

# **DM<sup>2</sup>® Series D 3/2 Double Valves**

**with Dynamic Monitoring &  
Dynamic Memory**



**Manufacturers of Premium Pneumatic Controls since 1921.**

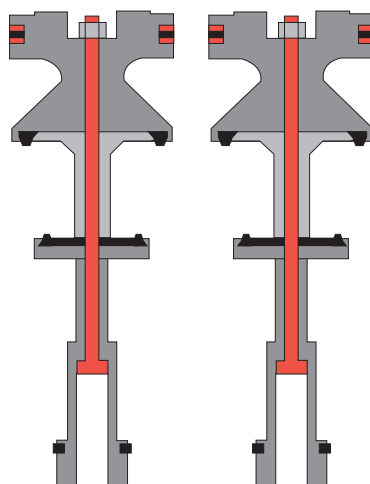
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## The Leader in Double Valve Design.

ROSS has long been in the forefront of double valve research and development. For over 60 years ROSS has been responding to the needs of press manufacturers and users by progressively improving double valve technology. Internal flow patterns of double valves developed by ROSS have included series flow, parallel flow, combined series-parallel tandem flow, and combined series-parallel Crossflow™.

Monitoring devices have also been offered in a variety of designs to satisfy differing requirements. Traditionally, in order to achieve complete monitoring capability, it has been necessary to add devices or components to the valve or to the control system.



The **DM<sup>2®</sup>** Series D valve combines the monitor and the main valve components into two identical piston-poppet assemblies. Two piston-poppet assemblies provide a redundant 3/2 normally closed air flow pattern and the patented internal design provides dynamic monitoring as well as complete memory.

During valve operation air pressure acting on changing combinations of assembly surfaces cause the assemblies to move to the required position. Force balances in the valve assure positive shifting forces during normal operation as well as a positive force to hold the assemblies in a locked-out position.

# DM<sup>2</sup>® Series D Double Valves

The ROSS DM<sup>2</sup>® Series D double valves provide significant features in response to the changing demands of the mechanical press industry and its associated standards (e.g. EN 692 ff.) and regulations regarding the control of pneumatically controlled clutch and brake applications. The consensus requirements of the regulations and good practices require that, in case of a failure within the valve, the clutch and brake mechanisms be quickly exhausted, a monitor takes action to prevent further operation, and a method to alert personnel is incorporated. These features also make the valve suitable for use in other Category 3 & 4 safety-related applications.

A ROSS DM<sup>2</sup>® Series D double valve has two valve elements independently controlled by two solenoid pilots. The two valve elements share common inlet, outlet, and exhaust ports. When the pilot valves are simultaneously energized, the valve elements operate so that the valve functions as a 3/2 normally closed valve.

If one of the valve elements does not open or close synchronously with the other, the valve goes into a faulted condition, exhausts downstream air and keeps residual outlet pressure to less than 1% of inlet supply. This is an important

safety characteristic of the ROSS DM<sup>2</sup>® Series D design.

Valve element redundancy provides an additional safety factor, as the likelihood of a malfunction in both valve elements in the same cycle is considered extremely remote.

DM<sup>2</sup>® valves also have an internal monitor that is integrated into the valve elements. Should the valve operate abnormally, the monitor will lock-out the valve and prevent further operation until corrective action is taken.

## IMPORTANT NOTE:

*Standards, regulations, and good practice all require that mechanical power presses or other hazardous machines using a pneumatically-controlled clutch and brake mechanism be equipped with a double valve with a self-contained monitoring device and/or an external monitoring system, which inhibits further operation of the valve and machine in the event of a failure within the valve. Of course, a double valve is just one of the components in a press control system, and all other elements of the system should be planned with safety as a primary consideration.*

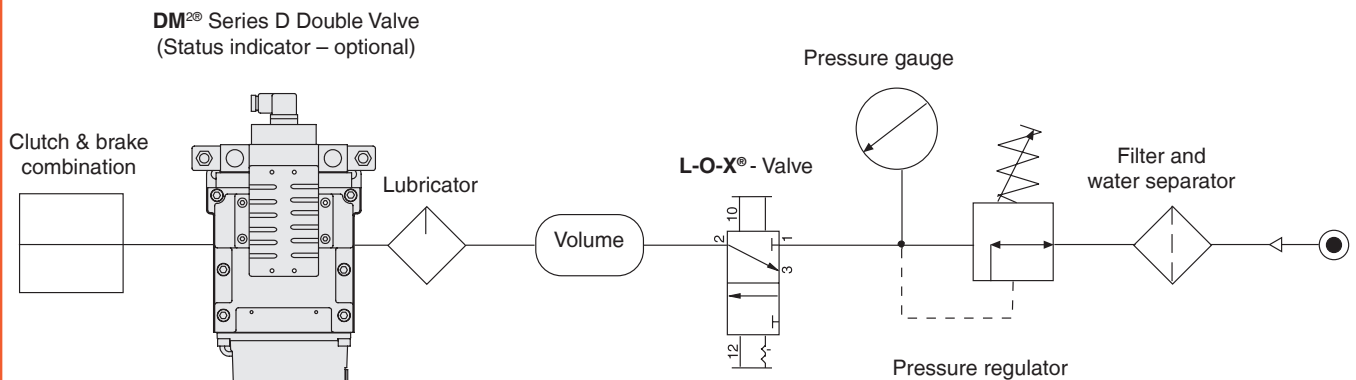
## DM<sup>2</sup>® Monitoring:

The DM<sup>2</sup>® is a patented 3/2 normally closed valve (with an intermediate, lockout position) distinguished by Crossflow™ passages with poppet and spool valving on the main valve stems. This arrangement provides the valve's outstanding flow characteristics and an integrated monitoring capability with total memory. The valve provides dynamic monitoring and dynamic memory.

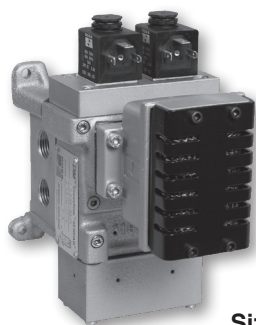
**Dynamic Monitoring** means that all monitoring components change state on every valve cycle. Should the valve elements cycle asynchronously, the valve will exhaust downstream air and lock-out, prohibiting further operation.

**Dynamic Memory** within a monitoring system indicates that when a valve lock-out occurs, the valve will retain the fault information regardless of air or electrical changes. The DM<sup>2</sup>® system can only be reset by a defined operation/procedure, and will not self-reset (turning the valve off and on) or reset when inlet air supply is removed and re-applied. Such automatic resetting would conceal potential hazards from the operator.

