

HD-2 CONTROLAIR® VALVE

Service Information

Description of Models

The HD-2 Type Controlair Valves are handle operated 4-way, exhausted center, pressure control valves.

The typical unit contains two directional control 3-way side valves and a pressure graduating portion that is arranged to increase, decrease or maintain air pressure to a separate delivery line. In neutral position, both 3-way side valves exhaust both delivery lines. A movement of 10 degrees either side of center position opens the appropriate side valve and directs pressure to the indicated outlet port. Continued movement past 10 degrees up to full travel, or 46 degrees either side of neutral continues to actuate the pressure graduating portion to deliver a graduated pressure according to the valve of the control spring.



Models

There are six models with similar valve functions, but different handle operating characteristics.

HD-2-X Controlair Valve - Handle is spring returned to neutral position from all positions in the handle travel. Some special models exist. See notes on Identity schedule on page 7.

HD-2-LX Controlair Valve - Handle is spring returned to neutral position from all positions except at the maximum pressure setting on both sides of center. The handle is held in both extreme positions by a mechanical detent.

HD-2-FX Controlair Valve - Handle is equipped with a friction brake that will hold the handle in any position selected in the handle travel.

HD-2-XS Controlair Valve - Handle detents in both maximum pressure positions. The handle is spring returned to neutral position from all other positions in the handle travel. Graduated pressure to port (8) is only delivered in one direction of the handle movement.

HD-2-FXR Controlair Valve - Handle function is similar to the HD-2-FX Valve. The difference is the two directional valves are *supplied* instead of being *exhausted* when the handle is in the neutral position,

HD-2-LS Controlair Valve - Handle holds in full travel, neutral and detent positions.

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Installation and General Maintenance Recommendations

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 a system is under pressure. Always exhaust or drain the pressure from a 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 a manner that they cannot be accidentally operated.

Installation and General Maintenance Recommendations

Before installing the Controlair® Valve, all air lines in the system should be cleaned to remove all dirt, moisture or contamination.

A strainer is furnished on the inlet port to protect the valve from large particles or foreign matter in the supply line. To insure long, trouble-free service, a 10 micron or better filter should be installed in the supply line to the valve.

The HD-2 Controlair Valve is designed for panel mounting. The valve less the pipe bracket can be installed from the top of the panel. Refer to the installation view for panel opening dimension. Allow suitable clearance for installing or removing of the (3) pipe bracket screws which are 2 1/8" long.

GENERAL MAINTENANCE AND REPAIR RECOMMENDATIONS

Maintenance periods should be scheduled in accordance with frequency of use and working environment of the Controlair Valve.

All valves must be visually inspected for wear and given an "In System" operating performance and leakage test at least once a year. If these visual observations indicate valve repair is required, the valve must be removed immediately and repaired.

A major overhaul is recommended at one million cycles. However, where frequency of use is such that it would require more than two years to obtain the one million cycles, the valve must be overhauled at the two year period.

When it is determined that the Controlair Valve requires a major repair as a result of the one million cycles, one year routine inspection or the two year service period has elapsed, the device must be disassembled, cleaned, inspected, parts replaced as required. The valve then must be tested for leakage and proper operation prior to installation, refer to the Major Repair and Maintenance Instructions and test procedures.

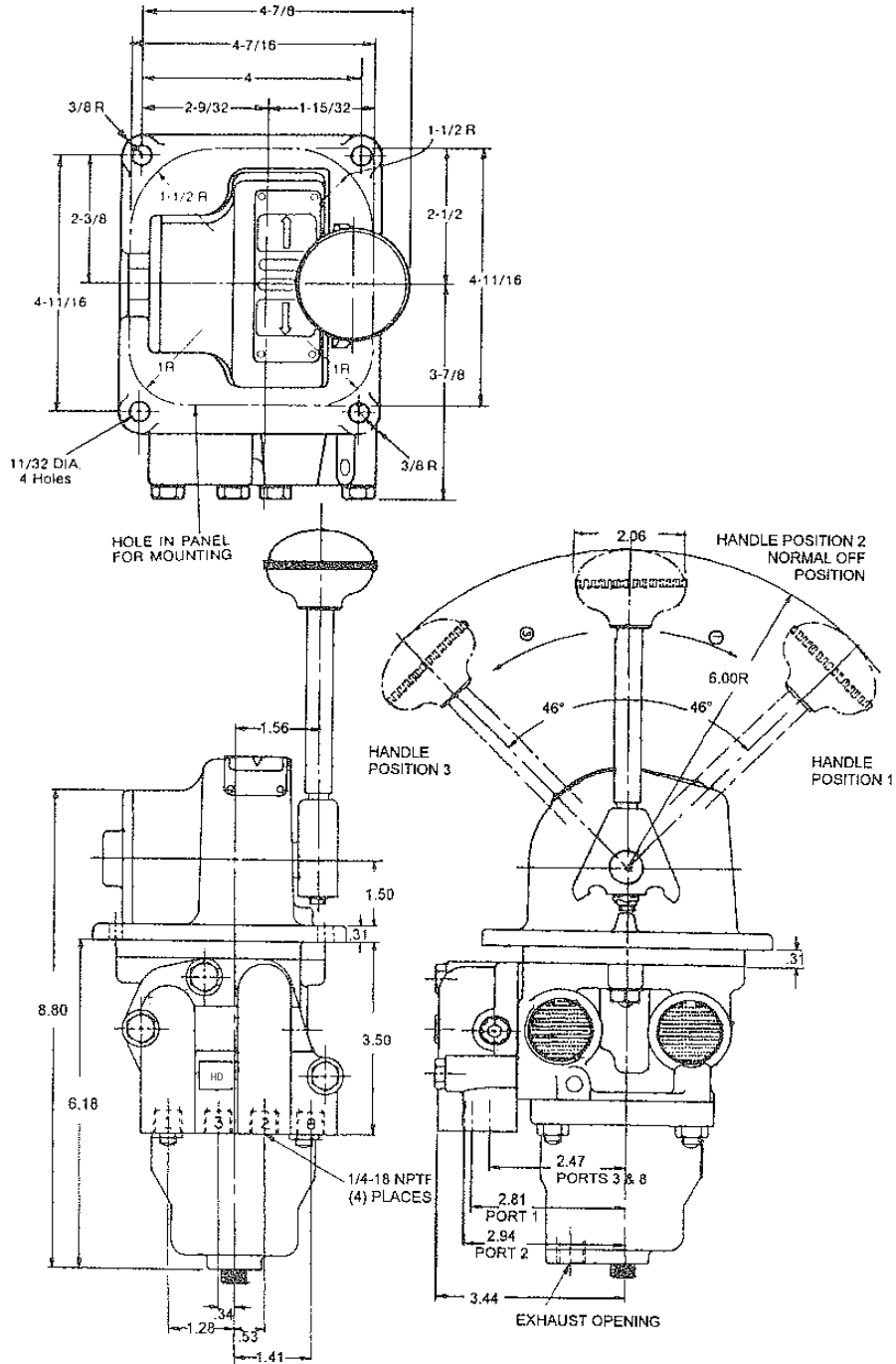
Notice that the operating portion of the valve can be removed without disturbing the pipe connections by just removing the (3) screws that hold the pipe bracket to the valve.

