

“A” Pilotair[®] Valves

Pneumatic Directional Control

(Pages from electronic SC-700 Catalog)

The Drive & Control Company



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"A" Pilotair® Pneumatic Directional Control Valves Features and Specifications

"A" PILOTAIR, Block-type and Panel Mounted Valves

The REXROTH "A" PILOTAIR Valves are block-type and panel-mounted poppet-type directional valves which open, close or vent an air circuit. The poppet-type directional valve is ideal for frequent usage because of its ease of operation. This valve line makes maximum use of high production parts which are interchangeable throughout this product line as well as providing interchangeability of parts with the poppets in our Contro-lair® and Flexair® Valve product lines. A definite advantage is gained when all of these products are used in the same application.

A very short travel of the valve parts produces full capacity flow. This factor is important in fact action circuits and repetitive manual or mechanical operations. Its design is highly compact for conserving mounting space and appearance. Spring force and air pressure are combined to give a tight seal and its resulting economies. Both block type and panel mounted "A" PILOTAIR Valves have a large flow capacity and have been proven under the most adverse conditions for dependable operation.

STANDARD SPECIFICATIONS

All Valve Models

MATERIALS - Both the block type and panel-mounted "A" PILOTAIR Valves have die-cast anodized aluminum bodies for corrosion resistance. They use a new one piece unitized cartridge valve element that is made of an engineered plastic and stainless steel. The seals are oil resistant, synthetic rubber.

The panel-mounted "A" PILOTAIR contains hardened sintered steel cams and cam followers. The cam shaft is a steel extrusion. The handle shaft is cadmium plated steel.

PRESSURES - Maximum inlet pressure is 250 psi (17.2 bar).

TEMPERATURE - Maximum operating temperature is -40° F to +200°F (-40°C to +93°C)

MEDIA - Air & inert gases (consult factory for other uses).

CAPACITY - As shown by the graph, these valves have been designed to give maximum flow capacity to speed operations and provide full power.

CARTRIDGE VALVE ELEMENT - is constructed of engineered plastic and stainless steel. This design gives superior corrosion resistance and sealing also simplifies repairs. See page 28 for complete details.

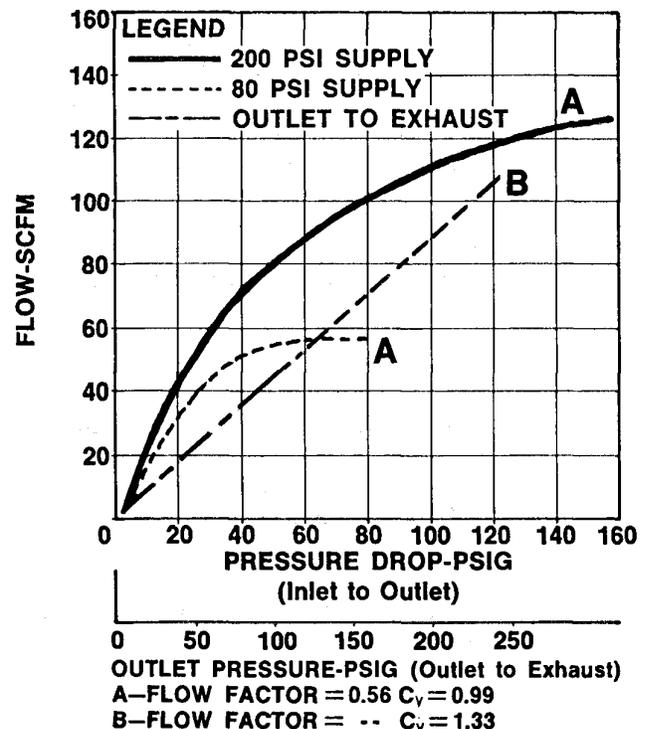
APPROXIMATE WEIGHTS

"A" PILOTAIR Valve, Block Type

2-MA-1A	1/2 lb. (0.23 Kg)
2-LA-1A	3/4 lb. (0.34 Kg)
2-CA-1A	3/4 lb. (0.34 Kg)
2-CA-1B	1 lb. (0.45 Kg)

"A" PILOTAIR Valve, Panel Mounted

2-BA-1	1 lb. (0.45 Kg)
2-HA-1	1-1/2 lb. (0.68 Kg)
2-HA-2	2 lb. (0.91 Kg)
2-HA-3	4 lb. (1.81 Kg)
2-HA-4	4 lb. (1.81 Kg)



To determine flow from inlet to outlet for any pressure drop with 80 psi (5.5 bar) supply pressure, project up from the PRESSURE DROP Scale (permissible difference between inlet and outlet pressures) to the dotted curve.

At this intersection, project to the left for the resulting flow on the vertical scale. For 200 psi (13.8 bar) use the solid curve. To determine flow from outlet to exhaust, project from OUTLET PRESSURE Scale to the dash line curve and then to the left.

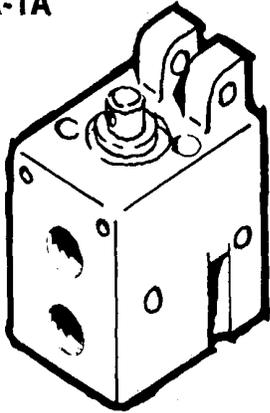
**“A” Pilotair® Pneumatic Directional Control Valves
Block-Type Valves-Three Way**

The Block-Type “A” PILOTAIR Valve is a poppet-type, on-off, 3 way directional valve enclosed in a solid die-cast aluminum block for ruggedness and ease of installation. The basic valve and all operators can be easily and quickly assembled without special tools. This valve line features a choice of six operators, assembled to the basic valve 2-MA-1A, to provide cam, lever and pilot cylinder operation. The design permits conversion from one type of operation to another and simplifies stocking. The body design lends itself to individual or multiple-mounting operations. The Block-Type “A” PILOTAIR Valve can be installed in any convenient position without interfering with the valve operation. The straight, flat sides are iden-

tical to provide either right or left hand horizontal mounting. Mounting holes are also provided for mounting the valve vertically from the top or bottom. All valves, except the Normally Open 2-CA-1B, have dual 1/4” NPT IN and OUT ports for ease of piping. Pipe plugs are furnished with each valve for plugging the unused ports.

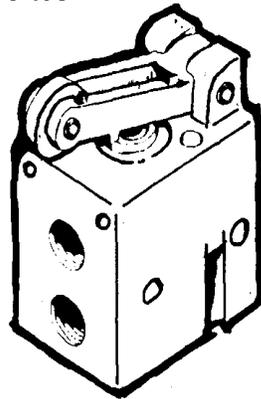
Unitized cartridge valve elements are used for long life, easy service, corrosion resistance and excellent sealing characteristics.

2-MA-1A



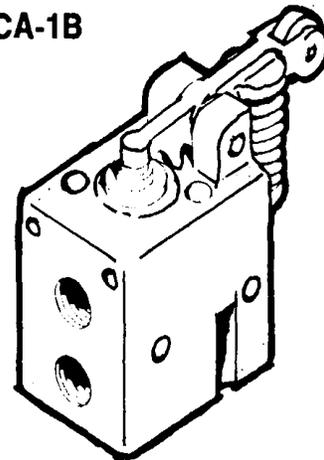
without lugs, N.C., page 4
with lugs, N.C., page 5

2-CA-1A



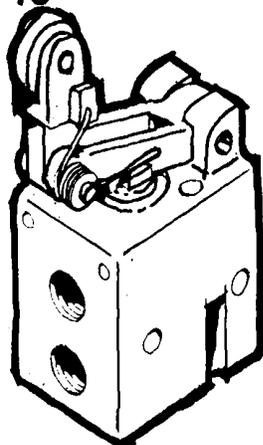
cam dog, N.C. operator, page 6
cam roller operator kit, page 9

2-CA-1B



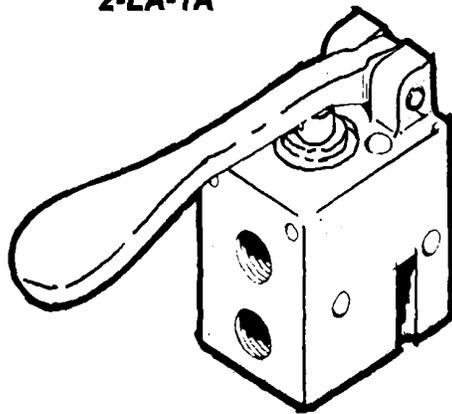
cam roller, N.O. operator, page 7

2-CA-1C



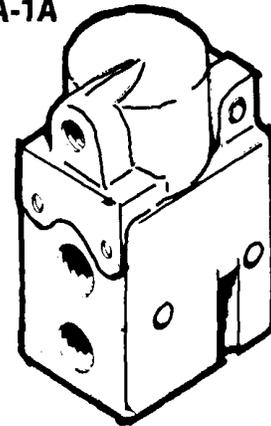
single direction cam roller, N.C. operator, page 8
two direction cam roller, N.C. operator (2-CA-1A), page 9

2-LA-1A



palm lever, N.C. operator, page 10

2-PA-1A



air pilot, N.C. operator, page 11

"A" Pilotair® Pneumatic Directional Control Valves Block-Type Valves Three Way - Normally Closed

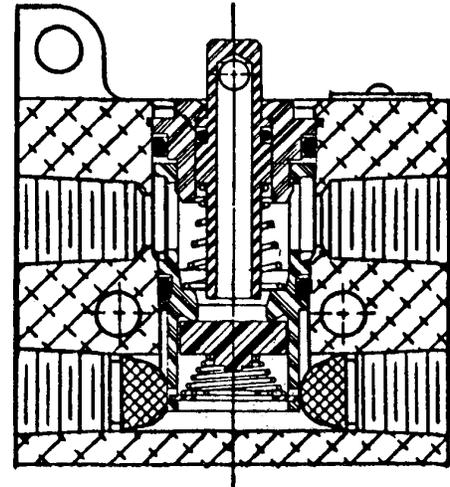
OPERATION

In release position, as shown, the valve disc seats on the inlet valve seat and seals the passage from the inlet to the outlet port. The outlet port is vented to atmosphere through the center of the plunger. As the plunger is forced downward by an external force it seats on the valve disc. This seals the passage between the outlet port and atmosphere.

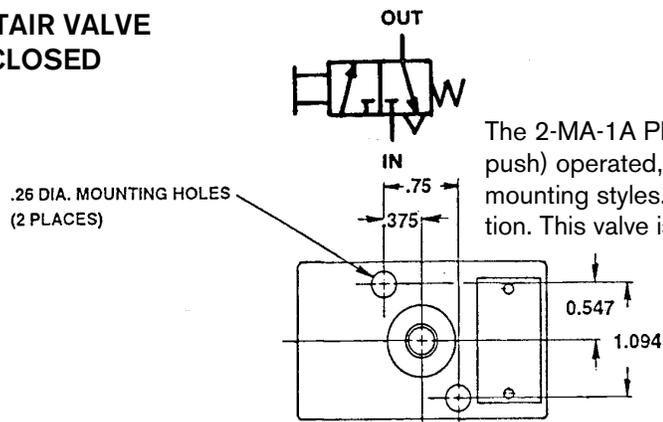
Future downward travel of the plunger unseats the valve disc from the inlet valve seat and allows inlet air pressure to flow to the outlet port.

Release of the external force, releases the plunger and valve and plunger return to the original position.

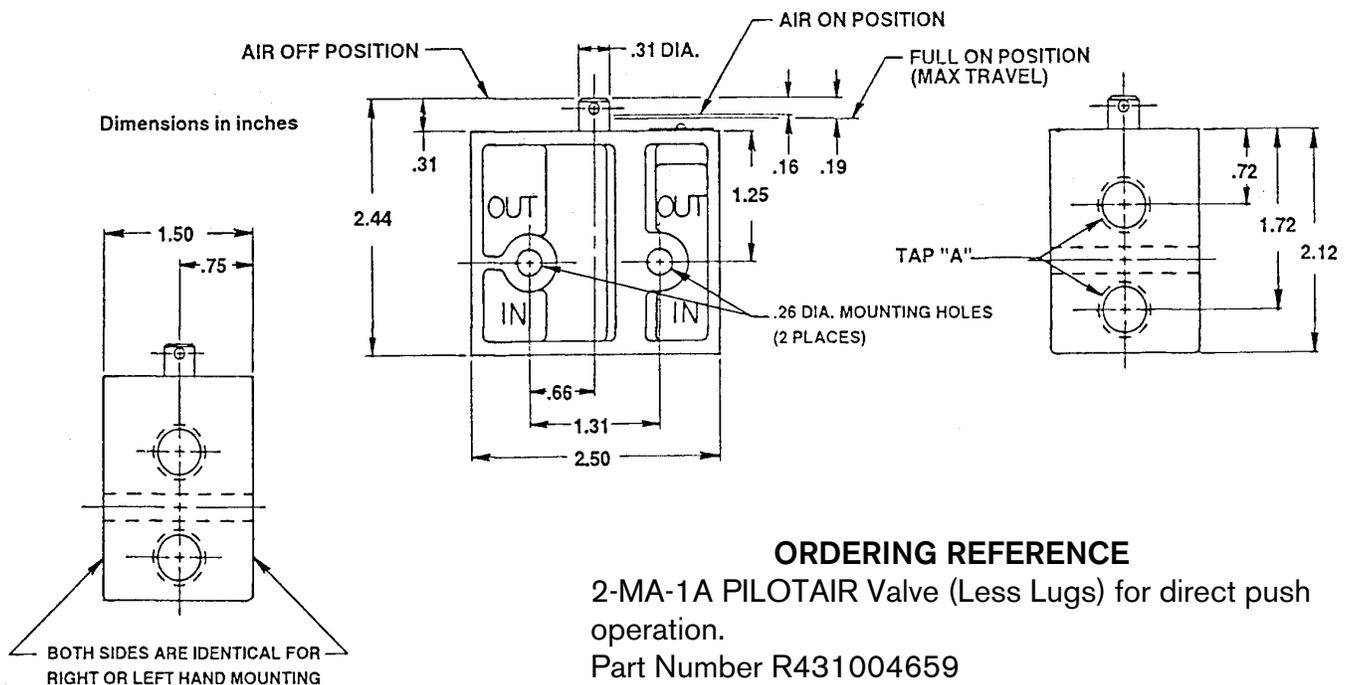
Install the valve to ensure operation within the travel limits shown on the outline drawings. Travel beyond these limits can cause damage to the valve.



