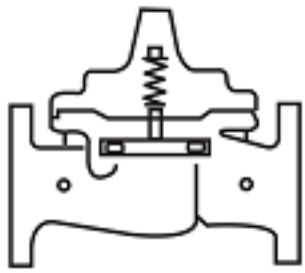
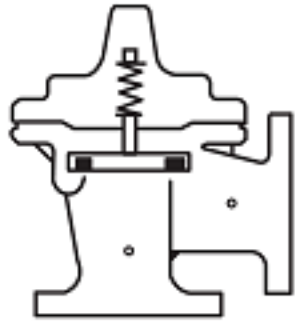
# CLA-VAL
## AUTOMATIC CONTROL VALVES

**350-01/3650-01**

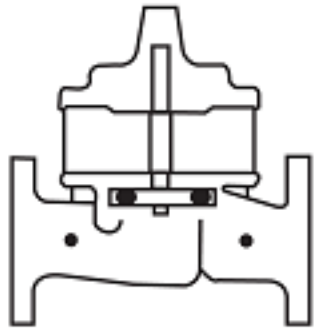
Place this manual with personnel responsible for maintenance of this valve



## *Installation*



## *Operation*



## *Maintenance*

**CLA-VAL** • 1701 Placentia Avenue • Costa Mesa, CA 92627 • (949) 722-4800 • info@cla-val.com
**CLA-VAL CANADA LTD.** • 4687 Christie Drive • Beamsville, Ontario, LOR 1B4 Canada • (905) 563-4963
**www.cla-val.com • info@cla-val.com**

CLA-VAL™

MODEL 350-01 (Full Internal Port)
3650-01 (Reduced Internal Port)

# Electronic Actuated Pressure Sustaining Control Valve

- **Simplified Interfacing with SCADA Systems**
- **Accepts Local or Remote Set-Point**
- **Integral Loop Power Supply**
- **Accurate Pressure Control**
- **Reliable Hydraulic Operation**
- **Rugged Durable Design**

The Cla-Val Model 350-01/3650-01 Electronic Actuated Pressure Sustaining Control Valve combines the precise control of field proven Cla-Val hydraulic pilots and the convenience and versatility of remote Set-Point control. The Model 350-01/3650-01 control valve is a hydraulically operated, pilot controlled, modulating valve designed to maintain constant upstream pressure within close limits. This valve can be used for pressure sustaining, back pressure, or unloading functions in a by-pass system. The pilot control, consisting of a hydraulic pilot and integral controller, accepts a Set-Point and compares it with a pressure or internal potentiometer signal and makes incremental adjustments to modulate the valve to a Set-Point.

Adjustable solid state limit switches eliminate over ranging. In the event of a power or transmitter failure, the CRL-30 pilot remains in hydraulic control virtually assuring system stability under changing conditions. If check feature ("D") is added, and pressure reversal occurs, the valve closes to prevent return flow.

## Schematic Diagram

| Item | Description |
|---|---|
| 1 | Hytrol (Main Valve) |
| 2 | X42N-2 Strainer & Needle Valve |
| 3 | CRL-30 Electronic Pressure Sustaining Control |

## Optional Features

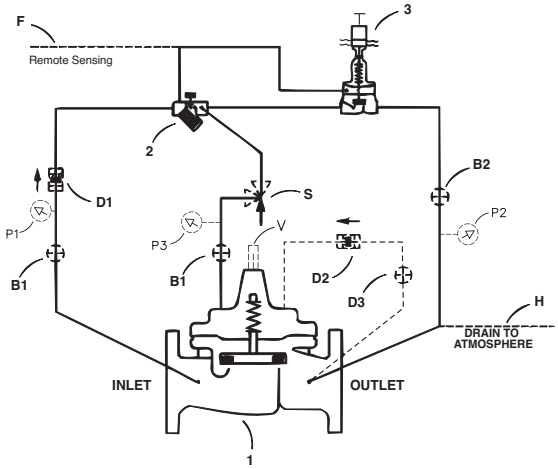
| Item | Description |
|---|---|
| B | CK2 (Isolation Valve) |
| D | Check Valves with Isolation Valve |
| F | Remote Pilot Sensing |
| H | Drain to Atmosphere |
| P | X141 Pressure Gauge |
| S | CV Flow Control (Opening) |
| V | X101 Valve Position Indicator |

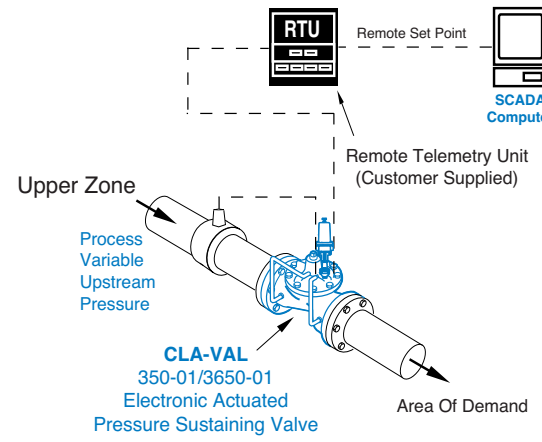
## Typical Applications

The valve is designed to be used with supervisory control systems having a isolated remote analog Set-Point output and a process variable upstream pressure input. When installed in a line between an upper zone and a lower area of demand, the valve acts to maintain desired upstream pressure to prevent "robbing" of the upper zone. Water in excess of pressure setting flows to area of demand, control is smooth, and pressure regulation is positive.

It is also an effective solution for lowering costs associated with "confined space" requirements by eliminating need for entry into valve structure for Set-Point adjustments and system information.

Additional Pilot Controls, hydraulic and/or electronic, can be easily added to perform multiple control functions to fit exact system requirements.




CLA-VAL™

## Model 350-01 (Uses Basic Valve Model 100-01)

## Pressure Ratings (Recommended Maximum Pressure - psi)

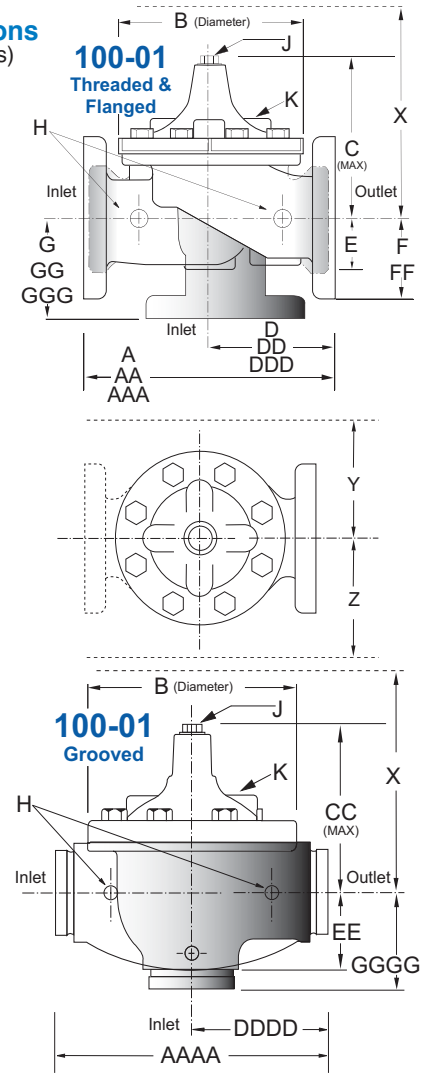
| Valve Body & Cover | | Pressure Class | | | | |
|---|---|---|---|---|---|---|
| | | Flanged | | | Grooved | Threaded |
| Grade | Material | ANSI Standards* | 150 Class | 300 Class | 300 Class | End‡ Details |
| ASTM A536 | Ductile Iron | B16.42 | 250 | 400 | 400 | 400 |
| ASTM A216-WCB | Cast Steel | B16.5 | 285 | 400 | 400 | 400 |
| ASTM B62 | Bronze | B16.24 | 225 | 400 | 400 | 400 |

Note: * ANSI standards are for flange dimensions only.
Flanged valves are available faced but not drilled.
‡ End Details machined to ANSI B2.1 specifications.
***Valves for higher pressure are available; consult factory for details***

## Materials

| Component | Standard Material Combinations | | |
|---|---|---|---|
| Body & Cover | Ductile Iron | Cast Steel | Bronze |
| Available Sizes | 1-1/2" - 36" | 1-1/2" - 16" | 1-1/2" - 16" |
| Disc Retainer & Diaphragm Washer | Cast Iron | Cast Steel | Bronze |
| Trim: Disc Guide, Seat & Cover Bearing | Bronze is Standard<br>Stainless Steel is Optional | | |
| Disc | Buna-N® Rubber | | |
| Diaphragm | Nylon Reinforced Buna-N® Rubber | | |
| Stem, Nut & Spring | Stainless Steel | | |
| For material options not listed, consult factory.<br>Cla-Val manufactures valves in more than 50 different alloys. | | | |