No special tools are required to maintain the Controlair valves, with the exception of internal snap-ring pliers.

One complete Controlair valve should be kept in stock for every (4) valves in service. During the maintenance period, replacing the complete valve with the stand-by unit reduces production down time and affords inspection and replacement of parts at a more appropriate time and favorable location.

Technical Data:	
Max. Operating Pressure	200 PSI (13.8 Bar)
Admissible Mediums	Clean & Dry Compressed Air
Operating Temperature	-40° to 160° F (- 40° to 71° C)
Hysteresis	1 1/2 Psi
Control Pressure Range	Ref. Identity Chart
Pressure Change	1/2 Psi. Increments
Mounting	Flanged Plate
Port Size	1/4-18 NPTF
Materials	
Controlair Valve	
Housing & Body	Die Cast Aluminum
Internal Parts	Brass, Rubber, Aluminum, Steel, Plastic and Hytrel™
Weight	9 Lb. (4.1 Kgs.)

Outline View HD-2 TYPE CONTROLAIR® VALVE



Description of Operation For HD-2 Controlair[®] Valve

Note in the diagrammatic view that supply pressure is connected to port (2) and this supply pressure is directed to the pressure-graduating portion and the side control valves. The delivery graduating portion is directed to port (8). The delivery from the side valves is directed to outlet ports (1) or (3).

With the handle in neutral position both outlet (1) & (3) ports are open to atmosphere through their respective side valve and port 8 is at minimum pressure.

Movement of the handle through the first 10 degrees of travel from neutral operates one of the 3 way side valves to connect the supply pressure from port 2 to the appropriate outlet port (1) or (3), and the graduating portion to port (8).

Movement of the handle to 10 degrees either side of center position causes the dual cam to push down on the pressure control plunger closing the exhaust valve and opening the upper supply valve, which allows air to flow to port (8) and the upper diaphragm chamber. As the pressure builds up in the delivery line Port (8) and through the sensing port orifice it deflects the control diaphragm downward, compressing the control spring. When sufficient diaphragm deflection is obtained to allow the upper supply valve in the pressure control portion to close, the pressure in the delivery line is held to that value.

The value of the pressure delivered to the outlet port is proportional to the pressure graduating portion plunger movement. This movement in turn is controlled by the cam contour and is proportional to the handle travel.

The HD-2 Controlair Valve will automatically compensate for air pressures changes. These air pressure changes can be caused by line leakage, temperature change or load feedback. If air pressure at port (8) increases over that called for by the handle position, the diaphragm in the control portion will deflect downward opening the lower exhaust valve and exhausting air until the original setting is obtained. If the pressure drops below that called for by the handle position the decreased force on the diaphragm will allow the control spring to force the diaphragm upward, opening the upper supply valve to restore the set pressure.

The range of pressure is controlled by the strength of the diaphragm spring. Various values are available as shown on the Identity Schedule on page 7.

Repair and Maintenance Instructions

Repair and Maintenance Instructions

When it has been determined that the Controlair® Valve requires repairs, the following general instructions are recommended.

Disassembly, Cleaning and Lubrication

Completely disassemble the Controlair valve. Wash all metal parts in a non-flammable solvent. Rinse each part thoroughly and blow dry with low pressure air.

Inspect and clean the inlet filter Item #2 and gasket Item #3 (older models had multiple gaskets that are still supplied in the repair kits). Be sure all passages in the body and pipe bracket and sensing port orifice in top of the diaphragm chamber are clean and unrestricted.

To remove cam set screw Item #55 use of an impact wrench (set soft) will break it loose to remove the cam and shaft form cam housing.

Examine all parts carefully. Replace all rubber parts and all worn or damaged parts. *The use of repair kits is recommended.*

Reassemble

Refer to exploded Parts and Assembly Views.

Valves should always be reassembled using new rubber parts.

Lubricate all metal to metal wear surfaces with Lubriplate 107 Grease. Lubricate all the rubber parts, **except the diaphragm** with Dow Corning No. 55 Pneumatic Grease.

The exhaust valve and seat if not replaced should be polished for minimum leakage using a 600 grit lapping compound. Be sure to clean these parts prior to installing in the valve.

Installing the cam set screw Item #55. The cam set screw must be fully seated into the drill point location on the cam shaft, Items #62 or 63. When installing set screw Item #55 use a thread locker like Loctite TL242.

Installing the handle Item #53, seat the handle into the yoke, Item #52 before installing the nut, Item #51.

Do not over torque the cap nut, Item #60.

Adjustments

Screw, Item #40 varies the graduated output pressure setting. Screws Item #23 adjust the opening of the side valves and screw, Item #19 aligns the follower Item #18 with the cam Item #61. The nut Item #50 adjusts the brake tension on the HD-2-FX versions.

Side Valve Lever Adjustments

With air supplied to the valve, turn adjusting screw Item #40 in or until the control spring Item #29 is slightly compressed. Remove the snap rings and screens Item #3. Move the Controlair Valve handle Item #53 back and forth, both sides of the neutral position, observing the action of the levers Items #20 & 22. The side valves should be fully open after the handle moves the first 10 degrees of travel.