2-MA-1 PILOTAIR VALVE NORMALLY CLOSED



The 2-MA-1A PILOTAIR valve is a mechanically (straight push) operated, 3-way directional valve with a variety of mounting styles. The outlet port is exhausted in release position. This valve is the basic valve shown below, without lugs.



ORDERING REFERENCE

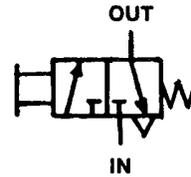
2-MA-1A PILOTAIR Valve (Less Lugs) for direct push operation.

Part Number R431004659

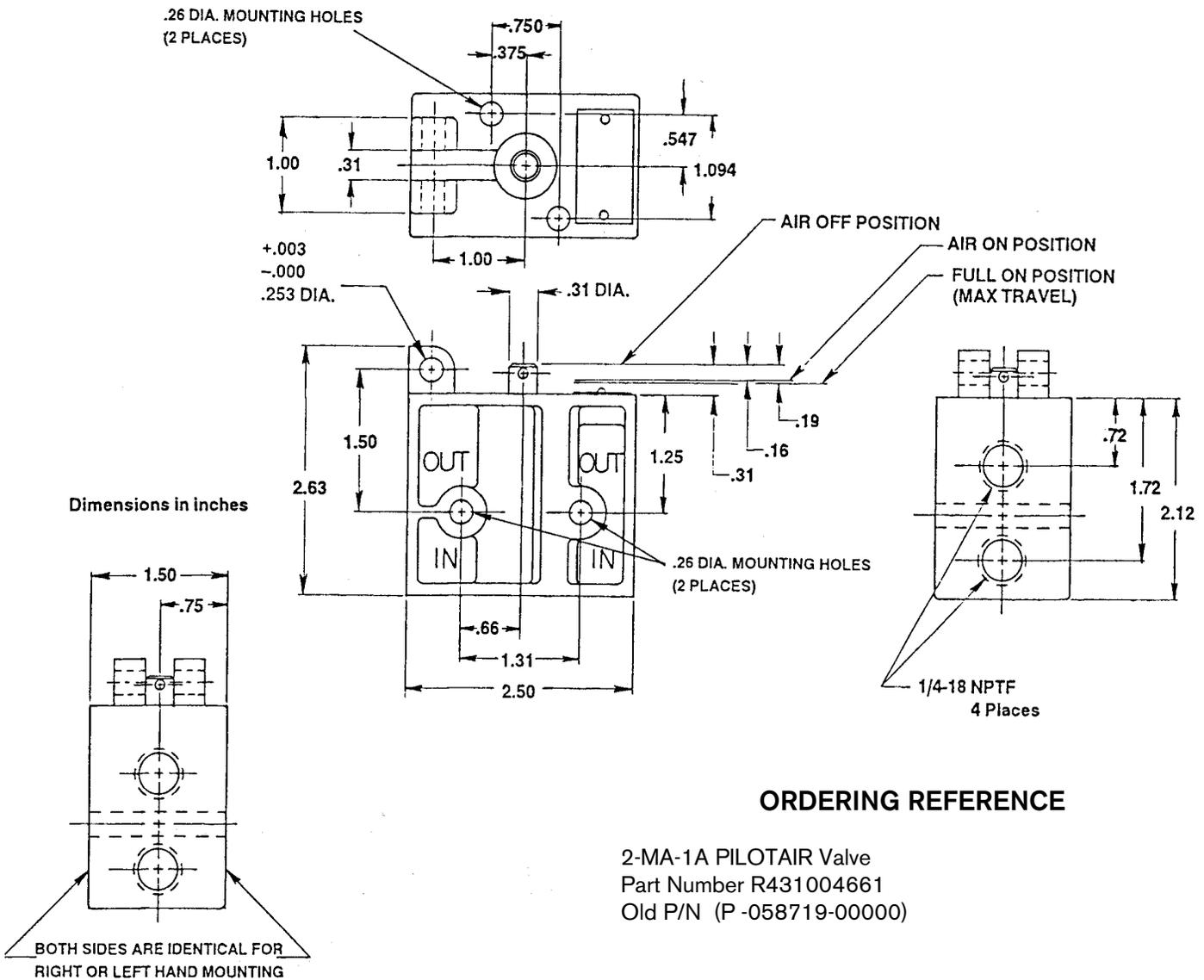
(Old P/N P -058718-00000)

**“A” Pilotair® Pneumatic Directional Control Valves
Block-Type Valves Three Way-Normally Closed**

**2-MA-1A PILOTAIR VALVE,
NORMALLY CLOSED**

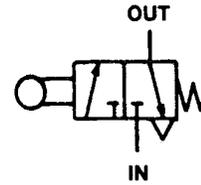


The 2-MA-1A valve, with lugs, is the basic block-type “A” PILOTAIR Valve. It may be combined with the operator kits listed on the following pages to provide palm lever, pilot cylinder, cam dog and cam roller operation. Operator kits contain all material required to adapt each of these operators to the basic valve.

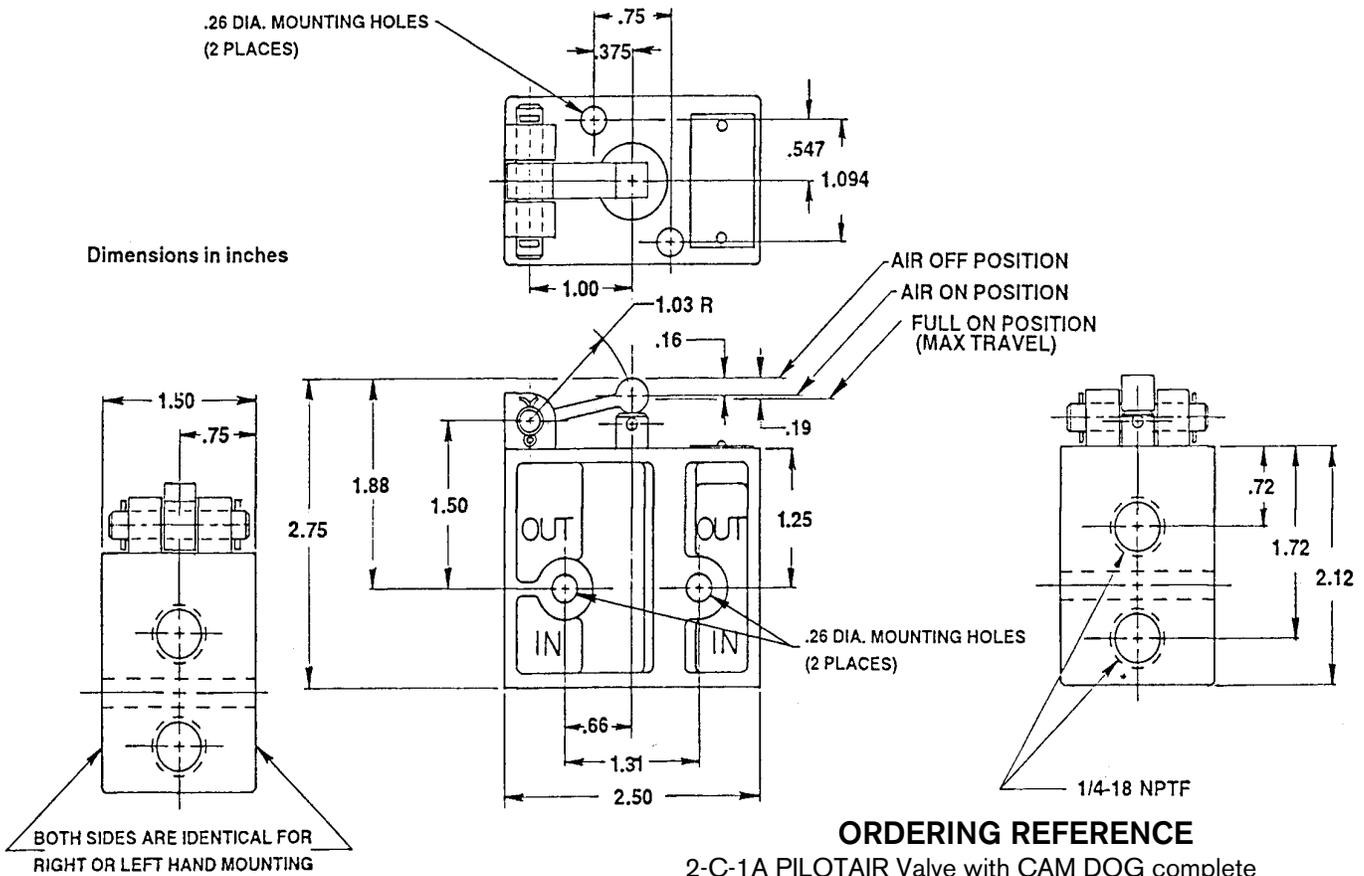


“A” Pilotair® Pneumatic Directional Control Valves
Block-Type Valves Three Way-Normally Closed

**2-CA-1A PILOTAIR VALVE WITH CAM DOG,
 NORMALLY CLOSED**



The cam dog operated 2-CA-1A PILOTAIR Valve is composed of the 2-MA-1A PILOTAIR Valve and the Cam Dog Operator Kit.



ORDERING REFERENCE

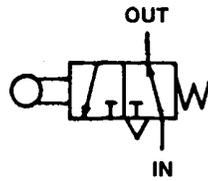
2-C-1A PILOTAIR Valve with CAM DOG complete
 Part Number R-431004665
 (Old P/N P -058720-00000)

CAM DOG OPERATOR KIT

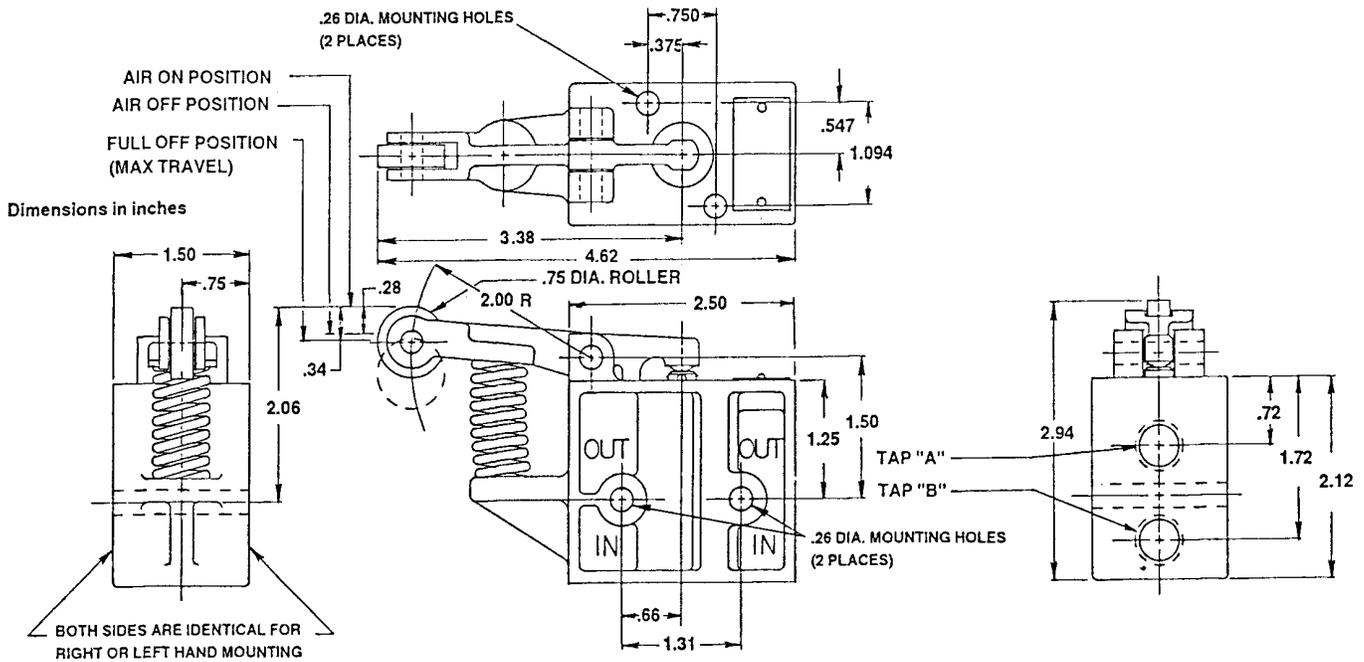
Contains a hardened, stainless steel cam dog, cam dog pin and cotter.
 Part Number R431003068
 (Old P/N P -052973-K0000)

“A” Pilotair® Pneumatic Directional Control Valves
Block Type Valves Three Way-Normally Open

**2-CA-1B PILOTAIR VALVE,
 WITH SPRING OPPOSED
 CAM ROLLER LEVER,
 NORMALLY OPEN**



This 3-way directional valve has the inlet port connected to the outlet port in its normal position. When a cam operates the spring opposed cam roller lever, the valve closes and the outlet port is connected to atmosphere.

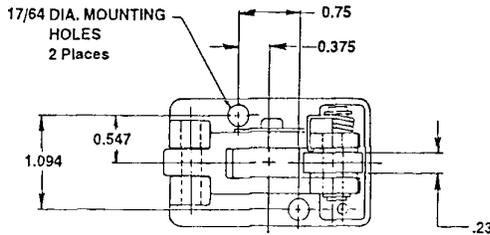
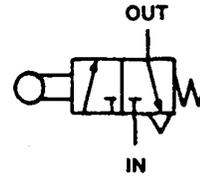


ORDERING REFERENCE

- Part No. R431004669 (Old P- 058722-00000) max. inlet pressure 250 psi (17.2 bar). operator force 30 lb.)
- Part No. R431004671 (Old P -058722-00002) max. inlet pressure 250 psi (17.2bar). operator force 40 lb.)
- Part No. R431004672 (Old P -058722-00003) max. inlet pressure 125 psi (8.6 bar). operator force 14 lb.)
- Part No. R431004673 (Old P -058722-00005) max. inlet pressure 250 psi (17.2 bar). operator force 30 lb.)
 w/o Roller
- Part No. P -058722-0000 (Max. inlet pressure 125 psi (8.6 bar) operator force 40 lb.)

