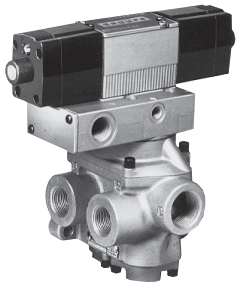
27 Series Poppet Valves & Adaptors

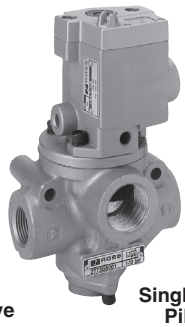
Thank You! You have purchased a premium-quality ROSS® pneumatic valve. It is a poppet valve designed for inline mounting, and has been built to the highest standards.

With care in its installation and maintenance, you can expect it to have a long and economical service life. So before you go any further, please take a few minutes to look over the information in this folder. Then save it for future reference and for the useful service information it contains. A general service manual with more detailed information is available, visit ROSS' website at www.rosscontrols.com.

For information on 27 Series adaptors, see pages 3 & 4.



Direct Double Solenoid Valve



Single Solenoid Pilot Valve

Pressure Controlled Valve

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.

Important Note: *ROSS 27 Series valves are* ***not*** *designed as control valves for air clutch/brake mechanisms on mechanical power presses, and must not be installed for such use. Only double valves conforming to OSHA standards shall be used in such applications.*

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 an 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.

Valve Outlets (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.

Valve Exhausts (Port 3): Do not restrict the air flow from the exhaust port of the valve body or pilot body as this can adversely affect the operation of the valve. However, to reduce exhaust noise, an efficient silencer may be used. ROSS silencers reduce impact noise by as much as 25 dB, and produce little back pressure.

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. If power is supplied by a transformer it must be capable of handling the inrush current without significant voltage drop. See *Valve Specifications* below for information on inrush current.

Operating Pressures and Temperatures: Allowable ranges for pressure and temperatures are given in the *Valve Specifications* below. Exceeding the values shown can shorten valve life.

Pilot Supply: *Pressure Control:* Connect a 1/4-inch control line to the threaded port in the air cap at the top of the valve. See *Valve Specifications* below for required pressures.

Solenoid Control: Pressure for the pilot valve is supplied internally for most valves, and requires no special connection. However, if your valve is designated for external pilot supply, a 1/8-inch pilot supply line must be connected to port X-1 in the pilot housing. See *Valve specifications* below for pressure requirements.

Pipe Installation: To install pipe in valve ports, 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.

VALVE SPECIFICATIONS

Construction: Poppet.
Mounting Type: Inline.

Pressure Controlled

Temperature Range: 40° to 175°F (4° to 80°C).
Flow Media: Filtered air.
Inlet Pressure:
1/4 to 1-1/2 Port Sizes: 15 to 150 psig (1 to 10 bar).
1-1/2 to 2-1/2 Port Sizes: 30 to 150 psig (2 to 10 bar).
2/2 EEZ-ON®: 30 to 150 psig (2 to 10 bar) for all sizes.
Pilot Pressure: Must be equal to or greater than inlet pressure.

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

Solenoid Pilot Controlled

Solenoids: Rated for continuous duty. Voltage and Hertz ratings shown on pilot housing.
Power Consumption:
Single Solenoid: 87 VA inrush, 30 VA holding on AC; 14 watts on DC.
Double Solenoid: Each solenoid, 190 VA inrush, 40 VA holding on AC; 20 watts on DC.
Temperature Range: *Ambient:* 40° to 120°F (4° to 50°C).
Media: 40° to 175°F (4° to 80°C).
Flow Media: Filtered air.
Inlet Pressure: *1/4 to 1-1/2 Port Sizes:* 15 to 150 psig (1 to 10 bar).
1-1/2 to 2-1/2 Port Sizes: 30 to 150 psig (2 to 10 bar).
Pilot Pressure: When external supply is used, pressure must be equal to or greater than inlet pressure.
Manual Override: Flush; rubber, non-locking.

Safety Integrity Level (SIL) – Certified by TÜV Rheinland in accordance to IEC 61508 and IEC 61511 safety integrity level 2 (SIL 2) and EN ISO 13849-1, PL c or PL d (with application specific diagnosis) in singular application with HFT = 0 and SIL 3 and PL e in redundant application with HFT≥1.

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 an 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 this valve itself does not require air line lubrication, but some optional adaptors do, i.e., air index, etc.)

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 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. A schedule should be established for cleaning all valves, the frequency depending on the cleanliness of the air being supplied.

