CM Series CrossMirror® Double Valves
Solenoid Pilot 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.

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 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): If your valve is not equipped with a reset solenoid on the valve, then 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.

Electrical Supply: The voltage and hertz ratings of the valve solenoids (if any) are shown on the pilot housing. The electrical supply must correspond to these ratings. Otherwise the solenoids are subject to early failure. The power supply must be capable of handling the maximum power. See *Valve Specifications* on page 3 for information on maximum power.

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 pilot solenoids must be de-energized prior to reset and must remain de-energized until after the reset signal is removed.*

A) Electrically energize both pilot solenoids simultaneously, then de-energize one pilot solenoid. This should result in a valve lockout and prevent the valve from operating.
B) Energize both solenoids and the valve should remain in the lockout condition.
C) De-energize both pilot solenoids and reset the valve.
D) Electrically energize both pilot solenoids simultaneously again. De-energize the other pilot solenoid this time. Again, this should result in a lockout.
E) Energize both pilot solenoids. The valve should remain in a lockout condition.
F) De-energize both pilot solenoids and then reset the valve.

After satisfying these tests, energizing both pilot solenoids 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 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. 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.

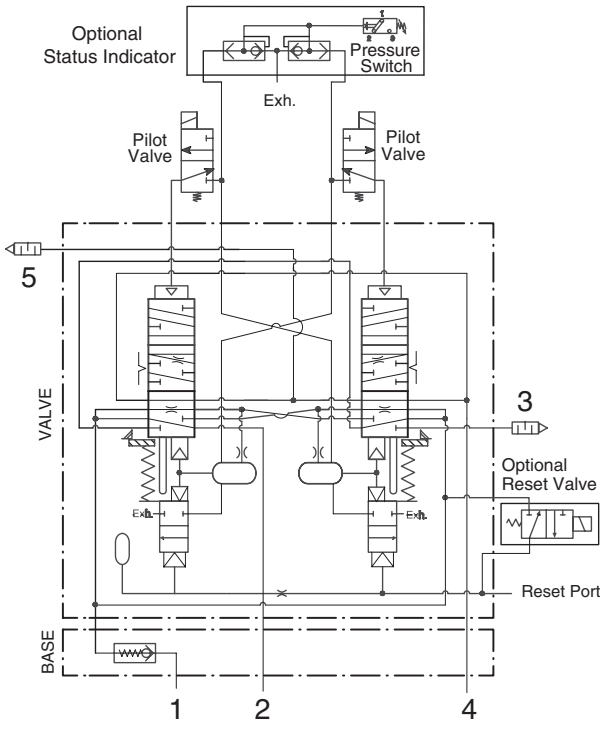
Detecting a Malfunction: If the main valve elements are not both actuated or de-actuated synchronously, the valve defaults to the locked-out position so that outlet port 2 receives full inlet pressure, and outlet port 4 is exhausted through port 5. The valve must now be "reset" to resume normal operation.

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, or from an optional 3/2 normally closed solenoid (which includes an integral manual reset button) mounted on the reset adapter.

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 Schematic



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 Design	Double Spool and Sleeve
Mounting Type	Base
Solenoids	According to VDE 0580. Two solenoids, rated for continuous duty
Voltage	24 volts DC; 110 volts AC, 50 Hz; 120 volts AC, 60 Hz
Power Consumption (each solenoid)	**Size 0:** 24 volts DC: 1.5 watts on DC; 110 volts AC, 50 Hz/120 volts AC, 60 Hz: 1.7 watts; 120 volts AC, 60 Hz: 5.0 VA **Size 2:** 24 volts DC; 110 volts AC, 50 Hz; 120 volts AC, 50/60 Hz 5.8 watts nominal on AC and DC, 6.5 watts maximum on AC and DC
Enclosure Rating	DIN 400 50 IP 65
Electrical Connection	**Size 0:** Connector socket according to EN 175301-803 Form C **Size 2:** Connector socket according to EN 175301-803 Form A
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 (3 to 10 bar)
Pressure Switch (Status Indicator) Rating	5 amps at 250 volts AC, or 5 amps at 30 volts DC

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.
Solenoid Reset	Units with solenoid reset include a 3/2 solenoid valve. Energize this solenoid momentarily to reset valve after lock-out condition occurs
Remote Reset	Remote signal to be supplied by customer's 3/2 valve (connect remote signal line to remote RESET port in valve). Apply signal momentarily to reset valve after fault condition occurs.
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 (n_{op}: 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* ***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, replacement accessories, and electrical connectors 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. These kit contain all parts needed for complete reconditioning of a 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.

Replacement Pressure Switch Assembly (status indicator). This kit includes a replacement pressure switch and electrical connector for the status indicator assembly.

Port 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	2436K77	2435K77	2451K77	2434K77
1/2	2501K77	2500K77	2451K77	2499K77

Replacement Valve and Base Assembly

Port Size		Basic Size	Valve without Sub-Base			Manifold Base Model Number#
1	2, 4		Pressure Switch	Model Number		
				With Remote Reset	With Solenoid Reset	
1/4	1/4	0	With	CM26PXA0X**11	CM26PXA0X**21	Y1951D91
			Without	CM26PXA0X**1X	CM26PXA0X**2X	Y1951D91
3/8	3/8	0	With	CM26PXA0X**11	CM26PXA0X**21	Y1949D91
			Without	CM26PXA0X**1X	CM26PXA0X**2X	Y1949D91
1/2	1/2	2	With	CM26PXA2X**11	CM26PXA2X**21	Y1955D91
			Without	CM26PXA2X**1X	CM26PXA2X**2X	Y1955D91

** Insert voltage code: "A" = 24 volts DC; "B" = 120 volts AC; e.g., CM26PXA0XA1X. #NPT port threads. For BSPP threads, insert a "D" after "Y" in the model number, e.g., YD1951D91.

Replacement Solenoid Coils Model Number

Port Size	Solenoid Coil Type	Voltage	
		24 volts DC	110 or 120 volts AC
1/4, 3/8	Main	1536B7916	1536B79105
	Reset	1527B7916	1527B79105
1/2	Main	1526C7916	1526C79105
	Reset	1524C7916	1524C79105

Replacement Pressure Switch

Pressure Switch Option	Model Number
Pressure Switch (Status Indicator)	1104A30
Pressure Switch Assembly (Status Indicator & Base)	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).**

Basic Valve Size	Electrical Connector	Electrical Connector Type	Cord Length meter (feet)	Cord Diameter	Electrical Connector Model Number			
					Without Light	Lighted Connector		
						24 Volts DC	120 Volts AC	
0	EN 175301-803 Form C	Prewired Connector	3 (10)	8-mm	2449K77	2450K77-W	2450K77-Z	
		Connector Only	–	–	2452K77	2453K77-W	2453K77-Z	
2	EN 175301-803 Form A	Prewired Connector (18 gauge)	2 (6½)	6-mm	721K77	720K77-W	720K77-Z	
		Prewired Connector (18 gauge)	2 (6½)	10-mm	371K77	383K77-W	383K77-Z	
		Connector for threaded conduit (1/2 inch electrical conduit fittings)	–	–	723K77	724K77-W	724K77-Z	
		Connector Only	–	–	937K87	936K87-W	936K87-Z	

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

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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