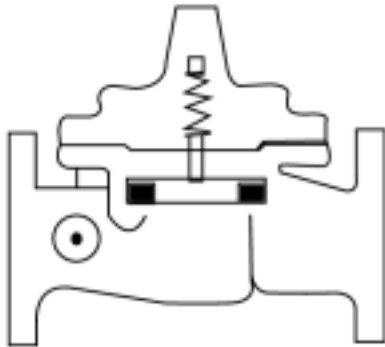


CLA-VAL

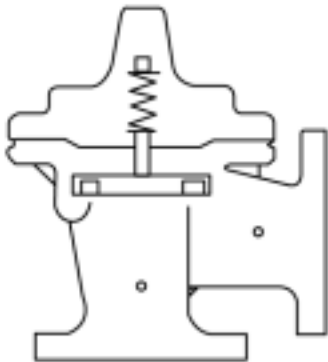
AUTOMATIC CONTROL VALVES

49-01/649-01

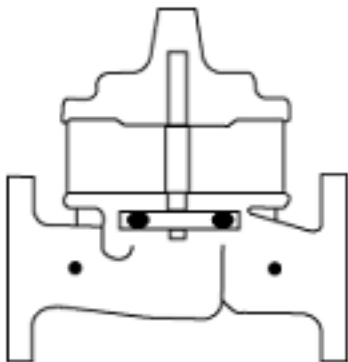
Place this manual with personal responsible
for maintenance of this valve



INSTALLATION



OPERATION



MAINTENANCE



Distributed By: M&M Control Service, INC.


Phone: 800-876-0036 Fax: 847-356-0747

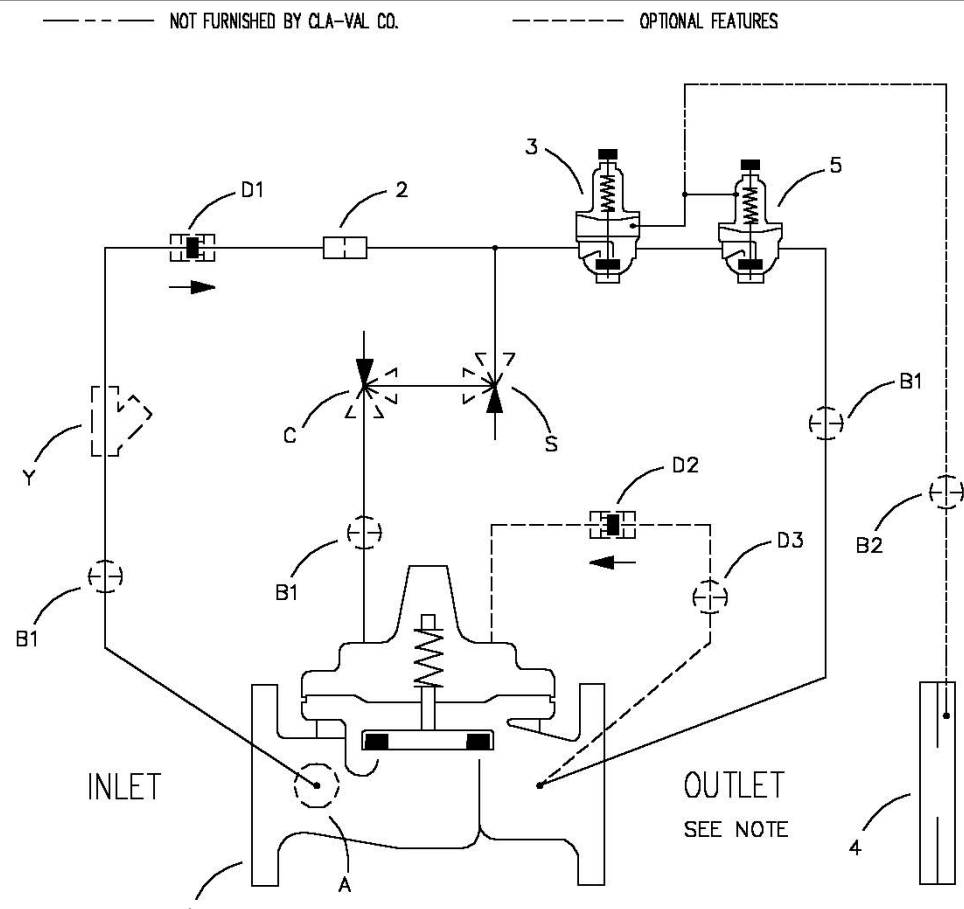
Email: Sales@mmcontrol.com

CVCL 1 ② 3 4

DIST. CODE 002

SHEET 1 OF 3

 CLA-VAL CO. NEWPORT BEACH, CALIFORNIA	CATALOG NO. 49-01/649-01	DRAWING NO. 76573	REV. M
	TYPE OF VALVE AND MAIN FEATURES COMBINATION RATE OF FLOW CONTROLLER AND PRESSURE REDUCING VALVE		DESIGN CH 12-15-78 DP 12-18-78 WAL 12-18-78



NOTE: ORIFICE PLATE ASSEMBLY MAY BE ATTACHED TO THE MAIN VALVE OUTLET FLANGE, HOWEVER, BETTER CONTROL IS OBTAINED IF LOCATED 1 TO 5 PIPE DIAMETERS DOWNSTREAM.

ITEM NO.	BASIC COMPONENTS	QTY
1	100-01 HYTROL (49-01) MAIN VALVE	1
	100-20 HYTROL (649-01) MAIN VALVE	1
2	X58C RESTRICTION FITTING	1
3	CRA PRESSURE REDUCING CONTROL	1
4	X52A-1 ORIFICE PLATE ASSEMBLY	1
5	CDHS18 DIFFERENTIAL CONTROL	1

OPTIONAL FEATURE SUFFIX		ADDED TO CATALOG NUMBER
A	X46A FLOW CLEAN STRAINER	1
B	CK2 COCK (ISOLATION VALVE)	4
C	CV FLOW CONTROL (CLOSING)	1
D	CHECK VALVES WITH COCK	1
S	CV FLOW CONTROL (OPENING)	1
Y	X43 "Y" STRAINER	1

DATE	6-27-91
BY	TLC
DESCRIPTION	ADDED D OPTIONAL FEATURE & REVISED ON CAD (ECO 12046)
SEE REVISION FILE	

THIS DRAWING IS THE PROPERTY OF CLA-VAL CO. AND SAME AND COPIES MADE THEREOF, IF ANY, SHALL BE RETURNED TO IT UPON DEMAND. DELIVERY AND DISCLOSURE HEREOF ARE SOLELY UPON CONDITION THAT THE SAME SHALL NOT BE USED, COPIED OR REPRODUCED, NOR SHALL THE SUBJECT HEREOF BE DISCLOSED IN ANY MANNER TO ANYONE FOR ANY PURPOSE, EXCEPT AS HEREIN AUTHORIZED, WITHOUT PRIOR WRITTEN APPROVAL OF CLA-VAL CO. THIS DRAWING IS SUBMITTED CONFIDENTIALLY AND MAY NOT BE USED IN THE MANUFACTURE OF ANY MATERIAL OR PRODUCT OTHER THAN SUCH MATERIALS AND PRODUCTS FURNISHED TO CLA-VAL CO. WHETHER OR NOT THE EQUIPMENT OR INFORMATION SHOWN HEREON IS PATENTED OR OTHERWISE PROTECTED, FULL TITLE AND COPYRIGHTS, IF ANY, IN AND TO THIS DRAWING AND/OR INFORMATION DELIVERED OR SUBMITTED ARE FULLY RESERVED CLA-VAL CO.

CVCL 1 ② 3 4

DIST. CODE 002

SHEET 2 OF 3



CLA-VAL CO.

NEWPORT BEACH, CALIFORNIA

CATALOG NO.
49-01/649-01

DRAWING NO.
76573

REV.
M

TYPE OF VALVE AND MAIN FEATURES

COMBINATION RATE OF FLOW CONTROLLER
AND PRESSURE REDUCING VALVE

DESIGN		
DRAW	CH	12-15-78
CHK'D	DP	12-18-78
APVD	WAL	12-18-78

OPERATING DATA

I. RATE OF FLOW FEATURE:

PRESSURE DIFFERENTIAL CONTROL (5) IS NORMALLY OPEN AND RESPONDS TO DIFFERENTIAL PRESSURE CHANGES SENSED ACROSS ORIFICE PLATE ASSEMBLY (4). AN INCREASE IN DIFFERENTIAL PRESSURE TENDS TO CLOSE CONTROL (5) AND A DECREASE IN DIFFERENTIAL PRESSURE TENDS TO OPEN CONTROL (5). THIS CAUSES MAIN VALVE COVER PRESSURE TO VARY AND THE MAIN VALVE MODULATES (OPENS AND CLOSES) MAINTAINING A RELATIVELY CONSTANT RATE OF FLOW. PRESSURE DIFFERENTIAL CONTROL (5) ADJUSTMENT: TURN THE ADJUSTING SCREW CLOCKWISE TO INCREASE THE RATE OF FLOW.

II. PRESSURE REDUCING FEATURE:

PRESSURE REDUCING CONTROL (3) IS A NORMALLY OPEN CONTROL THAT SENSES MAIN VALVE OUTLET PRESSURE CHANGES. AN INCREASE IN OUTLET PRESSURE TENDS TO CLOSE CONTROL (3) AND A DECREASE IN OUTLET PRESSURE TENDS TO OPEN CONTROL (3). THIS CAUSES MAIN VALVE COVER PRESSURE TO VARY AND THE MAIN VALVE MODULATES (OPENS AND CLOSES) MAINTAINING A RELATIVELY CONSTANT OUTLET PRESSURE. PRESSURE REDUCING CONTROL (3) ADJUSTMENT: TURN THE ADJUSTING SCREW CLOCKWISE TO INCREASE THE SETTING.

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) AND (B2) ARE USED TO ISOLATE THE PILOT SYSTEM FROM MAIN LINE PRESSURE. THESE VALVES MUST BE OPEN DURING NORMAL OPERATION.

SUFFIX C (CLOSING SPEED CONTROL)

FLOW CONTROL (C) CONTROLS THE CLOSING SPEED OF THE MAIN VALVE. TURN THE ADJUSTING STEM CLOCKWISE TO MAKE THE MAIN VALVE CLOSE SLOWER.

SUFFIX D (CHECK VALVES WITH COCK):

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

CAD REVISION RECORD - DO NOT REVISE MANUALLY	DATE	
	BY	
DESCRIPTION		
	SEE SHEET 1	
LTR		

THIS DRAWING IS THE PROPERTY OF CLA-VAL CO. AND SAME AND COPIES MADE THEREOF, IF ANY, SHALL BE RETURNED TO IT UPON DEMAND. DELIVERY AND DISCLOSURE HEREOF ARE SOLELY UPON CONDITION THAT THE SAME SHALL NOT BE USED, COPIED OR REPRODUCED, NOR SHALL THE SUBJECT HEREOF BE DISCLOSED IN ANY MANNER TO ANYONE FOR ANY PURPOSE, EXCEPT AS HEREIN AUTHORIZED, WITHOUT PRIOR WRITTEN APPROVAL OF CLA-VAL CO. THIS DRAWING IS SUBMITTED CONFIDENTIALLY AND MAY NOT BE USED IN THE MANUFACTURE OF ANY MATERIAL OR PRODUCT OTHER THAN SUCH MATERIALS AND PRODUCTS FURNISHED TO CLA-VAL CO. WHETHER OR NOT THE EQUIPMENT OR INFORMATION SHOWN HEREON IS PATENTED OR OTHERWISE PROTECTED, FULL TITLE AND COPYRIGHTS, IF ANY, IN AND TO THIS DRAWING AND/OR INFORMATION DELIVERED OR SUBMITTED ARE FULLY RESERVED CLA-VAL CO.

CVCL 1 ② 3 4

DIST. CODE 002

SHEET 3 OF 3



CLA-VAL CO.

NEWPORT BEACH, CALIFORNIA

CATALOG NO.
49-01/649-01

DRAWING NO.
76573

REV.
M

TYPE OF VALVE AND MAIN FEATURES

COMBINATION RATE OF FLOW CONTROLLER
AND PRESSURE REDUCING VALVE

DESIGN		
DRAW	CH	12-15-78
CHK'D	DP	12-18-78
APVD	WAL	12-18-78

OPERATING DATA

SUFFIX S (OPENING SPEED CONTROL)

FLOW CONTROL (S) CONTROLS THE OPENING SPEED OF THE MAIN VALVE. TURN THE ADJUSTING STEM CLOCKWISE TO MAKE THE MAIN VALVE OPEN SLOWER.

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) OPEN (OPTIONAL FEATURE).
- () PERIODIC CLEANING OF STRAINER (Y) IS RECOMMENDED (OPTIONAL FEATURE).
- () ORIFICE PLATE ASSEMBLY (4) ASSEMBLED DOWNSTREAM OF THE MAIN VALVE, BETWEEN 1 AND 5 PIPE DIAMETERS IN DISTANCE (SEE NOTE A). NOTE (A): ORIFICE PLATE ASSEMBLY MAY BE ATTACHED TO THE MAIN VALVE OUTLET FLANGE. HOWEVER, BETTER CONTROL IS OBTAINED IF LOCATED 1 TO 5 PIPE DIAMETERS DOWNSTREAM.

CAD REVISION RECORD - DO NOT REVISE MANUALLY

DATE

BY

DESCRIPTION

LTR

SEE SHEET 1

THIS DRAWING IS THE PROPERTY OF CLA-VAL CO. AND SAME AND COPIES MADE THEREOF, IF ANY, SHALL BE RETURNED TO IT UPON DEMAND. DELIVERY AND DISCLOSURE HEREOF ARE SOLELY UPON CONDITION THAT THE SAME SHALL NOT BE USED, COPIED OR REPRODUCED, NOR SHALL THE SUBJECT HEREOF BE DISCLOSED IN ANY MANNER TO ANYONE FOR ANY PURPOSE, EXCEPT AS HEREIN AUTHORIZED, WITHOUT PRIOR WRITTEN APPROVAL OF CLA-VAL CO. THIS DRAWING IS SUBMITTED CONFIDENTIALLY AND MAY NOT BE USED IN THE MANUFACTURE OF ANY MATERIAL OR PRODUCT OTHER THAN SUCH MATERIALS AND PRODUCTS FURNISHED TO CLA-VAL CO. WHETHER OR NOT THE EQUIPMENT OR INFORMATION SHOWN HEREON IS PATENTED OR OTHERWISE PROTECTED, FULL TITLE AND COPYRIGHTS, IF ANY, IN AND TO THIS DRAWING AND/OR INFORMATION DELIVERED OR SUBMITTED ARE FULLY RESERVED CLA-VAL CO.

— MODEL — **49-01**

Rate of Flow Controller & Pressure Reducing Valve

INTRODUCTION

This manual titled the 49-01 Series Combination Rate of Flow Controller and Pressure Reducing Valve contains information for installation, operation and maintenance of the valve and control system.

The Cla-Val 49-01 is an automatic valve designed to reduce a higher inlet pressure to a steady lower downstream pressure regardless of changing flow rate and/or varying inlet pressure, as long as the flow rate is below a preset maximum. The automatic valve also prevents excessive flow by limiting flow to a preselected maximum rate.

