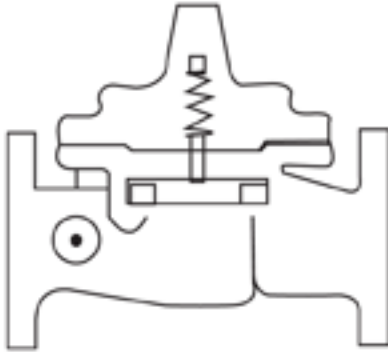


# CLA-VAL

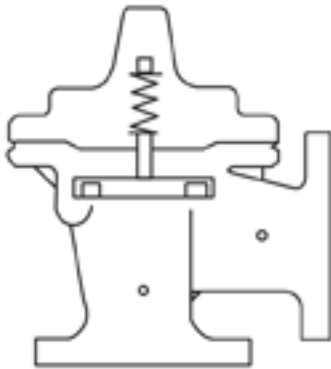
**AUTOMATIC CONTROL VALVES**

90-01/690-01

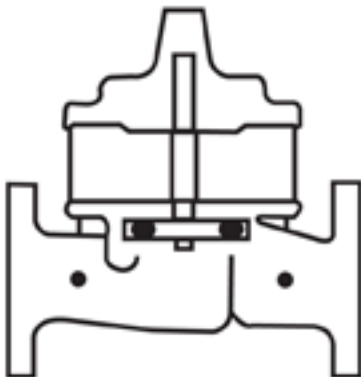
Place this manual with personal responsible  
for maintenance of this valve



## *INSTALLATION*



## *OPERATION*



## *MAINTENANCE*





**CLA-VAL CO.**

NEWPORT BEACH, CALIFORNIA

CATALOG NO.  
90-01/690-01

DRAWING NO.  
76551

REV.  
J

TYPE OF VALVE AND MAIN FEATURES

**PRESSURE REDUCING VALVE EQUIPPED WITH CRD PRESSURE REDUCING CONTROL**

|        |     |          |
|--------|-----|----------|
| DESIGN |     |          |
| DRAW   | DP  | 11-30-78 |
| CHK'D  | CH  | 11-30-78 |
| APVD   | WAL | 11-30-78 |

J CAT NO. WAS 90-01; ADDED 100-20 (690-01) TO ITEM 1 (ECO 14478)

CAD REVISION RECORD - DO NOT REVISE MANUALLY

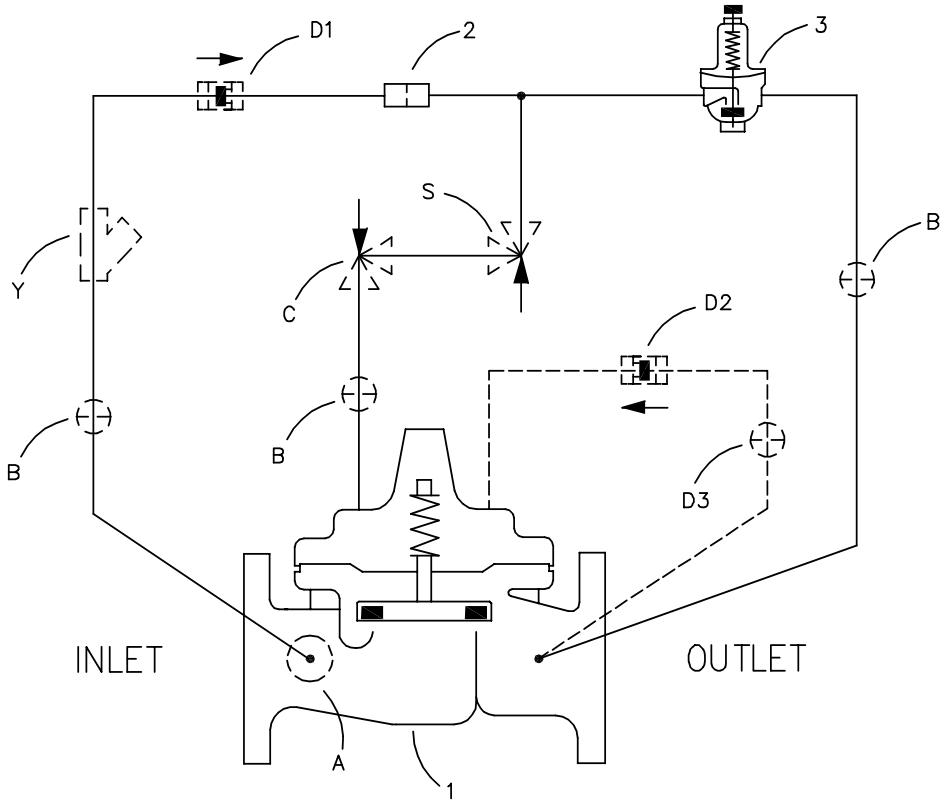
DESCRIPTION

LTR

DATE

|   |        |
|---|--------|
| BY  | DATE   |
| TLC   | 7-1-91 |
| A-G SEE REVISION FILE                                   |        |
| H ADDED D OPTIONAL FEATURE & REVISED ON CAD (ECO 12041) |        |

----- NOT FURNISHED BY CLA-VAL CO. ----- OPTIONAL FEATURES



| ITEM NO. | BASIC COMPONENTS                  | QTY |
|----------|-----------------------------------|-----|
| 1        | 100-01 HYTROL (90-01) MAIN VALVE  | 1   |
|          | 100-20 HYTROL (690-01) MAIN VALVE |     |
| 2        | X58C RESTRICTION FITTING          | 1   |
| 3        | CRD PRESSURE REDUCING CONTROL     | 1   |
|          |                                   |     |
|          |                                   |     |
|          |                                   |     |
|          |                                   |     |

| OPTIONAL FEATURE SUFFIX |                            | ADDED TO CATALOG NUMBER |  |
|-------------------------|----------------------------|-------------------------|--|
| A                       | X46A FLOW CLEAN STRAINER   | 1                       |  |
| B                       | CK2 COCK (ISOLATION VALVE) | 3                       |  |
| C                       | CV FLOW CONTROL (CLOSING)  | 1                       |  |
| D                       | CHECK VALVES WITH COCK     | 1                       |  |
| S                       | CV FLOW CONTROL (OPENING)  | 1                       |  |
| Y                       | X43 "Y" STRAINER           | 1                       |  |

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NEWPORT BEACH, CALIFORNIA

CATALOG NO.

90-01/690-01

DRAWING NO.

76551

REV.

J

TYPE OF VALVE AND MAIN FEATURES

PRESSURE REDUCING VALVE EQUIPPED  
WITH CRD PRESSURE REDUCING CONTROL

DESIGN

|      |    |          |
|------|----|----------|
| DRAW | DP | 11-30-78 |
|------|----|----------|

|       |    |          |
|-------|----|----------|
| CHK'D | CH | 11-30-78 |
|-------|----|----------|

|      |     |          |
|------|-----|----------|
| APVD | WAL | 11-30-78 |
|------|-----|----------|

OPERATING DATA

I. 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.

II. 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 (B) 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.

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.

CAD REVISION RECORD - DO NOT REVISE MANUALLY

DATE

BY

DESCRIPTION

LTR

SEE SHEET 1



**CLA-VAL CO.**

NEWPORT BEACH, CALIFORNIA

CATALOG NO.

90-01/690-01

DRAWING NO.

76551

REV.

J

TYPE OF VALVE AND MAIN FEATURES

PRESSURE REDUCING VALVE EQUIPPED  
WITH CRD PRESSURE REDUCING CONTROL

DESIGN

|       |     |          |
|-------|-----|----------|
| DRAW  | DP  | 11-30-78 |
| CHK'D | CH  | 11-30-78 |
| APV'D | WAL | 11-30-78 |

OPERATING DATA-CONTINUED

III. 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 (B) OPEN (OPTIONAL FEATURE).
- ( ) PERIODIC CLEANING OF STRAINER (Y) IS RECOMMENDED (OPTIONAL FEATURE).
- ( ) CV FLOW (C) AND (S) OPEN AT LEAST 1/4 TURN (OPTIONAL FEATURE).

CAD REVISION RECORD - DO NOT REVISE MANUALLY

DATE

BY

DESCRIPTION

SEE SHEET 1

LTR



— MODEL — **90-01/690-01**

# PRESSURE REDUCING VALVE

The Cla-Val 90-01/690-01 is an automatic control valve designed to reduce higher inlet pressure to a steady lower downstream pressure regardless of changing flow rate and/or varying inlet pressure. It is a hydraulically operated, pilot-controlled, diaphragm type globe or angle valve. When downstream pressure exceeds the pressure setting of the control pilot the main valve and pilot valve close drip tight. The control system is very sensitive to slight pressure changes and immediately controls the main valve to maintain the desired downstream pressure. Pressure setting adjustment is made with a single adjusting screw that has a protective cap to discourage tampering.

**INSTALLATION**

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

2. It is recommended that gate or line block valves be installed on both ends of the 90-01/690-01 valve assembly to facilitate isolating the valve for maintenance. Minimum one pipe diameter apart.

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

3. Place the valve assembly in the 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. 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 and larger valves, installation with the cover up is advisable. This makes periodic inspection of internal parts readily accessible.

**OPERATION AND START-UP**

1. Prior to pressurizing the valve assembly make sure the necessary gauges to measure pressure in the system are installed as required 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 valve movement during startup.

**CAUTION:** During start-up 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. **All adjustments in pressure should be made slowly while under flowing conditions.** If the main valve closes too fast it may cause surging in upstream piping.

2. If isolation valves (B) are installed in pilot system open these valves (see schematic).

3. Optional Cla-Val CV Flow Controls (C or S) provide adjustable regulation of flow in and out of the main valve chamber to minimize pulsations that sometime occur at very low flow rates. If CV Controls are installed, loosen jam nut and turn adjustment screw counterclockwise from closed position 3.5 turns for an initial setting.

4. Open the upstream gate or block valve just slightly to allow the main valve assembly and pilot system to fill with liquid.

5. Carefully loosen tube fittings at highest points and bleed air from pilot control system. Carefully loosen the plug at top of main valve cover to bleed air from cover. If an indicator is installed, carefully loosen the air bleed valve at top of indicator. Tighten tube fittings.

6. Open the upstream gate or block valve fully.

7. Slowly open the downstream gate or block valve. Flow should occur and pressure should remain constant.

8. Adjust the CRD Control to desired pressure. To change pressure setting, turn the adjusting screw clockwise to increase pressure, counterclockwise to decrease pressure. There must be liquid flowing through the valve during pressure adjustments. When the desired setting has been made, tighten jam nut and replace cover.

9. To check the operation of the valve, open and close the downstream gate valve. The downstream pressure should remain constant.