Move the control handle to a maximum pressure position. With 3/32" Allen Wrench, back out adjusting screws Items #23 of the operated lever Items #20 or 22 just far enough to crack the exhaust valve so that gage in the output line starts to show a drop in pressure. From this point, turn the adjusting screw in a full three (3) turns. This will open the inlet valve of the side valve to its maximum capacity.

Move the handle to the other extreme position and repeat these adjustments on the other side valve lever.

Graduated Output Pressure Adjustments

Adjusting screw Item #40 varies the maximum pressure setting. Turning the adjusting screw in raises the *maximum* pressure. Turning the screw out decreases the *maximum* pressure. The maximum control pressure adjustment should not exceed the maximum control pressure shown in the Identity Schedule for that part number. (Control Springs are color coded).

The maximum output pressure rating can be changed by changing the control spring Item #30.

With air supplied to the valve, move handle from neutral to full travel position and hold. Adjust graduating valve screw Item #40 to obtain the maximum control pressure per Identity schedule. Move handle back to neutral position and *note* delivery line is exhausted to zero. Move handle to full travel position in the opposite direction and the delivery pressure should be the same as the other side. If the delivery pressure is higher or lower by 2 to 3 psi it can be corrected by adjusting the cam dog Item #18 with adjusting screw Item #19. Move the handle back to neutral position and *note* delivery line is exhausted to zero.

Cam Dog Adjustment

The eccentric cam dog screw Item #19 aligns the cam follower Item #18 with the rise in the cam item #61. If the pressure setting is not within 2 to 3 psi from one full handle travel position to the other, the difference can be compensated for by turning the eccentric screw Item #19 either clockwise or counter-clockwise. This adjustment is accessible from the outside of the valve through the notch under the panel flange using a long flat bladed screw driver.

The following procedure is recommended: move the valve handle to Full Travel in one direction (on detented models handle should be placed in detent position). Observe the output gage and note the pressure. Move the handle to the opposite position, turn the eccentric cam follower screw Item #19 to half way between the pressure difference. Continue adjustment until delivery gages (1 and 3) match within 2 to 3 psi of each other for related handle position.

Special Preload Setting

This settings calls for a predetermined delivery pressure when the handle is moved 10° from neutral in either direction.

Place handle 10° from neutral in either direction. Turn adjusting screw Item #40 in until the gage reads the desired preload pressure. Move the handle to the maximum pressure position. The delivery gage should read, preload pressure plus the range value of the control spring within ± 3 psi. Check handle setting in the opposite direction.

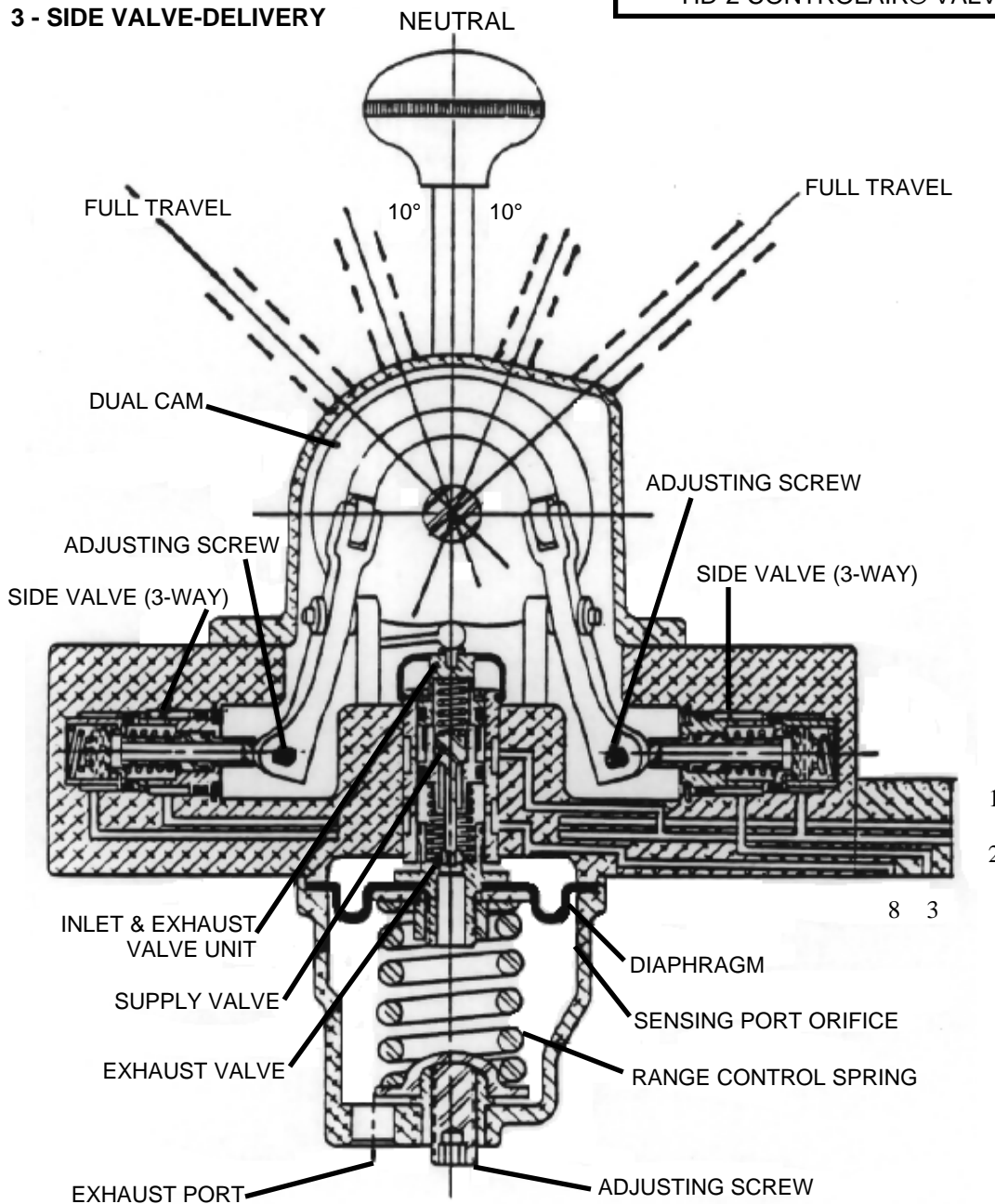
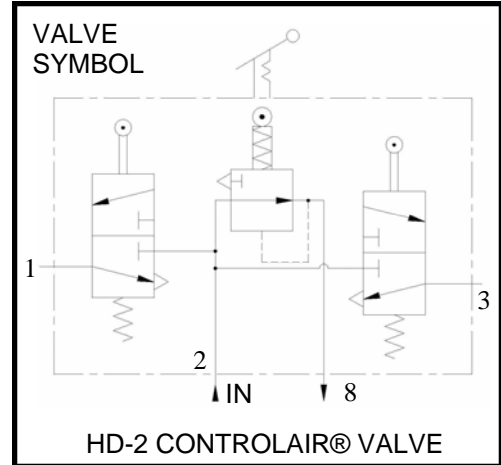
Force Brake Adjustment