The Cla-Val 49-01 is a single seated, hydraulically operated, pilot controlled diaphragm type globe or angle valve. The pilot system includes a direct acting, spring loaded, pressure reducing pilot (CRA) and a rate of flow differential control (CDHS-18).

INSTALLATION

1. Allow sufficient room around the valve to make adjustments and for disassembly.

2. It is recommended that gate or line block valves be installed upstream and downstream of the Cla-Val valve assembly to facilitate isolating the valve for preventive maintenance.

NOTE: BEFORE THE VALVE IS INSTALLED, PIPE LINES SHOULD BE FLUSHED OF ALL CHIPS, SCALE AND FOREIGN MATTER.

3. Place valve in line with flow through the valve in the direction indicated on the inlet plate or by flow arrows. Check all fittings and hardware for proper makeup and that no apparent damage is evident. Be sure main valve cover nuts/bolts are tight. Pressure in some applications can be very high so be thorough in checking and inspecting for proper installation and makeup.

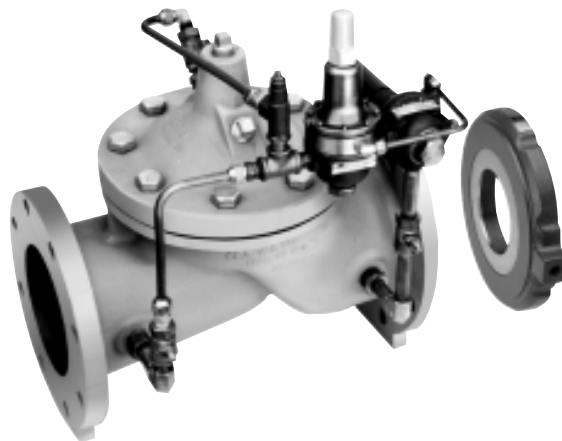
4. For best control, it is recommended that the orifice plate restriction be installed 1 to 5 pipe diameters downstream of the main valve. The flow arrows should be pointing to the downstream side of the system.

5. A sensing line, supplied by other than Cla-Val, must be connected between the orifice plate holder and the Differential Control. See dotted lines on schematic drawing.

6. Cla-Val 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 cover and internal components of six inch valves and larger, installation with the cover up is advisable. This makes periodic inspection of internal parts readily accessible.

OPERATION AND START-UP

1. Operation of the Cla-Val 49-01 Series Valve is fully automatic once the flow rate and reduced pressure settings have been made. Modulation in the main valve is brought about by the action of the pressure reducing and differential pilot controls.



Throttling of either of these controls in response to changes in the flow rate or downstream pressure produces a change in the flow rate through the control system. This, in turn, causes changes in the main valve cover chamber pressure.

It is the constant variations of main valve cover chamber pressure which forces the main valve to seek new throttling positions in response to slight changes in the flow rate or downstream pressure.

The controls are so arranged that the reducing control is in command of the main valve only when the flow rate is below the setting of the differential control. The valve, therefore, holds a constant delivery pressure. If, however, the flow rate reaches the preset maximum the differential control takes command and holds the flow rate at the desired maximum. Under these conditions of increased demand the downstream pressure falls below the normal reduced pressure.

2. Prior to pressurizing the valve assembly, make sure the necessary gauges are installed, to measure required pressure and flow, as designated by the system engineer. A Cla-Val X101 Valve Position Indicator may be installed in the center cover port to provide a visual indication of the stem position during startup adjustment.

CAUTION: During startup and test procedures a large volume of water may be discharged downstream. Check that the downstream venting is adequate to prevent damage to personnel and equipment.

3. With the downstream block valve closed, slowly open upstream block valve. If isolation valves are installed, as shown on the schematic, open these valves slowly.

4. Carefully loosen the pipe plug at top of cover assembly. If a Valve Position Indicator is installed, loosen the vent plug at top of Indicator. Bleed air from cover and retighten plug.

5. Carefully loosen tube fittings at highest points and bleed air from system. Retighten fittings.

NOTE: Be sure the sensing line (dotted line shown on schematic), which connects the orifice plate to the CDHS-18 and the CRA Control, is installed. This sensing line is supplied by the contractor or others. The 49-01 system will not function unless this sensing line is installed. The line should be routed without any high spots above the control connections. Be sure to bleed air from line at the control fittings.

6. Turn the CRA Control adjusting screw clockwise until spring is fully compressed. DO NOT FORCE. This puts the control in a full open mode.

7. Slowly open downstream block valve and adjust the CDHS-18 Control, turning the adjusting screw slowly counterclockwise until the main valve closes. Adjust for rate of flow by turning adjusting screw slowly clockwise.

8. Reduce flow rate to a value below the setting of CDHS-18 Control by closing downstream block valve or other means, then turn the adjustment screw on the CRA Control counterclockwise until the main valve begins to close. Adjust for outlet pressure requirements.

9. Check operation of controls by changing flow and pressure in the piping system.

10. If opening and closing speed controls (Cla-Val CV) are installed on the valve assembly, fine tune the opening and closing speed of the main valve while performing step 9.

11. The rate of flow and pressure reducing feature is outlined in Cla-Val engineering drawing 76573 included in this manual.

MAINTENANCE

1. Cla-Val Valves and Controls require no lubrication or packing and a minimum of maintenance. However, a periodic inspection schedule should be established to determine how the fluid handled is affecting the efficiency of the valve assembly.

2. Repair and adjustment procedures of the main valve and control components are included in separate sections of the manual. Accessory components are listed for reference.

3. Refer to the Service Suggestions Chart to identify operation symptoms.

SERVICE SUGGESTIONS

SYMPTOM	PROBABLE CAUSE	REMEDY
Main valve won't open.	Controls not adjusted properly.	Readjust controls.
	Orifice port and/or orifice sensing line clogged.	Remove line and clean orifice port. Clean or replace line.
	Control line shutoff cock to cover, main valve outlet, and/or orifice sensing line closed.	Open shutoff cock.
	Either of the pilot valves stuck closed. Mineral deposits or foreign matter under disc retainer assembly.	Remove plug and disc retainer assembly. Clean or replace.
	Main valve stuck closed. Mineral buildup on stem. Stem damaged.	Disassemble valve, clean parts and/or replace damaged parts.
Main valve won't close.	Controls not adjusted properly.	Readjust controls.
	CRA and/or CDHS-18 Control has foreign matter or mineral buildup on yoke assembly.	Disassemble and clean parts.
	CDHS-18 Control has foreign matter or mineral buildup above diaphragm.	Disassemble and clean parts.
	Diaphragm of either control leaks or stuck. Diaphragm nut loose.	Disassemble and clean parts.
	Clogged restriction assembly.	Remove and clean.
	Clogged Flow Clean Strainer.	Remove and clean or replace.
	Control line shutoff cock from inlet to restrictor closed.	Open shutoff cock.
	CV Flow Control closed or clogged.	Readjust or disassemble and clean.
	Pilot control (CRA or CDHS-18) disc worn or nicked. Fails to seat.	Remove disc retainer assembly and replace.

INSTALLATION / OPERATION / MAINTENANCE



— MODEL — **100-01**
Hytrol Valve

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

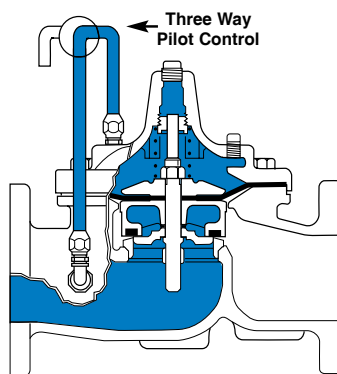
1. Before valve is installed, pipe lines should be flushed of all chips, scale and foreign matter.
2. It is recommended that either gate or block valves be installed on both ends of the 100-01 Hytrol Valve to facilitate isolating the valve for preventive maintenance and repairs.
3. Place the valve in the line with flow through the valve in the direction indicated on the inlet nameplate. (See "Flow Direction" Section)
4. Allow sufficient room around valve to make adjustments and for disassembly.
5. Cla-Val 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. If a pilot control system is installed on the 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.

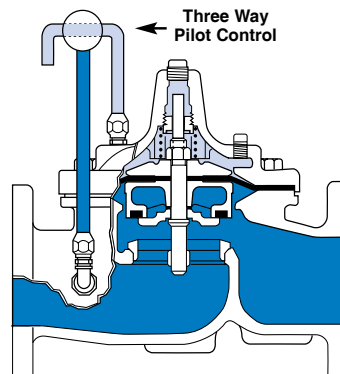
7. After the valve is installed and the system is first pressurized, vent air from the cover chamber and pilot system tubing by loosening fittings at all high points.

Principles of Operation



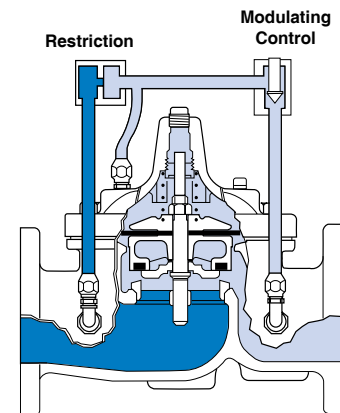
Tight Closing Operation

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.

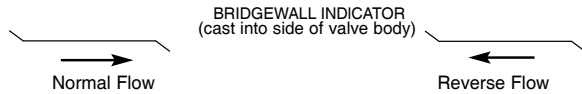


Modulating Action

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 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.**



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 X101 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 100-01 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 X101 Valve Position Indicator and three gauges in unused Hytrol inlet, outlet and cover connections.

SYMPTOM	PROBABLE CAUSE	REMEDY
Fails to Close	Closed cocks in control system, or in main line.	Open Cocks.
	Lack of cover chamber pressure.	Check upstream pressure, pilot system, strainer, tubing, cocks, 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 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.

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.

Three Checks

The 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 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.*

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	.020	.07
1 1/2	.020	.07
2	.032	.12
2 1/2	.043	.16
3	.080	.30
4	.169	.64
6	.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	36.2
24	29.00	109.8

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 X101 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 X101 Valve position indicator corresponding to the "closed" position. The distance between the two marks should be approximately the stem travel shown in chart.

STEM TRAVEL

(Fully Open to Fully Closed)

Valve Size (inches)		Travel (inches)	
Inches	MM	Inches	MM
1 1/4	32	0.4	10
1 1/2	40	0.4	10
2	50	0.6	15
2 1/2	65	0.7	18
3	80	0.8	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
24	610	6.5	165

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.)

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 Co. 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

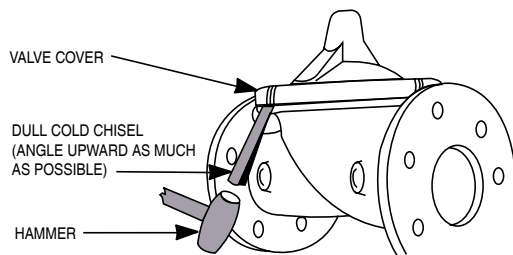
Inspection or maintenance can be accomplished without removing the valve from the line. Repair kits with new diaphragm and disc are recommended to be on hand before work begins.

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	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"
24"	4 1/4"

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	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
24"	3-12

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.

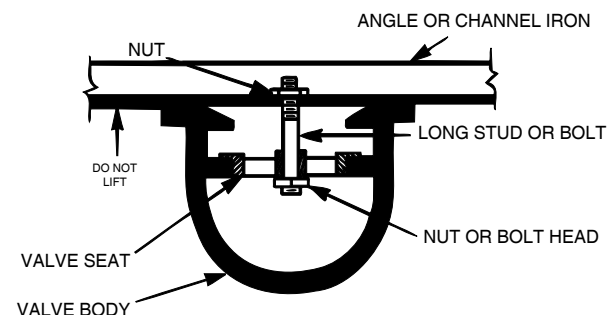
The use of a pipe wrench or a vise without soft brass jaws scars the fine finish on the stem. No amount of careful dressing can restore the stem to its original condition. Damage to the finish of the stem can cause the stem to bind in the bearings and the valve will not open or close.

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.)

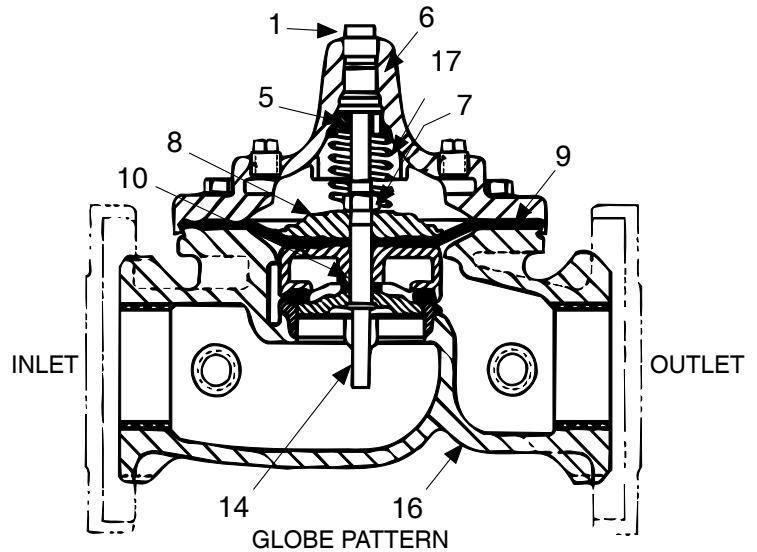
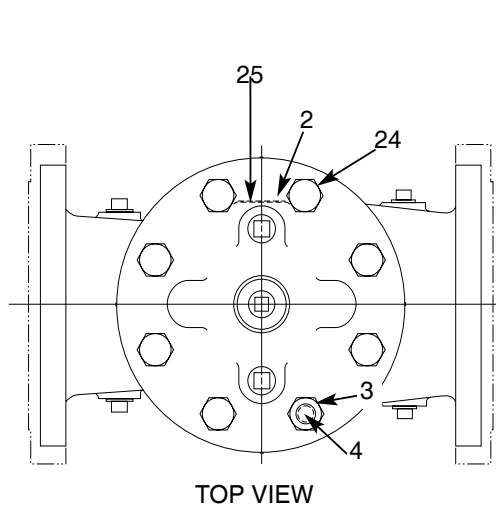
Due to the weight of the diaphragm assembly this procedure is not possible on valves 8" and larger. on these valves, the same determination can be made by carefully introducing a low pressure-less than five psi) into the valve body with the cover vented. **SEE CAUTION.** Looking in cover center hole 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.)

