



**ROSS CONTROLS®**

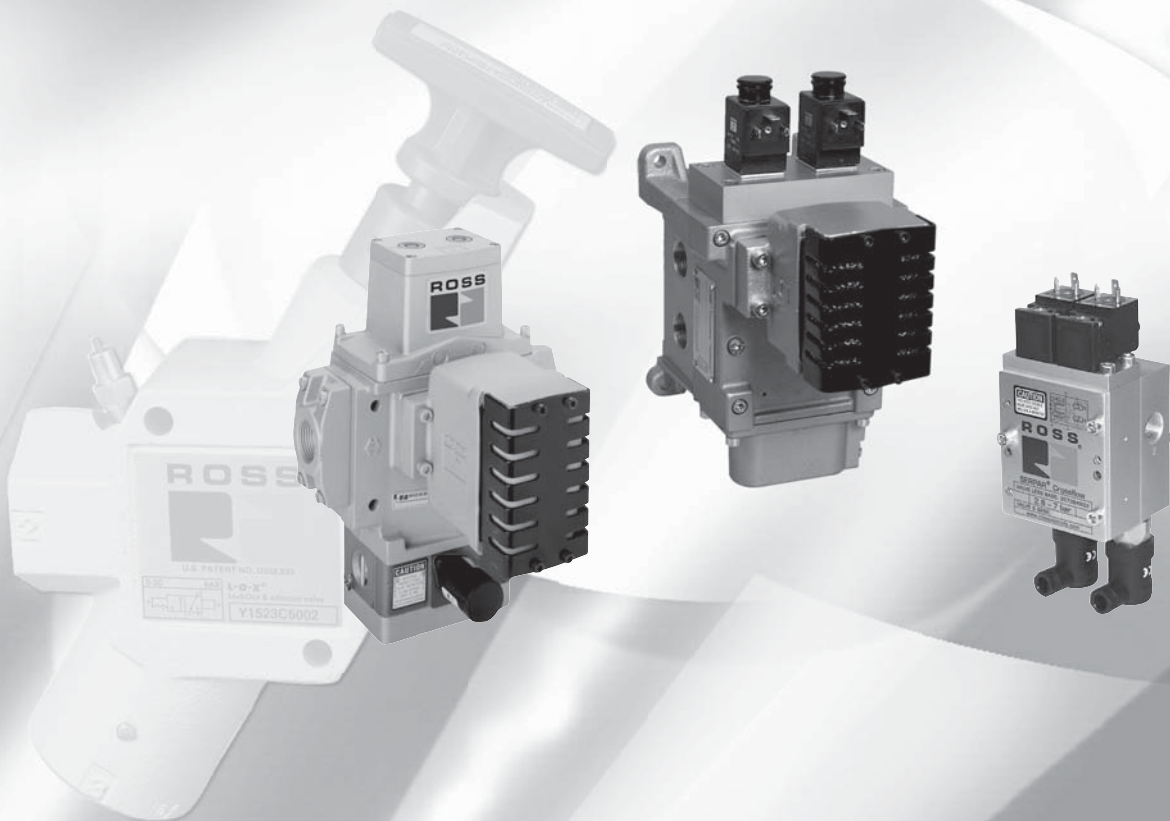
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# **PRESS SAFETY DOUBLE VALVES**

## **DOUBLE VALVES**

### **FOR CLUTCH/BRAKE CONTROL**

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

G1.1 - G1.8

- With Internal Dynamic Monitoring & Memory

## SERPAR® Control Reliable Double Valves 35 Series

G2.1 - G2.10

- With Internal Monitoring and Pneumatic Reset, L-G Monitor
- With Internal Monitoring and Solenoid Reset, E-P Monitor
- With Internal Monitoring and Dry Contact Reset, D-S Monitor

## Crossflow™ Double Valves 35 Series

G3.1 - G3.9

- Designed for External Monitoring, with Pressure Switches
- Designed for External Monitoring, without Pressure Switches

## Explosion Proof Valves for Clutch/Brake Control

Consult  
ROSS

## Automatic Systems

Consult  
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## Modular Air Distribution

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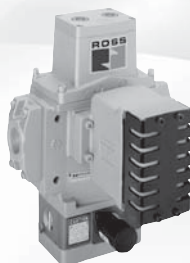
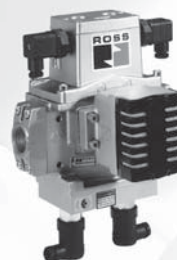
## Automation Valves

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## Cautions and Warranty

- Compatible Lubricants
- Cautions and Warnings

Inside Cover

DM<sup>20</sup> Series D Double ValvesSERPAR<sup>®</sup> 35 Series Double ValvesCrossflow<sup>™</sup> 35 Series Double Valves

VALVE SERIES	Basic Size	AVAILABLE PORT SIZES								MAX. FLOW Cv								Reset			Page
		1/4	3/8	1/2	3/4	1	1¼	1½	2	Port Size								Manual	Remote	Solenoid	
										1/4	3/8	1/2	3/4	1	1¼	1½	2				
DM <sup>20</sup> Series D with Internal Dynamic Monitoring & Memory																					
DM <sup>20</sup> D	2, 4, 8									2.17	2.17	2.8	4.63	4.63							G1.3 - G1.6
DM <sup>20</sup> D	12, 30													8.86		20.22					G1.3 - G1.6
DM <sup>20</sup> D Series E & C Preassembled Wiring Kits																					G1.7
Accessories																					G1.8
SERPAR® 35 Series																					
L-G Monitor	4										3	3	3								G2.3 - G2.4
	8											3.5	4	4							G2.5 - G2.6
	12												8	8.5	9						G2.5 - G2.6
	30														20.0	21	21				G2.5 - G2.6
E-P Monitor	8											3.5	4	4							G2.7 - G2.8
	12												8	8.5	9						G2.7 - G2.8
	30														20	21	21				G2.7 - G2.8
D-S Monitor	8											3.5	4	4							G2.9 - G2.10
	12												8	8.5	9						G2.9 - G2.10
	30														20	21	21				G2.9 - G2.10
Crossflow™ 35 Series																					
With or Without Pressure Switches	1									0.9	1.2										G3.3 - G3.4
	2											3.7	4.2								G3.5 - G3.6
With Pressure Switches	4										3	3	3								G3.7
	8											3.5	4	4							G3.8 - G3.9
	12												8	8.5	9						G3.8 - G3.9
	30														20	21	21				G3.8 - G3.9

**ROSS CONTROLS®**



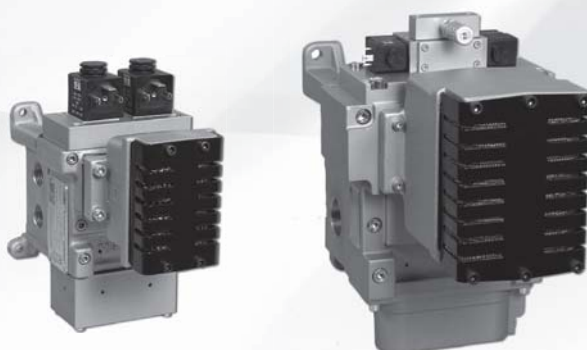
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## **PRESS SAFETY DOUBLE VALVES**

**CONTROL RELIABLE VALVES FOR CLUTCH/BRAKE CONTROL**  
**DM<sup>2</sup>® SERIES D**

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### DM²® Monitoring:

The DM²® is a patented 3/2 normally closed valve (with an intermediate, lockout position) distinguished by SERPAR® 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 DM²® 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.

*Explosion-Proof solenoid pilot valves available, consult ROSS.*

VALVE SERIES	AVAILABLE PORT SIZES						MAX. FLOW Cv						Reset			Page
	1/4	3/8	1/2	3/4	1	1½	Port Size						Manual	Remote	Solenoid	
							1/4	3/8	1/2	3/4	1	1½				
DM <sup>20</sup> D							2.17	2.17	2.8	4.63	4.63 8.86	20.22				G1.3 - G1.6
DM <sup>20</sup> D Series E & C Preamsembled Wiring Kits																G1.7
Accessories																G1.8

## Clutch/Brake Control

## G



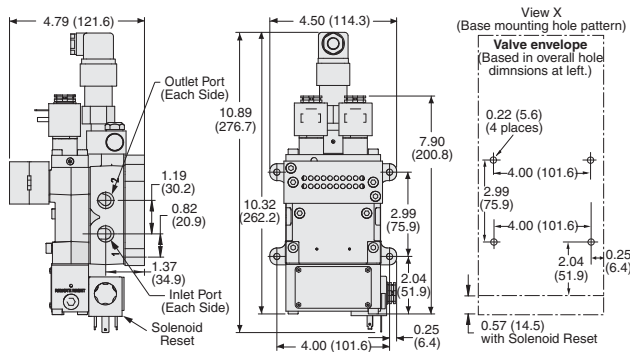
# Press Control Double Valves with Internal Dynamic Monitoring & Memory

## Valve Technical Data DM<sup>2</sup>® Series D

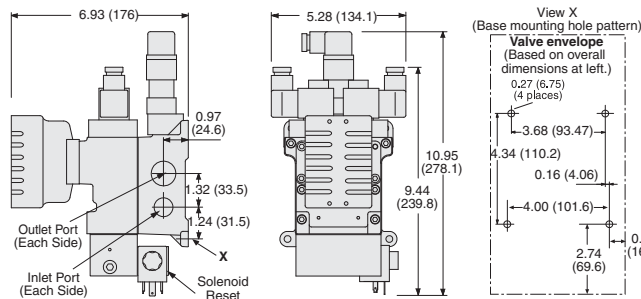
### Valve Dimensions – inches (mm)

G1

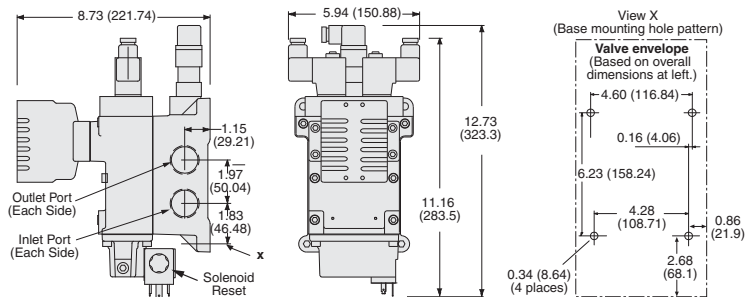
#### Basic Size 2



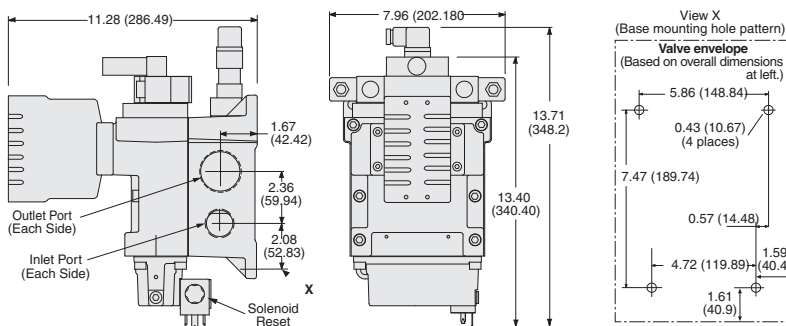
#### Basic Size 4



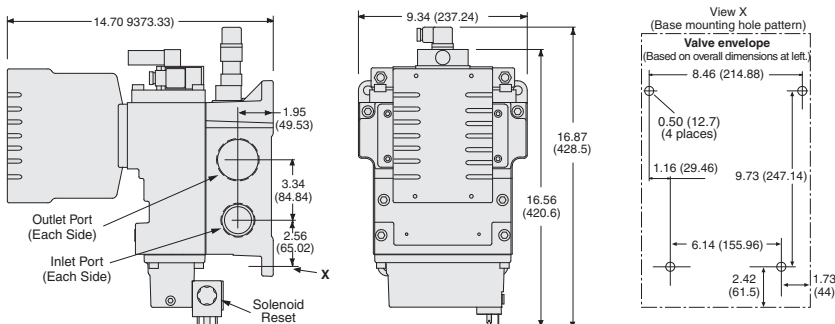
#### Basic Size 8



#### Basic Size 12



#### Basic Size 30



SUB-BASE MODEL NUMBERS and SUB-BASE SPECIFIC INFORMATION						
Valve Basic Size	Port Size		Sub-Base Model Number		Status Indicator	Weight lb (kg)
	Inlet	Outlet	NPT Threads	BSPP Threads		
2	1/4	1/4	1872C91	D1872C91	No	1.7 (0.8)
	1/4	1/4	1873C91	D1873C91	Yes	2.1 (1.0)
	3/8	3/8	1874C91	D1874C91	No	1.7 (0.8)
	3/8	3/8	1875C91	D1875C91	Yes	2.1 (1.0)
4	1/2	1/2	1697C91	D1697C91	No	1.7 (0.8)
	1/2	1/2	1698C91	D1698C91	Yes	2.3 (1.1)
	1/2	3/4	1699C91	D1699C91	No	1.7 (0.8)
	1/2	3/4	1700C91	D1700C91	Yes	2.3 (1.1)
8	3/4	3/4	1701C91	D1701C91	No	3.6 (1.6)
	3/4	3/4	1702C91	D1702C91	Yes	4.2 (1.9)
	1	1	1703C91	D1703C91	No	3.6 (1.6)
	1	1	1704C91	D1704C91	Yes	4.2 (1.9)
12	1	1	1705C91	D1705C91	No	6.2 (2.8)
	1	1	1706C91	D1706C91	Yes	6.8 (3.1)
	1	1 1/2	1707C91	D1707C91	No	6.2 (2.8)
	1	1 1/2	1708C91	D1708C91	Yes	6.8 (3.1)
30	1 1/2	2	1709C91	D1709C91	No	12.0 (5.4)
	1 1/2	2	1710C91	D1710C91	Yes	12.6 (5.7)



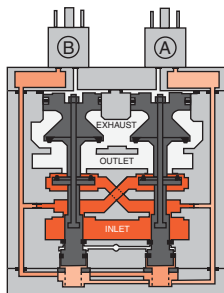
# Press Control Double Valves with Internal Dynamic Monitoring & Memory

## Valve Operation DM<sup>2</sup>® Series D

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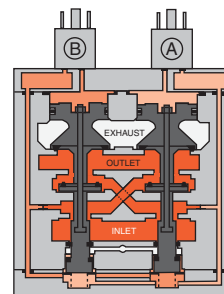
### Valve de-actuated (ready-to-run):

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.

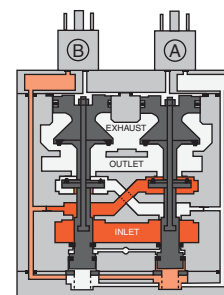


### Valve locked-out:

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.



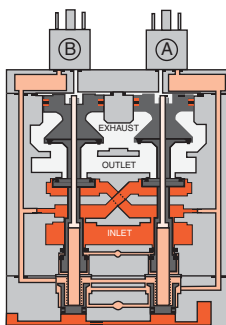
### Resetting the valve:

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.)

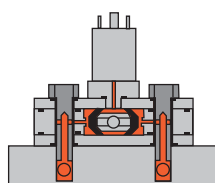
De-actuation of reset pistons causes the reset poppets to close and pilot supply to fully pressurize.

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.



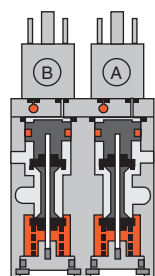
### Status Indicator:

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.

