
CLA-VAL

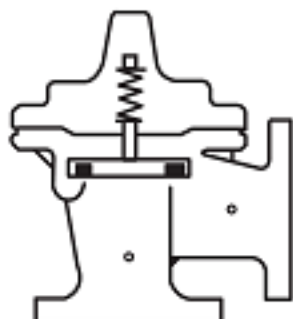
AUTOMATIC CONTROL VALVES

427-01/627-01

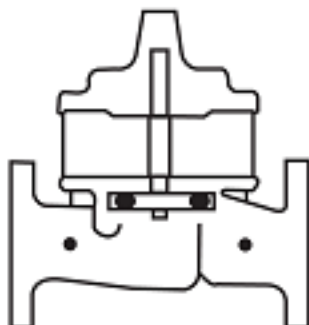
Place this manual with personnel responsible
for maintenance of this valve



Installation



Operation



Maintenance



I.C.	2-5-96	VL	11-25-96	AK	12-04-00	CLA-VAL CO. NEWPORT BEACH, CALIFORNIA	CATALOG NO.	427-01/627-01	DRAWING NO.	76273	REV	N
TYPE OF VALVE AND MAIN FEATURES MODULATING FLOAT VALVE (EQUIPPED WITH X74B-3 AND CFM-7)						DESIGN						
----- NOT FURNISHED BY CLA-VAL CO. ----- ----- OPTIONAL FEATURES -----						DRAWN		JD	11-30-78			
						CHK'D		CH	11-30-78			
INLET OUTLET						APVD		HWE	11-30-78			

***MAIN VALVE OPTIONS = 99999N (3" & SMALLER).**
****MAIN VALVE OPTIONS = 99999N (3" ONLY) & MAIN VALVE AVAILABLE SIZES 3" TO 16".**

ITEM NO.	BASIC COMPONENTS	QTY	
1	*100-01 HYTROL (427-01) MAIN VALVE	1	
	**100-20 HYTROL (627-01) MAIN VALVE		
2	X74B-3 STEM VALVE	1	
3	CFM-7 FLOAT CONTROL	1	

OPTIONAL FEATURE SUFFIX	ADDED TO CATALOG NUMBER	QTY	
A	X46A FLOW CLEAN STRAINER	1	
B	CK2 COCK (ISOLATION VALVE)	3	
D	CHECK VALVE WITH COCKS	1	
F	INDEPENDENT OPERATING PRESSURE		
Y	X43 "Y" STRAINER	1	

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CLA-VAL CO.

NEWPORT BEACH, CALIFORNIA

CATALOG NO.

427-01/627-01

DRAWING NO.

76273

REV

N

TYPE OF VALVE AND MAIN FEATURES

MODULATING FLOAT VALVE (EQUIPPED WITH X74B-3 AND CFM-7)

DESIGN

DRAWN

JD

11-30-78

CHK'D

CH

11-30-78

APVD

HWE

11-30-78

OPERATING DATA

I. FLOAT CONTROL FEATURE:

INSTALLATION AND DESCRIPTION

FLOAT CONTROL (3) MUST BE INSTALLED IN THE RESERVOIR WITH THE FLOAT BALL POSITIONED AT THE DESIRED LIQUID LEVEL. FLOAT CONTROL (3) IS ACTUATED BY A FLOAT BALL THAT FLOATS ON TOP OF THE LIQUID IN THE RESERVOIR. AS THE FLOAT BALL LOWERS, FLOW INCREASES THROUGH CONTROL (3). AS THE FLOAT BALL RISES, FLOW DECREASES THROUGH CONTROL (3). STEM VALVE (2) IS ACTUATED AS THE MAIN VALVE OPENS AND/OR CLOSES. FLOW THROUGH THE STEM VALVE (2) INCREASES AS THE MAIN VALVE OPENS AND IS REDUCED AS THE MAIN VALVE CLOSES.

OPERATION

OPENING OPERATION: AS THE FLOAT (LIQUID LEVEL) LOWERS, FLOW INCREASES THROUGH CONTROL (3) AND REDUCES MAIN VALVE COVER PRESSURE. THIS CAUSES THE MAIN VALVE TO OPEN UNTIL FLOW THROUGH STEM VALVE (2) IS BALANCED WITH THE FLOW THROUGH CONTROL (3).

CLOSING OPERATION: AS THE FLOAT (LIQUID LEVEL) RISES, FLOW DECREASES THROUGH CONTROL (3) AND INCREASES MAIN VALVE COVER PRESSURE. THIS CAUSES THE MAIN VALVE TO CLOSE UNTIL FLOW THROUGH STEM VALVE (2) IS BALANCED WITH THE FLOW THROUGH CONTROL (3). IF THE FLOAT (LIQUID LEVEL) RISES TO THE TOP POSITION, FLOW IS STOPPED THROUGH CONTROL (3). THIS PRESSURIZES THE MAIN VALVE COVER AND THE MAIN VALVE CLOSES.

II. ADJUSTMENT OF X74B-3 STEM VALVE:

WITH THE MAIN VALVE IN THE CLOSED POSITION, TURN THE X74B-3 ADJUSTING STEM CLOCKWISE UNTIL CONTACT IS MADE WITH THE MAIN VALVE DIAPHRAGM ASSEMBLY, THEN TURN 1/8 OF A TURN MORE.

III. OPTIONAL FEATURE OPERATING DATA:

SUFFIX A (FLOW CLEAN STRAINER)

A SELF-CLEANING STRAINER IS INSTALLED IN THE MAIN VALVE INLET BODY BOSS WHICH PROTECTS THE PILOT SYSTEM FROM FOREIGN PARTICLES.

SUFFIX B (ISOLATION VALVES)

CK2 COCKS (B1), (B2) & (D3) ARE USED TO ISOLATE THE PILOT SYSTEM FROM MAIN LINE PRESSURE. THESE VALVES MUST BE OPEN DURING NORMAL OPERATION.

CAD REVISION RECORD - DO NOT REWSE MANUALLY

DESCRIPTION

BY DATE

LTR

SEE SHEET 1.

 CLA-VAL CO. NEWPORT BEACH, CALIFORNIA	CATALOG NO. 427-01/627-01	DRAWING NO. 76273	REV N
	TYPE OF VALVE AND MAIN FEATURES MODULATING FLOAT VALVE (EQUIPPED WITH X74B-3 AND CFM-7)		

OPERATING DATA-CONTINUED

SUFFIX D (CHECK VALVES WITH COCK)

WHEN OUTLET PRESSURE IS HIGHER THAN INLET PRESSURE, CHECK VALVE (D2) OPENS AND (D1) CLOSSES. THIS DIRECTS THE HIGHER OUTLET PRESSURE INTO THE MAIN VALVE COVER AND THE MAIN VALVE CLOSSES.

SUFFIX F (INDEPENDENT OPERATING PRESSURE)

PILOT SUPPLY PRESSURE IS OBTAINED FROM AN INDEPENDENT SOURCE. (PILOT SUPPLY PRESSURE IS OBTAINED FROM THE MAIN VALVE INLET IF SUFFIX (F) IS NOT SPECIFIED.) NOTE: INDEPENDENT OPERATING PRESSURE MUST BE EQUAL TO OR GREATER THAN PRESSURE AT THE MAIN VALVE INLET AT ALL TIMES.

SUFFIX Y (Y-STRAINER)

A Y-PATTERN STRAINER IS INSTALLED IN THE PILOT SUPPLY LINE TO PROTECT THE PILOT SYSTEM FROM FOREIGN PARTICLES. THE STRAINER SCREEN MUST BE CLEANED PERIODICALLY.

IV. CHECK LIST FOR PROPER OPERATION:

- () SYSTEM VALVES OPEN UPSTREAM AND DOWNSTREAM.
- () AIR REMOVED FROM THE MAIN VALVE COVER AND PILOT SYSTEM AT ALL HIGH POINTS.
- () CK2 COCKS (B1), (B2) AND (D3) OPEN (OPTIONAL FEATURE).
- () PERIODIC CLEANING OF STRAINER (Y) IS RECOMMENDED (OPTIONAL FEATURE).
- () FLOAT CONTROL (3) PROPERLY INSTALLED.
- () INDEPENDENT OPERATING PRESSURE CONNECTION PROPERLY CONNECTED.

CAD REVISION RECORD - DO NOT REVISE MANUALLY

DATE

BY

DESCRIPTION

SEE SHEET 1.

LTR

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SCALE 1/2" = 1'-0"	UNITS: PC	SHEET 1 OF 2

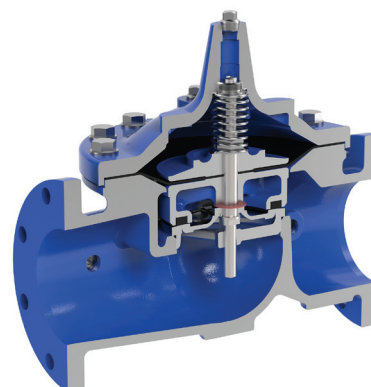


Model 100-01 HYTROL VALVE

INSTALLATION / OPERATION / MAINTENANCE

DESCRIPTION

The Cla-Val Model 100-01 Hytrol Valve is a main valve for Cla-Val Automatic Control Valves. It is a hydraulically operated, diaphragm-actuated, globe or angle pattern valve. This valve consists of three major components; body, diaphragm assembly, and cover. The diaphragm assembly is the only moving part. The diaphragm assembly uses a diaphragm of nylon fabric bonded with synthetic rubber. A synthetic rubber disc, contained on three and one half sides by a disc retainer and disc guide, forms a seal with the valve seat when pressure is applied above the diaphragm. The diaphragm assembly forms a sealed chamber in the upper portion of the valve, separating operating pressure from line pressure.

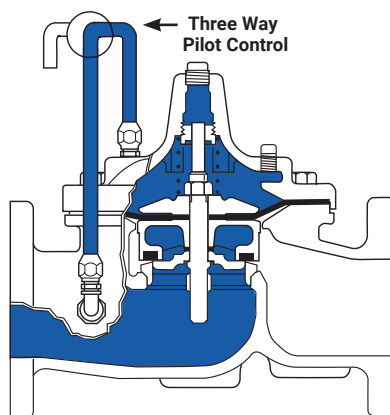


Installation

1. Before valve is installed, pipe lines should be flushed of all chips, scale and foreign matter.
2. It is recommended that either gate or block valves be installed on both ends of the Model 100-01 Hytrol Valve to facilitate isolating the valve for preventive maintenance and repairs.
3. Place the valve in the line with flow through the valve in the direction indicated on the inlet nameplate. (See "Flow Direction" Section) **Note: Valve can be installed in the vertical or horizontal position.**
4. Allow sufficient room around valve to make adjustments and for disassembly.
5. Cla-Val Model 100-01 Hytrol Valves operate with maximum efficiency when mounted in horizontal piping with the cover UP, however, other positions are acceptable. Due to size and weight of the cover and internal components of 8 inch and larger valves, installation with the cover UP is advisable. This makes internal parts readily accessible for periodic inspection.

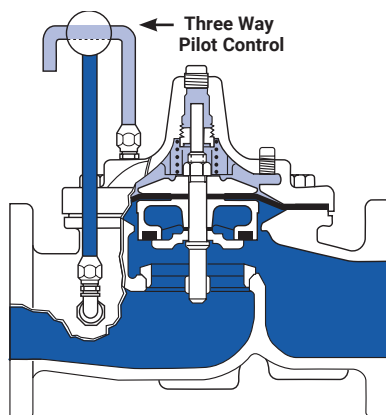
6. Caution must be taken in the installation of this valve to insure that galvanic and/or electrolytic action does not take place. The proper use of dielectric fittings and gaskets are required in all systems using dissimilar metals.
7. If a pilot control system is installed on the Model 100-01 Hytrol Valve, use care to prevent damage. If it is necessary to remove fittings or components, be sure they are kept clean and replaced exactly as they were.
8. After the valve is installed and the system is first pressurized, vent air from the cover chamber and pilot system tubing by loosening fittings at all high points.

Principles of Operation



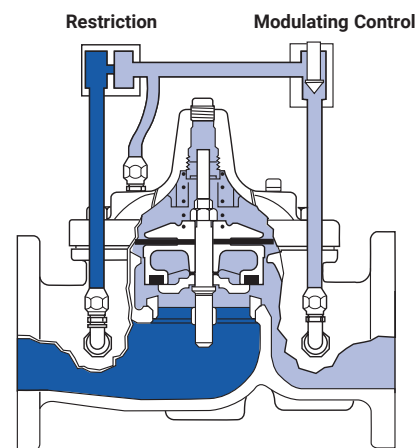
Tight Closing Operation

When pressure from the valve inlet (or an equivalent independent operating pressure) is applied to the diaphragm chamber the valve closes drip-tight.



Full Open Operation

When pressure in diaphragm chamber is relieved to a zone of lower pressure (usually atmosphere) the line pressure (5 psi Min.) at the valve inlet opens the valve.



Modulating Action

Valve modulates when diaphragm pressure is held at an intermediate point between inlet and discharge pressure. With the use of a Cla-Val. "Modulating control," which reacts to line pressure changes, the pressure above the diaphragm is varied, allowing the valve to throttle and compensate for the change.

CLA-VAL™

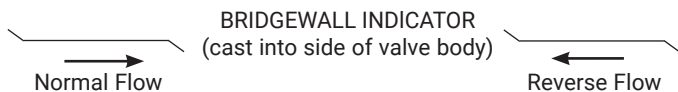
www.cla-val.com | info@cla-val.com

N-100-01 (R-02/2026)

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Flow Direction

The flow through the Model 100-01 Hytrol Valve can be in one of two directions. When flow is “up-and-over the seat,” it is in “normal” flow and the valve will fail in the open position. When flow is “over-the seat-and down,” it is in “reverse” flow and the valve will fail in the closed position. There are no permanent flow arrow markings. **The valve must be installed according to nameplate data.**



Troubleshooting

The following troubleshooting information deals strictly with the Model 100-01 Hytrol Valve. This assumes that all other components of the pilot control system have been checked out and are in proper working condition. (See appropriate sections in Technical Manual for complete valve).

All trouble shooting is possible without removing the valve from the line or removing the cover. It is highly recommended to permanently install a Model X101D Valve Position Indicator and three gauges in unused Hytrol inlet, outlet and cover connections.

After checking out probable causes and remedies, the following three checks can be used to diagnose the nature of the problem before maintenance is started. They must be done in the order shown.

Recommended Tools

1. Three pressure gauges with ranges suitable to the installation to be put at Hytrol inlet, outlet and cover connections.
2. Cla-Val Model X101D Valve Position Indicator. This provides visual indication of valve position without disassembly of valve.
3. Other items are: suitable hand tools such as screwdrivers, wrenches, etc., soft jawed (brass or aluminum) vise, 400 grit wet or dry sandpaper and water for cleaning.

Service Suggestions		
Symptom	Possible Cause	Solutions
Fails to Close	Closed isolation valves in control system, or in main line.	Open Isolation valves.
	Lack of cover chamber pressure	Check upstream pressure, pilot system, strainer, tubing, valves, or needle valves for obstruction.
	Diaphragm damaged. (See Diaphragm Check.)	Replace diaphragm.
	Diaphragm assembly inoperative. Corrosion or excessive scale build up on valve stem. (See Freedom of Movement Check)	Clean and polish stem. Inspect and replace any damaged or badly eroded part.
	Mechanical obstruction. Object lodged in valve. (See Freedom of Movement Check)	Remove obstruction.
	Worn disc. (See Tight Sealing Check)	Replace disc.
	Badly scored seat (See Tight Sealing Check)	Replace seat.
Fails to Open	Closed upstream and/or downstream isolation valves in main line.	Open isolation valves.
	Insufficient line pressure.	Check upstream pressure. (Minimum 5 psi flowing line pressure differential.)
	Diaphragm assembly inoperative. Corrosion or excessive buildup on valve stem. (See Freedom of Movement Check)	Clean and polish stem. Inspect and replace any damaged or badly eroded part.
	Diaphragm damaged. (For valves in “reverse flow” only)	Replace diaphragm.