## Dimensions (In inches)




## Model 350-01 Dimensions (In Inches)

| **Valve Size** (Inches) | **1 1/2** | **2** | **2 1/2** | **3** | **4** | **6** | **8** | **10** | **12** | **14** | **16** | **18** | **20** | **24** | **30** | **36** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **A** Threaded | 7.25 | 9.38 | 11.00 | 12.50 | — | — | — | — | — | — | — | — | — | — | — | — |
| **AA** 150 ANSI | 8.50 | 9.38 | 11.00 | 12.00 | 15.00 | 20.00 | 25.38 | 29.75 | 34.00 | 39.00 | 41.38 | 46.00 | 52.00 | 61.50 | 63.00 | 76.00 |
| **AAA** 300 ANSI | 9.00 | 10.00 | 11.62 | 13.25 | 15.62 | 21.00 | 26.38 | 31.12 | 35.50 | 40.50 | 43.50 | 47.64 | 53.62 | 63.24 | 64.50 | 76.00 |
| **AAAA** Grooved End | 8.50 | 9.00 | 11.00 | 12.50 | 15.00 | 20.00 | 25.38 | — | — | — | — | — | — | — | — | — |
| **B** Dia. | 5.62 | 6.62 | 8.00 | 9.12 | 11.50 | 15.75 | 20.00 | 23.62 | 28.00 | 32.75 | 35.50 | 41.50 | 45.00 | 53.16 | 56.00 | 66.00 |
| **C** Max. | 5.50 | 6.50 | 7.56 | 8.19 | 10.62 | 13.38 | 16.00 | 17.12 | 20.88 | 24.19 | 25.00 | 39.06 | 41.90 | 43.93 | 54.60 | 61.50 |
| **CC** Max. Grooved End | 4.75 | 5.75 | 6.88 | 7.25 | 9.31 | 12.12 | 14.62 | — | — | — | — | — | — | — | — | — |
| **D** Threaded | 3.25 | 4.75 | 5.50 | 6.25 | — | — | — | — | — | — | — | — | — | — | — | — |
| **DD** 150 ANSI | 4.00 | 4.75 | 5.50 | 6.00 | 7.50 | 10.00 | 12.69 | 14.88 | 17.00 | 19.50 | 20.81 | — | — | 30.75 | — | — |
| **DDD** 300 ANSI | 4.25 | 5.00 | 5.88 | 6.38 | 7.88 | 10.50 | 13.25 | 15.56 | 17.75 | 20.25 | 21.62 | — | — | 31.62 | — | — |
| **DDDD** Grooved End | — | 4.75 | — | 6.00 | 7.50 | — | — | — | — | — | — | — | — | — | — | — |
| **E** | 1.12 | 1.50 | 1.69 | 2.06 | 3.19 | 4.31 | 5.31 | 9.25 | 10.75 | 12.62 | 15.50 | 12.95 | 15.00 | 17.75 | 21.31 | 24.56 |
| **EE** Grooved End | 2.00 | 2.50 | 2.88 | 3.12 | 4.25 | 6.00 | 7.56 | — | — | — | — | — | — | — | — | — |
| **F** 150 ANSI | 2.50 | 3.00 | 3.50 | 3.75 | 4.50 | 5.50 | 6.75 | 8.00 | 9.50 | 10.50 | 11.75 | 15.00 | 16.50 | 19.25 | 22.50 | 25.60 |
| **FF** 300 ANSI | 3.06 | 3.25 | 3.75 | 4.13 | 5.00 | 6.25 | 7.50 | 8.75 | 10.25 | 11.50 | 12.75 | 15.00 | 16.50 | 19.25 | 24.00 | 25.60 |
| **G** Threaded | 1.88 | 3.25 | 4.00 | 4.50 | — | — | — | — | — | — | — | — | — | — | — | — |
| **GG** 150 ANSI | 4.00 | 3.25 | 4.00 | 4.00 | 5.00 | 6.00 | 8.00 | 8.62 | 13.75 | 14.88 | 15.69 | — | — | 22.06 | — | — |
| **GGG** 300 ANSI | 4.25 | 3.50 | 4.31 | 4.38 | 5.31 | 6.50 | 8.50 | 9.31 | 14.50 | 15.62 | 16.50 | — | — | 22.90 | — | — |
| **GGGG** Grooved End | — | 3.25 | — | 4.25 | 5.00 | — | — | — | — | — | — | — | — | — | — | — |
| **H** NPT Body Tapping | .375 | .375 | .50 | .50 | .75 | .75 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 |
| **J** NPT Cover Center Plug | .25 | .50 | .50 | .50 | .75 | .75 | 1 | 1 | 1.25 | 1.5 | 2 | 1.5 | 1.5 | 1.5 | 2 | 2 |
| **K** NPT Cover Tapping | .375 | .375 | .50 | .50 | .75 | .75 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 |
| Stem Travel | 0.4 | 0.6 | 0.7 | 0.8 | 1.1 | 1.7 | 2.3 | 2.8 | 3.4 | 4.0 | 4.5 | 5.1 | 5.63 | 6.75 | 7.5 | 8.5 |
| Approx. Ship Wt. Lbs. | 15 | 35 | 50 | 70 | 140 | 285 | 500 | 780 | 1165 | 1600 | 2265 | 2982 | 3900 | 6200 | 7703 | 11720 |
| **X** Pilot System | 11 | 13 | 14 | 15 | 17 | 29 | 31 | 33 | 36 | 40 | 40 | 43 | 47 | 68 | 79 | 85 |
| **Y** Pilot System | 9 | 9 | 10 | 11 | 12 | 20 | 22 | 24 | 26 | 29 | 30 | 32 | 34 | 39 | 40 | 45 |
| **Z** Pilot System | 9 | 9 | 10 | 11 | 12 | 20 | 22 | 24 | 26 | 29 | 30 | 32 | 34 | 39 | 42 | 47 |

Note: The top two flange holes on valve size 36 are threaded to 1 1/2"-6 UNC.

## Pressure Ratings (Recommended Maximum Pressure - psi)

| Valve Body & Cover | | Pressure Class | | |
|---|---|---|---|---|
| | | Flanged | | |
| Grade | Material | ANSI Standards* | 150 Class | 300 Class |
| ASTM A536 | Ductile Iron | B16.42 | 250 | 400 |
| ASTM A216-WCB | Cast Steel | B16.5 | 285 | 400 |
| ASTM B62 | Bronze | B16.24 | 225 | 400 |

Note: * ANSI standards are for flange dimensions only.
Flanged valves are available faced but not drilled.
***Valves for higher pressure are available; consult factory for details***

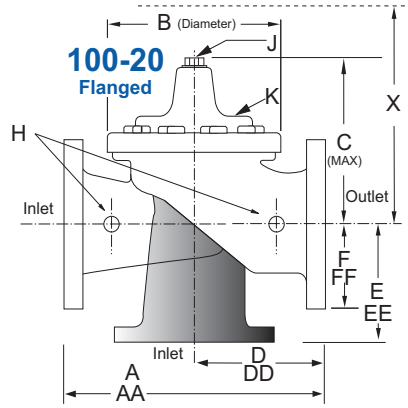
## Materials

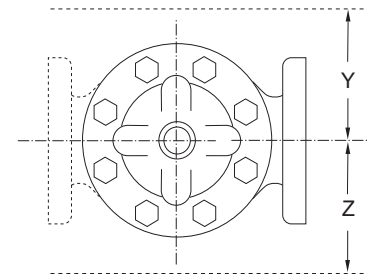
| Component | Standard Material Combinations | | |
|---|---|---|---|
| Body & Cover | Ductile Iron | Cast Steel | Bronze |
| Available Sizes | 3" - 48" | 3" - 16" | 3" - 16" |
| Disc Retainer & Diaphragm Washer | Cast Iron | Cast Steel | Bronze |
| Trim: Disc Guide, Seat & Cover Bearing | Bronze is Standard<br>Stainless Steel is Optional | | |
| Disc | Buna-N® Rubber | | |
| Diaphragm | Nylon Reinforced Buna-N® Rubber | | |
| Stem, Nut & Spring | Stainless Steel | | |

For material options not listed, consult factory.
Cla-Val manufactures valves in more than 50 different alloys.