10. If opening and closing speed controls (C or S) are installed in the valve pilot system, fine tune the opening and closing speed of the main valve while performing step 9. Turn the CV adjustment screw clockwise on the opening speed control to make the main valve open slower. Turn the adjustment screw clockwise on the closing speed control to make the main valve close slower. When adjustments have been completed tighten jam nuts.

**MAINTENANCE**

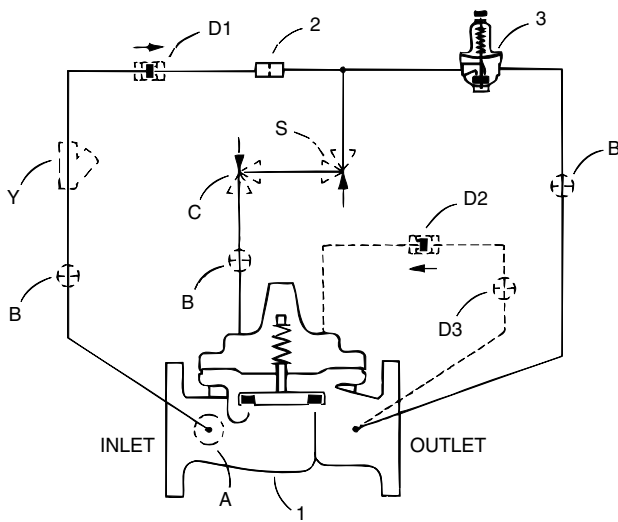
1. Cla-Val Valves and Controls require no lubrication or packing and a minimum of maintenance. However, a periodic inspection schedule should be established. Minimum of once per year.

2. Repair and maintenance procedures of the Cla-Val Hytrol Main Valve and pilot control components are included in a more detailed IOM manual. It can be downloaded from our web site ([www.cla-val.com](http://www.cla-val.com)) or obtained by contacting a Cla-Val Regional Sales Office.

3. **When ordering parts always refer to the catalog number and stock number on the valve nameplate.**

| SYMPTOM                   | PROBABLE CAUSE  | REMEDY   |
|---------------------------|---|--|
| Main valve fails to open  | No pressure at valve inlet  | Check inlet pressure   |
|                           | Main valve diaphragm assembly inoperative   | Disassemble, clean and polish stem, replace defective parts  |
|                           | Pilot Valve (CRD) not opening:<br>1. No spring compression<br>2. Damaged spring<br>3. Spring guide not in place<br>4. Yoke dragging on inlet nozzle         | 1. Tighten adjusting screw<br>2. Disassemble and replace<br>3. Assemble properly<br>4. Assemble properly   |
|                           | Flow Control (CV) disc inoperative. corrosion or excessive scale buildup on stem  | Disassemble, clean and polish stem. Replace worn parts   |
| Main valve fails to close | Foreign matter between disc and seat or worn disc. Scale on stem or Diaphragm ruptured  | Disassemble main valve, remove matter, clean parts and replace defective parts   |
|                           | Flow Clean Strainer plugged   | Remove and clean or replace  |
|                           | CK2 (isolation valves) closed   | Open isolation valves  |
|                           | Pilot Valve (CRD) remain open:<br>1. Spring compressed solid<br>2. Mechanical obstruction<br>3. Worn disc<br>4. Yoke dragging on inlet nozzle diaphragm nut | 1. Back off adjusting screw<br>2. Disassemble and remove obstruction<br>3. Disassemble remove and replace disc retainer assembly<br>4. Assemble properly |
|                           | 5. Diaphragm damaged or loose diaphragm nut. Leakage from vent hole in cover  | 5. Disassemble. replace diaphragm and/or tighten nut   |
| Fails to regulate         | Air in main valve cover and/or tubing   | Loosen top cover plug and fittings and bleed air   |
|                           | Pilot Valve (CRD) yoke dragging on inlet nozzle   | Assemble properly  |
|                           | Pilot Valve (CRD) spring not in correct range to control  | Check outlet pressure requirements and compare existing spring with Spring Chart   |

# 90-01/690-01 SCHEMATIC

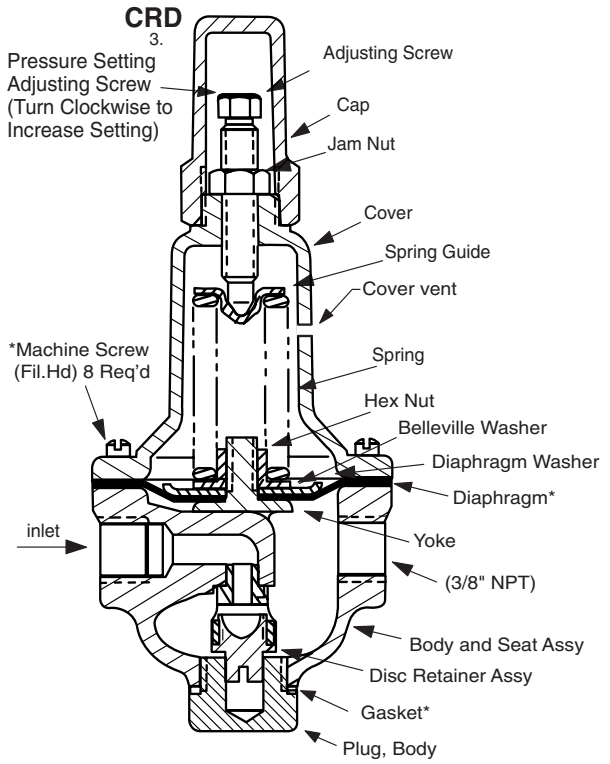


### BASIC COMPONENTS

- 1 100-01 Hytrol (Main Valve)
- 100-20 600 Series Hytrol (Main Valve)
- 2 X58C Restriction Fitting
- 3 CRD Pressure Reducing Control

### OPTIONAL FEATURES

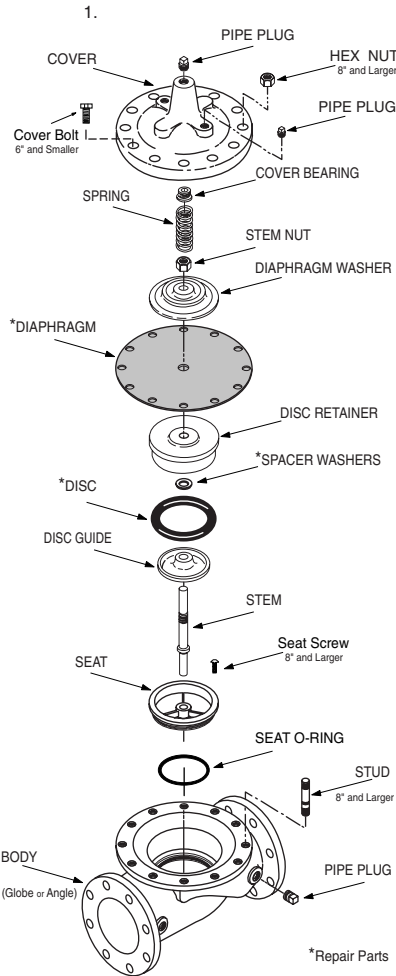
- A X46A Flow Clean Strainer
- B CK2 (Isolation Valve)
- C Closing Speed Control
- D Check Valves with Isolation Valve
- S Opening Speed Control
- Y X43 "Y" Strainer



| CRD adjust range (psi) | Spring Color    | psi change per turn* |
|------------------------|-----------------|----------------------|
| 2 - 30                 | Stainless Steel | 3                    |
| 15 - 75                | Red             | 9                    |
| 30 - 300               | Green           | 27                   |

\* approximate. Use gauge at valve outlet to set

### HYTROL MAIN VALVE



X58C  
2.



X46A  
A.



CK2  
B.



CV  
C.



CDC-1  
D.



X43  
Y.



\*SUGGESTED REPAIR PARTS

For a more detailed IOM Manual go to [www.cla-val.com](http://www.cla-val.com) or contact a Cla-Val Regional Sales Office.

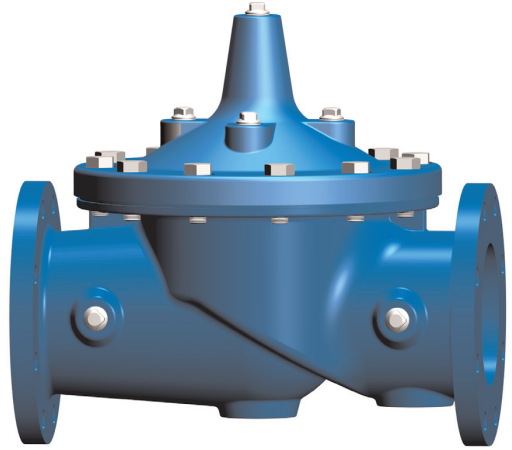


—MODEL— **100-01**  
**Hytrol Valve**

**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.

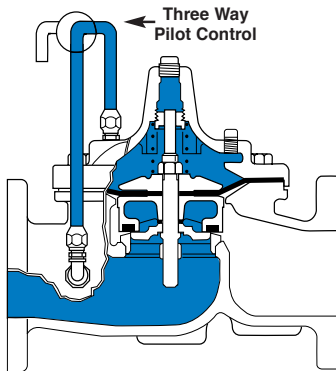


**Installation**

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,

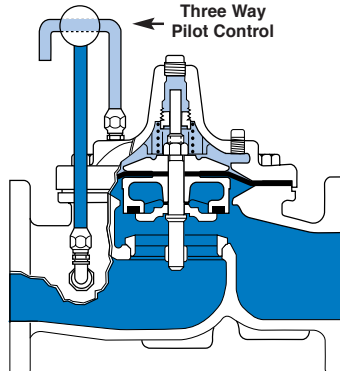
- other positions are acceptable. Due to size and weight of the cover and internal components of 8 inch and larger valves, installation with the cover UP is advisable. This makes internal parts readily accessible for periodic inspection.
6. If a pilot control system is installed on the 100-01 Hytrol 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**



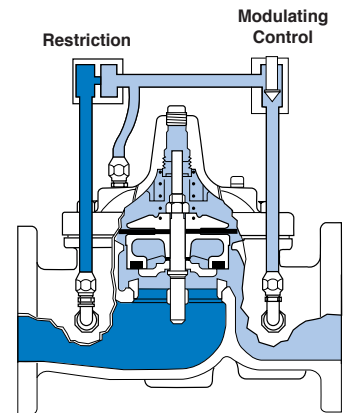
**Tight Closing Operation**

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.