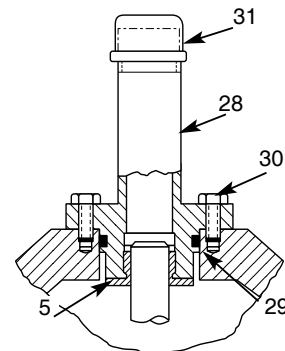
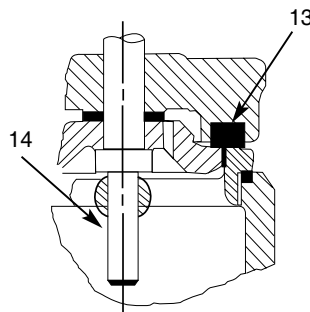
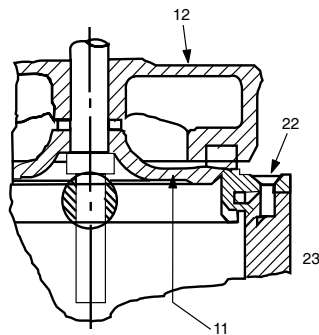
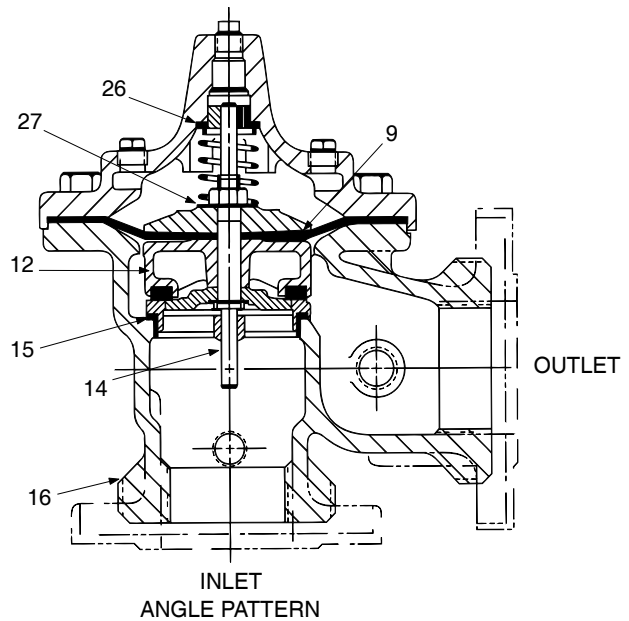
3. With the line connected from the inlet to the cover, apply full working pressure to the inlet. Check all around the cover for any leaks. Re-tighten cover nuts if necessary to stop leaks past the diaphragm.

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.

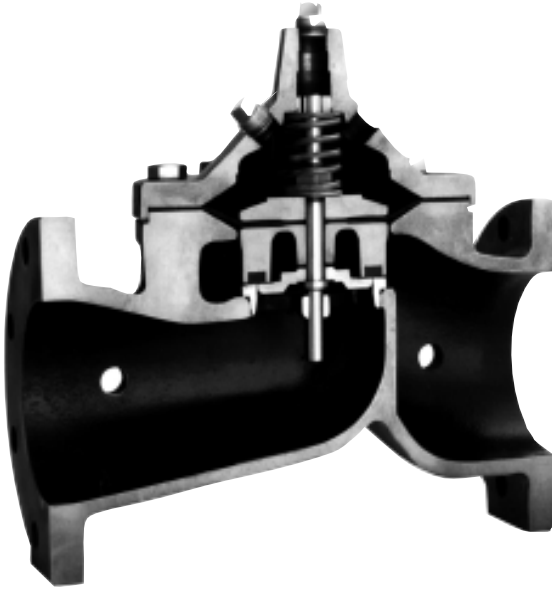


PARTS LIST	
Item	Description
1.	Pipe Plug
2.	Drive Screws (for nameplate)
3.	Hex Nut (8" and larger)
4.	Stud (8" and larger)
5.	Cover Bearing
6.	Cover
7.	Stem Nut
8.	Diaphragm Washer
9.	Diaphragm
10.	Spacer Washers
11.	Disc Guide
12.	Disc Retainer
13.	Disc
14.	Stem
15.	Seat
16.	Body
17.	Spring
22.	Flat 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 — **100-20**
600 Series
Hytrol Valve



- **Reduced Cavitation Design**
- **Drip-tight, Positive Seating Action**
- **Service Without Removal From Line**
- **Globe or Angle Pattern**
- **Every Valve Factory-Tested**

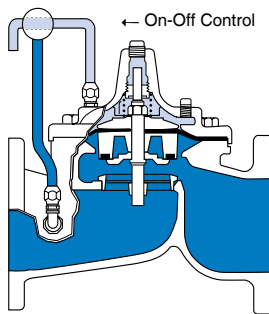
The Cla-Val Model 100-20 Hytrol Valve is a hydraulically operated, diaphragm actuated, globe or angle pattern valve. It consists of three major components: body, diaphragm assembly and cover. The diaphragm assembly is the only moving part.

The diaphragm assembly is guided top and bottom by a precision machined stem which utilizes a non-wicking diaphragm of nylon fabric bonded with synthetic rubber. A resilient synthetic rubber disc, retained on three and one-half sides by a disc retainer, forms a drip-tight seal with the renewable seat when pressure is applied above the diaphragm.

The reduced cavitation characteristics of the 100-20 Hytrol Valve is the basis for the Cla-Val 600 Series. The rugged simplicity of design and packless construction assure a long life of dependable, trouble-free operation. It's smooth flow passages and fully guided disc and diaphragm assembly assure optimum control when used in piping systems requiring remote control, pressure regulation, solenoid operation, rate of flow control or check valve operation.

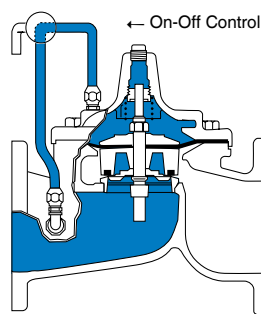
Available in various materials and in a wide range of sizes. It's applications are unlimited.

Principle of Operation



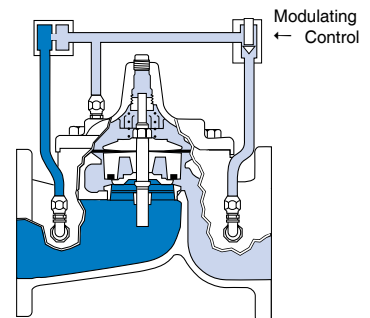
Full Open Operation

When pressure in the cover chamber is relieved to a zone of lower pressure, the line pressure at the valve inlet opens the valve, allowing full flow.



Tight Closing Operation

When pressure from the valve inlet is applied to the cover chamber, the valve closes drip-tight.



Modulating Action

The valve holds any intermediate position when operating pressure is equal above and below the diaphragm. Using a Cla-Val "Modulating" Control will allow the valve to automatically compensate for line pressure changes.



Specifications

Model 100 -20

Available Sizes

Pattern	Flanged
Globe	3", 4", 6", 8", 10", 12", 14", 16", 18", 20", 24", 30"
Angle	4", 6", 8"

Operating Temp. Range

Fluids
-40° to 180° F

Pressure Ratings (Recommended Maximum Pressure - psi)

Valve Body & Cover		Pressure Class		
		Flanged		
Grade	Material	ANSI Standards*	150 lb.	300 lb.
ASTM A536	Ductile Iron	B16.42	250	400
ASTM A216-WCB	Cast Steel	B16.5	285	400
ASTM B62	Bronze	B16.24	225	400
ASTM A743	Stainless Steel	B16.5	285	400
356-T6	Aluminum	B16.1	275	—

Note: *ANSI standards are for flange dimensions only.
Flanged valves are available faced but not drilled.

Materials

Component	Material Options				
	Ductile Iron	Cast Steel	Bronze	Stainless Steel	Aluminum
Body & Cover	Ductile Iron	Cast Steel	Bronze	Stainless Steel	Aluminum
Available Sizes	3" - 30"	3" - 30"	3" - 16"	3" - 16"	3" - 16"
Disc Retainer & Diaphragm Washer	Cast Iron	Cast Steel	Bronze	Stainless Steel	Aluminum
Trim: Disc Guide, Seat & Cover Bearing	Bronze is standard. Stainless Steel is optional.			Stainless Steel is standard.	
Disc	Buna-N® Rubber				
Diaphragm	Nylon Reinforced Buna-N® Rubber				
Stem, Nut & Spring	Stainless Steel				

Options

Epoxy Coating - suffix KC

An FDA approved fusion bonded epoxy coating for use with cast iron, ductile iron or steel valves. This coating is resistant to various water conditions, certain acids, chemicals, solvents and alkalis. Epoxy coatings are applied in accordance with AWWA coating specifications C550-90. Do not use with temperatures above 175° F.

Dura-Kleen® Stem - suffix KD

This stem is designed for applications where water supplies containing dissolved minerals create deposits that build-up on a standard stem and hamper valve operation. A patented self-cleaning design on the stem allows all valve sizes to operate freely in the harshest conditions.

Delrin® Sleeved Stem - suffix KG

The Delrin® sleeved stem is designed for applications where water supplies contain

dissolved minerals which can form deposits that build up on the valve stem and hamper valve operation. Scale build-up will not adhere to the Delrin® sleeve stem. Delrin® sleeved stems are not recommended for valves in continuous operation where differential pressures are in excess of 80 psi (2" and larger Hytrol valves).

Water Treatment Clearance - suffix KW

This additional clearance is beneficial in applications where water treatment compounds can interfere with the closing of the valve. The smaller outside diameter disc guide provides more clearance between the disc guide and the valve seat. This option is best suited for valves used in on-off (non-modulating) service.

Viton® Rubber Parts - suffix KB

Optional diaphragm, disc and o-ring fabricated with Viton® synthetic rubber. Viton® is well suited for use with mineral

acids, salt solutions, chlorinated hydrocarbons, and petroleum oils; and is primarily used in high temperature applications up to 250° F. Do not use with epoxy coatings above 175° F.

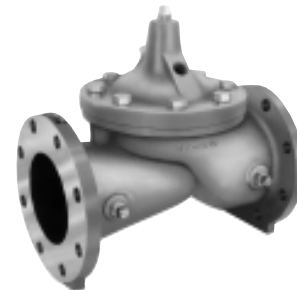
Heavy Spring - suffix KH

The heavy spring option is used in applications where there is low differential pressure across the valve, and the additional spring force is needed to help the valve close. This option is best suited for valves used in on-off (non-modulating) service.

For assistance in selecting appropriate valve options or valves manufactured with special design requirements, please contact our Regional Sales Office or Factory.



3" Globe, Flanged



6" Globe, Flanged



6" Angle, Flanged

Functional Data

Model 100 - 20

Valve Size		Inches	3	4	6	8	10	12	14	16	18	20	24	30
		mm.	80	100	150	200	250	300	350	400	460	510	610	760
C _V Factor	Globe Pattern	Gal./Min. (gpm)	62	136	229	480	930	1458	1725	2110	2940	3400*	3500*	7900*
		Litres/Sec. (l/s)	15	32.5	55	115	223	350	414	506	705	816	840	1895
	Angle Pattern	Gal./Min. (gpm)	—	135	233	545	—	—	—	—	—	—	—	—
		Litres/Sec. (l/s)	—	32	56	132	—	—	—	—	—	—	—	—
Equivalent Length of Pipe	Globe Pattern	Feet (ft)	293	251	777	748	621	654	750	977	983	1125	3005	2130
		Meters (m)	89.3	76.4	237.1	228.1	189.5	199.4	228.7	298.1	299.9	343.2	916.6	649.6
	Angle Pattern	Feet (ft)	—	254	751	580	—	—	—	—	—	—	—	—
		Meters (m)	—	77.6	229	176.9	—	—	—	—	—	—	—	—
K Factor	Globe Pattern		20.6	12.7	23.1	15.7	10.4	8.5	8.9	10.2	8.4	8.8	19.1	10.5
	Angle Pattern		—	12.9	22.3	12.2	—	—	—	—	—	—	—	—
Liquid Displaced from Diaphragm Chamber When Valve Opens	Fl. Oz		—	—	—	—	—	—	—	—	—	—	—	—
	U.S. Gal.		.032	.08	.17	.53	1.26	2.51	4	4	9.6	9.6	9.6	29.0
	ml		—	—	—	—	—	—	—	—	—	—	—	—
	Litres		.12	.30	.64	2.0	4.8	9.5	15.1	15.1	36.2	36.2	36.2	110

*Estimated

C_V Factor

Formulas for computing C_V Factor, Flow (Q) and Pressure Drop (ΔP):

$$C_V = \frac{Q}{\sqrt{\Delta P}} \quad Q = C_V \sqrt{\Delta P} \quad \Delta P = \left(\frac{Q}{C_V}\right)^2$$

K Factor (Resistance Coefficient)

The Value of K is calculated from the formula: $K = \frac{894 d^4}{C_V^2}$ (U.S. system units)

Equivalent Length of Pipe

Equivalent lengths of pipe (L) are determined from the formula: $L = \frac{Kd}{12f}$ (U.S. system units)

Fluid Velocity

Fluid velocity can be calculated from the following formula: $V = \frac{.4085 Q}{d^2}$ (U.S. system units)

Where:

C_V = U.S. (gpm) @ 1 psi differential at 60° F water

□ □ □ or

□ = (l/s) @ 1 bar (14.5 PSIG) differential at 15° C water

d = inside pipe diameter of Schedule 40 Steel Pipe (inches)

f = friction factor for clean, new Schedule 40 pipe

□ (dimensionless) (from Cameron Hydraulic Data,

□ 18th Edition)

K = Resistance Coefficient (calculated)

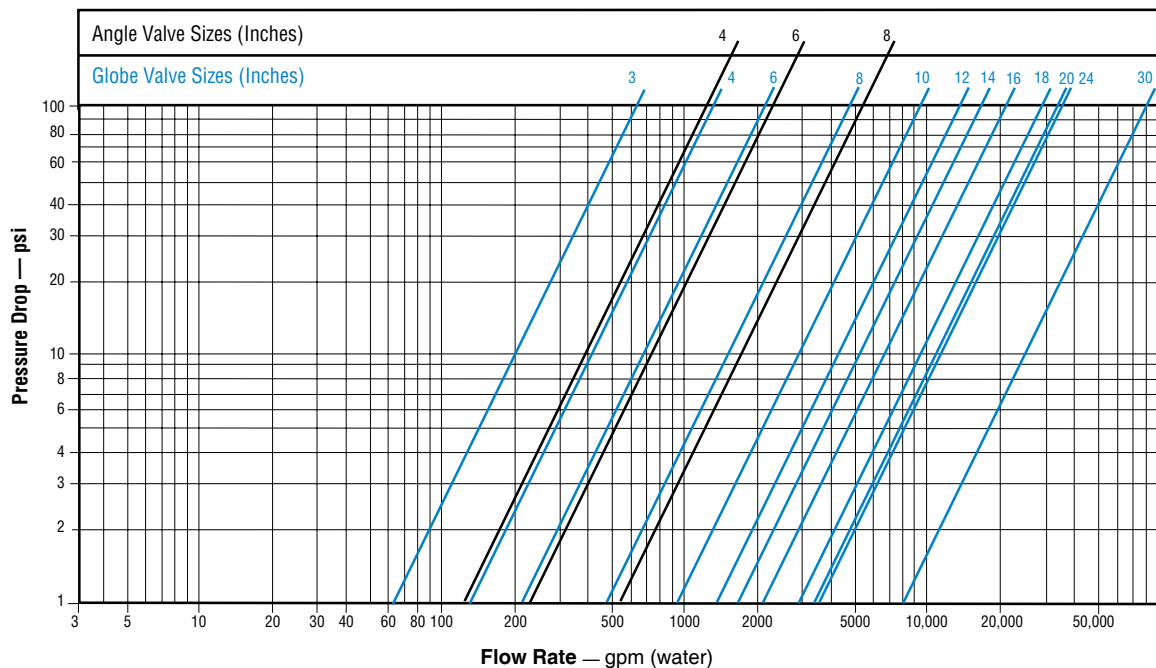
L = Equivalent Length of Pipe (feet)

