
CLA-VAL

AUTOMATIC CONTROL VALVES

350-07/3650-07

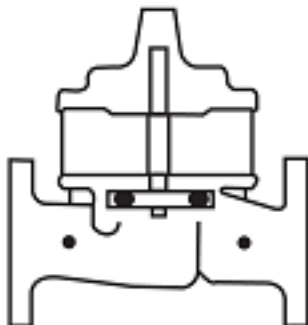
Place this manual with personnel responsible
for maintenance of this valve



Installation



Operation



Maintenance





Recommended Inspections

Cla-Val recommends that an inspection be performed on our products annually. The inspection should include both a visual and functional test of the main valve/component and the pilot system. The inspection ensures that no damage or premature wear occurred due to velocity, pressure, or foreign matter within the fluid that may have exceeded the valve's design. Please consult the maintenance manual for specific information on the model. Manuals are available for download at Cla-Val.com, as well as contact information for a company representative.

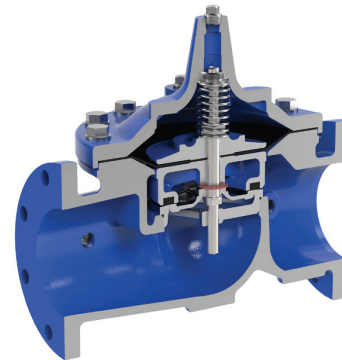
Accurate record-keeping is a best practice for any preventative maintenance program, and Cla-Val strongly recommends this action through an asset management program. Cla-Val provides a free asset management tool, Link2Valves [Link2Valves - Cla-Val \(cla-val.com\)](http://Link2Valves - Cla-Val (cla-val.com)), to assist in preventative maintenance record-keeping and scheduling.



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.

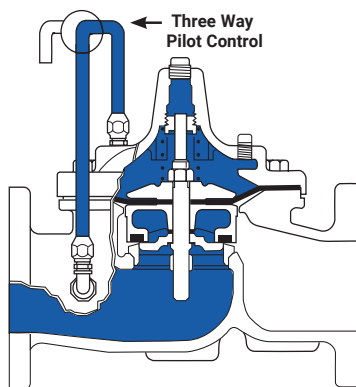


Installation

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

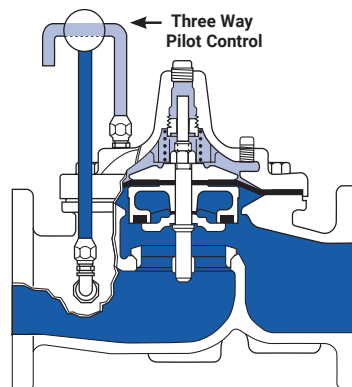
6. Caution must be taken in the installation of this valve to insure that galvanic and/or electrolytic action does not take place. The proper use of dielectric fittings and gaskets are required in all systems using dissimilar metals.
7. If a pilot control system is installed on the Model 100-01 Hytrol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

Principles of Operation



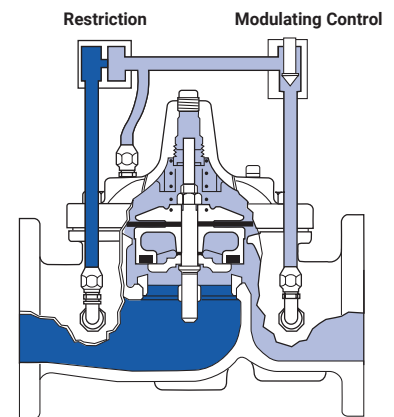
Tight Closing Operation

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



Full Open Operation

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

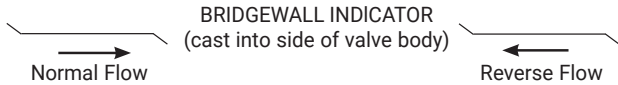


Modulating Action

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

Flow Direction

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



Recommended Tools

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

Troubleshooting

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

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

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

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

Three Checks

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

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

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

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

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



Three Checks (cont.)

DIAPHRAGM CHECK (#1)

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

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

FREEDOM OF MOVEMENT CHECK (#2)

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

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

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

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

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

TIGHT SEALING CHECK (#3)

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



Maintenance

PREVENTATIVE MAINTENANCE

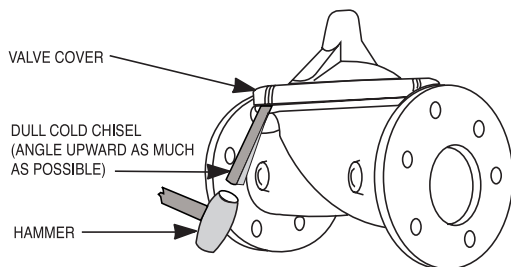
The Cla-Val Model 100-01 Hytrol Valve requires no lubrication or packing and a minimum of maintenance. However, a periodic inspection schedule should be established to determine how the operating conditions of the system are affecting the valve. The effect of these actions must be determined by inspection.

DISASSEMBLY

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

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

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



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

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

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

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

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

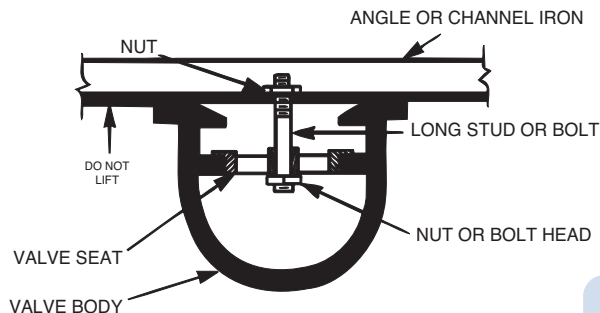
The use of a pipe wrench or a vise without soft brass jaws scars the fine finish on the stem. No amount of careful dressing can restore the stem to its original condition. Damage to the finish of the stem can cause the stem to bind in the bearings and the valve will not open or close.

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

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

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

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



Lime Deposits

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

Inspection of Parts

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

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

Reassembly

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

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

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

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

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

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

Test Procedure After Valve Assembly

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

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

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

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

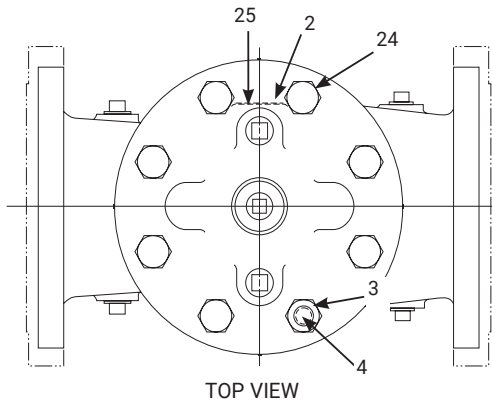
2. To check the valve for drip-tight closure, a line should be connected from the inlet to the cover, and pressure applied at the inlet of the valve. If properly assembled, the valve should hold tight with as low as ten PSI at the inlet. (See "Tight Sealing Check" section.)

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

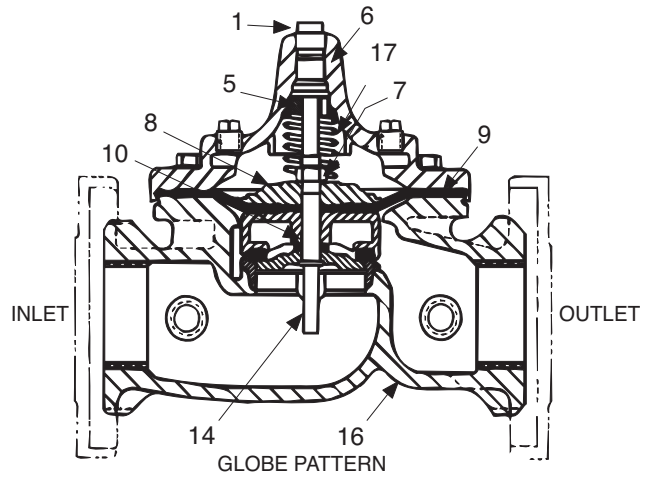
4. Remove pressure, then re-install the pilot system and tubing exactly as it was prior to removal. **Bleed air from all high points.**