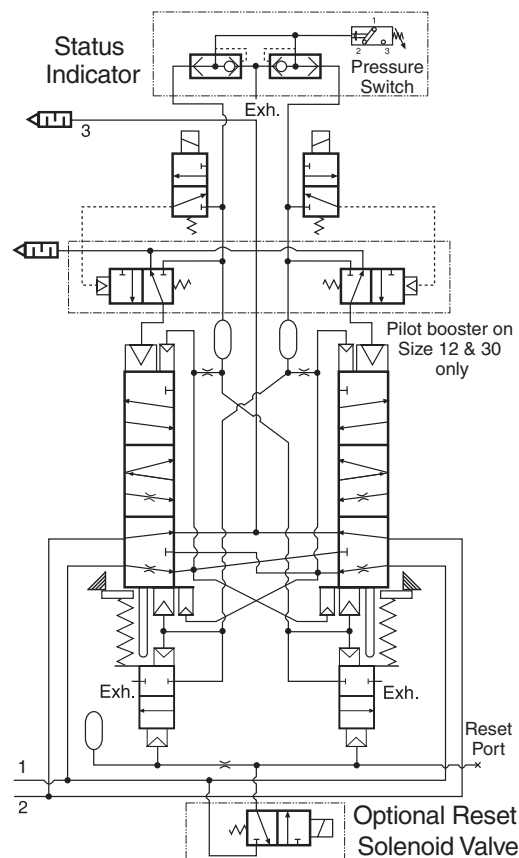


Status indicator (optional) in normal ready-to-run position.

Basic 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 required electrical current to operate the pilots to a minimum.



Basic Size 12 & 30 pilots



Schematic - Valve de-actuated

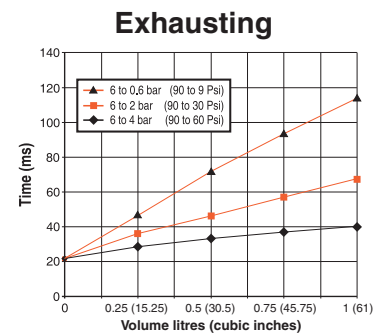
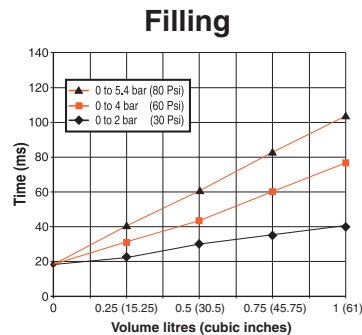
# Press Control Double Valves with Internal Dynamic Monitoring & Memory

## Valve Response Charts DM<sup>2</sup>® Series D

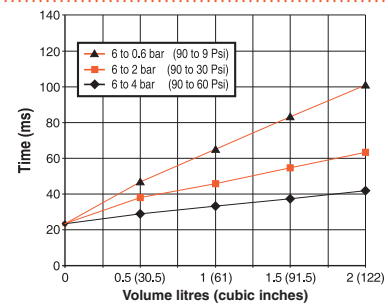
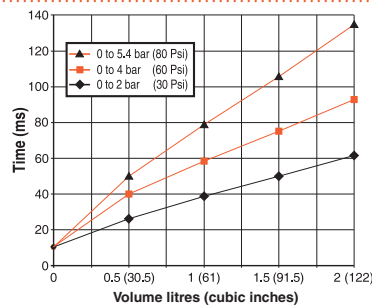
G1

The charts below represent the fill and exhaust times for each of the various sizes of DM<sup>2</sup>® Series D double valves. The “fill” times were measured while raising (filling) the pressure in a volume from 0 to 30, 60, & 80 psi (0 to 2.1, 4.1, & 5.5 bar) with a 90 psi (6.2 bar) inlet pressure. Conversely, the “exhaust” times were measured while lowering the pressure (exhausting) in a volume from 90 psi (6.2 bar) down to 90 to 60, 30, & 9 psi (4.1, 2.1, & 0.6 bar). **Exhausting tests performed with silencer installed.**

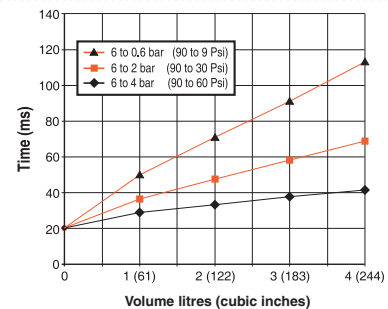
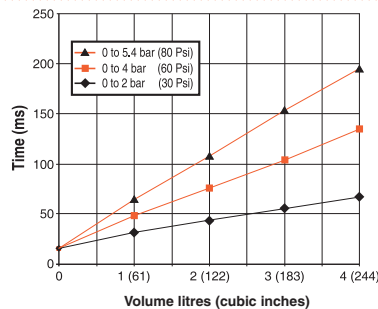
Basic Size 2



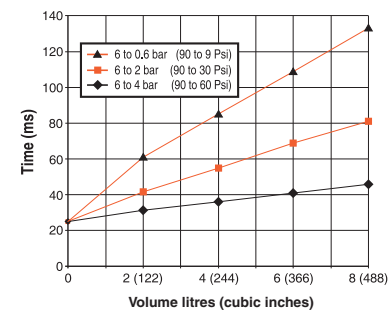
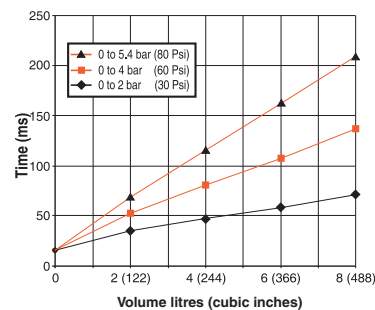
Basic Size 4



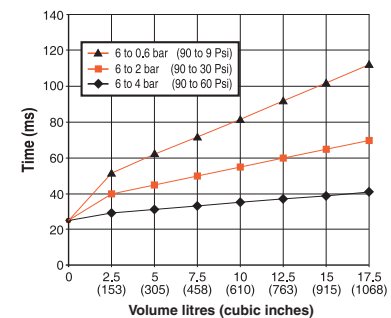
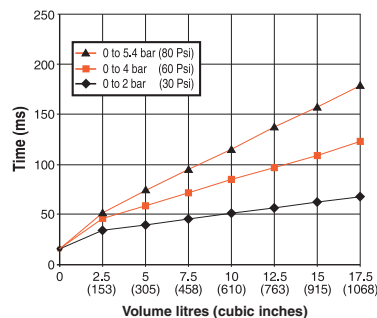
Basic Size 8



Basic Size 12



Basic Size 30



# Preassembled Wiring Kits

## Clutch/Brake Control DM<sup>2</sup>® Series D

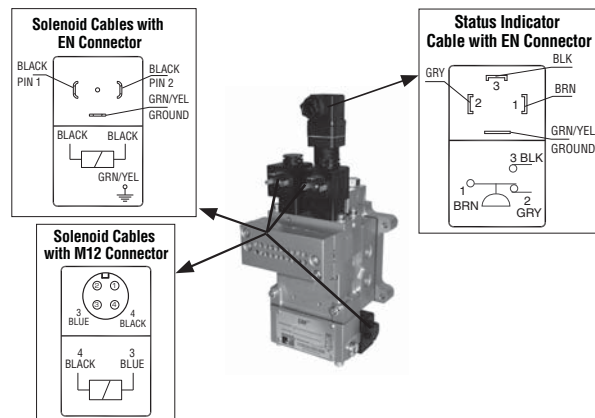
### Preassembled Wiring Kits

Solenoid Connector Type	Kit Number*			Length meters (feet)
	Connector without Light	Lighted Connector		
		24 Volts DC	120 Volts AC	
EN 175301-803 Form A	2283H77	2532H77-W	2532H77-Z	5 (16.4)
	2284H77	2533H77-W	2533H77-Z	10 (32.8)
M12	2288H77	—	—	5 (16.4)
	2289H77	—	—	10 (32.8)

\* Each cable has one connector.

\* Each cable has one connector.

These kits include 1 cable for the status indicator, and 3 cables with connector plus a cord grip for each.

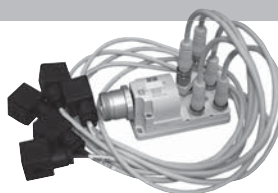


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### Wiring Kits with J-Box

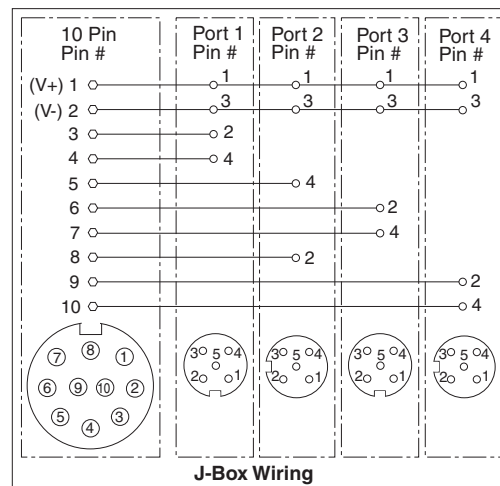
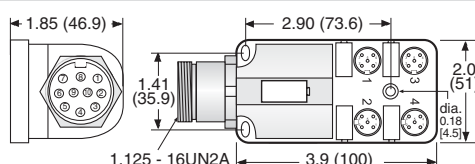
Connector Types	Kit Number*	Length meters (feet)
M12 - DIN	2249H77	1 (3.3)
M12 - M12	2250H77	1 (3.3)

\*24 volts DC only.



A J-Box is a junction box with a 10-pin MINI connector for connecting to the user's control system and (4) 5-pin M12 ports for connecting to the 3 solenoids and the status indicator on the DM<sup>2</sup> Series valve. The J-Box kits include the J-Box as described above and (4) 1-meter cables for connecting to the valve. These cables have a connector on each end. The status indicator cable and the (3) solenoid cables have an M12 connector on one end and a EN connector on the other end (M12-DIN).

Standard valves come with DIN type solenoid connections, but could be bought with M12 type connections as well. Therefore we also offer a kit that provides solenoid cables with an M12 connector on each end (M12-M12).



### 10 PIN MINI Cable

Kit Number	Length meters (feet)
2253H77	3.66 (12)
2254H77	6.1 (20)
2255H77	9.1 (30)
2256H77	15.2 (50)

These cables have a 10-pin MINI connector for connecting the J-Box kits above to the user's control system. Kits include one cable with connector and cord grip. Cable conductors are 18-gauge wire.

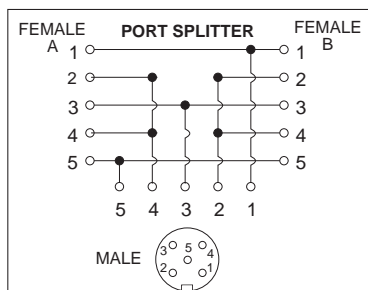
PIN #		PIN #	
1	+24 volts DC	6	-
2	Common volts DC	7	Remote Reset
3	-	8	-
4	Solenoid A	9	Remote Valve Fault Light
5	Solenoid B	10	Remote System OK Light

Wire Colors:	Wire Colors:
Orange	Orange w/Black
Blue	Red
White w/Black	Green/Yellow
Red w/Black	Black
Green w/Black	White

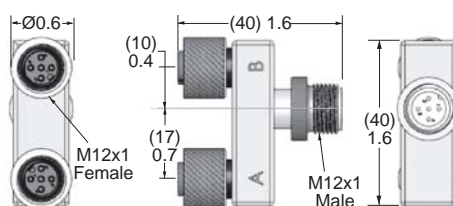


### Outlet Port Pressure Monitoring Wiring Kit

Kit Number	Length meters (feet)
2251H77	1 (3.3)



Some customers prefer to monitor downstream pressure in addition to using the DM<sup>2</sup> or DM<sup>1</sup> Series valve. A convenient way to do this is to install a pressure switch in the extra outlet port that is provided on the valve. The Outlet Port Pressure Monitoring kit can be used with one of the J-Box kits above to split one of the M12 ports on the J-Box so that a pressure switch can be wired in as well. These kits consist of one port splitter (a Tee with three M12 connectors) and one M12-DIN cable (1 meter).



Pressure switch available separately, see valve options.

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



Online Version  
Rev. 03/12/18

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### Electrical Connectors

Electrical Connector Form	Electrical Connector Type	Cord Length meters (feet)	Cord Diameter	Electrical Connector Model Number		
				Without Light	Lighted Connector	
					24 Volts DC	120 Volts AC
EN 175301-803 Form A	Prewired Connector (18 gauge)	2 (6½)	6-mm	721K77	720K77-W	720K77-Z
	Prewired Connector (18 gauge)	2 (6½)	10-mm	371K77	383K77-W	383K77-Z
	Connector for threaded conduit (1/2 inch electrical conduit fittings)	—	—	723K77	724K77-W	724K77-Z
	Connector Only	—	—	937K87	936K87-W	936K87-Z

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



### Status Indicator

Model Number
670B94

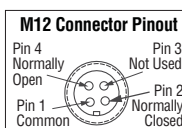
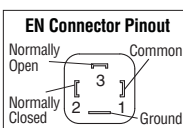
The Status Indicator pressure switch actuates when the valve is in a ready-to-run condition and de-actuates when the valve is in a lockout condition or when the inlet air pressure has been removed. Although, the valves can be purchased with this option already installed, the Status Indicator can be purchased separately.



### Downstream Pressure Monitoring

- May be installed downstream on all double valves
- Provides means to verify the release of downstream pressure to next obstruction
- Factory preset, 5 psi (0.3 bar) - falling

Pressure Switches		
Connection Type	Model Number	Port Threads
EN 175301-803 Form A	586A86	1/8 NPT
M12	1153A30	1/8 NPT



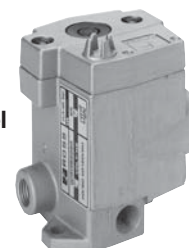
### RESET VALVES for DOUBLE VALVES with REMOTE RESET

Valves with the remote reset option require a small 3/2 reset valve and the installation of a 1/8 inch air line from the reset valve to the reset port of the double valve. ROSS offers 3/2 normally closed valves with either manual or electric control that are suitable for this purpose.