Q = Flow Rate in U.S. (gpm) or (l/s)

V = Fluid Velocity (feet per second) or (meters per second)

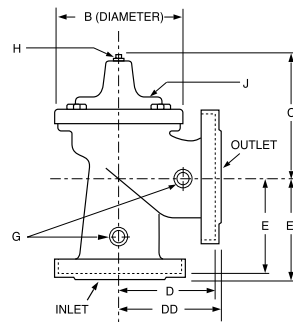
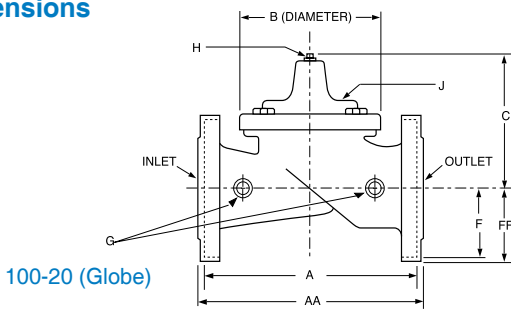
ΔP = Pressure Drop in (psi) or (bar)

Model 100-20 Flow Chart (Based on normal flow through a wide open valve)



Dimensions

Model 100 -20



100-20 (Globe)

100-20 (Angle)

VALVE SIZE (Inches)	3	4	6	8	10	12	14	16	18	20	24	30
A 150 ANSI	10.25	13.88	17.75	21.38	26.00	30.00	34.25	35.00	42.12	48.00	48.00	63.25
AA 300 ANSI	11.00	14.50	18.62	22.38	27.38	31.50	—	36.62	43.63	49.62	49.75	—
B DIA.	6.62	9.12	11.50	15.75	20.00	23.62	28.00	28.00	35.44	35.44	35.44	53.19
C MAX.	7.00	8.62	11.62	15.00	17.88	21.00	20.88	25.75	25.00	31.00	31.00	43.94
D 150 ANSI	—	6.94	8.88	10.69	—	—	—	—	—	—	—	—
DD 300 ANSI	—	7.25	9.38	11.19	—	—	—	—	—	—	—	—
E 150 ANSI	—	5.50	6.75	7.25	—	—	—	—	—	—	—	—
EE 300 ANSI	—	5.81	7.25	7.75	—	—	—	—	—	—	—	—
F 150 ANSI	3.75	4.50	5.50	6.75	8.00	9.50	11.00	11.75	15.88	14.56	17.00	19.88
FF 300 ANSI	4.12	5.00	6.25	7.50	8.75	10.25	—	12.75	15.88	16.06	19.00	—
G NPT Body Tapping	3/8	1/2	3/4	3/4	1	1	1	1	1	1	1	1
H NPT Cover Center Plug	1/2	1/2	3/4	3/4	1	1	1 1/4	1 1/4	2	2	2	2
J NPT Cover Tapping	3/8	1/2	3/4	3/4	1	1	1	1	1	1	1	1
Valve Stem Internal Thread UNF	10-32	1/4-28	1/4-28	3/8-24	3/8-24	3/8-24	3/8-24	3/8-24	1/2-20	1/2-20	1/2-20	3/4-16
Stem Travel	0.6	0.8	1.1	1.7	2.3	2.8	3.4	3.4	4.5	4.5	4.5	6.5
Approx Ship Wt. Lbs.	45	85	195	330	625	900	1250	1380	1500	2551	2750	6500

VALVE SIZE (mm)	80	100	150	200	250	300	350	400	450	500	600	750
A 150 ANSI	260	353	451	543	660	762	870	889	1070	1219	1219	1607
AA 300 ANSI	279	368	473	568	695	800	—	930	1108	1260	1263	—
B DIA.	168	232	292	400	508	600	711	711	900	900	900	1351
C MAX.	178	219	295	381	454	533	530	654	635	787	787	1116
D 150 ANSI	—	176	226	272	—	—	—	—	—	—	—	—
DD 300 ANSI	—	184	238	284	—	—	—	—	—	—	—	—
E 150 ANSI	—	140	171	184	—	—	—	—	—	—	—	—
EE 300 ANSI	—	148	184	197	—	—	—	—	—	—	—	—
F 150 ANSI	95	114	140	171	203	241	279	298	403	370	432	505
FF 300 ANSI	105	127	159	191	222	260	—	324	403	408	483	—
G NPT Body Tapping	3/8	1/2	3/4	3/4	1	1	1	1	1	1	1	1
H NPT Cover Center Plug	1/2	1/2	3/4	3/4	1	1	1 1/4	1 1/4	2	2	2	2
J NPT Cover Tapping	3/8	1/2	3/4	3/4	1	1	1	1	1	1	1	1
Valve Stem Internal Thread UNF	10-32	1/4-28	1/4-28	3/8-24	3/8-24	3/8-24	3/8-24	3/8-24	1/2-20	1/2-20	1/2-20	1/2-20
Stem Travel	15	20	28	43	58	71	86	86	86	114	114	165
Approx. Ship Wt. Kgs.	20	39	89	150	284	409	568	627	681	1157	1249	2951

Service and Installation

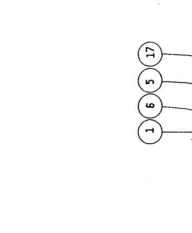
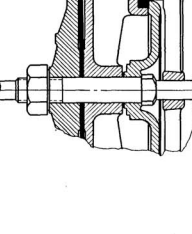
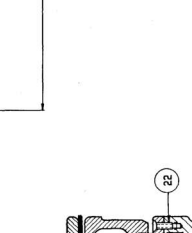
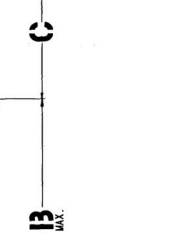
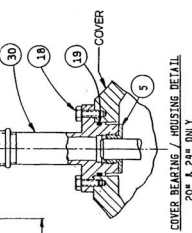
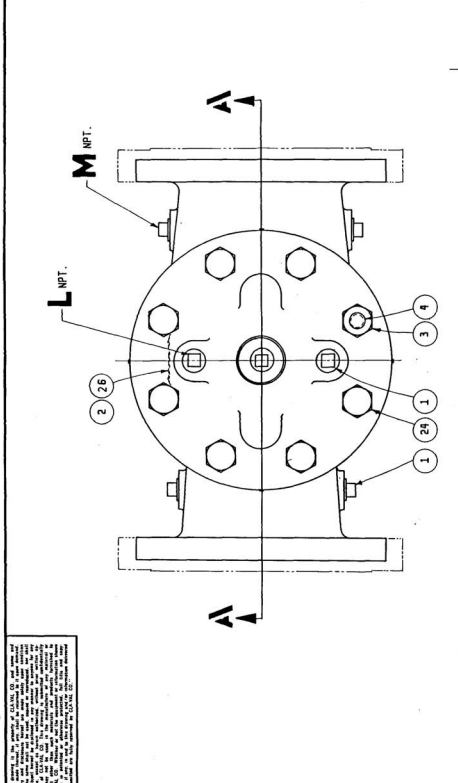
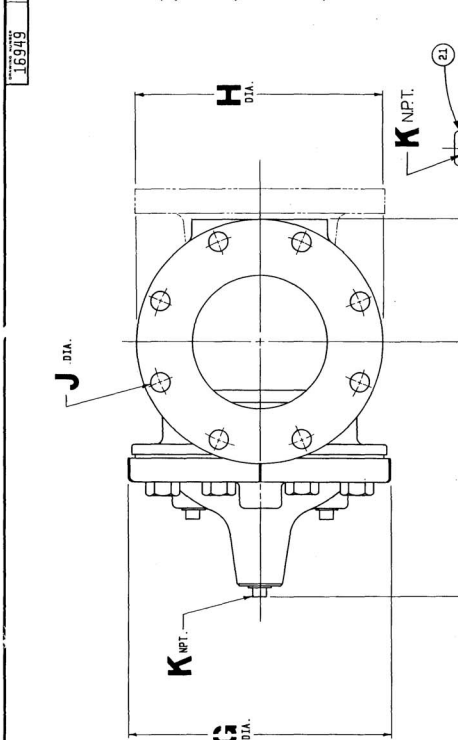
Cla-Val Control Valves operate with maximum efficiency when mounted in horizontal piping with the main valve cover UP, however, other positions are acceptable. Due to component size and weight of 10 inch and larger valves, installation with cover UP is advisable. We recommend isolation valves be installed on inlet and outlet for maintenance. Adequate space above and around the valve for service personnel should be considered essential. A regular maintenance program should be established based on the specific application data. However, we recommend a thorough inspection be done at least once a year. Consult factory for specific recommendations.



Distributed By:
M&M Control Service, INC.
 Phone: 800-876-0036
 Fax: 847-356-0747
 Email: Sales@mmcontrol.com

ITEM NO.	DESCRIPTION	QTY.	REV'D
1	PLUG, DITE	1	
2	NUT, HEX (8" 10", 12", 16", 20" & 24")	2	
3	NUT, HEX (8" 10", 12", 16", 20" & 24")	A/R	
4	STUD, THREADED (8" 10", 12", 16", 20" & 24")	A/R	
5	BEARING, COVER	1	
6	COVER	1	
7	NUT, STEM	1	
8	WASHER, DIAPHRAGM	1	
9	DIAPHRAGM	1	
10	WASHER, SPACER	A/R	
11	GUIDE DISC	1	
12	RETAINER DISC	1	
13	DISC	1	
14	SEAL	1	
15	SEAL	1	
16	BODY	1	
17	SPRING	1	
18	BOLT, HEX HD. (20" & 24" ONLY)	6	
19	O-RING (20" & 24" ONLY)	1	
21	CAP, PIPE (20" & 24" ONLY)	1	
22	SCREW, FLAT HD. (10" THRU 24" ONLY)	A/R	
23	O-RING, SEAT	1	
24	BOLT, HEX HD (3" 4", & 6" ONLY)	A/R	
25	WASHER, SPRING (100-200C)	1	
26	WASHER, SPRING (100-200C)	1	
28	BRUSHING, COVER BEARING (20" & 24")	1	

RECOMMENDED SPARE PARTS



VALVE SIZE	PRESSURE CLASS	A	B	C	D	E	F	G	H	J	K	L	M
3"	125 LB.	10.25	7.00	3.75	7.50	7.50	7.50	7.50	7.50	6.000	3/8"	3/8"	
3"	250 LB.	11.00	7.00	4.12	8.25	8.25	8.25	8.25	8.25	6.000	3/8"	3/8"	
4"	125 LB.	13.88	8.62	4.50	9.00	9.00	9.00	9.00	9.00	7.500	1/2"	1/2"	
4"	250 LB.	14.50	8.62	5.00	9.12	9.12	9.12	9.12	9.12	7.500	1/2"	1/2"	
6"	125 LB.	17.75	11.62	5.50	10.00	10.00	10.00	10.00	10.00	8.000	3/4"	3/4"	
6"	250 LB.	18.62	11.62	6.25	11.50	11.50	11.50	11.50	11.50	8.000	3/4"	3/4"	
8"	125 LB.	21.38	15.00	6.75	12.50	12.50	12.50	12.50	12.50	8.000	3/4"	3/4"	
8"	250 LB.	22.38	15.00	7.50	13.50	13.50	13.50	13.50	13.50	8.000	3/4"	3/4"	
10"	125 LB.	25.00	17.88	8.00	15.00	15.00	15.00	15.00	15.00	10.000	1"	1"	
10"	250 LB.	26.38	17.88	8.50	16.00	16.00	16.00	16.00	16.00	10.000	1"	1"	
12"	125 LB.	31.50	21.00	9.50	18.00	18.00	18.00	18.00	18.00	12.000	1"	1"	
12"	250 LB.	31.50	21.00	10.25	19.00	19.00	19.00	19.00	19.00	12.000	1"	1"	
16"	125 LB.	35.00	25.75	11.75	21.00	21.00	21.00	21.00	21.00	14.000	1"	1"	
16"	250 LB.	36.62	25.75	12.75	22.00	22.00	22.00	22.00	22.00	14.000	1"	1"	
20"	125 LB.	48.00	31.00	14.56	25.00	25.00	25.00	25.00	25.00	16.000	1"	1"	
20"	250 LB.	49.62	31.00	16.06	26.00	26.00	26.00	26.00	26.00	16.000	1"	1"	
24"	125 LB.	48.00	31.00	17.00	28.00	28.00	28.00	28.00	28.00	18.000	1"	1"	
24"	250 LB.	49.75	31.00	19.00	29.00	29.00	29.00	29.00	29.00	18.000	1"	1"	

ANGLE BODY STYLE CONFIGURATION AVAILABLE IN 1", 6" & 8" SIZES ONLY

OPTIONAL NO CORE COVER CONFIGURATION 3", 4" & 6" SIZES ONLY

SEAT CONFIGURATION 100-20 HYDRAULIC CLASS GLOBE BODY CONFIGURATION SHOWN

6" 250 LB CLASS GLOBE BODY CONFIGURATION SHOWN

6" 125 LB CLASS ANGLE BODY CONFIGURATION SHOWN

6" 250 LB CLASS ANGLE BODY CONFIGURATION SHOWN

SECTION A-A


CLAYVAL CO.

16949

CVCL 1 ② 3 4

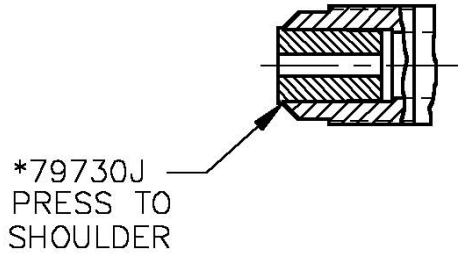
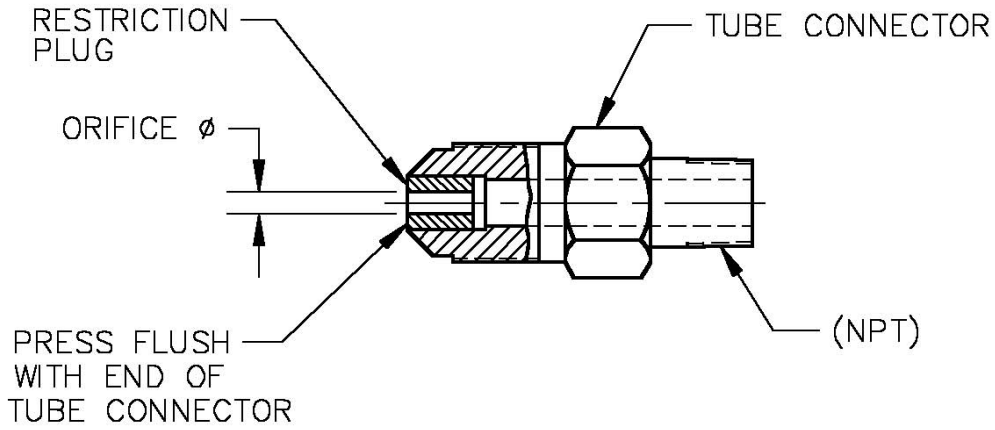
DIST CODE 048

SHEET 1 OF 2

 CLA-VAL CO. NEWPORT BEACH, CALIFORNIA	CATALOG NO. X58C	DRAWING NO. 48834	REV AN
	TYPE OF VALVE AND MAIN FEATURES <p style="text-align: center;">X58C RESTRICTION ASSEMBLIES</p>		DESIGN DRAWN JC 12-3-85 CHK'D JC 12-4-85 APVD CH 12-11-85

10-18-94	TLC	AM REINSTATED PN 68565B & 64673H (ECO 15043)
09-15-98	AK	AN ADDED PN 48834-05F (NED 43663)


CAD REVISION RECORD - DO NOT REVISE MANUALLY		
DESCRIPTION	BY	DATE
A-MK SEE REVISION FILE		
AL REDRAWN ON CAD (ECO 14229)	EK	11-18-93



NOTES:

1. *FOR IDENTIFICATION, THESE STOCK NO'S ARE TO BE STAINED BLUE WITH 74234-03.
2. **FOR IDENTIFICATION, THESE STOCK NO'S ARE TO BE STAINED RED WITH 74234-05.
3. SEE DWG 76740 FOR STAINLESS STEEL X58C.