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

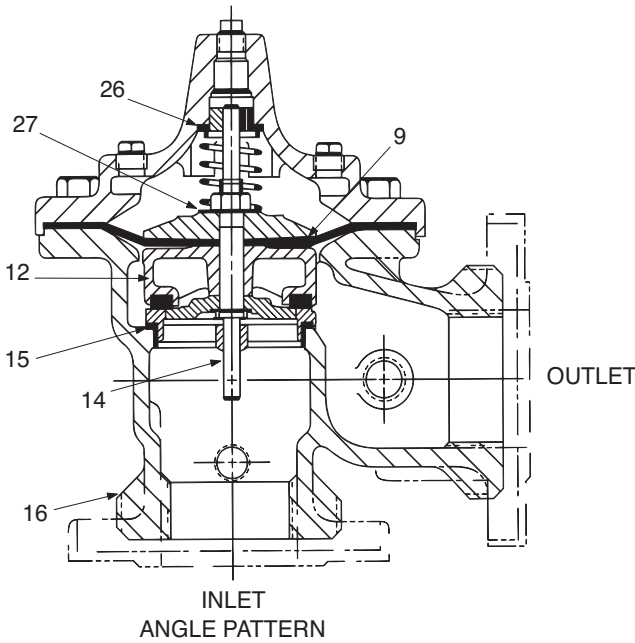




TOP VIEW

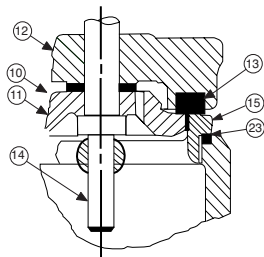


GLOBE PATTERN

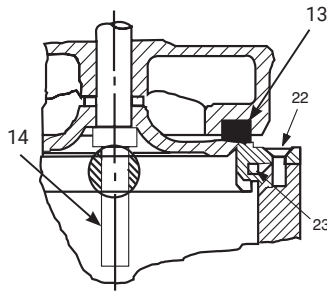


INLET
ANGLE PATTERN

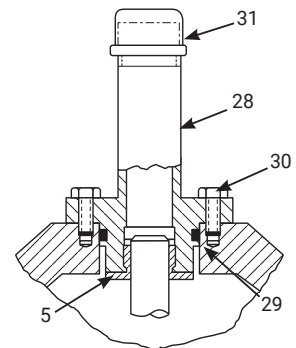
| Item No. | Description |
|----------|--|
| 1 | Pipe Plug |
| 2 | Drive Screws (for nameplate) |
| 3 | Hex Nut (8" and larger) |
| 4 | Stud (8" and larger) |
| 5 | Cover Bearing |
| 6 | Cover |
| 7 | Stem Nut |
| 8 | Diaphragm Washer |
| 9 | Diaphragm |
| 10 | Spacer Washers |
| 11 | Disc Guide |
|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



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

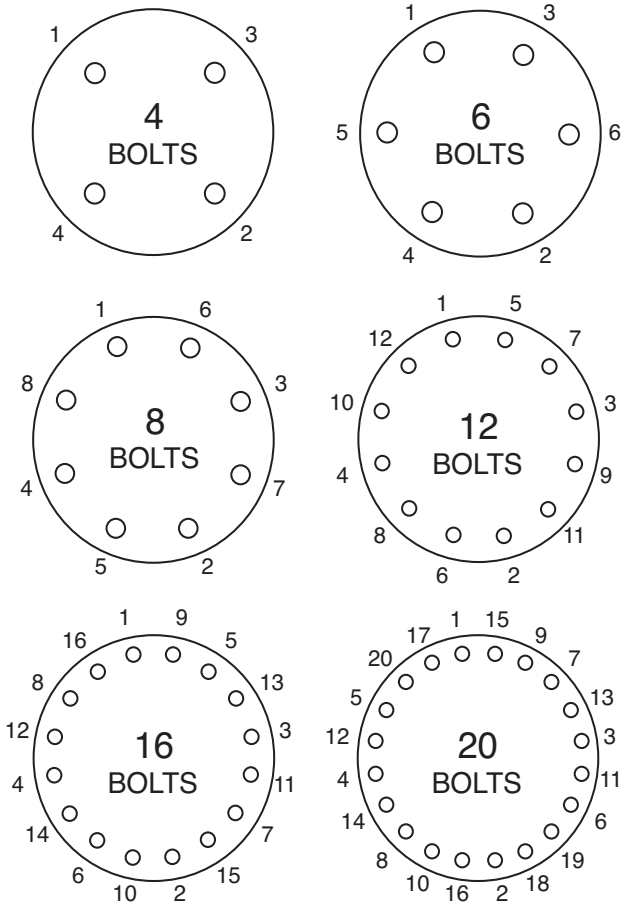
| Hytrol Service Data | | | | | | | | | | | | | | | | | | | |
|---------------------|-----|------------|------------------|-------------|-----|-----------------------------|--------|------------------|----------------------------------|---------|-----|-----------------------------------|---------|---------------------|----------------------------|-------------------------|---------------|-----------------------------------|----|
| Hytrol Size | | | | Stem Travel | | Cover Capacity Displacement | | Cover Center NPT | Cover Nut or Bolt ⁽¹⁾ | | | | | Cover Lifting Holes | Valve Stem Internal Thread | Stem Nut ⁽³⁾ | | | |
| 100-01 | | 100-20 | | | | | | | Thread | Socket | Qty | Torque, Lubricated ⁽²⁾ | | | | Thread | Socket (Long) | Torque, Lubricated ⁽²⁾ | |
| IN | MM | IN | MM | IN | MM | Gallons | Liters | | | | | FT. LBS | IN. LBS | | | FT. LBS | IN. LBS | | |
| 1 | 25 | — | — | 0.24 | 6 | 0.02 | — | 1/4 | 1/4 - 20 | 7/16 | 8 | — | 80 | — | — | 3/8 - 24 | 9/16 | — | 80 |
| 1 1/4 | 32 | — | — | 0.49 | 12 | 0.02 | 0.08 | 1/4 | 5/16 - 18 | 1/2 | 8 | 12 | — | — | #10 - 32 | 7/16 - 20 | 11/16 | 12 | — |
| 1 1/2 | 40 | — | — | 0.49 | 12 | 0.02 | 0.08 | 1/4 | 5/16 - 18 | 1/2 | 8 | 12 | — | — | #10 - 32 | 7/16 - 20 | 11/16 | 12 | — |
| 2 | 50 | 3 | 80 | 0.59 | 15 | 0.03 | 0.12 | 1/2 | 3/8 - 16 | 9/16 | 8 | 20 | — | — | #10 - 32 | 1/2 - 20 | 3/4 | 16 | — |
| 2 1/2 | 65 | — | — | 0.71 | 18 | 0.04 | 0.16 | 1/2 | 7/16 - 14 | 5/8 | 8 | 36 | — | — | #10 - 32 | 5/8 - 18 | 15/16 | 32 | — |
| 3 | 80 | 4 | — | 0.84 | 21 | 0.08 | 0.3 | 1/2 | 1/2 - 13 | 3/4 | 8 | 50 | — | — | 1/4 - 28 | 5/8 - 18 | 15/16 | 32 | — |
| 4 | 100 | 6 | — | 1.09 | 28 | 0.17 | 0.64 | 3/4 | 3/4 - 10 | 1 1/8 | 8 | 125 | — | — | 1/4 - 28 | 3/4 - 16 | 1 1/8 | 55 | — |
| 6 | 150 | 8 | — | 1.58 | 40 | 0.53 | 2.01 | 3/4 | 3/4 - 10 | 1 1/8 | 12 | 125 | — | — | 3/8 - 24 | 7/8 - 14 | 1 5/16 | 100 | — |
| 8 | 200 | 10 | — | 2.24 | 57 | 1.26 | 4.77 | 1 | 3/4 - 10 | 1 1/4 | 16 | 125 | — | 5/8 - 11 | 3/8 - 24 | 1 1/8 - 12 | 1 3/4 | 180 | — |
| 10 | 250 | 12 | — | 2.71 | 69 | 2.51 | 9.5 | 1 | 7/8 - 9 | 1 7/16 | 20 | 160 | — | 3/4 - 10 | 3/8 - 24 | 1 1/4 - 12 | 1 7/8 | 300 | — |
| 12 | 300 | 14, 16 | 350, 400 | 3.34 | 85 | 4.00 | 15.14 | 1 1/4 | 1 1/8 - 7 | 1 13/16 | 20 | 320 | — | 3/4 - 10 | 3/8 - 24 | 1 1/2 - 12 | 2 1/4 | 500 | — |
| 14 | 350 | — | — | 4.08 | 104 | 6.50 | 24.61 | 1 1/2 | 1 1/4 - 7 | 2 | 20 | 450 | — | 1 - 8 | 3/8 - 24 | 1 1/2 - 12 | 2 1/4 | 500 | — |
| 16 | 400 | 18, 20, 24 | 450, 500, 600 | 4.58 | 116 | 9.60 | 36.34 | 2 | 1 1/4 - 7 | 2 | 20 | 450 | — | 1 - 8 | 1/2 - 20 | 2 - 16 | 3 | 600 | — |
| 18 | 500 | — | — | 5.13 | 130 | 11.00 | 42 | 1 | 1 1/4 - 7 | 2 | 24 | 450 | — | 1 - 8 | 3/4 - 16 | 2 1/4 - 16 | 3 7/16 | 1000 | — |
| 20 | 500 | — | — | 5.63 | 143 | 12.00 | 45.42 | 1 | 1 3/8 - 6 | 2 3/16 | 24 | 600 | — | 1 - 8 | 3/4 - 16 | 2 1/4 - 16 | 3 7/16 | 1000 | — |
| 24 | 600 | 30 | — | 6.50 | 165 | 29.00 | 109.78 | 1 | 1 1/2 - 12 | 2 3/8 | 24 | 850 | — | 1 1/8 - 7 | 3/4 - 16 | 3 - 12 | 4 5/8 | 1600 | — |
| 30 | 750 | 36 | 900 | 8.00 | 203 | 42.00 | 158.99 | 2 | 1 1/2 - 12 | 2 3/8 | 32 | 850 | — | 1 1/8 - 7 | 3/4 - 16 | 3 - 12 | 4 5/8 | 3000 | — |
| 36 | 900 | 42, 48, 56 | 1050, 1200, 1400 | 8.71 | 221 | 90.00 | 340.69 | 2 | 1 3/4 - 10 | 2 3/4 | 36 | 1250 | — | 1 1/4 - 12 | 3/4 - 16 | 3 1/2 - 8 | 6 | 3000 | — |