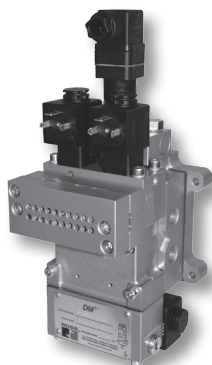
## Installation Example



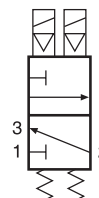
## Self Monitored - Clutch/Brake Control



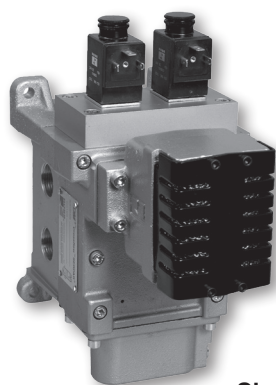
Size 4



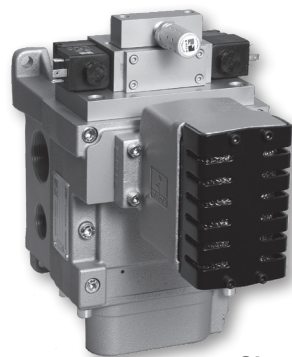
Size 2



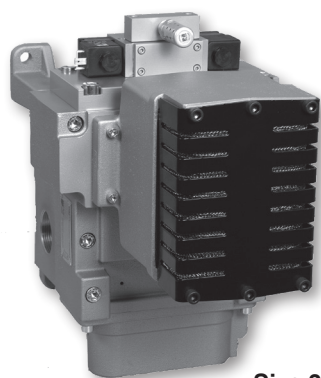
Simplified Schematic



Size 8



Size 12



Size 30

**Valve Sizes:** DM<sup>2</sup>® Series D double valves are available in 5 sizes, providing a broad range of flow capabilities to meet your needs. For convenience, valves are designated by the nominal sizes 2, 4, 8, 12, and 30 with outlet ports ranging from G 1/4 to G 2.

### Size 2, 4, 8, 12 and 30

- **Dynamic Monitoring With Complete Memory:** Memory, monitoring, and air flow control functions are simply integrated into two identical valve elements. Valves lock-out due to asynchronous movement of valve elements during actuation or de-actuation, resulting in a residual outlet pressure of less than 1% of supply. Overt action is required for reset – cannot be reset by removing and re-applying supply pressure. Reset can only be accomplished by remote air signal, optional electrical solenoid reset signal, or optional manual reset.
- **Basic 3/2 Normally Closed Valve Function:** Dirt tolerant, wear compensating poppet design for quick response and high flow capacity. Teflon back-up rings on pistons to enhance valve endurance – operates with or without inline lubrication.
- **Status Indicator (Optional):** Includes a pressure switch with both normally open and normally closed contacts to provide status feedback to the press control system indicating whether the valve is in the lockout or ready-to-run condition. The Status Indicator can be ordered installed or purchased separately and added to any DM<sup>2</sup>® base.
- **Silencers:** All models include high flow, clog resistant silencers.
- **Mounting:** Base mounted – with BSPP or NPT pipe threads. Inlet and outlet ports on both sides provide for flexible piping (plugs for unused ports included). Captive valve-to-base mounting screws.

### Size 12 and 30

- **Intermediate Pilots:** Increases pilot air flow for fast valve response, making it possible to use the same size solenoids as valve sizes 2, 4 & 8, thereby reducing electrical power requirements for these larger valves.

# DM<sup>2</sup>® Series D Double Valves

## HOW TO ORDER

(Choose your options (in red) to configure your valve model number.)

<b>PRODUCT</b>	<b>DM2D</b>	<b>D</b>	<b>A</b>	<b>4</b>	<b>2</b>	<b>A</b>	<b>1</b>	<b>1</b>	<b>STATUS INDICATOR</b>
<b>THREAD</b>									1..... YES X..... NO
BSPP .....		D							<b>RESET TYPE</b>
NPT .....		N							1..... REMOTE 2..... SOLENOID 4..... MANUAL
N/A (no base) .....		X							<b>VOLTAGE</b>
<b>REVISION LEVEL</b>									A..... 24 volts DC B..... 110 volts AC, 50/60 Hz C**..... 220 volts AC, 50/60 Hz D..... 12 volts DC E..... 24 volts AC F..... 48 volts AC
Size 4, 8, 12, 30.....			A						** 220 VAC not available in the U.S. (OSHA regulations limit press control voltage to no more than 120 volts AC).
Size 2.....			B						
<b>BASIC SIZE</b>									
2.....									
4.....									
8.....									
12.....									
30.....									
<b>BASE PORT SIZE</b>									
<b>Size 2</b>									
G 1/4 inlet – G 1/4 outlet.....									0
G 3/8 inlet – G 3/8 outlet.....									1
<b>Size 4</b>									
G 1/2 inlet – G 1/2 outlet.....									2
G 1/2 inlet – G 3/4 outlet.....									3
<b>Size 8</b>									
G 3/4 inlet – G 3/4 outlet.....									4
G 1 inlet – G 1 outlet.....									5
<b>Size 12</b>									
G 1 inlet – G 1 outlet.....									6
G 1 inlet – G 1-1/2 outlet .....									7
<b>Size 30</b>									
G 1-1/2 inlet – G 2 outlet .....									8
<b>Valve only (less base) .....</b>									X

**Valve Weight:** Valve and base assembly with status indicator and solenoid reset.

- Size 2: 2.3 kg
- Size 4: 2.8 kg
- Size 8: 4.2 kg
- Size 12: 7.1 kg
- Size 30: 14.8 kg

### BASE MODEL NUMBERS and BASE SPECIFIC INFORMATION

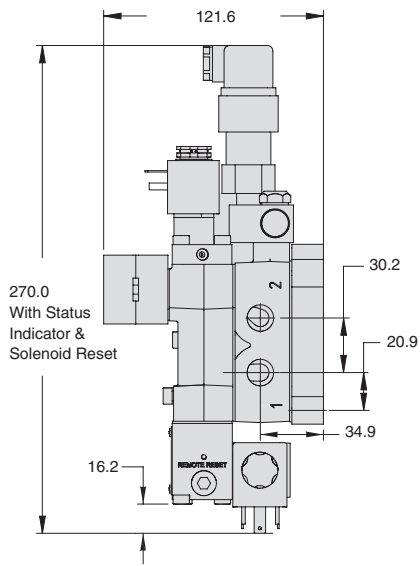
Valve Size	Port Size Inlet	Port Size Outlet	Base Model Number*	Status Indicator	Weight kg
2	G 1/4	G 1/4	D1872C91	No	0.8
2	G 1/4	G 1/4	D1873C91	Yes	1.0
2	G 3/8	G 3/8	D1874C91	No	0.8
2	G 3/8	G 3/8	D1875C91	Yes	1.0
4	G 1/2	G 1/2	D1697C91	No	0.8
4	G 1/2	G 1/2	D1698C91	Yes	1.1
4	G 1/2	G 3/4	D1699C91	No	0.8
4	G 1/2	G 3/4	D1700C91	Yes	1.1
8	G 3/4	G 3/4	D1701C91	No	1.6
8	G 3/4	G 3/4	D1702C91	Yes	1.9
8	G 1	G 1	D1703C91	No	1.6
8	G 1	G 1	D1704C91	Yes	1.9
12	G 1	G 1	D1705C91	No	2.8
12	G 1	G 1	D1706C91	Yes	3.1
12	G 1	G 1-1/2	D1707C91	No	2.8
12	G 1	G 1-1/2	D1708C91	Yes	3.1
30	G 1-1/2	G 2	D1709C91	No	5.4
30	G 1-1/2	G 2	D1710C91	Yes	5.7

\*BSPP port threads. For NPT threads omit letter "D".  
Example: 1872C91.