Reset Valves		
Description	Model Number	
	NPT Threads	BSPP Threads
Flush Pushbutton: Green	1223B1FPG	D1223B1FPG
Mushroom Button: Green	1223B1MBG	D1223B1MBG
Direct Solenoid Control for Line Mounting	1613B1020Z	D1613B1020Z
Direct Solenoid Control for Base Mounting	W1413A1409Z (Base: 516B91)	—
Sub-Base for Direct Solenoid Control Valves	516B91	D516B91

# **Voltage:** Z=120 VAC, 60 Hz; W=24 VDC, e.g., 1613B1020W. For other voltages consult ROSS

**Direct Solenoid Model for Line Mounting:**  
1613B1020Z



**Flush Pushbutton:**  
1223B1FPG



**Mushroom Button:**  
1223B1MBG



**Direct Solenoid Model for Base Mounting**  
Valve: W1413A1409Z  
Sub-Base: 516B91



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

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**ROSS CONTROLS®**



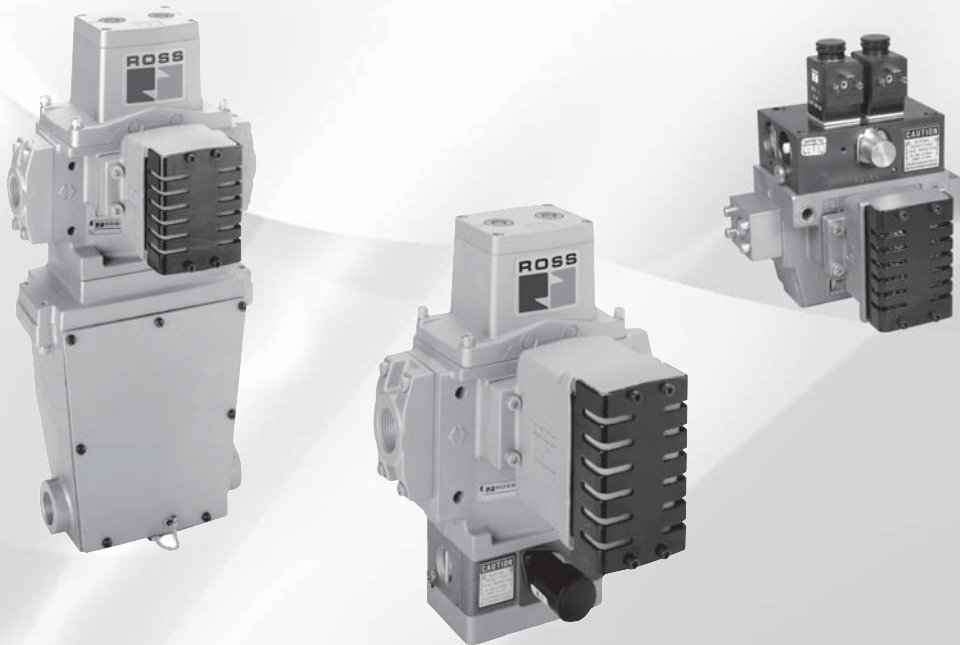
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## **PRESS SAFETY DOUBLE VALVES**

**CONTROL RELIABLE VALVES FOR CLUTCH/BRAKE CONTROL**

**SERPAR® 35 SERIES**

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## SERPAR® 35 SERIES DOUBLE VALVES WITH INTERNAL MONITORING AND PNEUMATIC RESET – KEY FEATURES

- Internal monitoring – requires no additional monitoring circuitry
- Automatic lock-out/inhibit upon detection of a malfunction
- Default to de-energized position upon fault detection
- Dedicated reset function
- No undesired automatic reset upon removal of electrical or pneumatic energy sources
- Built-in non-clogging silencers

35 Series SERPAR® valves are internally monitored double valves and are available in Basic Size 4, 8, 12 and 30 ranging from 3/8" – 1½" port sizes. Internally monitored double valves contain a built-in monitoring device that checks for the proper operation of each valve element. If the internal monitor detects a valve fault on a particular cycle, the double valve will fail to a safe condition (all downstream air is exhausted) and the monitor will lock-out to inhibit further operation of the device. Normal operation can only be resumed by a momentary reset signal to the valve, either pneumatic or electric.

The original application for these double valves was in the control of clutch/brake mechanisms on stamping presses, but they have found their way into many other critical applications such as alternative lockout systems for energy isolation, air cylinder press load-holding systems, as well as other Category -3 and -4 safety circuits. ROSS double valves are a vital part of any control-reliable fluid power control system.

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# SERPAR® Double Valves with Internal Monitoring and Pneumatic Reset – L-G Monitor

Clutch/Brake Control  
35 Series

## Basic Size 4

Port Size	Basic Size	Monitor Reset	Right Inlet		Left Inlet		C <sub>v</sub>		Avg. Response Constants			Weight lb (kg)
			Valve Model Number#		Valve Model Number#				M	F		
			NPT Threads	BSPP Threads	NPT Threads	BSPP Threads	1-2	2-3		1-2	2-3	
3/8	4	Manual	3573D3191Z	D3573D3191Z	3573D3195Z	D3573D3195Z	3	6	15	0.70	0.40	8.3 (3.7)
		Remote	3573D3192Z	D3573D3192Z	3573D3196Z	D3573D3196Z	3	6	15	0.70	0.40	8.3 (3.7)
1/2	4	Manual	3573D4211Z	D3573D4211Z	3573D4215Z	D3573D4215Z	3	8	15	0.65	0.35	8.3 (3.7)
		Remote	3573D4212Z	D3573D4212Z	3573D4216Z	D3573D4216Z	3	8	15	0.65	0.35	8.3 (3.7)
3/4	4	Manual	3573D5211Z	D3573D5211Z	3573D5215Z	D3573D5215Z	3	9	15	0.65	0.35	8.3 (3.7)
		Remote	3573D5212Z	D3573D5212Z	3573D5216Z	D3573D5216Z	3	9	15	0.65	0.35	8.3 (3.7)

# Voltage: Z=110-120 VAC, 50/60 Hz; W=24 VDC, e.g., 3573D3191W. For other voltages consult ROSS.

## Valve Response Time

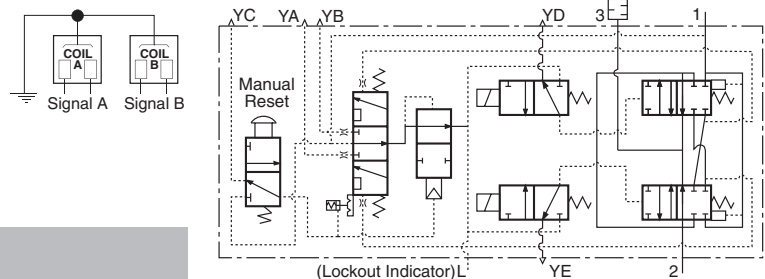
The constants above, designated M and F, can be used to determine the amount of time required to fill or exhaust a volume of any size using the formula on the right:

$$\text{Vlv. Resp. Time (msec)} = M + F \cdot V$$

M = avg. time for parts movement

F = msec. per cubic inch of volume

V = volume in cubic inches



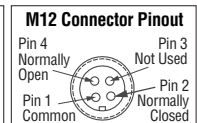
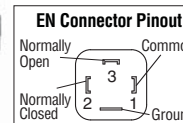
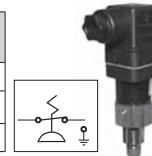
## ACCESSORIES & OPTIONS

### Pressure Switches

(Electrical Lockout Indicator)

Connection Type	Model Number*	Port Threads
EN 175301-803 Form A	586A86	1/8 NPT
M12	1153A30	1/8 NPT

\*Pressure switch closes on falling pressure of 5 psig (0.34 bar).



### Piping Flange Kits

Each kit includes two threaded (NPT) flanges and the required seals and mounting bolts.

Port Size	Basic Size	Kit Number
3/8	4	658K77
1/2	4	659K77
3/4	4	660K77

### Valve Without Piping Flanges

Port Size	Basic Size	Monitor Reset	Right Inlet		Left Inlet	
			Valve Model Number#		Valve Model Number#	
			NPT Threads	BSPP Threads	NPT Threads	BSPP Threads
3/8, 1/2, 3/4	4	Manual	3573D4241Z	D3573D4241Z	3573D4245Z	D3573D4245Z
		Remote	3573D4242Z	D3573D4242Z	3573D4246Z	D3573D4246Z

## RESET VALVES for L-G MONITOR

On valve models with manual reset a button on the side of the monitor is pushed to perform the reset function. Models for remote reset, however, require a small reset valve and the installation of a 1/8 line from the reset valve to the reset port on the monitor. ROSS offers 3/2 normally closed valves with either manual or electric control that are suitable for this purpose, valves size 8, 12, 30 with L-G monitor are suggested.

## Reset Valves

Description	Model Numbers#	
	NPT Threads	BSPP Threads
Flush Pushbutton: Green	1223B1FPG	D1223B1FPG
Mushroom Button: Green	1223B1MBG	D1223B1MBG
Direct Solenoid Control for Line Mounting	1613B1020Z	1613B1020Z
Direct Solenoid Control for Base Mounting	W1413A1409Z (Sub-Base: 516B91)	—
Sub-Base for Direct Solenoid Control	516B91	D516B91

# Voltage: Z=110-120 VAC, 50/60 Hz; W=24 VDC, e.g., 3573D4241W. For other voltages consult ROSS

**Valve Without Silencer** Exhaust port has threaded flange only, consult ROSS.

## STANDARD SPECIFICATIONS (for valves on this page):

**Construction:** Dual poppet.

**Mounting Type:** In-Line.

**Solenoids:** Two solenoids, rated for continuous duty.

**Standard Voltages:** 24 volts DC; 110-120 volts AC, 50/60 Hz.

**Power Consumption** (each solenoid): 30 VA inrush, 16 VA holding on 50 or 60 Hz; 11 watts on DC.

**Enclosure Rating:** IP65, IEC 60529.

**Electrical Connections:** EN 175301-803 Form A, uses two cord-grip connectors at solenoids.

**Ambient Temperature:** 40° to 120°F (4° to 50°C).

**Media Temperature:** 40° to 175°F (4° to 80°C).

**Flow Media:** Filtered air.

**Inlet Pressure:** 30 to 100 psig (2 to 7 bar).

**L-G Reset Pressure:** Remote pneumatic reset models require a pressure of at least 30 psig (2 bar). Manual reset models use internal valve pressure.

**Inlet Port:** Models are available with the inlet port on either the right or the left side of the valve body.

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



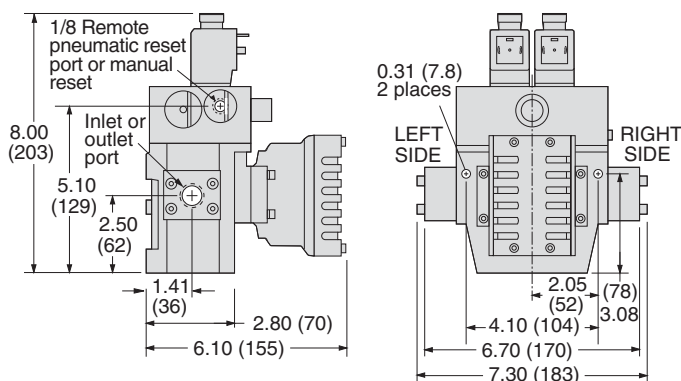
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G2.3

### Basic Size 4

#### Valve Dimensions – inches (mm)



### OPTIONS

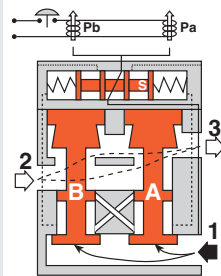
Electrical Connectors	Electrical Connector Form	Electrical Connector Type	Cord Length meters (feet)	Cord Diameter	Electrical Connector Model Number		
					Without Light	Lighted Connector	
						24 Volts DC	120 Volts AC
	EN 175301-803 Form A	Prewired Connector (18 gauge)	2 (6½)	6-mm	721K77	720K77-W	720K77-Z
		Prewired Connector (18 gauge)	2 (6½)	10-mm	371K77	383K77-W	383K77-Z
		Connector for threaded conduit (1/2 inch electrical conduit fittings)	—	—	723K77	724K77-W	724K77-Z
		Connector Only	—	—	937K87	936K87-W	936K87-Z

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

## VALVE OPERATION

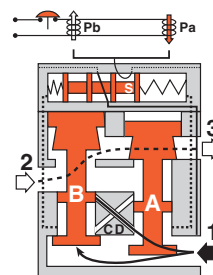
### Conditions at Start:

Inlet 1 is closed to outlet 2 by both valve elements A and B. Outlet 2 is open to exhaust 3. Pilot air is ported from inlet 1 and through the center section of spool S to the normally closed pilots Pa and Pb. Monitoring pressure signals at both ends of spool S are exhausted.



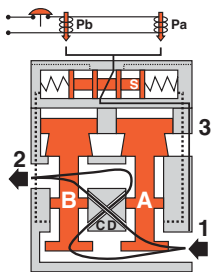
### Detecting a Malfunction:

A malfunction in the system or the valve itself could cause one valve element to be open and the other closed. Air then flows past the inlet poppet on valve element A, into crossflow passage D, but is substantially blocked by the spool portion of element B. The large size of the open exhaust passage past element B keeps the pressure at the outlet port below two percent of inlet pressure. Full monitoring air pressure from side A goes to the right end of spool S, and a reduced pressure goes to the left end. This pressure imbalance causes the spool to shift to the left. This shuts off and exhausts pilot air to both solenoid pilots, and allows valve element A to return to the closed position.



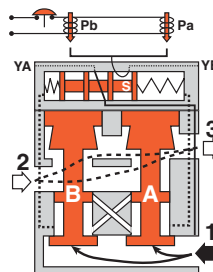
### Normal Operation:

Simultaneously energizing both solenoids actuates both pilots and causes valve elements A and B to shift. Inlet 1 is then connected to outlet 2 via crossflow passages C and D. Exhaust 3 is closed. Monitoring pressure signals go to each end of spool S and become equal to inlet pressure.



### L-G Monitor Locked-out:

When the L-G spool shifts it is held by a lockout pin (not shown). Pilot air is then exhausted to atmosphere via port YB, and pilot supply air is diverted to atmosphere via port YA. The lockout mechanism must be reset before the valve can return to normal operation. During and following reset, the pilot solenoids must be kept de-energized to prevent inadvertent and possibly dangerous cycling of the press. The reset function is either manual or remote-pneumatic depending on valve model.



Both solenoids must be energized simultaneously to shift the valve; maintained signal required to keep valve shifted.

**WARNING:** If monitor must be reset, electrical signals to both solenoids must be removed to prevent the machine controlled by the valve from immediately recycling and producing a potentially hazardous condition.

# SERPAR® Double Valves with Internal Monitoring and Pneumatic Reset – L-G Monitor

Clutch/Brake Control  
35 Series

## Basic Size 8, 12, 30

Port Size	Basic Size	With Overrides		Without Overrides		C <sub>v</sub>		Avg. Response Constants			Weight lb (kg)
		Valve Model Number#		Valve Model Number#				M	F		
		NPT Threads	BSPP Threads	NPT Threads	BSPP Threads	1-2	2-3		1-2	2-3	
1/2	8	3573A4142Z	D3573A4142Z	3573A4162Z	D3573A4162Z	3.5	8.5	15	0.70	0.30	15.3 (6.9)
3/4	8	3573A5142Z	D3573A5142Z	3573A5162Z	D3573A5162Z	4.0	12	15	0.65	0.23	15.3 (6.9)
	12	3573A5152Z	D3573A5152Z	3573A5172Z	D3573A5172Z	8.0	15	15	0.65	0.23	19.0 (8.6)
1	8	3573A6152Z	D3573A6152Z	3573A6172Z	D3573A6172Z	4.0	12	20	0.33	0.21	15.3 (6.9)
	12	3573A6162Z	D3573A6162Z	3573A6182Z	D3573A6182Z	8.5	19	20	0.28	0.21	19.0 (8.6)
1¼	12	3573A7162Z	D3573A7162Z	3573A7182Z	D3573A7182Z	9.0	21	20	0.28	0.21	19.0 (8.6)
	30	3573A7152Z	D3573A7152Z	3573A7172Z	D3573A7172Z	20	42	25	0.19	0.07	37.5 (16.9)
1½	30	3573A8162Z	D3573A8162Z	3573A8182Z	D3573A8182Z	21	43	25	0.18	0.07	37.5 (16.9)
2	30	2 inch port size available on size 30 valves. Order model number 1999H77 flange kit separately.									

# Voltage: Z=110-120 VAC, 50/60 Hz; W=24 VDC, e.g., 3573A4142W. For other voltages consult ROSS.

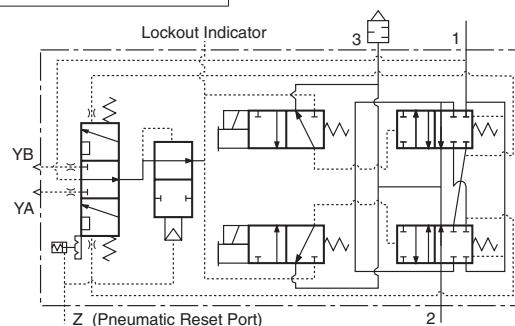
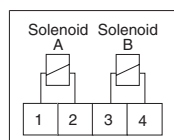
**Valve Response Time** The constants above, designated M and F, can be used to determine the amount of time required to fill or exhaust a volume of any size using the formula on the right:

$$\text{Vlv. Resp. Time (msec)} = M + F \cdot V$$

M = avg. time for parts movement

F = msec. per cubic inch of volume

V = volume in cubic inches



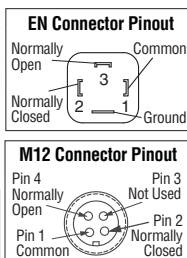
## ACCESSORIES & OPTIONS

### Pressure Switches

(Electrical Lockout Indicator)

Connection Type	Model Number*	Port Threads
EN 175301-803 Form A	586A86	1/8 NPT
M12	1153A30	1/8 NPT

\*Pressure switch closes on falling pressure of 5 psig (0.34 bar).