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

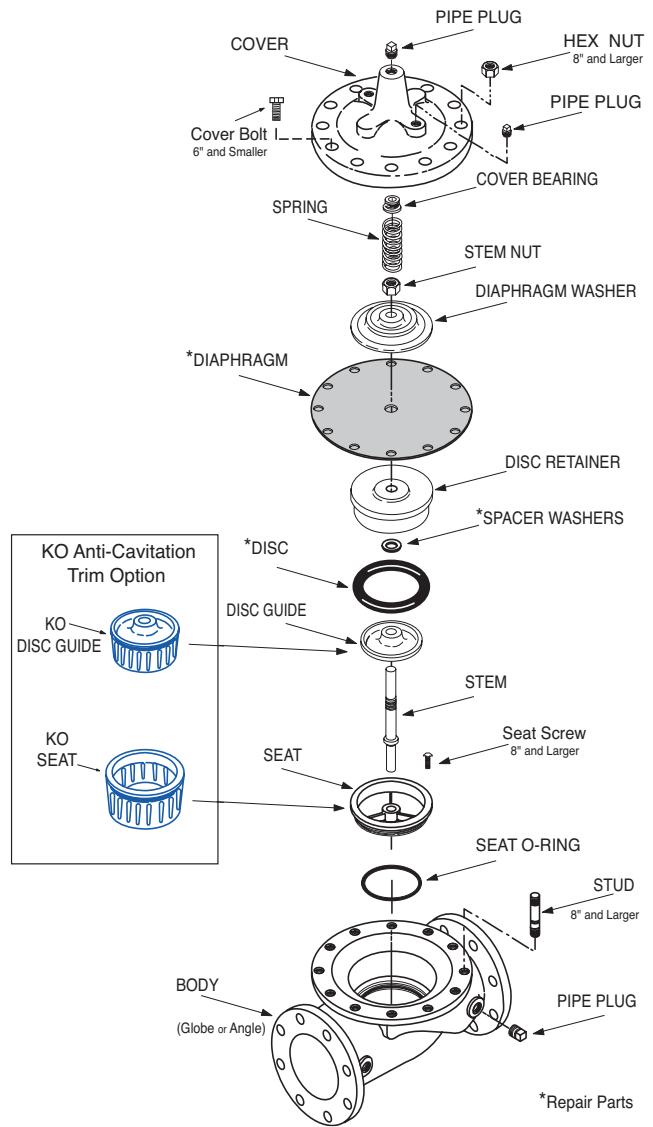
(2) Clean all threads and apply anti-seize prior to reassembly of threaded fasteners. Torque values are based on standard SST material.

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





- Follow this procedure when reassembling Main Valve:
- 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.
 - Torque the bolt/nuts in three stages with a "Star" or "Cross-Over" pattern for each stage:
 - To approximately 10% of final torque.
 - To approximately 75% of final torque.
 - To final required torque.
 - Valves that are to be tested to 375 PSI or higher should be re-torqued after 24 hours.





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

600 Series Hytrol Valve

SERVICE AND MAINTENANCE OF 600 SERIES VALVES

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

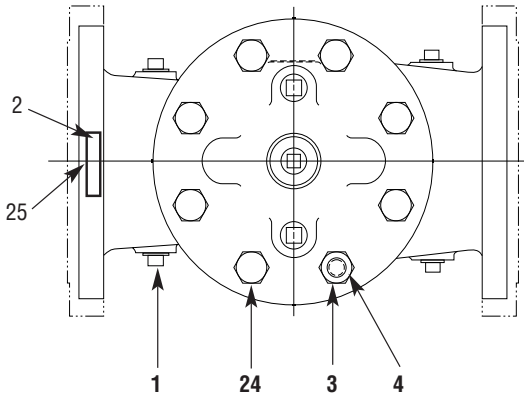
| Basic Main Valve Size Comparison | | |
|----------------------------------|---------------------|---------------------|
| Globe Pattern Valves | | |
| Flange Size (inch) | Seat Size | |
| | 100-01 (100 Series) | 100-20 (600 Series) |
| 3 | 3 | 2 |
| 4 | 4 | 3 |
| 6 | 6 | 4 |
| 8 | 8 | 6 |
| 10 | 10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

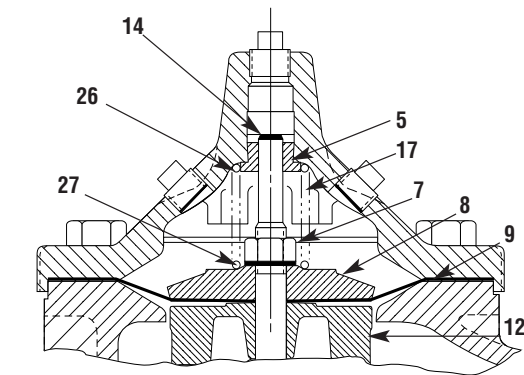
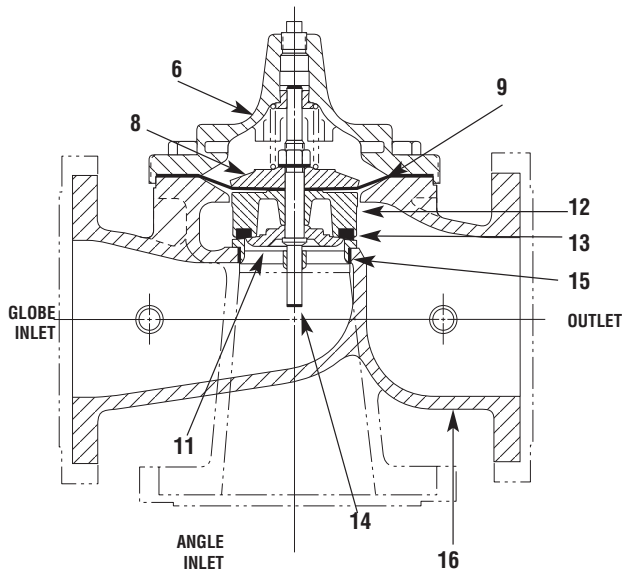
Cla-Val Main Valves

| 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 |

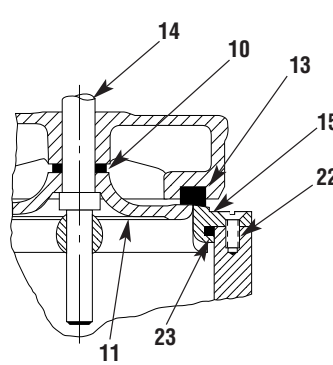
100-20



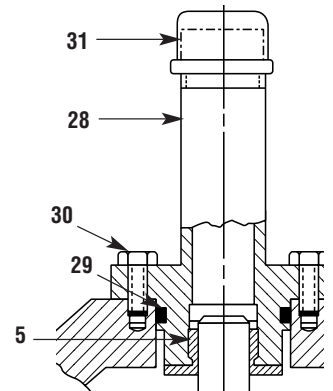
TOP VIEW



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" & 30")
- 29 Cover Bearing Housing O-Ring (20" & 24" & 30")
- 30 Hex Bolt (20" & 24")
- 31 Pipe Cap (20" & 24" & 30")

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



Technical Bulletin



300 Series (Single-Mode) Electronic Actuated Pilot Controls

Introduction

CDB-32, CDHS-32, CRA-32, CRD-32, and CRL-32 are pilot controls for Cla-Val 300 Series Electronic Actuated Control Valves. These controls offer the same hydraulic control of the valve as existing manually-set controls, along with additional remote electronic setpoint adjustment capabilities. The new pilot controls consist of a modified pilot control sub-assembly, and the 130VC-2 Electronic Actuator with mounting components. Complete controls are valve mounted with an accessory X56 Mounting Assembly.

I. O. M. Information

A. The 130VC-2 wiring diagram is included with this technical bulletin. The 5-wire cable is permanently attached to actuator and should be terminated in suitable junction box. Care should be used when attaching to wires to avoid damage. There are no user serviceable parts inside the actuator and tampering or opening it will void the warranty.