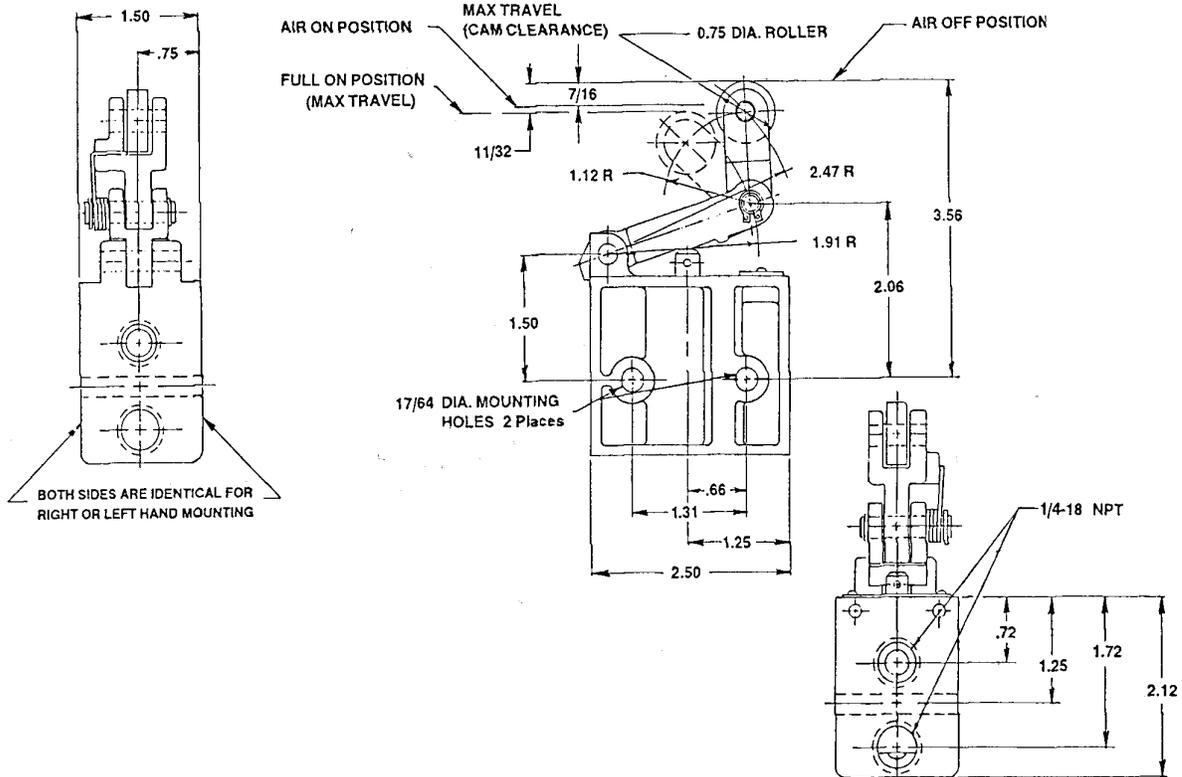
"A" Pilotair® Pneumatic Directional Control Valves Block-Type Valves Three Way - Normally Closed

2-CA-1C PILOTAIR VALVE WITH SINGLE DIRECTION CAM ROLLER, NORMALLY CLOSED



Dimensions in inches

The Single-Direction Cam Roller Operator Kit assembled to the 2-MA-1A PILOTAIR Valve is designated the 2-CA-1C PILOTAIR Valve with Single-Direction Cam Roller.



ORDERING REFERENCE

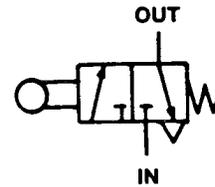
2-CA-1C PILOTAIR Valve, with Single-Direction Cam Roller complete.
Part Number R431005758 (Old P/N P -061347-00000)

SINGLE-DIRECTION CAM ROLLER OPERATOR KIT

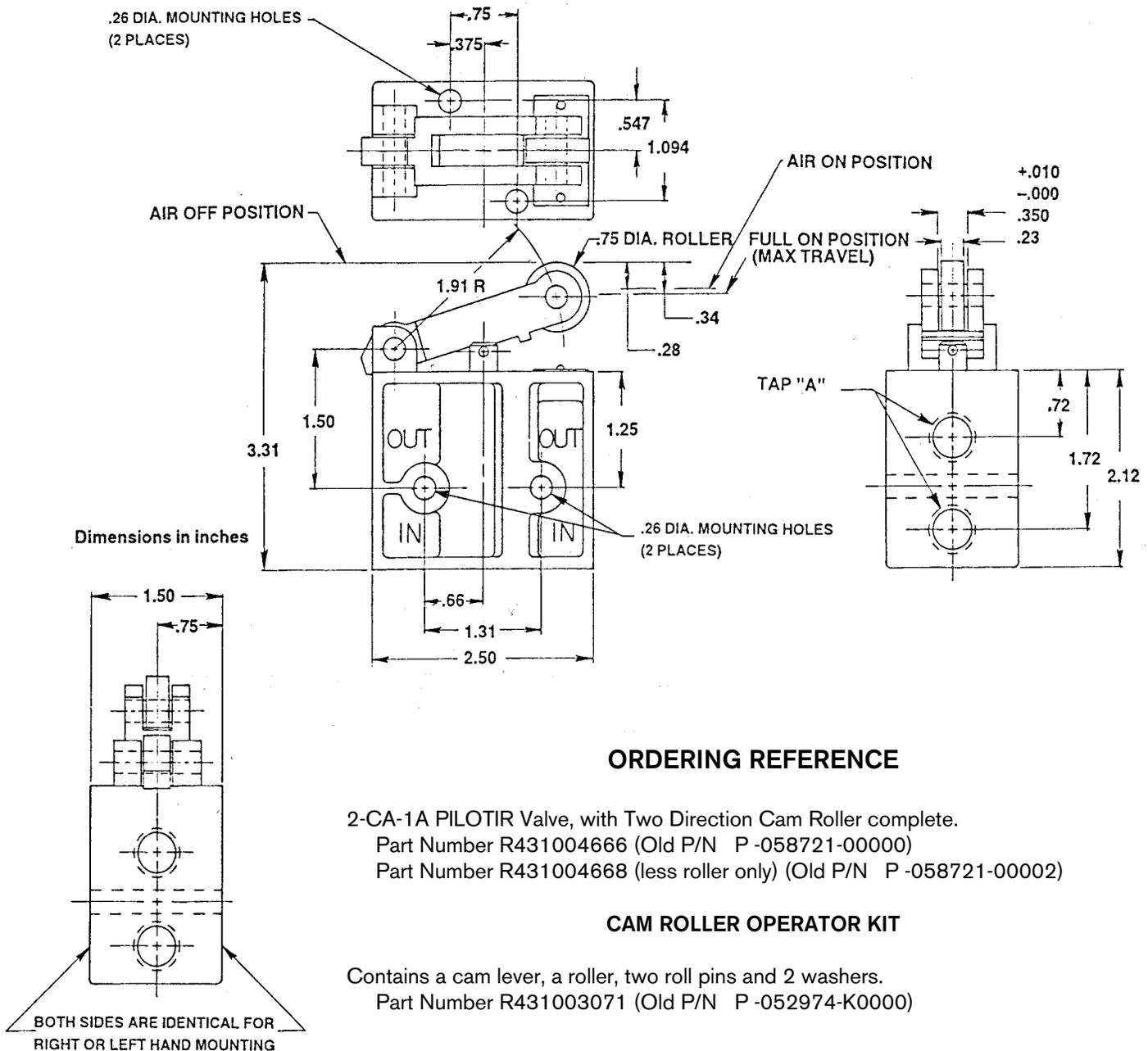
Contains two cam levers, a roller, three roll pins, 2 retaining rings, one torsion spring, and one washer.
Part Number R431005759 (Old P/N P -061348-00000)

**“A” Pilotair® Pneumatic Directional Control Valves
Block-Type Valves Three Way - Normally Closed**

**2-CA-1A PILOTAIR VALVE WITH TWO-DIRECTION CAM ROLLER,
NORMALLY CLOSED**



The Two-Direction Cam Roller Operator Kit assembled to the 2-MA-1A PILOTAIR Valve is designated the 2-CA-1A PILOTAIR Valve with Two-Direction Cam Roller.



ORDERING REFERENCE

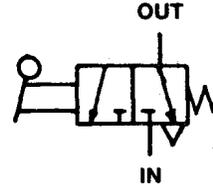
2-CA-1A PILOTAIR Valve, with Two Direction Cam Roller complete.
Part Number R431004666 (Old P/N P -058721-00000)
Part Number R431004668 (less roller only) (Old P/N P -058721-00002)

CAM ROLLER OPERATOR KIT

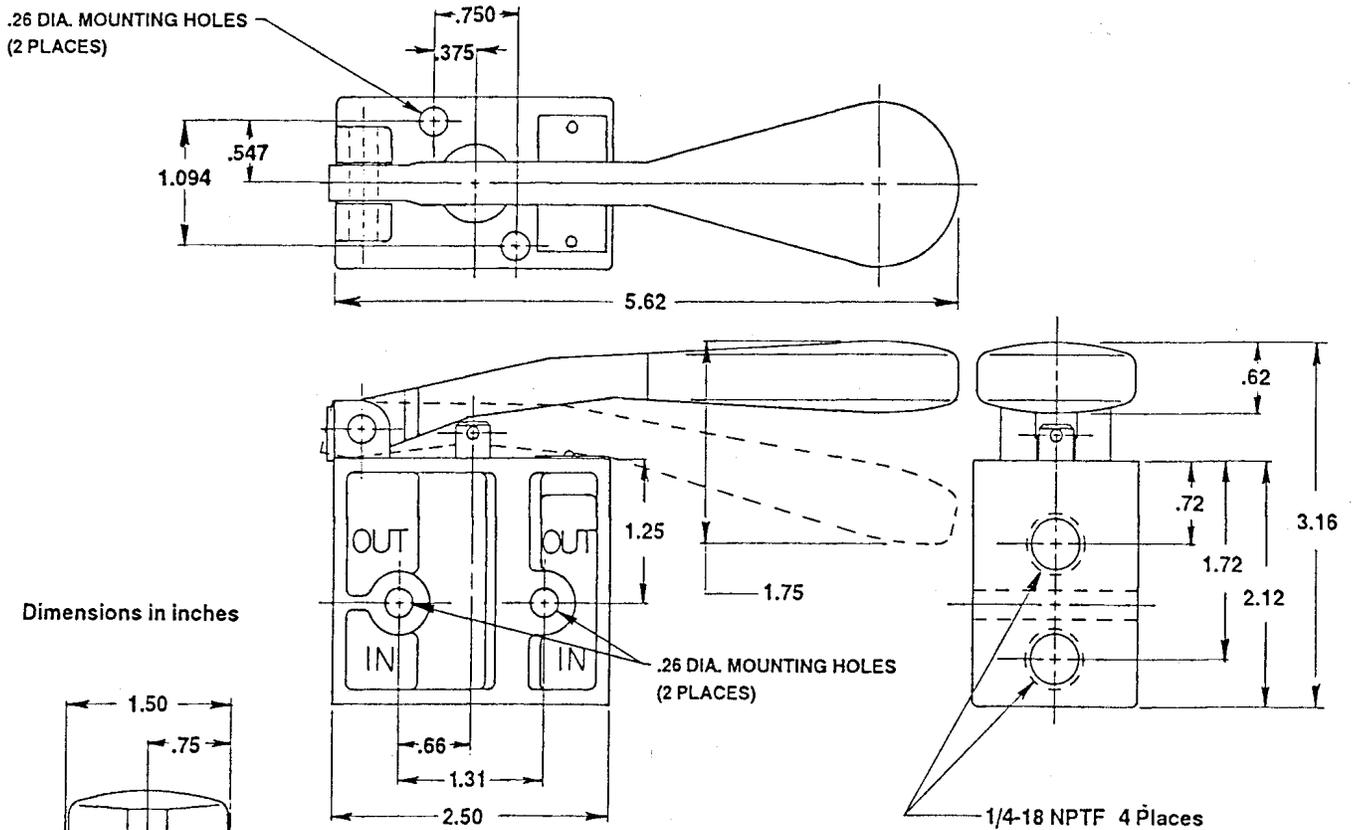
Contains a cam lever, a roller, two roll pins and 2 washers.
Part Number R431003071 (Old P/N P -052974-K0000)

“A” Pilotair® Pneumatic Directional Control Valves
Block Type Valves Three Way - Normally Closed

**2-LA-1A PILOTAIR VALVE, PALM LEVER,
 NORMALLY CLOSED**



The Palm Lever Operator Kit assembled to the 2-MA-1A PILOTAIR Valve makes the 2-LA-1A PILOTAIR Valve.



ORDERING REFERENCE

2-LA-1A PILOTAIR Valve complete. Operator force 5 lb. at 80 psi (5.5 bar)
 Part Number R431004675 (Old P/N P -058724-00000)

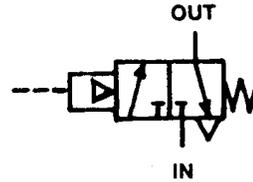
PALM LEVER OPERATOR KIT

Contains a cast aluminum lever, roll pin. Lever is mounted parallel to top face of valve body.

