DM²® Series D Press Double Valves
Monitored - For Clutch/Brake Control

Thank You!
You have purchased a premium-quality ROSS® pneumatic valve. It is a high quality DM²® Series D double valve with dynamic monitoring and inherent lockout capability, for Category 4 applications. 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.

VALVE INSTALLATION

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

Air Lines: Before installing this valve in a new or 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 have any restrictions (e.g., a crimp in the line, a sharp bend, or a clogged filter element). The air supply must not only provide sufficient pressure (see Standard 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 (Port 2): 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 restrictions (e.g., a crimp in the line, a sharp bend, or a clogged filter element).
Valve Exhaust (Port 3): Do not restrict the air flow from the exhaust port as this can adversely affect the operation of the valve. The valves are factory equipped with a properly sized silencer. ROSS silencers reduce impact noise by as much as 25 dB, and produce little back pressure.
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: DM²® Series D double valves get electrical power through plug-in connectors. The electrical supply must correspond to the voltage and Hertz ratings of the solenoids. Otherwise, the solenoids are subject to early failure. If power is supplied by a transformer, 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 temperatures are given in the Standard Specifications on page 3. Exceeding these values 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 DM²® Series D double valve must be tested for proper functioning. Observe normal press operation 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.

On first operation, or after repair, the pilot valve supply circuit and inherent monitoring elements may need to be reset. This reset is accomplished by applying a momentary air signal to the RESET port or by energizing the optional reset solenoid momentarily on the valve. After reset, the valve will then be ready for operation.
The air supply to each pilot valve is controlled by the position of the inlet poppets. In the ready-for-operation position these poppets are held on their seats and maintain pilot air flow. During shifting of the valve elements the poppets move off seat and momentarily allow pilot air to escape to exhaust. If either valve element fails to operate correctly, the pilot supply to the other valve element will remain connected to exhaust causing the valve to lock-out.

The internal monitoring system will lock out the valve if the time difference between both elements shifting fully is longer than approximately 125 milliseconds. This timing is preset by restricting-orifices and chambers in the pilot air circuit.
The main airflow from port 1 to port 2 is via crossflow passages between both main valves, so that both valve elements must be fully shifted in order for port 2 to be pressurized.
If the valve locks out, further operation is prevented until the valve has been reset. Electrical signals to the solenoids must be "off" to allow the valve to be reset.
The DM²® Series D double valve is completely self-contained and does not need an external monitoring system.
When and why does the valve require a reset signal?
The valve will only require a reset when the valve has detected asynchronous movement of the two independent internal elements. This condition will be indicated by a fault signal from the Status Indicator and an audible leak from the silencer. For solenoid reset models, reset is accomplished by applying a momentary signal to the reset solenoid. For air reset models, reset is accomplished by applying a momentary air signal to the reset port. The DM® Series D double valves have an anti-tie-down feature that requires both main valve solenoids to be de-energized while resetting.

Why will my valve not reset?
There are a few common conditions that can prevent reset from occurring.

1. If the main valve solenoids are energized the valve will not reset. This is a safety feature of the DM® Series double valves that prevents unintended pressure output from occurring upon valve reset. There should be at least a 200 ms delay between removing power from the reset solenoid and applying power to the main valve solenoids.

2. If the pneumatic supply to port 1 is not sufficient the valve will not reset. This is not unusual for initial testing and startup if full plant pressure and volume is not applied and quick connects or small hoses are used.

3. If the supply pressure was removed before de-energizing the valve it is possible that both valve elements are in the faulted condition. This condition results in a greater leakage rate to the exhaust port when the supply is reapplied, and increases the insufficient supply issue mentioned in item #2.

4. The reset solenoid may be mounted backwards. In this case energizing the reset solenoid will result in the release of air through the reset solenoid’s exhaust port (through the nut mounted on the stem of the solenoid) and no reset action can occur.

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

<table>
<thead>
<tr>
<th>Maker</th>
<th>Brand Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amoco</td>
<td>American Industrial Oil 32</td>
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<tr>
<td>.................</td>
<td>Amoco Spindle Oil C, Amolite 32</td>
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<tr>
<td>Citgo</td>
<td>Pacemaker 32</td>
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<tr>
<td>Exxon</td>
<td>Spinesstic 22, Teresstic 32</td>
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<tr>
<td>Mobil</td>
<td>Velocite 10</td>
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<tr>
<td>Non-Fluid Oil</td>
<td>Air Lube 10H/NR</td>
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<tr>
<td>Shell</td>
<td>Turbo T32</td>
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<tr>
<td>Sun</td>
<td>Sunvis 11, Sunvis 722</td>
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<tr>
<td>Texaco</td>
<td>Regal R&amp;O 32</td>
</tr>
<tr>
<td>Union</td>
<td>Union Turbine Oil</td>
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</tbody>
</table>

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.

Valve MAINTENANCE

Pneumatic equipment should be maintained only by persons trained and experienced in the maintenance of such equipment.