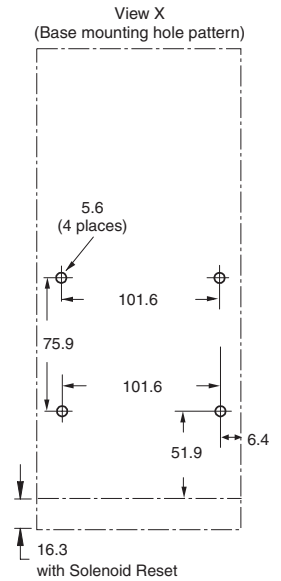
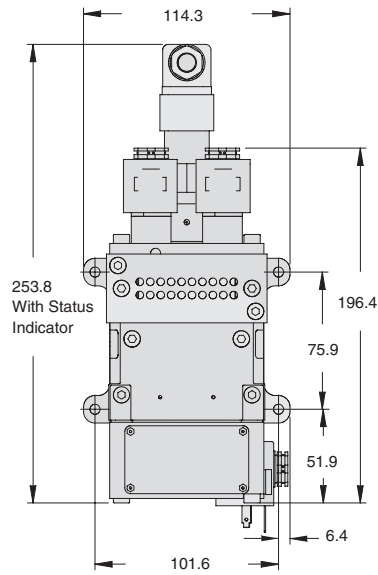
# DM<sup>2</sup>® Series D Double Valves

DIMENSIONS – mm

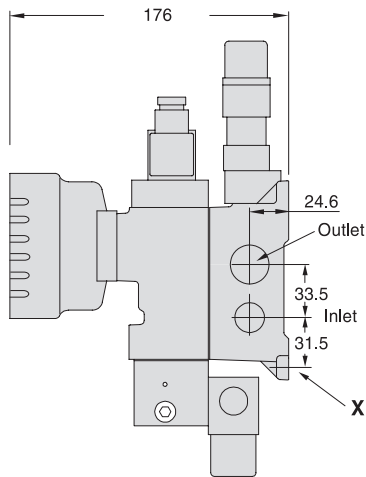
## SIZE 2



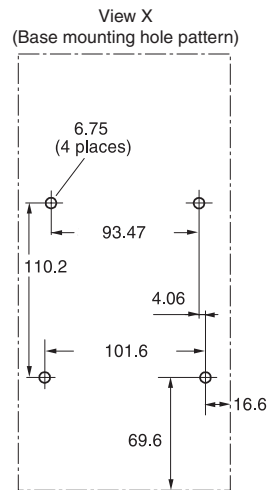
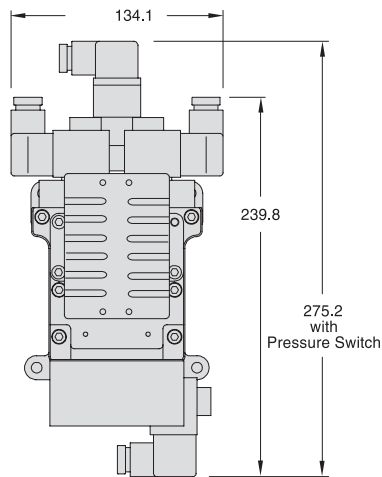
$k_v$ :  
1 to 2: 1.9  
2 to 3: 3.2



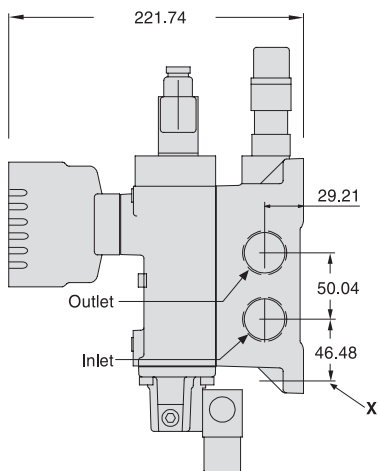
## SIZE 4



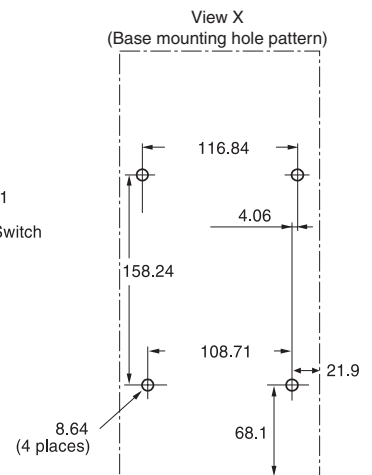
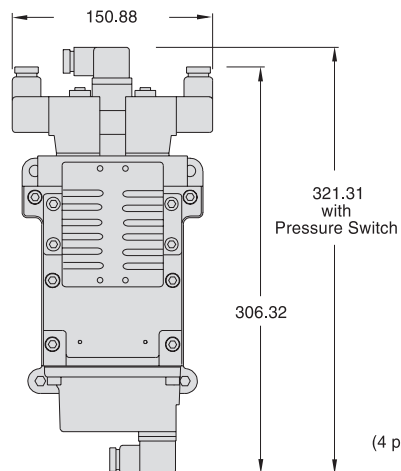
$k_v$ :  
1 to 2: 2.4  
2 to 3: 5.8