Part Number R431004677 (Old P/N P -058725-K0000)

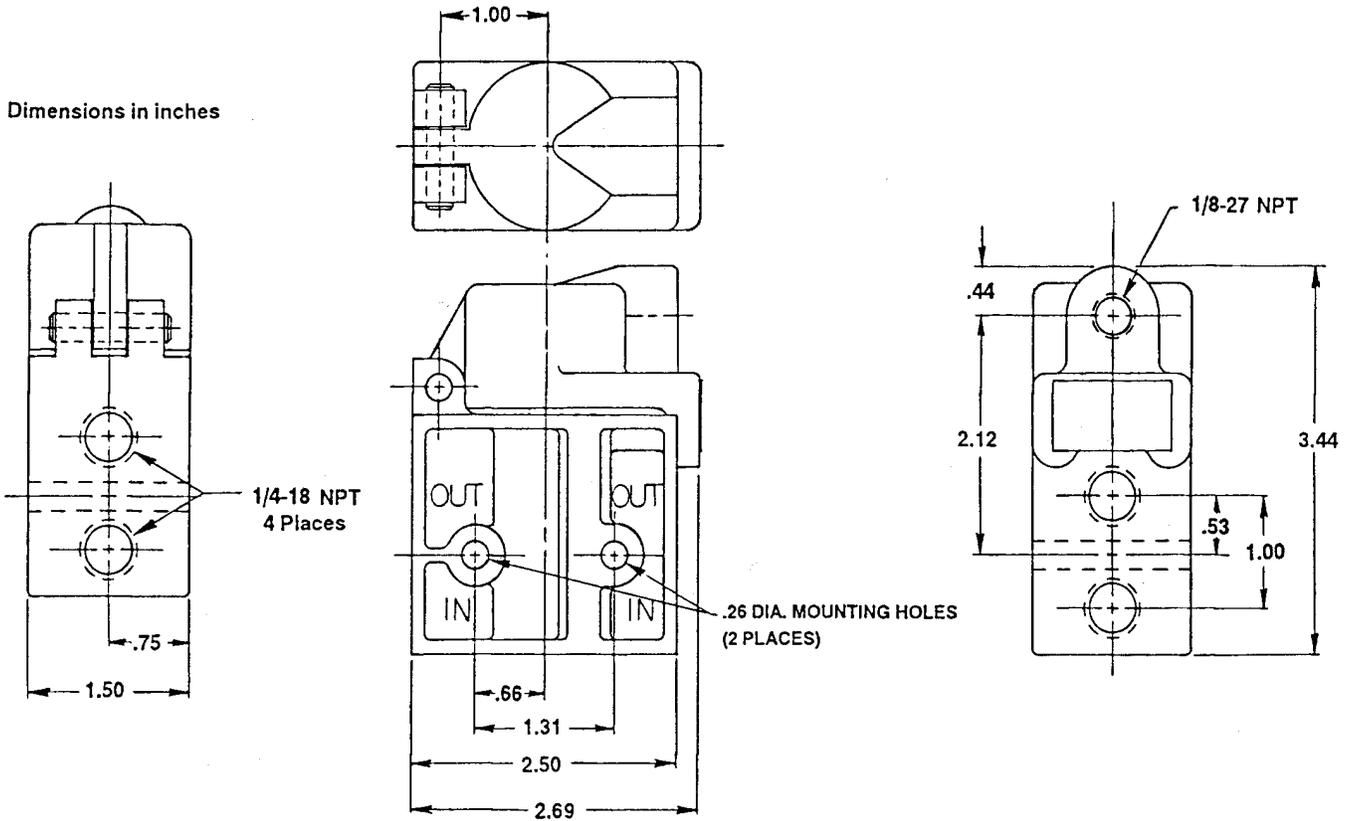
**“A” Pilotair® Pneumatic Directional Control Valves
Block-Type Valves Three Way - Normally Closed**

**2-PA-1A PILOTAIR VALVE, AIR PILOTED,
NORMALLY CLOSED**



The air pilot operated 2-PA-1A PILOTAIR Valve consists of the Pilot Cylinder Operator Kit assembled to the 2-MA-1A PILOTAIR Valve. Suitable for pilot pressures from 10 to 250 psi (0.7 to 17.2 bar). For each 50 psi (3.4 bar) of inlet pressure, the control pressure must increase 8 psi (0.6 bar). Starting with zero inlet pressure, control pressure must be 10 psi (0.7 bar).

Dimensions in inches



ORDERING REFERENCE

2-PA-1A PILOTAIR Valve complete
Part Number R431004674 (Old P/N P-058723-00000)

PILOT CYLINDER, OPERATOR KIT

Contains a cast aluminum pilot cylinder, piston, “O” Ring packing, roll pin and two DRIV-LOK Pins.
Part Number R431003054 (Old P/N P-052956-K0001)

“A” Pilotair® Pneumatic Directional Control Valves
Panel-Mounted Valves, Three-Way, Four-Way and Multi-Function Operations

The Panel-Mounted “A” PILOTAIR Valve is a poppet-type pneumatic directional control valve consisting of a cam housing portion and a valve portion containing from one to four 3-way valve units.

The “A” PILOTAIR Valves’ streamlined compact design makes them especially suited for deluxe panel mountings such as in consoles or control panels. They can be mounted in either horizontal or vertical panels. The internal parts are enclosed to make them ideal for outdoors installations or other unfavorable working conditions.

OPERATING VERSATILITY

Versatility has been designed into the operating cams. By reversing, rotating and rearranging these all-purpose cams, all the listed combinations can be made with a minimum of parts. Single unit valves for 3-way operation may be normally open or normally closed. The two unit valves have two, three, or five positions of operation as do the three and four unit valves. (See operation.) Detents can be had for two, three or five positions, or handle may be spring-

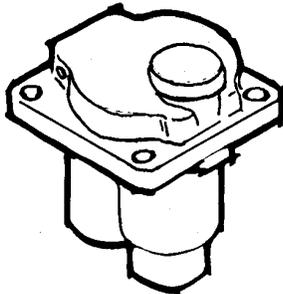
returned to center for three position operation.

NEW DESIGN FEATURES

Several new features have been designed into the Panel-Mounted “A” PILOTAIR Valve for added strength, easier maintenance and longer service life.

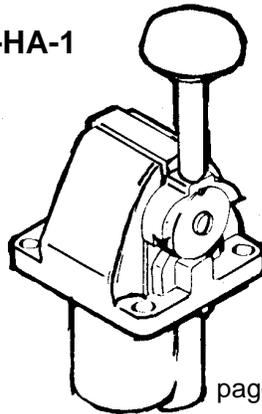
- One-piece solid steel shaft for increased strength.
- Bronze bearings in cam housing for longer wear.
- Separate steel handle and hub for increased strength.
- Tooth-type Nylatron plastic detents for longer wear and more positive detenting.
- Internal centering spring assembly for longer wear and more positive handle centering.
- Die-cast anodized aluminum body and cam housing for lighter weight, added strength and corrosion-resistance.
- More-positive handle latch. Available in one, two, and three positions for added flexibility and longer service lift.

2-BA-1



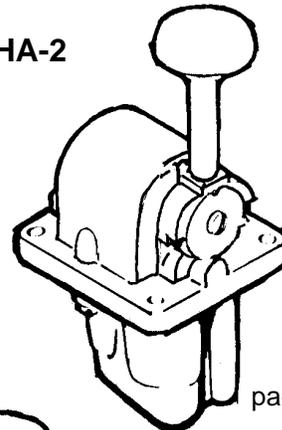
page 13

2-HA-1



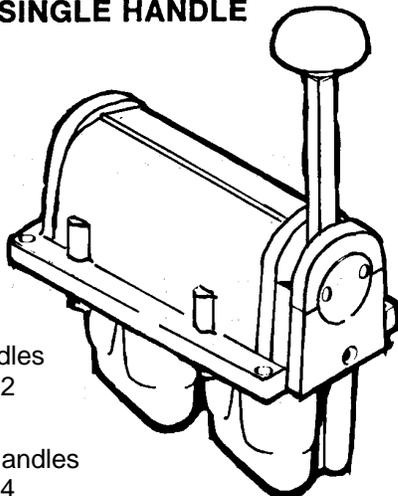
pages 14 - 15

2-HA-2



pages 16 - 18

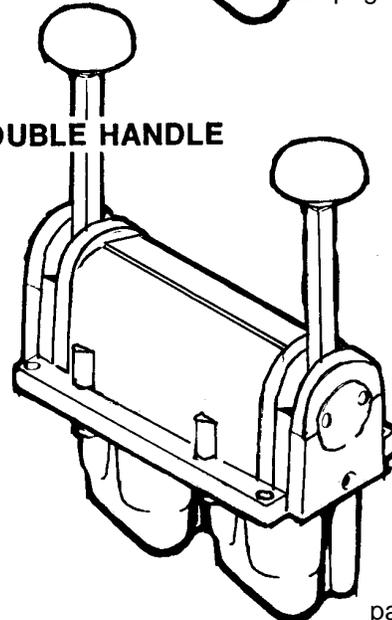
2-HA-3 SINGLE HANDLE
2-HA-4



Gated Handles
 pages 19-22

Detented Handles
 pages 23-24

2-HA-3 DOUBLE HANDLE
2-HA-4



pages 25—27

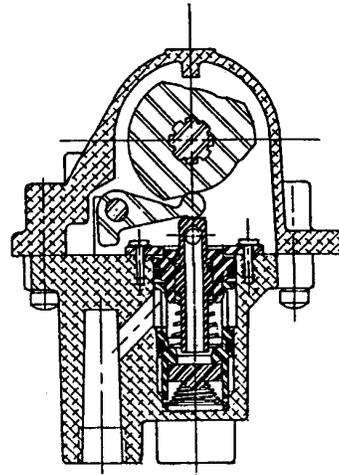
“A” Pilotair® Pneumatic Directional Control Valves
Panel-Mounted Valves, Three-Way Operation

OPERATION

In release position, as shown, the valve disc seats on the inlet valve seat and seals the passage from the inlet to the outlet port. The outlet port is vented to atmosphere through the center of the plunger.

As the plunger is forced downward by the cam force it seats on the valve disc. This seals the passage between the outlet port and atmosphere.

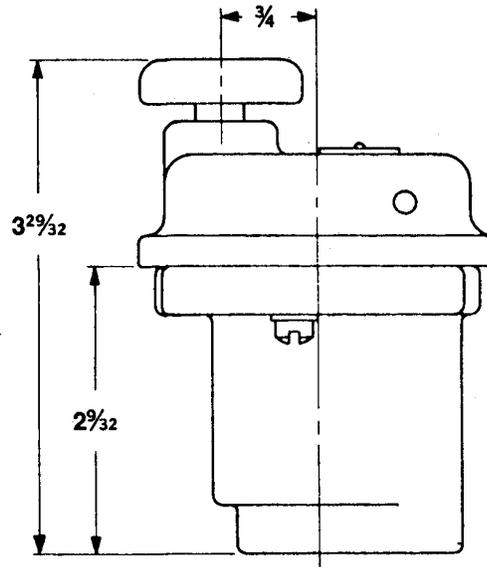
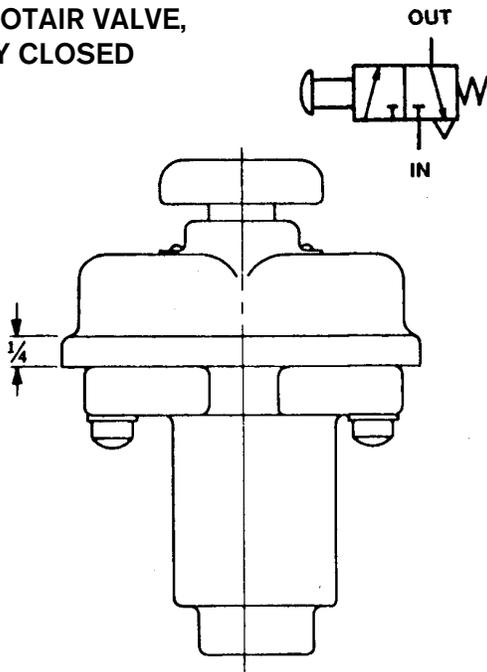
Further downward travel of the plunger unseats the valve disc from the inlet valve seat and allows inlet air pressure to flow to the outlet port.



THREE-WAY OPERATION - SINGLE UNIT VALVES

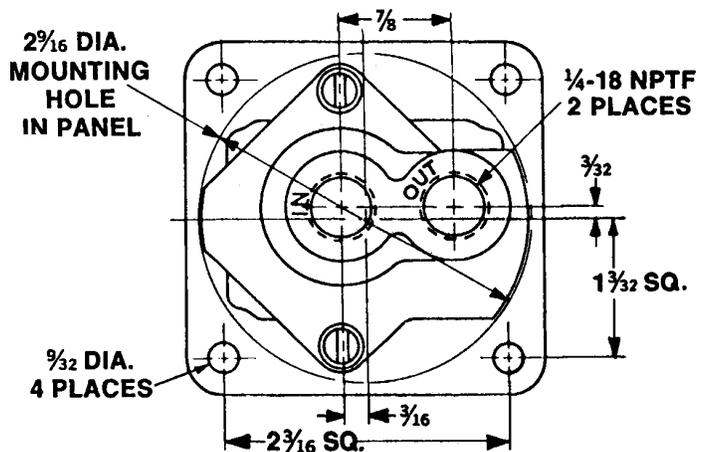
2-BA-1 PILOTAIR VALVE,
NORMALLY CLOSED

The model 2-BA-1 PILOTAIR Valve is a panel mounted, 2 position button operated 3-way valve with 1/4" NPT inlet and outlet ports.