Three Checks

The Model 100-01 Hytrol Valve has only one moving part (the diaphragm and disc assembly). So, there are only three major types of problems to be considered.

First: Valve is stuck - that is, the diaphragm assembly is not free to move through a full stroke either from open to close or vice versa.

Second: Valve is free to move and can't close because of a worn out diaphragm.

Third: Valve leaks even though it is free to move and the diaphragm isn't leaking.

CAUTION: Care should be taken when doing the troubleshooting checks on the Model 100-01 Hytrol Valve. These checks do require the valve to open fully. This will either allow a high flow rate through the valve, or the downstream pressure will quickly increase to the inlet pressure. In some cases, this can be very harmful. Where this is the case, and there are no block valves in the system to protect the downstream piping, it should be realized that **the valve cannot be serviced under pressure**. Steps should be taken to remedy this situation before proceeding any further.



Three Checks (cont.)

DIAPHRAGM CHECK (#1)

1. Shut off pressure to the Hytrol Valve by slowly closing upstream and downstream isolation valves. **SEE CAUTION.**
2. Disconnect or close all pilot control lines to the valve cover and leave only one fitting in highest point of cover open to atmosphere.
3. With the cover vented to atmosphere, slowly open upstream isolation valve to allow some pressure into the Hytrol Valve body. Observe the open cover tapping for signs of continuous flow. It is not necessary to fully open isolating valve. Volume in cover chamber capacity chart will be displaced as valve moves to open position. Allow sufficient time for diaphragm assembly to shift positions. If there is no continuous flow, you can be quite certain the diaphragm is sound and the diaphragm assembly is tight. If the fluid appears to flow continuously this is a good reason to believe the diaphragm is either damaged or it is loose on the stem. In either case, this is sufficient cause to remove the valve cover and investigate the leakage. (See "Maintenance" section for procedure.)

Cover Chamber Capacity (Liquid Volume displaced when valve opens)		
Valve Size (Inches)	Displacement	
	Gallons	Liters
1-1/4"	0.020	0.07
1-1/2"	0.020	0.07
2"	0.032	0.12
2-1/2"	0.043	0.16
3"	0.080	0.30
4"	0.169	0.64
6"	0.531	2.0
8"	1.26	4.8
10"	2.51	9.5
12"	4.00	15.1
14"	6.50	24.6
16"	9.57	36.0
18"	11.00	41.6
20"	12.00	45.4
24"	29.00	109.8
30"	42.00	197.0
36"	90.00	340.0

FREEDOM OF MOVEMENT CHECK (#2)

4. Determining the Hytrol Valve's freedom of movement can be done by one of two methods.
5. For most valves it can be done after completing Diaphragm Check (Steps 1, 2, and 3). **SEE CAUTION.** At the end of step 3 the valve should be fully open.
6. If the valve has a Cla-Val X101D Position Indicator, observe the indicator to see that the valve opens wide. Mark the point of maximum opening.
7. Re-connect enough of the control system to permit the application of inlet pressure to the cover. Open pilot system cock so pressure flows from the inlet into the cover.
8. While pressure is building up in the cover, the valve should close smoothly. There is a hesitation in every Hytrol Valve closure, which can be mistaken for a mechanical bind. The stem will appear to stop moving very briefly before going to the closed position. This slight pause is caused by the diaphragm flexing at a particular point in the valve's travel and is not caused by a mechanical bind.
9. When closed, a mark should be made on the X101D Valve position indicator corresponding to the "closed" position. The distance between the two marks should be approximately the stem travel shown in chart.
10. If the stroke is different than that shown in stem travel chart this is a good reason to believe something is mechanically restricting the stroke of the valve at one end of its travel. If the flow does not

stop through the valve when in the indicated "closed" position, the obstruction probably is between the disc and the seat. If the flow does stop, then the obstruction is more likely in the cover. In either case, the cover must be removed, and the obstruction located and removed. The stem should also be checked for scale build-up. (See "Maintenance" section for procedure.)

Stem Travel (Fully open to fully closed)			
Valve Size (Inches)		Travel (Inches)	
Inches	MM	Inches	MM
1-1/4"	32	0.04"	10
1-1/2"	40	0.04"	10
2"	50	0.06"	15
2-1/2"	65	0.07"	18
3"	80	0.08"	20
4"	100	1.1"	28
6"	150	1.7"	43
8"	200	2.3"	58
10"	250	2.8"	71
12"	300	3.4"	86
14"	350	4.0"	100
16"	400	4.5"	114
18"	450	5.1"	130
20"	500	5.6"	143
24"	600	6.7"	165
30"	800	7.5"	190
36"	900	8.5"	216

11. For valves 6" and smaller, the Hytrol Valve's freedom of movement check can also be done after all pressure is removed from the valve. **SEE CAUTION.** After closing inlet and outlet isolation valves and bleeding pressure from the valve, check that the cover chamber and the body are temporarily vented to atmosphere. Insert fabricated tool into threaded hole in top of valve stem, and lift the diaphragm assembly manually. Note any roughness. The diaphragm assembly should move smoothly throughout entire valve stroke. The tool is fabricated from rod that is threaded on one end to fit valve stem and has a "T" bar handle of some kind on the other end for easy gripping. (See chart in Step 4 of "Disassembly" Section.)
12. Place marks on this diaphragm assembly lifting tool when the valve is closed and when manually positioned open. The distance between the two marks should be approximately the stem travel shown in stem travel chart. If the stroke is different than that shown, there is a good reason to believe something is mechanically restricting the stroke of the valve. The cover must be removed, and the obstruction located and removed. The stem should also be checked for scale build-up. (See "Maintenance" section for procedure.)

TIGHT SEALING CHECK (#3)

13. Test for seat leakage after completing checks #1 & #2 (Steps 1 to 12). **SEE CAUTION.** Close the isolation valve downstream of the Hytrol Valve. Apply inlet pressure to the cover of the valve, wait until it closes. Install a pressure gauge between the two closed valves using one of the two ports in the outlet side of the Hytrol. Watch the pressure gauge. If the pressure begins to climb, then either the downstream isolation valve is permitting pressure to creep back, or the Hytrol is allowing pressure to go through it. Usually the pressure at the Hytrol inlet will be higher than on the isolation valve discharge, so if the pressure goes up to the inlet pressure, you can be sure the Hytrol is leaking. Install another gauge downstream of isolating valve. If the pressure between the valves only goes up to the pressure on the isolation valve discharge, the Hytrol Valve is holding tight, and it was just the isolation valve leaking.



Maintenance

PREVENTATIVE MAINTENANCE

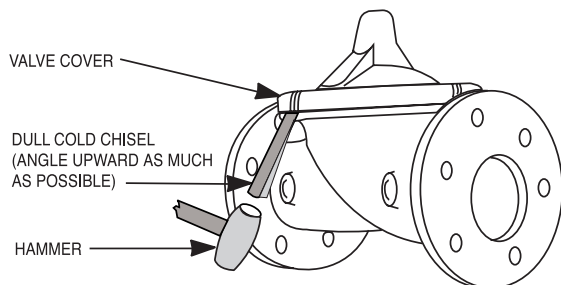
The Cla-Val Model 100-01 Hytrol Valve requires no lubrication or packing and a minimum of maintenance. However, a periodic inspection schedule should be established to determine how the operating conditions of the system are affecting the valve. The effect of these actions must be determined by inspection.

DISASSEMBLY

Inspection or maintenance can be accomplished without removing the valve from the line. Repair kits with new diaphragm and disc are recommended to be on hand before work begins.

WARNING: Maintenance personnel can be injured and equipment damaged if disassembly is attempted with pressure in the valve. **SEE CAUTION.**

1. Close upstream and downstream isolation valves and **independent operating pressure when used** to shut off all pressure to the valve.
2. Loosen tube fittings in the pilot system to remove pressure from valve body and cover chamber. After pressure has been released from the valve, use care to remove the controls and tubing. Note and sketch position of tubing and controls for re-assembly. The schematic in front of the Technical Manual can be used as a guide when reassembling pilot system.
3. Remove cover nuts and remove cover. If the valve has been in service for any length of time, chances are the cover will have to be loosened by driving upward along the edge of the cover with a **dull cold chisel**.



On 6" and smaller valves block and tackle or a power hoist can be used to lift valve cover by inserting proper size eye bolt in place of the center cover plug. On 8" and larger valves there are 4 holes (5/8" – 11 size) where jacking screws and/or eye bolts may be inserted for lifting purposes. **Pull cover straight up** to keep from damaging the integral seat bearing and stem.

Cover Center Plug Size	
Valve Size (Inches)	Thread Size (NPT)
1-1/4" - 1-1/2"	1/4"
2" - 3"	1/2"
4" - 6"	3/4"
8" - 10"	1"
12"	1-1/4"
14"	1-1/2"
16"	2"
18" - 24"	1"
30" & 36"	2"

4. Remove the diaphragm and disc assembly from the valve body. With smaller valves this can be accomplished by hand by **pulling straight up on the stem so as not to damage the seat bearing**. On large valves, an eye bolt of proper size can be installed in the stem and the diaphragm assembly can be then lifted with a block and tackle or power hoist. Take care not to damage the stem or bearings. The valve won't work if these are damaged.

Valve Stem Thread Size	
Valve Size (Inches)	Thread Size (UNF Internal)
1-1/4" - 2-1/2"	10 - 32
3" - 4"	1/4 - 28
6" - 14"	3/8 - 24
16"	1/2 - 20
18"	3/4 - 16
20"	3/4 - 16
24"	3/4 - 16
30"	3/4 - 16
36"	3/4 - 16

5. The next item to remove is the stem nut. Examine the stem threads above the nut for signs of mineral deposits or corrosion. If the threads are not clean, use a wire brush to remove as much of the residue as possible. Attach a good fitting wrench to the nut and give it a sharp "rap" rather than a steady pull. Usually several blows are sufficient to loosen the nut for further removal. On the smaller valves, the entire diaphragm assembly can be held by the stem in a vise **equipped with soft brass jaws** before removing the stem nut.

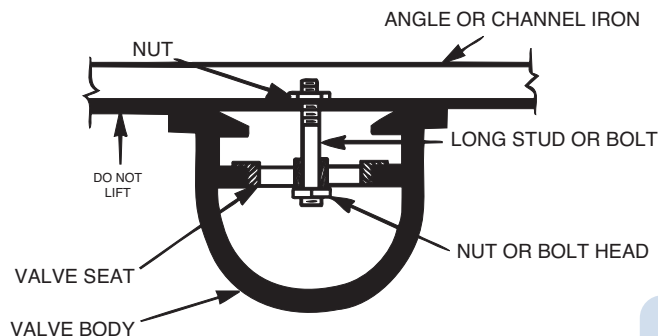
The use of a pipe wrench or a vise without soft brass jaws scars the fine finish on the stem. No amount of careful dressing can restore the stem to its original condition. Damage to the finish of the stem can cause the stem to bind in the bearings and the valve will not open or close.

6. After the stem nut has been removed, the diaphragm assembly breaks down into its component parts. Removal of the disc from the disc retainer can be a problem if the valve has been in service for a long time. Using two screwdrivers inserted along the outside edge of the disc usually will accomplish its removal. Care should be taken to preserve the spacer washers in water, particularly if no new ones are available for re-assembly.

7. The only part left in the valve body is the seat which ordinarily does not require removal. Careful cleaning and polishing of inside and outside surfaces with 400 wet/dry sandpaper will usually restore the seat's sharp edge. If, however, it is badly worn and replacement is necessary, it can be easily removed.

Seats in valve sizes 1 1/4" through 6" are threaded into the valve body. They can be removed with accessory X109 Seat Removing Tool available from the factory. On 8" and larger valves, the seat is held in place by flat head machine screws. Use a tight-fitting, long shank screwdriver to prevent damage to seat screws. If upon removal of the screws the seat cannot be lifted out, it will be necessary to use a piece of angle or channel iron with a hole drilled in the center. Place it across the body so a long stud can be inserted through the center hole in the seat and the hole in the angle iron. By tightening the nut a uniform upward force is exerted on the seat for removal.

NOTE: Do not lift up on the end of the angle iron as this may force the integral bearing out of alignment, causing the stem to bind.



Lime Deposits

One of the easiest ways to remove lime deposits from the valve stem or other metal parts is to dip them in a 5-percent muriatic acid solution just long enough for the deposit to dissolve. This will remove most of the common types of deposits. **CAUTION: USE EXTREME CARE WHEN HANDLING ACID.** Rinse parts in water before handling. If the deposit is not removed by acid, then a fine grit (400) wet or dry sandpaper can be used with water.

Inspection of Parts

After the valve has been disassembled, each part should be examined carefully for signs of wear, corrosion, or any other abnormal condition. Usually, it is a good idea to replace the rubber parts (diaphragm and disc) unless they are free of signs of wear. These are available in a repair kit. Any other parts which appear doubtful should be replaced. **WHEN ORDERING PARTS, BE SURE TO GIVE COMPLETE NAMEPLATE DATA, ITEM NUMBER AND DESCRIPTION.**

NOTE: If a new disc isn't available, the existing disc can be turned over, exposing the unused surface for contact with the seat. The disc should be replaced as soon as practical.

Reassembly

1. Reassembly is the reverse of the disassembly procedure. If a new disc has been installed, it may require a different number of spacer washers to obtain the right amount of "grip" on the disc. When the diaphragm assembly has been tightened to a point where the diaphragm cannot be twisted, the disc should be compressed very slightly by the disc guide. Excessive compression should be avoided. Use just enough spacer washers to hold the disc firmly without noticeable compression.

2. **MAKE SURE THE STEM NUT IS VERY TIGHT.** Attach a good fitting wrench to the nut and give it a sharp "rap" rather than a steady pull. Usually several blows are sufficient to tighten the stem nut for final tightening. Failure to do so could allow the diaphragm to pull loose and tear when subjected to pressure.

3. Carefully install the diaphragm assembly by lowering the stem through the seat bearing. Take care not to damage the stem or bearing. Line up the diaphragm holes with the stud or bolt holes on the body. On larger valves with studs, it may be necessary to hold the diaphragm assembly up part way while putting the diaphragm over the studs.

4. Put spring in place and replace cover. Make sure diaphragm is lying smooth under the cover.

5. Tighten cover nuts firmly using a cross-over pattern until all nuts are tight.

6. Test Hytrol Valve before re-installing pilot valve system.

Test Procedure After Valve Assembly

There are a few simple tests which can be made in the field to make sure the Hytrol Valve has been assembled properly. Do these before installing pilot system and returning valve to service. These are similar to the three troubleshooting tests.

1. Check the diaphragm assembly for freedom of movement after all pressure is removed from the valve. **SEE CAUTION.** Insert fabricated tool into threaded hole in top of valve stem, and lift the diaphragm assembly manually. Note any roughness, sticking or grabbing. The diaphragm assembly should move smoothly throughout entire valve stroke. The tool is fabricated from rod that is threaded on one end to fit valve stem (See chart in Step 4 of "Disassembly" section.) and has a "T" Bar handle of some kind on the other end for easy gripping.