## Dimensions
(In inches)

**100-20**
**Flanged**




## Model 3650-01 Dimensions (In Inches)

| Valve Size (Inches) | 3 | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 24 | 30 | 36 | 42 | 48 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **A** 150 ANSI | 10.25 | 13.88 | 17.75 | 21.38 | 26.00 | 30.00 | 34.25 | 35.00 | 42.12 | 48.00 | 48.00 | 63.25 | 65.00 | 76.00 | 94.50 |
| **AA** 300 ANSI | 11.00 | 14.50 | 18.62 | 22.38 | 27.38 | 31.50 | 35.75 | 36.62 | 43.63 | 49.62 | 49.75 | 63.75 | 67.00 | 76.00 | 94.50 |
| **B** Dia. | 6.62 | 9.12 | 11.50 | 15.75 | 20.00 | 23.62 | 27.47 | 28.00 | 35.44 | 35.44 | 35.44 | 53.19 | 56.00 | 66.00 | 66.00 |
| **C** Max. | 7.00 | 8.62 | 11.62 | 15.00 | 17.88 | 21.00 | 20.88 | 25.75 | 25.00 | 31.00 | 31.00 | 43.94 | 54.60 | 61.50 | 61.50 |
| **D** 150 ANSI | — | 6.94 | 8.88 | 10.69 | CF* | CF* | CF* | CF* | CF* | CF* | CF* | — | — | — | — |
| **DD** 300 ANSI | — | 7.25 | 9.38 | 11.19 | CF* | CF* | CF* | CF* | CF* | CF* | CF* | — | — | — | — |
| **E** 150 ANSI | — | 5.50 | 6.75 | 7.25 | CF* | CF* | CF* | CF* | CF* | CF* | CF* | — | — | — | — |
| **EE** 300 ANSI | — | 5.81 | 7.25 | 7.75 | CF* | CF* | CF* | CF* | CF* | CF* | CF* | — | — | — | — |
| **F** 150 ANSI | 3.75 | 4.50 | 5.50 | 6.75 | 8.00 | 9.50 | 11.00 | 11.75 | 15.88 | 14.56 | 17.00 | 19.88 | 25.50 | 28.00 | 31.50 |
| **FF** 300 ANSI | 4.12 | 5.00 | 6.25 | 7.50 | 8.75 | 10.25 | 11.50 | 12.75 | 15.88 | 16.06 | 19.00 | 22.00 | 27.50 | 28.00 | 31.50 |
| **H** NPT Body Tapping | .375 | .50 | .75 | .75 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 |
| **J** NPT Cover Center Plug | .50 | .50 | .75 | .75 | 1 | 1 | 1.25 | 1.25 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| **K** NPT Cover Tapping | .375 | .50 | .75 | .75 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 |
| Stem Travel | 0.6 | 0.8 | 1.1 | 1.7 | 2.3 | 2.8 | 3.4 | 3.4 | 3.4 | 4.5 | 4.5 | 6.5 | 7.5 | 8.5 | 8.5 |
| Approx. Ship Wt. Lbs. | 45 | 85 | 195 | 330 | 625 | 900 | 1250 | 1380 | 1500 | 2551 | 2733 | 6500 | 8545 | 12450 | 13100 |
| **X** Pilot System | 13 | 15 | 27 | 30 | 33 | 36 | 36 | 41 | 40 | 46 | 55 | 68 | 79 | 85 | 86 |
| **Y** Pilot System | 10 | 11 | 18 | 20 | 22 | 24 | 26 | 26 | 30 | 30 | 30 | 39 | 40 | 45 | 47 |
| **Z** Pilot System | 10 | 11 | 18 | 20 | 22 | 24 | 26 | 26 | 30 | 30 | 30 | 39 | 42 | 47 | 49 |

*Consult Factory

Note: The top two flange holes on valve sizes 36 thru 48 are threaded to 1 1/2"-6 UNC.

### 350-01/3650-01 Purchase Specifications

The 350-01/3650-01 Electronic Actuated Pressure Sustaining Control Valve shall have an integral hydraulic and electronic controller contained in a NEMA 4 enclosure to provide the interface between remote telemetry and valve control. It will compare a selectable remote analog or local set-point with a process variable signal or internal position sensor signal and automatically adjust the hydraulic pilot control until the main control valve reaches desired set-point.

The electronic actuator will supply loop power for the process variable signal. Retransmission of the process variable shall be with an isolated non-powered analog signal. The actuator speed will be infinitely adjustable between 1/3 and 5 RPM and will have an adjustable dead band. In the event of an erroneous communications signal, actuator output will be capable of being limited to a predetermined process variable value. If these signals (SP and /or PV) are lost, the valve shall remain under control of the pressure sustaining hydraulic control. The actuator can also be programmed to drive the main valve to the open or closed position if these signals are lost.

All setup and adjustments will be capable of being made prior to placing the valve into service using actuator test points for signal measurement and subsequent calibration. Actuator diagnostics will be displayed using LEDs. Manual operation of the hydraulic pilot will be fully adjustable using a non-rotating handwheel.

The Electronic Actuated Pressure Sustaining Control Valve shall be the Cla-Val Model 350-01/3650-01 as manufactured by Cla-Val, Newport Beach, CA.

| 350-01 Valve Selection | 100-01 Pattern: Globe (G), Angle (A), End Connections: Threaded (T), Grooved (GR), Flanged (F) Indicate Available Sizes | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Inches | 1½ | 2 | 2½ | 3 | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 24 | 30 | 36 |
| | mm | 40 | 50 | 65 | 80 | 100 | 150 | 200 | 250 | 300 | 350 | 400 | 450 | 500 | 600 | 750 | 900 |
| Basic Valve 100-01 | Pattern | G, A | G, A | G, A | G, A | G, A | G, A | G, A | G, A | G, A | G, A | G, A | G | G | G, A | G | G |
| | End Detail | T, F, Gr* | T, F, Gr | T, F, Gr* | T, F, Gr | F, Gr | F, Gr* | F, Gr* | F | F | F | F | F | F | F | F | F |
| Suggested Flow (gpm) | Maximum | 125 | 210 | 300 | 460 | 800 | 1800 | 3100 | 4900 | 7000 | 8400 | 11000 | 14000 | 17000 | 25000 | 42000 | 50000 |
| | Maximum Intermittent | 160 | 260 | 370 | 580 | 990 | 2250 | 3900 | 6150 | 8720 | 10540 | 13700 | 17500 | 21700 | 31300 | 48000 | 62500 |
| | Minimum | 1 | 1 | 2 | 2 | 4 | 10 | 15 | 35 | 50 | 70 | 95 | 120 | 150 | 275 | 450 | 650 |
| Suggested Flow (Liters/Sec) | Maximum | 8 | 13 | 19 | 29 | 50 | 113 | 195 | 309 | 442 | 530 | 694 | 883 | 1073 | 1577 | 2650 | 3150 |
| | Maximum Intermittent | 10 | 16 | 23 | 37 | 62 | 142 | 246 | 387 | 549 | 664 | 863 | 1104 | 1369 | 1972 | 3028 | 3940 |
| | Minimum | .03 | .06 | .09 | 0.13 | 0.25 | 0.63 | 0.95 | 2.2 | 3.2 | 4.4 | 6.0 | 7.6 | 9.5 | 17.4 | 28.4 | 41.0 |

**100-01 Series is the full internal port Hytrol.** **For Lower Flows Consult Factory** *Globe Grooved Only

| 3650-01 Valve Selection | 100-20 Pattern: Globe (G), Angle (A), End Connections: Flanged (F) Indicate Available Sizes | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Inches | 3 | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 24 | 30 | 36 | 42 | 48 |
| | mm | 80 | 100 | 150 | 200 | 250 | 300 | 350 | 400 | 450 | 500 | 600 | 750 | 900 | 1000 | 1200 |
| Basic Valve 100-20 | Pattern | G | G, A | G, A | G, A | G | G | G | G | G | G | G | G | G | G | G |
| | End Detail | F | F | F | F | F | F | F | F | F | F | F | F | F | F | F |
| Suggested Flow (gpm) | Maximum | 260 | 580 | 1025 | 2300 | 4100 | 6400 | 9230 | 9230 | 16500 | 16500 | 16500 | 28000 | 33500 | 33500 | 33500 |
| | Minimum | 1 | 2 | 4 | 10 | 15 | 35 | 50 | 50 | 95 | 95 | 95 | 275 | 450 | 450 | 450 |
| Suggested Flow (Liters/Sec) | Maximum | 16 | 37 | 65 | 145 | 258 | 403 | 581 | 581 | 1040 | 1040 | 1040 | 1764 | 2115 | 2115 | 2115 |
| | Minimum | .06 | .13 | .25 | .63 | .95 | 2.2 | 3.2 | 3.2 | 6.0 | 6.0 | 6.0 | 17.4 | 28.4 | 41.0 | 41.0 |

**100-20 Series is the reduced internal port size version of the 100-01 Series.** **For Lower Flows Consult Factory**

We recommend providing adequate space around valve for maintenance work

Many factors should be considered in sizing pressure sustaining valves including inlet pressure, outlet pressure and flow rates. For sizing questions or cavitation analysis, consult Cla-Val with system details.

## Pilot System Specifications

**Adjustment Ranges**

0 to 75 psi
20 to 200 psi

**Temperature Range**

Water: to 180°F

**Materials**

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

Optional Pilot System Materials
Pilot Systems are available with optional Aluminum, Stainless Steel or Monel materials.

Note: Available with remote sensing control.

## When Ordering, Please Specify

1. Catalog No. 350-01 or 3650-01
2. Valve Size
3. Pattern - Globe or Angle
4. Pressure Class
5. Threaded or Flanged
6. Trim Material
7. Adjustment Range
8. Desired Options
9. When Vertically Installed

## Electronic Actuator - CRL-30 Pilot Control

| | |
|---|---|
| **Input Voltage:** | 120/240 Vac +/- 10%, 50/60 Hz |
| **Operating Current:** | 2 Amperes at 120 Vac |
| **Process Variable:** | Field Selectable between 4-20mA transmitter (supplied by others) or internal potentiometer |
| **Loop Power Supply:** | 0-24 VDC |
| **Retransmission:** | Isolated non-powered 4-20mA |
| **Input Signal Monitor:** | If process variable is lost actuator holds in present position, opens or closes, field selectable |
| **Set-Point:** | Field selectable between local and remote 4-20 mA, 0-5 Volt, 0-10 Volt |
| **Manual Adjustment:** | Non-rotating handwheel |
| **Limit Switches:** | Electronic-Full range adjustable |
| **Terminations:** | Terminal blocks accepting up to #16 Awg solid or stranded wire |
| **Operating Temperature:** | 0°F to 150 °F (-18 C to 65 C) |
| **Environmental Rating:** | Enclosure rated NEMA type 4 indoor/outdoor, corrosion resistant aluminum |

CLA-VAL P.O. Box 1325 • Newport Beach, CA 92659-0325 • Phone: 949-722-4800 • Fax: 949-548-5441 • E-mail: claval@cla-val.com • Website cla-val.com

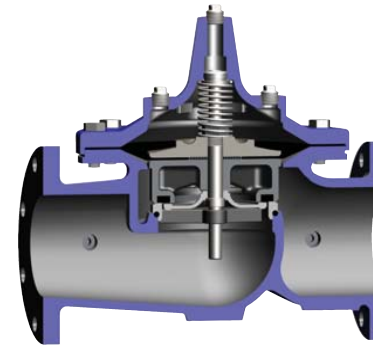
CLA-VAL

# —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.

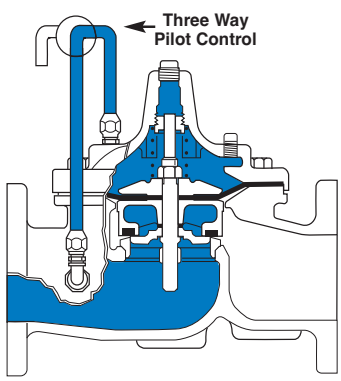
This valve consists of three major components; body, diaphragm assembly, and cover. The diaphragm assembly is the only moving part. The diaphragm assembly uses a diaphragm of nylon fabric bonded with synthetic rubber. A synthetic rubber disc, contained on three and one half sides by a disc retainer and 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.