ORDERING REFERENCE

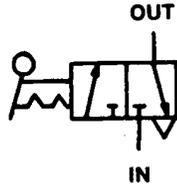
- 2-BA-1 PILOTAIR Valve - Part Number R431003427 (Old P/N P-054692-00002)
- With chrome plated cover - Part No. R431003429 (Old P/N P-054692-00004)
- With special black coated cover - Pt. No. R431003430 (Old P/N P-054692-00006)



BUTTON POSITION	PORT SUPPLIED
UP	
DOWN	X

“A” Pilotair® Pneumatic Directional Control Valves
Panel-Mounted Valves, Three-Way Operation—Single Unit Valves

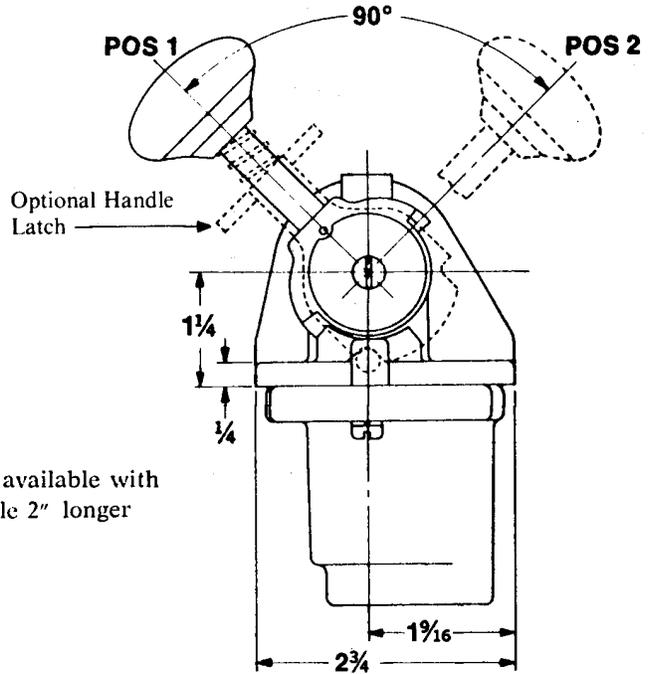
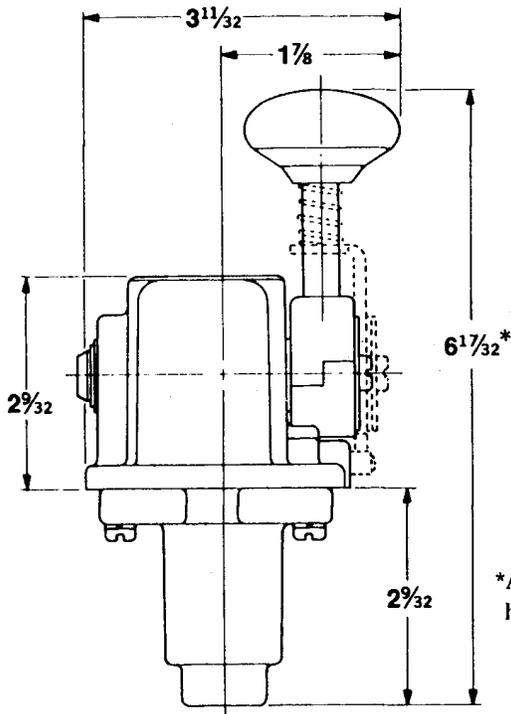
2-HA-1 PILOTAIR VALVE



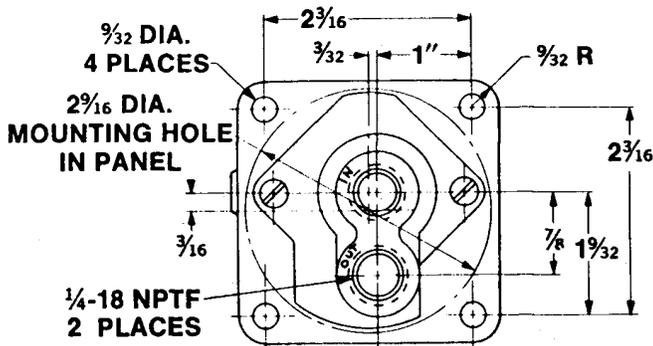
The model 2-HA-1 “A” PILOTAIR Valve is a panel mounted, handle operated 3-way valve with 1/4” NPT inlet and outlet ports. It contains a spring opposed detent cam to hold the handle in either of its two extreme positions. The 2-HA-1L

model is available with an additional external handle latch which requires manual release to insure against unintentional operation. The 2-HA-1W model is spring returned from position 2 to center position, which is the same as position 1 (normally closed).

The model 2-HA-1R, 2-HA-1LR and 2-HA-1RW “A” PILOTAIR Valves are the same as the 2-HA-1 and 2-HA-1L models except that the cam is reversed to obtain pull instead of push operation. The 2-HA-1R model may also be mounted with the handle on the left hand side for tandem push operation with the 2-HA-1 model.



*Also available with handle 2" longer



See ordering references on next page

“A” Pilotair® Pneumatic Directional Control Valves
Panel-Mounted Valves, Three-Way Operation—Single Unit Valves

2-HA-1 PILOTAIR VALVES
ORDERING REFERENCE

2-HA-1 PILOTAIR Valve (with detents)
 Part Number R431004994
 (Old P/N P -059331-00000)
 with chrome plated cover and hub
 Part Number R431004996
 (Old P/N P -059331-00002)
 with long handle
 Part Number R431006456
 (Old P/N P -064533-00000)

2-HA-1L PILOTAIR Valve (with latch)
 Part Number R431004997
 (Old P/N P -059332-00001)
 with chrome plated cover and hub
 Part Number R431004999
 (Old P/N P -059332-00003)
 with black coated cover and hub
 Part Number R431004998
 (Old P/N P -059332-00002)

Handle Position	Out Port Supplied
1	
2	X

2-HA-1R PILOTAIR Valve (with detents)
 Part Number R431005000
 (Old P/N P -059333-00000)
 with black coated cover and hub:
 Part Number R431006571
 (Old P/N P -065207-00000)

2-HA-1LR PILOTAIR Valve (with latch)
 Part Number R431005001
 (Old P/N P -059334-00001)
 with chrome plated cover and hub:
 Part Number R431005002
 (Old P/N P -059334-00003)

Handle Position	Out Port Supplied
1	X
2	

2-HA-1W PILOTAIR Valve
 (spring returned to center position)
 Part Number R431005660
 (Old P/N P -061083-00000)
 Maximum inlet pressure 150 psi (10.3 bar)

Handle Position	Out Port Supplied
1	
Center	
2	X

2-HA-1RW PILOTAIR Valve
 (spring returned to center position)
 Part Number R431005661
 (Old P/N P -061090-00000)
 Maximum inlet pressure 150 psi (10.3 bar)

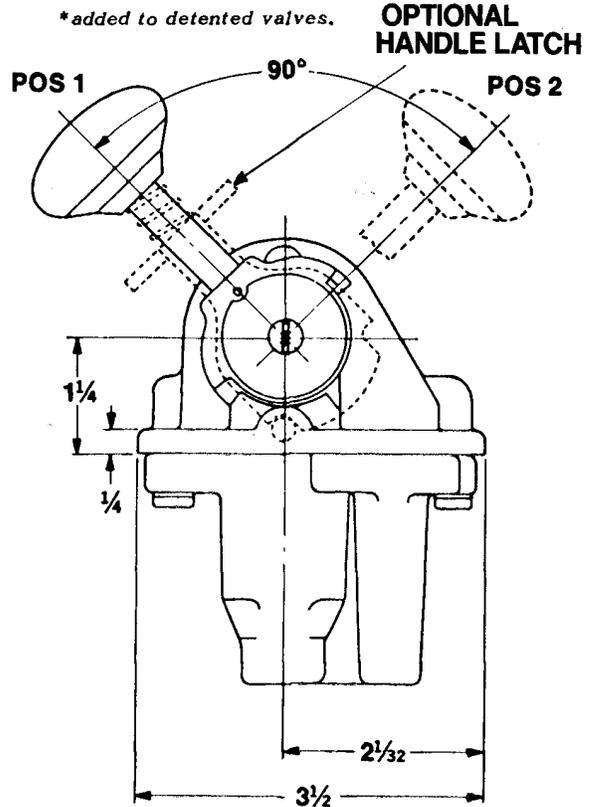
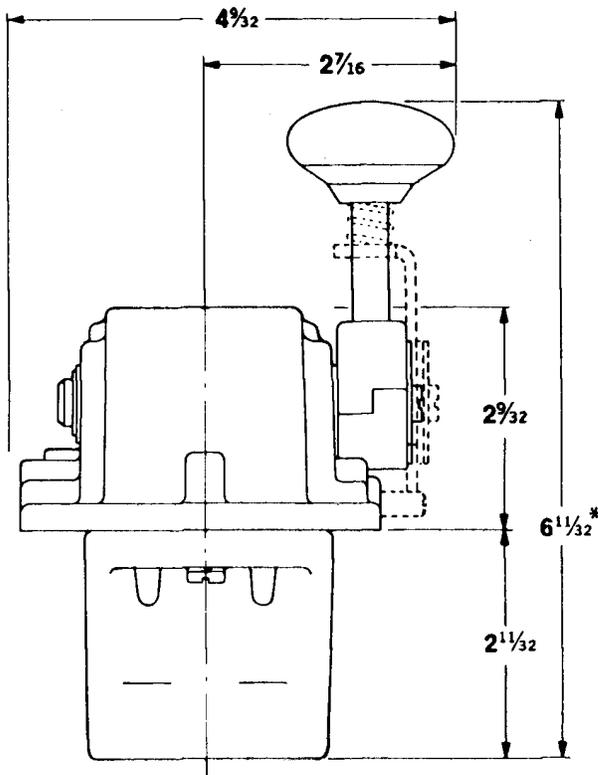
Handle Position	Out Port Supplied
1	X
Center	
2	

X denotes port supplied in that position.
 Empty block denotes port exhausted in that position.

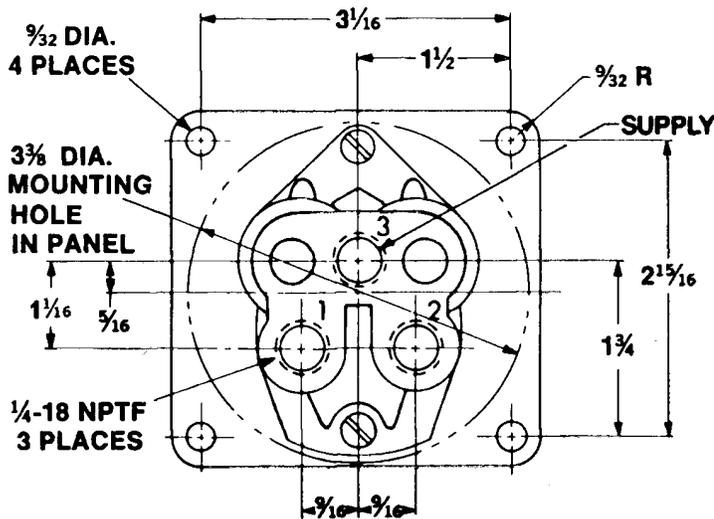
“A” Pilotair® Pneumatic Directional Control Valves
Panel-Mounted Valves - Four-Way Operation - Double Unit Valves

2-HA-2Y PILOTAIR VALVES
FOUR-WAY, TWO POSITION HANDLE

The 2-HA-2 PILOTAIR Valves are panel-mounted, 2, 3 and 5 position valves with one inlet and two outlet ports. Available with detents in each handle position, a latching handle that requires manual release to insure against unintentional operation,* or spring return to center position. All ports are 1/4" NPT.



*Also available with handle 2" longer



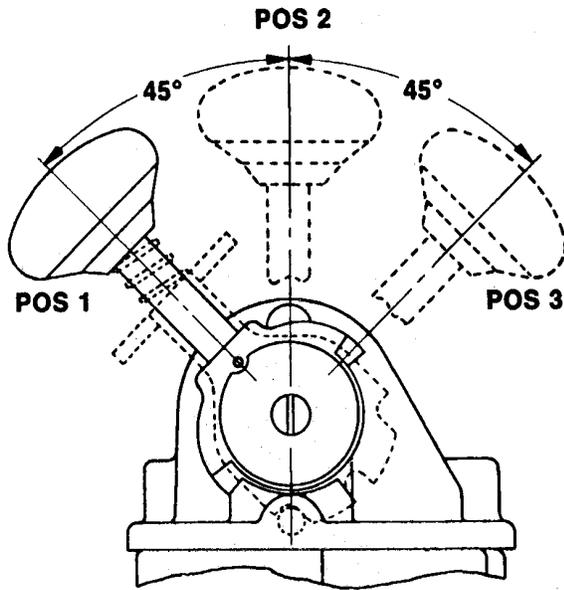
ORDERING REFERENCE (4-Way - 2 Position Handle)

- 2-HA-2Y PILOTAIR Valve** (with detents)
 (supplied thru center) Part Number R431005016
 (Old P/N P -059340-00000)
 with seals for 65°F (-54°C) Part Number R431005017
 (Old P/N P -059340-00001)
 with chrome plated cover & hub Part Number R431005018
 (Old P/N P -059340-00003)
 with long handle Part Number P -065760-00000
- 2-HA-2Y PILOTAIR Valve** (with detents) (exhaust thru center)
 Part Number R431005861 (Old P/N P -061745-00000)
- 2-HA-2LY PILOTAIR Valve** (with latch 1 & 2) (supplied thru center)
 Part Number R431005019 (Old P/N P -059341-00001)
- 2-HA-2LY PILOTAIR Valve** (with latch 1 & 2) (exhausted thru center)
 Part Number R431006194 (Old P/N P -063158-00000)
 with chrome plated cover and hub Part Number R431006195
 (Old P/N P -063158-00002)
 with black epoxy coated cover on hub Part No.R431006604
 (Old P/N P -065353-00000)

Handle Position	Ports Supplied	
	Out 1	Out 2
1		X
2	X	

“A” Pilotair® Pneumatic Directional Control Valves

Panel-Mounted Valves, Four-Way and Multi-Function Operation - Double Unit Valves



DOUBLE 3-WAY VALVES - 3 POSITION HANDLE

2-HA-2X PILOTAIR Valve (with detents 1, 2 & 3)
Part Number R431005020 (Old P/N P 59342-00000)

2HA-2LX PILOTAIR Valve (Detent position 1, 2 & 3 -
latch positions 1 & 3) Part Number R431005021
(Old P/N P -059343-00001)

Handle Position	Ports Supplied	
	Out 1	Out 2
1		
2		X
3	X	X

2-HA-2U PILOTAIR Valve (with detents 1, 2 & 3)
Part No. R431006413 (Old P/N P -064417-00000)

Handle Position	Ports Supplied	
	Out 1	Out 2
1		X
2	X	X
3		

X denotes port supplied in that position.
Empty block denotes port exhausted in that position.