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

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 MobilGrease 28.

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 some 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 for these valves are listed below. Service kits for adaptors are listed on page 3.

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.

Valve Body Service Kits. These kits contain all parts needed for complete reconditioning of a valve body. Included are poppets, spindle, all required gaskets and seals, and instructions for use. Order by the kit number listed in the table on the right.

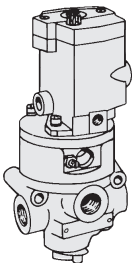
Gasket and Seal Kits. These kits are needed when valve bodies are disassembled for cleaning. They include all the necessary gaskets, O-rings, and other seals. Order by the kit number listed in the table on the right.

Solenoid Pilot Kits. These kits contain all parts needed to recondition the pilot valve. Order by the following kit numbers:

For single solenoid pilots: **946K87**
For double solenoid pilots: **273K87**

Solenoids. Replacement solenoids can be ordered by the part numbers listed below. Specify the required voltage and hertz when ordering.

For single solenoid pilots: **411B04**
For double solenoid pilots: **171C95**



Adapters. Some valves have adapters (e.g., time delay, pressure booster, air index, or L-O-X® adapters) above the valve body. For information on servicing these adapters, see pages 3-4 or consult ROSS.

Timed sequence adapter shown between the solenoid pilot and the valve body.

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.

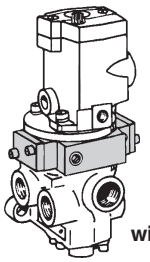
Valve Type	Port Sizes	Body Size	Valve Body Kit Number*	Gasket & Seal Kit Number*
2/2 Normally Closed	1/4, 3/8, 1/2	3/8	501K87	513K87
	1/2, 3/4, 1	3/4	502K87	514K87
	1, 1¼, 1½	1¼	503K87	515K87
	1½, 2, 2½	2	547H77	—
2/2 Normally Open	1/4, 3/8, 1/2	3/8	504K87	513K87
	1/2, 3/4, 1	3/4	505K87	514K87
	1, 1¼, 1½	1¼	506K87	515K87
	1½, 2, 2½	2	548H77	—
3/2 Normally Closed	1/4, 3/8, 1/2	3/8	495K87	510K87
	1/2, 3/4, 1	3/4	496K87	511K87
	1, 1¼, 1½	1¼	497K87	512K87
	1½, 2, 2½	2	814K77	—
3/2 Normally Open	1/4, 3/8, 1/2	3/8	498K87	510K87
	1/2, 3/4, 1	3/4	499K87	511K87
	1, 1¼, 1½	1¼	500K87	512K87
	1½, 2, 2½	2	550H77	—
4/2	1/4, 3/8, 1/2	3/8	492K87	507K87
	1/2, 3/4, 1	3/4	493K87	508K87
	1, 1¼, 1½	1¼	494K87	509K87

* Except EEZ-ON® adaptors, consult ROSS for information.

27 Series Adaptors

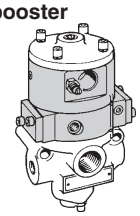
Some 27 Series ROSS valves have special-function adaptors installed between the valve body and the solenoid pilot (or air head). Examples of two valves with special function adaptors are illustrated at the right.

Lubrication Note: Valves using these adaptors (except L-O-X® and EEZ-ON® adaptors) require air line lubrication.



4-Way solenoid pilot valve with air index adaptor.

3-Way pressure controlled valve with timed-in adaptor plus pressure booster adaptor.

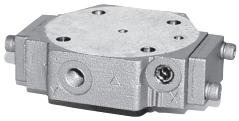


TIMED SEQUENCE EXTENSION ADAPTOR

The timed sequence extension adaptor is used with the timed-sequence adaptors to extend the timing interval up to 60 seconds. It also ensures "snap" action of the valve by keeping pilot pressure off the main valve piston until it has built up high enough to cause prompt valve response.

All Sizes: Order Model Number: W421B93.

AIR INDEX ADAPTOR

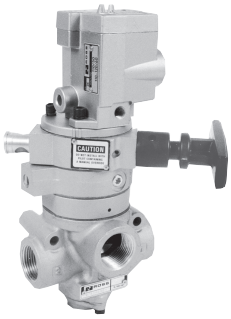


Air Index Adaptor

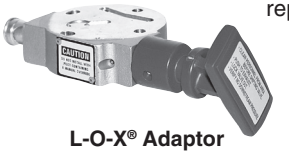
The air index adaptor allows a valve controlled by a single signal source (solenoid pilot or remote pressure control) to function as an impulse-controlled mechanically-detented valve. A momentary electrical signal to the solenoid actuates the valve and holds it in the actuated position. A second momentary signal from the same source returns the valve to its deactuated position.