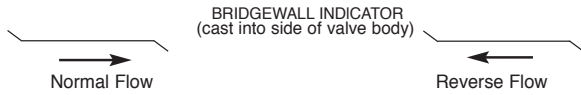
**Modulating Action**

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

**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  |
| 36                  | 42.00        | 159.0  |

## Freedom of Movement Check (#2)

4. Determining the Hytrol Valve's freedom of movement can be done by one of two methods.
5. For most valves it can be done after completing Diaphragm Check (Steps 1, 2, and 3). **SEE CAUTION.** At the end of step 3 the valve should be fully open.
6. If the valve has a Cla-Val 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                  | 600 | 6.5             | 165 |
| 36                  | 900 | 8.5             | 216 |

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

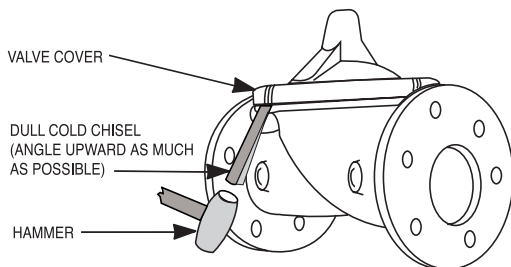
The Cla-Val Co. Model 100-01 Hytrol Valve requires no lubrication or packing and a minimum of maintenance. However, a periodic inspection schedule should be established to determine how the operating conditions of the system are affecting the valve. The effect of these actions must be determined by inspection.

### 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"             | 2"                |
| 36"             | 2"                |

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

#### VALVE STEM THREAD SIZE

| Valve Size      | 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"             | 3/4 – 16                   |
| 36"             | 3/4 – 16                   |

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

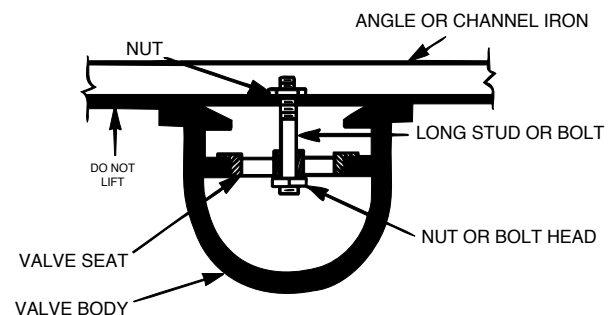
The use of a pipe wrench or a vise without soft brass jaws scars the fine finish on the stem. No amount of careful dressing can restore the stem to its original condition. Damage to the finish of the stem can cause the stem to bind in the bearings and the valve will not open or close.

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

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

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

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



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## 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.

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## 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.

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## 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.)

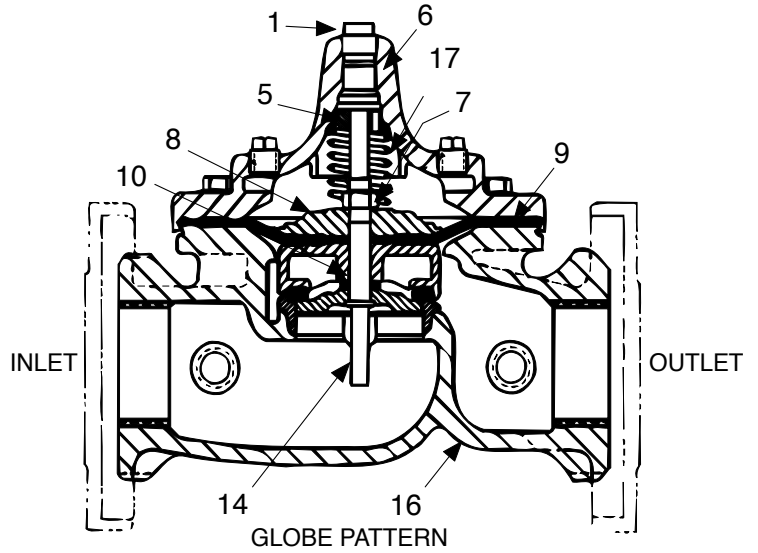
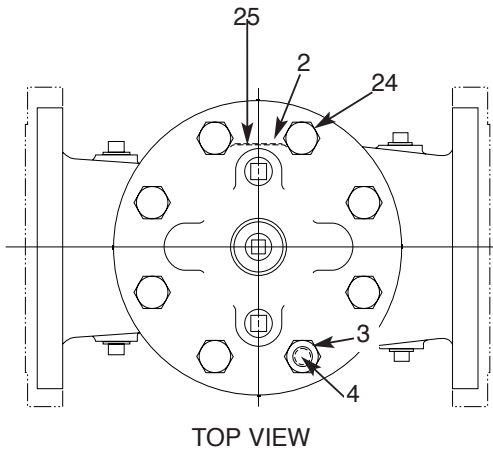
Due to the weight of the diaphragm assembly this procedure is not possible on valves 8" and larger. On these valves, the same determination can be made by carefully introducing a low pressure-less than five psi) into the valve body with the cover vented. **SEE CAUTION.** Looking in cover center hole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

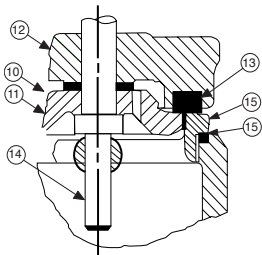
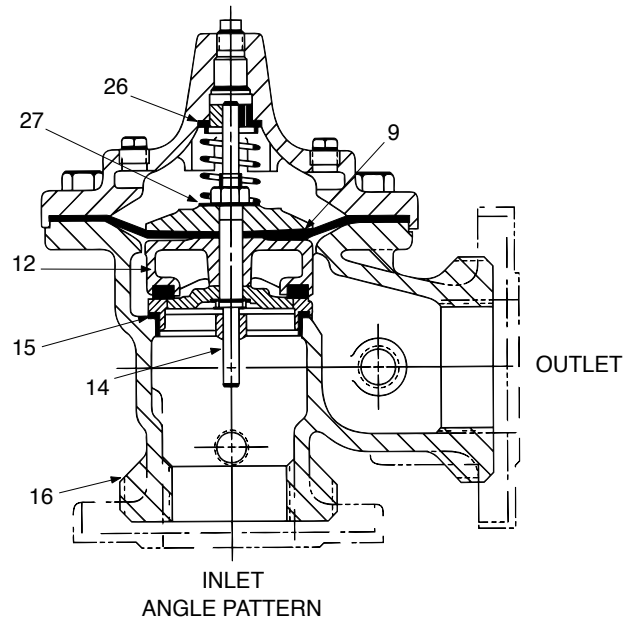
4. Remove pressure, then re-install the pilot system and tubing exactly as it was prior to removal. **Bleed air from all high points.**

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

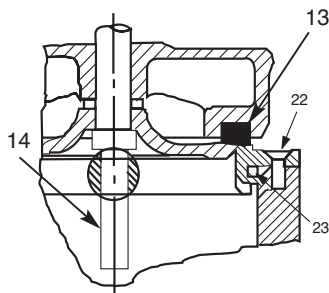


### PARTS LIST

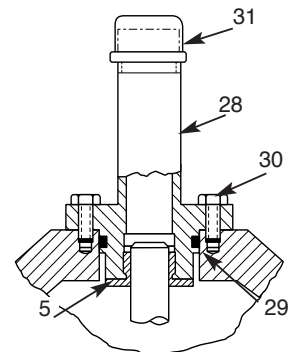
| Item | Description                                    |
|------|--|
| 1.   | Pipe Plug                                      |
| 2.   | Drive Screws (for nameplate)                   |
| 3.   | Hex Nut (8" and larger)                        |
| 4.   | Stud (8" and larger)                           |
| 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)                            |



1 1/4" - 6" SEAT DETAIL



8" - 24" SEAT DETAIL



16" COVER DETAIL

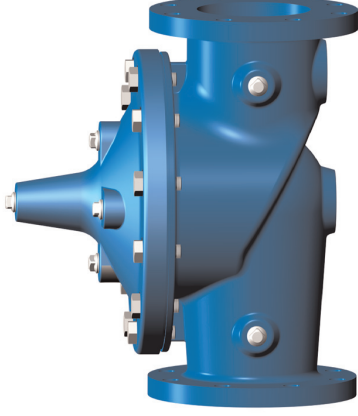


# — MODEL — 100-01 Hytrol Valve Service Data

## Description 100-01 Hytrol Valve

The Cla-Val Model 100-01 Hytrol Valve is a main valve for Cla-Val Automatic Control Valves. It is a hydraulically operated, diaphragm-actuated, globe or angle pattern valve.

This valve consists of three major components; body, diaphragm assembly, and cover. The diaphragm assembly is the only moving part. The diaphragm assembly uses a diaphragm of nylon fabric bonded with synthetic rubber. A synthetic rubber disc, contained on three and one half sides by a disc retainer and disc guide, forms a seal with the valve seat when pressure is applied above the diaphragm. The diaphragm assembly forms a sealed chamber in the upper portion of the valve, separating operating pressure from line pressure.



## Description 100-20 600 Series Hytrol Valve

The Cla-Val Model 100-20 Hytrol Valve (600 Series main valve) have only one part -the body- that is different from standard 100 Series Cla-Val main valve parts. The remaining parts of the 600 series main valve are standard Cla-Val main valve parts. All service and maintenance information for the standard 100 Series main valves also apply to the 600 series main valves.

The most important thing to remember when ordering main valve repair kits and replacement parts, except for the body, all other parts are going to be for a smaller size main valve. Cla-Val identifies main valve parts with the flange size of the standard 100 Series main valve. Refer to the "Main Valve Sizes" chart below.