ORDERING REFERENCE

4-Way Exhaust Center Valves - 3 Position Handle

2-HA-2 PILOTAIR Valve (with detents 1,2 & 3)
Part Number R431005003 (Old P/N P -059335-00000)
with chrome plated cover and hub - Part No. R431005005
(Old P/N P -059335-00003)
with black coated cover and hub - Part No. R431005004
(Old P/N P -059335-00002)
with long handle - Part Number R431005820
(Old P/N P -061652-00000)

2-HA-2L PILOTAIR Valve (Detents positions 1,2 & 3 - Latch
positions 1 & 3) Part Number R431005006
(Old P/N P -059336-00003)
with black coated cover and hub - Part No. R431005007
(Old P/N P -059336-00004)

2-HA-2L PILOTAIR Valve (Detents positions 1, 2 & 3)
Part Number R431006008 (Old P/N P -062082-00000)
with chrome plated cover and hub - Part No. R431006010
(Old P/N P -062082-00002)
with black coated cover and hub - Part No. R431006009
(Old P/N P -062082-00001)

2-HA-2L PILOTAIR Valve (Detents positions 1,2 & 3 - latch
position 2 only) Part Number R431005927
(Old P/N P -061966-00000)

2-HA-2Z PILOTAIR Valve (spring centered)
Part Number R431005013 (Old P/N P -059339-00000)
with chrome plated cover and hub - Part No. R431005015
(Old P/N P -059339-00003)
with black coated cover and hub - Part No. R431005014
(Old P/N P -059339-00002)

*Maximum inlet pressure 150 psi (10.3 bar)

Handle Position	Ports Supplied	
	Out 1	Out 2
1		X
2		
3	X	

4-Way Supplied Center Valves - 3 Position Handle

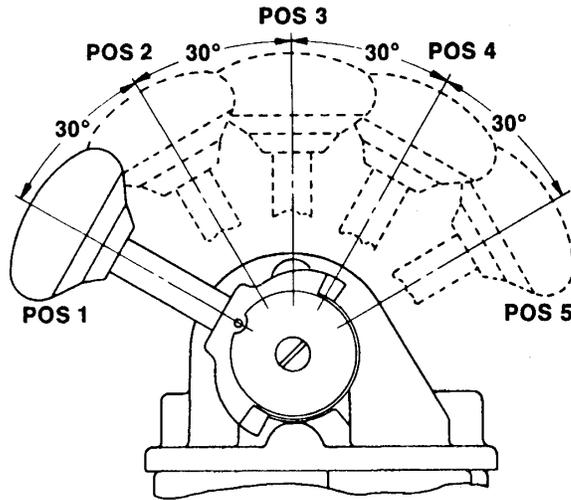
2-HA-2R PILOTAIR Valves (with detents)
Part Number R431005008 (Old P/N P -059337-00000)
with chrome plated cover and hub - Part No. R431005009
(Old P/N P -059337-00002)
with black coated cover and hub - Part No. R431005010
(Old P/N P -059337-00003)
with long handle - Part Number R431005754
(Old P/N P -061326-00000)

2-HA-2LR PILOTAIR Valves (Detents positions 1,2 & 3 - latch
position 1 & 3) Part Number R431005011
(Old P/N P -059338-00002)

2-HA-2LR PILOTAIR Valves (Detents and latch in positions 1,
2 & 3) Part No. R431005012 (Old P/N P -059338-00003)

Handle Position	Ports Supplied	
	Out 1	Out 2
1		X
2	X	X
3	X	

“A” Pilotair® Pneumatic Directional Control Valves
Panel-Mounted Valves, Double Three-Way Valve, Five Position Handle



ORDERING REFERNECE

Double 3-Way Valve - 5 Position Handle

2-HA-2F PILOTAIR Valve (with detents)

Part Number R431003360 (Old P/N P -054427-00001)

with black coated cover and hub - Part No. P -054427-00003

Handle Position	Ports Supplied	
	Out 1	Out 2
1	X	X
2	X	
3		
4		X
5	X	X

**“A” Pilotair® Pneumatic Directional Control Valves
Panel-Mounted Valves**

2-HA-3 and 2-HA-4 Pilotair Valves

The 2-HA-3 and 2-HA-4 models are an extension of the 2-HA-2 models. They were created basically to furnish a housing that will operate up to four 3-way valves to provide a variety of functions.

The body assembly of the 2-HA-3 and 2-HA-4 models is made up of two 2-HA-2 bodies under a single housing. The supply port of each body requires a separate supply source. The 2-HA-3 model has one cavity plugged to provide a three unit assembly, usually cavity 1L.

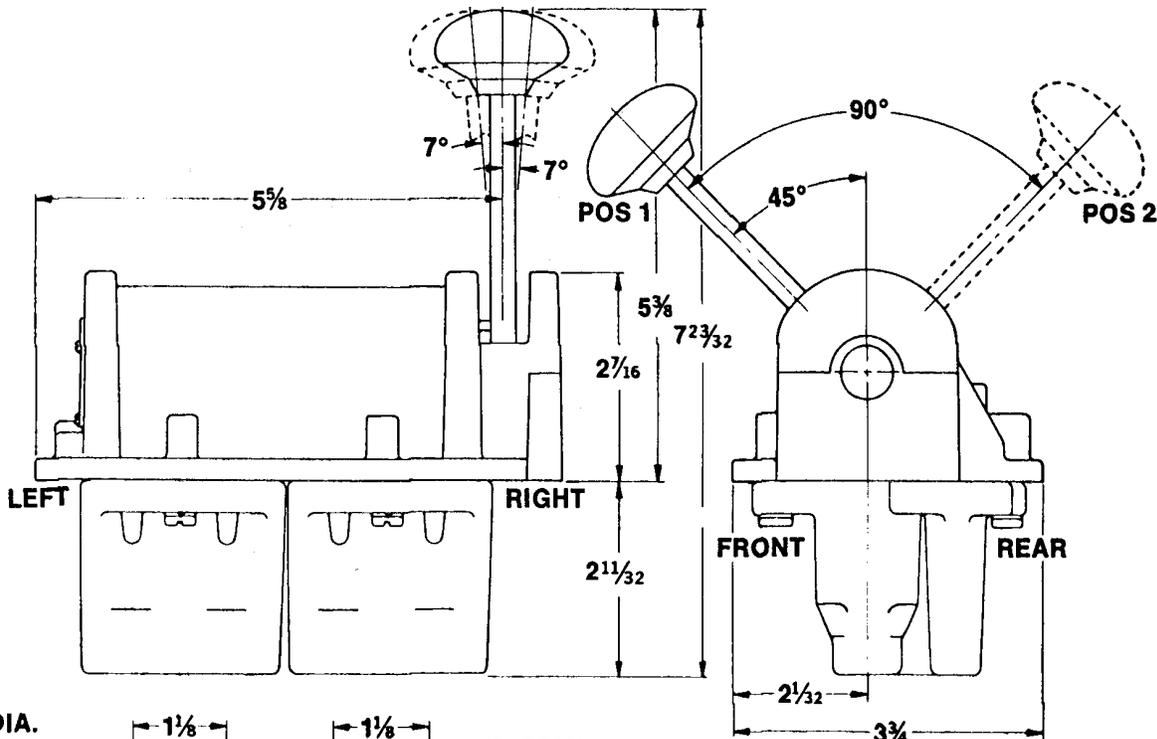
These valves were designed primarily for use with multiposition cylinders for Transmission Controls.

They also meet the application requirements for two different supply pressures, selector functions and directional control of up to four different circuits.

It is possible to operate all four valves with a single handle or in any combination from one to three valves with the left hand handle or with the right hand handle.

Double handle assemblies are provided for space conservation and for applications requiring two handles located adjacent to each other. Thus, two different functions can be controlled. As an example, the left handle can control direction (forward or reverse) and the right handle, range (1st, 2nd, 3rd and 4th gear).

MULTI-WAY OPERATION - THREE AND FOUR UNIT VALVES - GATED SINGLE HANDLE

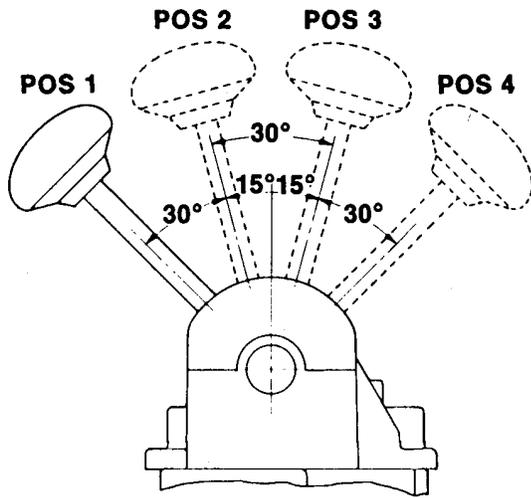


ORDERING REFERENCE
 Quadruple 3-Way Valve (2-HA-4)
 2 Position Handle

2-HA-4 PILOTAIR Valve
 Part No. R431004543 (Old P/N P-058457-00001)

HANDLE POSITION	PORTS SUPPLIED			
	OUT 1L	OUT 2L	OUT 1R	OUT 2R
1	X		X	
2		X		X

“A” Pilotair® Pneumatic Directional Control Valves
Panel Mounted Valves, Multi-Function Operation



2-HA-3 PILOTAIR Valve
 Part No. R431004511 (Old P/N P -058378-00002)

HANDLE POSITION	PORTS SUPPLIED			
	OUT 1L	OUT 2L	OUT 1R	OUT 2R
1	PLUGGED	X		
2				X
3				
*4			X	

**spring-returned to position 3*

ORDERING REFERENCE

Triple (2-HA-3) and Quadruple (2-HA-4) 3-Way Valves,
 4 Position Gated Single Handle

2-H-3 PILOTAIR Valve

HANDLE POSITION	PORTS SUPPLIED			
	OUT 1L	OUT 2L	OUT 1R	OUT 2R
1	PLUGGED		X	
2			X	X
3		X		X
4		X		

2-HA-4 PILOTAIR Valve

Part No. R431005485 (Old P/N P -060324-00000)

HANDLE POSITION	PORTS SUPPLIED			
	OUT 1L	OUT 2L	OUT 1R	OUT 2R
1		X		
2				X
3	X			
4			X	

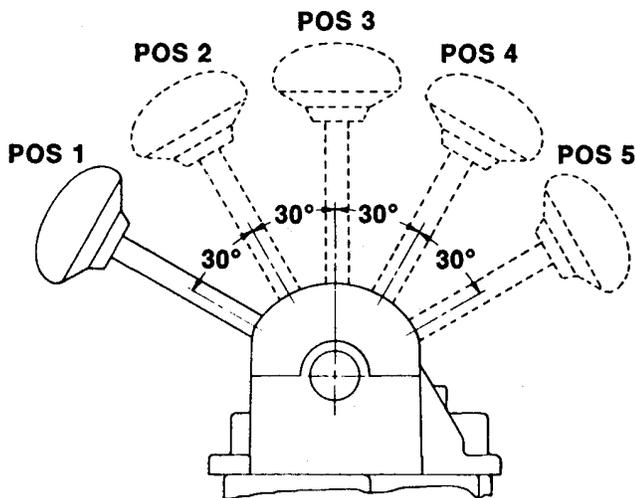
ORDERING REFERENCE

Triple (2-HA-3) and Quadruple (2-HA-4) 3-Way Valves

5 POSITION GATED SINGLE HANDLE

2-HA-3 PILOTAIR Valve - Part Number R431004512
 (Old P/N P -058379-00001)

2-HA-3 PILOTAIR Valve (Spring return to positions 3 & 4 -
 Replaces B-3 Pilotair Valve) - Part Number R431006034
 (Old P/N P -062269-00000)



HANDLE POSITION	PORTS SUPPLIED			
	OUT 1L	OUT 2L	OUT 1R	OUT 2R
1	PLUGGED			X
2				
3			X	
4				
5		X		

“A” Pilotair® Pneumatic Directional Control Valves

Panel-Mounted Valves Ordering Reference

Triple (2-HA-3) and Quadruple (2-HA-4) 3-Way Valves - 5 Position Gated Single Handle

2-HA-3 PILOTAIR Valve

Part No. R431009019 (Old P/N P -060877-00000)

HANDLE POSITION	PORTS SUPPLIED			
	OUT 1L	OUT 2L	OUT 1R	OUT 2R
1	PLUGGED		X	
2				
3		X		
4				
5				X

2-HA-4 PILOTAIR Valve (For 5-position transmission cylinder)
Part No. R431004541 (Old P/N P -058455-00002)

HANDLE POSITION	PORTS SUPPLIED			
	OUT 1L	OUT 2L	OUT 1R	OUT 2R
R		X		
N		X		X
F ₁			X	X
F ₂	X		X	
F ₃			X	

2-HA-4 PILOTAIR Valve

Part No. R431005386 (Old P/N P -060056-00000)

HANDLE POSITION	PORTS SUPPLIED			
	OUT 1L	OUT 2L	OUT 1R	OUT 2R
1	X	X		
2	X			
3				
4			X	
5			X	X

2-HA-4 PILOTAIR Valve

Part No. R431005740 (Old P/N P -061274-00000)

HANDLE POSITION	PORTS SUPPLIED			
	OUT 1L	OUT 2L	OUT 1R	OUT 2R
1	X		X	
2	X		X	X
3	X			X
4	X	X		X
5		X		X

2-HA-4 PILOTAIR Valve

Part No. R431009113 (Old P/N P -058381-00001)

HANDLE POSITION	PORTS SUPPLIED			
	OUT 1L	OUT 2L	OUT 1R	OUT 2R
1		X		X
2				X
3	X			X
4	X		X	X
5	X		X	

2-HA-4 PILOTAIR Valve

Part No. R431004542 (Old P/N P -058456-00001)

HANDLE POSITION	PORTS SUPPLIED			
	OUT 1L	OUT 2L	OUT 1R	OUT 2R
1		X	X	
2		X		X
3				
4	X		X	
5	X			X

2-HA-4 PILOTAIR Valve (For 5-position “E” cylinder)

Part No. R431004801 (Old P/N P -058892-00001)

HANDLE POSITION	PORTS SUPPLIED			
	OUT 1L	OUT 2L	OUT 1R	OUT 2R
1				X
2	X			X
3	X	X		X
4	X	X	X	
5		X	X	

2-HA-4 PILOTAIR Valve

Part No. R4310055403 (Old P/N P -060153-00000)

HANDLE POSITION	PORTS SUPPLIED			
	OUT 1L	OUT 2L	OUT 1R	OUT 2R
1				
2	X			
3		X		
4			X	
5				X

2-HA-4 PILOTAIR Valve

Part No. R431005803 (Old P/N P -061619-00000)

HANDLE POSITION	PORTS SUPPLIED			
	OUT 1L	OUT 2L	OUT 1R	OUT 2R
1	X	X	X	X
2	X	X		X
3	X	X	X	
4	X		X	X
5		X	X	X

“A” Pilotair® Pneumatic Directional Control Valves
Panel Mounted Valves, Quadruple Three-Way Valves (2-HA-4)

QUADRUPLE THREE-WAY VALVES (2-HA-4)
4 and 5 POSITION GATED SINGLE HANDLE
 (see page 20 for handle position diagrams)

2-HA-4 PILOTAIR Valve

Part No. R431004540 (Old P/N P-058454-00001)

Handle Position	Ports To Which Pressure Is Supplied			
	Single Right Handle			
	Out 1L	Out 2L	Out 1R	Out 2R
1		X		X
2		X		
3			X	
4	X			

2-HA-4 PILOTAIR Valve

Part No. R431006038 (Old P/N P-062275-00000)

Handle Position	Ports To Which Pressure Is Supplied			
	Single Right Handle			
	Out 1L	Out 2L	Out 1R	Out 2R
1	X			
2		X		
3				
4			X	
5				X

2-HA-4 PILOT Valve

Part No. R431006000 (Old P/N P-062068-00000)

Handle Position	Ports To Which Pressure Is Supplied			
	Single Right Handle			
	Out 1L	Out 2L	Out 1R	Out 2R
1	X			
2	X	X		
3		X	X	
4			X	X

X denotes port supplied in that position.