Place marks on this diaphragm assembly lifting tool when the valve is closed and when manually positioned open. The distance between the two marks should be approximately the stem travel shown in stem travel chart. (See "Freedom of Movement Check" section.) If the stroke is different than that shown, there is a good reason to believe something is mechanically restricting the stroke of the valve. The cover must be removed, the obstruction located and removed. (See "Maintenance" section for procedure.

Due to the weight of the diaphragm assembly this procedure is not possible on valves 8" and larger. on these valves, the same determination can be made by carefully introducing a low pressure-less than five psi) into the valve body with the cover vented. **SEE CAUTION.** Looking in cover center hole see the diaphragm assembly lift easily without hesitation, and then settle back easily when the pressure is removed.

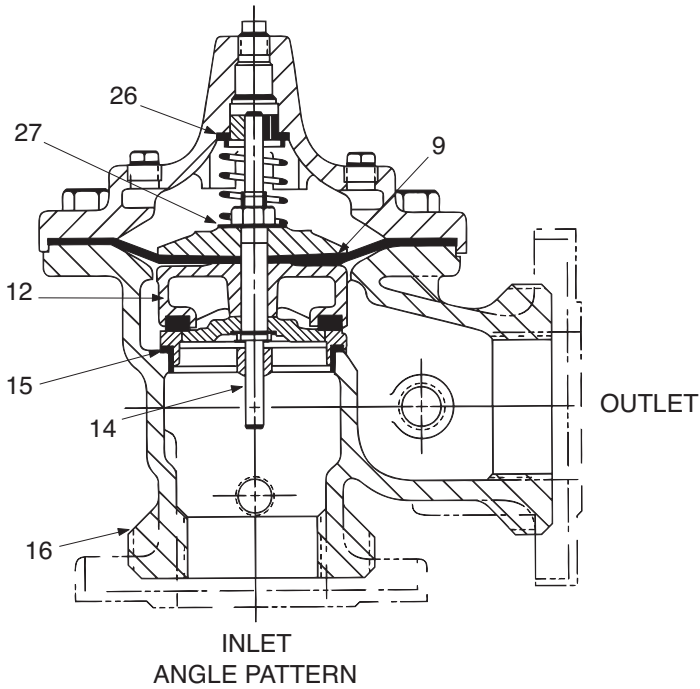
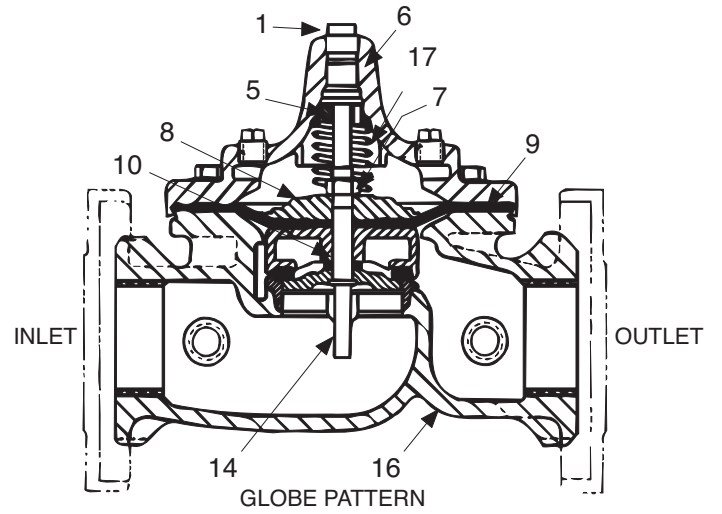
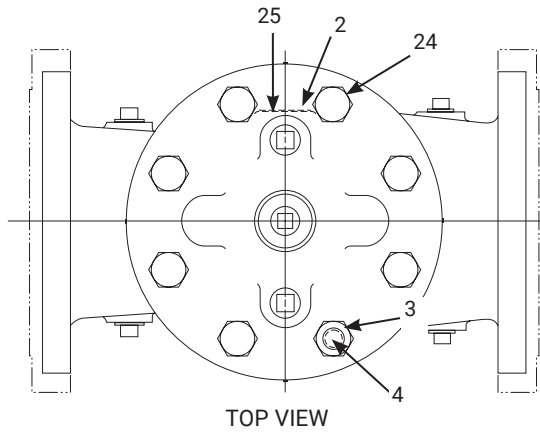
2. To check the valve for drip-tight closure, a line should be connected from the inlet to the cover, and pressure applied at the inlet of the valve. If properly assembled, the valve should hold tight with as low as ten PSI at the inlet. See "Tight Sealing Check" section.)

3. With the line connected from the inlet to the cover, apply full working pressure to the inlet. Check all around the cover for any leaks. Re-tighten cover nuts if necessary to stop leaks past the diaphragm.

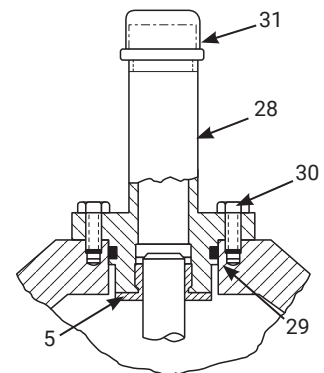
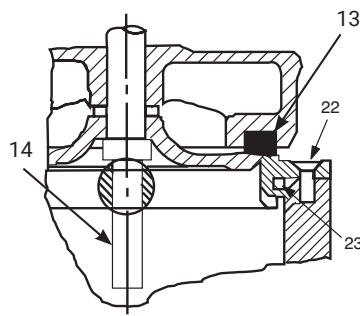
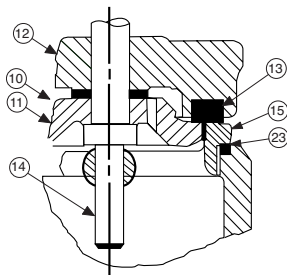
4. Remove pressure, then re-install the pilot system and tubing exactly as it was prior to removal. **Bleed air from all high points.**

5. Follow steps under "Start-Up and Adjustment" Section in Technical Manual for returning complete valve back to service.





Item No.	Description
1	Pipe Plug
2	Drive Screws (for nameplate)
3	Hex Nut (8" and larger)
4	Stud (8" and larger)
5	Cover Bearing
6	Cover
7	Stem Nut
8	Diaphragm Washer
9	Diaphragm
10	Spacer Washers
11	Disc Guide
12	Disc Retainer
13	Disc
14	Stem
15	Seat
16	Body
17	Spring
22	Flat Head Screws (8" and larger)
23	Seat O-Ring
24	Hex Head Bolt (1-1/4" thru 4")
25	Nameplate
26	Upper Spring Washer (Epoxy coated valves only)
27	Lower Spring Washer (Epoxy coated valves only)
28	Cover Bearing Housing (16" only)
29	Cover O-Ring (16" only)
30	Hex Bolt (16" only)
31	Pipe Cap (16" only)





Model 100-01

HYTROL VALVE SERVICE DATA

INSTALLATION / OPERATION / MAINTENANCE

DESCRIPTION 100-01 HYTROL VALVE

The Cla-Val Model 100-01 Hytrol Valve is a main valve for Cla-Val Automatic Control Valves. It is a hydraulically operated, diaphragm-actuated, globe or angle pattern valve. This valve consists of three major components; body, diaphragm assembly, and cover. The diaphragm assembly is the only moving part. The diaphragm assembly uses a diaphragm of nylon fabric bonded with synthetic rubber. A synthetic rubber disc, contained on three and one half sides by a disc retainer and disc guide, forms a seal with the valve seat when pressure is applied above the diaphragm. The diaphragm assembly forms a sealed chamber in the upper portion of the valve, separating operating pressure from line pressure.

DESCRIPTION 100-20 600 SERIES HYTROL VALVE

The Cla-Val Model 100-20 Hytrol Valve (600 Series main valve) have only one part -the body- that is different from standard 100 Series Cla-Val main valve parts. The remaining parts of the 600 series main valve are standard Cla-Val main valve parts. All service and maintenance information for the standard 100 Series main valves also apply to the 600 series main valves. The most important thing to remember when ordering main valve repair kits and replacement parts, except for the body, all other parts are going to be for a smaller size main valve. Cla-Val identifies main valve parts with the flange size of the standard 100 Series main valve. Refer to the "Main Valve Sizes" chart below.



Hytrol Service Data

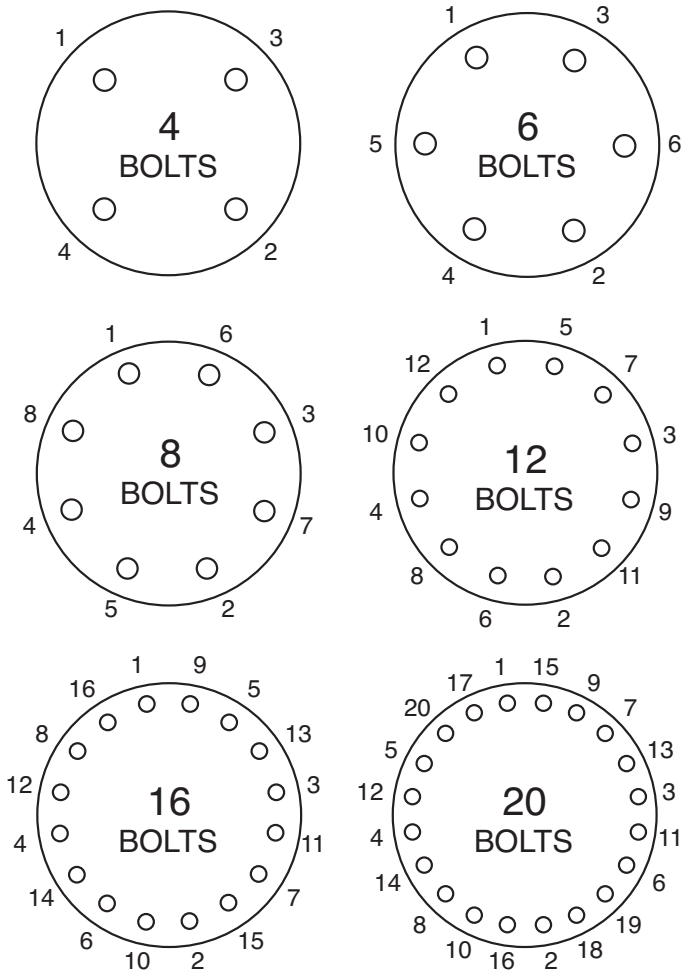
Hytrol Service Data																			
Hytrol Size				Stem Travel		Cover Capacity Displacement		Cover Center NPT	Cover Nut or Bolt ⁽¹⁾					Cover Lifting Holes	Valve Stem Internal Thread	Stem Nut ⁽³⁾			
									Thread	Socket	Qty	Torque, Lubricated ⁽²⁾				Thread	Socket (Long)	Torque, Lubricated ⁽²⁾	
IN	MM	IN	MM	IN	MM	Gallons	Liters	FT. LBS				IN. LBS	FT. LBS	IN. LBS					
1	25	—	—	0.24	6	0.02	—	1/4	1/4 – 20	7/16	8	—	80	—	—	3/8 – 24	9/16	—	80
1 1/4	32	—	—	0.49	12	0.02	0.08	1/4	5/16 – 18	1/2	8	12	—	—	#10 – 32	7/16 – 20	11/16	12	—
1 1/2	40	—	—	0.49	12	0.02	0.08	1/4	5/16 – 18	1/2	8	12	—	—	#10 – 32	7/16 – 20	11/16	12	—
2	50	3	80	0.59	15	0.03	0.12	1/2	3/8 – 16	9/16	8	20	—	—	#10 – 32	1/2 – 20	3/4	16	—
2 1/2	65	—	—	0.71	18	0.04	0.16	1/2	7/16 – 14	5/8	8	36	—	—	#10 – 32	5/8 – 18	15/16	32	—
3	80	4	—	0.84	21	0.08	0.3	1/2	1/2 – 13	3/4	8	50	—	—	1/4 – 28	5/8 – 18	15/16	32	—
4	100	6	—	1.09	28	0.17	0.64	3/4	3/4 – 10	1 1/8	8	125	—	—	1/4 – 28	3/4 – 16	1 1/8	55	—
6	150	8	—	1.58	40	0.53	2.01	3/4	3/4 – 10	1 1/8	12	125	—	—	3/8 – 24	7/8 – 14	1 5/16	100	—
8	200	10	—	2.24	57	1.26	4.77	1	3/4 – 10	1 1/4	16	125	—	5/8 – 11	3/8 – 24	1 1/8 – 12	1 3/4	180	—
10	250	12	—	2.71	69	2.51	9.5	1	7/8 – 9	1 7/16	20	160	—	3/4 – 10	3/8 – 24	1 1/4 – 12	1 7/8	300	—
12	300	14, 16	350, 400	3.34	85	4.00	15.14	1 1/4	1 1/8 – 7	1 13/16	20	320	—	3/4 – 10	3/8 – 24	1 1/2 – 12	2 1/4	500	—
14	350	—	—	4.08	104	6.50	24.61	1 1/2	1 1/4 – 7	2	20	450	—	1 – 8	3/8 – 24	1 1/2 – 12	2 1/4	500	—
16	400	18, 20, 24	450, 500, 600	4.58	116	9.60	36.34	2	1 1/4 – 7	2	20	450	—	1 – 8	1/2 – 20	2 – 16	3	600	—
18	500	—	—	5.13	130	11.00	42	1	1 1/4 – 7	2	24	450	—	1 – 8	3/4 – 16	2 1/4 – 16	3 7/16	1000	—
20	500	—	—	5.63	143	12.00	45.42	1	1 3/8 – 6	2 3/16	24	600	—	1 – 8	3/4 – 16	2 1/4 – 16	3 7/16	1000	—
24	600	30	—	6.50	165	29.00	109.78	1	1 1/2 – 12	2 3/8	24	850	—	1 1/8 – 7	3/4 – 16	3 – 12	4 5/8	1600	—
30	750	36	900	8.00	203	42.00	158.99	2	1 1/2 – 12	2 3/8	32	850	—	1 1/8 – 7	3/4 – 16	3 – 12	4 5/8	3000	—
36	900	42, 48, 56	1050, 1200, 1400	8.71	221	90.00	340.69	2	1 3/4 – 10	2 3/4	36	1250	—	1 1/4 – 12	3/4 – 16	3 1/2 – 8	6	3000	—

(1) Valve sizes 6" and smaller use hex bolts for cover fasteners. Valve sizes 8" and larger use studs with hex nuts.

(2) Clean all threads and apply anti-seize prior to reassembly of threaded fasteners. Torque values are based on standard SST material.

(3) Only stem nuts supplied by CLA-VAL shall be used.