## HYTROL Service Data

| HYTROL SIZE |     | Stem Travel |     | Cover Capacity |        | Valve Stem Thread | Center Plug NPT | Cover Nut or Bolt |         | Cover Lifting Holes UNC | Cover Plug |        | Cover Torque |          | Stem Nut Torque |               |       |      |     |
|-------------|-----|-------------|-----|----------------|--------|-------------------|-----------------|-------------------|---------|-------------------------|------------|--------|--------------|----------|-----------------|---------------|-------|------|-----|
| inches      | mm  | inches      | mm  | Gallons        | Liters | UNF-Internal      |                 | Thread (Bolt)     | Socket  | Qty                     | Thread     | Socket | ft. Lbs.     | in. Lbs. | Thread          | Socket (Long) |       |      |     |
| 1"          | 25  | 0.3         | 8   | 0.020          | 0.07   | 10-32             | 1/4"            | 1/4" - 20 (B)     | 7/16"   | 8                       |            |        | 4            | 48       | 3/8" - 24       |               | Lubed | 4    | 6   |
| 1 1/4"      | 32  | 0.4         | 10  | 0.020          | 0.07   | 10-32             | 1/4"            | 5/16" - 18 (B)    | 1/2"    | 8                       |            |        | 8            | 96       | 7/16" 20        |               |       | 6    | 10  |
| 1 1/2"      | 40  | 0.4         | 10  | 0.020          | 0.07   | 10-32             | 1/4"            | 5/16" - 18 (B)    | 1/2"    | 8                       |            |        | 8            | 96       | 7/16" 20        |               |       | 6    | 10  |
| 2"          | 50  | 0.6         | 15  | 0.032          | 0.12   | 10-32             | 1/2"            | 3/8" - 16 (B)     | 9/16"   | 8                       | 3/8"       | 7/16"  | 12           |          | 1/2" - 20       | 3/4"          |       | 10   | 15  |
| 2 1/2"      | 65  | 0.7         | 18  | 0.043          | 0.16   | 10-32             | 1/2"            | 7/16" - 14 (B)    | 5/8"    | 8                       | 1/2"       | 9/16"  | 20           |          | 5/8" - 18       | 15/16"        |       | 21   | 30  |
| 3"          | 80  | 0.8         | 20  | 0.080          | 0.30   | 1/4 - 28          | 3/4"            | 1/2" - 13 (B)     | 3/4"    | 8                       | 1/2"       | 9/16"  | 30           |          | 5/8" - 18       | 15/16"        |       | 21   | 30  |
| 4"          | 100 | 1.1         | 23  | 0.169          | 0.64   | 3/8 - 24          | 1"              | 3/4" - 10 (B)     | 1 1/8"  | 12                      | 3/4"       | 5/8"   | 110          |          | 3/4" - 16       | 1 1/16"       |       | 40   | 60  |
| 6"          | 150 | 1.7         | 43  | 0.531          | 2.00   | 3/8 - 24          | 1 1/2"          | 3/4" - 10 (B)     | 1 1/8"  | 12                      | 3/4"       | 5/8"   | 110          |          | 7/8" - 14       | 1 5/16"       |       | 85   | 125 |
| 8"          | 200 | 2.3         | 58  | 1.26           | 4.80   | 3/8 - 24          | 1"              | 7/8" - 9          | 1 7/16  | 16                      | 1"         | 13/16" | 110          |          | 1 1/8" - 12     | 1 13/16"      |       | 125  | 185 |
| 10"         | 250 | 2.8         | 71  | 2.51           | 9.50   | 3/8 - 24          | 1 1/4"          | 1-1/8" - 7        | 1 13/16 | 20                      | 1"         | 13/16" | 160          |          | 1 1/2" - 12     | 1 7/8"        |       | 250  | 375 |
| 12"         | 300 | 3.4         | 86  | 4.0            | 15.10  | 3/8 - 24          | 1 1/2"          | 1-1/8" - 7        | 1 13/16 | 20                      | 1"         | 13/16" | 390          |          | 1 1/2" - 12     | 2 1/2"        |       | 270  | 400 |
| 14"         | 350 | 3.9         | 99  | 6.5            | 24.60  | 3/8 - 24          | 2"              | 1-1/4" - 7        | 2"      | 20                      | 1"         | 13/16" | 545          |          | 1 1/2" - 12     | 2 1/2"        |       | 280  | 420 |
| 16"         | 400 | 4.5         | 114 | 9.5            | 36.20  | 1/2 - 20          | 2"              | 1-1/4" - 7        | 2"      | 20                      | 1"         | 13/16" | 545          |          | 2" - 16         | 3"            |       | 500  | 750 |
| 24"         | 600 | 6.5         | 165 | 29.0           | 108.80 | 3/4 - 16 *        | 3/4"            | 1-1/2" - 12       | 2 3/8"  | 24                      | 1"         | 13/16" | 800          |          | 3" - 12         | Special       |       | 1350 | N/R |

Grade 5 Bolts  
"Heavy" Grade Nuts

Tighten cover nuts in a "star" cross-over pattern

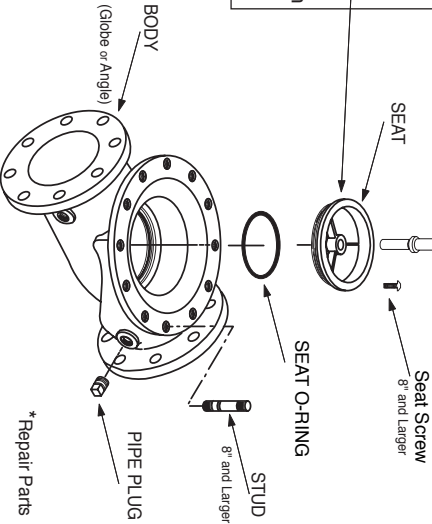
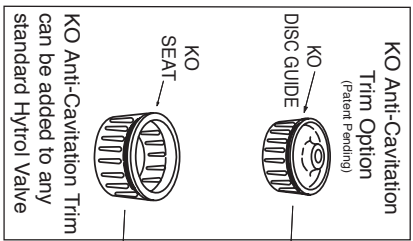
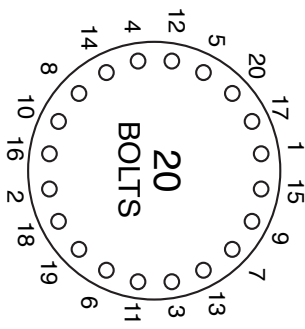
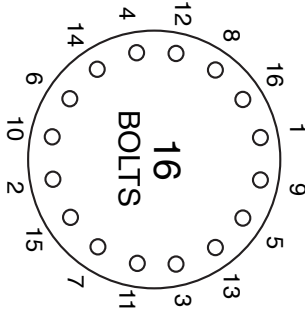
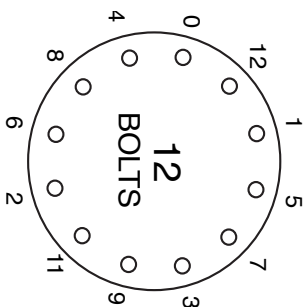
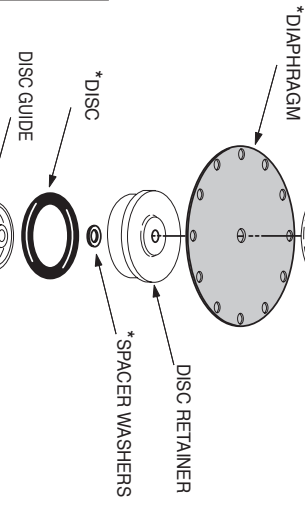
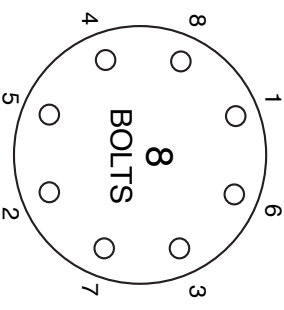
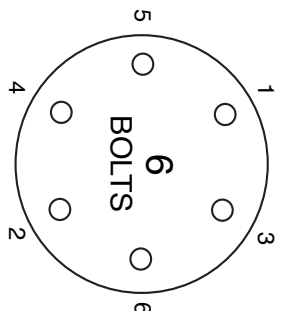
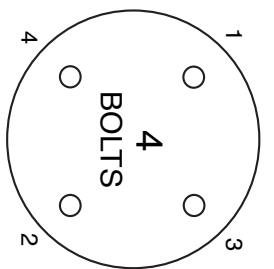
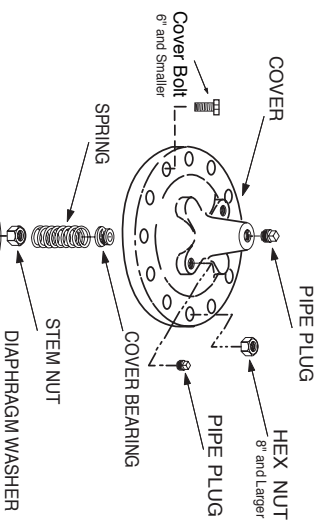
\*\*Must Use ONLY  
Cla-Val Supplied part

\* Adapter p/n 2594101E  
inside 1/4" - 28



## 100-01 Hytrol Main Valve Assembly

### BOLT/NUT TORQUING PROCEDURES ON VALVE COVERS



Follow this procedure when reassembling MAIN Valve:

1. Tightens bolts/nuts in a "Star" or "Cross-Over" Pattern following the numbers shown above to insure that cover seats evenly on the diaphragm material and body.
2. Torque the bolt/nuts in three stages:
  - A. To approximately 10% of final torque valve.
  - B. To approximately 75% of final torque valve.
  - C. To final required torque valve.
3. Valves that are to be tested to 375 PSI or higher should be retorqued after 24 hours.



— MODEL — **100-20**  
(Reduced Internal Port)

# 600 Series Hytrol Valve

## SERVICE AND MAINTENANCE OF 600 SERIES VALVES

The 600 series main valves have only one part -the body- that is different from standard 100 Series Cla-Val main valve parts. The remaining parts of the 600 series main valve are standard Cla-Val main valve parts. All service and maintenance information for the standard 100 Series main valves in this manual also apply to the 600 series main valves.

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

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

## UNDERSTANDING THE 600 SERIES VALVES

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

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

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

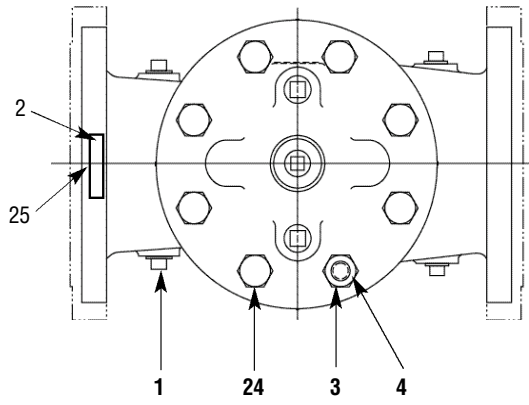
### Basic Main Valve Sizes Comparison

| Globe Pattern Valves |                     |                     |
|----------------------|---------------------|---------------------|
| Flange Size (inch)   | Seat Size           |                     |
|                      | 100-01 (100 Series) | 100-20 (600 Series) |
| 3                    | 3                   | 2                   |
| 4                    | 4                   | 3                   |
| 6                    | 6                   | 4                   |
| 8                    | 8                   | 6                   |
| 10                   | 10                  | 8                   |
| 12                   | 12                  | 10                  |
| 14                   | 14                  |                     |
| 16                   | 16                  | 12                  |
| 20                   |                     | 16                  |
| 24                   | 24                  | 16                  |
| Angle Pattern Valves |                     |                     |
| Flange Size (inch)   | Seat Size           |                     |
|                      | 100-01 (100 Series) | 100-20 (600 Series) |
| 4                    | 4                   | 3                   |
| 6                    | 6                   | 4                   |
| 8                    | 8                   | 6                   |