## SIZE 8



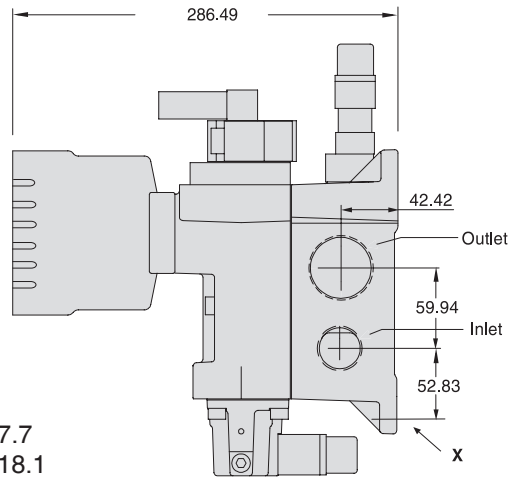
$k_v$ :  
1 to 2: 4.0  
2 to 3: 10.9



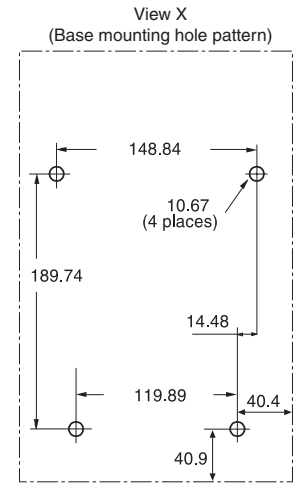
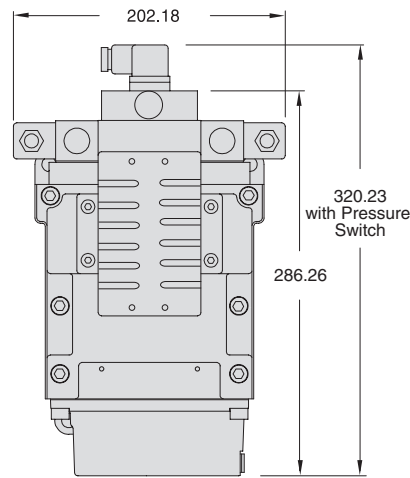
# DM<sup>2</sup>® Series D Double Valves

DIMENSIONS – mm

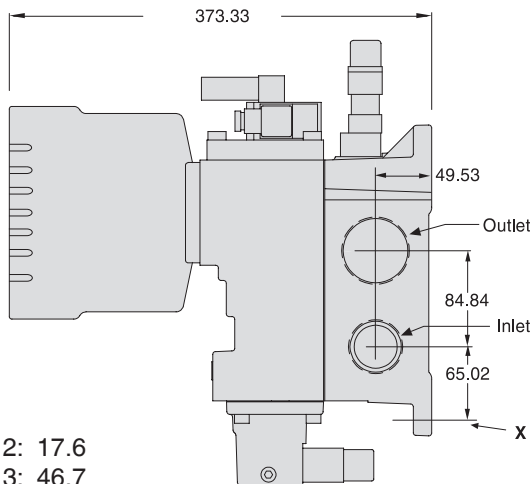
## SIZE 12



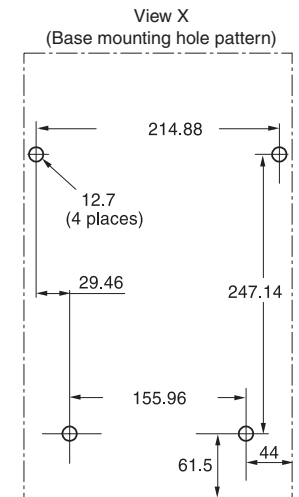
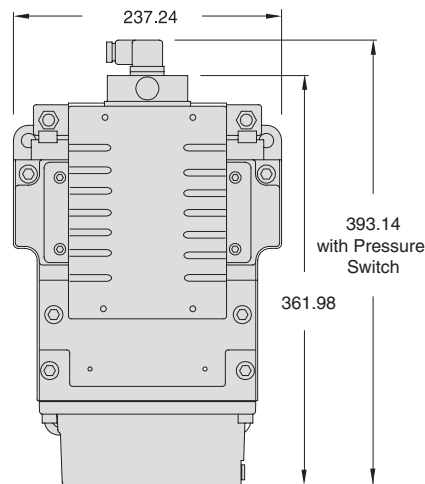
$k_v$ :  
1 to 2: 7.7  
2 to 3: 18.1



## SIZE 30



$k_v$ :  
1 to 2: 17.6  
2 to 3: 46.7



### STANDARD SPECIFICATIONS

**Pilot Solenoids:** According to VDE 0580. Enclosure rating according to DIN 40050, IEC 60529 IP65. Two solenoids, rated for continuous duty (additional solenoid on optional reset).

**Standard Voltages:** 24 volts DC; 110 volts AC, 50/60 Hz. For other voltages, consult ROSS.

#### Power Consumption (each solenoid):

**Size 2, 4, 12, 30:** For primary and reset solenoids:  
6.0 watts on DC; 15.8 VA inrush and 10.4 VA holding on AC.

**Size 8:** Primary solenoids:  
15 watts on DC; 36 VA inrush and 24.6 VA holding on AC.

Reset solenoid:  
6.0 watts on DC; 15.8 VA inrush and 10.4 VA holding on AC.

**Electrical connection:** DIN 43650, Form A. Order connectors separately, see page 14.

**Ambient Temperature:** -10° to 50°C.

**Media Temperature:** 4° to 80°C.

**Flow Media:** Filtered, lubricated or unlubricated (mineral oils according to DIN 51519, viscosity classes 32-46); 5-micron recommended.

**Inlet Pressure:** **Size 2:** 3.1 to 10.3 bar.

**Size 4, 8, 12, 30:** 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.

**Mounting orientation:** Preferably horizontally (valve on top of base) or vertically (with pilot solenoids on top).

**Port Threads:** BSPP or NPT.

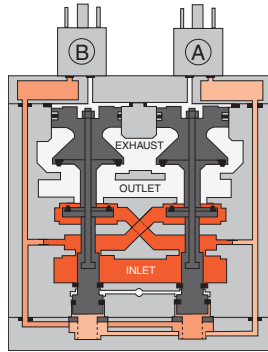
**IMPORTANT NOTE:** Please read carefully and thoroughly all of the **CAUTIONS** on the inside back cover.



# Overview of DM<sup>2</sup>® Series D Double Valve Function

## Valve de-actuated (ready-to-run):

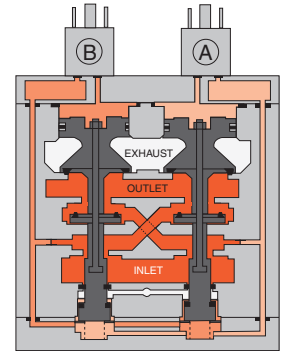
The flow of inlet air pressure into the crossover passages is restricted by the size of the passage between the stem and the valve body opening. Flow is sufficient to quickly pressurize pilot supply/timing chambers A and B. The inlet poppets prevent air flow from crossover passages into the outlet chamber. Air pressure acting on the inlet poppets and return pistons securely hold the valve elements in the closed position. (Air passages shown out of position and reset adapter omitted for clarity.)



## Valve actuated:

Energizing the pilot valves simultaneously applies pressure to both pistons, forcing the internal parts to move to their actuated (open) position, where inlet air flow to crossover passages is fully open, inlet poppets are fully open and exhaust poppets are fully closed. The outlet is then quickly pressurized, and pressure in the inlet, crossovers, outlet, and timing chambers are quickly equalized.

De-energizing the pilots quickly causes the valve elements to return to the ready-to-run position.



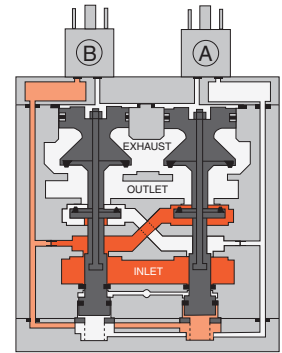
## Valve locked-out:

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. Air pressure in the crossover acts on the differential of side B stem diameters creating a latching force.