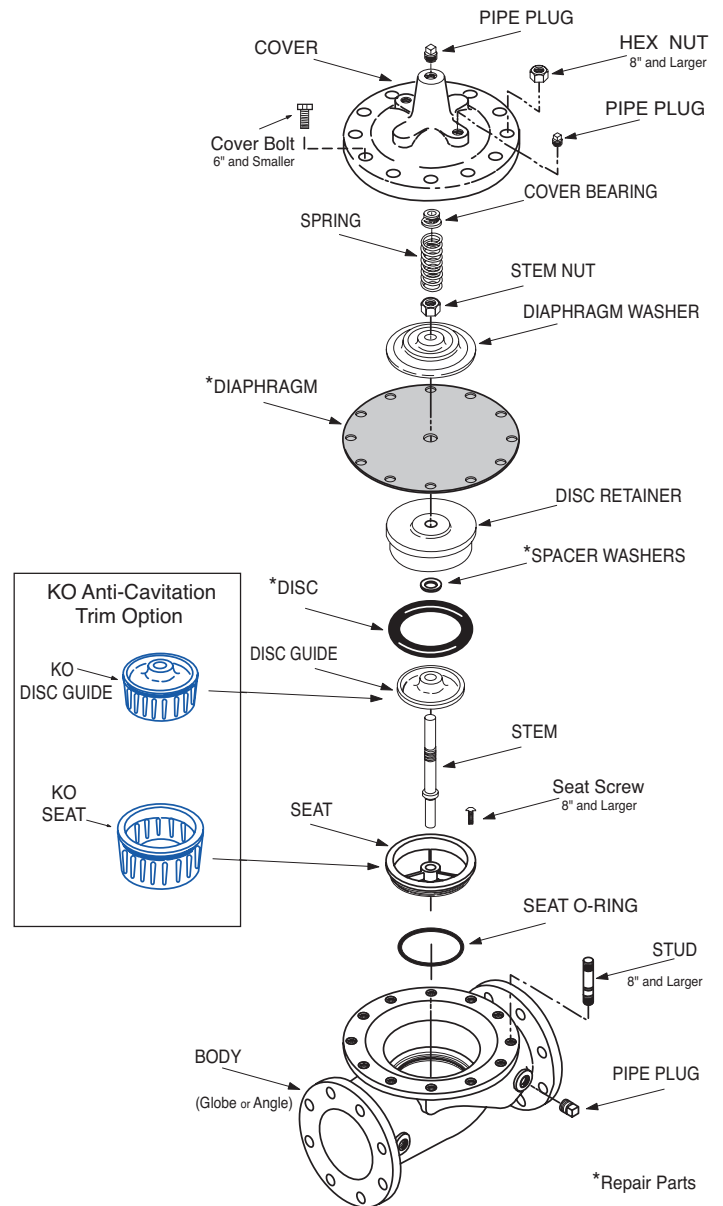
Follow this procedure when reassembling Main Valve:

1. Tightens bolts/nuts in a "Star" or "Cross-Over" pattern following the numbers shown above to insure that cover seats evenly on the diaphragm material and body.

2. Torque the bolt/nuts in three stages with a "Star" or "Cross-Over" pattern for each stage:

- A To approximately 10% of final torque.
- B. To approximately 75% of final torque.
- C. To final required torque.

3. Valves that are to be tested to 375 PSI or higher should be re-torqued after 24 hours.





Model 100-20

(Reduced Internal Port)

600 SERIES HYTROL VALVE

SERVICE AND MAINTENANCE OF 600 SERIES VALVES

The 600 series main valves have only one part -the body- that is different from standard 100 Series Cla-Val main valve parts. The remaining parts of the 600 series main valve are standard Cla-Val main valve parts.

The most important thing to remember when ordering main valve repair kits and replacement parts, except for the body, all other parts are going to be for a smaller size main valve. Cla-Val identifies main valve parts with the flange size of the standard 100 Series main valve. Refer to the "Main Valve Sizes Comparison" chart. For example, if you are servicing a 6" Model 100-20 Hytrol and needed a repair kit, you would order a repair kit for a 4" 100-01 Hytrol. This kit is also suitable for a 6" Model 100-20 Hytrol. Complete Technical Manuals include a repair kit data sheet N-RK that shows this relationship.

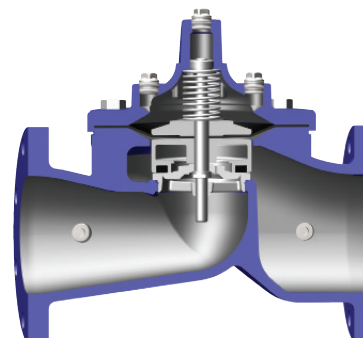
When you order repair parts, it is a good idea to include valve nameplate data (size, catalog number, and part number) and description of the parts desired. Do this to be sure parts will fit the valve you are working on and not be too big for it. Pilot controls and repair kits maintenance information remain the same for 100 or 600 Series valves.

UNDERSTANDING THE 600 SERIES VALVES

In 1987, Cla-Val introduced the Model 100-20 Hytrol as the basic main valve for the 600 Series of automatic control valves. To identify all new valves using the Model 100-20 Hytrol, an existing catalog number is modified. Making a 600 Series catalog number is simply done by using a "6" in front of the two digit catalog numbers or replacing the "2" with a "6" in three digit catalog numbers. Current schematics reflect both catalog numbers together separated by a slash (i.e. - Model 90-01/690-01, 58-02/658-02, 210-01/610-01, etc). Since these two valves 'share' the same catalog number and schematic, they provide the same function in a system. The only difference between the two valves is the relative capacity of the two main valve series.

The Model 100-01 Hytrol is the basic main valve for Cla-Val automatic control valves. This valve is the current version of the Clayton Hytrol valve design originated in 1936. The 100-01 Hytrol is designed as a full flow area valve. This means that the inlet, seat and outlet openings are the same size. Thus, the pressure drop is kept to a minimum for this globe style design.

The Model 100-20 Hytrol valve has all of the basic features and advantages of the original Model 100-01 Hytrol. Only one part has been changed - the body. It is designed with different size inlet, seat and outlet openings. The Model 100-20 Hytrol has inlet and outlet flanges one valve size larger than the seat opening size. This results in what is sometimes called a "reduced port" main valve. For example, a 4" Model 100-20 valve has a 3" seat. Note: valve size is always determined by the flange size. The following chart compares the Model 100-01 and the Model 100-20 main valves.



Basic Main valve Size Comparison		
Globe Pattern Valves		
Flange Size (inch)	Seat Size	
	Model 100-01 (100 Series)	Model 100-20 (600 Series)
3	3	2
4	4	3
6	6	4
8	8	6
10	10	8
12	12	10
14	14	12
16	16	12
18	18	16
20	20	16
24	24	16
30	30	24
36	36	30
42	-	36
48	-	36
Angle Pattern Valves		
Flange Size (inch)	Seat Size	
	Model 100-01 (100 Series)	Model 100-20 (600 Series)
4	4	3
6	6	4
8	8	6

The Model 100-20 Hytrol is available only in ductile iron, 150 and 300 pressure class, and Bronze trim standard. Available extra cost main valve options include stainless steel trim, epoxy coating, Dura-Kleen stem, Delrin sleeved stem, and high temperature rubber parts. All four basic main valves have a 600 Series version available with all of the same benefits and size relationships. The following chart shows the relationship of Cla-Val main valve catalog numbers.

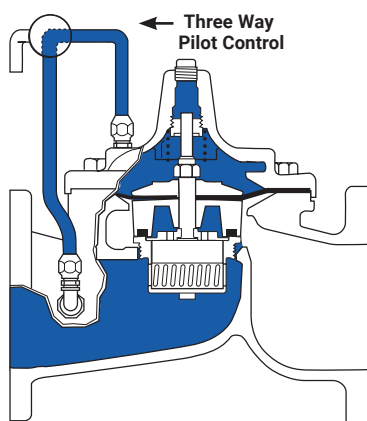
Cla-Val Main valve			
Catalog Name	Catalog Number		
	Circa 1936	100 Series	600 Series
Hytrol	100 (Angle =2100)	100-01	100-20
Powertrol	100P & 100PA	100-02	100-21
Powercheck	100PC & 100PCA	100-03	100-22
Hycheck	181	100-04	100-23



Installation

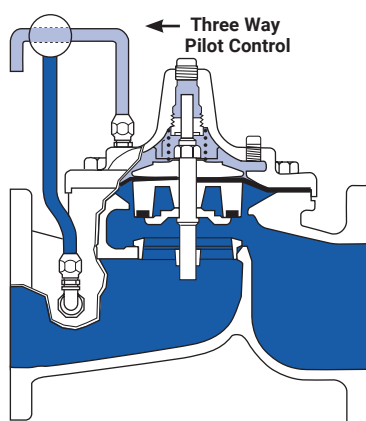
1. Before valve is installed, pipe lines should be flushed of all chips, scale and foreign matter.
2. It is recommended that either gate or block valves be installed on both ends of the Model 100-20 Hytrol Valve to facilitate isolating the valve for preventive maintenance and repairs.
3. Place the valve in the line with flow through the valve in the direction indicated on the inlet nameplate. (See "Flow Direction" Section)
4. Allow sufficient room around valve to make adjustments and for disassembly.
5. Cla-Val Model 100-20 Hytrol Valves operate with maximum efficiency when mounted in horizontal piping with the cover UP, however, other positions are acceptable. Due to size and weight of the cover and internal components of 8 inch and larger valves, installation with the cover UP is advisable. This makes internal parts readily accessible for periodic inspection.
6. Caution must be taken in the installation of this valve to insure that galvanic and/or electrolytic action does not take place. The proper use of dielectric fittings and gaskets are required in all systems using dissimilar metals.
7. If a pilot control system is installed on the Model 100-20 Hytrol Valve, use care to prevent damage. If it is necessary to remove fittings or components, be sure they are kept clean and replaced exactly as they were.
8. After the valve is installed and the system is first pressurized, vent air from the cover chamber and pilot system tubing by loosening fittings at all high points.

Principles of Operation



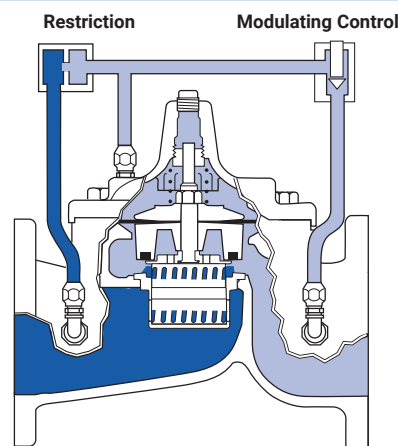
Tight Closing Operation

When pressure from the valve inlet (or an equivalent independent operating pressure) is applied to the diaphragm chamber the valve closes drip-tight.



Full Open Operation

When pressure in diaphragm chamber is relieved to a zone of lower pressure (usually atmosphere) the line pressure (5 psi Min.) at the valve inlet opens the valve.

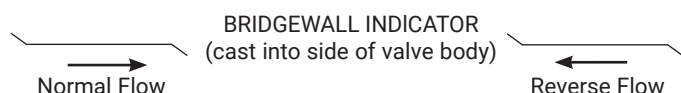


Modulating Action

Valve modulates when diaphragm pressure is held at an intermediate point between inlet and discharge pressure. With the use of a Cla-Val. "Modulating control," which reacts to line pressure changes, the pressure above the diaphragm is varied, allowing the valve to throttle and compensate for the change.

Flow Direction

The flow through the Model 100-20 Hytrol Valve can be in one of two directions. When flow is "up-and-over the seat," it is in "normal" flow and the valve will fail in the open position. When flow is "over-the seat-and down," it is in "reverse" flow and the valve will fail in the closed position. There are no permanent flow arrow markings. **The valve must be installed according to nameplate data.**



Recommended Tools

1. Three pressure gauges with ranges suitable to the installation to be put at Hytrol inlet, outlet and cover connections.
2. Cla-Val Model X101D Valve Position Indicator. This provides visual indication of valve position without disassembly of valve.
3. Other items are: suitable hand tools such as screwdrivers, wrenches, etc., soft jawed (brass or aluminum) vise, 400 grit wet or dry sandpaper and water for cleaning.

Troubleshooting

The following troubleshooting information deals strictly with the Model 100-20 Hytrol Valve. This assumes that all other components of the pilot control system have been checked out and are in proper working condition. (See appropriate sections in Technical Manual for complete valve).

All trouble shooting is possible without removing the valve from the line or removing the cover. It is highly recommended to permanently install a Model X101D Valve Position Indicator and three gauges in unused Hytrol inlet, outlet and cover connections.

After checking out probable causes and remedies, the following three checks can be used to diagnose the nature of the problem before maintenance is started. They must be done in the order shown.

Service Suggestions		
Symptom	Possible Cause	Solutions
Fails to Close	Closed isolation valves in control system, or in main line.	Open Isolation valves.
	Lack of cover chamber pressure	Check upstream pressure, pilot system, strainer, tubing, valves, or needle valves for obstruction.
	Diaphragm damaged. (See Diaphragm Check.)	Replace diaphragm.
	Diaphragm assembly inoperative. Corrosion or excessive scale build up on valve stem. (See Freedom of Movement Check)	Clean and polish stem. Inspect and replace any damaged or badly eroded part.
	Mechanical obstruction. Object lodged in valve.(See Freedom of Movement Check)	Remove obstruction.
	Worn disc. (See Tight Sealing Check)	Replace disc.
	Badly scored seat (See Tight Sealing Check)	Replace seat.
Fails to Open	Closed upstream and/or downstream isolation valves in main line.	Open isolation valves.
	Insufficient line pressure.	Check upstream pressure. (Minimum 5 psi flowing line pressure differential.)
	Diaphragm assembly inoperative. Corrosion or excessive buildup on valve stem. (See Freedom of Movement Check)	Clean and polish stem. Inspect and replace any damaged or badly eroded part.
	Diaphragm damaged. (For valves in "reverse flow" only)	Replace diaphragm.

Three Checks

The Model 100-20 Hytrol Valve has only one moving part (the diaphragm and disc assembly). So, there are only three major types of problems to be considered.

First: Valve is stuck - that is, the diaphragm assembly is not free to move through a full stroke either from open to close or vice versa.

Second: Valve is free to move and can't close because of a worn out diaphragm.

Third: Valve leaks even though it is free to move and the diaphragm isn't leaking.

CAUTION: Care should be taken when doing the troubleshooting checks on the Model 100-20 Hytrol Valve. These checks do require the valve to open fully. This will either allow a high flow rate through the valve, or the downstream pressure will quickly increase to the inlet pressure. In some cases, this can be very harmful. Where this is the case, and there are no block valves in the system to protect the downstream piping, it should be realized that **the valve cannot be serviced under pressure**. Steps should be taken to remedy this situation before proceeding any further.



Three Checks (cont.)

DIAPHRAGM CHECK (#1)

1. Shut off pressure to the Hytrol Valve by slowly closing upstream and downstream isolation valves. **SEE CAUTION.**
2. Disconnect or close all pilot control lines to the valve cover and leave only one fitting in highest point of cover open to atmosphere.
3. With the cover vented to atmosphere, slowly open upstream isolation valve to allow some pressure into the Hytrol Valve body. Observe the open cover tapping for signs of continuous flow. It is not necessary to fully open isolating valve. Volume in cover chamber capacity chart will be displaced as valve moves to open position. Allow sufficient time for diaphragm assembly to shift positions. If there is no continuous flow, you can be quite certain the diaphragm is sound and the diaphragm assembly is tight. If the fluid appears to flow continuously this is a good reason to believe the diaphragm is either damaged or it is loose on the stem. In either case, this is sufficient cause to remove the valve cover and investigate the leakage. (See "Maintenance" section for procedure.)