### Piping Flange Kits

Each kit includes two threaded (NPT) flanges and the required seals and mounting bolts.

Port Size	Basic Size	Pipe Flange Kit Model Number
1/2	8	661K77
3/4	8	662K77
	12	664K77
1	8	663K77
	12	665K77
1¼	12	666K77
	30	667K77
1½	30	668K77

### Valve Without Piping Flanges

Port Size	Basic Size	With Overrides		Without Overrides	
		Valve Model Number#	Valve Model Number#	Valve Model Number#	Valve Model Number#
1/2, 3/4, 1	8	3573A4202Z	D3573A4202Z	3573A4222Z	D3573A4222Z
3/4, 1, 1¼	12	3573A5202Z	D3573A5202Z	3573A5222Z	D3573A5222Z
1¼, 1½	30	3573A7202Z	D3573A7202Z	3573A7222Z	D3573A7222Z

### RESET VALVES for L-G MONITOR

Models for remote reset, however, require a small reset valve and the installation of a 1/8 line from the reset valve to the reset port on the monitor.

Reset Valves		
Description	Model Numbers#	
	NPT Threads	BSPP Threads
Flush Pushbutton: Green	1223B1FPG	D1223B1FPG
Mushroom Button: Green	1223B1MBG	D1223B1MBG
Direct Solenoid Control for Line Mounting	1613B1020Z	1613B1020Z
Direct Solenoid Control for Base Mounting	W1413A1409Z (Sub-Base: 516B91)	—
Sub-Base for Direct Solenoid Control Valves	516B91	D516B91

# Voltage: Z=110-120 VAC, 50/60 Hz; W=24 VDC, e.g., 3573D4241W. For other voltages consult ROSS

**Valve Without Silencer** Exhaust port has threaded flange only, consult ROSS.

### STANDARD SPECIFICATIONS (for valves on this page):

**Construction:** Dual poppet.

**Mounting Type:** In-Line.

**Solenoids:** Two solenoids, rated for continuous duty.

**Standard Voltages:** 24 volts DC; 110-120 volts AC, 50/60 Hz.

**Power Consumption** (each solenoid): 87 VA inrush, 30 VA holding on 50 or 60 Hz; 14 watts on DC.

**Electrical Connections:** Uses terminal strip connectors.

**Ambient Temperature:** 40° to 120°F (4° to 50°C).

**Media Temperature:** 40° to 175°F (4° to 80°C).

**Flow Media:** Filtered air.

**Inlet Pressure:** 30 to 125 psig (2 to 8.5 bar).

**L-G Reset Pressure:** 60 psig (4 bar) minimum.

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



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G2.5

G2

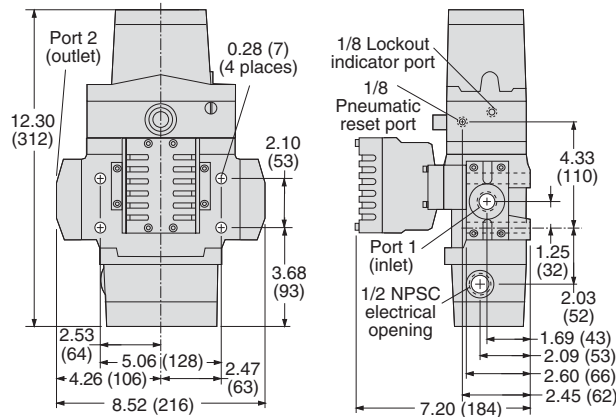
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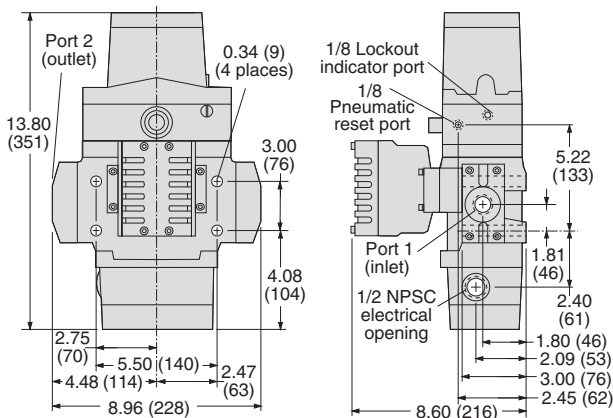
**Basic Size 8, 12, 30**

**Valve Dimensions – inches (mm)**

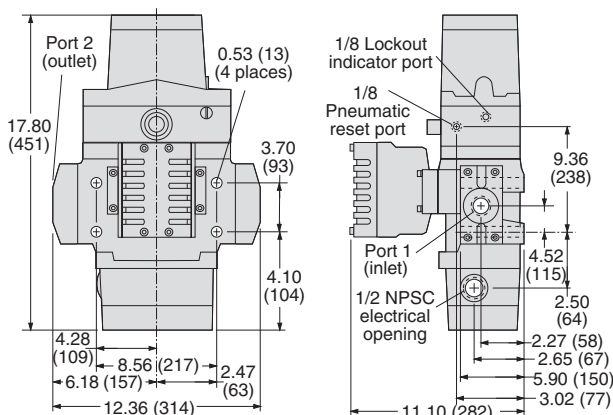
**Basic Size 8**



**Basic Size 12**



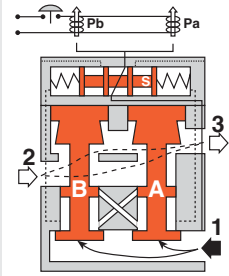
**Basic Size 30**



**VALVE OPERATION**

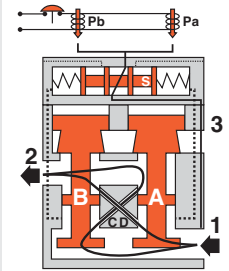
**Conditions at Start:**

Inlet 1 is closed to outlet 2 by both valve elements A and B. Outlet 2 is open to exhaust 3. Pilot air is ported from inlet 1 and through the center section of spool S to the normally closed pilots Pa and Pb. Monitoring pressure signals at both ends of spool S are exhausted.



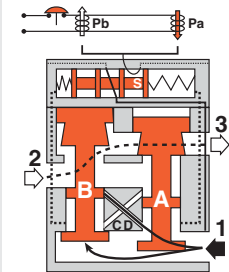
**Normal Operation:**

Simultaneously energizing both solenoids actuates both pilots and causes valve elements A and B to shift. Inlet 1 is then connected to outlet 2 via crossflow passages C and D. Exhaust 3 is closed. Monitoring pressure signals go to each end of spool S and become equal to inlet pressure.



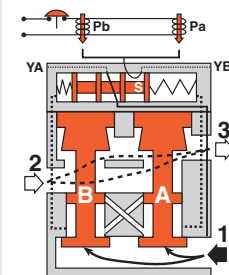
**Detecting a Malfunction:**

A malfunction in the system or the valve itself could cause one valve element to be open and the other closed. Air then flows past the inlet poppet on valve element A, into crossflow passage D, but is substantially blocked by the spool portion of element B. The large size of the open exhaust passage past element B keeps the pressure at the outlet port below two percent of inlet pressure. Full monitoring air pressure from side A goes to the right end of spool S, and a reduced pressure goes to the left end. This pressure imbalance causes the spool to shift to the left. This shuts off and exhausts pilot air to both solenoid pilots, and allows valve element A to return to the closed position.



**L-G Monitor Locked-out:**

When the L-G spool shifts it is held by a lockout pin (not shown). Pilot air is then exhausted to atmosphere via port YB, and pilot supply air is diverted to atmosphere via port YA. The lockout mechanism must be reset before the valve can return to normal operation. *During and following reset, the pilot solenoids must be kept de-energized to prevent inadvertent and possibly dangerous cycling of the press.* The reset function is either manual or remote-pneumatic depending on valve model.



Both solenoids must be energized simultaneously to shift the valve; maintained signal required to keep valve shifted.

**WARNING:** If monitor must be reset, electrical signals to both solenoids must be removed to prevent the machine controlled by the valve from immediately recycling and producing a potentially hazardous condition.



# SERPAR® Double Valves

## with Internal Monitoring and Solenoid Reset – E-P Monitor

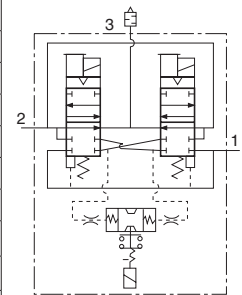
# Clutch/Brake Control

## 35 Series

Port Size	Basic Size	With Overrides		Without Overrides		C <sub>v</sub>		Avg. Response Constants			Weight lb (kg)
		Valve Model Number#		Valve Model Number#		1-2	2-3	M	F		
		NPT Threads	BSPP Threads	NPT Threads	BSPP Threads				1-2	2-3	
Single Signal Input											
1/2	8	3573A4141Z	D3573A4141Z	3573A4161Z	D3573A4161Z	3.5	8.5	15	0.70	0.30	11.8 (5.3)
3/4	8	3573A5141Z	D3573A5141Z	3573A5161Z	D3573A5161Z	4	12	15	0.65	0.23	11.8 (5.3)
	12	3573A5151Z	D3573A5151Z	3573A5171Z	D3573A5171Z	8	15	15	0.65	0.23	15.5 (7.0)
1	8	3573A6151Z	D3573A6151Z	3573A6171Z	D3573A6171Z	4	12	20	0.33	0.21	11.8 (5.3)
	12	3573A6161Z	D3573A6161Z	3573A6181Z	D3573A6181Z	8.5	19	20	0.28	0.21	15.5 (7.0)
1¼	12	3573A7161Z	D3573A7161Z	3573A7181Z	D3573A7181Z	9	21	20	0.28	0.21	15.5 (7.0)
	30	3573A7151Z	D3573A7151Z	3573A7171Z	D3573A7171Z	20	42	25	0.19	0.07	35.0 (15.8)
1½	30	3573A8161Z	D3573A8161Z	3573A8181Z	D3573A8181Z	21	43	25	0.18	0.07	35.0 (15.8)
2	30	2 inch port size available on size 30 valves. Order model number 1999H77 flange kit separately.									
Dual Signal Input											
1/2	8	3573A4341Z	D3573A4341Z	3573A4361Z	D3573A4361Z	3.5	8.5	15	0.70	0.30	11.8 (5.3)
3/4	8	3573A5341Z	D3573A5341Z	3573A5361Z	D3573A5361Z	4	12	15	0.65	0.23	11.8 (5.3)
	12	3573A5351Z	D3573A5351Z	3573A5371Z	D3573A5371Z	8	15	15	0.65	0.23	15.5 (7.0)
1	8	3573A6351Z	D3573A6351Z	3573A6371Z	D3573A6371Z	4	12	20	0.33	0.21	11.8 (5.3)
	12	3573A6361Z	D3573A6361Z	3573A6381Z	D3573A6381Z	8.5	19	20	0.28	0.21	15.5 (7.0)
1¼	12	3573A7361Z	D3573A7361Z	3573A7381Z	D3573A7381Z	9	21	20	0.28	0.21	15.5 (7.0)
	30	3573A7351Z	D3573A7351Z	3573A7371Z	D3573A7371Z	20	42	25	0.19	0.07	35.0 (15.8)
1½	30	3573A8361Z	D3573A8361Z	3573A8381Z	D3573A8381Z	21	43	25	0.18	0.07	35.0 (15.8)
2	30	2 inch port size available on size 30 valves. Order model number 1999H77 flange kit separately.									
# Voltage: Z=110-120 VAC, 50/60 Hz; W=24 VDC, e.g., 3573A4141W. For other voltages consult ROSS.											



G2



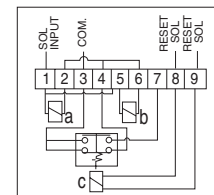
### OPTIONS

#### Piping Flange Kits

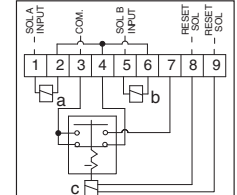
Each kit includes two threaded (NPT) flanges and the required seals and mounting bolts.

Port Size	Basic Size	Kit Number
1/2	8	661K77
3/4	8	662K77
	12	664K77
1	8	663K77
	12	665K77
1¼	12	666K77
	30	667K77
1½	30	668K77

**During lock-out:** Terminals 3 and 7 are connected which allows a panel light, bell, or other electrical device to be wired through terminals 7 and 3 to serve as a lockout indicator.



Single Input Wiring Diagram



Dual Input Wiring Diagram

#### Valve Response Time

The constants above, designated M and F, can be used to determine the amount of time required to fill or exhaust a volume of any size using the formula on the right:

**Vlv. Resp. Time (msec) = M + F \* V**  
**M** = avg. time for parts movement  
**F** = msec. per cubic inch of volume  
**V** = volume in cubic inches

### Valve Without Piping Flanges

Port Size	Basic Size	Single Signal Input				Dual Signal Input			
		With Overrides		Without Overrides		With Overrides		Without Overrides	
		Valve Model Number#		Valve Model Number#		Valve Model Number#		Valve Model Number#	
1/2, 3/4, 1	8	3573A4201Z	D3573A4201Z	3573A4221Z	D3573A4221Z	3573A4301Z	D3573A4301Z	3573A4321Z	D3573A4321Z
3/4, 1, 1¼	12	3573A5201Z	D3573A5201Z	3573A5221Z	D3573A5221Z	3573A5301Z	D3573A5301Z	3573A5321Z	D3573A5321Z
1¼, 1½	30	3573A7201Z	D3573A7201Z	3573A7221Z	D3573A7221Z	3573A7301Z	D3573A7301Z	3573A7321Z	D3573A7321Z
# Voltage: Z=110-120 VAC, 50/60 Hz; W=24 VDC, e.g., 3573A4201W. For other voltages consult ROSS.									

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**Valve Without Silencer** Exhaust port has threaded flange only, consult ROSS.

### STANDARD SPECIFICATIONS (for valves on this page):

**Construction:** Dual poppet.  
**Mounting Type:** In-Line.  
**Solenoids:** Two solenoids, rated for continuous duty.  
**Standard Voltages:** 24 volts DC; 110-120 volts AC, 50/60 Hz.  
**Power Consumption** (each solenoid): 87 VA inrush, 30 VA holding on 50 or 60 Hz; 14 watts on DC.

**E-P Reset Solenoid:** Rated for *intermittent* duty. Voltages: 24-48 or 100-120 volts AC or DC.  
**Ambient Temperature:** 40° to 120°F (4° to 50°C).  
**Media Temperature:** 40° to 175°F (4° to 80°C).  
**Flow Media:** Filtered air.  
**Pressure Range:** 30 to 125 psig (2 to 8.5 bar).