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).
STANDARD SPECIFICATIONS

**Construction Design**
- Dual poppet

**Mounting**
- Type: Base
- Orientation: Preferably horizontally (valve on top of base) or vertically (with pilot solenoids on top)

**Solenoids**
- According to VDE 0580. Two solenoids, rated for continuous duty

**Voltage**
- Basic Size 2, 4, 12, 30: 24 volts DC; 110 volts AC, 50 Hz; 120 volts AC, 60 Hz.
- Basic Size 8: 24 volts DC; 110 volts AC, 50/60 Hz

**Power Consumption (each solenoid)**
- Basic Size 2, 4, 12, 30:
  - Primary and reset solenoids: 5.8 watts nominal on AC and DC; 6.5 watts maximum on AC and DC
  - Basic Size 8:
    - Primary solenoid: 15 watts on DC; 36 VA inrush and 24.6 VA holding on AC
    - Reset solenoid: 5.0 watts on DC; 15.8 VA inrush and 10.4 VA holding on AC

**Enclosure Rating**
- DIN 40050, IP65, IEC 60529

**Electrical Connection**
- Connector socket according to EN 175301-803 Form A

**Temperature**
- Ambient: 15° to 120°F (-10° to 50°C)
- Media: 40° to 175°F (4° to 80°C)

**Ambient: 15° to 120°F (-10° to 50°C)**

**Connector Type**
- Cord Length (feet)
  - Light: 2 (6/1/2) 6-mm: 721K77, 720K77-W, 720K77-Z
  - 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

**Electrical Connector Model Number**

<table>
<thead>
<tr>
<th>Electrical Connectors</th>
<th>Electrical Connector Form</th>
<th>Electrical Connector Type</th>
<th>Cord Length (feet)</th>
<th>Cord Diameter</th>
<th>Electrical Connector Model Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>EN 175301-803 Form A</td>
<td>Prewired Connector (18 gauge)</td>
<td>2 (6/1/2)</td>
<td>2 (6/1/2)</td>
<td>6-mm</td>
<td>721K77, 720K77-W, 720K77-Z</td>
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<td></td>
<td></td>
<td>10-mm</td>
<td>371K77, 383K77-W, 383K77-Z</td>
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<td></td>
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<td></td>
<td></td>
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<td>723K77, 724K77-W, 724K77-Z</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>937K87, 936K87-W, 936K87-Z</td>
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</tbody>
</table>

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

**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.

When servicing 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 DM® Series D double valves, as well as replacement solenoid information.

**CAUTION:** Before operating the DM® Series D 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 Kits.** These kits 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.

**Pilot Booster Service Kits.** Available for sizes 12 and 30, these kits contain all parts needed for complete reconditioning of a pilot booster. Included are poppets, gaskets, seals, and instructions for use.

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

**Solenoid Coils.** Order replacement by part number provided at the right. For other voltages, consult ROSS.

**Complete Solenoid Pilot Assemblies.** These assemblies consist of new pilot valve mechanisms and a new solenoid coil, ready to bolt in position on the valve. For other voltages, consult ROSS.

**Flow Media**
- Filtered, lubricated or un lubricated (mineral oils according to DIN 51519, viscosity classes 32-46).

**Operating Pressure**
- Basic Size 2: 45 to 150 psig (3.1 to 10.3 bar)
- Basic Size 4, 8, 12, 30: 30 to 120 psig (2.1 to 8.3 bar)

**Reset Pressure**
- For remote air reset option – must be equal to inlet pressure

**Manual Pressure**
- Encapsulated, push button actuation

**Pressure Switch (Status Indicator) Rating**
- Contacts - 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.

**Operation Frequency**
- Minimum once per month, to ensure proper function

**Construction Material**
- Valve Body: Cast Aluminum
- Poppet: Aceltal and Stainless Steel
- Seals: Buna-N

**Functional Safety Data**
- Category 4, PL e, B,LC: 20,000,000, PFH: 7.71x10^8 ; MTTF: 301.9 (n<sub>o</sub>: 662400).
- Certifications: CE Marked for applicable directives, DGUV, CSA/UL, TSSA for appropriately tested valves
- Vibration/Impact Resistance: Tested to BS EN 60068-2-27.

**Replacement Solenoid Coils**

<table>
<thead>
<tr>
<th>Basic Size</th>
<th>Solenoid Coil Type</th>
<th>Model Number</th>
<th>Voltage</th>
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<tbody>
<tr>
<td>2, 4, 12, 30</td>
<td>Pilot</td>
<td>411B3316</td>
<td>110 or 120 volts AC</td>
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<tr>
<td>8</td>
<td>Pilot</td>
<td>360K3316</td>
<td>110 or 120 volts AC</td>
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</table>

**Complete Solenoid Pilot Assemblies**

<table>
<thead>
<tr>
<th>Basic Size</th>
<th>Solenoid Coil Type</th>
<th>Model Number</th>
<th>Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Pilot</td>
<td>1524C7916</td>
<td>110 or 120 volts AC</td>
</tr>
<tr>
<td>4</td>
<td>Pilot</td>
<td>1403H7916</td>
<td>110 or 120 volts AC</td>
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<tr>
<td>8</td>
<td>Pilot</td>
<td>1404H7916</td>
<td>110 or 120 volts AC</td>
</tr>
<tr>
<td>12 &amp; 30</td>
<td>Pilot</td>
<td>1526C7916</td>
<td>110 or 120 volts AC</td>
</tr>
<tr>
<td>All Sizes</td>
<td>Reset</td>
<td>1524C7916</td>
<td>110 or 120 volts AC</td>
</tr>
</tbody>
</table>

For additional wiring kit accessories, please see product web page or product literature at www.rosscontrols.com.
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. Plastic bowls are designed for compressed air applications only.
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.