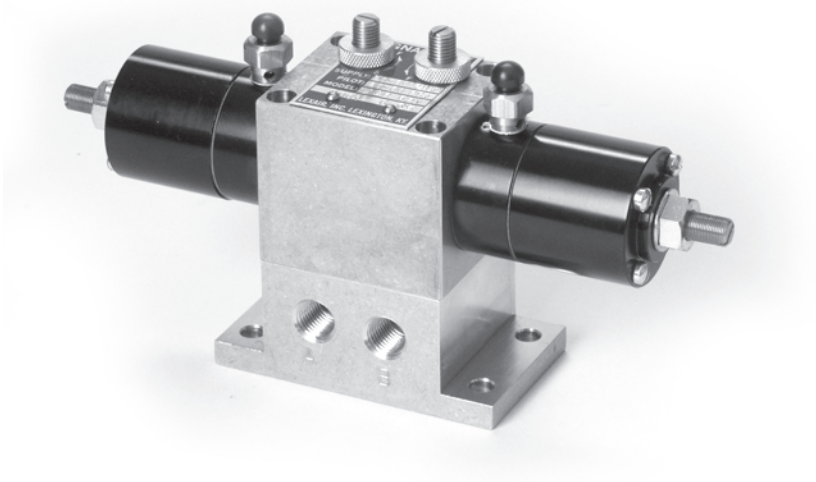
Hi-Cyclic® Magna-Cycle® Valves



Magna-Cycle® valves are pneumatic 4-way, 2-position directional control models that are air pilot actuated. They contain adjustable permanent magnets in both pilot chambers which detent and hold the spool in one of two positions until building pilot pressure exceeds the holding force of the magnet. The adjustment screws allow any pilot pressure between 20 and 80 PSI to actuate the valve to the opposite position. The magnetic detent action in the pilot chambers allows automatic control actions to be consistently and reliably repeated. Due to the fact that they are pneumatically controlled, they are explosion-proof and may be installed in hazardous locations. Operations that may be performed include: continuous reciprocation of a double acting cylinder, sequential operation of two or more cylinders, adjustable or fixed time delays for cylinder movement, force sensing of cylinder loads, pressure sensing, etc. all with no mechanical or electrical connections. Models available include internal pilot connections, external pilot connections and mixed pilots (one internal, one external). For detailed operating information and circuit examples, see pages 17-18.

Magna-Cycle® valves are based on the time proven Hi-Cyclic® valve line. They utilize a brass body with a sleeveless spool-to-body design featuring an individually precision matched fit, which provides for nearly frictionless operation.

Applications include:

- Operations of any sort requiring continuous reciprocation of a cylinder without the use of electrical or mechanical connections, such as to operate a diaphragm pump, shaking of a hopper for compacting or discharging of material, shaking large containers for mixing, etc.
- Sequential operation or sequencing of cylinders
- Cylinder force or pressure sensing operations
- Circuits operating in hostile or hazardous locations where electrical control is impractical or dangerous to use.

Hi-Cyclic® Magna-Cycle® Valves

SPECIFICATIONS

Body	Brass Alloy 360
Spool	303 Stainless (See options page for other spool options).
Seals	Buna-N
Port Size	1/4” or 3/8” NPT Subbase
Temperature Range	-0°F to +160°F (with Buna-N)
Pressure Rating	20 - 80 PSI for MCR and MCE series Vacuum to 250 PSI for MCS series (pilot pressure 20 - 80 PSI)
Flow	1/4” 1.00 Cv, 3/8” 1.13 Cv

Model Numbers

NPT Port Size (inches)	* Model Number	Description
♦ 1/4	MCR-521-1001	Pilot signals received from cylinder ports internally.
3/8	MCR-531-1001	
♦ 1/4	MCE-521-1001	One pilot signal received from cylinder port internally, one received from an external source.
3/8	MCE-531-1001	
♦ 1/4	MCS-521-1001	Both pilot signals received from an external source.
3/8	MCS-531-1001	

* Note: Adjusting screw caps which cover magnet detent adjustment screws to discourage tampering by unauthorized personnel are available, simply add a “-P” suffix to the part number. Ex: MCR-531-1001-P would be 3/8” NPT, MCR series with adjusting screw caps factory installed.