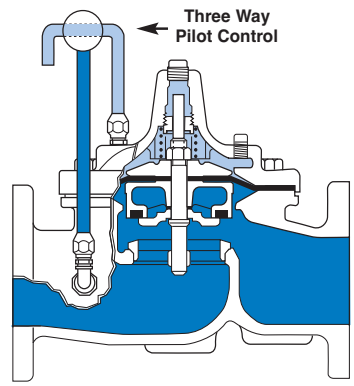
## Installation

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) **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 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 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.

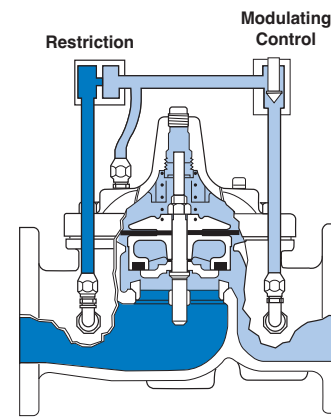
## Principles of Operation




**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.



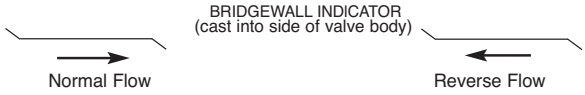

**Full Open Operation**
When pressure in diaphragm chamber is relieved to a zone of lower pressure (usually atmosphere) the line pressure (5 psi Min.) at the valve inlet opens the valve.




**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 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 |
| 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 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 |
| 20 | 500 | 5.6 | 143 |
| 24 | 600 | 6.7 | 165 |
| 30 | 800 | 7.5 | 190 |
| 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

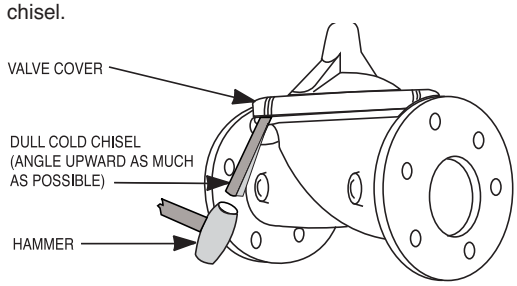
Inspection or maintenance can be accomplished without removing the valve from the line. Repair kits with new diaphragm and disc are recommended to be on hand before work begins.

**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" |
| 20” & 24" | 2" |
| 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 | 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 |
| 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.

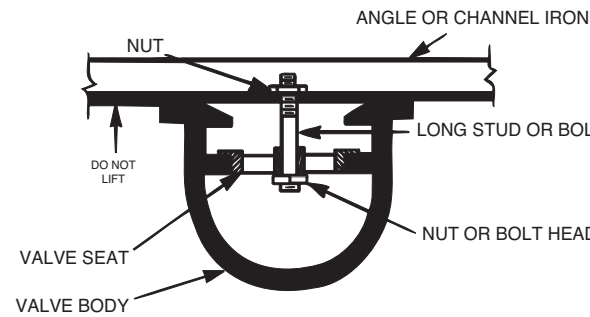
The use of a pipe wrench or a vise without soft brass jaws scars the fine finish on the stem. No amount of careful dressing can restore the stem to its original condition. Damage to the finish of the stem can cause the stem to bind in the bearings and the valve will not open or close.

**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.)

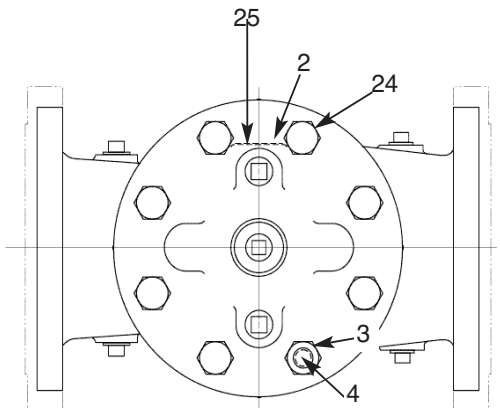
Due to the weight of the diaphragm assembly this procedure is not possible on valves 8" and larger. on these valves, the same determination can be made by carefully introducing a low pressure-less than five psi) into the valve body with the cover vented. **SEE CAUTION**. Looking in cover center hole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

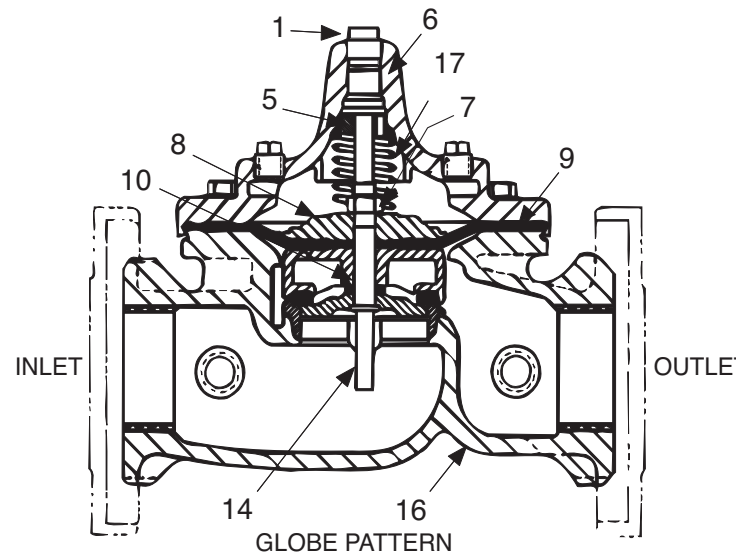
**3**. With the line connected from the inlet to the cover, apply full working pressure to the inlet. Check all around the cover for any leaks. Re-tighten cover nuts if necessary to stop leaks past the diaphragm.

**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.



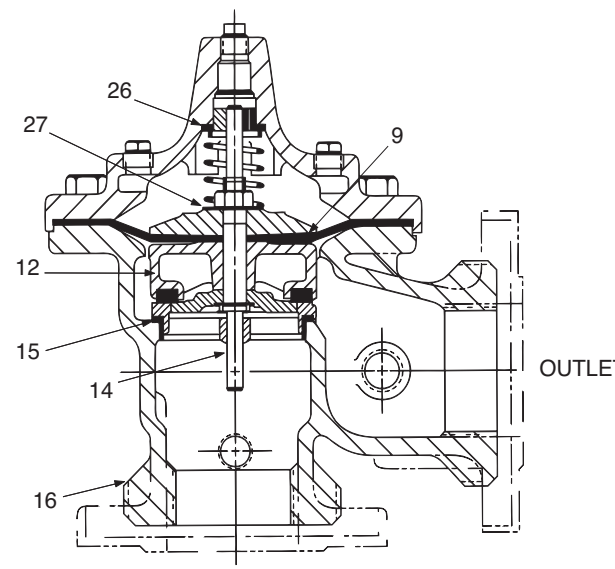

TOP VIEW



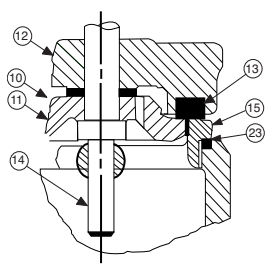

GLOBE PATTERN

## PARTS LIST

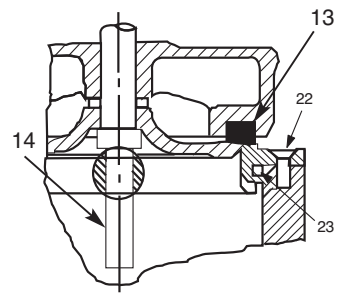
| Item | Description |
|---|---|
| 1. | Pipe Plug |
| 2. | Drive Screws (for nameplate) |
| 3. | Hex Nut (8” and larger) |
| 4. | Stud (8” and larger) |
| 5. | Cover Bearing |
| 6. | Cover |
| 7. | Stem Nut |
| 8. | Diaphragm Washer |
| 9. | Diaphragm |
| 10. | Spacer Washers |
| 11. | Disc Guide |
| 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) |