Empty block denotes port exhausted in that position.

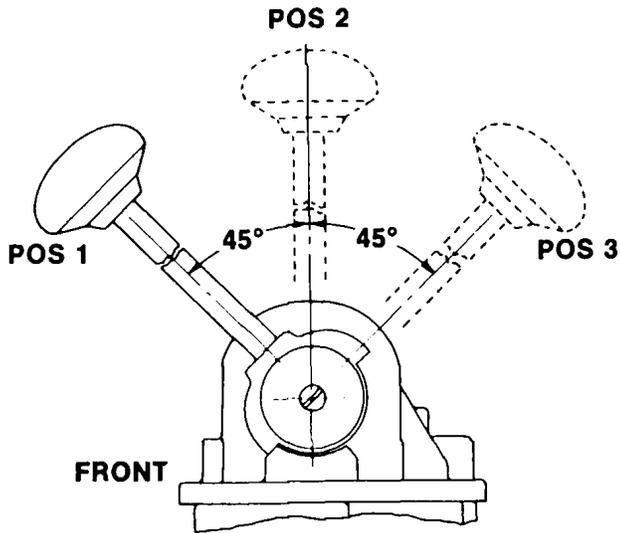
Consult Factory for outline drawings and other details on the above models.

These Diagrams illustrate the versatility of the 2-HA-2, 2-HA-3 and 2-HA-4 “A” Pilotair Valves. Many other porting and handle configurations are possible within the following general guidelines.

- 2, 3, 4, 5 Handle Positions
- Detented or Gated Handle Arrangements
- 2, 3 and 4 Three-Way Valve Combinations

Consult Factory For Special Porting Operations Not Listed.

“A” Pilotair® Pneumatic Directional Control Valves
Panel Mounted Valves, Triple 3-Way Valve



ORDERING REFERENCE

Triple (2-HA-3) 3-Way Valve

3 Position Handle, Detented

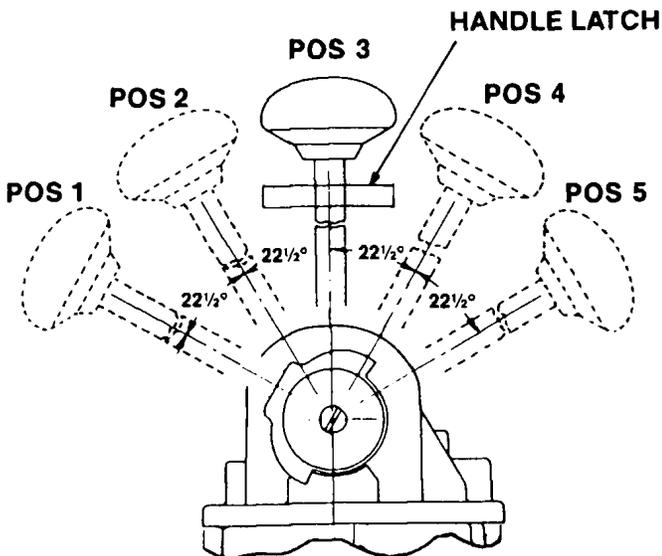
2-HA-3 PILOTAIR Valve (long handle)

HANDLE POSITION	PORTS SUPPLIED			
	OUT 1L	OUT 2L	OUT 1R	OUT 2R
1	PLUGGED		X	
2		X		
3				X

2-HA-3 PILOTAIR Valve

Part No. R431005734 (Old P/N P-061266-0002)

HANDLE POSITION	PORTS SUPPLIED			
	OUT 1L	OUT 2L	OUT 1R	OUT 2R
1	PLUGGED	X	X	
2				X
3			X	



Triple (2-HA-3) 3-Way Valve

5 Position Handle, Spring Centered

2-HA-3L PILOTAIR Valve

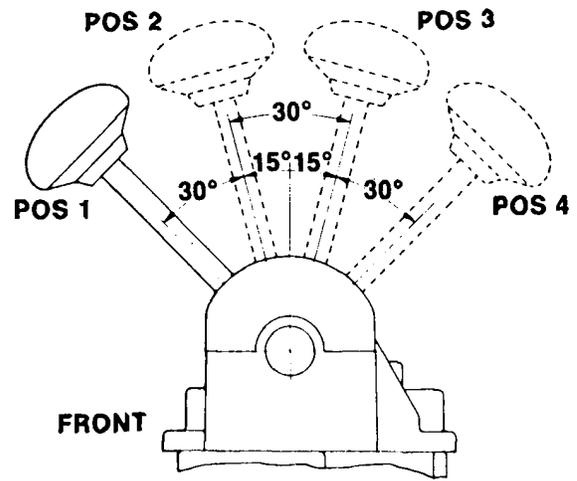
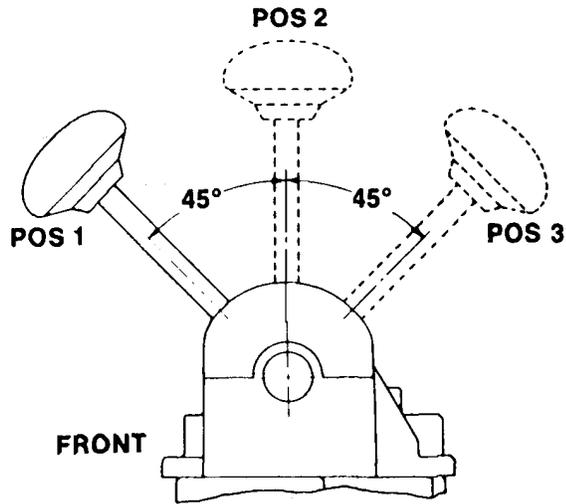
Part No. R431007396 (Old P/N P-069079-00000)

Handle Position	Ports To Which Pressure Is Supplied			
	Spring Return To Position 3 Special Handle Latch at Position 3 22½° Handle Travel Between Positions			
	Out 1L	Out 2L	Out 1R	Out 2R
1	Plugged	X	X	
2	Plugged	X		
3	Plugged			
4	Plugged	X		
5	Plugged	X		X

“A” Pilotair® Pneumatic Directional Control Valves
Panel Mounted Valves, Triple and Quadruple 3-Way Valves, Double Handle Operation

ORDERING REFERENCE

TRIPLE (2-HA-3) and QUADRUPLE (2-HA-4) 3-WAY VALVES - DOUBLE HANDLE OPERATION



2-HA-3 PILOTAIR Valve
 (2 positions right handle, 3 positions left handle)
 Part No. R431004513 (Old P/N P-058380-00001)

2-HA-4 PILOTAIR Valve
 (3 positions both handles)
 Part No. R431004537 (Old P/N P-058451-00001)

HANDLE POSITION	PORTS SUPPLIED			
	LEFT HANDLE		RIGHT HANDLE	
	OUT 1L	OUT 2L	OUT 1R	OUT 2R
1		X	PLUGGED	X
2	X	X		
3	X			

HANDLE POSITION	PORTS SUPPLIED			
	LEFT HANDLE		RIGHT HANDLE	
	OUT 1L	OUT 2L	OUT 1R	OUT 2R
1		X		X
2			X	X
3	X		X	

2-HA-4 PILOTAIR Valve
 (3 positions both handles)
 Part No. R431004541 (Old P/N P-058458-00001)

HANDLE POSITION	PORTS SUPPLIED			
	LEFT HANDLE		RIGHT HANDLE	
	OUT 1L	OUT 2L	OUT 1R	OUT 2R
1		X		X
2				
3	X		X	

**“A” Pilotair® Pneumatic Directional Control Valves
Panel Mounted Valves, Quadruple Three-Way Valves (2-HA-4)**

GATED DOUBLE HANDLE

2-HA-4 PILOTAIR Valve
Part Number P -058377-00001

Handle Position	Ports To Which Pressure Is Supplied			
	Left Handle		Right Handle	
	Out 1L	Out 2L	Out 1R	Out 2R
1		X		X
2	X		X	X
3			X	

2-HA-4 PILOTAIR Valve
Part Number P -059069-00001

Handle Position	Ports To Which Pressure Is Supplied			
	Left Handle		Right Handle	
	Out 1L	Out 2L	Out 1R	Out 2R
1		X		X
2			X	
3	X			

X denotes port supplied in that position.
Empty block denotes port exhausted in that position.

"A" Pilotair® Pneumatic Directional Control Valves Three Way-Normally Closed Cartridge Valves

Technical Data:

Materials	Plastic and Stainless Steel
Operating Pressure (max)	250 psi (17.2 bar)
Ambient Temperature	-40 to 160°F (-40 to 71°C)
Operating Medium	Air
Weight	1.2 oz. (34 g)

OPERATION

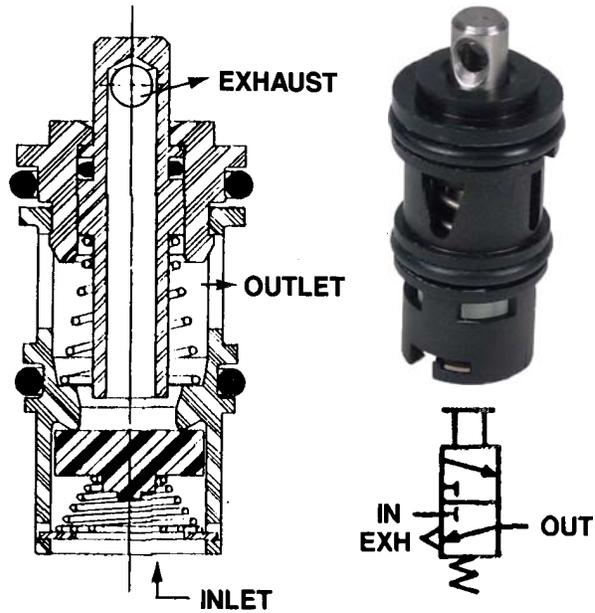
The "A" PILOTAIR® cartridge valve is a mechanically operated (straight push) 3-way directional control valve. It can be easily used in manifolds or in custom installations. This cartridge valve can also be used to graduate pressure (consult factory for additional information).

In release position, as shown, the valve disc seals on the inlet valve seat and closes the passage from the inlet to the outlet. The outlet is vented to atmosphere through the center of the plunger. As the plunger is forced downward by an external force, it seats on the valve disc. This seals the passage between the outlet and exhaust.

Further downward travel of the plunger unseats the valve disc from the inlet valve seat and allows inlet air pressure to flow to the outlet.

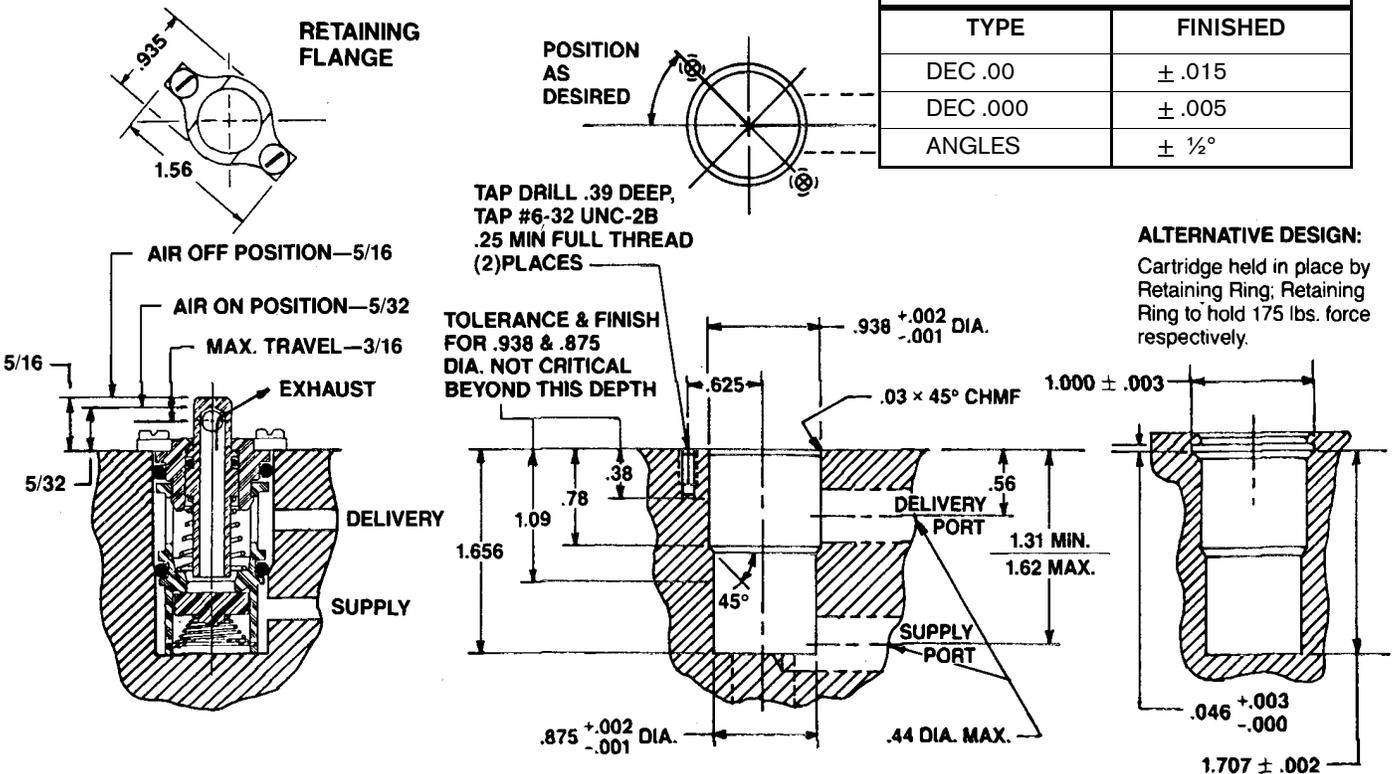
Release of the external force, allows the plunger and valve to spring return to the original position.