THIS DRAWING IS THE PROPERTY OF CLA-VAL CO. AND SAME AND COPIES MADE THEREOF, IF ANY, SHALL BE RETURNED TO IT UPON DEMAND. DELIVERY AND DISCLOSURE HEREOF ARE SOLELY UPON CONDITION THAT THE SAME SHALL NOT BE USED, COPIED OR REPRODUCED, NOR SHALL THE SUBJECT HEREOF BE DISCLOSED IN ANY MANNER TO ANYONE FOR ANY PURPOSE, EXCEPT AS HEREIN AUTHORIZED, WITHOUT PRIOR WRITTEN APPROVAL OF CLA-VAL CO. THIS DRAWING IS SUBMITTED CONFIDENTIALLY AND MAY NOT BE USED IN THE MANUFACTURE OF ANY MATERIAL OR PRODUCT OTHER THAN SUCH MATERIALS AND PRODUCTS FURNISHED TO CLA-VAL CO. WHETHER OR NOT THE EQUIPMENT OR INFORMATION SHOWN HEREON IS PATENTED OR OTHERWISE PROTECTED, FULL TITLE AND COPYRIGHTS, IF ANY, IN AND TO THIS DRAWING AND/OR INFORMATION DELIVERED OR SUBMITTED ARE FULLY RESERVED CLA-VAL CO.

 CLA-VAL CO. NEWPORT BEACH, CALIFORNIA	CATALOG NO.	DRAWING NO.	REV
	X58C	48834	AN
	TYPE OF VALVE AND MAIN FEATURES		
	X58C RESTRICTION ASSEMBLIES		

DESIGN		
DRAWN	JC	12-3-85
CHK'D	JC	12-4-85
APV'D	CH	12-11-85

X58C STOCK NO.	TUBE CONNECTOR		RESTRICTION PLUG	
	SIZE TUBE X NPT	MATERIAL	ORIFICE DIA	MATERIAL
	<u>37° FLARE</u>			
**44734C	3/8 X 3/8-18 NPT	ALUMINUM	.125 (1/8)	S. STEEL
	<u>45° FLARE</u>			
*37814B	1/4 X 1/8-27 NPT	BRASS	.031 (1/32)	S. STEEL
*80500C	1/4 X 1/8-27 NPT	BRASS	.062 (1/16)	S. STEEL
*67739D	3/8 X 1/8-27 NPT	BRASS	.040	S. STEEL
*64672K	3/8 X 3/8-18 NPT	BRASS	.062 (1/16)	S. STEEL
*99329-01D	3/8 X 3/8-18 NPT	BRASS	.094 (3/32)	S. STEEL
**79730J	1/2 X 1/2-14 NPT	BRASS	.125 (1/8)	S. STEEL
**48834-05F	3/8 X 3/8-18 NPT	BRASS	.125 (1/8)	S. STEEL
*85484E	1/4 X 1/8-27 NPT	BRASS	.031 (1/32)	DELRIN
*85486K	1/4 X 1/8-27 NPT	BRASS	.040	DELRIN
**48834-03A	1/4 X 1/8-27 NPT	BRASS	.125 (1/8)	DELRIN
*48834-04J	1/4 X 1/8-27 NPT	BRASS	.093	DELRIN
*88409-01G	3/8 X 1/8-27 NPT	BRASS	.031 (1/32)	DELRIN
*88409J	3/8 X 1/8-27 NPT	BRASS	.052	DELRIN
*42346H	3/8 X 1/8-27 NPT	BRASS	.062 (1/16)	DELRIN
**48834-01E	3/8 X 1/8-27 NPT	BRASS	.125 (1/8)	DELRIN
*42775H	3/8 X 1/4-18 NPT	BRASS	.062 (1/16)	DELRIN
**63604D	3/8 X 1/4-18 NPT	BRASS	.156 (5/32)	DELRIN
*10253D	3/8 X 3/8-18 NPT	BRASS	.031 (1/32)	DELRIN
*46946A	3/8 X 3/8-18 NPT	BRASS	.062 (1/16)	DELRIN
**64673H	3/8 X 3/8-18 NPT	BRASS	.125 (1/8)	DELRIN
*68565B	3/8 X 3/8-18 NPT	BRASS	.094 (3/32)	DELRIN
**43302K	3/8 X 3/8-18 NPT	BRASS	.188 (3/16)	DELRIN
**12900H	1/2 X 1/2-14 NPT	BRASS	.125 (1/8)	DELRIN
**48834-02C	1/2 X 1/2-14 NPT	BRASS	.188 (3/16)	DELRIN

CAD REVISION RECORD - DO NOT REVISE MANUALLY	DESCRIPTION	DATE
	BY	
	SEE SHEET 1	
LTR		

THIS DRAWING IS THE PROPERTY OF CLA-VAL CO. AND SAME AND COPIES MADE THEREOF, IF ANY, SHALL BE RETURNED TO IT UPON DEMAND. DELIVERY AND DISCLOSURE HEREOF ARE SOLELY UPON CONDITION THAT THE SAME SHALL NOT BE USED, COPIED OR REPRODUCED, NOR SHALL THE SUBJECT HEREOF BE DISCLOSED IN ANY MANNER TO ANYONE FOR ANY PURPOSE, EXCEPT AS HEREIN AUTHORIZED, WITHOUT PRIOR WRITTEN APPROVAL OF CLA-VAL CO. THIS DRAWING IS SUBMITTED CONFIDENTIALLY AND MAY NOT BE USED IN THE MANUFACTURE OF ANY MATERIAL OR PRODUCT OTHER THAN SUCH MATERIALS AND PRODUCTS FURNISHED TO CLA-VAL CO. WHETHER OR NOT THE EQUIPMENT OR INFORMATION SHOWN HEREON IS PATENTED OR OTHERWISE PROTECTED, FULL TITLE AND COPYRIGHTS, IF ANY, IN AND TO THIS DRAWING AND/OR INFORMATION DELIVERED OR SUBMITTED ARE FULLY RESERVED CLA-VAL CO.

INSTALLATION / OPERATION / MAINTENANCE

— MODEL — **CRA**

REMOTE SENSING TYPE

Pressure Reducing Control**DESCRIPTION**

The CRA Pressure Reducing Control automatically reduces a higher inlet pressure to a lower outlet pressure. It is a direct acting, spring loaded, diaphragm type valve that operates hydraulically or pneumatically and is designed to sense pressure from a remote point. It may be used as a self-contained valve or as a pilot control for a Cla-Val Co. main valve. It will hold a constant downstream pressure at the remote sensing point within very close pressure limits.

OPERATION

The CRA Pressure Reducing Control is normally held open by the force of the compression spring above the diaphragm; delivery pressure acts on the underside of the diaphragm. Flow through the valve responds to changes in pressure at the the sensing point.

INSTALLATION

The CRA Pressure Reducing Control may be installed in any position. There is one inlet port and two outlets, for either straight or angle installation. The second outlet port can be used for a gauge connection. A flow arrow is marked on the body casting.

ADJUSTMENT PROCEDURE

The CRA Pressure Reducing Control can be adjusted to provide a delivery pressure range as specified on the nameplate.

Pressure adjustment is made by turning the adjustment screw to vary the spring pressure on the diaphragm. The greater the compression on the spring the higher the pressure setting.

1. Turn the adjustment screw in (clockwise) to increase delivery pressure.
2. Turn the adjustment screw out (counter-clockwise) to decrease the delivery pressure. When pressure adjustment is completed, tighten jam nut on adjustment screw and replace protective cap.

Flow rates are not critical during pressure setting. The approximate minimum flow rates given in the table are for the main valve on which the CRA is installed.

Valve Size	1 1/4"-3"	4"-8"	10"-16"
Minimum Flow GPM	15-30	50-200	300-650

MAINTENANCE**Disassembly**

To disassemble follow the sequence of the item numbers assigned to parts in the sectional illustration.

Reassembly

Reassembly is the reverse of disassembly. Caution must be taken to avoid having the yoke (17) drag on the inlet nozzle of the body (18). Follow this procedure:

1. Place yoke (17) in body and screw the disc retainer assembly (16) until it bottoms.
2. Install gasket (14) and spring (19) for 2-30 psi range onto plug (13) and screw into body. Disc retainer must enter guide hole in plug as it is assembled. Screw the plug in by hand. Use wrench to tighten only.
3. Place gasket (25) and powertrol body (21) on yoke extension (17). Refer to sectional view for proper reassembly of (21) onto body (18).
4. Place lower diaphragm washer (24), "o" ring (22), diaphragm (12), upper diaphragm washer (11), and Belleville washer (20) on yoke extension (17). Screw on diaphragm nut (10) finger tight.
5. Place two machine screws (4) through (21) (25) and screw into body (18). Do not include the diaphragm (12) in this operation. This holds parts aligned for next step, and allows the diaphragm to move and be properly located during tightening of nut (10).
6. Hold the diaphragm so that screw holes in the diaphragm (12)

and powertrol body (21) align. Tighten diaphragm nut (10) with a wrench. At the final tightening release the diaphragm and permit it to rotate approximately 5° to 10°. The diaphragm holes should now be properly aligned with the body holes.

To check for proper alignment proceed as follows:

Rotate diaphragm clockwise and counterclockwise as far as possible. Diaphragm screw holes should rotate equal distance on either side of powertrol body screw holes $\pm 1/8"$.

Repeat assembly procedure until diaphragm and yoke are properly aligned. There must be no contact between yoke and body nozzle during its normal opening and closing movement. To simulate this movement hold powertrol body and diaphragm holes aligned. Move yoke to open and closed positions. There must be no evidence of contact or dragging.

7. Remove machine screws per step 5.
8. Install spring (9) with spring guide (8) on top of spring.
9. Install cover (5) using eight machine screws (4).
10. Replace adjusting screw (2) and nut (3), then cap (1).

SYMPTOM	PROBABLE CAUSE	REMEDY
Fails to open when pressure lowers	No spring compression	Tighten adjusting screw
	Mineral buildup on yoke extension (17)	Disassemble and clean part. Replace "O" rings (22) and (23).
	Damaged spring	Disassemble and replace.
	Spring guide (8) is not in place	Disassemble and place guide (8) on top of spring (9).
Fails to close when delivery pressure rises	Yoke dragging on inlet nozzle	Disassembled and reassemble use procedure.
	Spring compressed	Back off adjusting screw
	Mineral deposit on yoke extension (17)	Disassemble and clean part. Replace "o" rings (22) and (23).
	Mechanical obstruction	Disassemble and remove obstruction
	Worn disc	Disassemble, remove and replace disc retainer assembly. (16)
Leakage from cover vent hole	Yoke dragging on inlet nozzle	Refer to paragraph 6
	Damaged diaphragm (12)	Disassemble and replace
	Loose diaphragm nut (10)	Remove cover and tighten nut



PARTS LIST

CRA

REMOTE SENSING TYPE

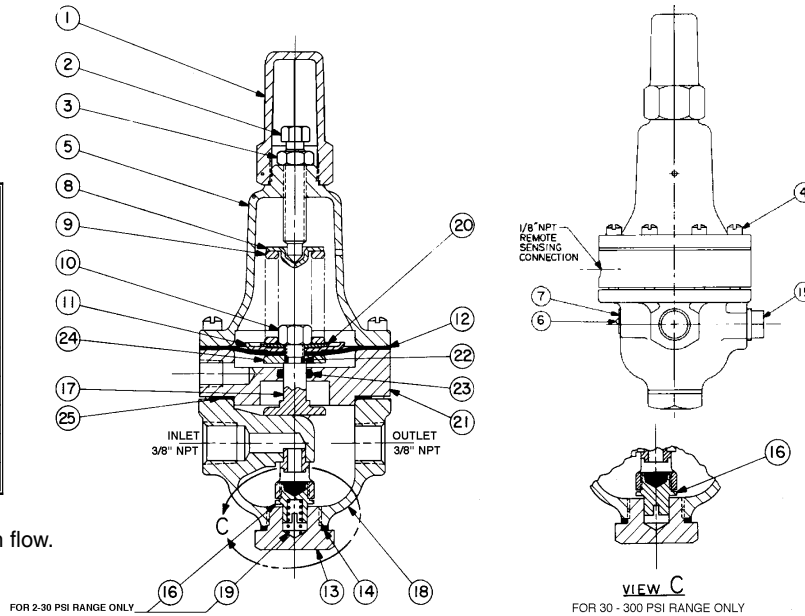
Pressure Reducing Control

When ordering parts specify:

- All nameplate data
- Description
- Item number

SIZE (inch)	STOCK NUMBER	SEAT DIA	ADJ. RANGE (psi)
3/8	79744-03D	1/4	15-75
3/8	79744-04B	1/4	30-300
3/8	79744-06G	1/4	2-30
			PSI*per turn
Factory set pressure:			
15-75 set @ 20 psi			9.0
30-300 set @ 60 psi			27.0
2-30 @ 10 psi			3.0

* Approximate - Final adjustment should be made with a pressure gauge and with flow.



ITEM	DESCRIPTION	MATERIAL	PART NUMBER	LIST PRICE
1	Cap	PL	67628J	
2	Adjusting Screw	BRS	7188201D	
3	Jam Nut, 3/8—16	303	6780106J	
4*	Machine Screw 10-32 x 1-1/4" (Fil.Hd.) (8 required)	SS	6757874A	
5	Cover	BRS	C2544K	
6	Nameplate Screw	SS	67999D	
7	Nameplate	BRS	C002201G	
8	Spring Guide	302	71881H	
9	Spring			
	(15-75 psi)	CHR VAN	71884B	
	(30-300 psi)	CHR VAN	71885B	
	(2-30 psi)	SS	81594E	
10	Hex Nut 5/16 - 18	303	71883D	
11	Diaphragm Washer (upper)	302	71891G	
12*	Diaphragm	NBR	C6936D	
13	Plug, Body	BRS	V5653A	
14*	Gasket	FIB	40174F	
15	Plug, 3/8 NPT	BRS	6766003F	
16*	Disc Retainer Assy (15-75 psi & 30-300 psi)	BR/RUB	C5256H	
	Disc Retainer Assy (2-30 psi)	BR/RUB	C5255K	
17	Yoke	VBZ	C1799A	
18	Body & Seat Assy, Seat only 1/4"	BS	8339701J	
19*	Bucking Spring (Required with 2-30 psi)	302	VO5586	
20	Belleville Washer	STL	7055007E	
21	Powertrol Body	BRS	C3388A	
22*	O-Ring	NBR	00708J	
23*	O-Ring	NBR	00746J	
24	Diaphragm Washer (lower)	BRS	C1804J	
25	Gasket	NBC	8059401D	
	Repair Kit (no Bucking Spring) Item 19		9170003K	
	Repair Kit (with Bucking Spring) Item 19		9170001D	

* Suggested Repair Parts

Distributed By: M&M Control Service, INC.