The handle force of the HD-2-FX Controlair Valve can be varied by adjusting nut Item #50 on the brake shoe holder Item #47. This adjustment increases or decreases the force required to move the handle in any position of the handle travel.

This adjustment is normally made on the cam housing portion before assembling to the control portion. Factory setting is 8 lbs.

DIAGRAMMATIC VIEW

- LEGEND - PIPE BRACKET**
 2 - SUPPLY-IN
 8 - GRADUATED-DELIVERY
 1 - SIDE VALVE-DELIVERY
 3 - SIDE VALVE-DELIVERY



HD-2 IDENTITY SCHEDULE

Model	Complete Part Number	Control Pressure Range (PSI)	Control Spring & Color Code (Ref. # 29)	Cam Portion *Complete	Valve Portion **Complete	Remarks
HD-2-X	P-050973-00001	0 - 65	P55442 Brown	850258	P-055583-00001	
	P-050973-00002	0 - 100	526749 Yellow	850258	P-055583-00002	
	P-050973-00003	0 - 125	540577 Light blue	850258	P-055583-00003	
	P-050973-00004	0 - 150	P55441 Red	850258	P-055583-00004	
	P-050973-00005	0 - 15	P60293 White	850258	P-055583-00005	
HD-2-FX	P-050970-00001	0 - 65	P55442 Brown	850260	P-055883-00001	
	P-050970-00002	0 - 100	526749 Yellow	850260	P-055583-00002	
	P-050970-00003	0 - 125	540577 Light blue	850260	P-055583-00003	
	P-050970-00004	0 - 150	P55441 Red	850260	P-055583-00004	
	P-063512-00001	0 - 65	P55442 Brown	850260	P-055583-00001	Note 2
	P-063512-00002	0 - 100	540577 Light blue	850260	P-055583-00002	Note 3
	P-064924-00017	15 - 70	P60291 Orange	850260	P-055583-00017	Note 4
	P-066514-00001	0 - 65	P55442 Brown	P66515	P-055583-00003	Note 1
P-068503-00001	0 - 65	P64834 Silver	P66515-0001	P-055583-00022	Note 5	
HD-2-LX	P-050972-00001	0 - 65	P55442 Brown	850431	P-055883-00001	
	P-050972-00002	0 - 100	526749 Yellow	850431	P-055583-00002	
	P-050972-00003	0 - 125	540577 Light blue	850431	P-055583-00003	
	P-050972-00004	0 - 150	P55441 Red	850431	P-055583-00004	
HD-2-LS	P-055449-00001	0 - 65	P55442 Brown	P55592	P-055883-00001	
	P-055449-00003	0 - 125	540577 Light blue	P55592	P-055583-00002	
	P-055449-00004	0 - 150	P55441 Red	P55592	P-055583-00015	
HD-2-FXR	P-051868-00001	0 - 65	P55442 Brown	P51870	P-055883-00001	
HD-2-XS	P-067556-00001	0 - 65	P55442 Brown	P67555	P-055883-00001	Note 6

Cam Portion - less valve portion, pipe bracket, screws and nameplate

** Valve Portion - less pipe bracket, screws and cam portion.

Note 1 - Same as P-050971-00001 except items 38, 52 & 53 are chrome plated (refer to page 8).

Note 2 - Same as P-050971-00001 except external surfaces are painted with black epoxy paint.

Note 3 - Same as P-050971-00003 except external surfaces are painted with black epoxy paint.

Note 4 - Same as P-050970-00000 - type except range setting.

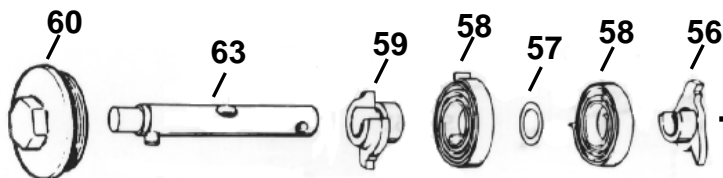
Note 5 - Same as P-050970-00000 - type except pressure setting and cam, Item 61, Pc. No. P-068502-00000. Special setting 0 psi at clutch and heavy detent at 13 degrees

Note 6 - Same as HD-2-X, Pc. No. P-050973-00001, except cam and escutcheon plate, Item 61 & 67