Cover Chamber Capacity		
Valve Size	Displacement	
Inches	Gallons	Liters
3"	0.032	0.12
4"	0.080	0.30
6"	0.169	0.64
8"	0.531	2.00
10"	1.26	4.80
12"	2.51	9.50
14"	4.00	15.10
16"	4.00	15.10
18"	9.60	36.20
20"	9.60	36.20
24"	9.60	36.20
30"	29.00	110
36"	42.00	197
42"	90.00	340
48"	90.00	340

FREEDOM OF MOVEMENT CHECK (#2)

4. Determining the Hytrol Valve's freedom of movement can be done by one of two methods.
5. For most valves it can be done after completing Diaphragm Check (Steps 1, 2, and 3). **SEE CAUTION.** At the end of step 3 the valve should be fully open.
6. If the valve has a Cla-Val X101D Position Indicator, observe the indicator to see that the valve opens wide. Mark the point of maximum opening.
7. Re-connect enough of the control system to permit the application of inlet pressure to the cover. Open pilot system cock so pressure flows from the inlet into the cover.
8. While pressure is building up in the cover, the valve should close smoothly. There is a hesitation in every Hytrol Valve closure, which can be mistaken for a mechanical bind. The stem will appear to stop moving very briefly before going to the closed position. This slight pause is caused by the diaphragm flexing at a particular point in the valve's travel and is not caused by a mechanical bind.
9. When closed, a mark should be made on the X101D Valve position indicator corresponding to the "closed" position. The distance between the two marks should be approximately the stem travel shown in chart.
10. If the stroke is different than that shown in stem travel chart this is a good reason to believe something is mechanically restricting the stroke of the valve at one end of its travel. If the flow does not stop through the valve when in the indicated "closed" position, the obstruction probably is between the disc and the seat. If the flow

does stop, then the obstruction is more likely in the cover. In either case, the cover must be removed, and the obstruction located and removed. The stem should also be checked for scale build-up. (See "Maintenance" section for procedure.)

Stem Travel (Fully open to fully closed)			
Valve Size		Travel	
Inches	MM	Inches	MM
3"	80	0.7"	18
4"	100	0.8"	20
6"	150	1.1"	28
8"	200	1.7"	43
10"	250	2.3"	58
12"	300	2.8"	71
14"	350	3.4"	71
16"	400	4.0"	86
18"	460	4.5"	86
20"	500	5.1"	114
24"	600	5.6"	143
30"	800	6.7"	165
36"	900	7.5"	191
42"	1000	8.5"	216
48"	1200	8.5"	216

11. For valves 6" and smaller, the Hytrol Valve's freedom of movement check can also be done after all pressure is removed from the valve. **SEE CAUTION.** After closing inlet and outlet isolation valves and bleeding pressure from the valve, check that the cover chamber and the body are temporarily vented to atmosphere. Insert fabricated tool into threaded hole in top of valve stem, and lift the diaphragm assembly manually. Note any roughness. The diaphragm assembly should move smoothly throughout entire valve stroke. The tool is fabricated from rod that is threaded on one end to fit valve stem and has a "T" bar handle of some kind on the other end for easy gripping. (See chart in Step 4 of "Disassembly" Section.)

12. Place marks on this diaphragm assembly lifting tool when the valve is closed and when manually positioned open. The distance between the two marks should be approximately the stem travel shown in stem travel chart. If the stroke is different than that shown, there is a good reason to believe something is mechanically restricting the stroke of the valve. The cover must be removed, and the obstruction located and removed. The stem should also be checked for scale build-up. (See "Maintenance" section for procedure.)

TIGHT SEALING CHECK (#3)

13. Test for seat leakage after completing checks #1 & #2 (Steps 1 to 12). **SEE CAUTION.** Close the isolation valve downstream of the Hytrol Valve. Apply inlet pressure to the cover of the valve, wait until it closes. Install a pressure gauge between the two closed valves using one of the two ports in the outlet side of the Hytrol. Watch the pressure gauge. If the pressure begins to climb, then either the downstream isolation valve is permitting pressure to creep back, or the Hytrol is allowing pressure to go through it. Usually the pressure at the Hytrol inlet will be higher than on the isolation valve discharge, so if the pressure goes up to the inlet pressure, you can be sure the Hytrol is leaking. Install another gauge downstream of isolating valve. If the pressure between the valves only goes up to the pressure on the isolation valve discharge, the Hytrol Valve is holding tight, and it was just the isolation valve leaking.



Maintenance

PREVENTATIVE MAINTENANCE

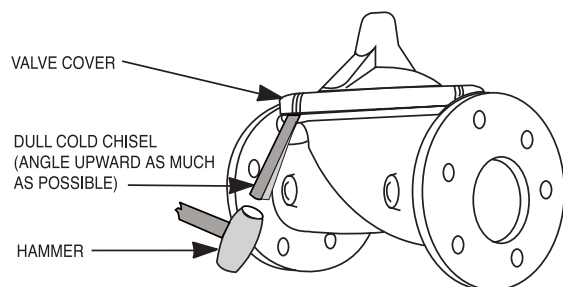
The Cla-Val Model 100-20 Hytrol Valve requires no lubrication or packing and a minimum of maintenance. However, a periodic inspection schedule should be established to determine how the operating conditions of the system are affecting the valve. The effect of these actions must be determined by inspection.

DISASSEMBLY

Inspection or maintenance can be accomplished without removing the valve from the line. Repair kits with new diaphragm and disc are recommended to be on hand before work begins.

WARNING: Maintenance personnel can be injured and equipment damaged if disassembly is attempted with pressure in the valve. **SEE CAUTION.**

1. Close upstream and downstream isolation valves and **independent operating pressure when used** to shut off all pressure to the valve.
2. Loosen tube fittings in the pilot system to remove pressure from valve body and cover chamber. After pressure has been released from the valve, use care to remove the controls and tubing. Note and sketch position of tubing and controls for re-assembly. The schematic in front of the Technical Manual can be used as a guide when reassembling pilot system.
3. Remove cover nuts and remove cover. If the valve has been in service for any length of time, chances are the cover will have to be loosened by driving upward along the edge of the cover with a **dull cold chisel**.



On 6" and smaller valves block and tackle or a power hoist can be used to lift valve cover by inserting proper size eye bolt in place of the center cover plug. On 8" and larger valves there are 4 holes (5/8" – 1 1/2" size) where jacking screws and/or eye bolts may be inserted for lifting purposes. **Pull cover straight up** to keep from damaging the integral seat bearing and stem.

Cover Center Plug Size	
Valve Size (Inches)	Thread Size (NPT)
3"	1/2"
4" - 6"	3/4"
8" - 10"	1"
12"	1-1/4"
14"	1-1/2"
16" - 18"	2"
20" - 24"	2"
30" & 36"	2"
42" & 48"	2"

4. Remove the diaphragm and disc assembly from the valve body. With smaller valves this can be accomplished by hand by **pulling straight up on the stem so as not to damage the seat bearing**. On large valves, an eye bolt of proper size can be installed in the stem and the diaphragm assembly can be then lifted with a block and tackle or power hoist. Take care not to damage the stem or bearings. The valve won't work if these are damaged.

CLA-VAL™ www.cla-val.com | info@cla-val.com
N-100-20 8pgs (R-03/2026)

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Valve Stem Thread Size	
Valve Size (Inches)	Thread Size (UNF Internal)
3" - 4"	1/4 - 28
6" - 14"	3/8 - 24
16" - 18"	1/2 - 20
20"	3/4 - 16
24"	3/4 - 16
30"	3/4 - 16
36"	3/4 - 16
42"	3/4 - 16
48"	3/4 - 16

5. The next item to remove is the stem nut. Examine the stem threads above the nut for signs of mineral deposits or corrosion. If the threads are not clean, use a wire brush to remove as much of the residue as possible. Attach a good fitting wrench to the nut and give it a sharp "rap" rather than a steady pull. Usually several blows are sufficient to loosen the nut for further removal. On the smaller valves, the entire diaphragm assembly can be held by the stem in a vise **equipped with soft brass jaws** before removing the stem nut.

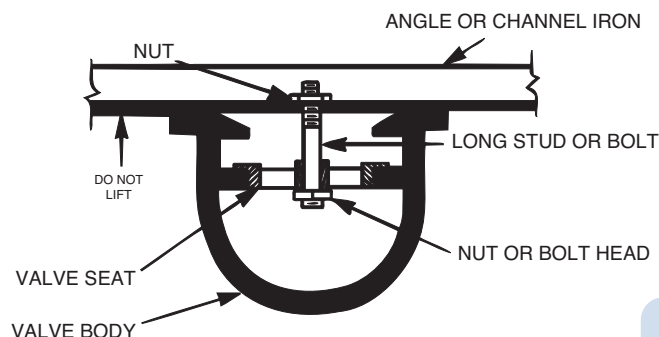
The use of a pipe wrench or a vise without soft brass jaws scars the fine finish on the stem. No amount of careful dressing can restore the stem to its original condition. Damage to the finish of the stem can cause the stem to bind in the bearings and the valve will not open or close.

6. After the stem nut has been removed, the diaphragm assembly breaks down into its component parts. Removal of the disc from the disc retainer can be a problem if the valve has been in service for a long time. Using two screwdrivers inserted along the outside edge of the disc usually will accomplish its removal. Care should be taken to preserve the spacer washers in water, particularly if no new ones are available for re-assembly.

7. The only part left in the valve body is the seat which ordinarily does not require removal. Careful cleaning and polishing of inside and outside surfaces with 400 wet/dry sandpaper will usually restore the seat's sharp edge. If, however, it is badly worn and replacement is necessary, it can be easily removed.

Seats in valve sizes 1 1/4" through 6" are threaded into the valve body. They can be removed with accessory X109 Seat Removing Tool available from the factory. On 8" and larger valves, the seat is held in place by flat head machine screws. Use a tight-fitting, long shank screwdriver to prevent damage to seat screws. If upon removal of the screws the seat cannot be lifted out, it will be necessary to use a piece of angle or channel iron with a hole drilled in the center. Place it across the body so a long stud can be inserted through the center hole in the seat and the hole in the angle iron. By tightening the nut a uniform upward force is exerted on the seat for removal.

NOTE: Do not lift up on the end of the angle iron as this may force the integral bearing out of alignment, causing the stem to bind.



Lime Deposits

One of the easiest ways to remove lime deposits from the valve stem or other metal parts is to dip them in a 5-percent muriatic acid solution just long enough for the deposit to dissolve. This will remove most of the common types of deposits. **CAUTION: USE EXTREME CARE WHEN HANDLING ACID.** Rinse parts in water before handling. If the deposit is not removed by acid, then a fine grit (400) wet or dry sandpaper can be used with water.

Inspection of Parts

After the valve has been disassembled, each part should be examined carefully for signs of wear, corrosion, or any other abnormal condition. Usually, it is a good idea to replace the rubber parts (diaphragm and disc) unless they are free of signs of wear. These are available in a repair kit. Any other parts which appear doubtful should be replaced. **WHEN ORDERING PARTS, BE SURE TO GIVE COMPLETE NAMEPLATE DATA, ITEM NUMBER AND DESCRIPTION.**

NOTE: If a new disc isn't available, the existing disc can be turned over, exposing the unused surface for contact with the seat. The disc should be replaced as soon as practical.

Reassembly

1. Reassembly is the reverse of the disassembly procedure. If a new disc has been installed, it may require a different number of spacer washers to obtain the right amount of "grip" on the disc. When the diaphragm assembly has been tightened to a point where the diaphragm cannot be twisted, the disc should be compressed very slightly by the disc guide. Excessive compression should be avoided. Use just enough spacer washers to hold the disc firmly without noticeable compression.

2. **MAKE SURE THE STEM NUT IS VERY TIGHT.** Attach a good fitting wrench to the nut and give it a sharp "rap" rather than a steady pull. Usually several blows are sufficient to tighten the stem nut for final tightening. Failure to do so could allow the diaphragm to pull loose and tear when subjected to pressure.

3. Carefully install the diaphragm assembly by lowering the stem through the seat bearing. Take care not to damage the stem or bearing. Line up the diaphragm holes with the stud or bolt holes on the body. On larger valves with studs, it may be necessary to hold the diaphragm assembly up part way while putting the diaphragm over the studs.

4. Put spring in place and replace cover. Make sure diaphragm is lying smooth under the cover.

5. Tighten cover nuts firmly using a cross-over pattern until all nuts are tight.

6. Test Hytrol Valve before re-installing pilot valve system.

Test Procedure After Valve Assembly

There are a few simple tests which can be made in the field to make sure the Hytrol Valve has been assembled properly. Do these before installing pilot system and returning valve to service. These are similar to the three troubleshooting tests.

1. Check the diaphragm assembly for freedom of movement after all pressure is removed from the valve. **SEE CAUTION.** Insert fabricated tool into threaded hole in top of valve stem, and lift the diaphragm assembly manually. Note any roughness, sticking or grabbing. The diaphragm assembly should move smoothly throughout entire valve stroke. The tool is fabricated from rod that is threaded on one end to fit valve stem (See chart in Step 4 of "Disassembly" section.) and has a "T" Bar handle of some kind on the other end for easy gripping.

Place marks on this diaphragm assembly lifting tool when the valve is closed and when manually positioned open. The distance between the two marks should be approximately the stem travel shown in stem travel chart. (See "Freedom of Movement Check" section.) If the stroke is different than that shown, there is a good reason to believe something is mechanically restricting the stroke of the valve. The cover must be removed, the obstruction located and removed. (See "Maintenance" section for procedure.

Due to the weight of the diaphragm assembly this procedure is not possible on valves 8" and larger. on these valves, the same determination can be made by carefully introducing a low pressure-less than five psi) into the valve body with the cover vented. **SEE CAUTION.** Looking in cover center hole see the diaphragm assembly lift easily without hesitation, and then settle back easily when the pressure is removed.

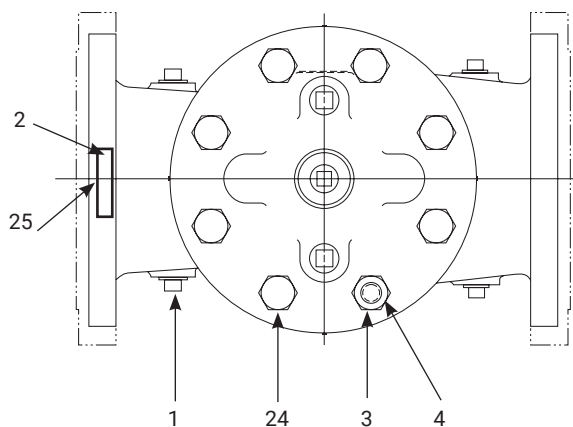
2. To check the valve for drip-tight closure, a line should be connected from the inlet to the cover, and pressure applied at the inlet of the valve. If properly assembled, the valve should hold tight with as low as ten PSI at the inlet. See "Tight Sealing Check" section.)

3. With the line connected from the inlet to the cover, apply full working pressure to the inlet. Check all around the cover for any leaks. Re-tighten cover nuts if necessary to stop leaks past the diaphragm.