B. For Installation, Operation and Maintenance information only on the pilot sub-assembly use instructions in the appropriate N-sheet for the manually adjusted pilot control. Since the 130VC-2 Electronic Actuator changes the setpoint adjustment of the control, all other service and maintenance information remains the same for both. See table below.

| Pilot Control | Pilot Assembly Drawing | Sub-Assembly IOM (ref. only) | Sub-Assembly Drawing | Sub-Assembly Repair Kit |
|---------------|------------------------|------------------------------|----------------------|-------------------------|
| CDB-32 | 205580 | N-CDB-7 | 201935 | 9170023H |
| CDHS-32 | 205137 | N-CDHS-11A | 76832 | 20287401E |
| CDHS-32A | 205333 | N-CDHS-11B | 205332 | 9170028G |
| CRA-32 | | N-CRA | 82528 | 9170001D |
| CRD-32 | 205129 | N-CRD | 70899 | 9170002B |
| CRL-32 | 205130 | N-CRL-5A | 90846 | 20666E |

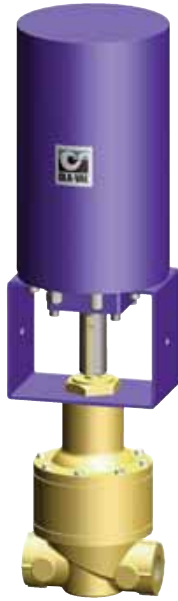
C. Additional service notes:

1. Before disassembly of pilot subassembly from 130VC-2 actuator, adjust pilot control to full minimum range setting with laptop computer and 130VC-2 software to ensure full adjustment range when reassembled.
2. Note orientation of sub-assembly ports and bracket. Coupler and blue Aluminum bracket will remain attached to actuator. Loosen and remove jam nut and washer from sub-assembly cover as sub-assembly is removed from 130VC-2 bracket. Count number of turns counterclockwise of pilot adjustment shaft from minimum range set position to full out stop position. See pilot drawing.
3. After servicing the pilot sub-assembly, re-establish minimum spring setting by manually turning adjusting screw counterclockwise until it stops (full out stop position). Then, turn in same number of turns found in step 2 to minimum range set position.
4. Do not lubricate coupler slots. A small amount of waterproof anti-seize grease is used only on sub-assembly adjusting screw threads and contact point with spring guide inside cover.
5. Reinstall sub-assembly to bracket with jam nut and washer. Check coupler slots and adjusting screw pin are lined up while installing actuator to bracket. Be sure to retain original alignment of sub-assembly with bracket when tightening jam nut and washer. A slight manual adjustment of adjusting screw may help align the coupler to adjusting screw. See pilot assembly drawing.
6. After reinstalling onto valve, use laptop computer and 130VC-2 software to reset range values.



—MODELS— **CRL-32**

Electronic Actuated Pressure Sustaining Pilot Control



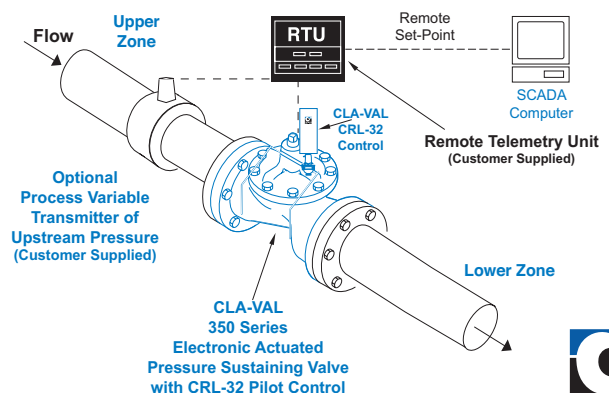
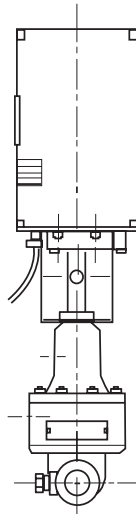
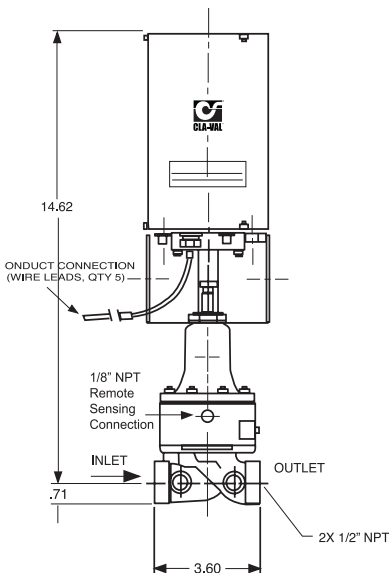
- Simplified Remote Valve Set-Point Control
- 12-24VDC Input Power
- Easy Interfacing to SCADA Systems
- Accurate Pressure Control
- Reliable Hydraulic Operation
- Submersible (IP-68)

The Cla-Val Model CRL-32 Electronic Actuated Pressure Sustaining Pilot Control provides remote set-point adjustment and accurate pressure sustaining control on Cla-Val 350 Series Control Valves. Remote set-point command signals can be from any SCADA-type control system that uses analog 4-20 mA signals. The CRL-32 senses upstream pressure with a remote hydraulic connection. Operating on 12 to 24 VDC and consuming very little power, it is an ideal control system for remote valve sites that may even be solar powered. Existing manually-set Cla-Val 50 Series Pressure Sustaining control valves can be retrofitted with CRL-32 to add remote set-point control of minimum inlet pressure. Verification of inlet pressure may be sent to SCADA system from customer supplied pressure sensor attached upstream of valve.

The CRL-32 consists of a hydraulic pilot and integral controller that accepts a 4-20 mA remote set-point and positions the pilot to maintain a minimum pressure at valve inlet within preset limits. Pressure settings are linear between these settings. Special USB connector cable and free downloadable software is required to change built-in electronic range limits for upstream sustained pressure. Continuous internal monitoring of actuator position results in smooth transitions between pilot set-points with no backlash or dithering. When power or control input fail, the CRL-32 pilot remains in automatic hydraulic control assuring system stability under all conditions.

Typical Applications

The CRL-32 is installed on Cla-Val 350 Series valves that maintain minimum upstream pressure by relieving excess pressure to lower zone and require this pressure setting to be changed from a remote location. It is also an effective solution for lowering costs associated with "confined space" requirements by eliminating the need for entry in valve structure for set point adjustment. Additional pilot controls, hydraulic and/or electronic, are also available to perform multiple functions to fit exact system requirements.



CRL-32 Purchase Specifications

The Electronic Actuated Pressure Sustaining Pilot Control shall have an integral hydraulic pilot and electronic controller contained in a IP-68 rated submersible enclosure to provide interface between remote telemetry and valve set-point control. It will compare a remote analog command signal with an internal position sensor signal and adjust the hydraulic pilot control spring mechanism to a new set-point position. 4-20 mA actuator position feedback output shall be supplied standard.

If power fails the valve shall continue to control to the last set-point command. If the Remote Set-Point signal is lost the actuator is programmable to go to either the 4mA, Last, or 20mA command set-point. No mechanical adjustments shall be necessary to the actuator. The low and high position range adjustment shall be accomplished only with valve manufacturer's components and instructions to be supplied in a separate kit.

The Electronic Actuated Pressure Sustaining Pilot Control shall be Cla-Val Model CRL-32 as manufactured by Cla-Val, Newport Beach, CA.

Pilot Control Subassembly Specifications

Adjustment Ranges

0 to 75 psi
20 to 200 psi

End Connection

1/2" NPT

Temperature Range

Water: to 180°F

Materials

Pilot Control: Bronze ASTM B62
Trim: Stainless Steel Type 303
Rubber: Buna-N® Synthetic Rubber

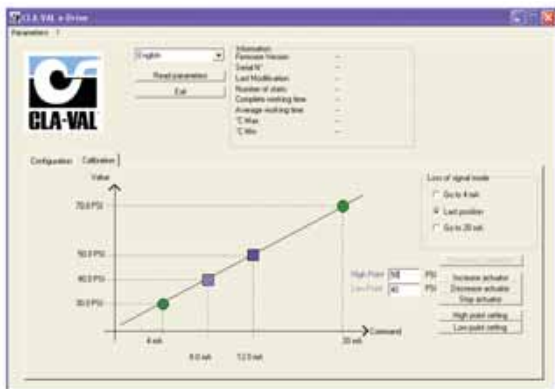
Available with optional Stainless Steel or Monel materials at additional cost. Consult factory for details.

Note: Shipping Weight: 8 Lbs.

Options:

Re-ranging software - free download from www.cla-val.com.

USB connection cable required when changing range parameters or restoring range parameters after servicing pilot control subassembly.



Ranging software makes it easy to set low (4mA) and high (20mA) set-point limits.

130VC-2 Electronic Actuator Specifications

Supply Power Input: 12V to 24V DC
No Load draw: 50 mA
Max. Load draw: 250 mA

Remote Command Input: 4-20 mA analog signal

Position Feedback Signal: 4-20 mA

Speed of Rotation: Adjustable On/Off time, max 6 rpm

Diagnostic: LED Indicator

Loss of Power: Actuator will remain in last commanded position.