Phone: 800-876-0036

Fax: 847-356-0747

Email: Sales@mmcontrol.com

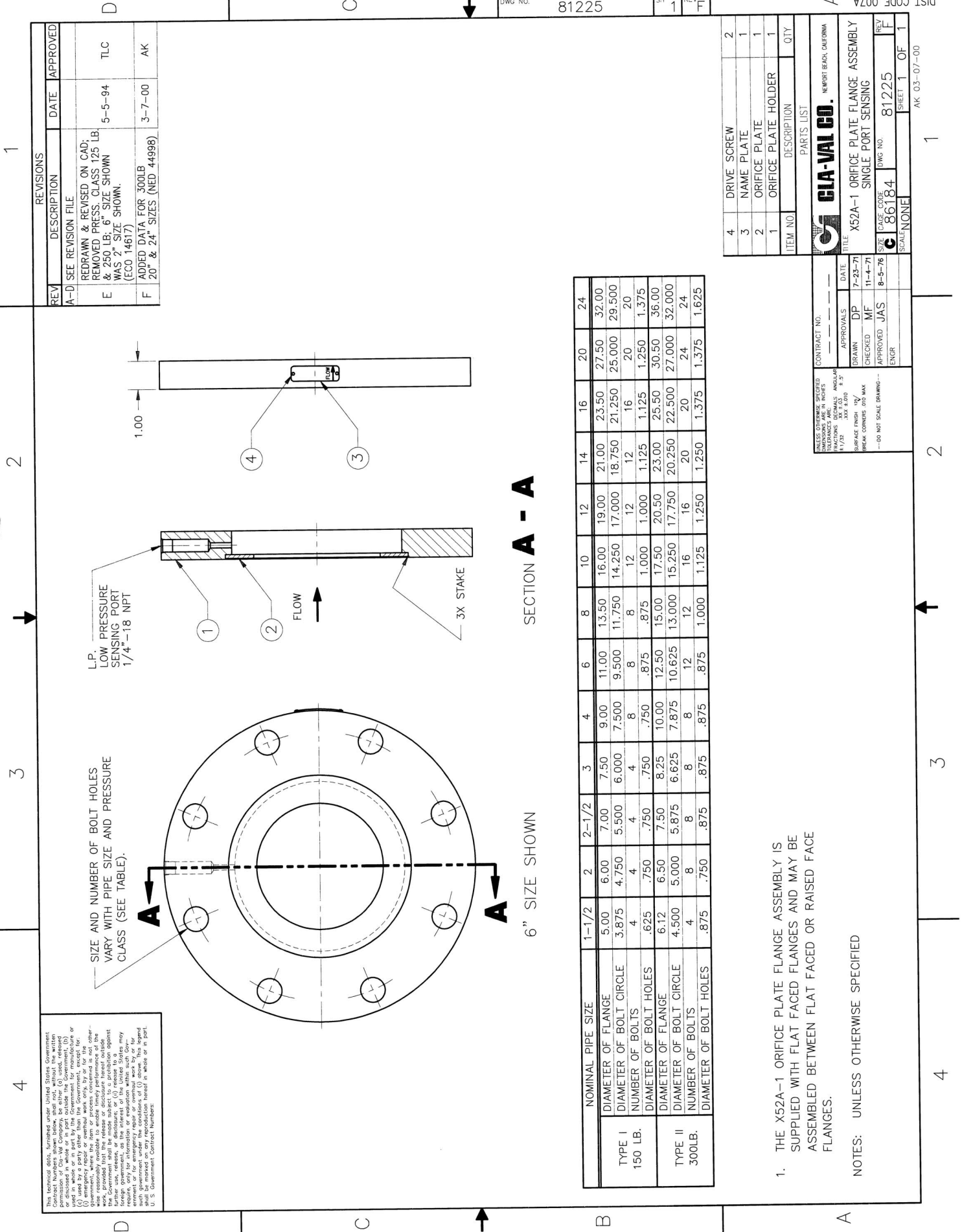
CVCL 1 [2] 3 4
D.C. 027
G:\WP51\ENG\47117.ENG

SHEET 1 OF 1
DWG. NO. REV.
47117 AC

●REGULATOR SPRING COLOR CODING CHART●

* THESE FIGURES ARE ONLY APPROXIMATE. FINAL ADJUSTMENTS SHOULD BE MADE WITH A PRESSURE GAGE.

WIRE SIZE	SPRING NUMBER	COLOR	WIRE MATERIAL	CATALOG NUMBER	PSI RANGE	*PSI PER TURN
.080 DIA	C0492D	BLUE	S.S	CDB-7 CRL-5A	0-7	.75
					0-7	.75
.080 DIA	82575C	--	S.S.	CRD CRD-10A	1.9-6.5	.61
					1.9-6.5	.49
.116 DIA	81594E	--	S.S.	CRD CRD-10A	2-30	3.0
					2-30	2.4
.120 DIA	V5654J	GREEN	CHR VAN	CRL-5A CRD	5-25	4.0
					10-40	4.0
.162 DIA	32447F	NATURAL	S.S.	CDB-7 CRL-5A CRL-13	10-60	12.0
					10-60	12.0
					10-60	12.0
.162 DIA	V5695B	YELLOW	MUSIC WIRE	CDB-7 CRL-5A CRL-13	20-80	14.5
					20-80	14.5
					20-80	14.5
.207 DIA	C1124B	CAD PLT	MUSIC WIRE	CDB-7 CRL-13 CRL-5A	50-150	29.5
					50-150	29.5
					50-150	29.5
.225 DIA	V6515A	RED	MUSIC WIRE	CDB-7 CRL-13 CRL-5A	65-180	44.0
					65-180	44.0
					65-180	44.0
.115 X .218	71884B	RED	CHR VAN	CRL CRD CRD-10A	0-75	8.5
					15-75	9.0
					15-75	7.2
.118 X .225	71885J	GREEN	CHR VAN	CRL CRD CRD-10A	20-200	28.0
					30-300	27.0
					30-300	22.4
.225 X .295	1630201A	CAD PLT	CHR VAN	CRL-5A CRL	100-300	18.00
					100-300	18.00
.440 X .219	48211H	CAD PLT	STEEL	CRA-1B CRD-22 CRL-4A	200-450	17.0
					200-450	17.0
					100-450	17.0
WIRE SIZE	SPRING NUMBER	COLOR	WIRE MATERIAL	CATALOG NUMBER	RANGE FEET	*FEET PER TURN
.080 DIA	C0492D	BLUE	S.S.	CRA CRD-2	4.5-15	.82
					4.5-15	.82
.375 DIA	87719B 1 SPRING 2 SPRINGS 3 SPRINGS 4 SPRINGS 5 SPRINGS	EPOXY COATED	CHROME SILICON	CDS-5	5-40	1.0
					30-80	2.0
					70-120	3.0
					110-120	4.0
					150-200	5.0
.072	V5097A	--	302SS	CVC	1-17	.7
.375 DIA	2933502H 1 SPRING 2 SPRINGS 3 SPRINGS 4 SPRINGS 5 SPRINGS	EPOXY COATED	CHROME SILICONE	CDS-6	5-40	.75
					30-80	1.50
					70-120	2.20
					110-160	3.00
					150-200	3.70



SIZE AND NUMBER OF BOLT HOLES VARY WITH PIPE SIZE AND PRESSURE CLASS (SEE TABLE).

L.P. LOW PRESSURE SENSING PORT 1/4" - 18 NPT

SECTION A - A

6" SIZE SHOWN

NOMINAL PIPE SIZE	6" SIZE SHOWN												
	1-1/2	2	2-1/2	3	4	6	8	10	12	14	16	20	24
DIAMETER OF FLANGE	5.00	6.00	7.00	7.50	9.00	11.00	13.50	16.00	19.00	21.00	23.50	27.50	32.00
DIAMETER OF BOLT CIRCLE	3.875	4.750	5.500	6.000	7.500	9.500	11.750	14.250	17.000	18.750	21.250	25.000	29.500
NUMBER OF BOLTS	4	4	4	4	8	8	8	12	12	12	16	20	20
DIAMETER OF BOLT HOLES	.625	.750	.750	.750	.750	.875	.875	1.000	1.000	1.125	1.125	1.250	1.375
DIAMETER OF FLANGE	6.12	6.50	7.50	8.25	10.00	12.50	15.00	17.50	20.50	23.00	25.50	30.50	36.00
DIAMETER OF BOLT CIRCLE	4.500	5.000	5.875	6.625	7.875	10.625	13.000	15.250	17.750	20.250	22.500	27.000	32.000
NUMBER OF BOLTS	4	8	8	8	8	12	12	16	16	20	20	24	24
DIAMETER OF BOLT HOLES	.875	.750	.875	.875	.875	.875	1.000	1.125	1.250	1.250	1.375	1.375	1.625

- THE X52A-1 ORIFICE PLATE FLANGE ASSEMBLY IS SUPPLIED WITH FLAT FACED FLANGES AND MAY BE ASSEMBLED BETWEEN FLAT FACED OR RAISED FACE FLANGES.

NOTES: UNLESS OTHERWISE SPECIFIED

REV	DESCRIPTION	DATE	APPROVED
A-D	SEE REVISION FILE		
E	REDRAWN & REVISED ON CAD; REMOVED PRESS. CLASS 125 LB & 250 LB; 6" SIZE SHOWN WAS 2" SIZE SHOWN. (ECO. 14617)	5-5-94	TLC
F	ADDED DATA FOR 300LB 20" & 24" SIZES (NED 44998)	3-7-00	AK

ITEM NO.	DESCRIPTION	QTY
4	DRIVE SCREW	2
3	NAME PLATE	1
2	ORIFICE PLATE	1
1	ORIFICE PLATE HOLDER	1

CLAVAL CO. NEWPORT BEACH, CALIFORNIA

TITLE: X52A-1 ORIFICE PLATE FLANGE ASSEMBLY

DATE: 7-23-71

DRAWN: DP

CHECKED: MF

APPROVED: JAS

ENGR:

SCALE: NONE

SHEET 1 OF 1

CONTRACT NO.	DATE
	7-23-71
	11-4-71
	8-5-76

APPROVALS	DATE
DP	7-23-71
MF	11-4-71
JAS	8-5-76

UNLESS OTHERWISE SPECIFIED:
 DIMENSIONS ARE IN INCHES
 TOLERANCES ARE:
 FRACTIONS .0015" ANGULAR .5"
 DECIMALS .005" .015" .030" .045" .075"
 SURFACE FINISH BY
 SPEC. ORDERS ONLY
 --DO NOT SCALE DRAWING--

DWG NO. 81225

DIST CODE 007A

AK 03-07-00

INSTALLATION / OPERATION / MAINTENANCE



— MODEL — CDHS-18

3/8" DIFFERENTIAL CONTROL

DESCRIPTION

The Cla-Val CDHS-18 Differential Control Valve is a normally open, spring loaded, diaphragm type valve that operates hydraulically and is designed to close on a rising differential pressure. When used as a pilot control with Cla-Val Valves, it acts as a flow limiting control.

INSTALLATION

The Differential Control may be installed in any position. There is one inlet port and two outlet ports in the body for either straight or angle installation. The outlet port senses the high pressure or inlet to the differential producing device. One of the outlet ports can be used for a gauge connection. The port above the diaphragm (located in the control cover) is used to sense the low pressure or outlet side of the differential producing device. A flow arrow is marked on the body casting.

OPERATION

The Differential Control is normally held open by the compression spring and the sensing pressure above the diaphragm. When the rate of flow through the main valve increases, the sensing pressure above the diaphragm of the control decreases and the higher pressure at the outlet port closes the control; which, in turn, closes the main valve. When the rate of flow through the main valve decreases, the sensing pressure above the diaphragm increases. This opens the control and in turn opens the main valve. This action causes the main valve to modulate, limiting the flow rate to the setting of the control.

ADJUSTMENT

The Differential Control Valve can be adjusted to limit the rate of flow as specified on the data plate. Rate of flow adjustment is made by turning the adjustment screw to vary the spring pressure on the diaphragm. The greater the compression on the spring the higher the flow rate.

1. Turn the adjustment screw in (clockwise) to increase flow rate.
2. Turn the adjustment screw out (counterclockwise) to decrease flow rate.

DISASSEMBLY

The Differential Control Valve should be removed from the Hytrol Valve assembly. Make sure that pressure shutdown is accomplished prior to disconnecting assembly. During disassembly inspect all threads for damage or evidence of cross-threading.

NOTE: A bench vice equipped with soft brass jaws should be used to hold the valve body during disassembly and reassembly. **DO NOT** tighten vice jaws more than enough to hold unit firmly. Excessive pressure may spring or crack casting

1. Remove adjusting screw cap (16).
2. Loosen lock nut on adjusting stem assembly (9) and turn adjusting screw counterclockwise to relieve tension on spring.
3. Remove bottom plug (8) and gasket (6).
4. Remove disc retainer assembly (5) and inspect sealing surface for damage or wear. Replace if necessary.
5. Remove 8 screws (12) and carefully lift off cover (2) spring guide (10) and spring (13) can now be removed.
6. Remove diaphragm assembly.
7. Remove diaphragm nut (7) and diaphragm washer (4).
8. Remove diaphragm (3), inspect for damage and replace if necessary.
9. Inspect all parts for damage, corrosion, wear, foreign particles, and cleanliness.
10. Repair minor nicks and scratches, these may be polished out using a fine grade of emery or crocus cloth.

REASSEMBLY

Prior to reassembly replace all parts which are damaged or worn. When ordering replacement parts be sure to specify item, part number, and all nameplate data.

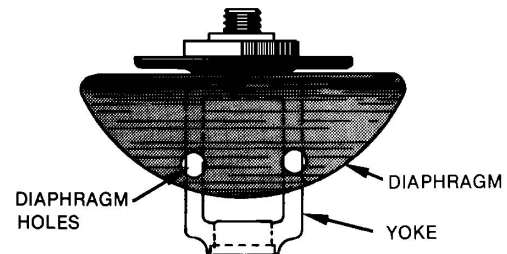
1. Place diaphragm (3) on top of yoke (11) place diaphragm washer (4) over diaphragm with rounded edges down or next to diaphragm. Screw on diaphragm nut (7) with the spring guide shoulder in up position. The nut is not tightened at this time.
2. Align diaphragm flange holes with and folding diaphragm as shown. Tighten diaphragm nut, retaining alignment shown.
3. Place yoke assembly in body (1) and screw the disc retainer assembly (5) in until it bottoms.
4. Screw in plug (8).

NOTE: The yoke arms can be viewed through the 3/8" NPT high pressure sensing outlet. There should be even spacing between the yoke arms and the 3/8" NPT inlet boss seat assembly. There must be no drag or friction between these parts. If there is drag, repeat step 2.

