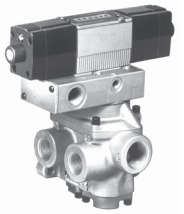
21 Series Poppet Valves

For High Temperature and Low Temperature Applications

Thank You!

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



Direct Double Solenoid Pilot Controlled Valve

Single Solenoid Pilot Controlled Valve

Pressure Controlled Valve

Important Note: *ROSS 21 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 should be used in such applications.*

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

High- and Low-Temperature Valves:
Temperature specifications are given on page 2. Valves whose model numbers end with a 001, 011, 051, or 061 are valves designed for **high**-temperature service. Valves whose model numbers end with a 002, 003, 012, 013, 052, 053, 062, or 063 are valves designed for **low**-temperature service.

Special Valves: If the second digit after the center letter in your valve's model number is an 8 or 9, then your valve has special features, (e.g. D2173B3952). You may consult ROSS Technical Services to verify the special features or to obtain high-pressure and vacuum service kits.

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 clo gged 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. The power supply must be capable of handling the inrush current without significant voltage drop.
See *Valve Specifications* on page 2 for information on inrush current.

Operating Pressures and Temperatures: Allowable ranges for pressure and temperatures are given in the *Valve Specifications* on page 2. 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 head at the top of the valve. See *Valve Specifications* on page 2 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* on page 2 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 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 on page 3.

VALVE SPECIFICATIONS

Construction: Poppet.
Mounting Type: Inline.
Flow Media: Filtered air.
Pilot Pressure: Must be equal to or greater than inlet pressure. For vacuum service models requiring external pilot supply, a pilot pressure of at least 30 psig (2.1 bar) is required.

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.

Pressure Controlled

Ambient/Media Temperatures:
High Temperature: 0° to 300°F (-17° to 150°C).
Low Temperature: -40° to 175°F (-40° to 80°C).
For temperatures below 40°F (4°C) air must be free of water vapor to prevent formation of ice.
Inlet Pressure: 30 to 150 psig (2 to 10 bar).

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.
Ambient Temperature:
High Temperature: 0° to 250°F (-17° to 122°C).
Low Temperature: -40° to 120°F (-40° to 50°C).
Media Temperature:
High Temperature: 0° to 300°F (-17° to 150°C).
Low Temperature: -40° to 175°F (-40° to 80°C).
Inlet Pressure:
Port Sizes 1/4 to 1½: 15 to 150 psig (1.0 to 10 bar).
Port Sizes1½ to 2½: 30 to 150 psig (2 to 10 bar).

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

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 1.

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 pilot section.
4. Attach 1/8" pilot supply line to external plot supply port (X-1).
5. External pilot supply pressure must be at least equal to the main supply pressure.

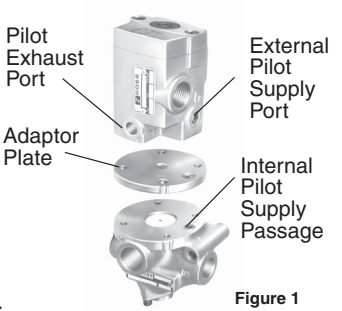


Figure 1

VALVE SERVICE

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.

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.

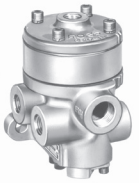
Solenoid Pilot Kits. These kits contain all parts needed to recondition the pilot valve. Order by the following kit numbers:

For single solenoid pilots:
High Temperature: **947K87**
Low Temperature: **946K87**
For double solenoid pilots:
Low Temperature: **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:
High Temperature: **257B04**
Low Temperature: **411B04**
For double solenoid pilots:
Low Temperature: **171C95**

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



Consult ROSS Technical Services for high-pressure and vacuum service kits.

Valve Type	Port Sizes	Body Size	Temperature Service Type	Valve Body Kit Number*	Gasket & Seal Kit Number*
2/2 Normally Closed	1/4, 3/8, 1/2	3/8	High	207K77	198K77
			Low	237K77	228K77
	1/2, 3/4, 1	3/4	High	208K77	199K77
			Low	238K77	229K77
	1, 1¼, 1½	1¼	High	209K77	200K77
			Low	239K77	230K77
2/2 Normally Open	1/4, 3/8, 1/2	3/8	High	213K77	198K77
			Low	243K77	228K77
	1/2, 3/4, 1	3/4	High	214K77	199K77
			Low	244K77	229K77
	1, 1¼, 1½	1¼	High	215K77	200K77
			Low	245K77	230K77
3/2 Normally Closed	1/4, 3/8, 1/2	3/8	High	219K77	201K77
			Low	249K77	231K77
	1/2, 3/4, 1	3/4	High	220K77	202K77
			Low	250K77	232K77
	1, 1¼, 1½	1¼	High	221K77	203K77
			Low	251K77	233K77
3/2 Normally Open	1/4, 3/8, 1/2	3/8	High	225K77	201K77
			Low	255K77	231K77
	1/2, 3/4, 1	3/4	High	226K77	202K77
			Low	256K77	232K77
	1, 1¼, 1½	1¼	High	227K77	203K77
			Low	257K77	233K77
4/2	1/4, 3/8, 1/2	3/8	High	260K77	258K77
			Low	264K77	262K77
	1/2, 3/4, 1	3/4	High	261K77	259K77
			Low	265K77	263K77
	1, 1¼, 1½	1¼	High	278K77	277K77
			Low	289K77	288K77

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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