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



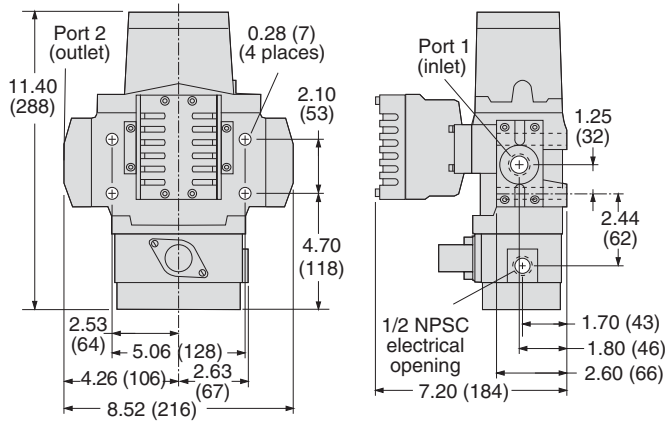
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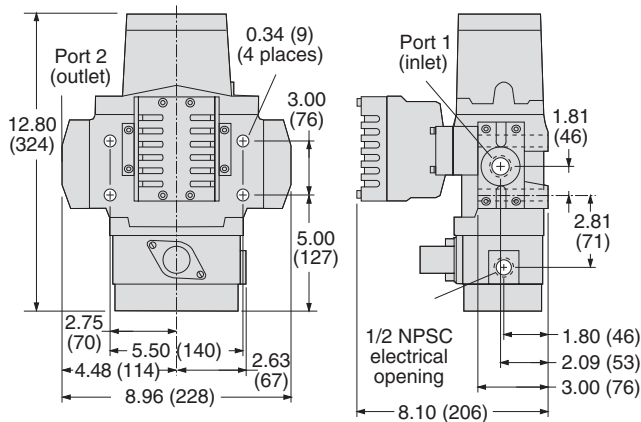
G2.7

### Valve Dimensions – inches (mm)

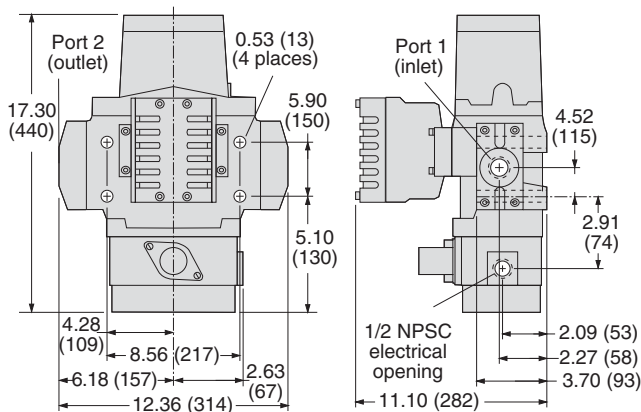
#### Basic Size 8



#### Basic Size 12



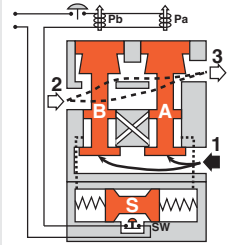
#### Basic Size 30



## VALVE OPERATION

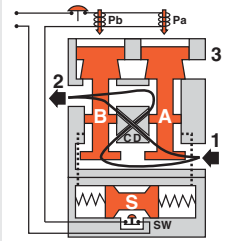
### Conditions at Start:

Inlet 1 is closed to outlet 2 by both valve elements A and B. Outlet 2 is open to exhaust 3. Contacts of switch SW are closed. Monitoring pressure signals at both ends of spool S are exhausted.



### Normal Operation:

Simultaneously energizing both solenoids actuates both pilots and causes valve elements A and B to shift. Inlet 1 is then connected to outlet 2 via crossflow passages C and D. Exhaust 3 is closed. Monitoring pressure signals go to each end of spool S and become equal to inlet pressure.

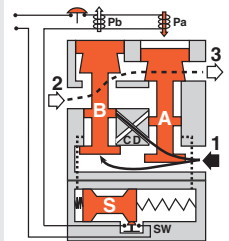


### Completion of Normal Cycle:

Simultaneously de-energizing both solenoids returns the valve to the "Conditions at Start" described above.

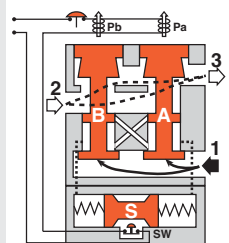
### Detecting a Malfunction:

A malfunction in the system or the valve itself could cause one valve element to be open and the other closed. Air then flows past the inlet poppet on valve element A, into crossflow passage D, but is substantially blocked by the spool portion of element B. The large size of the open exhaust passage past element B keeps the pressure at the outlet port below two percent of inlet pressure. Full monitoring air pressure from side A goes to the right end of spool S, and a reduced pressure goes to the left end. This pressure imbalance causes the spool to shift to the left. This trips switch SW, breaks the electrical circuit to the pilot solenoids, and allows valve element A to return to the closed position.



### E-P Monitor Locked-out:

With both valve elements closed, monitoring air pressure is exhausted from both ends of spool S so that it returns to its normal position. The electrical circuit to the pilot solenoids remains broken by switch SW. To restore the electrical circuit and return the valve to normal operation, the reset solenoid (not shown) must be briefly energized to reset switch SW. *During and following reset, the pilot solenoids must be kept de-energized to prevent inadvertent and possibly dangerous cycling of the press. Prolonged energizing of the reset solenoid can cause burnout and nullify the reset function.*



# SERPAR® Double Valves with Internal Monitoring and Dry Contact Reset – D-S Monitor

## Clutch/Brake Control 35 Series

Port Size	Basic Size	With Overrides		Without Overrides		C <sub>v</sub>		Avg. Response Constants		Weight lb (kg)	
		Valve Model Number#		Valve Model Number#				M	F		
		NPT Threads	BSPP Threads	NPT Threads	BSPP Threads	1-2	2-3		1-2		2-3
1/2	8	3573B4143Z	D3573B4143Z	3573B4163Z	D3573B4163Z	3.5	8.5	15	0.70	0.30	16.8 (7.6)
3/4	8	3573B5143Z	D3573B5143Z	3573B5163Z	D3573B5163Z	4	12	15	0.65	0.23	16.8 (7.6)
	12	3573B5153Z	D3573B5153Z	3573B5173Z	D3573B5173Z	8	15	15	0.65	0.23	20.5 (9.2)
1	8	3573B6153Z	D3573B6153Z	3573B6173Z	D3573B6173Z	4	12	20	0.33	0.21	16.8 (7.6)
	12	3573B6163Z	D3573B6163Z	3573B6183Z	D3573B6183Z	8.5	19	20	0.28	0.21	20.5 (9.2)
1¼	12	3573B7163Z	D3573B7163Z	3573B7183Z	D3573B7183Z	9	21	20	0.28	0.21	20.5 (9.2)
	30	3573B7153Z	D3573B7153Z	3573B7173Z	D3573B7173Z	20	42	25	0.19	0.07	39.3 (17.7)
1½	30	3573B8163Z	D3573B8163Z	3573B8183Z	D3573B8183Z	21	43	25	0.18	0.07	39.3 (17.7)
2	30	2 inch port size available on size 30 valves. Order model number 1999H77 flange kit separately.									
# Voltage: Z=110-120 VAC, 50/60 Hz; W=24 VDC, e.g., 3573B4143W. For other voltages consult ROSS.											

# Voltage: Z=110-120 VAC, 50/60 Hz; W=24 VDC, e.g., 3573B4143W. For other voltages consult ROSS.



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### Valve Response Time

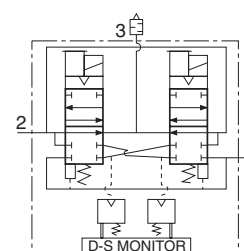
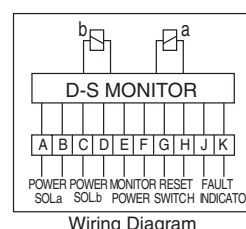
The constants above, designated M and F, can be used to determine the amount of time required to fill or exhaust a volume of any size using the formula below:

$$\text{Vlv. Resp. Time (msec)} = M + F \cdot V$$

M = avg. time for parts movement

F = msec. per cubic inch of volume

V = volume in cubic inches



### OPTIONS

#### Piping Flange Kits

Each kit includes two threaded (NPT) flanges and the required seals and mounting bolts.

Port Size	Basic Size	Kit Number
1/2	8	661K77
3/4	8	662K77
	12	664K77
1	8	663K77
	12	665K77
1¼	12	666K77
	30	667K77
1½	30	668K77

Valve Without Piping Flanges	Port Size	Basic Size	With Overrides		Without Overrides	
			Valve Model Number#		Valve Model Number#	
			NPT Threads	BSPP Threads	NPT Threads	BSPP Threads
	1/2, 3/4, 1	8	3573A4203Z	D3573A4203Z	3573A4223Z	D3573A4223Z
	3/4, 1, 1¼	12	3573A5203Z	D3573A5203Z	3573A5223Z	D3573A5223Z
	1¼, 1½	30	3573A7203Z	D3573A7203Z	3573A7223Z	D3573A7223Z

# Voltage: Z=110-120 VAC, 50/60 Hz; W=24 VDC, e.g., 3573A4203W. For other voltages consult ROSS.

**Valve Without Silencer** Exhaust port has threaded flange only, consult ROSS.

### STANDARD SPECIFICATIONS (for valves on this page):

**Construction:** Dual poppet.

**Mounting Type:** In-Line.

**Solenoids:** Two solenoids, rated for continuous duty.

**Standard Voltages:** 24 volts DC; 110-120 volts AC, 50/60 Hz.

**Power Consumption** (each solenoid): 87 VA inrush, 30 VA holding on 50 or 60 Hz; 14 watts on DC.

**D-S Monitor:** Rated for same voltage as pilot solenoids. Power supply to monitor must be independent and continuous.

**Ambient Temperature:** 40° to 120°F (4° to 50°C).

**Media Temperature:** 40° to 175°F (4° to 80°C).

**Flow Media:** Filtered air.

**Pressure Range:** 30 to 125 psig (2 to 8.5 bar).



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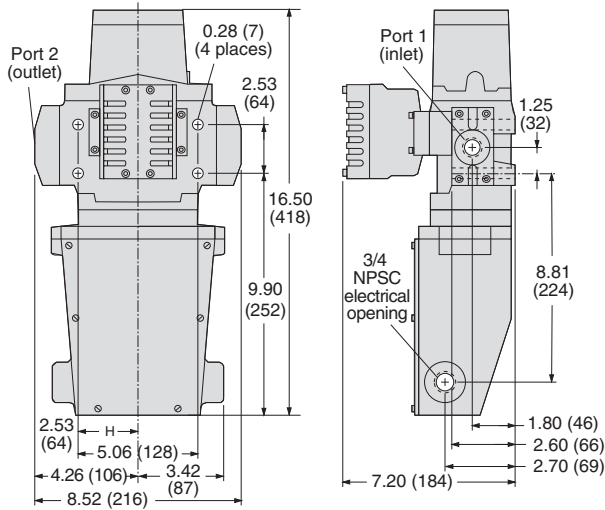
**IMPORTANT NOTE:** Please read carefully and thoroughly all of the **CAUTIONS, WARNINGS** on the inside back cover.

# SERPAR® Double Valves with Internal Monitoring and Dry Contact Reset – D-S Monitor

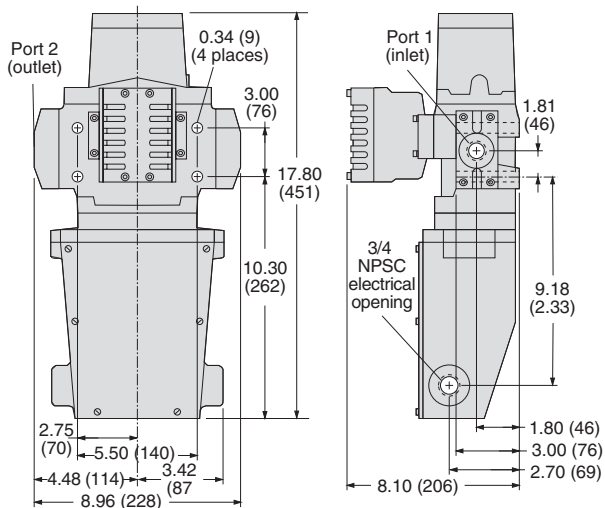
## Valve Technical Data 35 Series

### Valve Dimensions – inches (mm)

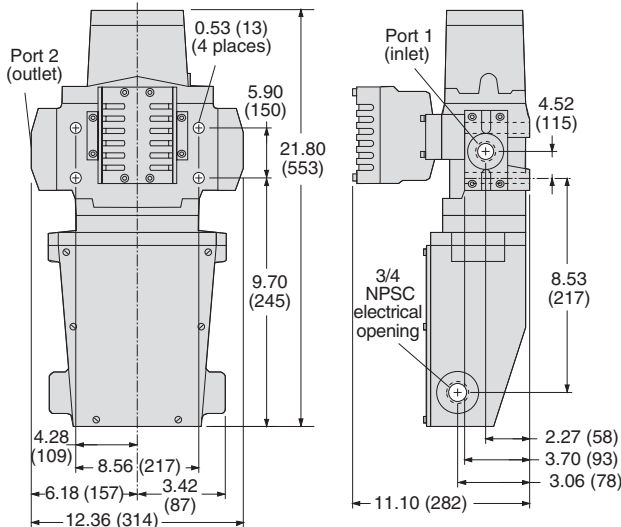
#### Basic Size 8



#### Basic Size 12



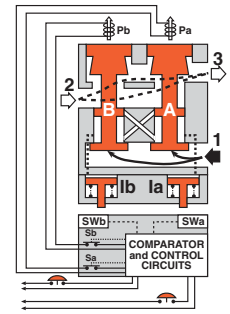
#### Basic Size 30



### VALVE OPERATION

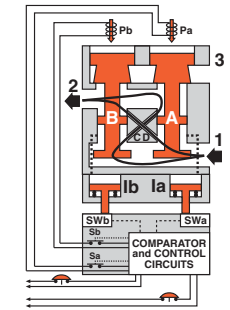
#### Conditions at Start:

Inlet 1 is closed to outlet 2 by both valve elements A and B. Outlet 2 is open to exhaust 3. Contacts of switch SW are closed. Monitoring pressure signals at both ends of spool S are exhausted.



#### Normal Operation:

Simultaneously energizing both solenoids actuates both pilots and causes valve elements A and B to shift. Inlet 1 is then connected to outlet 2 via crossflow passages C and D. Exhaust 3 is closed. Monitoring pressure signals go to pressure indicators Ia and Ib, causing the indicator pins to be extended and to actuate proximity switches SWa and SWb. In normal operation, each pair - solenoids, valve elements, indicators, and proximity switches - responds in unison so that the comparator circuits "read" the operation as normal.

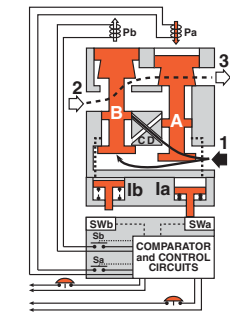


#### Completion of Normal Cycle:

Simultaneously de-energizing both solenoids returns the valve to the "Conditions at Start" described above.

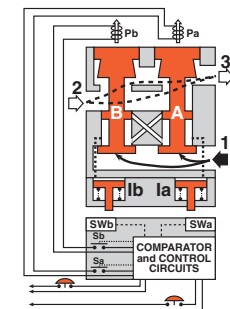
#### Detecting a Malfunction:

A malfunction in the system or the valve itself could cause one valve element to be open and the other closed. Air then flows past the inlet poppet on valve element A, into crossflow passage D, but is substantially blocked by the spool portion of element B. The large size of the open exhaust passage past element B keeps the pressure at the outlet port below two percent of inlet pressure. Full monitoring air pressure from side A goes to pressure indicator Ia so that its pin is extended and actuates proximity switch SWa. When the time interval between the signal to a solenoid and the signal from its corresponding proximity switch exceeds approximately 175 milliseconds, the D-S monitor breaks contacts Sa and Sb as soon as solenoid power is removed. This allows valve element A to return to the closed position.