Loss of Signal Programmable - 4mA, Last, or 20mA

Electrical Connections: Single, permanently attached cable with color-coded power supply and signal wires

Mechanical Specifications:

Environmental

Protection Class: IP-68 (Temporary submersible)

Ambient Temperature: 15° to 150° F (-10° to 65° C)

Materials

Enclosure and Bracket: Anodized Aluminum

Coupling Assembly: Stainless Steel

Gear Train: Stainless Steel, permanently lubricated

When Ordering, Please Specify

1. Catalog CRL-32
2. Adjustment Range
3. Materials - Pilot Control
4. X56 Mounting Kit (Specify Valve Size)



CLA-VALTM

E-CRL-32 (R-1/08)

CLA-VAL

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

CLA-VAL CANADA

4687 Christie Drive
Beamsville, Ontario
Canada LOR 1B4

Phone: 905-563-4963

Fax: 905-563-4040

CLA-VAL EUROPE

Chemin des Mesanges 1
CH-1032 Romanel/
Lausanne, Switzerland

Phone: 41-21-643-15-55

Fax: 41-21-643-15-50

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www.cla-val.com

Represented By:



NEWPORT BEACH, CALIFORNIA

CATALOG NO.
X58C

DRAWING NO.
48834

REV
AP

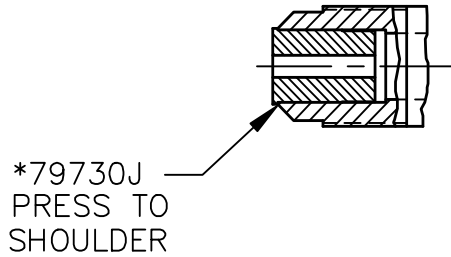
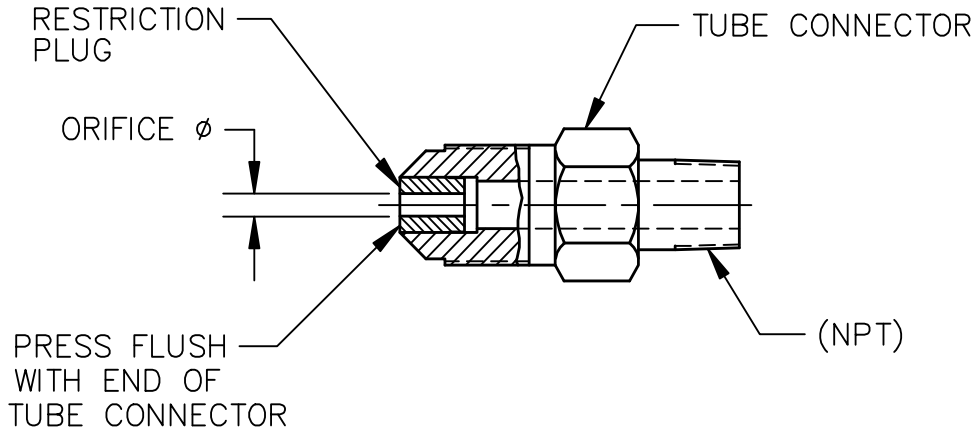
TYPE OF VALVE AND MAIN FEATURES

X58C RESTRICTION ASSEMBLIES

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

| | |
|-----|---|
| TLC | 10-18-94 |
| AK | 09-15-98 |
| EK | 9-29-11 |
| AM | REINSTATED PN 68565B & 64673H (ECO 15043) |
| AN | ADDED PN 48834-05F (NED 43663) |
| AP | ADDED PN 48834-06D (NED 75779) |

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



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.
4. SEE SHEETS 3 & 4 FOR UL APPROVED DRAWING.



NEWPORT BEACH, CALIFORNIA

CATALOG NO.
X58C

DRAWING NO.
48834

REV
AP

TYPE OF VALVE AND MAIN FEATURES

X58C RESTRICTION ASSEMBLIES

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

| X58C STOCK NO. | TUBE CONNECTOR | | RESTRICTION PLUG | |
|----------------|------------------|----------|------------------|----------|
| | SIZE TUBE X NPT | MATERIAL | ORIFICE DIA | MATERIAL |
| **44734C | 3/8 X 3/8-18 NPT | ALUMINUM | .125 (1/8) | S. STEEL |
| | <u>37° FLARE</u> | | | |
| *37814B | 1/4 X 1/8-27 NPT | BRASS | .031 (1/32) | S. STEEL |
| *80500C | 1/4 X 1/8-27 NPT | BRASS | .062 (1/16) | S. STEEL |
| *67739D | 3/8 X 1/8-27 NPT | BRASS | .040 | S. STEEL |
| *64672K | 3/8 X 3/8-18 NPT | BRASS | .062 (1/16) | S. STEEL |
| *99329-01D | 3/8 X 3/8-18 NPT | BRASS | .094 (3/32) | S. STEEL |
| **79730J | 1/2 X 1/2-14 NPT | BRASS | .125 (1/8) | S. STEEL |
| **48834-05F | 3/8 X 3/8-18 NPT | BRASS | .125 (1/8) | S. STEEL |
| *85484E | 1/4 X 1/8-27 NPT | BRASS | .031 (1/32) | DELTRIN |
| *85486K | 1/4 X 1/8-27 NPT | BRASS | .040 | DELTRIN |
| **48834-03A | 1/4 X 1/8-27 NPT | BRASS | .125 (1/8) | DELTRIN |
| *48834-04J | 1/4 X 1/8-27 NPT | BRASS | .093 | DELTRIN |
| *88409-01G | 3/8 X 1/8-27 NPT | BRASS | .031 (1/32) | DELTRIN |
| *88409J | 3/8 X 1/8-27 NPT | BRASS | .052 | DELTRIN |
| *42346H | 3/8 X 1/8-27 NPT | BRASS | .062 (1/16) | DELTRIN |
| **48834-01E | 3/8 X 1/8-27 NPT | BRASS | .125 (1/8) | DELTRIN |
| *42775H | 3/8 X 1/4-18 NPT | BRASS | .062 (1/16) | DELTRIN |
| **63604D | 3/8 X 1/4-18 NPT | BRASS | .156 (5/32) | DELTRIN |
| *10253D | 3/8 X 3/8-18 NPT | BRASS | .031 (1/32) | DELTRIN |
| *46946A | 3/8 X 3/8-18 NPT | BRASS | .062 (1/16) | DELTRIN |
| **64673H | 3/8 X 3/8-18 NPT | BRASS | .125 (1/8) | DELTRIN |
| *68565B | 3/8 X 3/8-18 NPT | BRASS | .094 (3/32) | DELTRIN |
| **43302K | 3/8 X 3/8-18 NPT | BRASS | .188 (3/16) | DELTRIN |
| **12900H | 1/2 X 1/2-14 NPT | BRASS | .125 (1/8) | DELTRIN |
| **48834-02C | 1/2 X 1/2-14 NPT | BRASS | .188 (3/16) | DELTRIN |
| **48834-06D | 1/2 X 1/2-14 NPT | BRASS | .250 (1/4) | DELTRIN |
| | | | | |

CAD REVISION RECORD - DO NOT REVISE MANUALLY

DATE

BY

DESCRIPTION

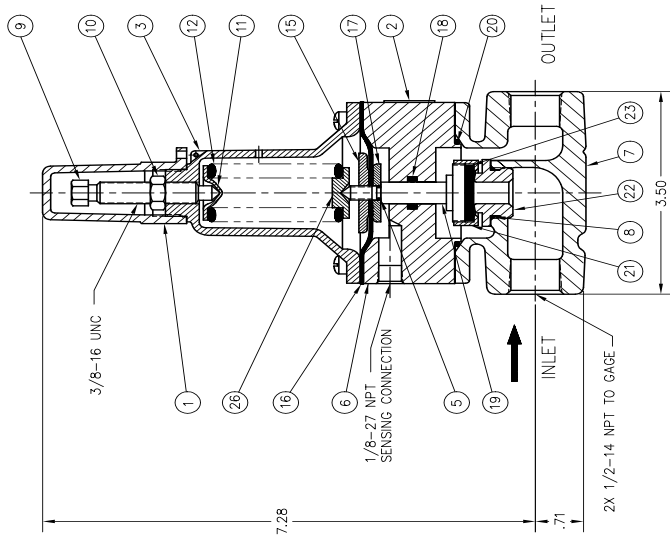
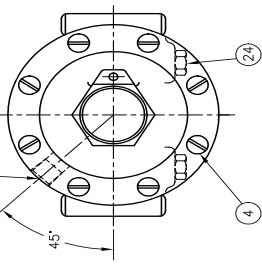
SEE SHEET 1

L/R

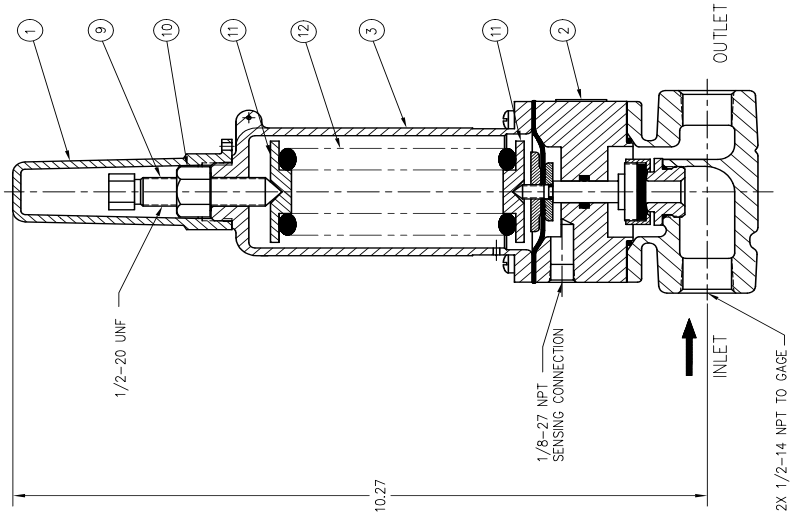
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TRUE LOCATION OF SENSING CONNECTION



0-75, 5-25, 20-105 & 20-200 PSI
LOW PRESSURE DESIGN



100-300 PSI
HIGH PRESSURE DESIGN

| CRL5A RANGE PSI | APPROXIMATE INCREASE FOR EACH CLOCKWISE TURN OF ADJUSTING SCREW, ITEM NO. 9 |
|--------------------|---|
| 0-75 | 8.5 PSI |
| 5-25 | 4.0 PSI |
| 20-105 | 13.0 PSI |
| 20-200 | 28.0 PSI |
| 100-300 | 19.0 PSI |