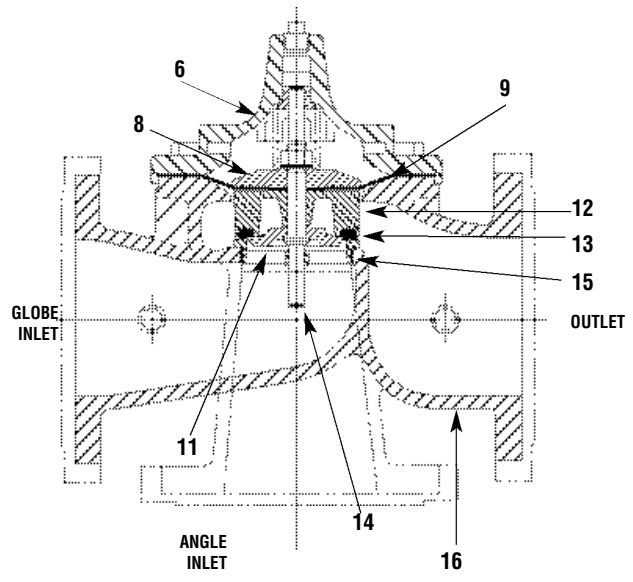
The 100-20 Hytrol is available only in ductile iron, 150 and 300 pressure class, and Bronze trim standard. Available extra cost main valve options include stainless steel trim, epoxy coating, Dura-Kleen stem, Delrin sleeved stem, and high temperature rubber parts. All four basic main valves have a 600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

### Cla-Val Main Valves

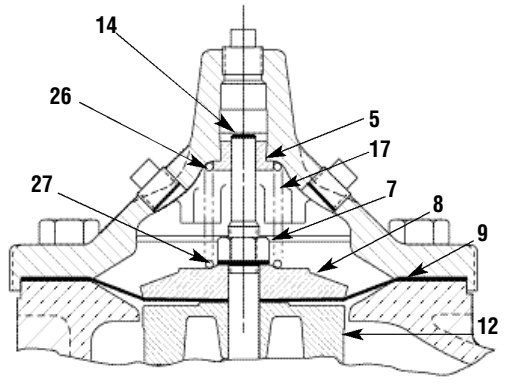
| Catalog Name | Catalog Number    |            |            |
|--------------|-------------------|------------|------------|
|              | Circa 1936        | 100-Series | 600 Series |
| Hytrol       | 100 (Angle =2100) | 100-01     | 100-20     |
| Powertrol    | 100P & 100PA      | 100-02     |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



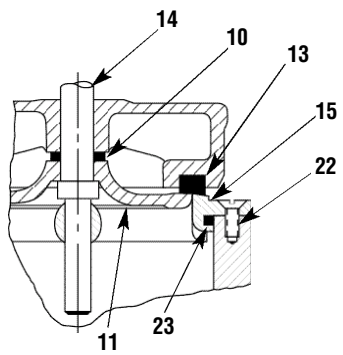
TOP VIEW



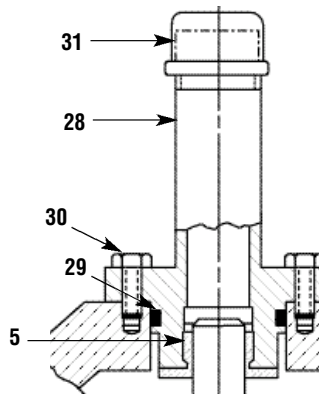
ANGLE INLET



3" - 6" COVER DETAIL



10" - 24" SEAT DETAIL



20" - 24" COVER DETAIL

PARTS LIST

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

WHEN ORDERING PARTS, BE SURE TO GIVE COMPLETE NAMEPLATE DATA, ITEM NUMBER AND DESCRIPTION.





NEWPORT BEACH, CALIFORNIA

CATALOG NO.  
X58C

DRAWING NO.  
48834

REV  
AN

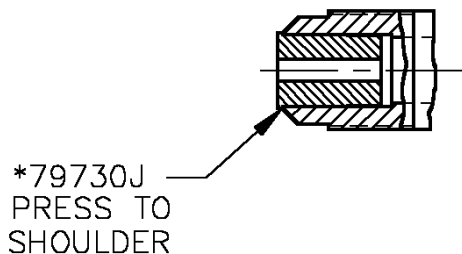
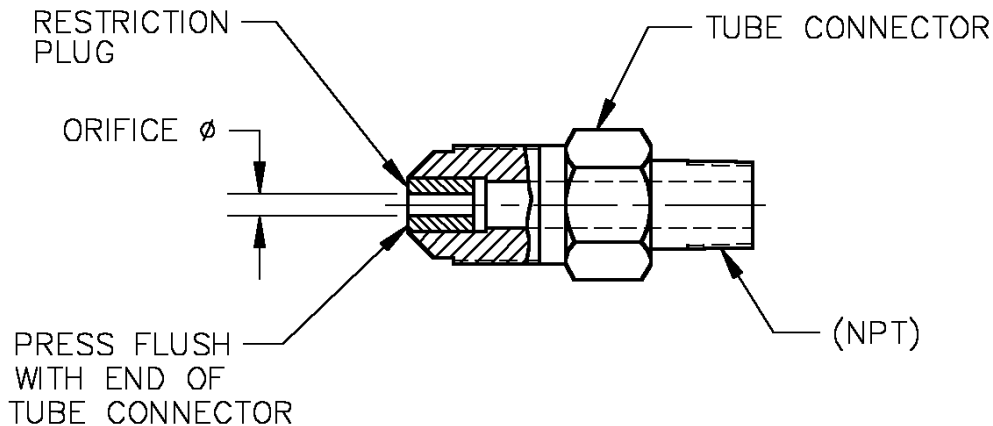
TYPE OF VALVE AND MAIN FEATURES

X58C RESTRICTION ASSEMBLIES

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

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

CAD REVISION RECORD - DO NOT REVISE MANUALLY  
LTR DESCRIPTION BY DATE  
A-AK 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.

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# Pressure Reducing Control



## DESCRIPTION

The Cla-Val Model CRD Pressure Reducing Control automatically reduces a higher inlet pressure to a lower outlet pressure. It is a direct acting, spring loaded, diaphragm type control that operates hydraulically or pneumatically. It may be used as a self-contained valve or as a pilot control for a Cla-Val main valve. It will hold a constant downstream pressure within very close pressure limits.

## OPERATION

The CRD Pressure Reducing Control is normally held open by the force of the compression spring above the diaphragm; and delivery pressure acts on the underside of the diaphragm. Flow through the valve responds to changes in downstream demand to maintain a pressure.

## INSTALLATION

The CRD 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 gage connection. A flow arrow is marked on the body casting.

## ADJUSTMENT PROCEDURE

The CRD 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.
3. When pressure adjustment is completed tighten jam nut on adjusting screw and replace protective cap.
4. When this control is used, as a pilot control on a Cla-Val main valve, the adjustment should be made under flowing conditions. The flow rate is not critical, but generally should be somewhat lower than normal in order to provide an inlet pressure several psi higher than the desired setting

*The approximate minimum flow rates given in the table are for the main valve on which the CRD is installed.*

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

| SYMPTOM                                     | PROBABLE CAUSE                   | REMEDY  |
|---|----------------------------------|---|
| Fails to open when deliver pressure lowers  | No spring compression            | Tighten adjusting screw                                   |
|   | Damaged spring                   | Disassemble and replace                                   |
|   | Spring guide (8) is not in place | Assemble properly   |
| Fails to close when delivery pressure rises | Yoke dragging on inlet nozzle    | Disassemble and reassemble properly (refer to Reassembly) |
|   | Spring compressed solid          | Back off adjusting screw                                  |
|   | Mechanical obstruction           | Disassemble and reassemble properly (refer to Reassembly) |
|   | Worn disc                        | Disassemble remove and replace disc retainer assembly     |
| Leakage from cover vent hole                | Yoke dragging on inlet nozzle    | Disassemble and reassemble properly (refer to Reassembly) |
|   | Damaged diaphragm                | Disassemble and replace                                   |
|   | Loose diaphragm nut              | Remove cover and tighten nut                              |

## 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 and 2-6.5 psi range onto plug (13) and fasten 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 diaphragm (12) diaphragm washer (11) and Belleville washer (20) on yoke. Screw on hex nut (10).
4. Hold the diaphragm so that the screw holes in the diaphragm and body align. Tighten diaphragm nut with a wrench. At the final tightening release the diaphragm and permit it to rotate 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 body screw holes ±1/8".

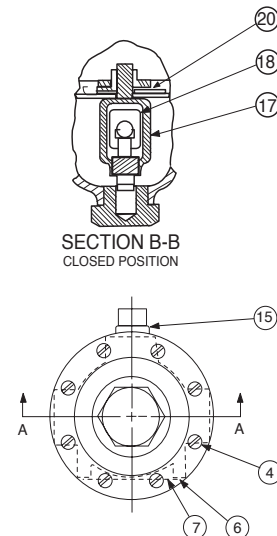
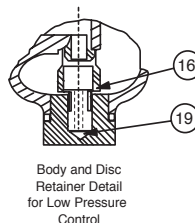
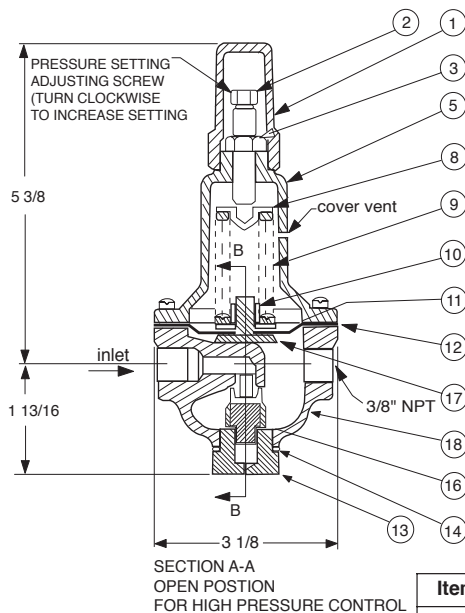
Repeat assembly procedure until diaphragm and yoke are properly aligned. There must be no contact between yoke and body nozzle during its normal movement. To simulate this movement hold body and diaphragm holes aligned. Move yoke to open and closed positions. There must be no evidence of contact or dragging.