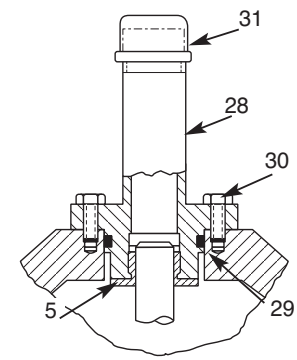

INLET
ANGLE PATTERN




1 1/4" - 6" SEAT DETAIL




8" - 24" SEAT DETAIL




16" COVER DETAIL

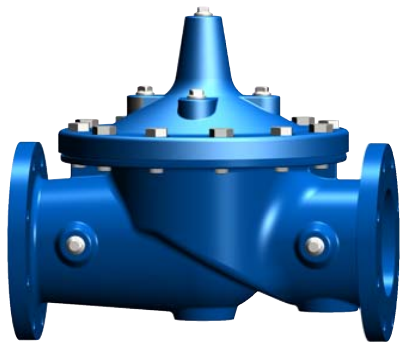
CLA-VAL

# —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

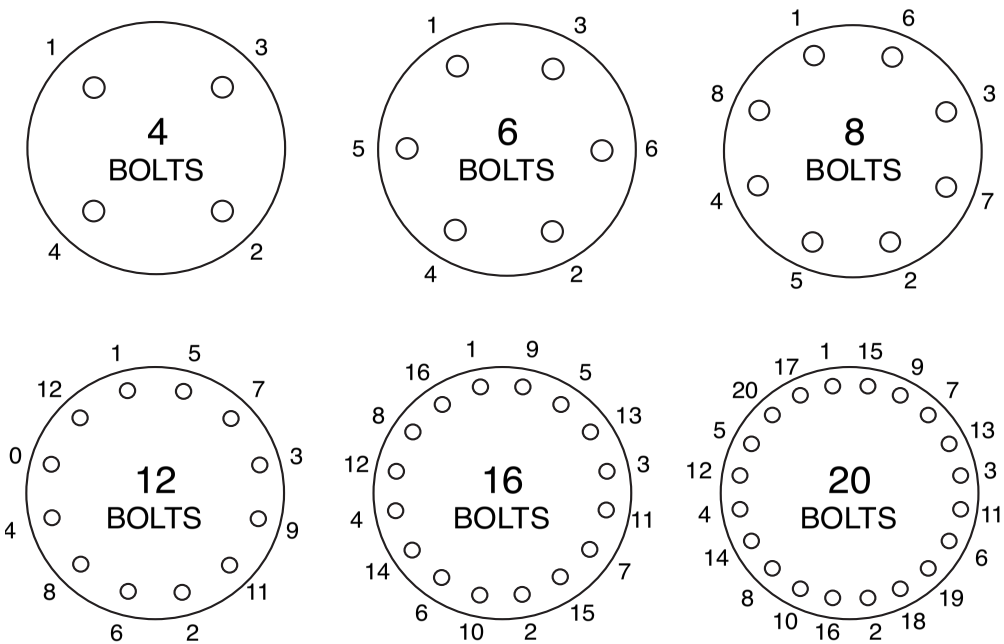
| HYTROL SIZE | | | | Stem Travel | | Cover Capacity Displacement | | Valve Stem Thread UNF-Internal | Cover Center Plug NPT | Cover Nut or Bolt | | | Cover Lifting Holes UNC | Cover Plug | | Cover Torque | | Stem Nut** | | Stem Nut Torque (ft. Lbs.) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 100-01 | | 100-20 | | | | | | | | Thread (Bolt) | Socket | Qty | | Thread | Socket | ft. Lbs. | in. Lbs. | Thread | Socket (Long) | Lubed | DRY |
| inches | mm | inches | mm | inches | mm | Gallons | Liters | | | | | | | | | | | | | | |
| 1" | 25 | | | 0.3 | 8 | | | | 1/4" | 1/4" - 20 (B) | 7/16" | 8 | | | | 4 | 48 | 3/8" - 24 | | 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 | 4" | 100 | 0.8 | 20 | 0.080 | 0.30 | 1/4 - 28 | 1/2" | 1/2" - 13 (B) | 3/4" | 8 | | 1/2" | 9/16" | 30 | | 5/8" - 18 | 15/16" | 21 | 30 |
| 4" | 100 | 6" | 150 | 1.1 | 23 | 0.169 | 0.64 | 1/4 - 28 | 3/4" | 3/4" - 10 (B) | 1 1/8" | 8 | | 3/4" | 5/8" | 110 | | 3/4" - 16 | 1 1/16" | 40 | 60 |
| 6" | 150 | 8" | 200 | 1.7 | 43 | 0.531 | 2.00 | 3/8 - 24 | 3/4" | 3/4" - 10 (B) | 1 1/8" | 12 | | 3/4" | 5/8" | 110 | | 7/8" - 14 | 1 5/16" | 85 | 125 |
| 8" | 200 | 10" | 250 | 2.3 | 58 | 1.26 | 4.80 | 3/8 - 24 | 1" | 3/4" - 10 | 1 1/4" | 16 | 5/8" - 11 | 1" | 13/16" | 110 | | 1 1/8" -12 | 1 13/16" | 125 | 185 |
| 10" | 250 | 12" | 300 | 2.8 | 71 | 2.51 | 9.50 | 3/8 - 24 | 1" | 7/8" - 9 | 1 7/16" | 20 | 3/4" - 10 | 1" | 13/16" | 160 | | 1 1/2" -12 | 1 7/8" | 252 | 375 |
| 12" | 300 | 16" | 400 | 3.4 | 86 | 4.0 | 15.10 | 3/8 - 24 | 1 1/4" | 1 1/8" - 7 | 1 13/16" | 20 | 3/4" - 10 | 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 | 1 1/2" | 1 1/4" - 7 | 2" | 20 | 1" - 8 | 1" | 13/16" | 545 | | 1 1/2" -12 | 2 1/2" | 280 | 420 |
| 16" | 400 | 20", 24" | 600 | 4.5 | 114 | 9.6 | 36.20 | 1/2 - 20 | 2" | 1 1/4" - 7 | 2" | 20 | 1" - 8 | 1" | 13/16" | 545 | | 2" - 16 | 3" | 500 | 750 |
| 20" | 500 | | | 5.63 | 143 | 12 | 45.40 | 3/4 - 16 | 1 1/2" | 1 3/8" - 6 | 2 1/8" | 24 | 1" - 8 | 1" | 13/16" | 670 | | 2 1/4" - 16 | 3 1/2" | 930 | N/R |
| 24" | 600 | 30" | 800 | 6.75 | 165 | 29.0 | 108.80 | 3/4 - 16* | 3/4" | 1 1/2" - 12 | 2 3/8" | 24 | 1 1/8"- 7 | 1" | 13/16" | 800 | | 3" - 12 | Special | 1350 | N/R |

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

Grade 5 Bolts "Heavy" Grade Nuts Tighten cover nuts in a "star" cross-over pattern

** Must Use ONLY Cla-Val Supplied part

## BOLT/NUT TORQUING PROCEDURES ON VALVE COVERS




Follow this procedure when reassembling MAIN Valve:

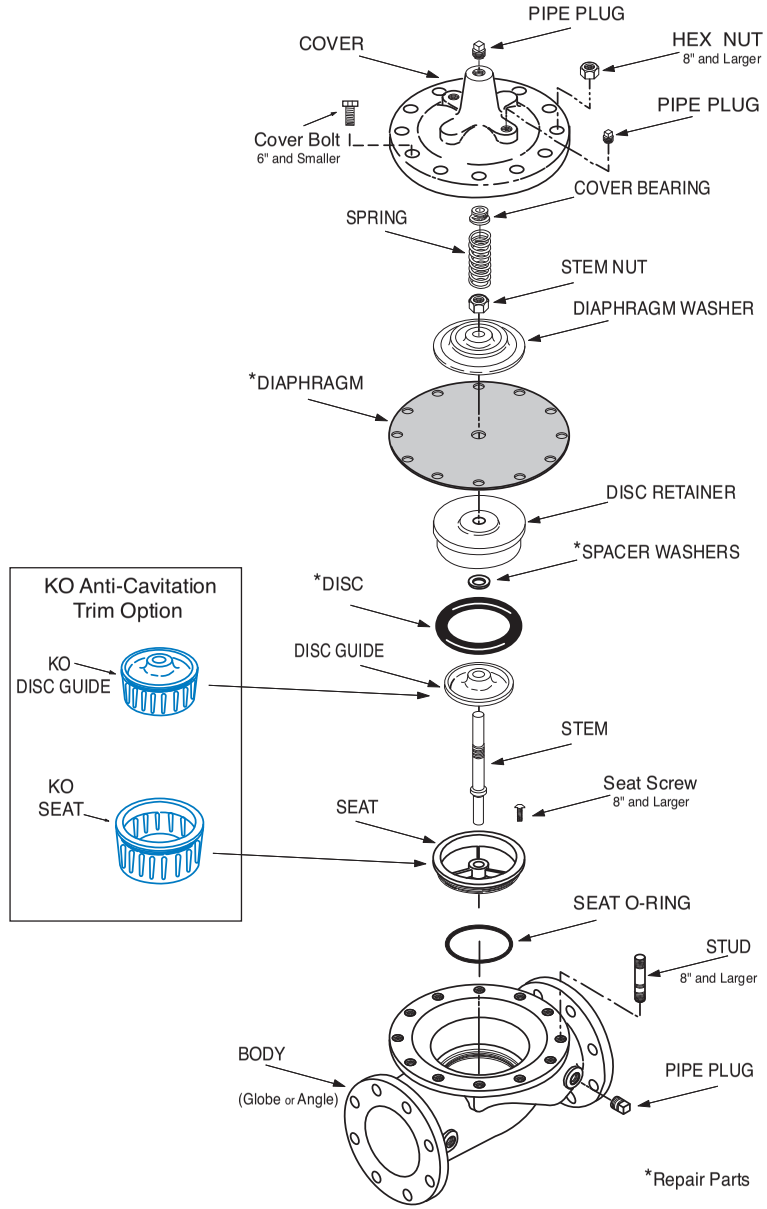
1. Tightens bolts/nuts in a “Star” or “Cross-Over” pattern following the numbers shown above to insure that cover seats evenly on the diaphragm material and body.