* = RECOMMENDED SPARE PARTS

| ITEM NO. | DESCRIPTION | QTY |
|----------|---|-----|
| 26 | GUIDE, SPRING, LOWER (FOR LOW PRESSURE DESIGN ONLY) | 1 |
| 25 | -58EW-FE-HD-10-32-2-1/4 LG-F068-500-PSI-ONE P-2---- | 2 |
| 24 | PLUG, PIPE | 2 |
| 23 | DISC ASSEMBLY | 1 |
| 22 | SEAT | 1 |
| 21 | RETAINER, DISC | 1 |
| 20 | O-RING | 1 |
| 19 | STEM | 1 |
| 18 | O-RING | 1 |
| 17 | WASHER, DIAPHRAGM, LOWER | 1 |
| 16 | DIAPHRAGM | 1 |
| 15 | WASHER, DIAPHRAGM, UPPER | 1 |
| 14 | | 1 |
| 13 | SPRING | 1 |
| 12 | GUIDE, SPRING | A/R |
| 11 | NUT -JAM | 1 |
| 10 | SCREW, ADJUSTING | 1 |
| 9 | BODY, POWERUNIT | 1 |
| 8 | COVER | 1 |
| 7 | NAMEPLATE | 1 |
| 6 | SCREW, FIL. HD 10-32 X 1.88 LG | 8 |
| 5 | | 1 |
| 4 | | 1 |
| 3 | | 1 |
| 2 | | 1 |
| 1 | | 1 |

| REV | DESCRIPTION | DATE | APPROVED |
|-----|---|----------|----------|
| B | REVISED & REDRAWN | 10-14-76 | CH |
| C | REMOVED ITEM NO'S 13 & 14, REVISED ITEM NO. 15 | 01-10-77 | D.P. |
| D | SEE ECO 23920 | 03-16-78 | CH |
| E | REMOVE NOTE 1 & ITEM NO. 25 FROM FACE OF P.W.G. & DELETED ITEM NO. 25 FROM PART LIST (ECO 6650) | 01-11-85 | G.N. |
| F | ON ADJUSTING SCREW CHART (100-300 PSI) 18.0 PSI WAS 18.0 PSI AND CHANGED CONFIGURATION OF ADJUSTING SCREW, SPRING & SPRING GUIDE ON 100-300 PSI DESIGN (ECO 7893) | 11-26-85 | G.N. |
| G | CORRECTED LOCATION OF ITEM 12, WAS POINTING TO ITEM 11 (ECO 9985) | 10-24-88 | JH |
| H | ADDED "RECOMMENDED SPARE PARTS" (NED 49378) | 03-16-05 | PC |
| J | REDRAWN ON CAD (ECO 20320) | 11-3-05 | AK |
| K | ADDED 20-105 "PSI RANGE" TO TABULATION TABLE. (21467) | 01-29-08 | PC |

CONTRACT NO. _____ TITLE _____

APPROVALS: _____ DATE _____

DRAWN: CH 10-14-76

DESIGNED: MF 10-19-76

APPROVED: J.A.S. 10-19-76

FLOOR _____

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES FRACTIONS DECIMALS ANGULAR ± 1/32 ± .0010 ± .25

MAX = +.00 - .09

MIN = -.09 - .00

SURFACE FINISH 1/4

BREAK CORNERS .010 MAX

--DO NOT SCALE DRAWING--

CLIA-VAL CO. NEWPORT BEACH, CALIFORNIA

PRESSURE RELIEF CONTROL CRL5A

REV. 90846

REV. DATE 10/14/84

REV. BY K

SCALE 1/1

UNIT/TYPE

SHEET 1 OF 2

1. SEE SHEET 2 FOR UL APPROVED DRAWING.

NOTES: UNLESS OTHERWISE SPECIFIED.



Model CRL

PRESSURE RELIEF CONTROL

DESCRIPTION

The CRL Pressure Relief Control is a direct acting, spring loaded, diaphragm type relief valve. It may be used as a self-contained valve or as a pilot control for a Cla-Val Main valve. It opens and closes within very close pressure limits.

OPERATION

The CRL Pressure Relief Control is normally held closed by the force of the compression spring above the diaphragm; control pressure is applied under the diaphragm. When the controlling pressure exceeds the spring setting, the disc is lifted off its seat, permitting flow through the control. When controlling pressure drops below spring setting, the spring returns the control to its normally closed position.

INSTALLATION

The CRL Pressure Relief Control may be installed in any position. The control body (7) has one inlet and one outlet port with a side pipe plug (24) at each port. These plugs are used for control connections or gauge applications. The inlet in the power unit body (6) is the sensing line port. A flow arrow is marked on the body casting.

ADJUSTMENT PROCEDURE

The CRL Pressure Relief Control can be adjusted to provide a relief setting at any point within the range found on the nameplate. Pressure adjustment is made by turning the adjustment screw (9) to vary the spring pressure on the diaphragm. Turning the adjustment screw clockwise increases the pressure required to open the valve. Counterclockwise decreases the pressure required to open the valve. When pressure adjustments are complete the jam nut (10) should be tightened and the protective cap (1) replaced. If there is a problem of tampering, lock wire holes have been provided in cap and cover. Wire the cap to cover and secure with lead seal.

MAINTENANCE

Disassembly

The CRL Pressure Relief Control does not need to be removed from the line for disassembly. Make sure that pressure shut down is accompanied prior to disassembly. If the CRL is removed from the line for disassembly be sure to use a soft jawed vise to hold body during work. Refer to Parts List Drawing for Item Numbers.

1. Remove cap (1), loosen jam nut (10) and turn adjusting screw counterclockwise until spring tension is relieved.

2. Remove the eight screws (4) holding the cover (3) and powerunit body (6). Hold the cover and powerunit together and place on a suitable work surface. See NOTE under REASSEMBLY.

3. Remove the cover (3) from powerunit body (6). The spring (12) and two spring guides (11).

4. Remove nut (13) from stem (19) and slide off the belleville washer (14), the upper diaphragm washer (15) and the diaphragm (16).

5. Pull the stem (19) with the disc retainer assembly (21) through the bottom of powerunit. The lower diaphragm washer (17) will slide off of stem top.

6. Remove jam nut (23) and disc retainer assembly (21) from stem. Use soft jawed pliers or vise to hold stem. The polished surface of stem must not be scored or scratched.

7. The seat (22) need not be removed unless it is damaged. If removal is necessary use proper size socket wrench and turn counterclockwise. Note: Some models have an integral seat in the body (7).

Inspection

Inspect all parts for damage, or evidence of cross threading. Check diaphragm and disc retainer assembly for tears, abrasions or other damage. Check all metal parts for damage, corrosion or excessive wear.

Repair and Replacement

Minor nicks and scratches may be polished out using 400 grit wet or dry sandpaper fine emery or crocus cloth. Replace all O-rings and any damaged parts. When ordering replacement parts, be sure to specify parts list item number and all nameplate data.

Reassembly

In general, reassembly is the reverse of disassembly. However, the following steps should be observed:

1. Lubricate the O-Ring (18) with a small amount of a good grade of waterproof grease, (Dow Corning 44 medium grade or equal). Use grease sparingly and install O-ring in powerunit body (6).

2. Install stem (19) in powerunit body (6). Use a rotating motion with minimum pressure to let stem pass through O-ring. Do Not Cut O-Ring.

3. Install O-ring (5) at top of stem (19). Place lower diaphragm washer (17) on the stem with the serrated side up. Position diaphragm (16), upper diaphragm washer (15), with serration down, and belleville washer (14) with concave side down.

4. Position powerunit body (6) as shown on parts list drawing (top view).

5. Continue reassembly as outlined in disassembly steps 1 through 3.


Note:

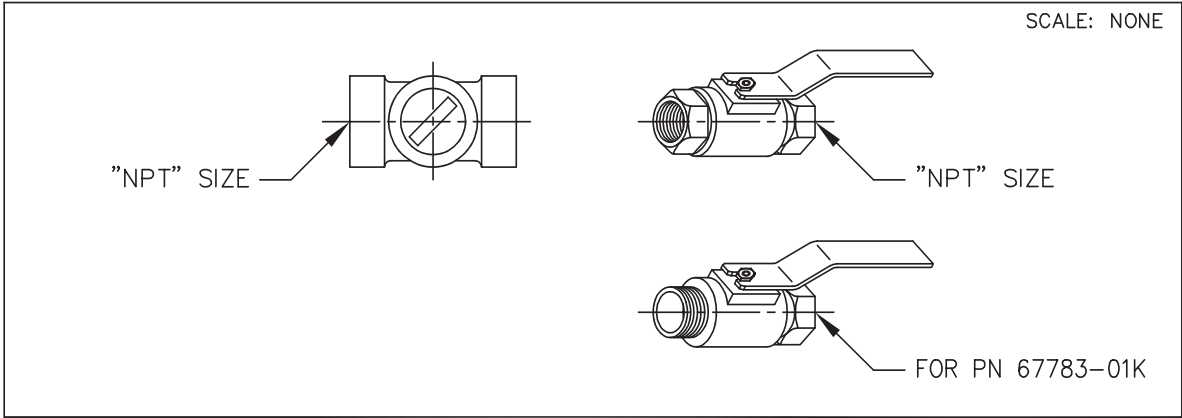
Item (4) Screw will have a quantity of 8 for the 0-75 and 20-200psi design and a quantity of 4 for the 100-300psi design. Item (25) Screw is used on the 100-300psi design only. Install item (25), before item (4) for preload of item (12) spring.