♦ Note: 1/4” models are supplied with exhaust flow controls in the body (see dimensional drawings) - 3/8” models require the use of flow controls in the subplate exhaust ports - use two Lexair 10-0076 flow controls.

* All models must be mounted with the spool in the horizontal position.

For Dimensional Drawings, please refer to the CD attached to the back cover.

Mounting Base Options

There are two base sizes available to match the valve body size chosen by valve model number. There are side ported and bottom ported versions available in both body/port sizes.

Base Model Numbers

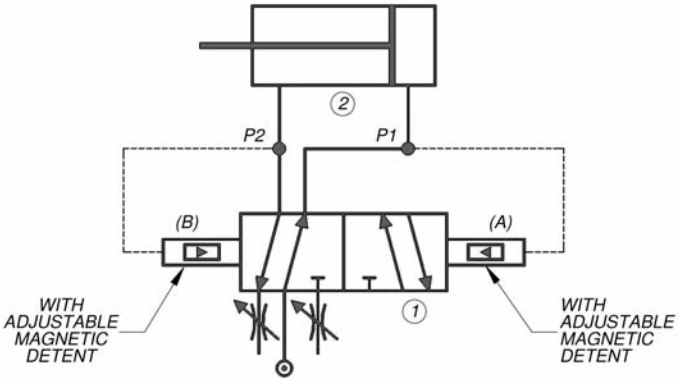
NPT Port Size	Part Number	Description	Used with
1/4”	10-0332	Bottom Ports	MCR-521-1001 MCE-521-1001 MCS-521-1001
1/4”	10-0333	Side Ports	
3/8”	10-0289	Bottom Ports	MCR-531-1001 MCE-531-1001 MCS-531-1001
3/8”	10-1115	Side Ports	

How to Order

1. Choose valve model desired from page 15.
2. Choose base model desired from chart above.
3. Indicate on your order if you would like to have the valve and base assembled. Otherwise, we will ship the two items separately.

For Dimensional Drawings, please refer to the CD attached to the back cover.

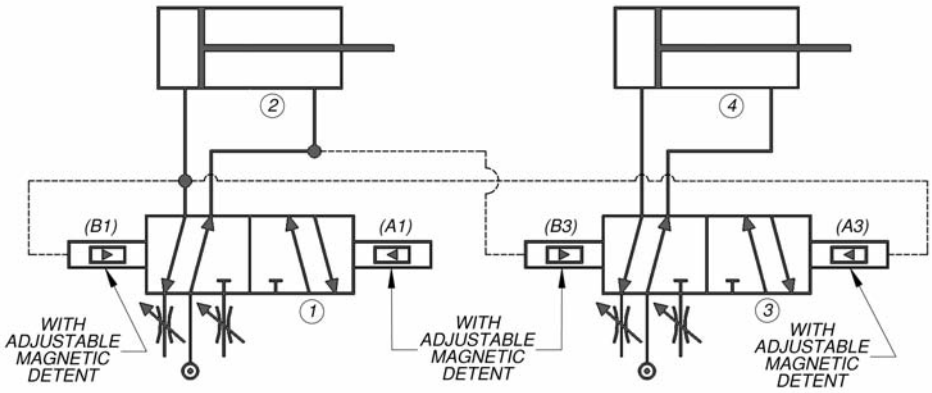
Typical Applications



Continuous Cylinder Reciprocation (one MCR valve)

The cylinder continually reciprocates due to the pilot lines being internally connected to the cylinder lines. The reciprocating motion is started by turning on the air supply to the valve. The motion is then stopped by turning off this air supply.