#### D-S Monitor Locked-out:

With the valve locked out by contacts Sa and Sb, solenoids Pa and Pb cannot be energized. The monitor must be reset before another valve cycle can begin. Reset can be achieved by a separately connected ancillary switch, but not if the pilot solenoids are energized. *The monitor can be reset by removing and reapplying power to the monitor even when the pilot solenoids are energized. For this reason it is necessary to have the pilot solenoids de-energized during and following reset to prevent inadvertent and possibly dangerous cycling of the press.*



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# ROSS CONTROLS®



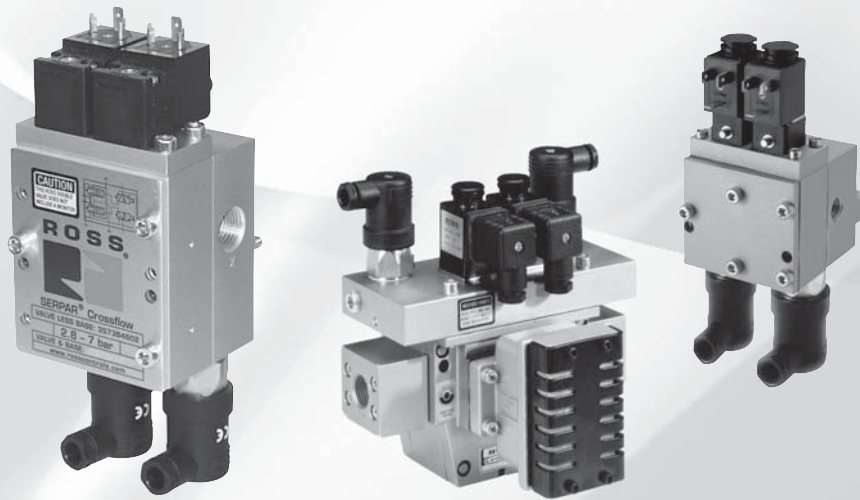
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## PRESS SAFETY DOUBLE VALVES

DOUBLE VALVES FOR CLUTCH/BRAKE CONTROL

CROSSFLOW™ 35 SERIES

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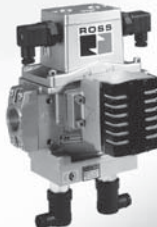


### CROSSFLOW™ DOUBLE VALVES 35 SERIES FOR EXTERNAL MONITORING WITH OR WITHOUT PRESSURE SWITCHES – KEY FEATURES

- Designed to enable users to comply with current safety regulations
- Can be integrated with external monitoring systems to provide for lockout and inhibiting further machine operation until the controls system is reset
- Default to de-energized position upon fault condition
- Built-in non-clogging silencers on Basic Sizes 4, 8, 12 and 30

Basic Size 1 and 2 Crossflow™ valves with pressure switches (designed for external monitoring) are available from 1/4" to 3/4" port sizes. Externally monitored double valves provide feedback signals (via the pressure switches), which allows the main press controls, or separate monitoring device,

The original application for these double valves was in the control of clutch/brake mechanisms on stamping presses, but they have found their way into many other critical applications such as alternative lockout systems for energy isolation, air cylinder press load-holding systems, as well as other Category-3 and -4 safety circuits. ROSS double valves are a vital part of any control-reliable fluid power control system.

DESCRIPTION		Page
<b>Crossflow™ Double Valves for External Monitoring with or without Pressure Switches Basic Size 1</b>		G3.3 - G3.4
<b>Crossflow™ Double Valves with or without Pressure Switches Basic Size 2</b>		G3.5 - G3.6
<b>Crossflow™ Double Valves with Pressure Switches Basic Size 4</b>		G3.7
<b>Crossflow™ Double Valves with Pressure Switches Basic Size 8, 12, 30</b>		G3.8 - G3.9

# Crossflow™ Double Valves for External Monitoring – with or without Pressure Switches

## Clutch/Brake Control 35 Series

### Basic Size 1

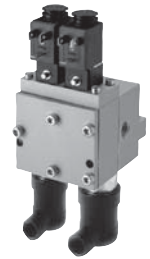
Port Sizes	Basic Size	Pressure Switches	Pressure Switch Provision	Valve & Base Model Number#		C <sub>v</sub>		Avg. Response Constants			Weight lb (kg)
				NPT Threads	BSPP Threads	1-2	2-3	M	1-2	2-3	
1/4 1/4	1	None	Yes	3573B2632Z	D3573B2632Z	0.9	1.4	28	4.6	3.4	2.1 (95)
		Two**	Yes	3573B2642Z	D3573B2642Z	0.9	1.4	28	4.6	3.4	2.5 (1.14)
1/4 3/8	1	None	No	3573B2640Z	D3573B2640Z	0.9	1.4	24	4.4	3.1	2.1 (95)
		None	Yes	3573B2645Z	D3573B2645Z	1.2	1.7	25	3.1	2.8	2.5 (1.14)
3/8 3/8	1	Two**	Yes	3573B2644Z	D3573B2644Z	1.2	1.7	25	3.1	2.8	2.9 (1.32)

# **Voltage:** Z=110-120 VAC, 50/60 Hz; W=24 VDC, e.g., 3573B2632W. For other voltages consult ROSS.

Valve and base can be ordered separately, see next page.

\*\* Only valves with pressure switches should be used to control clutch/brake mechanisms on press machinery. The pressure switches must be used in conjunction with a monitoring device to assist with OSHA compliance (Ref. 1910.217).

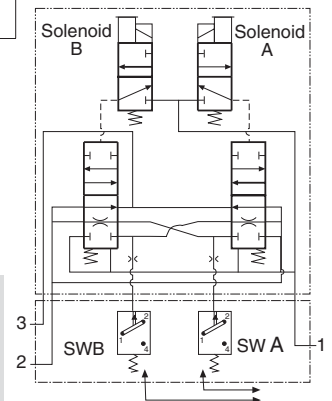
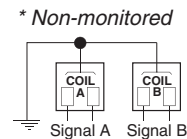
\*\*Valve include pressure switches with DIN type connection, for pressure switches with M12 type connection consult ROSS.



### Valve Response Time

The constants above, designated M and F, can be used to determine the amount of time required to fill or exhaust a volume of any size using the formula on the right:

**Vlv. Resp. Time (msec) = M + F \* V**  
**M** = avg. time for parts movement  
**F** = msec. per cubic inch of volume  
**V** = volume in cubic inches



To customer's external monitor

G3

### \*\* Pressure Switches & Monitoring:

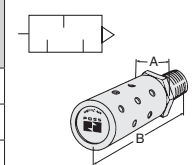
Valves without pressure switches must not be used to control clutch/brake mechanisms on press machinery. Valves with pressure switches must be used in conjunction with an external monitoring device to assist with OSHA compliance (Ref. 1910.217). The valves on this page do not have a built-in monitor, and must only be used in conjunction with an external monitoring system. Such monitoring system must be capable of inhibiting the operation of the valve in the event of a failure within the valve.

## ACCESSORIES & OPTIONS

Electrical Connectors	Electrical Connector Form	Electrical Connector Type	Cord Length meters (feet)	Cord Diameter	Electrical Connector Model Number		
					Without Light	Lighted Connector	
						24 Volts DC	120 Volts AC
	EN 175301-803 Form B	Prewired Connector (18 gauge)	2 (6½)	10-mm	266K77	267K77-W	267K77-Z
		Connector Only	—	—	372K77	382K77-W	382K77-Z
		CAUTIONS: Do not use electrical connectors with surge suppressors, as this may increase valve response time when de-actuating the solenoids.					

Silencers	Port Size	Thread Type	Model Number		Avg. C <sub>v</sub>	Dimensions inches (mm)		Weight lb (kg)
			NPT Threads	BSPT Threads		A	B	
	1/4	Male	5500A2003	D5500A2003	2.1	0.9 (21)	2.2 (55)	0.1 (0.1)
	3/8	Male	5500A3013	D5500A3013	2.7	0.9 (21)	2.2 (55)	0.1 (0.1)

**Pressure Range:** 0 to 290 psig (0 to 20 bar) maximum. **Flow Media:** Filtered air.



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### STANDARD SPECIFICATIONS (for valves on this page):

**Construction:** Dual poppet.

**Mounting Type:** In-Line.

**Solenoids:** Two solenoids, rated for continuous duty.

**Standard Voltages:** 24 volts DC; 110-120 volts AC, 50/60 Hz.

**Power Consumption** (each solenoid): 12 VA maximum inrush, 9.8 VA maximum holding on 50 or 60 Hz; 7.5 watts nominal on DC.

**Enclosure Rating:** IP65, IEC 60529.

**Electrical Connections:** EN 175301-803 Form B, uses two cord-grip connectors at solenoids.

**Ambient Temperature:** 40° to 120°F (4° to 50°C).

**Media Temperature:** 40° to 175°F (4° to 80°C).

**Flow Media:** Filtered air.

**Inlet Pressure:** 40 to 100 psig (2.8 to 7 bar).

**Functional Safety Data:** Category 4 PL e; B10D: 20,000,000; PFHD: 7.71x10<sup>-9</sup>; MTTFD: 301.9 (n<sub>op</sub>: 662400).

**Certifications:** CE Marked for applicable directives, DGVV Test, CSA/UL.

**Vibration/Impact Resistance:** Tested to BS EN 60068-2-27.

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



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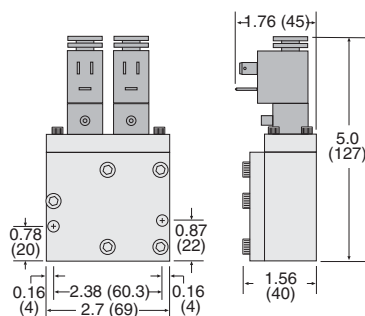
G3.3

# Crossflow™ Double Valves for External Monitoring – with or without Pressure Switches

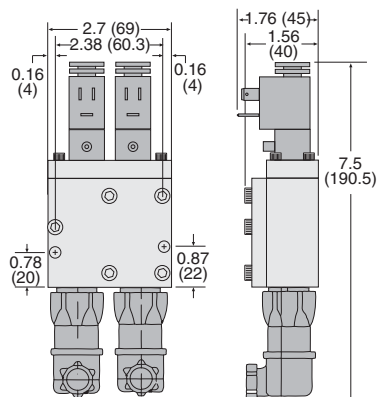
## Valve Technical Data 35 Series

### Basic Size 1

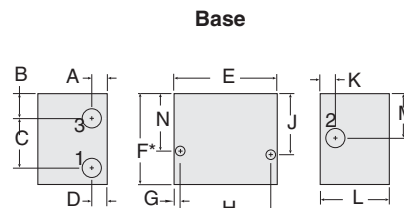
#### Valve without Pressure Switches



#### Valve with Pressure Switches



#### Valve Dimensions – inches (mm)



Valve & Base Model Number	Base Model Number	BASE Dimensions – inches (mm)												
		A	B	C	D	E	F	G	H	J	K	L	M	N
3573B2632	1120C91	0.4 (11)	0.7 (17)	1.29 (32.8)	0.4 (11)	2.7 (69)	2.4 (61)	0.2 (5)	2.38 (60.5)	1.6 (41)	0.4 (11)	1.8 (46)	1.2 (30)	1.5 (38)
3573B2640	1042C91	0.5 (13)	0.6 (15)	1.36 (34.5)	0.4 (11)	2.7 (69)	2.4 (61)	0.2 (5)	2.38 (60.5)	1.6 (41)	0.4 (11)	1.8 (46)	1.2 (30)	1.5 (38)
3573B2642	888C91	0.4 (11)	0.7 (17)	1.29 (32.8)	0.4 (11)	2.7 (69)	2.4 (61)	0.2 (5)	2.38 (60.5)	1.6 (41)	0.4 (11)	1.8 (46)	1.2 (30)	1.5 (38)
3573B2644	1171C91	0.5 (13)	0.6 (15)	1.47 (37.2)	0.5 (13)	2.7 (69)	2.5 (63)	0.2 (5)	2.38 (60.5)	1.6 (41)	0.8 (19)	1.8 (46)	1.1 (27)	1.5 (38)
3573B2645	1172C91	0.5 (13)	0.6 (15)	1.47 (37.2)	0.5 (13)	2.7 (69)	2.5 (63)	0.2 (5)	2.38 (60.5)	1.6 (41)	0.8 (19)	1.8 (46)	1.1 (27)	1.5 (38)

For replacement valve only (less base), order model number 3573B2602.

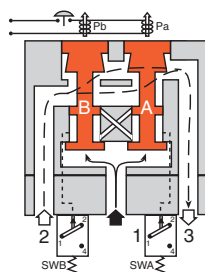
**Valve Operation:** Both solenoids must be energized simultaneously to shift the valve; maintained signal required to keep valve shifted.

**CAUTION:** If the monitor must be reset, electrical signals to both solenoids must be removed to prevent the machine controlled by the valve from immediately recycling and producing a potentially hazardous condition.

## VALVE OPERATION

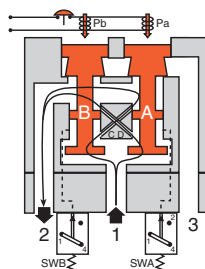
### Conditions at Start:

Inlet 1 is closed to outlet 2 by both valve elements A and B. Outlet 2 is open to exhaust 3. Pressure signals at both switches SWA and SWB are exhausted. Contacts 1 and 2 of switches SWA and SWB are connected.



### Normal Operation:

Simultaneously energizing both solenoids actuates both pilots and causes valve elements A and B to shift. Inlet 1 is then connected to outlet 2 via crossflow passages C and D. Exhaust 3 is closed. Sensing pressure signals go to each pressure switch and become equal to inlet pressure. Both switches trip and now contacts 1 and 4 of switches SWA and SWB are connected instead of contacts 1 and 2.

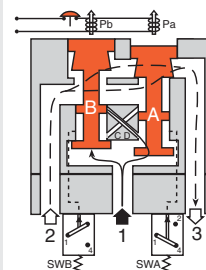


### Completion of Normal Cycle:

Simultaneously de-energizing both solenoids returns the valve to the "Conditions at Start" described at left.

### Detecting a Malfunction:

A malfunction in the system or the valve itself could cause one valve element to be open and the other closed. Air then flows past the inlet poppet on valve element A, into crossflow passage D, but is substantially blocked by the spool portion of element B. The large size of the open exhaust passage past element B keeps the pressure at the outlet port below 2 % of inlet pressure. Full sensing air pressure from side A goes to switch SWA, and a reduced pressure goes to switch SWB. This full pressure signal causes switch SWA to trip. Switch SWB, with a reduced pressure signal, does not trip. An external monitoring system can detect the malfunction by monitoring the condition of the switches SWA and SWB. The external monitoring system may then react accordingly by shutting down the power to the valve solenoids and any other components deemed necessary to stop the machine.