5. Install spring (9) with spring guide (8).
6. Install cover (5), adjusting screw (2) and nut (3), then cap (1).



# CRD

## Pressure Reducing Control



### \*SUGGESTED REPAIR PARTS

| Size (inch)           | Stock Number | Adjustment Range |             |
|-----------------------|--------------|------------------|-------------|
|                       |              | psi              | Ft of Water |
| 3/8                   | 71943-07A    | 2 - 6.5          | 4.5 - 15    |
| 3/8                   | 71943-08B    | 2 - 30           | 4.5 - 69    |
| 3/8                   | 71943-03K    | 15 - 75          | 35 - 173    |
| 3/8                   | 20561901H    | 20 - 105         | 46 - 242    |
| 3/8                   | 71943-08J    | 30 - 300         | 69 - 692    |
| Factory Set Pressure  |              | PSI per Turn     |             |
| 2 - 6.5 set @ 3.5 psi |              | .61              |             |
| 2 - 30 set @ 10 psi   |              | 3.0              |             |
| 15 - 75 set @ 20 psi  |              | 9.0              |             |
| 20 - 105 set @ 60 psi |              | 12.0             |             |
| 30 - 300 set @ 60 psi |              | 27.0             |             |

\*Approximate-Final Adjustment should be with a pressure gauge and with flow.

### When ordering parts specify:

- All nameplate data
- Item Description
- Item number

| Item | Description                        | Material | Part Number | List Price |
|------|------------------------------------|----------|-------------|------------|
| 1    | Cap                                | PL       | 67628J      |            |
| 2    | Adjusting Screw                    | BRS      | 7188201D    |            |
| 3    | Jam Nut (3/8-16)                   | SS       | 6780106J    |            |
| 4*   | Machine Screw (Fil.Hd.) 8 Req'd    | 303      | 6757821B    |            |
| 5    | Cover                              | BRS      | C2544K      |            |
| 6    | Nameplate Screw                    | SS       | 67999D      |            |
| 7    | Nameplate (15-75 psi)              | BRS      | C0022001G   |            |
| 8    | Spring Guide                       | 302      | 71881H      |            |
| 9    | Spring (15-75 psi)                 | CHR/VAN  | 71884B      |            |
|      | Spring (2 - 6.5 psi)               | SS       | 82575C      |            |
|      | Spring (2 - 30 psi)                | SS       | 81594E      |            |
|      | Spring (20 - 105 psi)              |          | 20561901H   |            |
|      | Spring (30 - 300 psi)              | CHR/VAN  | 71885J      |            |
| 10   | Hex Nut                            | 303      | 71883D      |            |
| 11   | Diaphragm Washer                   | 302      | 71891G      |            |
| 12   | Diaphragm                          | NBR      | C6936D      |            |
| 13   | Plug, Body                         | BRS      | V5653A      |            |
| 14*  | Gasket                             | Fiber    | 40174F      |            |
| 15   | Plug                               | BRS      | 6766003F    |            |
| 16*  | Disc Retainer Assy. (15 - 75 psi)  | BZ/Rub   | C5256H      |            |
|      | Disc Retainer Assy. (2 - 6.5 psi)  | BZ/Rub   | C5255K      |            |
|      | Disc Retainer Assy. (2 - 30 psi)   | BZ/Rub   | C5255K      |            |
|      | Disc Retainer Assy. (20 - 105 psi) | BZ/Rub   | 20561901H   |            |
|      | Disc Retainer Assy. (30 - 300 psi) | BZ/Rub   | C5256H      |            |
| 17   | Yoke                               | VBZ      | V6951H      |            |
| 18   | Body & 1/4" Seat Assy              | BR/SS    | 8339702G    |            |
| 19*  | Bucking Spring (2 - 30 psi)        | 302      | V0558G      |            |
|      | Bucking Spring (2 - 6.5 psi)       | 302      | V0558G      |            |
| 20   | Belleville Washer                  | STL      | 7055007E    |            |
|      | Repair Kit (No Bucking Spring)     |          | 9170003K    |            |
|      | Repair Kit (with Bucking Spring)   |          | 9170001D    |            |



# Regulator Spring Color Coding Chart

Dwg#47117

\*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          | 0-7       | .75            |
|             |  |                 |                | CRL-5A         | 0-7       | .75            |
| .018 DIA.   | 82575C   | --              | S.S.           | CRD            | 1.9-6.5   | .61            |
|             |  |                 |                | CRD-10A        | 1.9-6.5   | .49            |
| .116 DIA.   | 81594E   | --              | S.S.           | CRD            | 2-30      | 3.0            |
|             |  |                 |                | CRD-10A        | 2-30      | 2.4            |
| .120 DIA.   | V5654J   | GREEN           | CHR VAN        | CRL-5A         | 5-25      | 4.0            |
|             |  |                 |                | CRD            | 10-40     | 4.0            |
| .162 DIA.   | 32447F   | NATURAL         | S.S.           | CDB-7          | 10-60     | 12.0           |
|             |  |                 |                | CRL-5A         | 10-60     | 12.0           |
|             |  |                 |                | CRL-13         | 10-60     | 12.0           |
| .162 DIA.   | V5695B   | YELLOW          | MUSIC WIRE     | CDB-7          | 20-80     | 14.5           |
|             |  |                 |                | CRL-5A         | 20-80     | 14.5           |
|             |  |                 |                | CRL-13         | 20-80     | 14.5           |
| .207 DIA.   | C1124B   | CAD PLT         | MUSIC WIRE     | CDB-7          | 50-150    | 29.5           |
|             |  |                 |                | CRL-13         | 50-150    | 29.5           |
|             |  |                 |                | CRL-5A         | 50-150    | 29.5           |
| .225 DIA.   | V6515A   | RED             | MUSIC WIRE     | CDB-7          | 65-180    | 44.0           |
|             |  |                 |                | CRL-13         | 65-180    | 44.0           |
|             |  |                 |                | CRL-5A         | 65-180    | 44.0           |
| .115 X .218 | 71884B   | RED             | CHR VAN        | CRL            | 0-75      | 8.5            |
|             |  |                 |                | CRD            | 15-75     | 9.0            |
|             |  |                 |                | CRD-10A        | 15-75     | 7.2            |
| .118 X .225 | 71886J   | GREEN           | CHR VAN        | CRL            | 20-200    | 28.0           |
|             |  |                 |                | CRD            | 30-300    | 27.0           |
|             |  |                 |                | CRD-10A        | 30-300    | 22.4           |
| .225 X .295 | 1630201A   | CAD PLT         | CHR VAN        | CRL            | 100-300   | 18.00          |
|             |  |                 |                | CRL-5A         | 100-300   | 18.00          |
| .440 X .219 | 48211H   | CAD PLT         | STEEL          | CRA-18         | 200-450   | 17.0           |
|             |  |                 |                | CRD-22         | 200-450   | 17.0           |
|             |  |                 |                | CRL-4A         | 100-450   | 17.0           |
| .187        | 20561901H  | BLACK           | STEEL          | CRD            | 20-105    | 12.0           |
| WIRE SIZE   | SPRING NUMBER  | COLOR           | WIRE MATERIAL  | CATALOG NUMBER | PSI RANGE | *FEET PER TURN |
| .080 DIA.   | C0492D   | BLUE            | S.S.           | CRA            | 4.5-15    | .82            |
|             |  |                 |                | CRD-2          | 4.5-15    | .82            |
| .375 DIA.   | 87719B<br>1 SPRING<br>2 SPRING<br>3 SPRING<br>4 SPRING<br>5 SPRING   | EPOXY<br>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 DIA.   | V5097A   | --              | 302SS          | CVC            | 1-17      | .7             |
| .375 DIA.   | 2933502H<br>1 SPRING<br>2 SPRING<br>3 SPRING<br>4 SPRING<br>5 SPRING | EPOXY<br>COATED | CHROME SILICON | CDS-6          | 5-40      | .75            |
|             |  |                 |                |                | 30-80     | 1.50           |
|             |  |                 |                |                | 70-120    | 2.20           |
|             |  |                 |                |                | 110-120   | 3.00           |
|             |  |                 |                |                | 150-200   | 3.70           |

THE FOLLOWING CONTROL & SPRING P/N#S WERE REMOVED, 32656B, 31554K, 44591G, V65695B, & V5695B.  
ADDED CRL-13, CRL-5A, CRA, CRA-10A, CHANGED SPRING RANGES TO MATCH CURRENT CONTROLS.

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— MODEL — **X46**

# Flow Clean Strainer

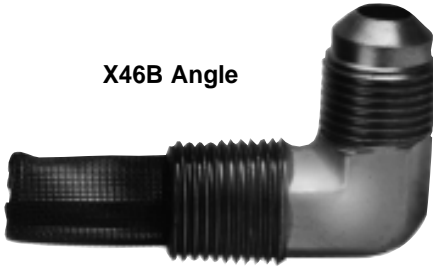


**X46A Straight**

- Self Scrubbing Cleaning Action
- Straight Type or Angle Type

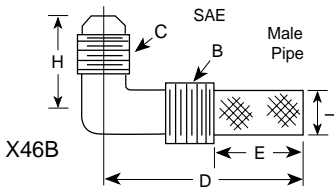
The Cla-Val Model X46 Strainer is designed to prevent passage of foreign particles larger than .015". It is especially effective against such contaminant as algae, mud, scale, wood pulp, moss, and root fibers. There is a model for every Cla-Val. valve.

**X46B Angle**

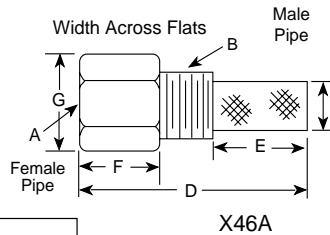


The X46 Flow Clean strainer operates on a velocity principle utilizing the circular "air foil" section to make it self cleaning. Impingement of particles is on the "leading edge" only. The low pressure area on the downstream side of the screen prevents foreign particles from clogging the screen. There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

## Dimensions (In Inches)



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



| X46A Straight Type A (In Inches) |         |       |       |       |       |     |
|----------------------------------|---------|-------|-------|-------|-------|-----|
| 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).



**CLA-VAL CO.**

NEWPORT BEACH, CALIFORNIA

CATALOG NO.

DRAWING NO.