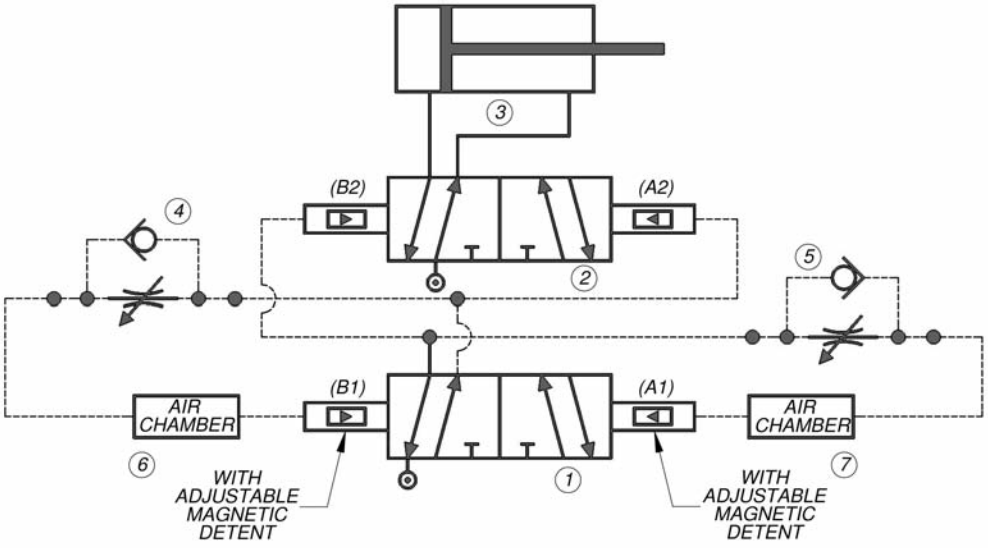
The reciprocating motion is started by supplying air to the valve (1), allowing pressure at P1 to extend the cylinder (2). Exhaust back pressure on P2 plus magnetic detent action prevents the spool from shifting. When the cylinder (2) reaches the end-of-stroke position, pressure at P2 drops to zero and the pressure at P1 builds and overrides the force of the magnetic detent in (A). The spool shifts to the opposite position, reversing flow to the cylinder (2) and causing P2 to start to pressurize as P1 starts to exhaust. The cylinder (2) continues to reciprocate in this manner until supply pressure is removed from the valve (1).



Sequential Operation of Two Cylinders (Two MCS Valves)

To start the sequential operation of the cylinders, a momentary pilot signal is applied to pilot chamber (A1) of Valve (1). This signal shifts Valve (1) and extends Cylinder (2). When (2) is fully extended, pressure builds in the pilot line (B1) of Valve (1) and pilot line (A3) of Valve (3) shifting both of them. This action retracts Cylinder (2) and extends Cylinder (4). When Cylinder (2) is fully retracted, pressure in the pilot line of (B3) going to Valve (3) builds causing Cylinder (4) to retract.

Typical Applications



Time Delayed Cylinder Operation
(One MCS and one double air piloted valve sized for cylinder operation)

As pressure flows through valve (1), it shifts valve (2) and at the same time is metered into air chamber (6) and actuating chamber (B1) through flow control (4). Once chambers (6) and (B1) are fully pressurized and overcome the magnetic detent setting, valve (1) shifts to the opposite position. This action also shifts valve (2), causing the cylinder (3) to retract and air pressure to build in chambers (7) and (A1) through flow control (5). Once chambers (7) and (A1) are fully pressurized and overcome the magnetic detent setting, valve (1) shifts back, as does valve (2), starting the cycle again.

Flow control valves (4) and (5) adjust the time delay. Maximum time delay depends upon the size of air chambers (6) and (7) plus the adjustability/sensitivity of flow controls (4) and (5). For the most accurate time control, it is best to have the Magna-Cycle® valve operate a piloted valve as shown. This keeps system pressure fluctuations caused by variations in the work load on the cylinder from affecting the timing cycle.