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

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

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

## 100-01 Hytrol Main Valve Assembly



CLA-VAL

— 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.

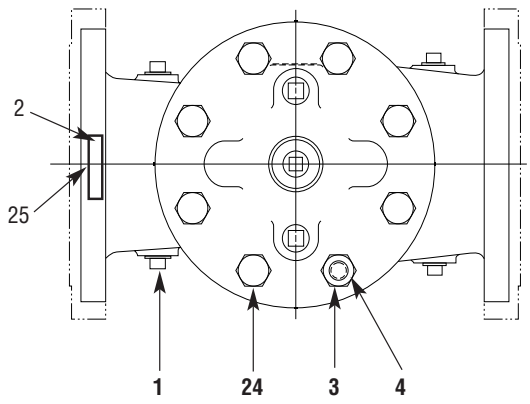
| Basic Main Valve Size Comparison | | |
|---|---|---|
| Globe Pattern Valves | | |
| Flange Size (inch) | Seat Size | |
| | 100-01 (100 Series) | 100-20 (600 Series) |
| 3 | 3 | 2 |
| 4 | 4 | 3 |
| 6 | 6 | 4 |
| 8 | 8 | 6 |
| 10 | 10 | 8 |
| 12 | 12 | 10 |
| 14 | 14 | ---- |
| 16 | 16 | 12 |
| 18 |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

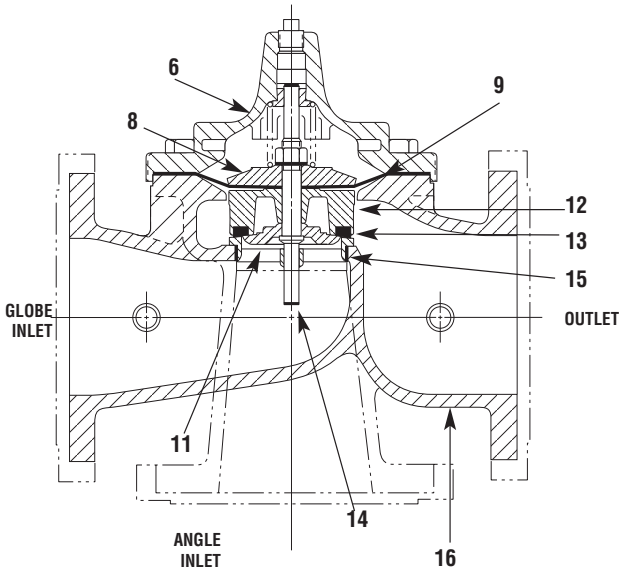
**Cla-Val Main Valves**

| | Catalog Number | | |
|---|---|---|---|
| Catalog Name | 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

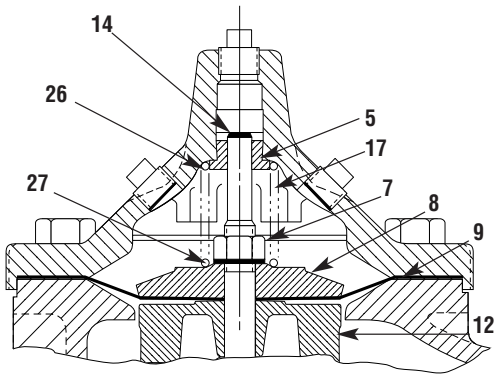



TOP VIEW

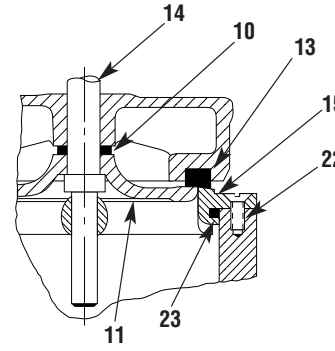



| PARTS LIST | |
|---|---|
| **NO.** | **DESCRIPTION** |
| 1 | Pipe Plug |
| 2 | Drive Screws (for nameplate) |
| 3 | Hex Nut (8" and larger) |
| 4 | Stud (8" and larger) |
| 5 | Cover Bearing |
| 6 | Cover |
| 7 | Stem Nut |
| 8 | Diaphragm Washer |
| 9 | Diaphragm |
| 10 | Spacer Washers |
| 11 | Disc 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"") |

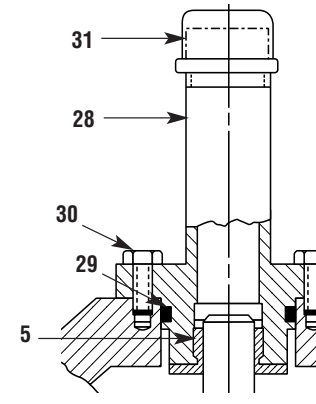
**WHEN ORDERING PARTS, BE SURE TO GIVE COMPLETE NAMEPLATE DATA, ITEM NUMBER AND DESCRIPTION.**




3" — 6" COVER DETAIL




10" — 24" SEAT DETAIL




20" — 24" COVER DETAIL

# Technical Bulletin

## 300 Series (Multi-Mode) Electronic Actuated Pilot Controls

### Introduction

CDB-30, CDHS-30, CRA-30, CRD-30, and CRL-30 are pilot controls used in Cla-Val 300 Series Electronic Actuated Control Valves. These controls offer the same functional control of the valve as existing pilot controls, along with additional remote electronic setpoint adjustment capabilities. The new pilot controls consist of a modified pilot control (sub-assembly), a 130VC Electronic Actuator and mounting components.

### I. O. M. Information

**A.** For Installation, Operation and Maintenance information only on the 130VC Electronic Actuator (p/n 20091401A), use data in N-130VC sheets included with this manual. *This document also includes wiring diagrams for electronic interface connections.*

**B.** For Installation, Operation and Maintenance information only on the pilot sub-assembly use data in the appropriate N-sheet for the manually adjusted pilot control. Since the 130VC 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 Control Drawing | Sub-Assembly IOM (ref. only) | Sub-Assembly Drawing | Sub-Assembly Repair Kit |
|---|---|---|---|---|
| CDB-30 | 201936 | N-CDB7 | 201935 | 9170023H |
| CDHS-30 | 201318 | N-CDHS18 | 76832 | 20287401E |
| CRA-30 | 202993 | N-CRA | 202990 | 9170001D |
| CRD-30 | 200915 | N-CRD | 201606 | 9170002B |
| CRL-30 | 201284 | N-CRL5A | 201597 | 20666E |

**C.** Additional service notes:

1. Before disassembly, first adjust pilot control electronically to minimum setting. This will retain full adjustment range for actuator and pilot sub-assembly when reassembled.
2. Remove four screws and washers along with 130VC Actuator with coupler attached from assembly bracket. Use care when removing or installing pilot sub-assembly and actuator to bracket. See Pilot drawing.
3. Do not lubricate coupler slot and pilot adjusting screw connection. A small amount of grease is only on adjusting screw of the pilot sub-assembly. See Sub-Assembly drawing.
4. After servicing the pilot sub-assembly, re-establish the initial factory default settings of actuator and pilot assembly. Follow page two of N-130VC sheet instructions.
5. Check that both sets of coupler setscrews are tight to the two flats on output shaft of the 130VC actuator before installing on bracket and connecting to pilot sub-assembly. A second set of setscrews lock the first ones in place. Install pilot sub-assembly to bracket first, then line up coupler and pilot control adjusting screw while installing actuator to bracket.

CLA-VAL

— MODEL — **130VC**

# Electronic Actuator

## *Table of Contents*





CLA-VAL

## 130 Series Actuator Start Up Procedures

**Introduction**

It is recommended that this manual is read before applying power to the actuator and start up is attempted. It will take you step by step through:

- **Modes of operation**
- **Factory configured default settings**
- **Configuration procedures**
- **Setup procedures**
- **Diagnostics**
- **Electrical components and wiring information**

**For specific information on the pilot(s) and control valve being actuated, consult the appropriate section of the Instruction Operation and Maintenance Manual (i.e. CRD-30, CRL-30, 90-01, etc.).**

There are two separate methods of remote operation possible with the actuator. These are remote automatic and remote manual.

The remote automatic mode can use an external process variable or an internal potentiometer as the feedback signal.

Enable either one by changing the wiring on TB4 terminal strip (see pages 8,9 and 10).