# Crossflow™ Double Valves for External Monitoring – with or without Pressure Switches

## Clutch/Brake Control 35 Series

### Basic Size 2

Port Sizes			Basic Size	Inlet Orientation	Pressure Switches	Pressure Switch Provision	Valve & Base Model Number#		C <sub>v</sub>		Avg. Response Constants			Weight lb (kg)
							NPT Threads	BSPP Threads	1-2	2-3	M	1-2	2-3	
1/2	1/2	2	Left Hand	None	No	No	3573C4620Z	D3573C4620Z	3.7	6.6	30	1.2	1.0	4.3 (1.95)
					Yes	No	3573C4632Z	D3573C4632Z	3.7	6.6	30	1.2	1.0	4.3 (1.95)
					Two**	Yes	3573C4642Z	D3573C4642Z	3.7	6.6	30	1.2	1.0	4.8 (2.18)
1/2	3/4	2	Left Hand	None	No	No	3573C4640Z	D3573C4640Z	3.7	9	25	1.1	0.9	4.3 (1.95)
					Yes	No	3573C4652Z	D3573C4652Z	3.7	9	25	1.1	0.9	4.3 (1.95)
					Two**	Yes	3573C4652Z	D3573C4652Z	3.7	9	25	1.1	0.9	4.3 (1.95)
1/2	1	2	Right Hand	Two**	Yes	No	3573C4706Z	D3573C4706Z	3.7	9	30	1.2	1.0	4.3 (1.95)
				None	No	No	3573B4891Z	D3573B4891Z	4.2	9	30	1.2	1.0	4.3 (1.95)
			Left Hand	None	No	No	3573A4735Z	D3573A4735Z	3.7	9	30	1.2	1.0	4.3 (1.95)
				Two**	Yes	No	3573A4736Z	D3573A4736Z	3.7	9	30	1.2	1.0	4.3 (1.95)
3/4	3/4	2	Left Hand	None	No	No	3573C4643Z	D3573C4643Z	4.2	9	25	1.1	0.9	4.7 (2.13)
					Yes	No	3573C4645Z	D3573C4645Z	4.2	9	25	1.1	0.9	4.7 (2.13)
				Two**	Yes	No	3573C4644Z	D3573C4644Z	4.2	9	25	1.1	0.9	5.2 (2.36)
3/4	1	2	Right Hand	None	No	No	3573B4883Z	D3573B4883Z	4.2	9	25	1.1	0.9	5.2 (2.36)
				Two**	Yes	No	3573C4715Z	D3573C4715Z	4.2	9	25	1.1	0.9	5.2 (2.36)
			Left Hand	None	No	No	3573A4737Z	D3573A4737Z	4.2	9	25	1.1	0.9	5.2 (2.36)
				Two**	Yes	No	3573A4738Z	D3573A4738Z	3.7	9	25	1.1	0.9	5.2 (2.36)

# Voltage: Z=110-120 VAC, 50/60 Hz; W=24 VDC, e.g., 3573C4620W. For other voltages consult ROSS.

Valve and base can be ordered separately, see next page.

\*\* Only valves with pressure switches should be used to control clutch/brake mechanisms on press machinery. The pressure switches must be used in conjunction with a monitoring device to assist with OSHA compliance (Ref. 1910.217).

\*\* Valve include pressure switches with DIN type connection, for pressure switches with M12 type connection consult ROSS.



G3

### Valve Response Time

The constants above, designated M and F, can be used to determine the amount of time required to fill or exhaust a volume of any size using the formula on the right:

$$\text{Vlv. Resp. Time (msec)} = M + F \cdot V$$

M = avg. time for parts movement

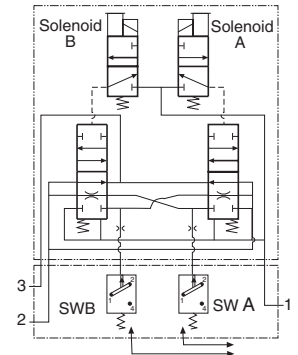
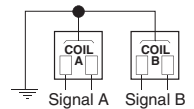
F = msec. per cubic inch of volume

V = volume in cubic inches

### \*\* Pressure Switches & Monitoring:

Valves without pressure switches must not be used to control clutch/brake mechanisms on press machinery. Valves with pressure switches must be used in conjunction with an external monitoring device to assist with OSHA compliance (Ref. 1910.217). The valves on this page do not have a built-in monitor, and must only be used in conjunction with an external monitoring system. Such monitoring system must be capable of inhibiting the operation of the valve in the event of a failure within the valve.

\* Non-monitored



To customer's external monitor

**Valve Operation:** Both solenoids must be energized simultaneously to shift the valve; maintained signal required to keep valve shifted.

**CAUTION:** If the monitor must be reset, electrical signals to both solenoids must be removed to prevent the machine controlled by the valve from immediately recycling and producing a potentially hazardous condition.

### STANDARD SPECIFICATIONS (for valves on this page):

**Construction:** Dual poppet.

**Mounting Type:** In-Line.

**Solenoids:** Two solenoids, rated for continuous duty.

**Standard Voltages:** 24 volts DC; 110-120 volts AC, 50/60 Hz.

**Power Consumption** (each solenoid): 8.5 VA maximum inrush, 8.5 VA maximum holding on 50 or 60 Hz; 6 watts nominal on DC.

**Enclosure Rating:** IP65, IEC 60529.

**Electrical Connections:** EN 175301-803 Form A, uses two cord-grip connectors at solenoids.

**Ambient Temperature:** 40° to 120°F (4° to 50°C).

**Media Temperature:** 40° to 175°F (4° to 80°C).

**Flow Media:** Filtered air.

**Inlet Pressure:** 40 to 100 psig (2.8 to 7 bar).

**Functional Safety Data:** Category 4 PL e; B10D: 20,000,000;

PFHD: 7.71x10<sup>-9</sup>; MTTFD: 301.9 (n<sub>op</sub>: 662400).

**Certifications:** CE Marked for applicable directives, DGV Test, CSA/UL.

**Vibration/Impact Resistance:** Tested to BS EN 60068-2-27.

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



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G3.5

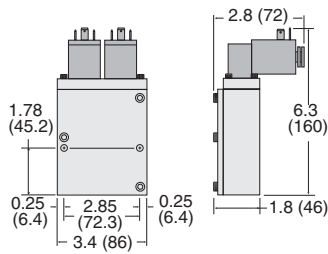


# SERPAR® Crossflow Double Valves for External Monitoring – with or without Pressure Switches

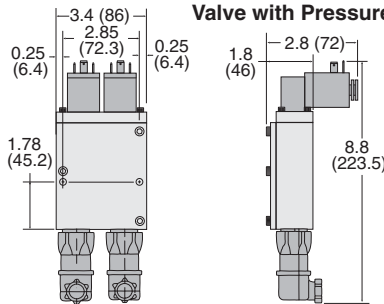
## Valve Technical Data 35 Series

### Basic Size 2

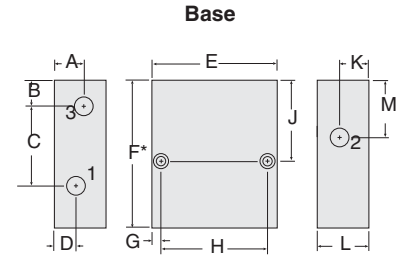
#### Valve without Pressure Switches



#### Valve with Pressure Switches




#### Valve Dimensions – inches (mm)



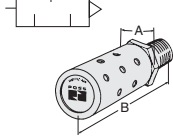
Valve & Base Model Number	Base Model Number	BASE Dimensions – inches (mm)											
		A	B	C	D	E	F	G	H	J	K	L	M
3573B4620	1136C91	0.8 (19)	0.7 (17)	2.15 (54.6)	0.6 (15)	3.4 (86)	4.0 (101)	0.3 (7)	2.85 (72.4)	2.2 (56)	0.8 (19)	1.4 (36)	1.6 (39)
3573B4632	1122C91	0.8 (19)	0.7 (17)	2.15 (54.6)	0.6 (15)	3.4 (86)	4.0 (101)	0.3 (7)	2.85 (72.4)	2.2 (56)	0.8 (19)	1.4 (36)	1.6 (39)
3573B4640	1028C91	1.1 (27)	1.0 (24)	2.32 (58.9)	0.6 (15)	3.4 (86)	4.3 (110)	0.3 (7)	2.85 (72.4)	2.6 (64)	0.8 (19)	1.7 (44)	1.9 (48)
3573B4642	893C91	0.8 (19)	0.7 (17)	2.15 (54.6)	0.6 (15)	3.4 (86)	4.0 (101)	0.3 (7)	2.85 (72.4)	2.2 (56)	0.8 (19)	1.4 (36)	1.6 (39)
3573B4643	1123C91	1.1 (27)	0.8 (19)	2.64 (67.1)	1.3 (33)	3.7 (94)	4.3 (110)	0.3 (7)	2.85 (72.4)	2.6 (64)	0.7 (17)	2.0 (50)	1.8 (46)
3573B4644	1163C91	1.1 (27)	0.8 (19)	2.86 (72.7)	0.7 (17)	3.7 (94)	4.3 (110)	0.3 (7)	2.85 (72.4)	2.6 (64)	0.7 (17)	2.0 (50)	1.8 (46)
3573B4645	1164C91	1.1 (27)	0.8 (19)	2.86 (72.7)	0.7 (17)	3.7 (94)	4.3 (110)	0.3 (7)	2.85 (72.4)	2.6 (64)	0.7 (17)	2.0 (50)	1.8 (46)
3573B4652	1129C91	1.1 (27)	1.0 (24)	2.32 (58.9)	0.6 (15)	3.4 (86)	4.3 (110)	0.3 (7)	2.85 (72.4)	2.6 (64)	0.8 (19)	1.7 (44)	1.9 (48)

For replacement valve only (less base), order model number 3573B4602.

### ACCESSORIES

Electrical Connectors	Electrical Connector Form	Electrical Connector Type	Cord Length meters (feet)	Cord Diameter	Electrical Connector Model Number		
					Without Light	Lighted Connector	
	EN 175301-803 Form A	Prewired Connector (18 gauge)	2 (6½)	6-mm	721K77	720K77-W	720K77-Z
		Prewired Connector (18 gauge)	2 (6½)	10-mm	371K77	383K77-W	383K77-Z
		Connector for threaded conduit (1/2 inch electrical conduit fittings)	–	–	723K77	724K77-W	724K77-Z
		Connector Only	–	–	937K87	936K87-W	936K87-Z

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

Silencers	Port Size	Thread Type	Model Number		Avg. C <sub>v</sub>	Dimensions inches (mm)		Weight lb (kg)
			NPT Threads	BSPT Threads		Length	Width	
	1/2	Male	5500A4003	D5500A4003	4.7	1.3 (32)	3.6 (91)	0.2 (0.1)
	3/4	Male	5500A5013	D5500A5013	5.1	1.3 (32)	3.6 (92)	0.2 (0.1)
			5500A5003	D5500A5003	11.5	2.0 (51)	5.3 (135)	0.6 (0.3)
	1	Male	5500A6003	D5500A6003	14.6	2.0 (51)	5.4 (138)	0.6 (0.3)

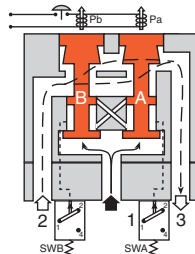
**Pressure Range:** 0 to 290 psig (0 to 20 bar) maximum. **Flow Media:** Filtered air.

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## VALVE OPERATION

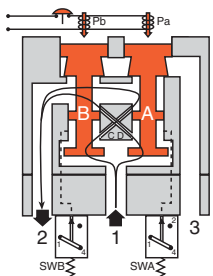
### Conditions at Start:

Inlet 1 is closed to outlet 2 by both valve elements A and B. Outlet 2 is open to exhaust 3. Pressure signals at both switches SWA and SWB are exhausted. Contacts 1 and 2 of switches SWA and SWB are connected.



### Normal Operation:

Simultaneously energizing both solenoids actuates both pilots and causes valve elements A and B to shift. Inlet 1 is then connected to outlet 2 via crossflow passages C and D. Exhaust 3 is closed. Sensing pressure signals go to each pressure switch and become equal to inlet pressure. Both switches trip and now contacts 1 and 4 of switches SWA and SWB are connected instead of contacts 1 and 2.

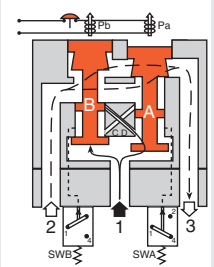


### Completion of Normal Cycle:

Simultaneously de-energizing both solenoids returns the valve to the "Conditions at Start" described at left.

### Detecting a Malfunction:

A malfunction in the system or the valve itself could cause one valve element to be open and the other closed. Air then flows past the inlet poppet on valve element A, into crossflow passage D, but is substantially blocked by the spool portion of element B. The large size of the open exhaust passage past element B keeps the pressure at the outlet port below 2 % of inlet pressure. Full sensing air pressure from side A goes to switch SWA, and a reduced pressure goes to switch SWB. This full pressure signal causes switch SWA to trip. Switch SWB, with a reduced pressure signal, does not trip. An external monitoring system can detect the malfunction by monitoring the condition of the switches SWA and SWB. The external monitoring system may then react accordingly by shutting down the power to the valve solenoids and any other components deemed necessary to stop the machine.





# Crossflow™ Double Valves for External Monitoring – with Pressure Switches

## Clutch/Brake Control 35 Series

### Basic Size 4

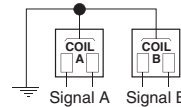
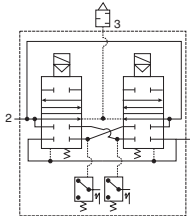
Port Size	Basic Size	Flanged Ports				C <sub>v</sub>		Weight lb (kg)
		With Overrides		Without Overrides				
		Valve Model Number***		Valve Model Number***		1-2	2-3	
		NPT Threads	BSPP Threads	NPT Threads	BSPP Threads			
3/8	4	3573C3270Z	D3573C3270Z	3573C3276Z	D3573C3276Z	3	7	8.4 (3.8)
1/2	4	3573C4270Z	D3573C4270Z	3573C4276Z	D3573C4276Z	3	9	8.4 (3.8)
3/4	4	3573C5230Z	D3573C5230Z	3573C5236Z	D3573C5236Z	3	11	8.4 (3.8)

# Voltage: Z=110-120 VAC, 50/60 Hz; W=24 VDC, e.g., 3573C3270W.

For other voltages consult ROSS.

\*\*Valve include pressure switches with DIN type connection, for pressure switches with M12 type connection consult ROSS.

Valve and base can be ordered separately, consult ROSS.



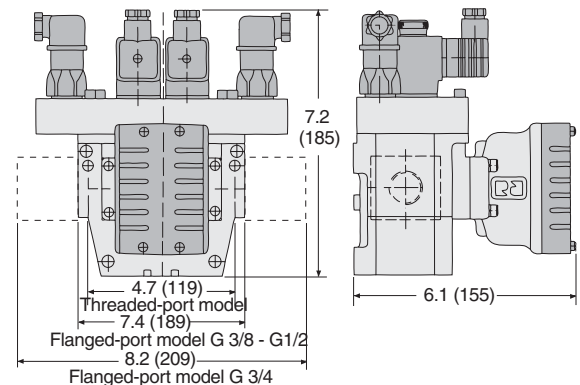
### Pressure Switches & Monitoring:

Valves with pressure switches must be used in conjunction with an external monitoring device to assist with OSHA compliance (Ref. 1910.217).

The valves on this page do not have a built-in monitor, and so must only be used in conjunction with an external monitoring system. Such monitoring system must be capable of inhibiting the operation of the valve and associated machinery in the event of a failure within the valve.

**CAUTION:** If the system must be reset, electrical signals to both solenoids must be removed to prevent the machine from immediately recycling and producing a potentially hazardous condition.

### Valve Dimensions – inches (mm)



### ACCESSORIES

Electrical Connectors	Electrical Connector Form	Electrical Connector Type	Cord Length meters (feet)	Cord Diameter	Electrical Connector Model Number		
					Without Light	Lighted Connector	
						24 Volts DC	120 Volts AC
	EN 175301-803 Form A	Prewired Connector (18 gauge)	2 (6½)	6-mm	721K77	720K77-W	720K77-Z
		Prewired Connector (18 gauge)	2 (6½)	10-mm	371K77	383K77-W	383K77-Z
		Connector for threaded conduit (1/2 inch electrical conduit fittings)	—	—	723K77	724K77-W	724K77-Z
		Connector Only	—	—	937K87	936K87-W	936K87-Z

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

## VALVE OPERATION Refer to page G3.9.

### STANDARD SPECIFICATIONS (for valves on this page):

**Construction:** Dual poppet.

**Mounting Type:** In-Line.

**Solenoids:** Two solenoids, rated for continuous duty.

**Standard Voltages:** 24 volts DC; 110-120 volts AC, 50/60 Hz.

*Voltages at pressure switches must not exceed 250 volts.*

**Power Consumption** (each solenoid): 35 VA maximum in-rush, 22 VA holding on 50 or 60 Hz; 14 watts nominal on DC.

**Enclosure Rating:** IP65, IEC 60529.

**Electrical Connections:** EN 175301-803 Form A, uses two cord-grip connectors at solenoids.

**Ambient Temperature:** 40° to 120°F (4° to 50°C).

**Media Temperature:** 40° to 175°F (4° to 80°C).

**Flow Media:** Filtered air.

**Inlet Pressure:** 40 to 150 psig (2.5 to 10 bar).

**Functional Safety Data:** Category 4 PL e; B10D: 20,000,000;

PFHD: 7.71x10<sup>-9</sup>; MTTFD: 301.9 (n<sub>op</sub>: 662400).