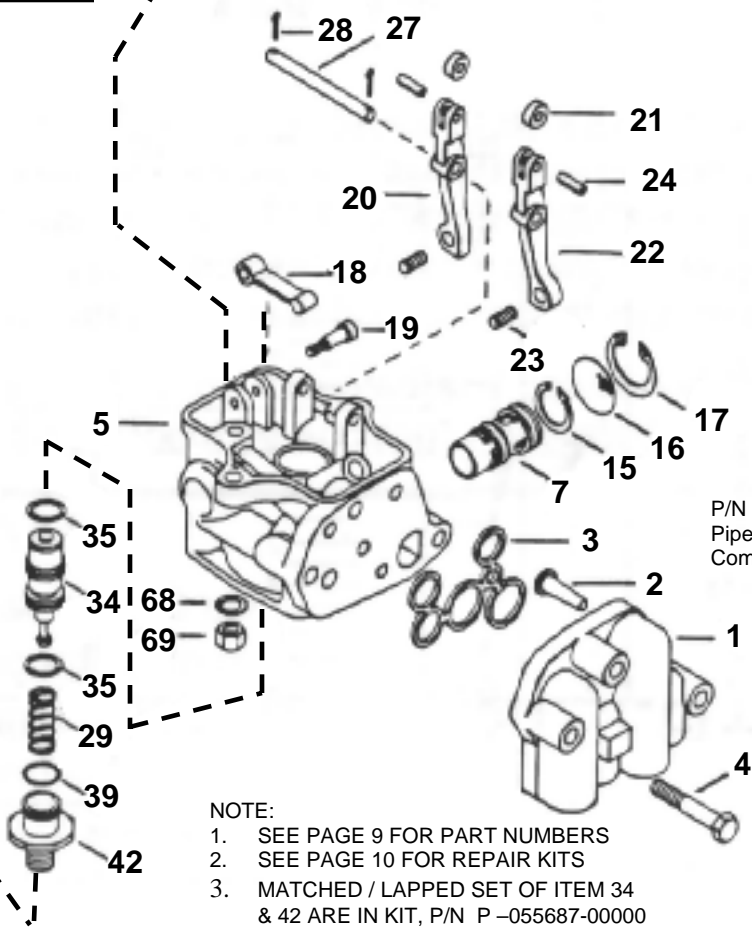
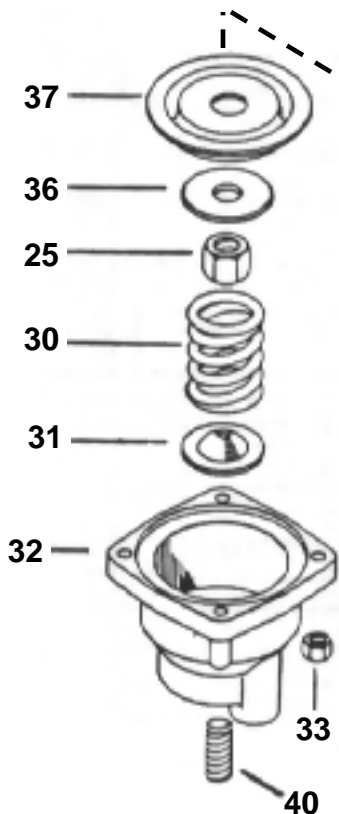
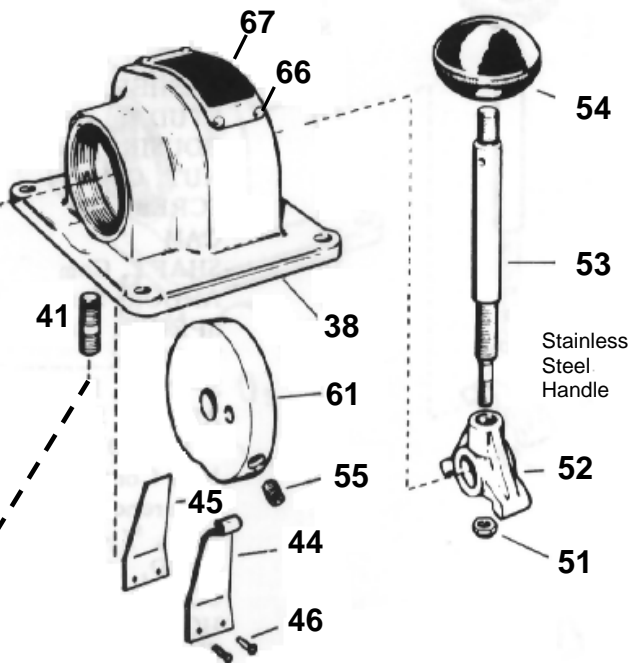
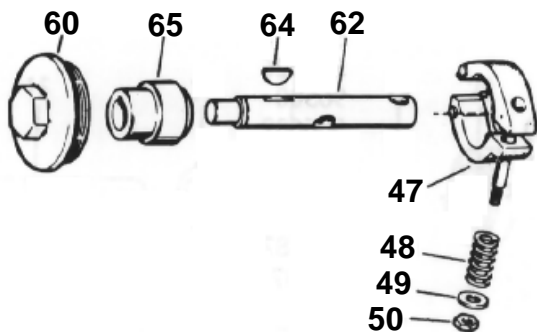
Pc. No.'s P-067554-00001 & P-048348-00000 respectively. (no graduated pressure at delivery line (8) when handle is moved in direction towards pipe bracket.)

EXPLODED VIEW

HD-2-X CONTROLAIR®
 HD-2-LX CONTROLAIR®
 HD-2-LS CONTROLAIR®
 HD-2-XS CONTROLAIR®



HD-2-FX CONTROLAIR®
 HD-2-FXR CONTROLAIR®



P/N - P-066890-K0000
 Pipe Bracket Portion
 Complete (Ref. 1,2,3, 4)

NOTE:
 1. SEE PAGE 9 FOR PART NUMBERS
 2. SEE PAGE 10 FOR REPAIR KITS
 3. MATCHED / LAPPED SET OF ITEM 34
 & 42 ARE IN KIT, P/N P-055687-00000