**Remote automatic mode.** In this mode the actuator will typically position in the increasing direction when the setpoint (local or remote) is greater than the process variable (external PV or internal potentiometer). The actuator will continue to increase until the process variable is equal to the setpoint, the actuator maximum travel position (span) is reached or the process variable has reached a value equal to the maximum process variable limit.

The actuator will also decrease when the setpoint is lower than the process variable value. The actuator will continue to decrease until the process variable is equal to the setpoint, the actuator minimum position (zero) is reached or the process variable has reached a value equal to the minimum process variable range limit.

**Remote manual mode.** In this mode the actuator can be positioned between the minimum actuator position (zero) and the maximum actuator position (span) using dry contact closures supplied from an external source.

**Factory default setting information.**

The actuator, if new and factory installed on a hydraulic pilot, has been configured to specific default settings and preset at minimum actuator position. If these settings are appropriate for your application, then further configuration may not be required.

If new and not installed, these default settings will still be present, however some adjustment to the hydraulic control will be required. It will be necessary to turn the adjusting stem of the hydraulic control counter clockwise to the minimum spring setting before the actuator is installed. This will insure that the minimum spring setting of the hydraulic pilot is equal to the minimum setting of the actuator.

If previously in service and settings are unknown, the unit should be completely reconfigured and the procedure for the hydraulic control adjusting stem, as described above, should be followed.

**Default settings.**

- Actuator power: 120 VAC
- Direction: Reverse acting (clockwise rotation when process variable is less than setpoint)
- Speed: 1/2 RPM
- Loss of remote setpoint or process variable: Actuator locks in place.
- setpoint type: 4-20 mA
- Zero (minimum) actuator position: Set at minimum CCW position
- Span (maximum) actuator position: Set at 8 turns CW from minimum CCW position
- Minimum process variable range limit: 4.0 mA
- Maximum process variable range limit: 20.0 mA
- Actuator set to minimum 4.0 mA position

**1 Configuration procedures for remote automatic mode**

This section contains the configuration and setup procedures for the **remote automatic mode** only. Use these steps to establish or change some or all of the default settings.

Remove cover using a 3/16 inch Allen wrench.

**Main Power Supply Selection.**

The AC input voltage must be selected prior to powering up the actuator. After cover removal, locate the main switch on the power supply board (see power supply terminal diagram). Slide the switch to the position corresponding to the correct input line voltage.

Right for 120 VAC.
Left for 240 VAC.

**Direction of Rotation.**

The direction is determined by the position of switch #1. When this switch is in the down position indicating reverse acting, the actuator will rotate clockwise when an increasing command is given. When the switch is in the up position indicating direct acting, the actuator will rotate counter clockwise when an increasing command is given. **Default setting is reverse acting.**

**Actuator speed.**

Turning the speed potentiometer to the desired value will set actuator speed. Increase is CW and decrease is CCW. **Default setting is 1/2 RPM.**

**Loss of Signal Conditions.**

The actuator will respond differently during loss of signal conditions. It will lock in place, rotate fully to the lowest limit of actuator travel (zero position) or rotate fully to the highest limit of actuator travel (span position). A loss of signal condition occurs when the setpoint signal or the process variable is not present. **Default setting is lock in place.**

| SW - 2 | SW- 3 | LOS Function |
|---|---|---|
| UP | UP | The actuator will lock in place during LOS conditions. |
| DOWN | UP | The actuator will go to the minimum zero CCW position during LOS conditions |
| UP | DOWN | The actuator will go to the maximum span CW position during LOS condition |

**Setpoint Command Signal.**

The setpoint command signal can accept a 4 – 20 mA current loop, 0 – 5 volt, 0 – 10 volt or a local setpoint. **Default setting is with 4 – 20 mA enabled.**

| Switch number | Enable | Function |
|---|---|---|
| SW1 – 5 | DOWN | Used to enable the 0 - 5 V setpoint (this must be used in conjunction with SW1 – 7 which must be down) |
| SW1 – 6 | DOWN | Used to enable the 4 to 20 ma setpoint |
| SW1 – 7 | DOWN | Used to enable the 0 to 10 v setpoint (this must be used in conjunction with SW1 – 5 which must be up) |
| SW1 – 8 | DOWN | Used to enable the local setpoint. In this mode the actuator will use a manually adjusted setpoint. |

**Setup Mode.**

The setup of the actuator consists of the setting the lowest limit of actuator travel (zero position), the highest limit of actuator travel (span position), the minimum process variable range limit and the maximum process variable range limit.

Placing switch #4 (setup mode) in the down position enables the setup mode. Actuator travel can then be increased using the blue push button and decreased using the yellow push button to any position.

**While in this mode, all remote commands given to the actuator will be temporarily disabled.**

**Setting the minimum actuator position.**
**External Process variable**

Position the actuator using the increase or decrease push button to the desired minimum position. Press the red enable and the blue zero push buttons at the same time. The LED light directly underneath the blue zero push button will illuminate confirming the setting. **Default setting is minimum CCW position.**

**Setting the maximum actuator position.**
**External Process variable mode**

Position the actuator using the increase or decrease push button to the desired maximum position. Press the red enable and yellow span push buttons at the same time. The LED adjacent to the yellow span push button will illuminate confirming the setting. **Default setting is 8 turns from minimum CCW position.**

**Setting the 4 milliamp actuator position**
**internal potentiometer mode** (if used)

Position the actuator to the minimum system value using the increase or decrease push button. Press the red enable and the blue zero push buttons at the same time. This sets the value at 4 mA.

**Setting the 20 milliamp actuator position**
**Internal potentiometer mode** (if used)

Position the actuator to the maximum system value using the increase or decrease push button. Press the red enable and the yellow span buttons at the same time. This sets the valve 20 mA.

It is highly recommended that a minimum of one pilot spring revolution be used between the 4 and 20 milliamps values.

**Setting the minimum process variable limit.**
**External process variable mode only**

Method one: Using the system process variable.
Set the minimum process variable limit by reducing the actual system dynamic (i.e. pressure, flow etc.) to the desired value. This can be done by pressing the actuator increase or decrease push button to attain the desired minimum process variable. When achieved, press the red enable and black LS1 push buttons at the same time. The LED adjacent to the black LS1 push button will illuminate confirming the setting. **Default setting is 4 mA.**

Method two: Applies only to external PV using a milliamp calibrator (if process variable cannot be changed or is not in service).
Disconnect the actual process variable wires located on the logic board (including jumper on terminals 11 and 12 if used) and connect a milliamp calibrator to the process variable input terminals 10 (+) and 11 (-). Use a milliamp value corresponding to the desired minimum process variable limit (i.e. 25 psi = 8 mA, if transducer range is 0 -100 psi). This must be at least 4 mA. Press the red enable and black LS1 push buttons at the same time. The LED adjacent to the black LS1 push button will illuminate to confirm the setting. **Default setting is 4 mA.**

**Setting the maximum process variable limit.**

Method one: Using the system process variable.
Set the maximum process variable limit by increasing the actual system dynamic (i.e. pressure, flow etc.) to the desired value. This can be done by pressing the actuator increase or decrease push button to attain the desired maximum process variable. When achieved, press the red enable and the white LS2 push buttons at the same time. The LED directly underneath will illuminate to confirm the setting. **Default setting is 20 mA.**

Method two: Applies only to external PV using a milliamp calibrator (if process variable cannot be changed or is not in service).
Disconnect the actual process variable wires located on the logic board (including jumper on terminals 11 and 12 if used) and connect a milliamp calibrator to the process variable input terminals 10 (+) and 11 (-). Use a milliamp value corresponding to the desired maximum process variable limit (i.e. 75 psi = 16mA, if transducer range is 0-100 psi). This must be 20mA or less. Press the red enable and the white LS2 push buttons at the same time. The LED directly underneath will illuminate to confirm the setting. **Default setting is 20 mA.**

**Setup Complete.**

Once the setup of the actuator has been completed, the setup mode selector must be turned off. This can be accomplished by placing switch #4 into the up position. The actuator is now in remote automatic operation and actuator movement will begin immediately.

**2 Configuration procedures for remote manual mode.**

Remove cover using a 3/16 inch Allen wrench.

In this mode, movement of the actuator is by dry contact closures (supplied by others). Only the direction of rotation, speed of rotation and actuator minimum and maximum positions require setting. Use the following steps to establish or change some or all of the default settings.

**Main Power Supply Selection.**

The AC input voltage must be selected prior to powering up the actuator. After cover removal, locate the main switch located on the power supply board (see power supply terminal diagram). Slide the switch to the position corresponding to the correct input line voltage. **Default is 120VAC**

Right for 120 VAC.
Left for 240 VAC.

**Direction of Rotation.**

The direction is determined by the position of switch #1. When this switch is in the down position indicating reverse acting, the actuator will rotate clockwise when an increasing command is given. When the switch is in the up position indicating direct acting, the actuator will rotate counter-clockwise when an increasing command is given.
**Default setting is reverse acting.**

**Setting the actuator speed.**

Turning the speed potentiometer to the desired value can set actuator speed. Increase is CW and decrease is CCW. **Default setting is 1/2 RPM.**

**Setup Mode.**

The setup consists of setting the lowest limit of actuator travel (zero position) and the highest limit of actuator travel (span position). Placing switch #4 (setup mode) in the down position enables the setup mode. Actuator travel can then be increased using the blue push button and decreased using the yellow push button to any position. While in this mode, all remote commands given to the actuator will be temporarily disabled.