| Service Suggestions | | |
|--|--|---|
| Symptom | Possible Cause | Solutions |
| Fails to open | Controlling pressure too low. | Back off adjusting screw until valve opens. |
| Fails to open with spring compression removed. | Mechanical obstruction, corrosion, scale build-up on stem. | Disassemble, locate, and remove obstruction, scale. |
| Leakage from cover vent hole when controlling pressure is applied. | Damaged diaphragm | Disassembly replace damaged diaphragm. |
| | Loose diaphragm assembly. | Tighten upper diaphragm washer. |
| Fails to close. | No spring compression. | Re-set pressure adjustment. |
| Fails to close with spring compressed. | Mechanical obstruction. | Disassemble, locate and remove obstruction. |



| | | | |
|--|---|----|----------------------------------|
| AK | 07-10-08 | BB | ADDED PN'S 67783-62B (NED 62200) |
| AK | 08-14-08 | BC | ADDED PN'S 67783-63K (NED 62218) |
| PC | 10-1-2008 | BD | ADDED PN 67783-64H (NED 62446) |
| CAD REVISION RECORD - DO NOT REVISE MANUALLY | | BY | DATE |
| LTR | DESCRIPTION | | |
| A-AY | SEE REVISION FILE | | |
| BA | ADDED PN'S 67783-59H, 67783-60F & 67783-61D (ECO 20434) | AK | 03-14-06 |

| | | | |
|--|-------------|-------------|-------------|
|  CLA-VAL CO. NEWPORT BEACH, CALIFORNIA | CATALOG NO. | DRAWING NO. | REV |
| | | 67783 | BD |
| TYPE OF VALVE AND MAIN FEATURES | | DESIGN | |
| <p style="text-align: center; font-size: 24pt;">CK2 COCK/BALL VALVE</p> | | DRAWN | MGR 4-02-80 |
| | | CHK'D | KD 4-03-80 |
| | | APV'D | CH 4-07-80 |



| 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 | MONEL W/ LOCKING HANDLE | SIZE "NPT" |
| 67783-01K* | -09C | -17F | -25J SUPSD BY-26G | | -41F SUPSD BY-01K | | | 1/8" |
| -02H | -10A | -18D | -26G | -51E SUPSD BY-26G -52C | -42D SUPSD BY-02H | -55F | | 1/4" |
| -03F * -59H*** | -11J | -19B | -27E | -46E SUPSD BY-27E -53A | -45G -57B * * | -48A SUPSD BY-49J | -63K | 3/8" |
| -04D -60F *** | -12G | -20K | -28C | -54J | -43B SUPSD BY-04D | -49J | -62B | 1/2" |
| -05A -61D *** | -13E | -21H | -29A | -64H | -44K SUPSD BY-05A | -56D | | 3/4" |
| -06J | -14C | -22F | -30J | | | -58K | | 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.

*** WILKINS CK2 (SEE SHEET 2 OF 2)

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Model X46

PRESSURE REDUCING CONTROL

- Self Scrubbing Cleaning Action
- Straight Type or Angle Type

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

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

INSTALLATION

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

INSPECTION

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

DISASSEMBLY

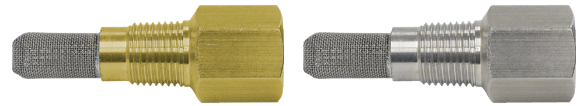
Do not attempt to remove the screens from the strainer housing.

CLEANING

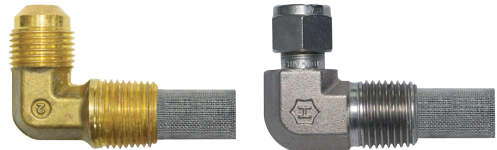
After inspection, cleaning of the Model X46 can begin. Water service usually will produce mineral or lime deposits on metal parts in contact with water. These deposits can be cleaned by dipping Model X46 in a 5-percent muriatic acid solution just long enough for deposit to dissolve. This will remove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

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

Protect from damage and dust until reassembled.



Model X46A Straight



Model X46B Angle

REPLACEMENT

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

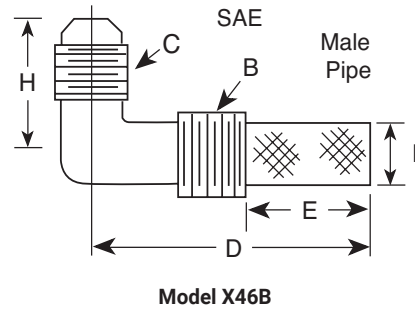
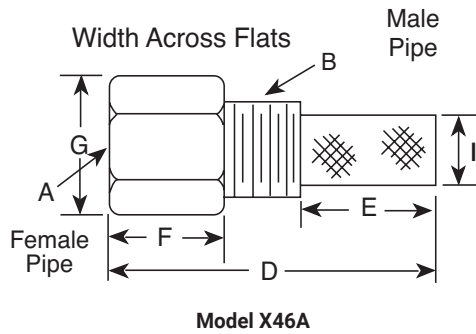
When ordering replacement Flow-Clean Strainers, it is important to determine pipe size of the tapped hole into which the strainer will be inserted (refer to column A or F), and the size of the external connection (refer to column B or G).



Dimensions (in Inches)

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

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



When Ordering, Please Specify

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





Model CV FLOW CONTROL

DESCRIPTION

The CV Control is an adjustable restriction which acts as a needle valve when flow is in the direction of the stem. When flow is in the reverse direction, the port area opens fully to allow unrestricted flow. When installed in the control system of a Cla-Val automatic valve, it can be arranged to function as either an opening or closing speed control.

OPERATION

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

INSTALLATION

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

DISASSEMBLY

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

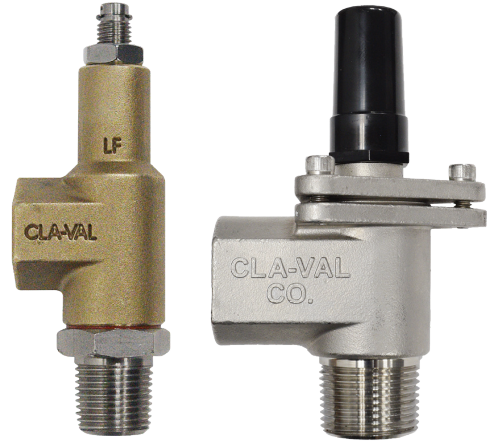
Use a scribe, or similar sharp-pointed tool to remove O-ring from the stem.

INSPECTION

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

CLEANING

After disassembly and inspection, cleaning of the parts can begin. Water service usually will produce mineral or lime deposits on metal parts in contact with water. These deposits can be cleaned by dipping the parts in a 5-percent muriatic acid solution just long enough for deposits to dissolve. This will remove most of the common types of deposits. **CAUTION: Use extreme care when handling acid.** If the deposit is not removed by acid, then a fine grit (400) wet or dry sandpaper can be used with water. Rinse parts in water before handling. An appropriate solvent can clean parts used in fueling service. Dry with compressed air or a clean, lint-free cloth. Protect from damage and dust until reassembled.



REPAIR AND REPLACEMENT

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

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

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

REASSEMBLY

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

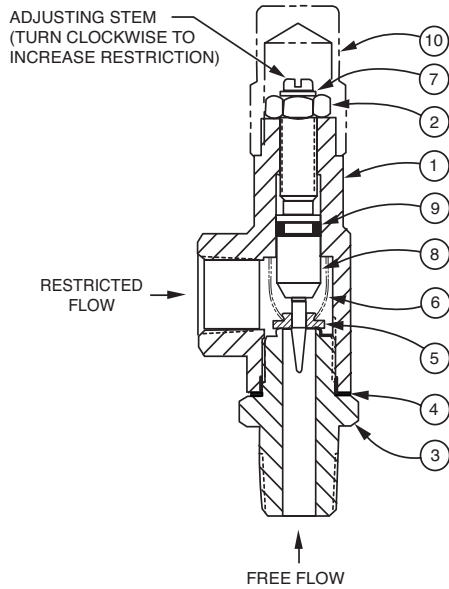
TEST PROCEDURE

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



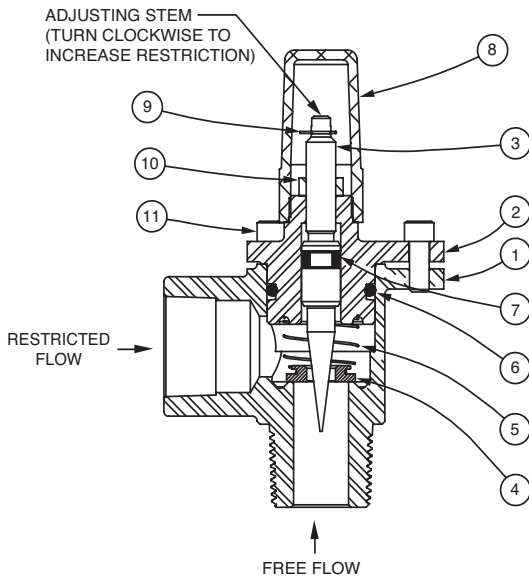


3/8" CV Flow Control



| Item No. | Description | QTY |
|----------|-----------------|-----|
| 1 | Housing | 1 |
| 2 | Nut, Jam | 1 |
| 3 | Seat | 1 |
| 4 | Gasket | 1 |
| 5 | Disc | 1 |
| 6 | Spring | 1 |
| 7 | Ring, Retaining | 1 |
| 8 | Stem | 1 |
| 9 | O-Ring | 1 |
| 10 | Cap (SS only) | 1 |