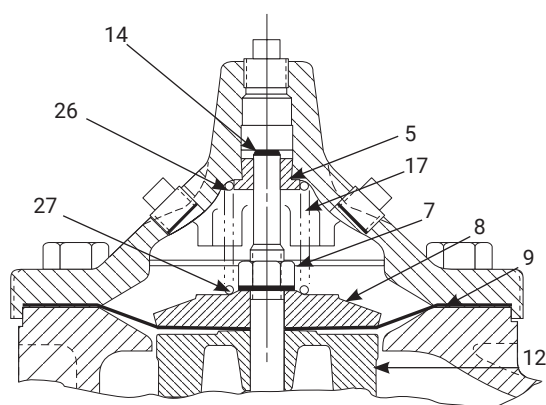
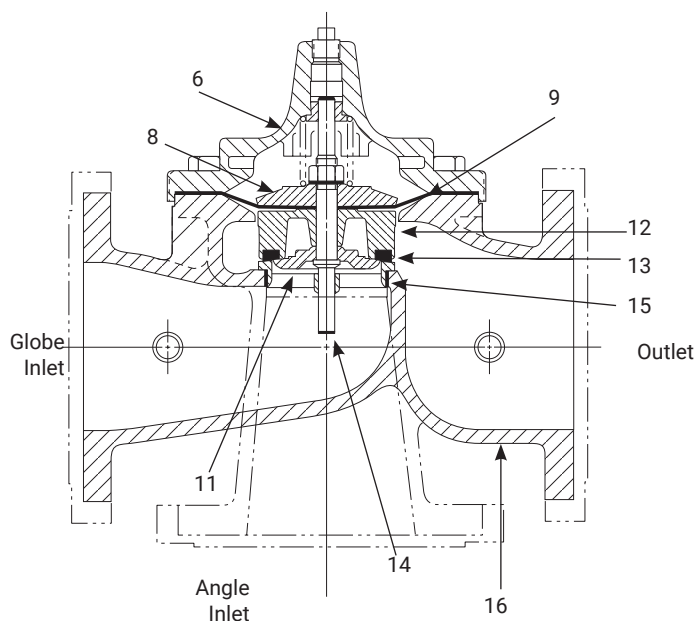
4. Remove pressure, then re-install the pilot system and tubing exactly as it was prior to removal. **Bleed air from all high points.**

5. Follow steps under "Start-Up and Adjustment" Section in Technical Manual for returning complete valve back to service.

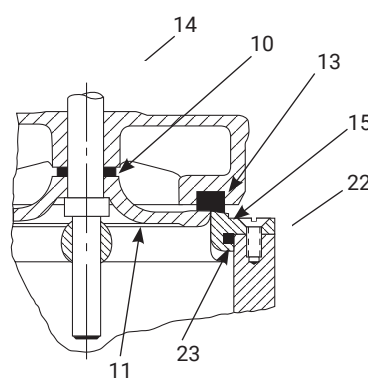




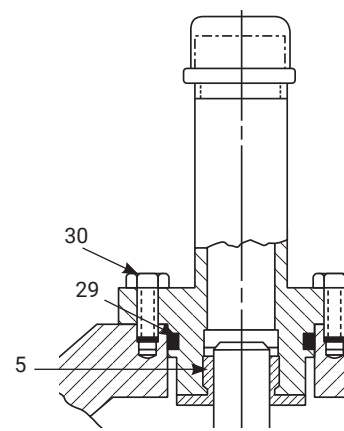
TOP VIEW



3" - 6" COVER DETAIL



10" - 24" SEAT DETAIL



20" - 24" COVER DETAIL

Item No.	Description
1	Pipe Plug
2	Drive Screws (for nameplate)
3	Hex Nut (8" and larger)
4	Stud (8" and larger)
5	Cover Bearing
6	Cover
7	Stem Nut
8	Diaphragm Washer
9	Diaphragm
10	Spacer Washers
11	Disc Guide
12	Disc Retainer
13	Disc
14	Stem
15	Seat
16	Body
17	Spring
22	Flat Head Screws (10" and larger)
23	Seat O-Ring
24	Hex Head Bolt (3" thru 6")
25	Nameplate (Mounted on inlet flange)
26	Upper Spring Washer (Epoxy coated valves only)
27	Lower Spring Washer (Epoxy coated valves only)
28	Cover Bearing Housing (20", 24", & 30")
29	Cover Bearing Housing O-Ring (20", 24", & 30")
30	Hex Bolt (20" & 24")
31	Pipe Cap (20", 24", & 30")



Model 100-20

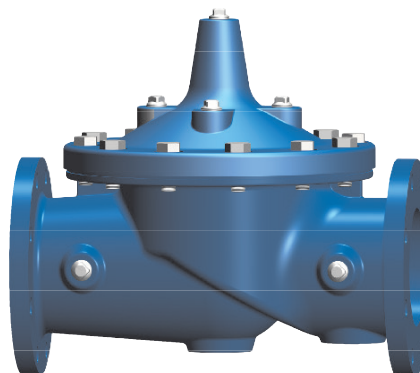
600 SERIES HYTROL VALVE SERVICE DATA

DESCRIPTION 100-01 HYTROL VALVE

The Cla-Val Model 100-01 Hytrol Valve is a main valve for Cla-Val Automatic Control Valves. It is a hydraulically operated, diaphragm-actuated, globe or angle pattern valve. This valve consists of three major components; body, diaphragm assembly, and cover. The diaphragm assembly is the only moving part. The diaphragm assembly uses a diaphragm of nylon fabric bonded with synthetic rubber. A synthetic rubber disc, contained on three and one half sides by a disc retainer and disc guide, forms a seal with the valve seat when pressure is applied above the diaphragm. The diaphragm assembly forms a sealed chamber in the upper portion of the valve, separating operating pressure from line pressure.

DESCRIPTION 100-20 600 SERIES HYTROL VALVE

The Cla-Val Model 100-20 Hytrol Valve (600 Series main valve) have only one part -the body- that is different from standard 100 Series Cla-Val main valve parts. The remaining parts of the 600 series main valve are standard Cla-Val main valve parts. All service and maintenance information for the standard 100 Series main valves also apply to the 600 series main valves. The most important thing to remember when ordering main valve repair kits and replacement parts, except for the body, all other parts are going to be for a smaller size main valve. Cla-Val identifies main valve parts with the flange size of the standard 100 Series main valve. Refer to the "Main Valve Sizes" chart below.



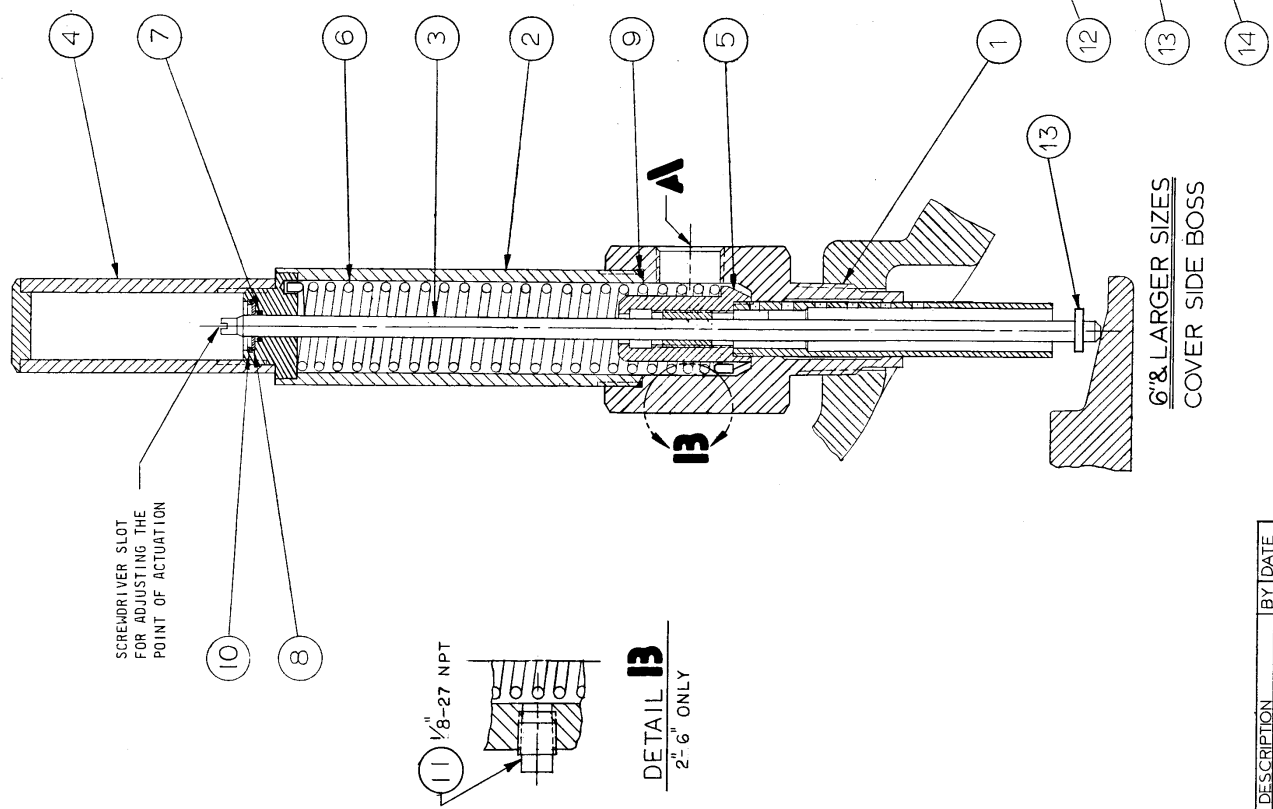
Hytrol Service Data

Hytrol Service Data																			
Hytrol Size				Stem Travel		Cover Capacity Displacement		Cover Center NPT	Cover Nut or Bolt ⁽¹⁾					Cover Lifting Holes	Valve Stem Internal Thread	Stem Nut ⁽³⁾			
									Thread	Socket	Qty	Torque, Lubricated ⁽²⁾				Thread	Socket (Long)	Torque, Lubricated ⁽²⁾	
IN	MM	IN	MM	IN	MM	Gallons	Liters	FT. LBS				IN. LBS	FT. LBS	IN. LBS					
1	25	—	—	0.24	6	0.02	—	1/4	1/4 – 20	7/16	8	—	80	—	—	3/8 – 24	9/16	—	80
1 1/4	32	—	—	0.49	12	0.02	0.08	1/4	5/16 – 18	1/2	8	12	—	—	#10 – 32	7/16 – 20	11/16	12	—
1 1/2	40	—	—	0.49	12	0.02	0.08	1/4	5/16 – 18	1/2	8	12	—	—	#10 – 32	7/16 – 20	11/16	12	—
2	50	3	80	0.59	15	0.03	0.12	1/2	3/8 – 16	9/16	8	20	—	—	#10 – 32	1/2 – 20	3/4	16	—
2 1/2	65	—	—	0.71	18	0.04	0.16	1/2	7/16 – 14	5/8	8	36	—	—	#10 – 32	5/8 – 18	15/16	32	—
3	80	4	—	0.84	21	0.08	0.3	1/2	1/2 – 13	3/4	8	50	—	—	1/4 – 28	5/8 – 18	15/16	32	—
4	100	6	—	1.09	28	0.17	0.64	3/4	3/4 – 10	1 1/8	8	125	—	—	1/4 – 28	3/4 – 16	1 1/8	55	—
6	150	8	—	1.58	40	0.53	2.01	3/4	3/4 – 10	1 1/8	12	125	—	—	3/8 – 24	7/8 – 14	1 5/16	100	—
8	200	10	—	2.24	57	1.26	4.77	1	3/4 – 10	1 1/4	16	125	—	5/8 – 11	3/8 – 24	1 1/8 – 12	1 3/4	180	—
10	250	12	—	2.71	69	2.51	9.5	1	7/8 – 9	1 7/16	20	160	—	3/4 – 10	3/8 – 24	1 1/4 – 12	1 7/8	300	—
12	300	14, 16	350, 400	3.34	85	4.00	15.14	1 1/4	1 1/8 – 7	1 13/16	20	320	—	3/4 – 10	3/8 – 24	1 1/2 – 12	2 1/4	500	—
14	350	—	—	4.08	104	6.50	24.61	1 1/2	1 1/4 – 7	2	20	450	—	1 – 8	3/8 – 24	1 1/2 – 12	2 1/4	500	—
16	400	18, 20, 24	450, 500, 600	4.58	116	9.60	36.34	2	1 1/4 – 7	2	20	450	—	1 – 8	1/2 – 20	2 – 16	3	600	—
18	500	—	—	5.13	130	11.00	42	1	1 1/4 – 7	2	24	450	—	1 – 8	3/4 – 16	2 1/4 – 16	3 7/16	1000	—
20	500	—	—	5.63	143	12.00	45.42	1	1 3/8 – 6	2 3/16	24	600	—	1 – 8	3/4 – 16	2 1/4 – 16	3 7/16	1000	—
24	600	30	—	6.50	165	29.00	109.78	1	1 1/2 – 12	2 3/8	24	850	—	1 1/8 – 7	3/4 – 16	3 – 12	4 5/8	1600	—
30	750	36	900	8.00	203	42.00	158.99	2	1 1/2 – 12	2 3/8	32	850	—	1 1/8 – 7	3/4 – 16	3 – 12	4 5/8	3000	—
36	900	42, 48, 56	1050, 1200, 1400	8.71	221	90.00	340.69	2	1 3/4 – 10	2 3/4	36	1250	—	1 1/4 – 12	3/4 – 16	3 1/2 – 8	6	3000	—

(1) Valve sizes 6" and smaller use hex bolts for cover fasteners. Valve sizes 8" and larger use studs with hex nuts.

(2) Clean all threads and apply anti-seize prior to reassembly of threaded fasteners. Torque values are based on standard SST material.

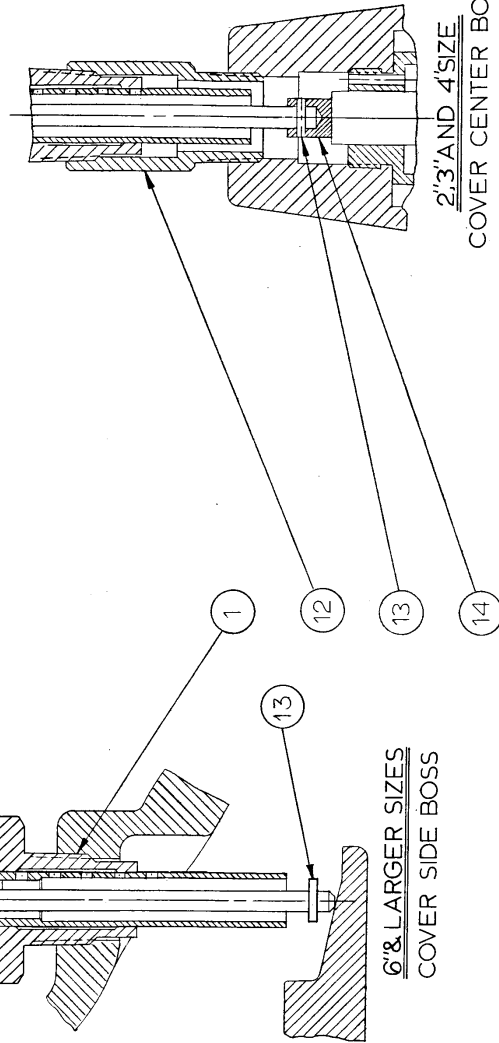
PARTS LIST		
ITEM NO.	DESCRIPTION	QTY.
1	BODY	1
2	SPRING HOUSING ASSEMBLY	1
3	STEM ASSEMBLY	1
4	CAP ASSEMBLY	1
5	POPPET ASSEMBLY	1
6	SPRING	1
7	O-RING	1
8	WASHER	1
9	O-RING	1
10	RING RETAINER	1
11	PLUG, PIPE 1/8" - 27NPT (2" - 6" SIZES ONLY)	1
12	ADAPTER (2" - 4" SIZE ONLY)	1
13	PIN, GROOVE	1
14	BUTTON, STEM (2" - 4" SIZE ONLY)	1