67783

REV

AW

TYPE OF VALVE AND MAIN FEATURES

CK2 COCK/BALL VALVE

DESIGN

DRAWN MGR

4-02-80

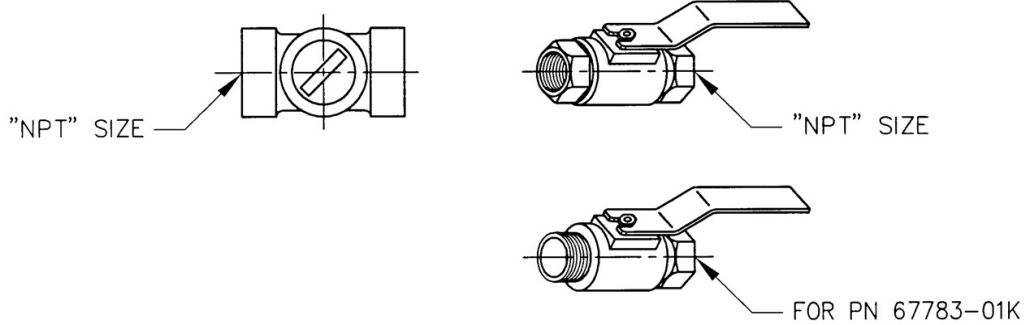
CHK'D KD

4-03-80

APVD CH

4-07-80

SCALE: NONE



CLA-VAL PART NO. AND MATERIAL

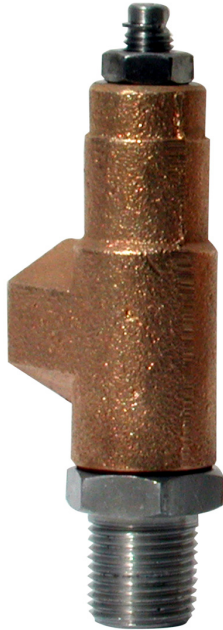
| BRONZE WITH HANDLE | STEEL WITH HANDLE | IRON WITH HANDLE | 316 SST WITH HANDLE | 316 SST W/ LOCKING HANDLE | BRONZE WITH HANDLE | MONEL WITH HANDLE | SIZE "NPT" |
|--------------------|-------------------|------------------|---------------------|---------------------------|--------------------|-------------------|------------|
| 67783-01K*         | -09C              | -17F             | -25J SUPSD BY-26G   |                           | -41F SUPSD BY-01K  |                   | 1/8"       |
| -02H               | -10A              | -18D             | -26G                | -51E SUPSD BY-26G<br>-52C | -42D SUPSD BY-02H  | -55F              | 1/4"       |
| -03F *             | -11J              | -19B             | -27E                | -46E SUPSD BY-27E<br>-53A | -45G<br>-57B **    | -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  | -56D              | 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).

\*\* HAMMOND VALVE 8501 ONLY.

04-07-03  
 AK  
 07-29-03  
 AK  
 REMOVED COLUMN "MONEL W/ LOCKING HANDLE"; RELOCATED PN 67783-56D;  
 ADDED VENDOR INFO FOR PN 67783-56D ON SHEET 2 (ECO 19327)  
 AV  
 AW  
 ADDED PN 67783-57B ON SHEET 1 (ECO 19484)  
 CAD REVISION RECORD - DO NOT REVISE MANUALLY  
 LTR  
 A-AT SEE REVISION FILE  
 AU  
 ADDED PN 67783-56D (ECO 19284)  
 DESCRIPTION  
 BY  
 DATE  
 AK  
 01-31-03

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— 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 scriber, 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**

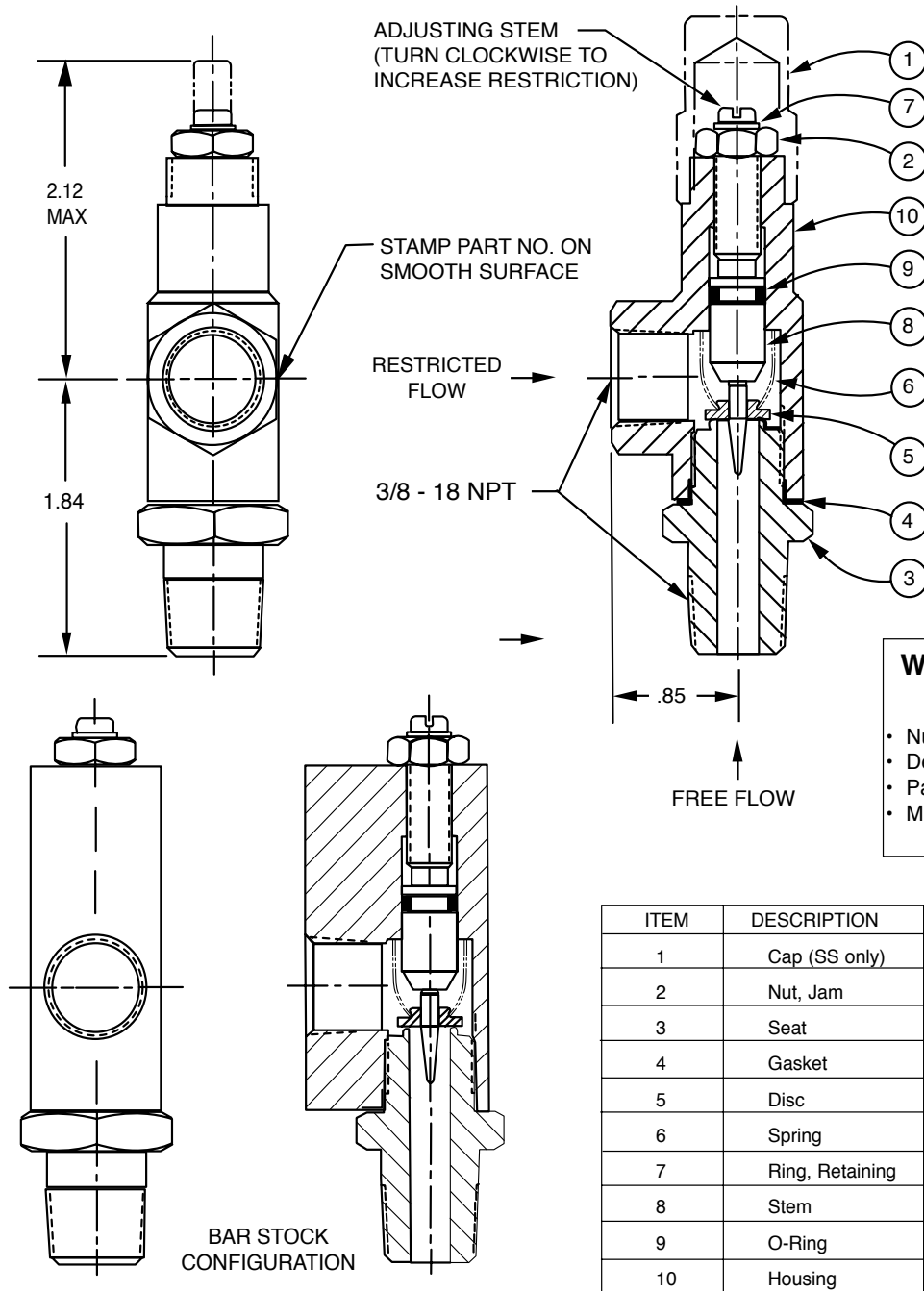
No testing of the flow Control is required prior to reassembly to the pilot control system on Cla-Val Main Valve.