**Certifications:** CE Marked for applicable directives, DGVV Test, CSA/UL.

**Vibration/Impact Resistance:** Tested to BS EN 60068-2-27.

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



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G3.7

# Crossflow™ Double Valves for External Monitoring – with Pressure Switches

## Clutch/Brake Control 35 Series

### Basic Size 8, 12, & 30

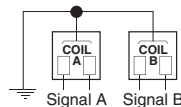
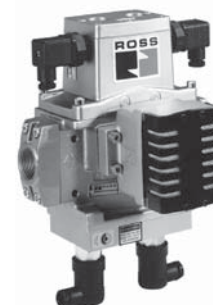
Port Size	Basic Size	Flanged Ports		C <sub>v</sub>		Weight lb (kg)
		Valve Model Number***		1-2	2-3	
		NPT Threads	BSPP Threads			
1/2	8	3573B4638Z	D3573B4638Z	3.5	10	11.4 (5.2)
3/4	8	3573B5638Z	D3573B5638Z	4	14	11.4 (5.2)
	12	3573B5632Z	D3573B5632Z	8	15	15.4 (7.0)
1	8	3573B6638Z	D3573B6638Z	4	14	11.4 (5.2)
	12	3573B6632Z	D3573B6632Z	8.5	19	15.4 (7.0)
1¼	12	3573B7632Z	D3573B7632Z	9	21	15.4 (7.0)
	30	3573B7630Z	D3573B7630Z	20	42	33.9 (15.4)
1½	30	3573B8630Z	D3573B8630Z	21	43	33.9 (15.4)

# **Voltage:** Z=110-120 VAC, 50/60 Hz; W=24 VDC, e.g., 3573B4638W.

For other voltages consult ROSS.

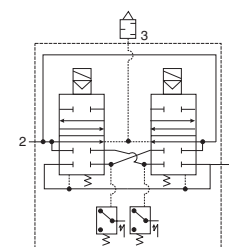
\*\*Valve include pressure switches with DIN type connection, for pressure switches with M12 type connection consult ROSS.

Valve and base can be ordered separately, consult ROSS.



**Pressure Switches & Monitoring:** Valves with pressure switches must be used in conjunction with an external monitoring device to assist with OSHA compliance (Ref. 1910.217).

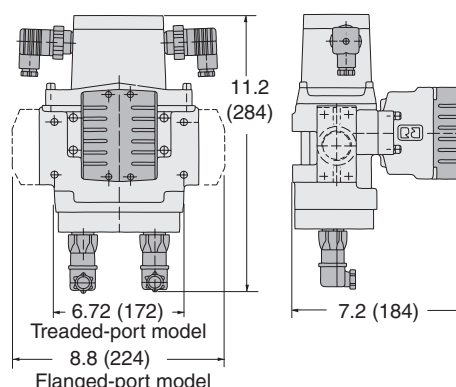
The valves on this page do not have a built-in monitor, and so must only be used in conjunction with an external monitoring system. Such monitoring system must be capable of inhibiting the operation of the valve and associated machinery in the event of a failure within the valve.



**CAUTION:** If the system must be reset, electrical signals to both solenoids must be removed to prevent the machine from immediately recycling and producing a potentially hazardous condition.

### Valve Dimensions – inches (mm)

Basic Size 8



### STANDARD SPECIFICATIONS (for valves on this page):

**Construction:** Dual poppet.

**Mounting Type:** In-Line.

**Solenoids:** Two solenoids, rated for continuous duty.

**Standard Voltages:** 24 volts DC; 110-120 volts AC, 50/60 Hz.

*Voltages at pressure switches must not exceed 250 volts.*

**Power Consumption** (each solenoid): 87 VA maximum in-rush, 30 VA holding on 50 or 60 Hz; 14 watts nominal on DC.

**Electrical Connections:** EN 175301-803 Form A, uses two cord-grip connectors at solenoids.

**Enclosure Rating:** IP 65 according to IEC-Publication 144 and DIN 40050, Sheet 1.

**Ambient Temperature:** 40° to 120°F (4° to 50°C).

**Media Temperature:** 40° to 175°F (4° to 80°C).

**Flow Media:** Filtered air.

**Inlet Pressure:** 30 to 125 psig (2 to 8.5 bar).

**Functional Safety Data:** Category 4 PL e; B10D: 20,000,000; PFHD: 7.71x10<sup>-9</sup>; MTTFD: 301.9 (n<sub>op</sub>: 662400).

**Certifications:** CE Marked for applicable directives, DGV Test, CSA/UL.

**Vibration/Impact Resistance:** Tested to BS EN 60068-2-27.

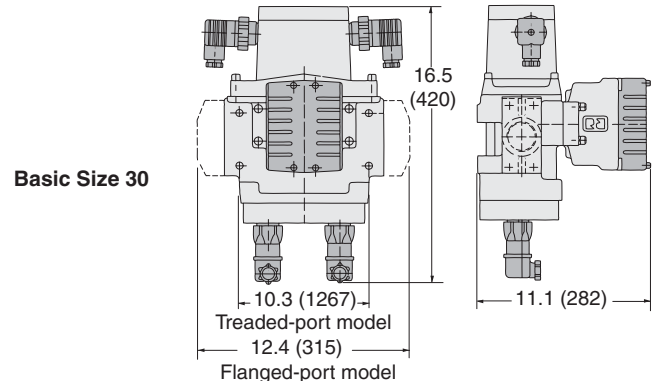
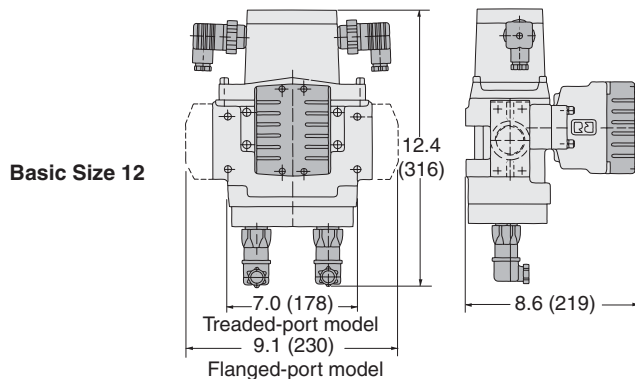
**IMPORTANT NOTE:** Please read carefully and thoroughly all of the **CAUTIONS, WARNINGS** on the inside back cover.

# Crossflow™ Double Valves for External Monitoring – with Pressure Switches

## Valve Technical Data 35 Series

### Basic Size 8, 12, & 30

#### Valve Dimensions – inches (mm)



### ACCESSORIES

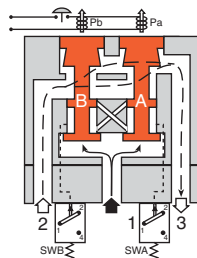
Electrical Connectors	Electrical Connector Form	Electrical Connector Type	Cord Length meters (feet)	Cord Diameter	Electrical Connector Model Number		
					Without Light	Lighted Connector	
						24 Volts DC	120 Volts AC
	EN 175301-803 Form A	Prewired Connector (18 gauge)	2 (6½)	6-mm	721K77	720K77-W	720K77-Z
		Prewired Connector (18 gauge)	2 (6½)	10-mm	371K77	383K77-W	383K77-Z
		Connector for threaded conduit (1/2 inch electrical conduit fittings)	—	—	723K77	724K77-W	724K77-Z
		Connector Only	—	—	937K87	936K87-W	936K87-Z

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

## VALVE OPERATION

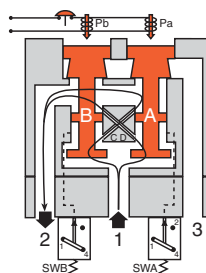
### Conditions at Start:

Inlet 1 is closed to outlet 2 by both valve elements A and B. Outlet 2 is open to exhaust 3. Pressure signals at both switches SWA and SWB are exhausted. Contacts 1 and 2 of switches SWA and SWB are connected.



### Normal Operation:

Simultaneously energizing both solenoids actuates both pilots and causes valve elements A and B to shift. Inlet 1 is then connected to outlet 2 via crossflow passages C and D. Exhaust 3 is closed. Sensing pressure signals go to each pressure switch and become equal to inlet pressure. Both switches trip and now contacts 1 and 4 of switches SWA and SWB are connected instead of contacts 1 and 2.

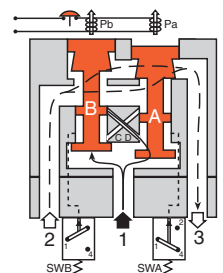


### Completion of Normal Cycle:

Simultaneously de-energizing both solenoids returns the valve to the "Conditions at Start" described at left.

### Detecting a Malfunction:

A malfunction in the system or the valve itself could cause one valve element to be open and the other closed. Air then flows past the inlet poppet on valve element A, into crossflow passage D, but is substantially blocked by the spool portion of element B. The large size of the open exhaust passage past element B keeps the pressure at the outlet port below 2 % of inlet pressure. Full sensing air pressure from side A goes to switch SWA, and a reduced pressure goes to switch SWB. This full pressure signal causes switch SWA to trip. Switch SWB, with a reduced pressure signal, does not trip. An external monitoring system can detect the malfunction by monitoring the condition of the switches SWA and SWB. The external monitoring system may then react accordingly by shutting down the power to the valve solenoids and any other components deemed necessary to stop the machine.





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# General Information

## Standard Specifications

The standard specifications for the products on each page of this catalog are given on the same page or referenced. For solenoid pilot valves, models with internal pilot supply are listed. Most models are also available for use with external pilot supply or have a built-in pilot supply selector valve.

The products in this catalog are intended for use in industrial pneumatic systems. Most products are adaptable to other uses and conditions not covered by the standard specifications given in this catalog. Weights shown are approximate and are subject to change. Dimensions given, unless otherwise noted, are envelope dimensions (not for mounting). Consult ROSS for further information.

## Port Threads

Ports of valves and bases described in this catalog have NPT (ANSI B2.1) threads. Other thread types can be specified by putting an appropriate prefix letter on the model or part number when ordering.

Thread Types by Model Prefix Letter

Pneumatic Port Threads	Prefix Letter	Threaded Electrical Opening
NPT (ANSI B2.1)	None	NPT
ISO 228 - DIN 259 Parallel, BSPP <sup>#</sup>	C*	—
ISO 228 - DIN 259 Parallel, BSPP <sup>#</sup>	D	G
ISO 228 - JIS B0203 Tapered <sup>#</sup>	J	ISO
SAE 1926- ISO 11926	S	NPT

\* Used only for filters, regulators, lubricators.

<sup>#</sup> ISO 228 threads supersedes BSPP, G and JIS thread types.

## Flow Ratings

Flow ratings are expressed as  $C_v$  where  $C_v = 1$  corresponds to a steady state air flow of approximately 32 scfm under the following conditions:

Inlet pressure = 100 psig (6.7 bar)  
Pressure drop = 10 psi (0.69 bar)  
Air temperature = 68°F (20°C)  
Relative humidity = 36%

**Note:** Because widely differing test standards are used to measure  $C_v$  values, the figures given in this catalog should not be used to compare ROSS valves with those of other makers. The  $C_v$  ratings given here are intended only for use with performance charts published by ROSS. The  $C_v$  ratings are averages for the various flow paths through the valve and are for steady flow conditions.

## Approvals and Certifications

ROSS products are designed to meet a number of industrial standards, including the Canadian Standards Association (C.S.A.) guidelines. For more information on specific product approvals, contact your local distributor or ROSS.

## Solenoids

All ROSS standard solenoids are rated for continuous duty (unless noted otherwise) and will operate the valve within the air pressure range specified in this catalog.

**Explosion-Proof Solenoid Pilot available, for more information consult ROSS.**

## Voltage & Hertz

When ordering a solenoid valve, also specify the desired solenoid voltage and hertz.

Voltage Types by Model Suffix Letter

Voltage	Suffix Letter
120 volts AC	Z
220 volts AC	Y
12 volts DC	H
24 volts DC	W
48 volts DC	M
90 volts DC	K
110 volts DC	P
125 volts DC	C

**Recommended Solenoid Voltages:** 100-110 volts AC, 50 Hz; 100-120 volts AC, 60 Hz; 24 volts DC; 110 volts DC.

In addition, the following voltages are available:

200, 220 volts AC, 50 Hz  
200, 240, 480 volts AC, 60 Hz  
24, 48, 220 volts AC, 50 Hz  
240 volts AC, 60 Hz  
200, 220 volts AC, 50 Hz  
200, 240 volts AC, 60 Hz.

For example: Model 2773B5001, 120 volts AC, 60 Hz.  
Model W6076B2401, 220 volts AC, 50 Hz.

**Please note that not all configurations are available for all models.**

*For additional information or help with voltage configuration, please contact your local distributor or ROSS.*

## Port Identification

Valve symbols in this catalog conform to the ISO 1219-1:1991 standard of the International Organization for Standardization (ISO) and the SAE J2051 standard of the Society of Automotive Engineers (SAE) respectively.

## Information or Technical Assistance

For additional information or application assistance concerning ROSS products, consult ROSS or your local ROSS distributor (see contact information on the back cover).

## Order Placement

**For order placement, consult ROSS or your local ROSS distributor.**

For a current list of countries and local distributors, visit ROSS' website at [www.rosscontrols.com](http://www.rosscontrols.com).





# CAUTIONS, WARNINGS and STANDARD WARRANTY

## 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 on the cover of this document.
4. Each ROSS product should be used within its specification limits. In addition, use only ROSS parts to repair ROSS products.

**WARNING:** *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.

**WARNING:** *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® and L-O-X® with EEZ-ON® operation products are defined as energy isolation devices, NOT AS EMERGENCY STOP DEVICES.

## STANDARD WARRANTY

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.

THE WARRANTY EXPRESSED ABOVE IS IN LIEU OF AND EXCLUSIVE OF ALL OTHER WARRANTIES AND ROSS EXPRESSLY DISCLAIMS ALL OTHER WARRANTIES EITHER EXPRESSED OR IMPLIED WITH RESPECT TO MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. ROSS MAKES NO WARRANTY WITH RESPECT TO ITS PRODUCTS MEETING THE PROVISIONS OF ANY GOVERNMENTAL OCCUPATIONAL SAFETY AND/OR HEALTH LAWS OR REGULATIONS. IN NO EVENT IS ROSS LIABLE TO PURCHASER, USER, THEIR EMPLOYEES OR OTHERS FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES WHICH MAY RESULT FROM A BREACH OF THE WARRANTY DESCRIBED ABOVE OR THE USE OR MISUSE OF THE PRODUCTS. NO STATEMENT OF ANY REPRESENTATIVE OR EMPLOYEE OF ROSS MAY EXTEND THE LIABILITY OF ROSS AS SET FORTH HEREIN.

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





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*To meet your requirements across the globe, ROSS distributors are located throughout the world. Through ROSS or its distributors, guidance is available for the selection of ROSS products, both for those using pneumatic components for the first time and those designing complex pneumatic systems.*

*Other literature is available for engineering, maintenance, and service requirements. If you need products or specifications not shown here, please contact ROSS or your ROSS distributor. They will be happy to assist you in selecting the best product for your application.*

***For a current list of countries and local distributors, visit ROSS' website at [www.rosscontrols.com](http://www.rosscontrols.com).***