Install the valve to ensure operation within the travel limits shown on the outline drawings. Travel beyond these limits can cause damage to the valve.



Description	Part Number	Old P/N
Cartridge Alone	R431003743	P-055474-K0002
Cartridge with Retaining Flange & Screws	R431003742	P-055474-00004

TOLERANCES - Unless specified otherwise	
TYPE	FINISHED
DEC .00	± .015
DEC .000	± .005
ANGLES	± ½°



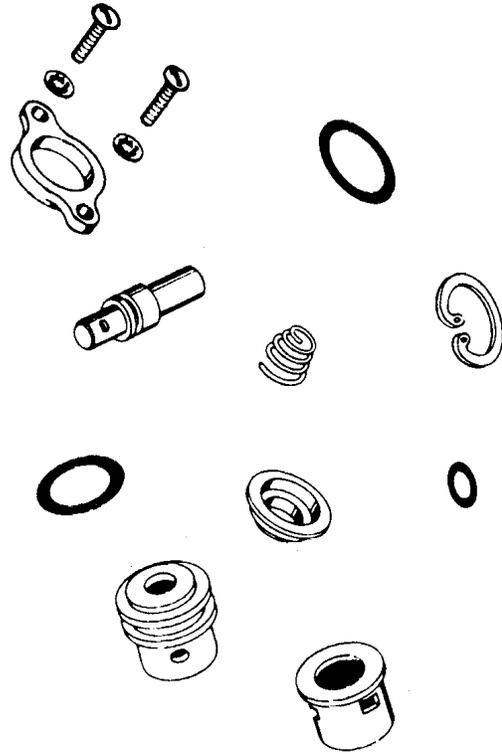
“A” Pilotair® Cartridge-Repair Kits

“A” PILOTAIR® CARTRIDGE



CARTRIDGE REPAIR KIT
Part Number R431003743
(Old P/N P -055474-K0002)

- Simplified Repair
- Factory Tested
- Fits Most Previous Design “A” Pilotair Valves
- Corrosion Resistant



**OLD MAJOR
 REPAIR KIT**

The one piece valve cartridge replaces the individual valve parts assembly for the following devices:

“A” PILOTAIR Valves
 “H” CONTROLAIR Valves
 FLEXAIR Valves - Side Valve Cavity

See next page for Part Number List

Quick, positive repair and conversion can be accomplished by directly replacing the old individual parts with the new factory pressure tested cartridge. The cartridge valve simplifies repair and eliminates possible problems due to improper parts assembly. The modern engineered plastic and stainless steel construction provide superior corrosion resistance and sealing characteristics.

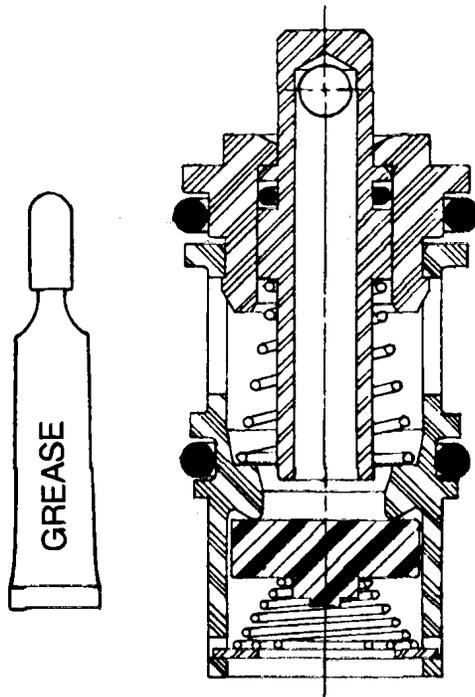
NOTE:

With the above kits, the elastomer seals and some common wear parts in the valve portions of the assemblies can be repaired. On severely worn or damaged valves, additional parts may be required.

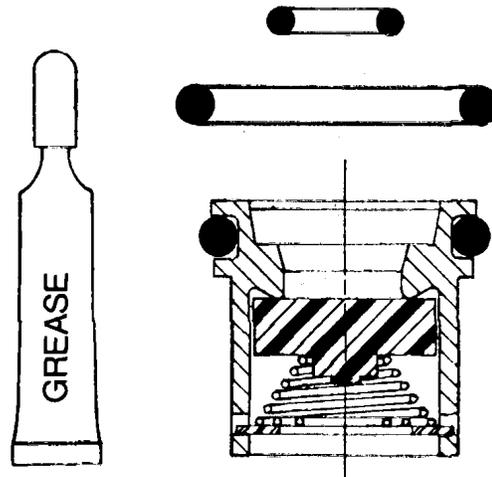
The above kits do not contain any parts for the mechanical operating portions of the valves. The mechanical operating portions of the valve should be repaired when necessary, with individually selected parts, and tested before being put in service.

Refer to Service Bulletin SM-700.7400 for additional parts information and service instructions on the type “A” PILOTAIR pneumatic directional valves.

"A" Pilotair® Cartridge—Repair Kits



CARTRIDGE REPAIR KIT
R431003743 (Old P/N P -055474-K0002)
"A" PILOTAIR VALVES
CONTROLAIR VALVES
FLEXAIR VALVES, On-Off #3 Valve



CARTRIDGE REPAIR KIT
R431003229 (Old P/N P -053460-K0006)
FLEXAIR VALVES
Graduated Pressure #3 Valve Only

Valve Description	Mfg Date	Discontinued Repair Kits		Cartridge Repair Kit♦
		Major Kit	Minor Kit	
Block-type "A" PILOTAIR Valves: 2-CA, 2-LA, 2-MA, & 2-PA	After 1968	P -055474-00000	P -055474-00001●	R431003743 (Old P/N P -055474-K0002)
Panel-type "A" PILOTAIR Valves: 2-BA, 2-HA 2-BA, 2-HA	1969-3/71	P -055474-00000	P -055474-00001●	R431003742 (Old P/N P -055474-00004▲) R431003743 (Old P/N P -055474-K0002)
	After 3/71	P -055474-00000	P -055474-00001●	
FLEXAIR Valves On-Off #3 Valve Graduating #3 Valve			P -053460-00004 P -053460-00004	R431003743 (Old P/N P -055474-K0002) R431003229 P -053460-00006●

NOTES:

- ♦ 1. To maintain valve performance, the complete cartridge should be replaced on all repairs.
- 2. Kits repair only one valve cavity. Complete valves with two or more cavities (such as 2-HA-2, 2-HA-3 and 2-HA-4) will require multiple kits.
- ▲ 3. Panel mounted 2-BA and 2-HA valves manufactured between 1969 and 1971 used die cast flange retainer to hold the valve parts in the body cavity Kit R431003742 (Old P/N P -055474-00004) includes a new flange and screws to service these valves.
- 4. Kit R431003229 (Old P/N P -053460-K0006) can be used as a minor repair kit for valves that do not have the new cartridge installed.

NOTICES TO PRODUCT USERS

1. WARNING: FLUID MEDIA

Bosch Rexroth pneumatic devices are designed and tested for use with filtered, clean, dry, chemical free air at pressures and temperatures within the specified limits of the device. For use with media other than air or for human life support systems, Bosch Rexroth must be consulted. Hydraulic cylinders are designed for operation with filtered, clean, petroleum based hydraulic fluid; operation using fire-resistant or other special types of fluids may require special packing and seals. Consult the factory.

2. WARNING: MATERIAL COMPATIBILITY

Damage to product seals or other parts caused by the use of non-compatible lubricants, oil additives or synthetic lubricants in the air system compressor or line lubrication devices voids Bosch Rexroth's warranty and can result in product failure or other malfunction. See lubrication recommendations below.

AIR LINE LUBRICANTS! In service higher than 18 cycles per minute or with continuous flow of air through the device, an air line lubricator is recommended. * (Do not use line lubrication with vacuum products.) However, the lubricator must be maintained since the oil will wash out the grease, and lack of lubrication will greatly shorten the life expectancy. The oils used in the lubricator must be compatible with the elastomers in the device. The elastomers are normally BUNA-N, NEOPRENE, VITON, SILICONE and HYTREL. Bosch Rexroth recommends the use of only petroleum-based oils without synthetic additives, and with an aniline point between 180° and 210° F.

COMPRESSOR LUBRICANTS! All compressors (with the exception of special "oil free" units) pass oil mist or vapor from the internal crankcase lubricating system through to the compressed air. Since even small amounts of non-compatible lubricants can cause severe seal deterioration (which could result in component and system failure) special care should be taken in selecting compatible compressor lubricants. It is recommended that users review the National Fluid Power Association "Recommended Guide Lines For Use Of Synthetic Lubricants In Pneumatic Fluid Power Systems" (NFPA T1-1978).

3. WARNING: INSTALLATION AND MOUNTING

The user of these devices must conform to all applicable electrical, mechanical, piping and other codes in the installation, operation or repair of these devices.

INSTALLATION! Do not attempt to install, operate or repair these devices without proper training in the technique of working on pneumatic or hydraulic systems and devices, unless under trained supervision. Compressed air and hydraulic systems contain high levels of stored energy. Do not attempt to connect, disconnect or repair these products when system is under pressure. Always exhaust or drain the pressure from system before performing any service work. Failure to do so can result in serious personal injury.

MOUNTING! Devices should be mounted and positioned in such manner that they cannot be accidentally operated.

4. WARNING: APPLICATION AND USE OF PRODUCTS

The possibility does exist for any device or accessory to fail to operate properly through misuse, wear or malfunction. The user must consider these possibilities and should provide appropriate safe guards in the application or system design to prevent personal injury or property damage in the event of malfunction.

5. WARNING: CONVERSION, MAINTENANCE AND REPAIR

When a device is disassembled for conversion to a different configuration, maintenance or repair, the device must be tested for leakage and proper operation after being reassembled and prior to installation.

MAINTENANCE AND REPAIR! Maintenance periods should be scheduled in accordance with frequency of use and working conditions. All Bosch Rexroth products should provide minimum of 1,000,000 cycles of maintenance free service when used and lubricated as recommended. However, these products should be visually inspected for defects and given an "in system" operating performance and leakage test once a year. Where devices require major repair as result of the one million cycles, one year, or routine inspection, the device must be disassembled, cleaned, inspected, parts replaced as required, rebuilt and tested for leakage and proper operation prior to installation. See individual catalogs for specific cycle life estimates.

6. PRODUCT CHANGES

Product changes including specifications, features, designs and availability are subject to change at any time without notice. For critical dimensions or specifications, contact factory.

*Many Bosch Rexroth pneumatic components can operate with or without air line lubrication; see individual sales catalogs for details.

--Refer to the appropriate service catalog for parts and service information.

LIMITATIONS OF WARRANTIES & REMEDIES

Bosch Rexroth warrants its products sold by it to be free from defects in material and workmanship to the following:

For twelve months after shipment Bosch Rexroth will repair or replace (F.O.B. our works), at its option, any equipment which under normal conditions of use and service proves to be defective in material or workmanship at no charge to the purchaser. No charge will be made for labor with respect to defects covered by this Warranty, provided that the work is done by Bosch Rexroth or any of its authorized service facilities. However, this Warranty does not cover expenses incurred in the removal and reinstallation of any product, nor any downtime incurred, whether or not proved defective.

All repairs and replacement parts provided under this Warranty policy will assume the identity, for warranty purposes, of the part replaced, and the warranty on such replacement parts will expire when the warranty on the original part would have expired. Claims must be submitted within thirty days of the failure or be subject to rejection.

This Warranty is not transferable beyond the first using purchaser. Specifically, excluded from this Warranty are failures caused by misuse, neglect, abuse, improper operation or filtration, extreme temperatures, or unauthorized service or parts. This Warranty also excludes the use of lubricants, fluids or air line additives that are not compatible with seals or diaphragms used in the products. This Warranty sets out the purchaser's exclusive remedies with respect to products covered by it, whether for negligence or otherwise. Neither, Bosch Rexroth nor any of its affiliates will be liable for consequential or incidental damages or other losses or expenses incurred by reason of the use or sale of such products. Our liability (except as to title) arising out of the sale, use or operation of any product or parts, whether on warranty, contract or negligence (including claims for consequential or incidental damage) shall not in any event exceed the cost of replacing the defective products and, upon expiration of the warranted period as herein provided, all such liability is terminated. THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, WHETHER FOR MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR OTHERWISE. No attempt to alter, amend or extend this Warranty shall be effective unless authorized in writing by an officer of Bosch Rexroth Corporation.

Bosch Rexroth reserves the right to discontinue manufacture of any product, or change product materials, design or specifications without notice.

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The data specified herein only serves to describe the product. No statements concerning a certain condition or suitability for a certain application can be derived from our information. The given information does not release the user from obligation of own judgment and verification. It must be remembered that our products are subject to a natural process of wear and aging.

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