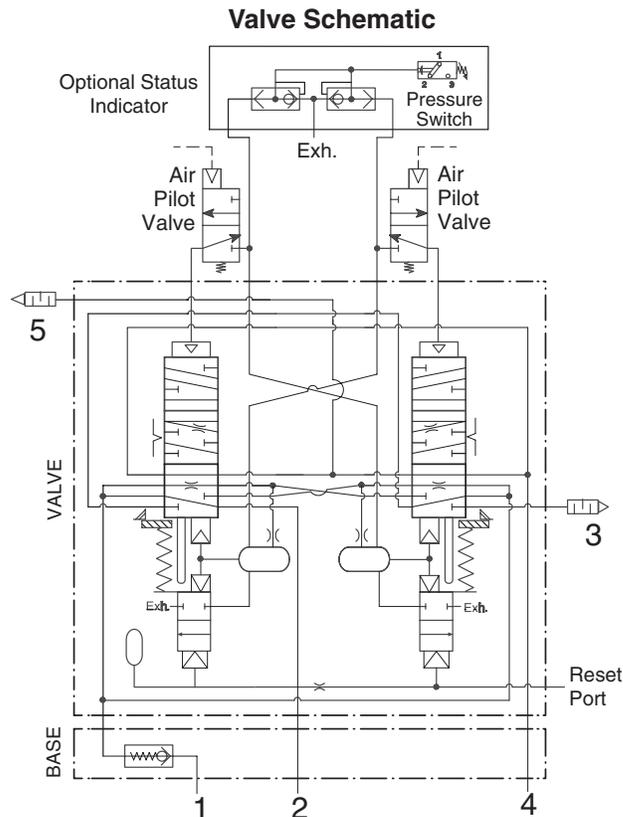
The return springs are limited in travel, and can only return the valve elements to the intermediate (locked-out) position. Sufficient air pressure acting on the return pistons is needed to return the valve elements to a fully home position.

Detecting a Malfunction: If the main valve elements are not both actuated or de-actuated synchronously, the valve defaults to the locked-out position so that outlet port 2 receives full inlet pressure, and outlet port 4 is exhausted through port 5. The valve must now be "reset" to resume normal operation.

Resetting the Valve: The valve will remain in the locked-out position, even if the inlet air supply is removed and re-applied.

A remote reset signal must be applied to reset the valve. Reset is accomplished by momentarily pressurizing the reset port. Actuation of the reset piston physically pushes the main valve elements to their home position. Actuation of the reset piston also opens the reset poppet, thereby, immediately exhausting pilot supply air, thus, preventing valve operation during reset. De-actuation of reset pistons causes the reset poppets to close and pilot supply timing chambers to fully pressurize. Reset pressure can be applied by a remote 3/2 normally closed valve.

Status Indicator: The optional status indicator pressure switch will actuate when the main valve is operating normally, and will de-actuate when the main valve is in the locked-out position or inlet pressure is removed. This device is not part of the valve lockout function, but, rather, only reports the status of the main valve.



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 phosphate additives (e.g., zinc dithiophosphate) and diester oils; both types 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 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.

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 |

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 any good commercial solvent. Do *not* scrape varnished surfaces. Also, do not use chlorinated solvents or abrasive materials. The former damages seals, and abrasives can do permanent damage to metal parts. Before reassembling the valve, lubricate all sliding surfaces with a grease such as Dow Corning BR 2 Plus.

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, exhaust the air in the system, and lock-out before beginning any disassembly operation. Service kits are listed on page 3.

STANDARD SPECIFICATIONS

Construction: Double spool and sleeve.

Mounting Type: Base mounted.

Ambient Temperature: 15° to 122°F (-10° to 50°C).

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

Flow Media: Filtered air.

Inlet Pressure: 40 to 150 psig (2.7 to 10 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.

Monitoring: Dynamically, cyclically, internally during each actuating and de-actuating movement. Monitoring function has memory and requires an overt act to reset unit after lockout.

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 **CAUTIONS** and **WARNINGS** on page 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 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 CM* double valves, as well as replacement valve and base assembly, and replacement accessories information.

CAUTION: Before operating the *CM Series CROSSMIRROR®* double valve, be sure to complete the test procedure (TEST), on page 1, upon installation and after any maintenance is performed on the valve. Failure to do so could result in personal injury or equipment damage.

Valve Body Service Kit.

This kit includes all parts needed for complete reconditioning of the valve body. Included are poppets, spindles, gaskets, seals, and instructions for use.

Status Indicator Assembly Service Kit.

This kit includes all parts needed for complete reconditioning of the status indicator assembly. Pressure switch and connector sold separately - see below.

Replacement Pressure Switch Assembly (status indicator).

This kit includes a replacement pressure switch and electrical connector for the status indicator assembly.

| Port Size | Basic Size | Valve Body Service Kit Number | Valve Body Seal and Gasket Service Kit Number | Status Indicator Assembly Service Kit Number | Base Service Kit Number |
|-----------|------------|-------------------------------|---|--|-------------------------|
| 1/4, 3/8 | 0 | 2474K77 | 2475K77 | 2451K77 | 2434K77 |
| 1/2 | 2 | 2502K77 | 2503K77 | 2451K77 | 2499K77 |

Replacement Valve and Base Assembly

| Port Sizes | | Basic Size | Pressure Switch | Replacements Model Number | |
|------------|------|------------|-----------------|---------------------------|-----------|
| 1 | 2, 4 | | | Valve No. | Base No.* |
| 1/4 | 1/4 | 0 | With | CM26PNA0XP11 | Y1951D91 |
| | | | Without | CM26PNA0XP1X | Y1951D91 |
| 3/8 | 3/8 | 0 | With | CM26PNA0XP11 | Y1949D91 |
| | | | Without | CM26PNA0XP1X | Y1949D91 |
| 1/2 | 1/2 | 2 | With | CM26PNA2XP11 | Y1955D91 |
| | | | Without | CM26PNA2XP1X | Y1955D91 |

* NPT port threads. For BSPP threads, insert a "D" after "Y" in the model number, e.g., YD1951D91.

Replacement Accessories

| Port Size | Pressure Switch (Status Indicator) Model Number | Pressure Switch Assembly (Status Indicator & Base) Model Number |
|---------------|---|---|
| 1/4, 3/8, 1/2 | 1104A30 | Y733B94 |

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.
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.

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

STANDARD WARRANTY

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.

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