HD-2 Controlair® Valve Parts List

Ref.	Qty.	Description	HD-2-X	HD-2-LX	HD-2-LS	HD-2-XS	HD-2-FX	HD-2-FXR
		Complete Device	P-50973-000X	P-50972-000X	P-55446-000X	P67556-000X	P50970-000X	P-51868-000X
1	1	Pipe Bracket	P66812-0006	P66812-0006	P66812-0006	P66812-0006	P66812-0006	P66812-0006
2	**1	Filter	P66849	P66849	P66849	P66849	P66849	P66849
3	**1	Gasket	P66823	P66823	P66823	P66823	P66823	P66823
4	3	Screws	P49902-0048	P49902-0048	P49902-0048	P49902-0048	P49902-0048	P49902-0048
5	1	Complete Bottom Portion includes items 5 thru 33	P55583-000X	P55583-000X	P55583-000X	P55583-000X	P55583-000X	P55583-000X
Must specify spring range, same as last digit on valve								
6	1	Complete Body Bushed w/item 7	P51112-0001	P51112-0001	P51112-0001	P51112-0001	P51112-0001	P51112-0001
7	1	Cartridge Valve	See Repair Kits	See Repair Kits	See Repair Kits	See Repair Kits	See Repair Kits	See Repair Kits
8	2	Side Cartridge Valve w/2 "O" rings	P55474-0002	P55474-0002	P55474-0002	P55474-0002	P55474-0002	P55474-0002
8A	2	Side Cartridge Vlv w/2 "O" rings including	P57094-0001	P57094-0001	P57094-0001	P57094-0001	P57094-0001	P57094-0001
	4	*Snap rings	See Repair Kits	See Repair Kits	See Repair Kits	See Repair Kits	See Repair Kits	See Repair Kits
	2	*Screens	See Repair Kits	See Repair Kits	See Repair Kits	See Repair Kits	See Repair Kits	See Repair Kits
15	2	Snap Ring	See Repair Kits	See Repair Kits	See Repair Kits	See Repair Kits	See Repair Kits	See Repair Kits
16	2	Screen	See Repair Kits	See Repair Kits	See Repair Kits	See Repair Kits	See Repair Kits	See Repair Kits
17	2	Snap Ring	See Repair Kits	See Repair Kits	See Repair Kits	See Repair Kits	See Repair Kits	See Repair Kits
18	**1	Cam Dog	P52835	P52835	P52835	P52835	P52835	P52835
19	1	Cam Dog Pin	P51856	P51856	P51856	P51856	P51856	P51856
20	1	Left Lever, includes Items 21, 23 & 24	P58978-0001	P58978-0001	P58978-0001	P58978-0001	P58978-0001	P58978-0001
21	1	Roller included with lever						
22	1	Rt. Lever, includes items 21, 23 & 24	P58979-0001	P58979-0001	P58979-0001	P58979-0001		P58979-0001
23	1	Adjusting screw included with lever						
24	1	Pin included with lever						
25	*1	Nut	See Repair Kits	See Repair Kits	See Repair Kits	See Repair Kits	See Repair Kits	See Repair Kits
27	1	Lever Pin	P50686-0007	P50686-0007	P50686-0007	P50686-0007	P50686-0007	P50686-0007
28	2	Cotter Pins	P49913-0001	P49913-0001	P49913-0001	P49913-0001	P49913-0001	P49913-0001
29	*3	Exhaust Valve Spring	See Repair Kits	See Repair Kits	See Repair Kits	See Repair Kits	See Repair Kits	See Repair Kits
30	1	Control Springs	See page 6	See page 6	See page 6	See page 6	See page 6	See page 6
31	1	Spring Seat	526347	526347	526347	526347	526347	526347
32	1	Spring Housing	P66488-0002	P66488-0002	P66488-0002	P66488-0002	P66488-0002	P66488-0002
33	4	Mounting Nuts	P49901-0020	P49901-0020	P49901-0020	P49901-0020	P49901-0020	P49901-0020
34	*1	Graduating Valve includes items 21 & 22	See Repair Kits	See Repair Kits	See Repair Kits	See Repair Kits	See Repair Kits	See Repair Kits
35	*2	3/4" "O" Rings	See Repair Kits	See Repair Kits	See Repair Kits	See Repair Kits	See Repair Kits	See Repair Kits
36	*1	Washer	See Repair Kits	See Repair Kits	See Repair Kits	See Repair Kits	See Repair Kits	See Repair Kits
	1	Complete Top Portion	850258	850258	P55592	P67555	850260	P55583-1
37	*1	Diaphragm	See Repair Kits	See Repair Kits	See Repair Kits	See Repair Kits	See Repair Kits	See Repair Kits
	1	Complete Cam Housing includes Items 38, 39, 40, 41, 42, 63 & 64	P51284	P51205	P51205	P51284-0001	P51205	P51205
38	*1	Cam Housing with bushing	P50851-0002	P50851-0002	P50851-0002	P50851-0002	P50851-0002	P50851-0002
39	*1	"O" Ring	See Repair Kits	See Repair Kits	See Repair Kits	See Repair Kits	See Repair Kits	See Repair Kits
40	1	Adjusting screw	P66209	P66209	P66209	P66209	P66209	P66209
41	2	Studs	P49906-0014	P49906-0014	P49906-0014	P49906-0014	P49906-0014	P49906-0014
42	*1	Exhaust Valve Seat	See Repair Kits	See Repair Kits	See Repair Kits	See Repair Kits	See Repair Kits	See Repair Kits
43	1	Brake Assembly includes items 47, 48, 49, 50 & 65					850187	850187
44	1	Latch		See Repair Kits	See Repair Kits		See Repair Kits	See Repair Kits
45	1	Latch Spring		See Repair Kits	See Repair Kits		See Repair Kits	See Repair Kits
46	2	Rivets		See Repair Kits	See Repair Kits		See Repair Kits	See Repair Kits
47	1	Brake Shoe & Holder					See Repair Kits	See Repair Kits
48	1	Brake Spring					See Repair Kits	See Repair Kits
49	1	Washer					See Repair Kits	See Repair Kits
50	1	Nut					See Repair Kits	See Repair Kits
51	1	Nut	See Repair Kits	See Repair Kits	See Repair Kits	See Repair Kits	See Repair Kits	See Repair Kits
52	1	Yoke	See Repair Kits	See Repair Kits	See Repair Kits	See Repair Kits	See Repair Kits	See Repair Kits
53	1	Handle Shaft	See Repair Kits	See Repair Kits	See Repair Kits	See Repair Kits	See Repair Kits	See Repair Kits
54	1	Ball	See Repair Kits	See Repair Kits	See Repair Kits	See Repair Kits	See Repair Kits	See Repair Kits
55	1	Stop Pin included with cam #61						
56	1	Arbor	850254	850254	850254	850254		
57	1	Spacer Washer	See Repair Kits	See Repair Kits	See Repair Kits	See Repair Kits		
58	2	Return Springs	See Repair Kits	See Repair Kits	See Repair Kits	See Repair Kits		
59	1	Arbor	See Repair Kits	See Repair Kits	See Repair Kits	See Repair Kits		
60	1	End Cap Nut	P55465	P55465	P55465	P55465	P55465	P55465
61	1	Cam w/Stop Pin	P50878-0003	P50878-0003	P50878-0012	P67554-0001	P63994	P51867
62	1	Cam Shaft					See Repair Kits	See Repair Kits
63	1	Cam Shaft	See Repair Kits	See Repair Kits	See Repair Kits	See Repair Kits		
64	1	Woodruff Key					P49767-0003	P49767-0003
65	1	Brake Drum					See Repair Kits	See Repair Kits
66	4	Screws	P49987-0002	P49987-0002	P49987-0002	P49987-0002	P49987-0002	P49987-0002
67	1	Escutcheon Plate	536565-1	536565-1	536565-1	P48348-1	536565-1	536565-1
68	2	Tooth Washers	P49898-0009	P49898-0009	P49898-0009	P49898-0009	P49898-0009	P49898-0009
69	2	Mounting Nuts	P49901-0020	P49901-0020	P49901-0020	P49901-0020	P49901-0020	P49901-0020