# CV

## 3/8" Flow Control

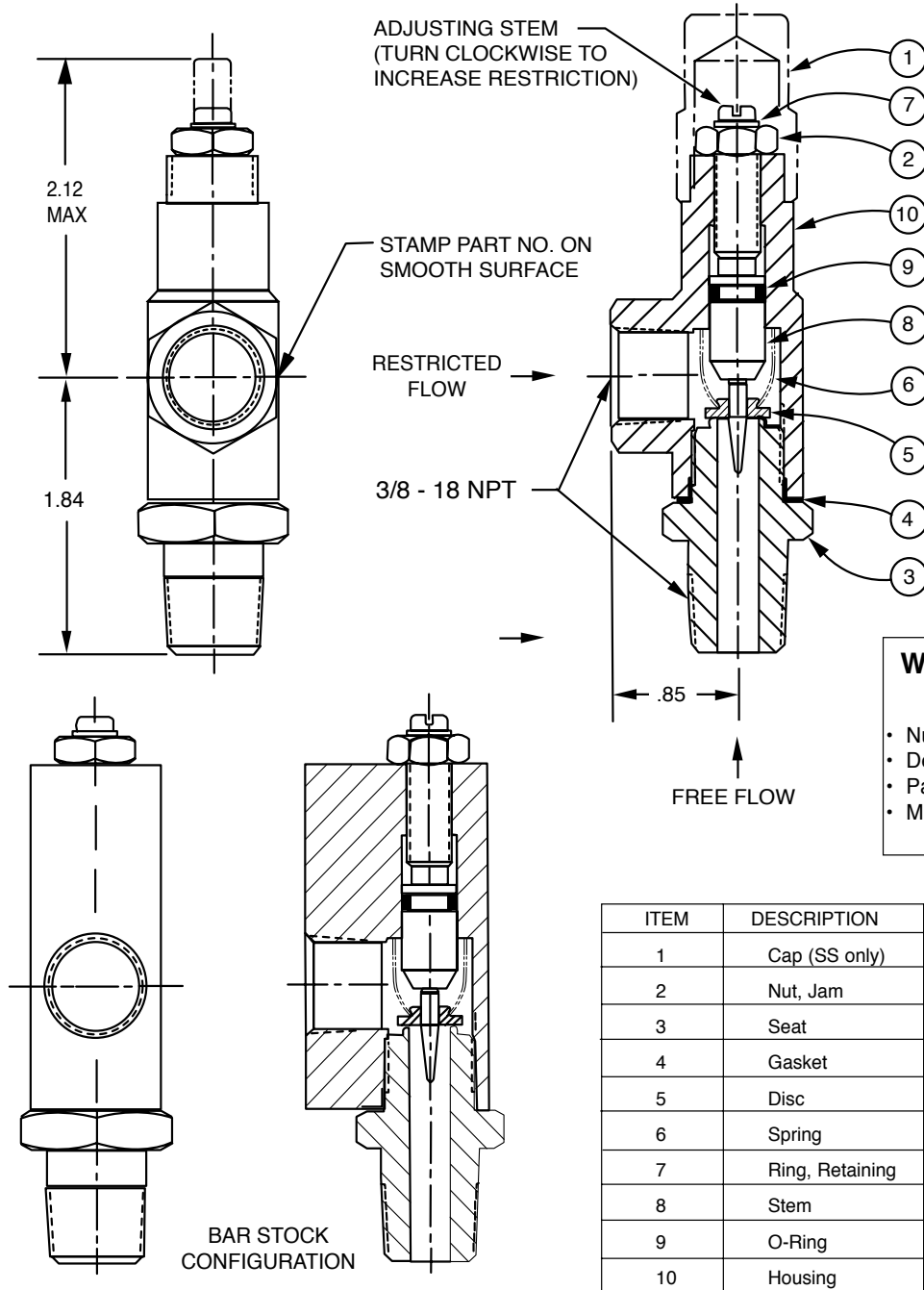






# CV

## 3/8" Flow Control





# CDC-1

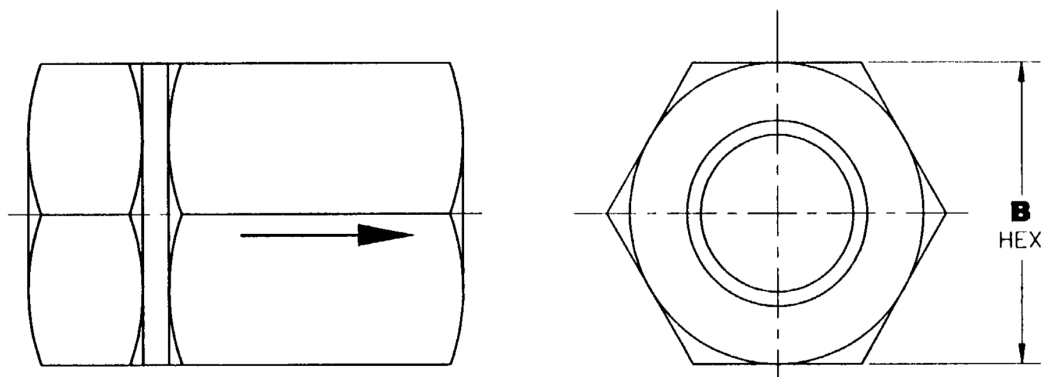
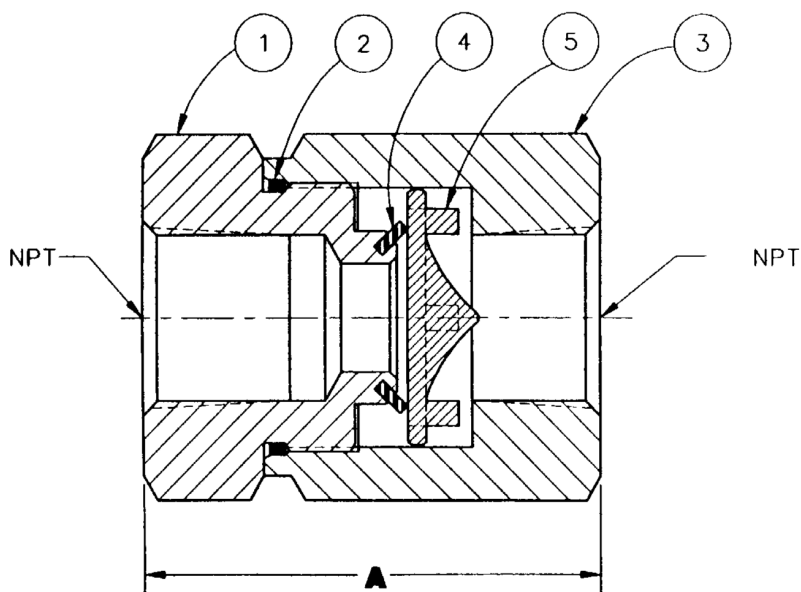
## Check Valve

| ITEM | DESCRIPTION      |
|------|------------------|
| 1    | Retainer, Seal   |
| 2    | O-Ring           |
| 3    | Retainer, Valve  |
| 4    | Seal, Valve Ring |
| 5    | Plate Valve      |

Available only in replacement assembly.

| SIZE (NPT) | STOCK NUMBER | A (inch) | B HEX (Inch) |
|------------|--------------|----------|--------------|
| 3/8        | 9834501A     | 2.06     | 1.06         |
| 1/2        | 9834502J     | 2.12     | 1.38         |

Material: Bronze





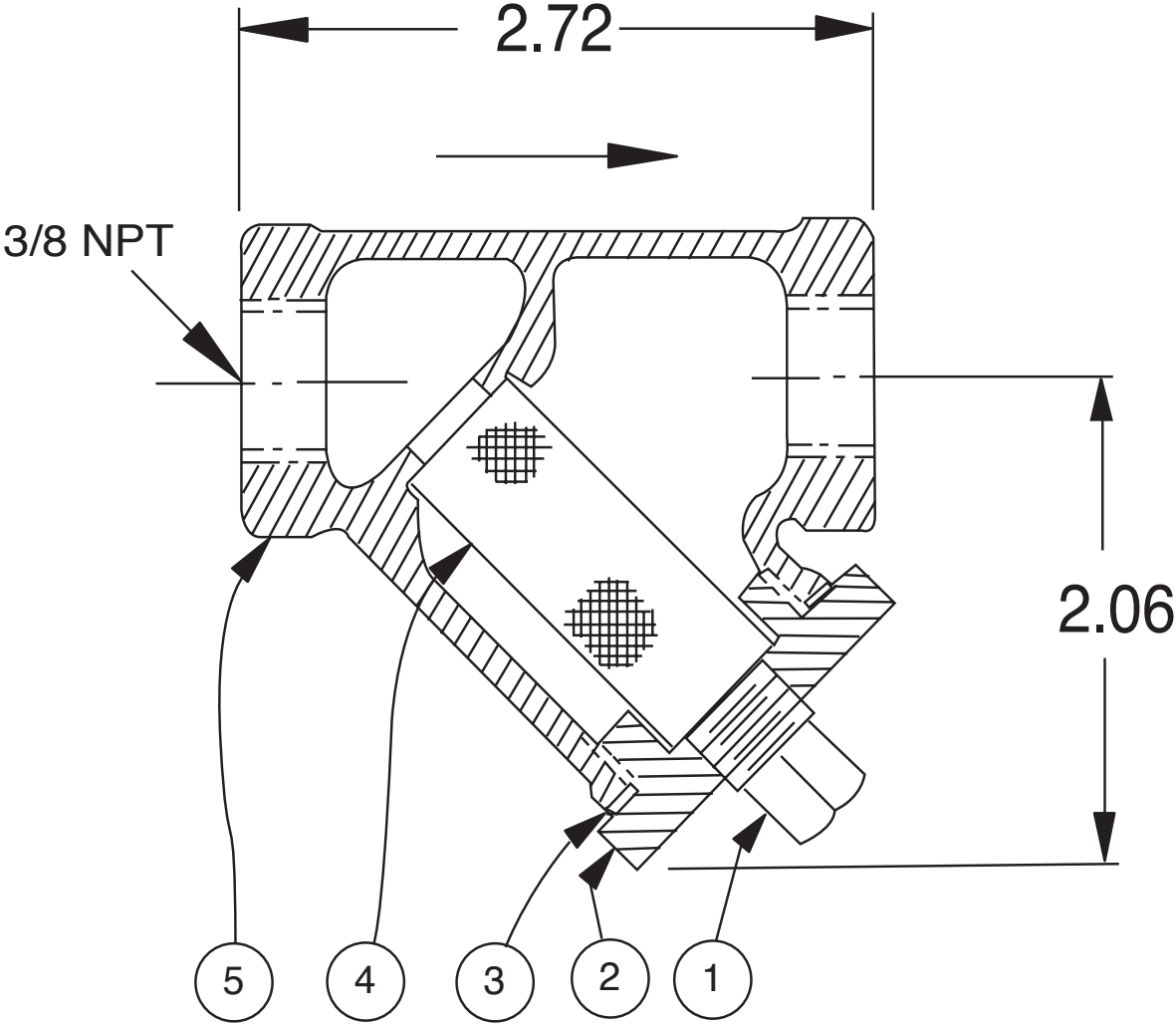
# X43 Strainer

| 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.

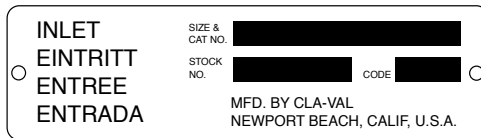


### Proper Identification

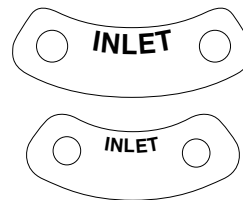
For ordering repair kits, replacement parts, or for inquiries concerning valve operation, it is important to properly identify Cla-Val products already in service by including all nameplate data with your inquiry. Pertinent product data includes valve function, size, material, pressure rating, end details,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

### Identification Plates

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



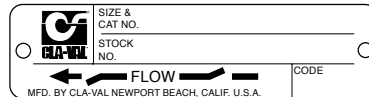
This brass plate appears on valves sized 2 1/2" and larger and is located on the top of the inlet flange.



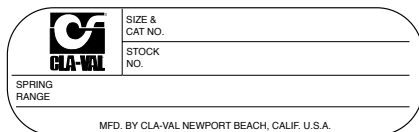
These two brass plates appear on 3/8", 1/2", and 3/4" size valves and are located on the valve cover.



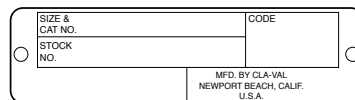
This brass plate appears on altitude valves only and is found on top of the outlet flange.



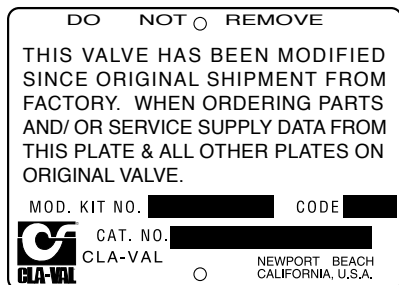
These two brass plates appear on threaded valves 1" through 3" size or flanged valves 1" through 2". It is located on only one side of the valve body.



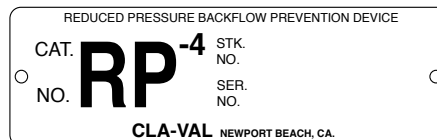
This tag is affixed to the cover of the pilot control valve. The adjustment range appears in the spring range section.



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

## HOW TO ORDER

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

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

## SPECIFY WHEN ORDERING

- Model Number
- Globe or Angle Pattern
- Adjustment Range (As Applicable)
- Valve Size
- Threaded 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 that develop in the service for which they are designed, provided the products are installed and used in accordance with all applicable instructions and limitations issued by Cla-Val.

We will repair or replace defective material, free of charge, that is returned to our factory, transportation charges prepaid, if upon inspection, the material is found to have been defective at time of original shipment. This warranty is expressly conditioned on the purchaser's providing written notification to Cla-Val immediate upon discovery of the defect.

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

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

## DISCLAIMER OF WARRANTIES AND LIMITATIONS OF LIABILITY

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



E-Product I.D. (R-5/05)

## CLA-VAL

PO Box 1325 Newport Beach CA 92659-0325  
Phone: 949-722-4800 • Fax: 949-548-5441

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Fax: 905-563-4040

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Lausanne, Switzerland  
Phone: 41-21-643-15-55  
Fax: 41-21-643-15-50

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Represented By:



— 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