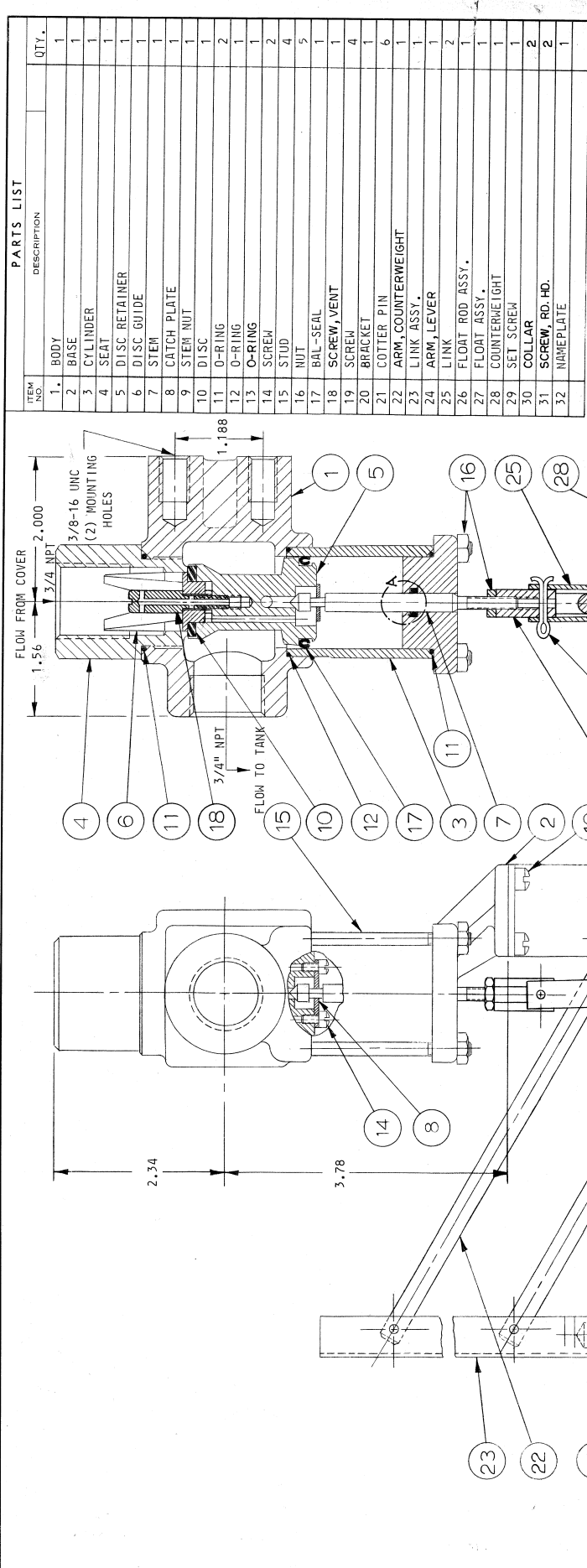
VALVE SIZE	1/2" NPT
2" - 6"	1" NPT

X74B STEM VALVE SETTING FOR FINAL ASSEMBLY:

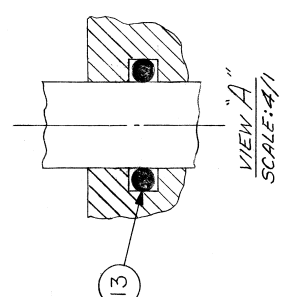
AFTER THE X74B STEM VALVE ASSEMBLY IS INSTALLED IN THE MAIN VALVE, TURN THE ADJUSTING STEM CLOCKWISE UNTIL IT CONTACTS EITHER THE MAIN VALVE STEM (SIZES 2" THROUGH 4") OR THE DIAPHRAGM WASHER (SIZES 6" THROUGH 16") OR THE X74B STEM BOTTOMS OUT WHENEVER OCCURS FIRST. WHEN THE X74B STEM CONTACTS THE MAIN VALVE STEM OR THE DIAPHRAGM WASHER, A SLIGHT RESISTANCE WILL BE FELT AND ALSO THE X74B STEM WILL STOP ITS DOWNWARD TRAVEL.



LTR	DESCRIPTION REVISION RECORD	BY	DATE	DATE 1-7-85	DR. S. HARRIS	CHK. L. LOCKERTY	APPRO. J. H.	REV. 14790
CLAVAL CO. NEWPORT BEACH, CALIFORNIA, U.S.A.				2" - 16" X 74B-3 STEM VALVE ASSEMBLY				CODE IDENT. NUMBER 86184
				DR. S. HARRIS				REV. 14790
				CHK. L. LOCKERTY				
				APPRO. J. H.				
				SOURCE: NONE				



NOTE: DO NOT USE FOR STRAIGHT ON-OFF SERVICE.



Float Rod Extension Detail

PARTS LIST		QTY.
ITEM NO.	DESCRIPTION	
1.	BODY	1
2.	BASE	1
3.	CYLINDER	1
4.	SEAT	1
5.	DISC RETAINER	1
6.	DISC GUIDE	1
7.	STEM	1
8.	CATCH PLATE	1
9.	STEM NUT	1
10.	DISC	1
11.	O-RING	2
12.	O-RING	1
13.	O-RING	1
14.	SCREW	2
15.	STUD	4
16.	NUT	5
17.	BAL-SEAL	1
18.	SCREW/VENT	1
19.	SCREW	4
20.	BRACKET	1
21.	COTTER PIN	1
22.	ARM, COUNTERWEIGHT	6
23.	LINK ASSY.	1
24.	ARM, LEVER	1
25.	LINK	2
26.	FLOAT ROD ASSY.	1
27.	FLOAT ASSY.	1
28.	COUNTERWEIGHT	1
29.	SET SCREW	1
30.	COLLAR	2
31.	SCREW, RD. HD.	2
32.	NAMEPLATE	1

**CLA-VAL CO.**
NEWPORT BEACH, CALIFORNIA, U.S.A.

DESCRIPTION
CFM-7 MODULATING FLOAT CONTROL

CODE IDENT. NUMBER
86184

REV.	DRAWING NUMBER	DATE	BY	DESCRIPTION
1	76823	4-20-70	DR. B. ADAMS	DR. B. ADAMS
		6-10-70	CHK. M. F.	CHK. M. F.
		6-10-70	APP. J. A.	APP. J. A.
			SCALE FULL	SCALE FULL

REVISION RECORD

REV.	DESCRIPTION	DATE
1	ADD NOTE	7-22-71
2	ADD DIM. 50 SET AT ASSY.	DP 11-2-71
3	ITEM 13 BAL-SEAL WAS O-RING	1-0 6-24-71
4	ITEM 2 DELETE ASSY. ADD DETAIL	DP 11-2-71
5	REVISE TOP LEVER TO SCALE	DP 11-2-71
6	FLOAT ROD STUD	DP 11-2-71
7	ITEM NO. 30 SET AT EXTENSION	DP 11-2-71

J	REMOVE ITEM NO. 33 (EO 3375)	CLM 2-18-72
K	SEE ECO 253	DP 7-10-72
L	SWAP LOCATION OF ITEM NO. 22 & 24	DP 5-5-79
M	SEE ECO 255-832	DP 7-27-78
N	ADD NOTE	CH 7-22-77
O	ADD DIM. 50 SET AT ASSY.	DP 11-2-71
P	ITEM 13 BAL-SEAL WAS O-RING	1-0 6-24-71
Q	ITEM 2 DELETE ASSY. ADD DETAIL	DP 11-2-71
R	REVISE TOP LEVER TO SCALE	DP 11-2-71
S	FLOAT ROD STUD	DP 11-2-71
T	ITEM NO. 30 SET AT EXTENSION	DP 11-2-71



Model X46

PRESSURE REDUCING CONTROL

- Self Scrubbing Cleaning Action
- Straight Type or Angle Type

The Cla-Val Model X46 Strainer is designed to prevent passage of foreign particles larger than 0.015". It is especially effective against such contaminant as algae, mud, scale, wood pulp, moss, and root fibers. There is a model for every Cla-Val valve.

The X46 Flow Clean strainer operates on a velocity principle utilizing the circular "air foil" section to make it self cleaning. Impingement of particles is on the "leading edge" only. The low pressure area on the downstream side of the screen prevents foreign particles from clogging the screen. There is also a scouring action, due to eddy currents, which keeps most of the screen area clean.

INSTALLATION

The strainer is designed for use in conjunction with a Cla-Val Main Valve, but can be installed in any piping system where there is a moving fluid stream to keep it clean. When it is used with the Cla-Val Valve, it is threaded into the upstream body port provided for it on the side of the valve. It projects through the side of the Main Valve into the flow stream. All liquid shunted to the pilot control system and to the cover chamber of the Main Valve passes through the Model X46 Flow Clean Strainer.

INSPECTION

Inspect internal and external threads for damage or evidence of cross-threading. Check inner and outer screens for clogging, embedded foreign particles, breaks, cracks, corrosion, fatigue, and other signs of damage.

DISASSEMBLY

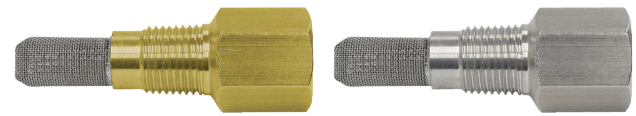
Do not attempt to remove the screens from the strainer housing.

CLEANING

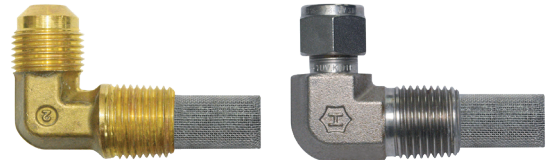
After inspection, cleaning of the Model X46 can begin. Water service usually will produce mineral or lime deposits on metal parts in contact with water. These deposits can be cleaned by dipping Model X46 in a 5-percent muriatic acid solution just long enough for deposit to dissolve. This will remove most of the common types of deposits.

CAUTION: use extreme care when handling acid. If the deposit is not removed by acid, then a fine grit (400) wet or dry sandpaper can be used with water. Rinse parts in water before handling. An appropriate solvent can clean parts used in fueling service. Dry with compressed air or a clean, lint-free cloth.

Protect from damage and dust until reassembled.



Model X46A Straight



Model X46B Angle

REPLACEMENT

If there is any sign of damage, or if there is the slightest doubt that the Model X46 Flow Clean Strainer may not afford completely satisfactory operation, replace it. Use Inspection steps as a guide. Neither inner screen, outer screen, nor housing is furnished as a replacement part. Replace Model X46 Flow Clean Strainer as a complete unit.

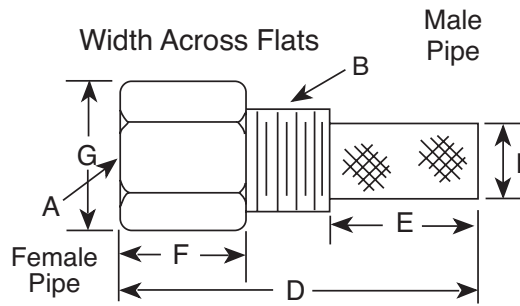
When ordering replacement Flow-Clean Strainers, it is important to determine pipe size of the tapped hole into which the strainer will be inserted (refer to column A or F), and the size of the external connection (refer to column B or G).



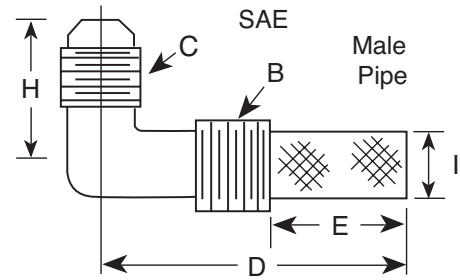
Dimensions (in Inches)

X46 Straight Type A (In Inches)						
A (NPT)	C (NPT)	D	E	F	G	I
1/8	1/8	1-3/4	3/4	1/2	1/2	1/4
1/4	1/4	2-1/4	1	3/4	3/4	3/8
3/8	3/8	2-1/2	1	7/8	7/8	1/2
3/8	1/2	2-1/2	1-1/4	1/2	7/8	3/4
1/2	1/2	3	1-1/4	1	1-1/8	3/4
3/8	3/4	3-3/8	2	1/2	1	7/8
3/4	3/4	4	2	1	1-1/2	7/8
3/8	1	4-1/4	2-3/4	1/2	1-3/8	7/8
1	1	4-1/2	2-3/4	1-1/4	1-3/4	7/8
1/2	1	4-1/4	2-3/4	1/2	1-3/8	7/8

X46 Angle Type B (In Inches)					
B (NPT)	C (SAE)	D	E	H	I
1/8	1/4	1-3/8	5/8	7/8	1/4
1/4	1/4	1-3/4	3/4	1	3/8
3/8	1/4	2	7/8	1	1/2
3/8	3/8	1-7/8	7/8	1	1/2
1/2	3/8	2-3/8	1	1-1/4	5/8



Model X46A

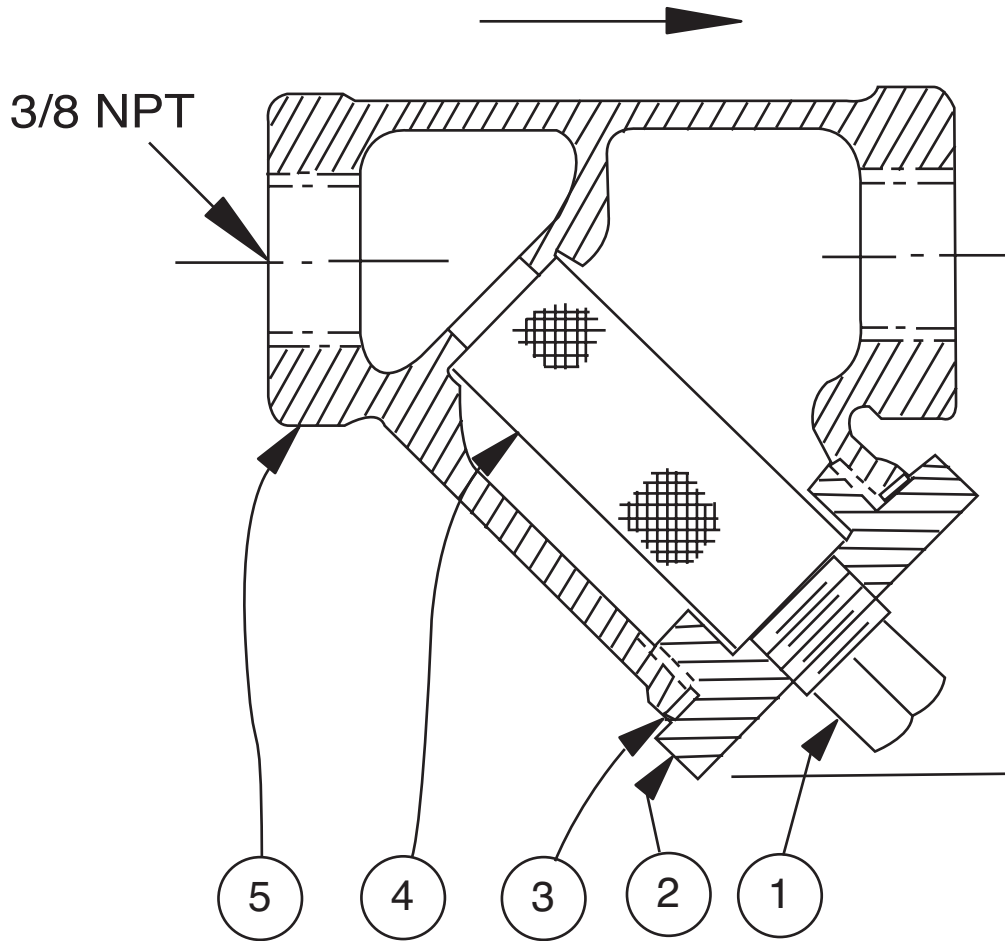


Model X46B

When Ordering, Please Specify

1. Catalog number X46
2. Straight or Angel Type
3. Size inserted into and size connection
4. Materials





Standard 60 mesh pilot system strainer for fluid service.