* These items are in the a minor repair kit for graduating section

** These items are in the major repair kit for graduating section.

See Page 10
For Repair Kits

Repair Kits for HD-2 Controlair® Valves

Piece Number	Quantity per valve	Description
P -055687-00000 Note 1	1	Minor Graduating Valve Portion-Repair Kit includes items 25, 29, 34, 35, 36, 37, 39 & 42
P -057136-00000 Note 1	1	Major Graduating Valve Portion-Repair Kit includes items 2,3 & 18 and kit P55687
P -055474-00002	2	Minor Side Valve Portion-Repair Kit includes item 7 cartridge with "O" Rings
P -057094-00001	2	Major Side Valve Portion-Repair Kit includes snap ring, screen and kit P -055474-00002
P -064894-00002 Notes 1,2,3 & 4	1	Complete Repair Kit for Control Portion - includes (1) kit P -055687-00000, (2) kits P -057094-00001, items 2, 3, 16 & 17
P -064421-00001 Note 5	1	Spring Latch Kit for LX, LS, FX and FXR Models includes items 44, 45 & 46
850187-00000 Note 5	1	Friction Brake Kit for FX & FXR Models includes items 47, 48, 49, 50 & 65
P -064421-00004 Note 5	1	Cam Shaft Kit for FX & FXR Models includes items 51, 52, 53, 54 & 62
P -064421-00005 Note 5	1	Cam Shaft Kit for X, LX, LS & XS Models includes items 51, 52, 53, 54 & 63
P -064421-00009 Note 5	1	Return Spring and Arbor Kit for X, LX, LS & XS Models includes items 57, 58 & 59
P -066890-K0000	1	Pipe Bracket Portion Kit for all Models includes items 1, 2, 3 & 4

NOTES:

1. The inlet and exhaust valve unit Item 34 and exhaust valve seat Item 42 are lapped together to form a matched set. Kits that contain these items from the factory include matched sets.
2. Select replacement range control spring from identity schedule on page 7.
3. All kits above include small tubes of the recommended lubricants.
4. Valve portion kits listed above contain the seals and other parts that are needed to repair the valve portion.
5. Replace all worn or damaged components, especially in the mechanical portions of the valve. The mechanical parts are listed on pages 7, 8 and 9.

Chrome plated HD-2 Controlair® Valves with chrome plated parts for item numbers listed (See Note 1 -- Page 6)

Model	Complete Part Number	Item 38 Cam Housing Part Number	Item 52 Yoke Part Number	Item 53 Handle Shaft Part Number
HD-2-FX	P -066514-00001	P -051025-00001	P -066852-00001	P -050979-00001
HD-2-FX	P -064924-00017	P -051025-00000	P -066852-00000	850460-00000

Testing and Test Set-Up

Testing

After any repair or adjustments, the HD-2 Controlair Valve should be tested using the following procedures and test arrangements described in this section.

Pressure control valves need to be tested for the following:

1. Function
2. Pressure Range
3. Leakage
4. Flow Capacity
5. Response
6. Mechanical Detents

The adjustments affecting these points were described in the previous sections.

General instructions for accomplishing these tests are listed below.

1. Function: The HD-2 Controlair valve is a 4 way exhausted center valve capable of graduating pressure in one or the other delivery lines. This function must be checked using the test arrangement to insure that only one volume is charged in either direction of handle travel.

2. Pressure Range: The minimum and maximum pressure range generated in the delivery lines (1) and (3) is specified by the control spring in use. See the graduated output pressure setting *Adjustment Section*. After the valve is adjusted, confirm that the minimum and maximum pressure ranges are generated in the delivery lines (1) and (3) as per the *Identity Schedule* by moving the handle from neutral to first 10° then to the full travel position on both sides of center.

3. Leakage: Set supply pressure to 20 psi above maximum delivery pressure of the valve being tested. Using a soap and water solution, coat the valve at the pipe bracket and spring housing parting lines. No leakage is permitted in any handle position.

A. Port (1)

1. On all valves with spring ranges less than 90 psi, set supply line pressure to 100 psi handle to full travel position and hold (detent position on detented valves). Close valve in supply line to port (2) and valve in delivery line (1) to isolate graduating valve. Observe delivery pressure gage in line (1). A pressure drop of no more than 2 psi in 30 seconds is permitted.

2. On all valve with spring ranges of 100 psi and above, set supply line pressure to 100 psi. Move valve handle to deliver 95 psi to delivery line (1) and hold in that position. Close valve in supply line to port (2) and valve and valve in port (1) delivery line to isolate the graduating valve. Observe the delivery gage in line (1). A pressure drop of no more than 2 psi in 30 seconds is permitted.

B. Port (3)

1. Repeat test A-1 for valves with 90 psi or less in opposite direction of the handle travel.

2. Repeat test A-2 for valves with 100 psi or more in opposite direction of the handle travel.

4. Flow Capacity: Set supply line pressure to 100 psi regardless of the control spring rating. Moving the handle from neutral position in either direction to full travel position. The delivery volume (1) or (3) should start to fill within the time limits shown in Table 1.

Move the handle quickly from full travel position to back to neutral position. This should exhaust volume (1) or (3) within the time limits shown on table 1.

Note valve with less than 0 to 35 psi or less rated

springs require an additional volume as shown in test arrangement diagram.

5. Response

A. Port (1) Move valve handle to the full travel position and hold. Fully open the valve at test volume (1) so that the air exhausts through the choke plug. Observe the delivery pressure gage at volume (1). A pressure drop of no more than 3 psi permitted.