Side A is in a fully closed position, and has no pilot air available to actuate, but has full pressure on the inlet poppet and return piston to hold the element in the fully closed position.

Inlet air flow on side A into its crossover is restricted, and flows through the open inlet poppet on side B, through the outlet into the exhaust port, and from the exhaust port to atmosphere. Residual pressure in the outlet is less than 1% of inlet pressure.

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 closed position.



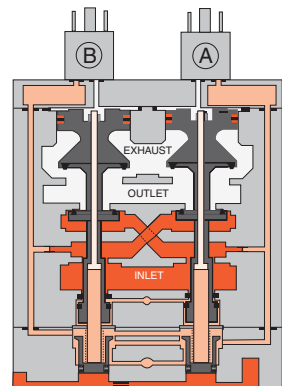
## Resetting the valve:

The valve will remain in the locked-out position, even if the inlet air supply is removed and re-applied. A remote reset signal (air or electric), or a manual push button actuation 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 closed position. Inlet air fully pressurizes the crossovers and holds the inlet poppets on seat. Actuation of the reset piston opens the reset poppet, thereby, immediately exhausting pilot supply air, thus, preventing valve operation during reset. (Reset adapter added to illustration.)

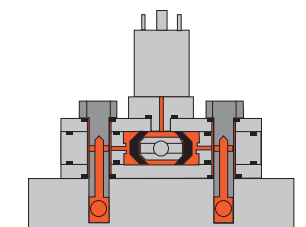
De-actuation of reset pistons causes the reset poppets to close and pilot supply to fully pressurize.

Reset air pressure can be applied by a remote 3/2 normally closed valve, or from an optional 3/2 normally closed solenoid, or a manual push button mounted on the reset adapter.



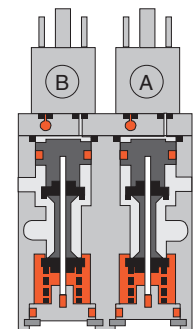
## Status indicator:

The 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.



Status indicator (optional)  
in normal ready-to-run position

Size 12 and 30 valves require relatively large pilots to actuate and de-actuate the main valve elements. In order to achieve extremely quick valve response for such large pilots, a 2-stage solenoid pilot system is incorporated into the design. This keeps the electrical current required to operate the pilots, to a minimum.