All Sizes: Order Model Number: W674B93.

L-O-X® and EEZ-ON® ADAPTORS



Valve shown with both L-O-X® and EEZ-ON® adaptors.



L-O-X® Adaptor

EEZ-ON® Adaptor

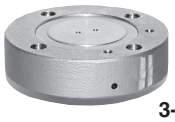
The ROSS valves with EEZ-ON® adaptors are used in air supply lines to give an adjustable, gradual buildup of pressure at startup time. ROSS valves with L-O-X® adaptors are used in air supply lines to provide a lockable shut off of the air supply and also exhaust downstream air when shut-off. The L-O-X® adaptor offers low-friction seals which ensure easy shifting even after a long standby period and can be padlocked only in the closed position.

27 Series L-O-X® adaptors are not field serviceable. If they require service, they should be replaced or returned to ROSS for rebuilding.

Valve Type	Port Sizes	Body Size	Adaptor	
			EEZ-ON® Model Number*	L-O-X® Model Number*
2/2 EEZ-ON®	1/4 to 1	3/8, 3/4	271A86	–
	1 to 1½	1¼	266A86	–
3/2 EEZ-ON®	1/4 to 1	3/8, 3/4	389A86	–
	1 to 1½	1¼	396A86	–
3/2 L-O-X®	1/4 to 1	3/8, 3/4	–	339B86
	1 to 1½	1¼	–	409B86
3/2 L-O-X® with EEZ-ON® operation	1/4 thru 1½	3/8, 3/4, 1¼	396A86	390B86

PRESSURE BOOSTER ADAPTORS

4-way Pressure Booster Adaptor



3-way Pressure Booster Adaptor

The pressure booster adaptor increases the actuating force on the valve piston. It should be used when inlet and pilot pressures are below the minimums specified for the valve. It should also be used when an external pilot supply with a lower pressure than the inlet pressure is used. The valve's pilot pressure is applied to a piston in the pressure booster adaptor that has a larger area than the piston in the valve. The force on the piston in the adaptor is thereby larger than that which could be produced by the piston in the valve. This larger force is applied to the valve's piston directly so that there is then sufficient force to shift the valve properly.

Description	Adaptor Model Number Body Size 3/8	3/4	1¼
For 2-way valve	168A86	168A86	169A86
For 3-way valve	168A86	168A86	169A86
For 4-way valve	170A86	171A86	172A86

TIMED-SEQUENCE ADAPTORS

Dual Timed Adaptor

Timed-Out Adaptor

Timed-In: Solenoid energized; after preset delay valve is actuated. Solenoid de-energized; valve immediately de-actuated.
Timed-Out: Solenoid energized; valve immediately actuated. Solenoid de-energized; after preset delay valve is de-actuated.
Dual Timed: Solenoid energized; after preset delay valve is actuated. Solenoid de-energized; after preset delay valve is de-actuated.
NOTE: Upper stem assembly is for timed-in control; lower stem assembly is for timed-out control.

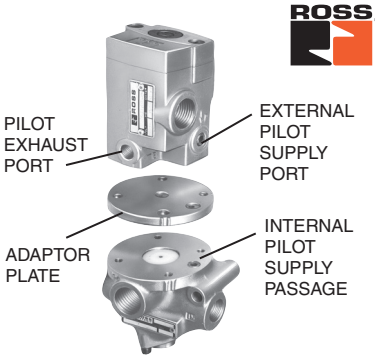
Description	Adaptor Model Number
Dual Timed Adaptor	996K87
Timed-In Adaptor	490B93
Timed-Out Adaptor	489B93

27 SERIES VALVES CONVERSION TO EXTERNAL PILOT SUPPLY

When a valve is converted to external pilot supply, consult ROSS for the converted valve's model number. This will allow records and drawings to be changed and prevent errors when ordering future replacements.

INLINE POPPET VALVES (see figure on the right)**:**

1. Remove pilot section and adaptor plate from valve body.
2. Remove pipe plug from external pilot supply port, and reinstall the plug in the internal pilot supply passage.
3. Replace adaptor plate and pilot section.
4. Attach 1/8" pilot supply line to external pilot supply port (X-1).
5. External pilot supply pressure must be at least equal to the main supply pressure.



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.

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