5. Align diaphragm flange holes with the body holes and position spring and spring guide (13) (10).
6. Replace cover (2) and secure with 8 screws (12).
7. Remove plug (8) and turn adjusting screw clockwise until the disc retainer assembly moves down.
8. Replace gasket (6) and plug (8).
9. Replace cap (16).

SERVICE SUGGESTIONS

SYMPTOM	PROBABLE CAUSE	REMEDY
FAILS TO OPEN	CONTROLLING DIFFERENTIAL NOT CHANGING	CHECK WITH GAUGE OR MANOMETERS
	DIAPHRAGM ASSEMBLY STUCK CLOSED	DISASSEMBLE AND FREE
	NO SPRING COMPRESSION	SCREW IN ADJUSTING STEM
	FOREIGN OBJECT UNDER DISC RETAINER	DISASSEMBLE AND REMOVE
FAILS TO CLOSE	INSUFFICIENT CONTROLLING DIFFERENTIAL	INCREASE DIFFERENTIAL
	FOREIGN OBJECT UNDER DISC	DISASSEMBLE AND REMOVE
	DIAPHRAGM ASSEMBLY STUCK OPEN	DISASSEMBLE AND FREE
	DAMAGED DIAPHRAGM	DISASSEMBLE AND REPLACE
	SPRING COMPRESSED SOLID	BACK OFF ADJUSTING STEM

**DIAPHRAGM HOLE ALIGNMENT**

INSTALLATION / OPERATION / MAINTENANCE



— MODEL — **X46**

Flow Clean Strainer

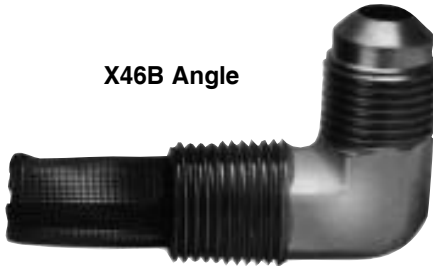


X46A Straight

- Self Scrubbing Cleaning Action
- Straight Type or Angle Type

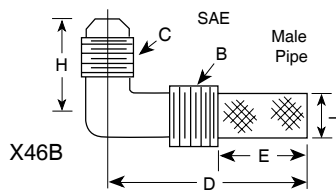
The Cla-Val Model X46 Strainer is designed to prevent passage of foreign particles larger than .015". It is especially effective against such contaminant as algae, mud, scale, wood pulp, moss, and root fibers. There is a model for every Cla-Val. valve.

X46B Angle

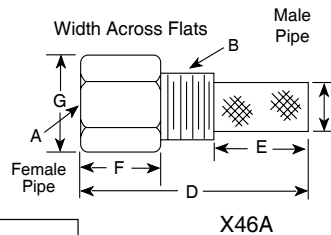


The X46 Flow Clean strainer operates on a velocity principle utilizing the circular "air foil" section to make it self cleaning. Impingement of particles is on the "leading edge" only. The low pressure area on the downstream side of the screen prevents foreign particles from clogging the screen. There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

Dimensions (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



A (NPT)	B (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

When Ordering, Please Specify:

- Catalog Number X46
- Straight Type or Angle Type
- Size Inserted Into and Size Connection
- Materials

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 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 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 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.

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).

CVCL 1 ② 3 4

DIST CODE 049

SHEET 1 OF 2



CATALOG NO.

DRAWING NO.

REV

67783

AS

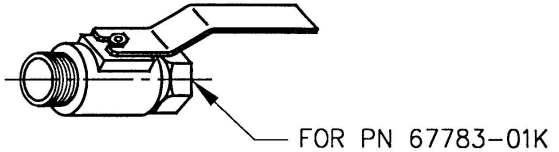
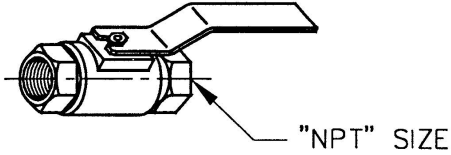
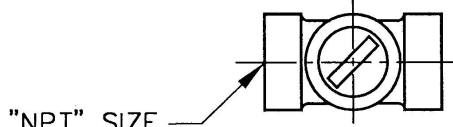
TYPE OF VALVE AND MAIN FEATURES

CK2 COCK/BALL VALVE

DESIGN

DRAWN	MGR	4-02-80
CHK'D	KD	4-03-80
AP'VD	CH	4-07-80

SCALE: NONE



CLA-VAL PART NO. AND MATERIAL

BRONZE WITH HANDLE	STEEL WITH HANDLE	IRON WITH HANDLE	316 SST WITH HANDLE	316 SST W/ LOCKING HANDLE	BRONZE WITH HANDLE	MONEL WITH HANDLE	SIZE "NPT"
67783-01K *	-09C	-17F	-25J SUPSD BY-26G		-41F SUPSD BY-01K		1/8"
-02H	-10A	-18D	-26G	-51E SUPSD BY-26G -52C	-42D SUPSD BY-02H		1/4"
-03F *	-11J	-19B	-27E	-46E SUPSD BY-27E -53A	-45G	-48A SUPSD BY-49J	3/8"
-04D	-12G	-20K	-28C	-54J	-43B SUPSD BY-04D	-49J	1/2"
-05A	-13E	-21H	-29A		-44K SUPSD BY-05A		3/4"
-06J	-14C	-22F	-30J				1"
-07G	-15K	-23D	-31G				1 1/4"
-08E	-16H	-24B	-32E				1 1/2"
-50G			-47C				2"

* SEE ENGINEERING APPROVED VENDORS TABLE (SHEET 2 OF 2).

AK	03-07-01	ADDED ** TO PN. 67783-01K TO SH. 1 (ECO 18551)	DESCRIPTION	BY	DATE
				LTR	
			A-AR SEE REVISION FILE		
			AS ADDED ANDERSON BRASS 1/8 FPT X 1/8 MPT TO SHEET 2 AND		

THIS DRAWING IS THE PROPERTY OF CLA-VAL CO. AND SAME AND COPIES MADE THEREOF, IF ANY, SHALL BE RETURNED TO IT UPON DEMAND. DELIVERY AND DISCLOSURE HEREOF ARE SOLELY UPON CONDITION THAT THE SAME SHALL NOT BE USED, COPIED OR REPRODUCED, NOR SHALL THE SUBJECT HEREOF BE DISCLOSED IN ANY MANNER TO ANYONE FOR ANY PURPOSE, EXCEPT AS HEREIN AUTHORIZED, WITHOUT PRIOR WRITTEN APPROVAL OF CLA-VAL CO. THIS DRAWING IS SUBMITTED CONFIDENTIALLY AND MAY NOT BE USED IN THE MANUFACTURE OF ANY MATERIAL OR PRODUCT OTHER THAN SUCH MATERIALS AND PRODUCTS FURNISHED TO CLA-VAL CO. WHETHER OR NOT THE EQUIPMENT OR INFORMATION SHOWN HEREON IS PATENTED OR OTHERWISE PROTECTED, FULL TITLE AND COPYRIGHTS, IF ANY, IN AND TO THIS DRAWING AND/OR INFORMATION DELIVERED OR SUBMITTED ARE FULLY RESERVED CLA-VAL CO.



INSTALLATION / OPERATION / MAINTENANCE

— MODEL — CV

Flow Control

**DESCRIPTION**

The Cla-Val Model CV Flow Control is a simply-designed, spring-loaded check valve. Rate of flow is full flow in one direction and restricted in other direction. Flow is adjustable in the restricted direction. It is intended for use in conjunction with a pilot control system on a Cla-Val Automatic Control Valve.

OPERATION

The CV Flow Control permits full flow from port A to B, and restricted flow in the reverse direction. Flow from port A to B lifts the disc from seat, permitting full flow. Flow in the reverse direction seats the disc, causing fluid to pass through the clearance between the stem and the disc. This clearance can be increased, thereby increasing the restricted flow, by screwing the stem out, or counter-clockwise. Turning the stem in, or clockwise reduces the clearance between the stem and the disc, thereby reducing the restricted flow.'

INSTALLATION

Install the CV Flow Control as shown in the valve schematic. All connections must be tight to prevent leakage.

DISASSEMBLY

Follow the sequence of the item numbers assigned to the parts in the cross sectional illustration for recommended order of disassembly.

Use a scribe, or similar sharp-pointed tool to remove O-ring from the stem.

INSPECTION

Inspect all threads for damage or evidence of cross-threading. Check mating surface of seat and valve disc for excessive scoring or embedded foreign particles. Check spring for visible distortion, cracks and breaks. Inspect all parts for damage, corrosion and cleanliness.

CLEANING

After disassembly and inspection, cleaning of the parts 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 the parts in a 5-percent muriatic acid solution just long enough for deposits 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.

REPAIR AND REPLACEMENT

Minor nicks and scratches may be polished out using a fine grade of emery or crocus cloth; replace parts if scratches cannot be removed.

Replace O-ring packing and gasket each time CV Flow Control is overhauled.

Replace all parts which are defective. Replace any parts which create the slightest doubt that they will not afford completely satisfactory operation. Use Inspection steps as a guide.

REASSEMBLY

Reassembly is the reverse of disassembly; no special tools are required.

TEST PROCEDURE

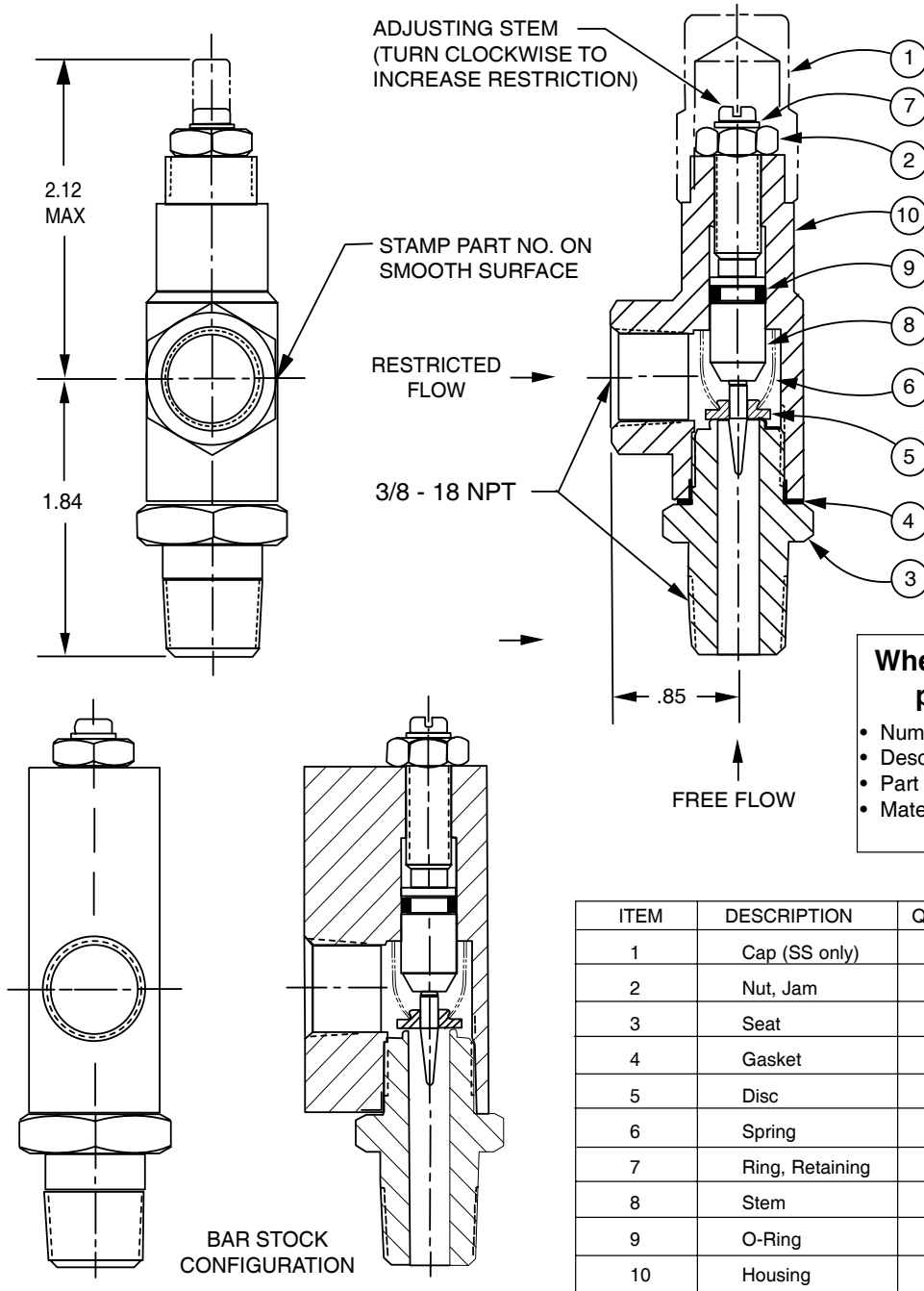
No testing of the flow Control is required prior to reassembly to the pilot control system on Cla-Val Main Valve.

PARTS LIST



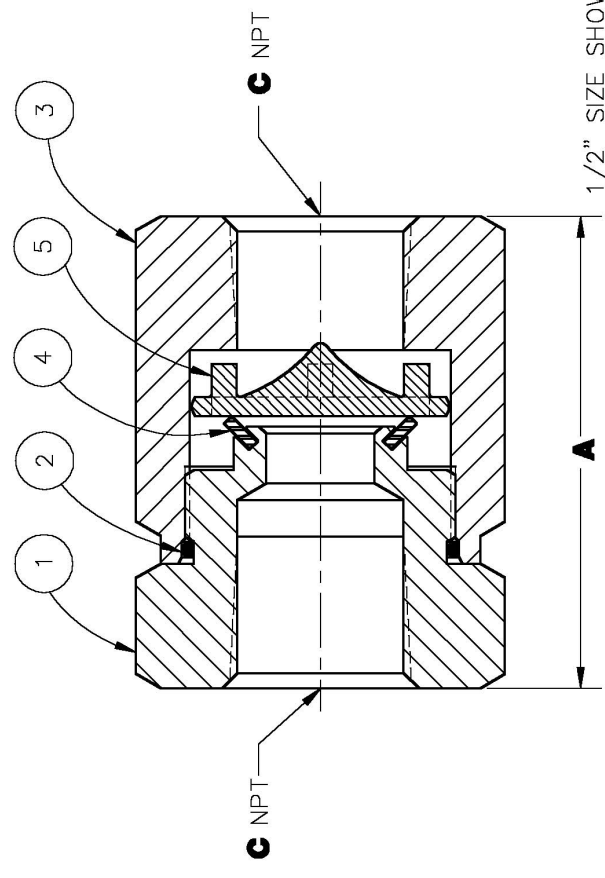
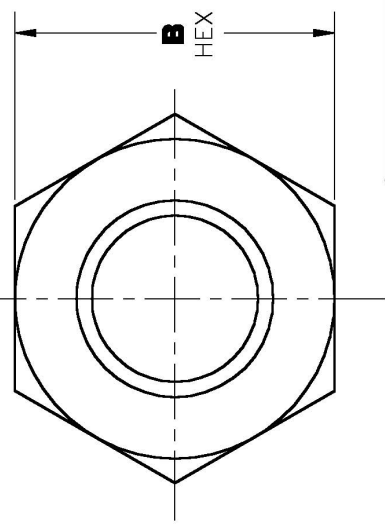
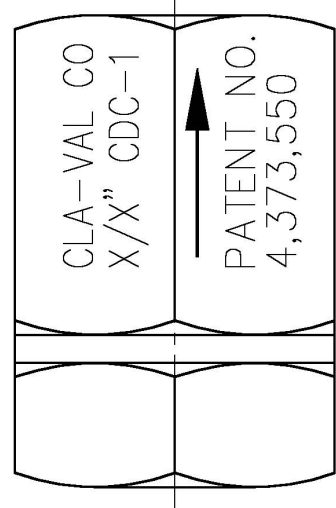
CV

3/8" Flow Control



DWG NO. 98345 SH 1 REV E

This drawing is the property of CLA-VAL CO. and herein and copyright thereon. If any part is returned to it upon demand, delivery and disclosure hereof are made solely upon demand. This drawing is not to be used for any purpose other than that for which it was prepared, and no part of the subject hereof be disclosed in any manner to anyone for any purpose, except as herein authorized, without the written consent of CLA-VAL CO. CLA-VAL CO. and its subsidiaries and affiliates may not be used in the manufacture of any material or product other than such materials and products as are specifically identified in this drawing. CLA-VAL CO. reserves all rights in and to this drawing and/or information shown hereon as patented or otherwise protected, full title and copyrights, if any, in and to this drawing and/or information shown hereon as patented or otherwise protected, CLA-VAL CO.