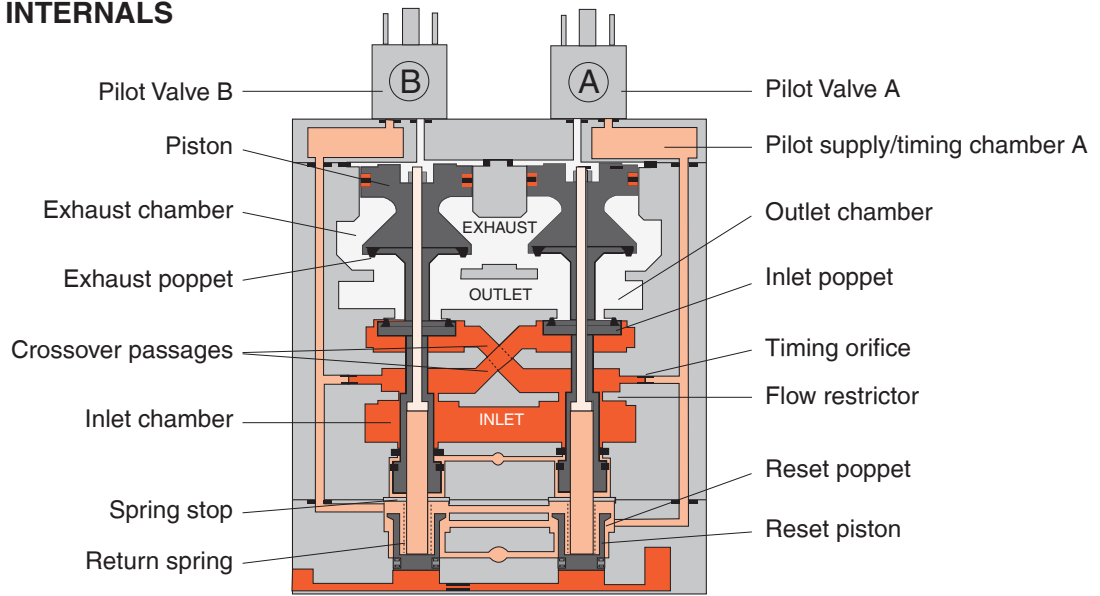


Size 12 & 30 pilots

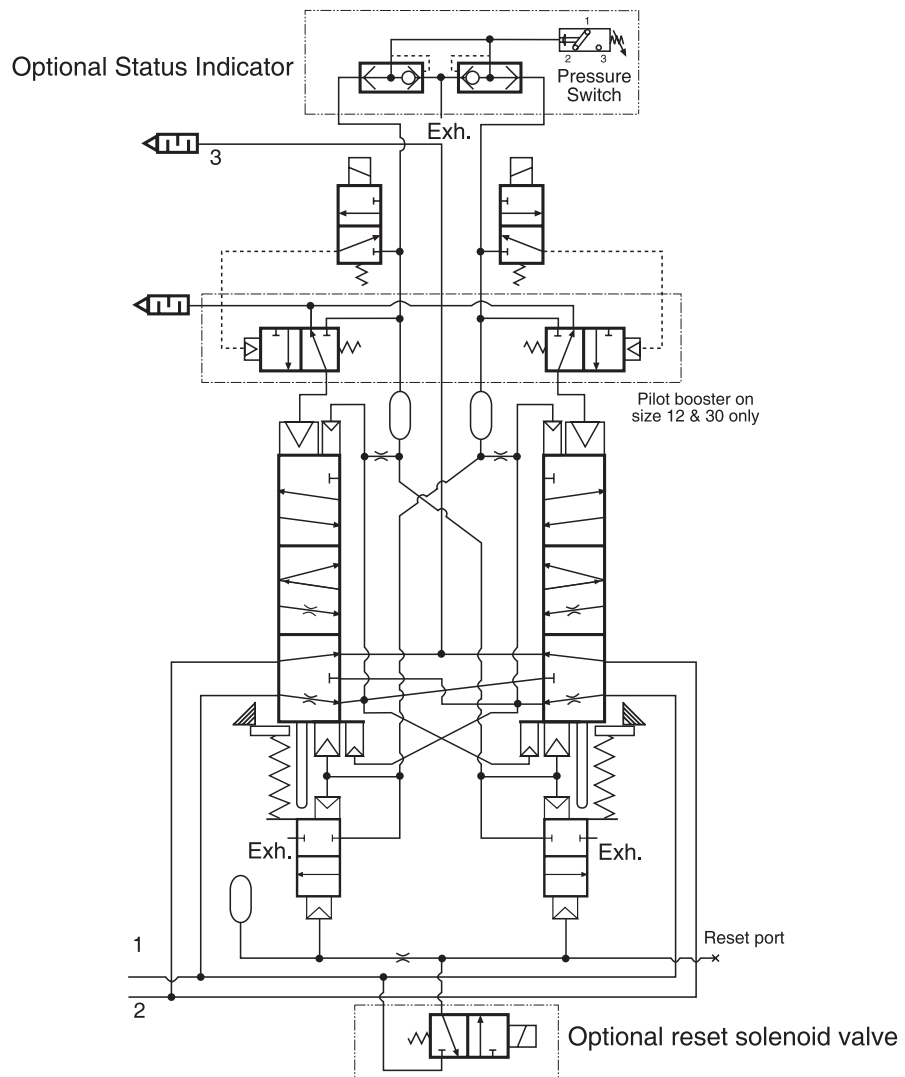


# Overview of DM<sup>2</sup>® Series D Double Valve

## MAIN VALVE INTERNALS



## VALVE SCHEMATIC

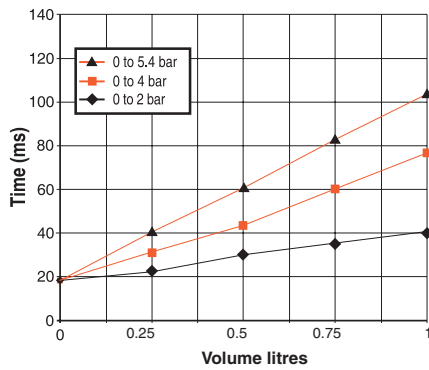


# Valve Response Charts

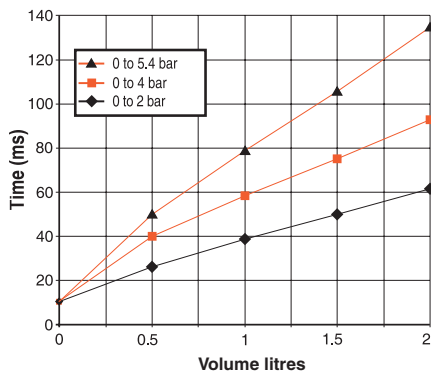
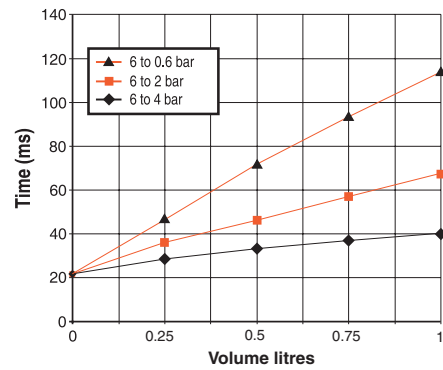
The charts below represent the fill and exhaust times for each of the various sizes of **DM<sup>20</sup>** valves. The “fill” times were measured while raising (filling) the pressure in a volume from 0 to 2, 0 to 4, & 0 to 5,4 bar with a 6 bar inlet pressure. Conversely, the “exhaust” times were measured while lowering (exhausting) the pressure (exhausting) in a volume from 6 bar down to 4, 6 bar down to 2, & 6 bar down to 0,6 bar. **Exhausting tests performed with silencer installed.**

## Filling

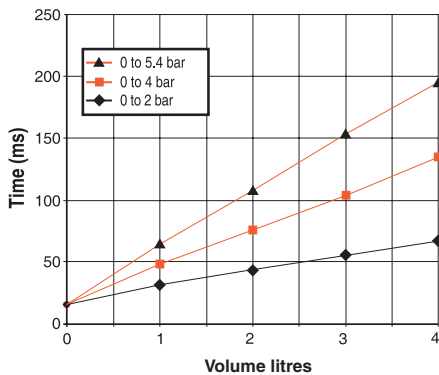
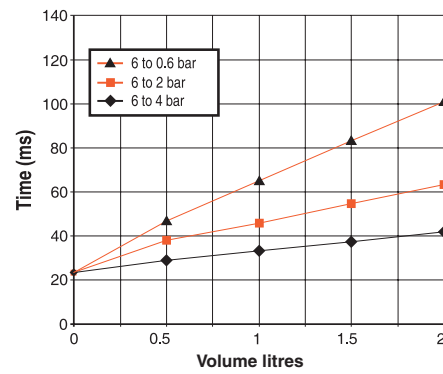
## Exhausting



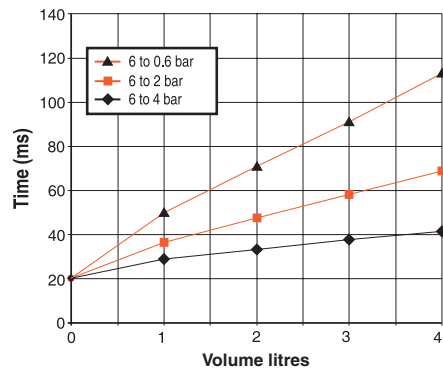
### Size 2



### Size 4

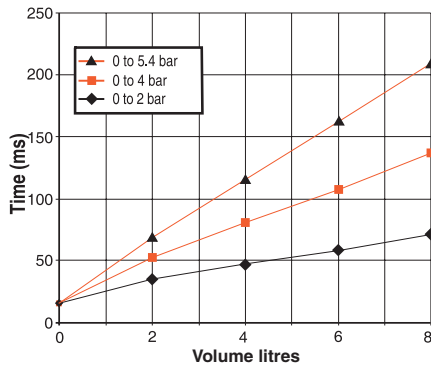


### Size 8



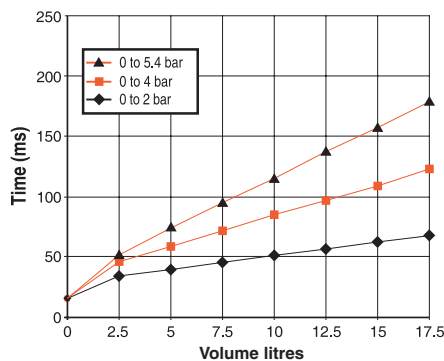
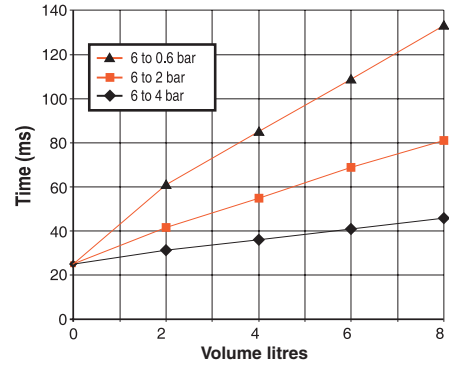
# Valve Response Charts

## Filling

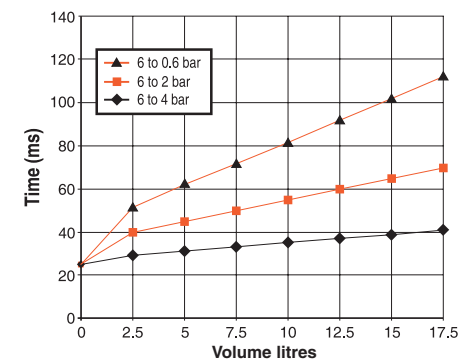


Size 12

## Exhausting



Size 30



## Application & Safety Category

### 1. General

The design features of the **DM<sup>2</sup>** Series D are of considerable importance to users of double valves, such as on mechanical power press applications (EN 692) and other critical applications. This is because the **DM<sup>2</sup>** Series D is designed to meet the latest standards requiring (EN 954) “control reliable”, “Category-3 & -4”, or “dynamic monitoring” capability.