Size	Stock Number
3/8" x 3/8"	8850604D

Item No.	Description	Material
1	Pipe Plug	Stainless Steel
2	Strainer Plug	Stainless Steel
3	Gasket	Fiber
4	Screen	Stainless Steel
5	Body	Stainless Steel
No parts available. Replacement assembly only.		

When Ordering, Please Specify

- 1. All Nameplate data
- 2. Item Number
- 3. Description
- 4. Material





Cla-Val Product ID

HOW TO ORDER

PROPER IDENTIFICATION

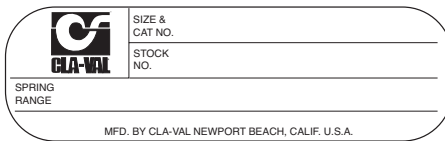
For ordering repair kits, replacement parts, or for inquiries concerning valve operation, it is important to properly identify Cla-Val products already in service by including all nameplate data with your inquiry. Pertinent product data includes valve function, size, material, pressure rating, end details, type of pilot controls used and control adjustment ranges.

IDENTIFICATION PLATES

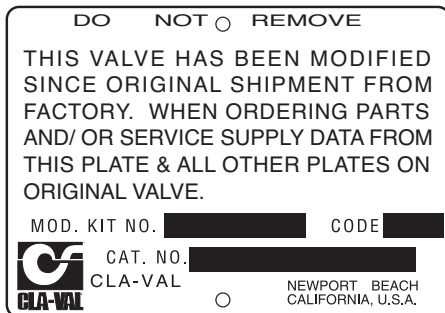
For product identification, cast-in body markings are supplemented by identification plates as illustrated on this page. The plates, depending on type and size of product, are mounted in the most practical position. **It is extremely important that these identification plates are not painted over, removed, or in any other way rendered illegible.**



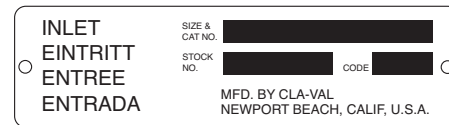
This brass plate appears on altitude valves only and is found on top of the outlet flange.



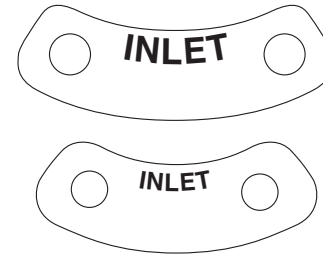
This tag is affixed to the cover of the pilot control valve. The adjustment range appears in the spring range section.



This aluminum plate is included in pilot system modification kits and is to be wired to the new pilot control system after installation.



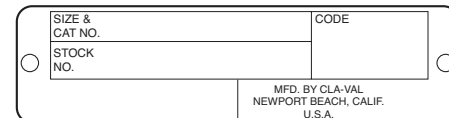
This brass plate appears on valves sized 21/2" and larger and is located on the top of the inlet flange.



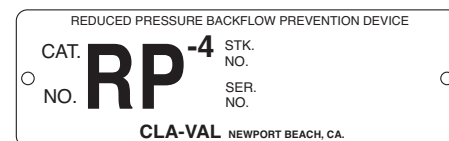
These two brass plates appear on 3/8", 1/2", and 3/4" size valves and are located on the valve cover.



These two brass plates appear on threaded valves 1" through 3" size or flanged valves 1" through 2". It is located on only one side of the valve body.



This brass plate is used to identify pilot control valves. The adjustment range is stamped into the plate.



This brass plate is used on our backflow prevention assemblies. It is located on the side of the Number Two check (2" through 10"). The serial number of the assembly is also stamped on the top of the inlet flange of the Number One check.

How to Order

Because of the vast number of possible configurations and combinations available, many valves and controls are not shown in published product and price lists. For ordering information, price and availability on product that are not listed, please contact your local Cla-Val office or our factory office located at:

P. O. Box 1325
Newport Beach, California 92659-0325
(949) 722-4800
FAX (949) 548-5441



When Ordering, Please Specify

1. Model Number	3. Adjustment range (as application)	4. Valve Size	6. Body and Trim Materials	7. Optional Features
2. Globe or Angle Pattern		5. Threaded or Flanged		8. Pressure Class

Unless Otherwise Specified

- Globe or angle pattern are the same price
- Ductile iron body and bronze trim are standard
- X46 Flow Clean Strainer or X43 "Y" Strainer are included
- CK2 Isolation Valves are included in price on 4" and larger valve sizes (6" and larger on 600 Series)

Limited Warranty

Automatic valves and controls as manufactured by Cla-Val are warranted for three years from date of shipment against manufacturing defects in material and workmanship that develop in the service for which they are designed, provided the products are installed and used in accordance with all applicable instructions and limitations issued by Cla-Val. Electronic components manufactured by Cla-Val are warranted for one year from the date of shipment.

We will repair or replace defective material, free of charge, that is returned to our factory, transportation charges prepaid, if upon inspection, the material is found to have been defective at time of

original shipment. This warranty is expressly conditioned on the purchaser's providing written notification to Cla-Val immediate upon discovery of the defect.

Components used by Cla-Val but manufactured by others, are warranted only to the extent of that manufacturer's guarantee.

This warranty shall not apply if the product has been altered or repaired by others, Cla-Val shall make no allowance or credit for such repairs or alterations unless authorized in writing by Cla-Val.

Disclaimer of Warranties and Limitations of Liability

The foregoing warranty is exclusive and in lieu of all other warranties and representations, whether expressed, implied, oral or written, including but not limited to any implied warranties or merchantability or fitness for a particular purpose. All such other warranties and representations are hereby canceled.

Cla-Val shall not be liable for any incidental or consequential loss, damage or expense arising directly or indirectly from the use of the

product. Cla-Val shall not be liable for any damages or charges for labor or expense in making repairs or adjustments to the product. Cla-Val shall not be liable for any damages or charges sustained in the adaptation or use of its engineering data and services. No representative of Cla-Val may change any of the foregoing or assume any additional liability or responsibility in connection with the product. The liability of Cla-Val is limited to material replacements F.O.B. Newport Beach, California.

Terms of Sale

ACCEPTANCE OF ORDERS

All orders are subject to acceptance by our main office at Newport Beach, California.

CREDIT TERMS

Credit terms are net thirty (30) days from date of invoice.

PURCHASE ORDER FORMS

Orders submitted on customer's own purchase order forms will be accepted only with the express understanding that no statements, clauses, or conditions contained in said order form will be binding on the Seller if they in any way modify the Seller's own terms and conditions of sales.

PRODUCT CHANGES

The right is reserved to make changes in pattern, design or materials when deemed necessary, without prior notice.

PRICES

All prices are F.O.B. Newport Beach, California unless expressly stated otherwise on our acknowledgment of the order. Prices are subject to change without notice. The prices at which any order is accepted are subject to adjustment to the Seller's price in effect at the time of shipment. Prices do not include sales, excise, municipal, state or any other Government taxes. Minimum order charge \$100.00.

RESPONSIBILITY

We will not be responsible for delays resulting from strikes, accidents, negligence of carriers, or other causes beyond our control. Also, we will not be liable for any unauthorized product alterations or charges accruing there from.

RISK

All goods are shipped at the risk of the purchaser after they have been delivered by us to the carrier. Claims for error, shortages, etc., must be made upon receipt of goods.

EXPORT SHIPMENTS

Export shipments are subject to an additional charge for export packing.

RETURNED GOODS

1. Customers must obtain written approval from Cla-Val prior to returning any material.
2. Cla-Val reserves the right to refuse the return of any products.
3. Products more than six (6) months old cannot be returned for credit.
4. Specially produced, non-standard models cannot be returned for credit.
5. Rubber goods such as diaphragms, discs, o-rings, etc., cannot be returned for credit, unless as part of an unopened vacuum sealed repair kit which is less than six months old.
6. Goods authorized for return are subject to a 35% (\$100 minimum) restocking charge and a service charge for inspection, reconditioning, replacement of rubber parts, retesting, repainting and repackaging as required.
7. Authorized returned goods must be packaged and shipped prepaid to Cla-Val, 1701 Placentia Avenue, Costa Mesa, California 92627.





Model Repair Kits

Model 100-01 Hytrol Main Valve

BUNA-N MATERIAL				
	RUBBER KIT STOCK #	REPAIR KIT STOCK #	REBUILD ASSEMBLY STOCK #	STUD & NUT KIT STOCK #
3/8"	9169801K		21176614B	21176633J
1/2"	9169802H	21176602F	21176615A	21176634H
3/4"	9169802H	21176602F	21176615A	21176634H
1" Non-Guided	9169803F	21176601G	21176616K	21176636F
1"	9169804D	21176603E	21176617J	21176636F
1 1/4"	9169804D	21176603E	21176617J	21176636F
1 1/2"	9169804D	21176603E	21176617J	21176636F
2"	9169805A	21176608K	21176618H	21176637E
2 1/2"	9169811J	21176609J	21176619G	21176638D
3"	9169812G	21176604D	21176620D	21176639C
4"	9169813E	21176605C	21176621C	21176640K
6"	9169815K	21176606B	21176622B	21176641J
8"	9817901D	21176607A	21176623A	21176642H
10"	9817902B	21176610F	21176654C	21176643G
12"	9817903K	21176611E	21176625J	21176644F
14"	9817904H	21176612D	21176626H	21176645E
16"	9817905E	21176613C	21176627G	21176645E

Model 100-20 Hytrol Main Valve

BUNA-N MATERIAL				
	RUBBER KIT STOCK #	REPAIR KIT STOCK #	REBUILD ASSEMBLY STOCK #	STUD & NUT KIT STOCK #
3"	9169805A	21176608K	21176618H	21176637E
4"	9169812G	21176604D	21176620D	21176639C
6"	9169813E	21176605C	21176621C	21176640K
8"	9169815K	21176606B	21176622B	21176641J
10"	9817901D	21176607A	21176623A	21176642H
12"	9817902B	21176610F	21176624K	21176643G
14"	9817903K	21176611E	21176625J	21176644F
16"	9817903K	21176611E	21176625J	21176644F

Model 100-30 Hytrol Main Valve

BUNA-N MATERIAL		
	RUBBER KIT STOCK #	REBUILD ASSEMBLY STOCK #
2 1/2"	21112704H	21235401C
3"	21112702K	21235402B
4"	21112703J	21235403A
6"	27496886J	21235404K
8"	21112701A	21235405J
10"	CF	21235406H

Rubber Kit Includes:	Diaphragm, Disc, Spacer Washers. Model 100-30 also includes: Stem O-Ring, Seal, Bearing O-Ring.
Repair Kit Includes:	Diaphragm, Disc, Spacer Washers, Epoxy Coated Disc Retainer, Epoxy Coated Diaphragm Washer, Protective Washer
Rebuild Assembly Includes:	Diaphragm, Disc, Spacer Washers, Epoxy Coated Disc Retainer, Epoxy Coated Diaphragm Washer, Protective Washer, Stainless Steel Bolts & Washers (6" & Below), Stainless Steel Studs, Nuts, & Washers (8" & Above), Stem, Stem Nut, Disc Guide, Standard Cover Spring, Cover Washer. Model 100-30 also includes: Upper and Lower Stem and Stem Nut, Stem O-Ring, Seal, Lower Spring, PU Bearing, Bearing O-Ring, Bearing Retainer Ring.
Stud & Nut Kit Includes:	Stainless Steel Bolts & Washers (6" & Below), Stainless Steel Studs, Nuts, & Washers (8" & Above)

Repair Kits for 100-02/100-21 Powertrol and 100-03/100-22 Powercheck Main Valves
For: Powertrol and Powercheck Main Valves—**150 Pressure Class Only**
Includes: Diaphragm, Disc (or Disc Assembly) and O-rings and full set of spare Spacer Washers.

Valve Size	Kit Stock Number	Valve Size	Kit Stock Number	
	100-02		100-02 & 100-03	100-21 & 100-22
3/8"	9169901H	2 1/2"	9169910J	N/A
1/2" & 3/4"	9169902F	3"	9169911G	9169905J
1"	9169903D	4"	9169912E	9169911G
1 1/4" & 1 1/2"	9169904B	6"	9169913C	9169912E
2"	9169905J	8"	9169950E	9169913C
		10"	9169939H	9169950E
		12"	9169937B	9169939H
Consult factory for larger sizes				

Repair Kits for 100-04/100-23 Hy-Check Main Valves
For: Hy-Check Main Valves—**150 Pressure Class Only**
Includes: Diaphragm, Disc and O-Rings and full set of spare Spacer Washers.

Valve Size	Kit Stock Number		Valve Size	Kit Stock Number	
	100-04	100-23		100-04	100-23
4"	20210901B	N/A	12"	20210905H	20210904J
6"	20210902A	20210901B	14"	20210906G	N/A
8"	20210903K	20210902A	16"	20210907F	20210905H
10"	20210904J	20210903K	20"	N/A	20210907F
			24"	N/A	20210907F
Consult factory for larger sizes					

Repair Kits for Pilot Control Valves (In Standard Materials Only)
Includes: Diaphragm, Disc (or Disc Assembly), O-Rings, Gaskets or spare Screws as appropriate.

BUNA-N® (Standard Material)				VITON (For KB Controls)	
Pilot Control	Kit Stock Number	Pilot Control	Kit Stock Number	Pilot Control	Kit Stock Number
CDB	9170006C	CFM-7A	1263901K	CDB-KB	9170012A
CDB-30	9170023H	CFM-9	12223E	CRA-KB	N/A
CDB-31	9170024F	CRA (w/bucking spring)	9170001D	CRD-KB (w/bucking spring)	9170008J
CDB-7	9170017K	CRD (w/bucking spring)	9170002B	CRL-KB	9170013J
CDH-2	18225D	CRD (no bucking spring)	9170003K	CDHS-2BKB	9170010E
CDHS-2	44607A	CRD-18	20275401K	CDHS-2FKB	9170011C
CDHS-2B	9170004H	CRD-22	98923G	CDHS-18KB (no bucking spring)	9170009G
CDHS-2F	9170005E	CRL (55F, 55L)	9170007A	102C-KB	1726202D
CDHS-3C-A2	24657K	CRL60/55L-60	9170033G		
CDHS-8A	2666901A	CRL60/55L60 1"	9170042H		
CDHS-18	9170003K	CRL-4A	43413E		
CDS-4	9170014G	CRL-5 (55B)	65755B		
CDS-5	14200A	CRL-5A (55G)	20666E		
CDS-6	20119301A	CRL-18	20309801C		
CDS-6A	20349401C	Universal CRL	9170041K		
CDS-7	20349402B	CV	9170019F		
CDS-7DO	20349403A	X105L (O-ring)	00951E	Buna-N®	
CFCM-M1	1222301C	102B-1	1502201F		
CFM-2	12223E	102C-2	1726201F	CRD Disc Ret. (Solid)	C5256H
CFM-7	1263901K	102C-3	1726201F	CRD Disc Ret. (Spring)	C5255K

Repair Assemblies (In Standard Materials Only)

Control	Description	Stock Number
CF1-C1	Pilot Assembly Only	89541H
CF1-CI	Complete Float Control less Ball and Rod	89016A
CFC2-C1	Disc, Distributor and Seals	2674701E
CSM 11-A2-2	Mechanical Parts Assembly	97544B
CSM 11-A2-2	Pilot Assembly Only	18053K
33A 1"	Complete Internal Assembly and Seal	2036030B
33A 2"	Complete Internal Assembly and Seal	2040830J

When ordering, please give complete nameplate data of the valve and/or control being repaired. MINIMUM ORDER CHARGE APPLIES