REVISION		
REV	DESCRIPTION	DATE
A-D	SEE REVISION FILE	
E	REVISED & REDRAWN ON CAD, WAS "D" SIZE (ECO 14229)	11-18-93

APPROVED	EK
----------	----

DESCRIPTION	A	B	C
3/8" CHECK VALVE	2.06	1.06	.38 (3/8)-18 NPT
1/2" CHECK VALVE	2.12	1.38	.50 (1/2)-14 NPT

ITEM NO.	QTY	REGD	NON-ENCLATURE OR DESCRIPTION
5	1		PLATE, VALVE
4	1		SEAL, VALVE RING
3	1		RETAINER, VALVE
2	1		O-RING
1	1		RETAINER, SEAL

PARTS LIST	
CONTRACT NO.	
APPROVALS	DATE
DRAWN JC	11-30-84
CHECKED LFH	12-4-84
APPROVED CH	12-6-84
ENGR	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES FRACTIONS DECIMALS ANGULAR ±1/32 .XXX ±.010 SURFACE FINISH 125/BREAK CORNERS .010 MAX --DO NOT SCALE DRAWING--

CLA-VAL CO. NEWPORT BEACH, CALIFORNIA
 TITLE: 3/8" & 1/2" CDC-1 CHECK VALVE
 PATENT NO. 4,373,550
 CAGE CODE DWG NO. 98345
 SCALE 2/1 SHEET 1 OF 1

DIST. CODE 007A
 EK 11-22-93

PARTS LIST



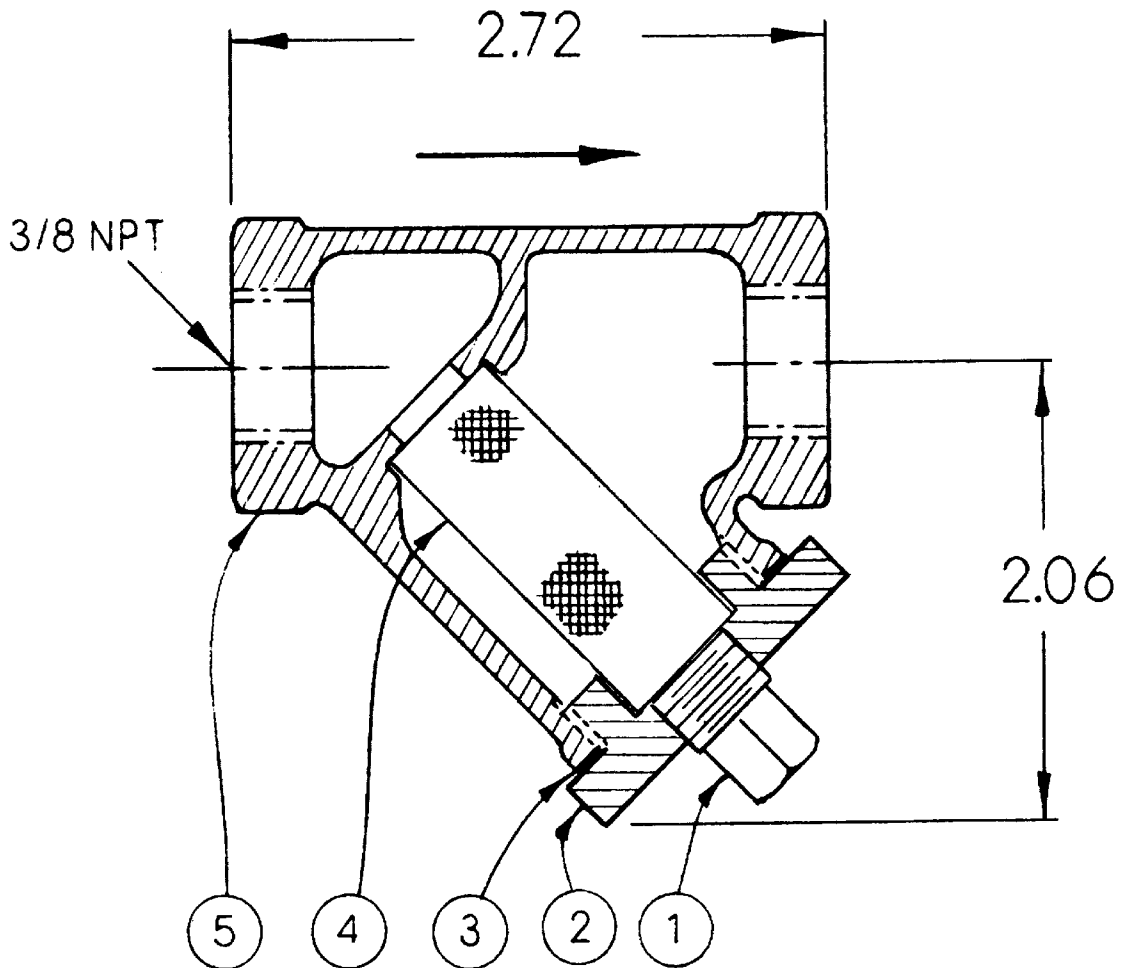
X43 Strainer

ITEM	DESCRIPTION	MATERIAL
1	Pipe Plug	Steel
2	Strainer Plug	Brass
3	Gasket	Copper
4*	Screen	Monel
5	Body	Brass

Standard 60 mesh pilot system strainer for fluid service.

SIZE	STOCK NUMBER
3/8 x 3/8	33450J

*Replacement screen stock number 68373A.
All other parts available only in replacement assembly.





Cla-Val Product Identification

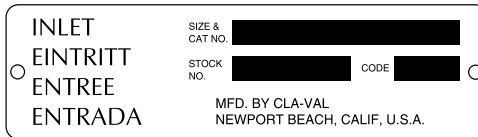
How to Order

Proper Identification

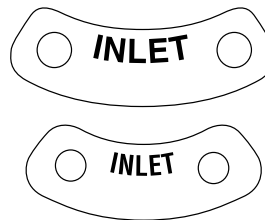
For ordering repair kits, replacement parts, or for inquiries concerning valve operation it is important to properly identify Cla-Val products already in service. Include all nameplate data with your inquiry. Pertinent product data includes valve function, size, material, pressure rating, end details, 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.**



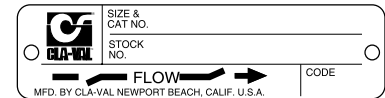
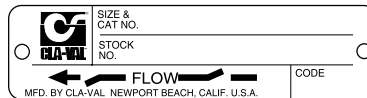
This brass plate appears on valves sized 2 1/2" and larger and is located on the top of the inlet flange.



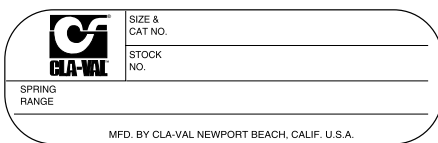
These two brass plates appear on 3/8", 1/2", and 3/4" size valves and are located on the valve cover.



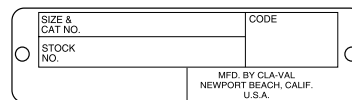
This brass plate appears on altitude valves only and is found on top of the outlet flange.



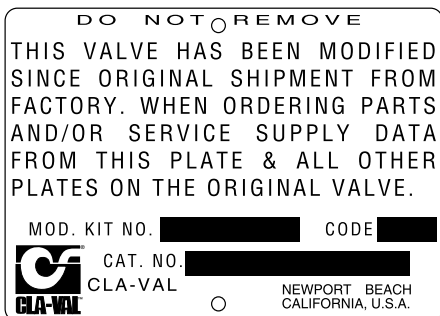
These two brass plates appear on 1" through 3" size screwed valves or 1" through 2" flanged valves. It is located on only one side of the valve body.



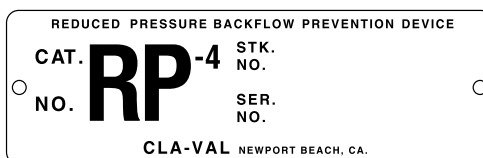
This tag is affixed to the cover of the pilot control valve. The adjustment range appears in the spring range section.



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



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 is 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

There are many valves and controls manufactured by Cla-Val that are not listed due to the sheer volume. For information 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

SPECIFY WHEN ORDERING

- Model Number
- Globe or Angle Pattern
- Adjustment Range (As Applicable)
- Valve Size
- Screwed or Flanged
- Body and Trim Materials
- Optional Features
- 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 which 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.

We will repair or replace defective material, free of charge, which is returned to our factory, transportation charges prepaid, provided that, after inspection, the material is found to have been defective at time of shipment. This warranty is expressly conditioned on the purchaser's giving Cla-Val immediate written notice 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, and 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 cancelled.

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 acknowledgement 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 \$75.00.

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% (\$75 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.



Distributed By:
M&M Control Service, INC.
Phone: 800-876-0036
Fax: 847-356-0747
Email: Sales@mmcontrol.com

INSTALLATION / OPERATION / MAINTENANCE

— MODEL — **REPAIR KITS****Complete Replacement Diaphragm Assemblies for 100-01 and 100-20 Hytrol Main Valves**

For: Hytrol Main Valves with Ductile Iron, Bronze Trim Materials—**125/150 Pressure Class Only.**
FACTORY ASSEMBLED

Includes: Stem, Disc Guide, Disc, Disc Retainer, Spacer Washers, Diaphragm, Diaphragm Washer and Stem Nut.

Valve Size	Diaphragm Assembly Stock Number		Valve Size	Diaphragm Assembly Stock Number	
	100-01	100-20		100-01	100-20
3/8" (Also 81-01)	49097K	N/A	6"	40456G	33273E
1/2" - 3/4" (Also 81-01)	C2518D	N/A	8"	45276D	40456G
1"	C2520K	N/A	10"	81752J	45276D
1 1/4" - 1 1/2"	C2522 F	N/A	12"	85533J	81752J
2"	C2524B	N/A	14"	89067D	N/A
2 1/2"	C2523D	N/A	16"	89068B	85533J
3"	C2525J	C2524B	20"	N/A	89068B
4"	33273E	C2525J	24"	N/A	89068B

Repair Kits for 100-01/100-20 Hytrol Valves

For: Hytrol Main Valves—**125/150 Pressure Class Only.**

Supplied Shrink Wrapped (4" and smaller) or Bagged (6" and larger)

Includes: Diaphragm, Disc (or Disc Assembly) and spare Spacer Washers.

Buna-N® Standard Material				Viton (For KB Valves)			
Valve Size	Repair Kit Stock Number		Valve Size	Repair Kit Stock Number			
	100-01	100-20		100-01	100-20		
3/8" (Also 81-01)	9169801K	N/A	3/8" (Also 81-01)	9169806J	N/A		
1/2" - 3/4" (Also 81-01)	9169802H	N/A	1/2" - 3/4" (Also 81-01)	9169807G	N/A		
1"	9169803F	N/A	1"	9169808E	N/A		
1 1/4" - 1 1/2"	9169804D	N/A	1 1/4" - 1 1/2"	9169809C	N/A		
2"	9169805A	N/A	2"	9169810A	N/A		
2 1/2"	9169811J	N/A	2 1/2"	9169817F	N/A		
3"	9169812G	9169805A	3"	9169818D	9169810A		
4"	9169813E	9169812G	4"	9169819B	9169818D		
6"	9169815K	9169813E	6"	9169820K	9169819B		
8"	9817901D	9169815K	8"	N/A	9169820K		
10"	9817902B	9817901D					
12"	9817903K	9817902B					
14"	9817904H	N/A					
16"	9817905E	9817903K					
20"	N/A	9817905E					
24"	N/A	9817905E					

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

Repair Kits for 100-02/100-21 Powertrol and 100-03/100-22 Powercheck Main Valves**For:** Powertrol and Powercheck Main Valves—125/150 Pressure Class Only*Supplied Shrink Wrapped* (4" and Smaller) or Bagged (6" and larger)

Includes: Diaphragm, Disc (or Disc Assembly) and 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"	99116G	9169913C
			10"	N/A	99116G

Larger Sizes: Consult Factory.

Repair Kits for 100-04/100-23 Hy-Check Main Valves**For:** Hy-Check Main Valves—125/150 Pressure Class Only*Supplied Shrink Wrapped* (4" and Smaller) or Bagged (6" and larger)

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", 24"	N/A	20210907F

Larger Sizes: Consult Factory.

Repair Kits for Pilot Control Valves

Supplied Shrink Wrapped 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-7 & 7-A	1263901K	CDB-KB	9170012A
CDB-7	9170017K	CRA (w/bucking spring)	9170001D	CRA-KB	9170018H
CDH-2	18225D	CRD (w/bucking spring)	9170002B	CRD-KB (w/bucking spring)	9170008J
CDHS-2	44607A	CRD (no bucking spring)	9170003K	CRL-KB	9170013J
CDHS-2B	9170004H	CRD-22	98923G	CDHS-2BKB	9170010E
CDHS-2F	9170005E	CRL (55F, 55L)	9170007A	CDHS-2FKB	9170011C
CDHS-3C-A2	24657K	CRL-4A	43413E	CDHS-18KB (no bucking spring)	9170009G
CDHS-8A	2666901A	CRL-5 (55B)	65755B	102C-KB	1726202D
CDHS-18	9170003K	CRL-5A (55G)	20666E	Buna-N®	
CDS-4	9170014G	CV	9170019F	CRD DISC RET. (SOLID)	C5256H
CDS-5	14200A	X105L (O-ring)	00951E	CRD DISC RET. (SPRING)	C5255K
CDS-6	20119301A	102B-1	1502201F		
CFM-2, CFM-9, CFCM-M1	12223E	102C-2 & -3	1726201F		

Repair Assemblies (In Standard Materials Only)

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

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

Distributed By: M&M Control Service, INC.

Phone: 800-876-0036

Fax: 847-356-0747

Email: Sales@mmcontrol.com