Both the monitoring and memory capabilities of the **DM<sup>2</sup>** Series D valve are built in to the two piston-poppet stem assemblies. During normal operation, the assemblies move between two extreme positions. The 3rd, or intermediate, position occurs only during valve lock-out. The valve will lock out whenever there is sufficiently asynchronous motion between the two piston-poppet stem assemblies. No additional external or internal devices are needed to provide monitoring and memory. When the inlet air supply is removed and re-applied, the valve “remembers” whether it was in the ready-to-run or locked-out position prior to the removal of the air supply. Resetting the valve after it has gone in to “locked out” mode requires a momentary application of a reset signal. Should the reset signal be inadvertently left on (permanent signal), the valve will nevertheless go back in to lock-out mode.

### 2. Description

The three way valve with **DM<sup>2</sup>** capability consists of two main valve systems and two pilot valve systems. The air flow paths within the main valve systems are a proven combination of both **SERIES** and **PARALLEL** paths.

Both pilot valves and both main valve elements are interconnected with each other pneumatically. The main valve elements control the air via Crossflow™ air passages from inlet (port 1) to outlet (port 2).

Air flows first through a control element on one side of the valve to a control element on the second side of the valve, hence a series flow path. A parallel flow path starts on the second side of the valve and flows to the first side of the valve. A total of four elements control air flow from inlet to outlet. Air flow from outlet (port 2) to exhaust port (port 3) occurs in parallel via the exhaust poppets of both main valve elements.

In normal operation, pilot air supply is maintained as long as the two main elements operate in a synchronous manner. Whenever there is asynchronous motion, however, one of the pilot air supplies will be exhausted.

Sufficient pilot pressure is necessary to move the main valve elements to their fully actuated or de-actuated positions.

Lack of sufficient pilot pressure will prevent a valve element from fully shifting, resulting in the element stopping in the intermediate, locked-out position.

### 3. Application

Uncontrolled movements of cylinders or rotary drives risks harm to personnel and machinery. In order to reduce risk of injuries and damage, pneumatic controls should ideally meet strict safety requirements.

ROSS developed the **DM<sup>2</sup>** Series D double valves for controlling pneumatic clutch and brake mechanisms on mechanical power presses. However, the features and functions built in to the valve make it an ideal product to meet the specifications and standards associated with other critical applications. Because of its redundant design and the fact that the air is directed in a Crossflow™ and SERPAR® pattern, the **DM<sup>2</sup>** valve provides a very high level of safety.

# Operating Instructions

## Start-up

Before start-up, the installation must be checked thoroughly by persons trained and experienced in the operation of pneumatic equipment. Make sure that specifications given on the valve label (e.g. "max. operating pressure" and "electrical characteristics") will be in accordance with the operating specifications of the press. When operating pressure is initially applied, it may be necessary to actuate the reset valve momentarily to move the main valve into the ready-to-run condition. Make sure that the inlet supply and the exhaust path are not restricted. Operating pressure must comply with the minimum and maximum limits.

### Functional test

Test	Result
1. Solenoid "A" actuated	Valve moves into lock-out mode, slight leakage at exhaust port 3
2. Solenoid "B" actuated	Valve moves into lock-out mode, slight leakage at exhaust port 3
3. Solenoids "A" and "B" actuated with $\Delta t < 0.1$ s	Valve operates properly
4. Solenoids "A" and "B" actuated with $\Delta t > 0.1$ s	Valve moves into lock-out mode, slight leakage at exhaust port 3
5. After lock-out, permanent signal on reset valve - solenoids "A" and "B" or only "A" / only "B" actuated	Valve cannot be moved into ready-to-run mode

### Pressure test

After a valve lock-out, the double valve must be moved into the ready-to-run position by using the reset valve. In general, if the valve is in the lock-out mode and one or both of the solenoids are energized, the valve should not reset with application or removal of the reset signal. If the valve is in the ready-to-run mode after the reset solenoid valve has been actuated momentarily, the valve will function normally with application and removal of pilot solenoid signal. However, if the valve elements cycle asynchronously, the valve will go to the lock-out mode. Provided that both solenoids are de-energized, removal of reset signal will return the valve to the ready-to-run mode.

An additional test to perform:

- With the valve in the ready-to-run mode, exhaust and re-pressurize the inlet port. The valve should remain in the ready-to-run mode.
- With the valve in the lock-out mode, exhaust and re-pressurize the inlet port. The valve should remain in the lock-out mode.

### Lock-outs

Any asynchronous movement between both piston elements for a time period  $> 0.1$  s will result in a lock-out of the valve. This can be due to various causes, for instance:

- worn piston seals
- delayed response of the main valve elements due to dirt or varnished lubricant
- electrical signals to solenoid incomplete or unable to maintain proper voltage

- independent electrical signals to solenoids are not received concurrently
- delayed response of solenoid pilots or booster pilots due to damaged components, dirt, or varnished lubricant
- collection of excessive water or lubrication

### Maintenance, Testing

Maintenance and testing procedures must follow the rules and regulations set by the respective national work-safety institutions. These procedures should only be performed by persons trained and experienced in the use of pneumatic equipment. Regulations generally require that maintenance and test procedures be performed at least once a year.

### Repair

ROSS would be happy to service this specialized double valve for you at its factory repair center. 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. Customers maintaining their own valves should make sure that only original spare parts (as specified in the ROSS parts lists) are used.

Pneumatic equipment should be repaired only by persons trained and experienced in the repairing of such equipment, guided by these operating instructions. Information about valve repair and/or the exchange of a valve must be written down in the machine operation documentation.