B. Port (3) Repeat test 5A for opposite direction of handle travel.

6. Mechanical Detent (HD-2-LX or SX Models only): Move handle to extreme detent position. Connect a spring scale just under the knob item #54. The force required to pull the handle out of detent position should be at least 12 lbs. Check detent hold in both extreme handle positions.

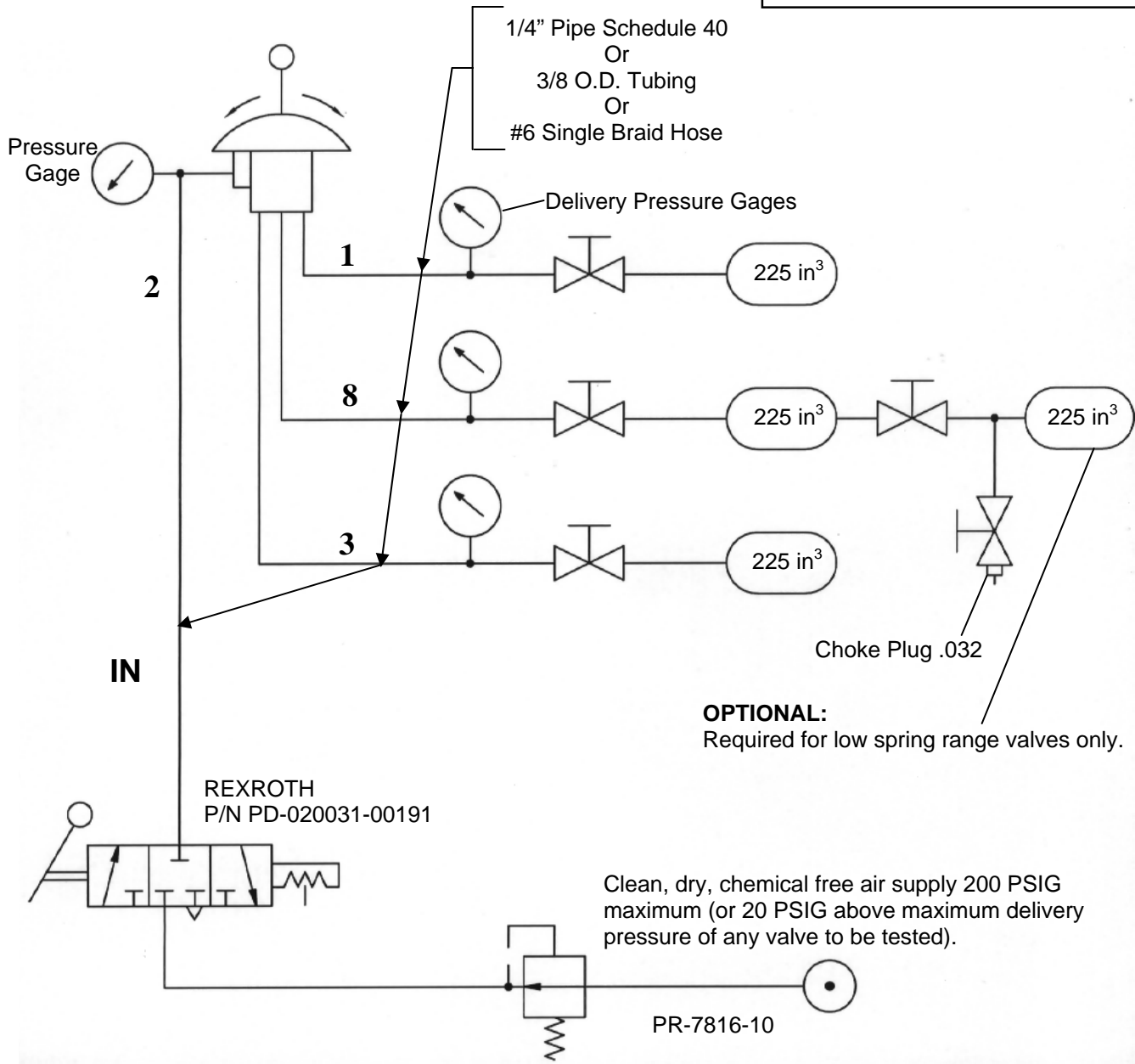
Flow Capacity Tests- Ports 1 & 3 Test Ranges & Times					
Valve Range	Fill Psi	Maximum Time-Sec	Exhaust Psi	Max. Time	Test Vol.
0 to 15 psi	0 to 15 psi	2 sec	15 to 5 psi	2 sec.	450 cu.in.
0 to 20 psi	0 to 15 psi	2 sec	15 to 5 psi	2 sec.	450 cu.in.
0 to 25 psi	0 to 15 psi	2 sec	15 to 5 psi	2 sec.	450 cu.in.
0 to 30 psi	0 to 15 psi	2 sec	15 to 5 psi	2 sec.	450 cu.in.
0 to 35 psi	0 to 15 psi	2 sec	15 to 5 psi	2 sec.	450 cu.in.
0 to 65 psi	0 to 50 psi	2 sec.	50 to 10 psi	2 sec.	225 cu. In.
0 to 100 psi	0 to 50 psi	2 sec.	50 to 10 psi	2 sec.	225 cu. In.
0 to 125 psi	0 to 50 psi	2 sec.	50 to 10 psi	2 sec.	225 cu. In.
0 to 150 psi	0 to 50 psi	2 sec.	50 to 10 psi	2 sec.	225 cu. In.
0 to 65 psi	0 to 15 psi	2 sec.	50 to 10 psi	2 sec.	225 cu. In.
35 to 85 psi	35 to 70 psi	2 sec.	70 to 40 psi	2 sec.	225 cu. In.

Test Arrangement Diagram

Notes:

1. Rexroth Taskmaster® Timing Volumes, part number TM-058887-00225 can be used for the volumes indicated.
2. The supply air line to the valve and the delivery lines must be full size as shown. Line must not exceed 3 Ft. between the supply valve and port (2), or between ports (1) & (3).
3. It is recommended that as large a gage as practical be used on the delivery lines. A 6" gage is recommended.

LEGEND - PIPE BRACKET	
2	SUPPLY-IN
8	GRADUATED-DELIVERY
1	SIDE VALVE-DELIVERY
3	SIDE VALVE-DELIVERY



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