1/2", 3/4", and 1" CV Flow Control



| Item No. | Description | QTY |
|----------|-----------------------|-----|
| 1 | Body | 1 |
| 2 | Cover | 1 |
| 3 | Stem | 1 |
| 4 | Disc | 1 |
| 5 | Spring | 1 |
| 6 | O-Ring | 1 |
| 7 | O-Ring | 1 |
| 8 | Cap | 1 |
| 9 | Ring, Retaining | 1 |
| 10 | Nut, Jam | 1 |
| 11 | Socket Head Cap Screw | 3 |

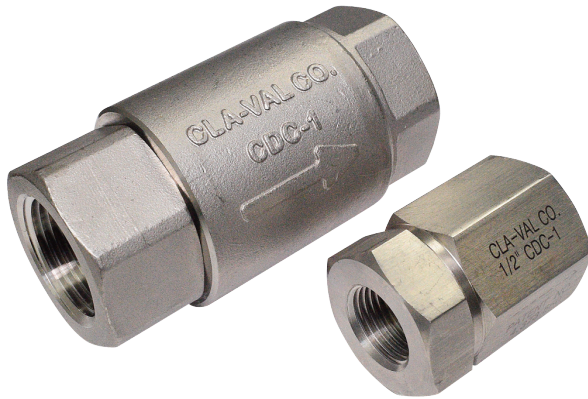
When Ordering, Please Specify

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

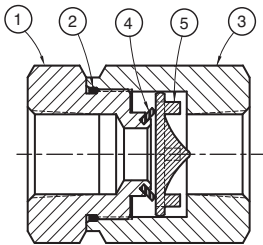




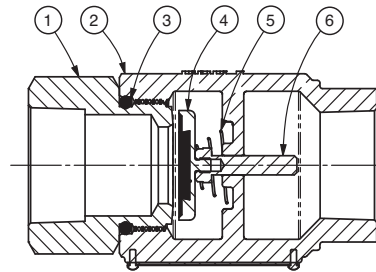
— MODEL — **CDC-1**
Check Valve
 Sizes 3/8", 1/2", 3/4" and 1"



- Meets Low Lead Requirements
- Patented Seal Design Allows for Drip Tight Shut-off at Low DP
- No Spring Required due to Patented Seal Design
- Delrin® Disc with Flow Profile Designed to Minimize Head Loss
- Delrin® Disc Resists Corrosion and/or Mineral Build-up
- Drip Tight Seating at both Low and High Operating Pressures
- Temperature Range: 10°F to 210°F
- EPR, NBR and Fluorocarbon Seal Options



| CDC-1 - 3/8" and 1/2" | | |
|-----------------------|------------------|----------|
| Item | Description | Quantity |
| 1 | Retainer, Seal | 1 |
| *2 | O-Ring | 1 |
| 3 | Retainer, Valve | 1 |
| *4 | Seal, Valve Ring | 1 |
| *5 | Plate, Valve | 1 |

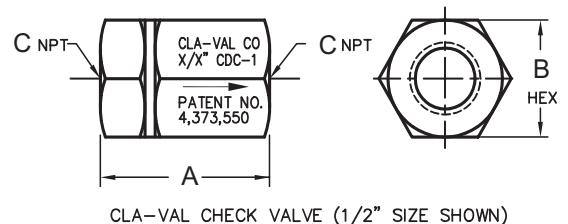


| CDC-1 - 3/4" and 1" | | |
|---------------------|------------------------|----------|
| Item | Description | Quantity |
| 1 | Seat, Valve | 1 |
| 2 | Body, Valve | 1 |
| *3 | O-Ring | 1 |
| *4 | Disc Retainer Assembly | 1 |
| *5 | Spring | 1 |
| *6 | Stem, Valve | 1 |

* Included in Repair Kit

Dimensions

| Size (NPT) | A | B | C |
|------------|------|------|-----------------------|
| 3/8" | 2.06 | 1.06 | 0.38 (3/8) - 18.0 NPT |
| 1/2" | 2.12 | 1.38 | 0.50 (1/2) - 14.0 NPT |
| 3/4" | 4.06 | 2.26 | 0.75 (3/4) - 14.0 NPT |
| 1" | 4.06 | 2.19 | 1.00 (1) - 11.5 NPT |



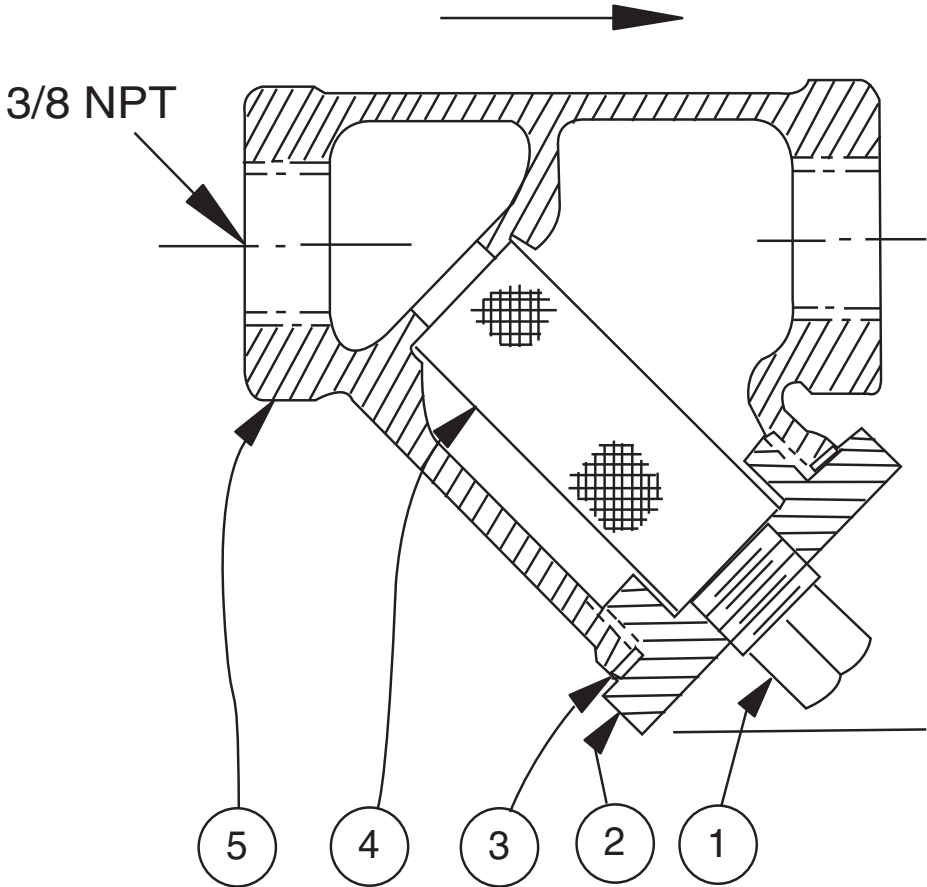


X43 Strainer

| ITEM | DESCRIPTION | MATERIAL |
|--|---------------|-----------------|
| 1 | Pipe Plug | Stainless Steel |
| 2 | Strainer Plug | Stainless Steel |
| 3 | Gasket | Fiber |
| 4 | Screen | Stainless Steel |
| 5 | Body | Stainless Steel |
| No parts available. Replacement assembly only. | | |

Standard 60 mesh pilot system strainer for fluid service.

| Size | Stock Number |
|-----------|--------------|
| 3/8 x 3/8 | 8850604D |





Model Repair Kits

Model 100-01 Hytrol Main Valve

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

Model 100-20 Hytrol Main Valve

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

Model 100-30 Hytrol Main Valve

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

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



Repair Kits for 100-02/100-21 Powertrol and 100-03/100-22 Powercheck Main Valves

For: Powertrol and Powercheck Main Valves—150 Pressure Class Only

Includes: Diaphragm, Disc (or Disc Assembly) and O-rings and full set of spare Spacer Washers.

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

Consult factory for larger sizes

Repair Kits for 100-04/100-23 Hy-Check Main Valves

For: Hy-Check Main Valves—150 Pressure Class Only

Includes: Diaphragm, Disc and O-Rings and full set of spare Spacer Washers.

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

Consult factory for larger sizes

Repair Kits for Pilot Control Valves (In Standard Materials Only)

Includes: Diaphragm, Disc (or Disc Assembly), O-Rings, Gaskets or spare Screws as appropriate.

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

Repair Assemblies (In Standard Materials Only)

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

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