# Repair Kits

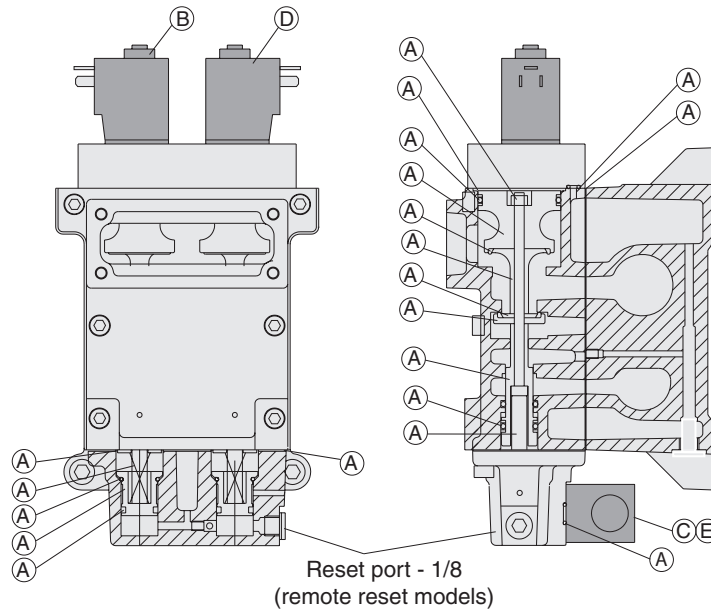
Item	Description	Size 2	Size 4	Size 8	Size 12	Size 30
A	Valve body service kit	2101K77	2102K77	2103K77	2104K77	2105K77
B*	Complete primary solenoid pilot	1480C79	1403C79	1404H79	1391C79	1391C79
C*	Complete reset solenoid pilot	859C79	851C79	851C79	851C79	851C79
D*	Solenoid coil - pilots	306K33	306K33	360K33	306K33	306K33
E*	Solenoid coil reset	306K33	306K33	306K33	306K33	306K33
F*	Pilot booster service kit	-	-	-	2106K77	2106K77

\* Specify solenoid voltage and Hz when ordering.

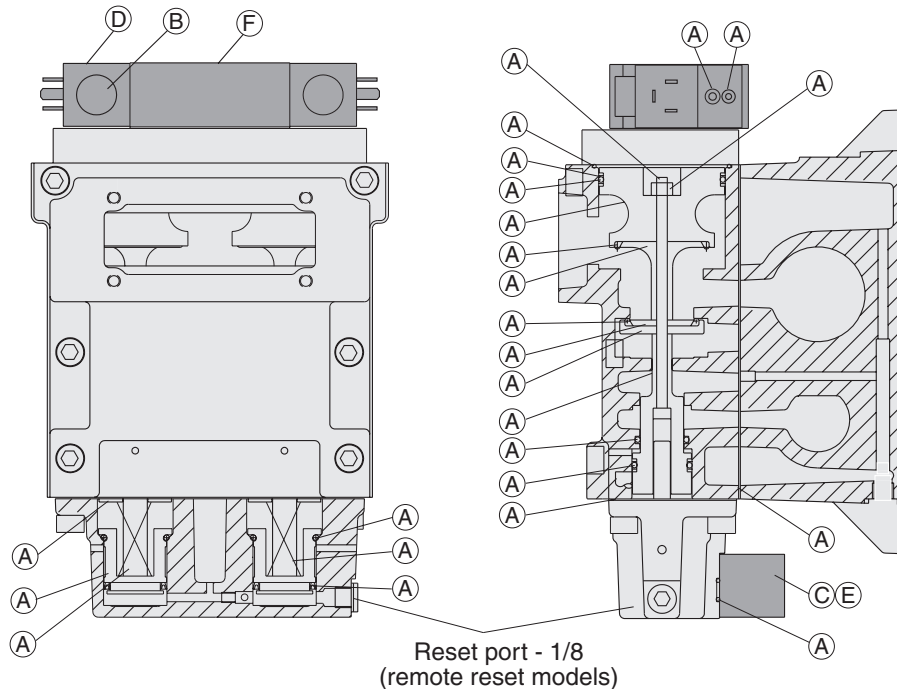
**Kits for optional items**  
(not shown in the drawings):

Status indicator assembly kit – **2151H77**  
Replacement pressure switch – **1018A30**

## Sizes 2, 4 & 8



## Sizes 12 & 30



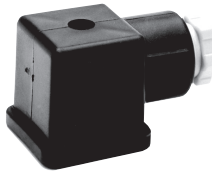
# ACCESSORIES

## STATUS INDICATOR



The Status Indicator pressure switch actuates when the valve is in a ready-to-run condition and de-actuates when the valve is in a lock-out condition or when the inlet air pressure has been removed. Although the valves can be purchased with this option already installed, the Status Indicator can be purchased separately by ordering part number: **670B94**

## ELECTRICAL CONNECTORS



Electrical connectors are required to connect the valve solenoids to the drop cords supplying electrical power.

Each connector can be positioned so that the cord exits upward or to the side. Cords of 6-mm to 10-mm diameter can be used. Connectors with a light in a translucent housing are also available to serve as indicator lights. Order connectors by the part numbers given in the chart below.

## RESET VALVES for MODELS with REMOTE RESET

On valve models with solenoid reset, a solenoid on the valve is actuated to perform the reset function. Models for remote reset, however, require a small reset valve and the installation of a G 1/8 line from the reset valve to the reset port on the double valve. ROSS offers 3/2 normally closed valves with either manual or electric control that are suitable for this purpose. The valves, pictured below, are suggested (EN 692 to be observed).

**WIRED CONNECTORS** have a 2-meter cord with three 18-gauge conductors. Cord exits upward, and is available in either 6-mm or 10-mm diameter.

### Part Numbers of Form A Electrical Connectors

Connector Type	Without Light	With Light*
For use with dropcord (Cord not included)	937K87	936K87*
Wired with 6-mm cord	721K77	720K77*
Wired with 10-mm cord	371K77	383K77*
For use with threaded conduit**	723K77	724K77*

\*Specify solenoid voltage when ordering.

\*\*Accept G 1/2 electrical conduit fitting.

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

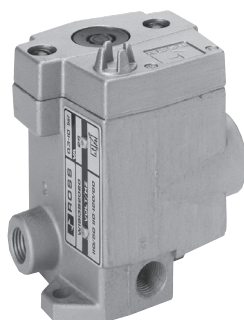
### Model Numbers of Reset Valves

Description	Valve Model Numbers
Pushbutton: Green	D1223A1005
Direct Solenoid Control for line mounting	W1613B1020**
Direct Solenoid Control for base mounting	W1413A1409** (Base: W516B91)

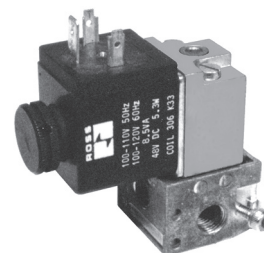
\*\*For NPT threads, delete D from model number. For example, 1223A1005. (In the case of the W1413A1409, the prefix should be added to the base model instead of the valve.)



**Pushbutton Models**  
Green button: D1223A1005



**Direct Solenoid Model  
for Line Mounting**  
D1613B1020\*



**Direct Solenoid Model  
for Base Mounting**  
Valve: W1413A1409\*  
Sub-Base: W516B91

\* Specify solenoid voltage and Hz when ordering.

# CAUTIONS

## 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: 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. 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 82°C and 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.

*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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