**Setting the minimum actuator position.**

Position the actuator using the increase or decrease push button to the desired minimum position. Press the red enable and the blue zero push buttons at the same time. The LED light directly underneath the blue zero push button will illuminate confirming the setting. **Default setting is minimum CCW position.**

**Setting the maximum actuator position.**

Position the actuator using the increase or decrease push button to the desired maximum position. Press the red enable and yellow span push buttons at the same time. The LED adjacent to the yellow span push button will illuminate confirming the setting. **Default setting is 8 turns from minimum CCW position.**

**Setup Complete.**

Once the setup of the actuator has been completed, the setup mode selector must be turned off. This can be accomplished by placing switch #4 into the up position. The actuator is now in remote manual mode and actuator movement will begin upon contact closure.

**3 Diagnostics**

The actuator contains two types of diagnostics. LED indication and voltage meter test ports.

**LED indication.**

LEDs are provided to display the status of the actuator. They are located on the logic board. Their functions are shown in the following table.

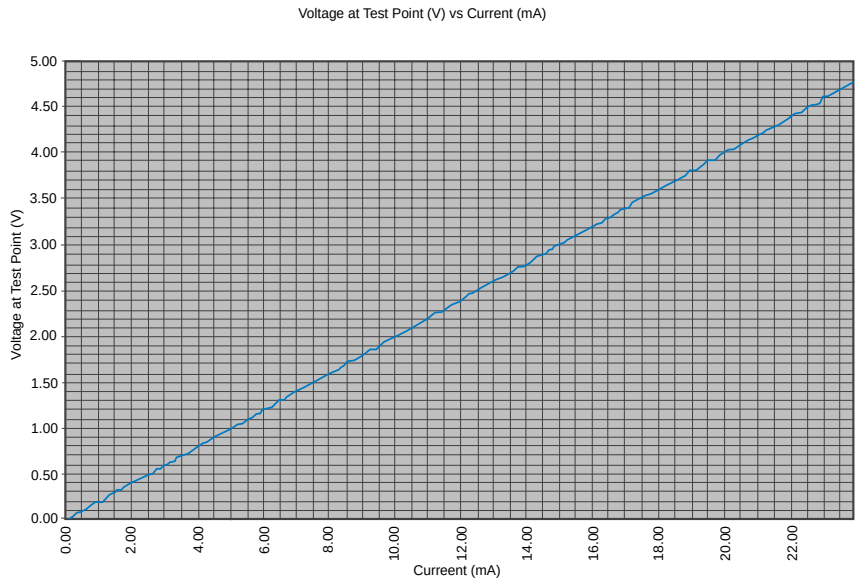
| LED | Function |
|---|---|
| Microprocessor running | This LED is on when power is applied to the microprocessor, and the microprocessor is running. If LED is not on, then verify power to the board, as well as the SW1 setting on the top board |
| Actuator Increasing | This LED is on when the actuator is moving in the increasing direction |
| Actuator Decreasing | This LED is on when the actuator is mowing in the decreasing direction. |
| Fault | This LED will flash when a fault is present. The LED will flash at a given rate. If the LED is flashing at 0.5 second intervals, then a LOS for the remote setpoint is present. If the LED is flashing at 1 second intervals, then a LOS for the process variable is present. If the LED is flashing a 2 second intervals, then the remote operation is disabled because the zero and span positions have not been set. |
| Red Enable Button | This LED will be on when the enable button and one of the other four setup push buttons have been pressed at the same time |
| Minimum Position | This LED will be on when the actuator is at or below its set minimum position. |
| LS1 Position | This LED will be on when the process variable is at or below its minimum value. |
| LS2 Position | This LED will be on when the process variable is at or above its maximum value. |
| Maximum Position | This LED will be on when the actuator is at or above its maximum position. |

**Tests using voltage meter.**

There are four test points located on the logic board. The black test point labeled COM is used for the common connection. Connect a voltage meter to the COM and the appropriate test point. The values of the four red test points are shown in the following table:

| Test Point | Function | Range |
|---|---|---|
| SPD<br>See Figure #4 | Speed of the actuator. | A value of 0 to 5 volts will be displayed. |
| PSN | The position of the actuator. | A value of 4.49 to 1.57 volts will be displayed<br>4.49V is minimum and 1.57V is maximum position |
| CMD | The setpoint command. | If 4 to 20ma current is selected, 0.8 volts to 4 will be displayed. If 0 to 5 volts, 0 to 10 or local setpoint volts is selected, then 0 to 5 volts will be displayed. |
| PV | The process variable. | Input is 4 to 20ma only and a value 0.8 volts to 4 volts will be displayed. |

## Voltage at Test Point vs. Current (mA)



## 4 Wiring information

**Wiring of remote automatic and remote manual operation.**

There are two modes of remote operation possible with the actuator. They are remote automatic mode and remote manual mode. The wiring diagrams for each are shown separately.

**Remote Automatic Actuator Wiring (when using an external process variable)**

Use the following procedures when interfacing this actuator with ancillary instrumentation components. This arrangement has been thoroughly tested and insures that problems associated with ground loops are avoided.

A. Wire the process variable transmitter directly to the actuator, using the actuator's internal power supply.

B. Retransmit the process variable signal using the terminals 9&10 on TB2 These outputs are isolated and must be externally powered.

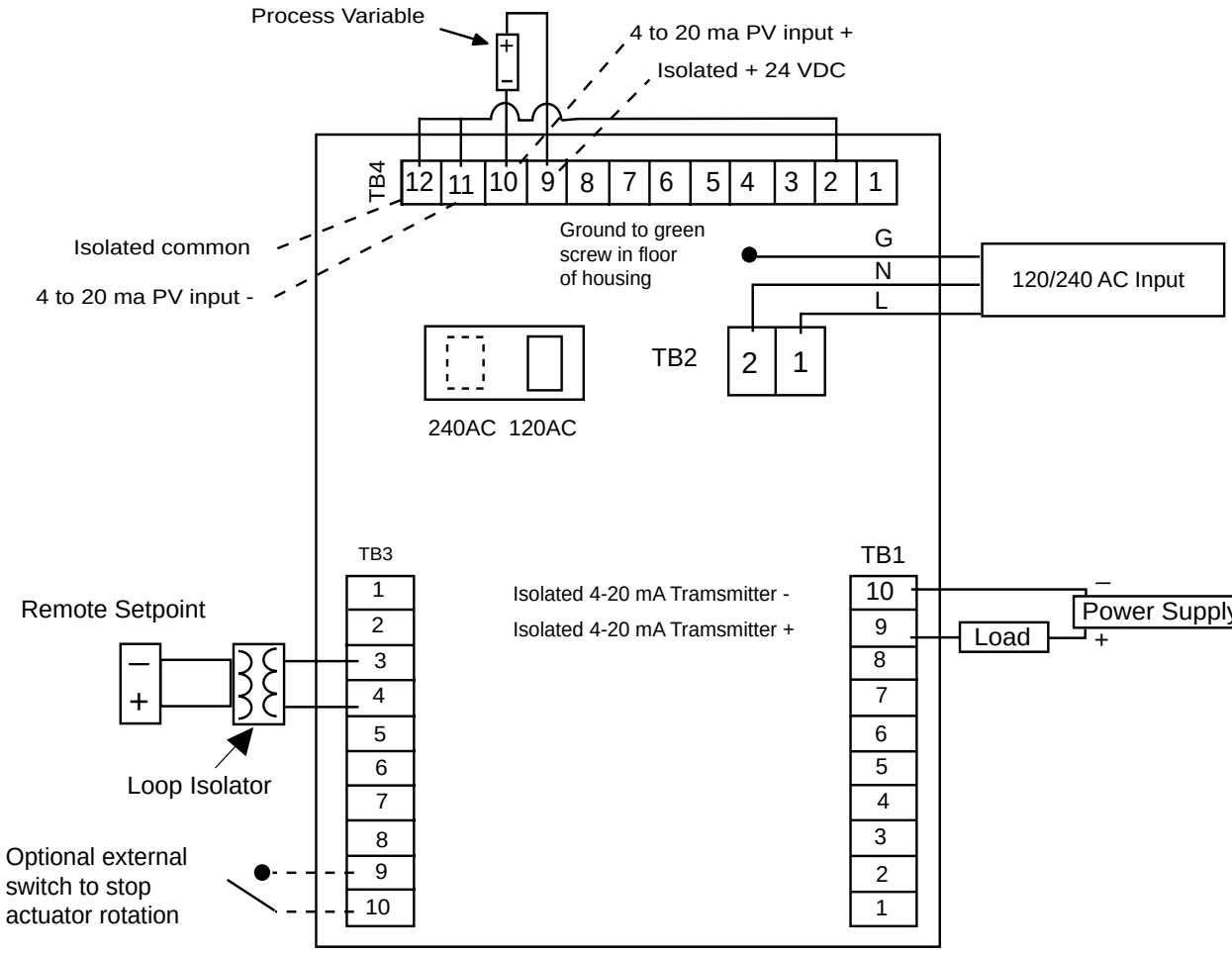
C. Use isolator when remote setpoint is used.

D. Use isolator when externally powering process variable.

Avoid whenever possible the "sharing" or "breaking-into" the process-variable loop wiring unless an optical isolator is used.

# Remote Automatic Mode

## Using external PV and internal power supply to power 4-20 mA loop



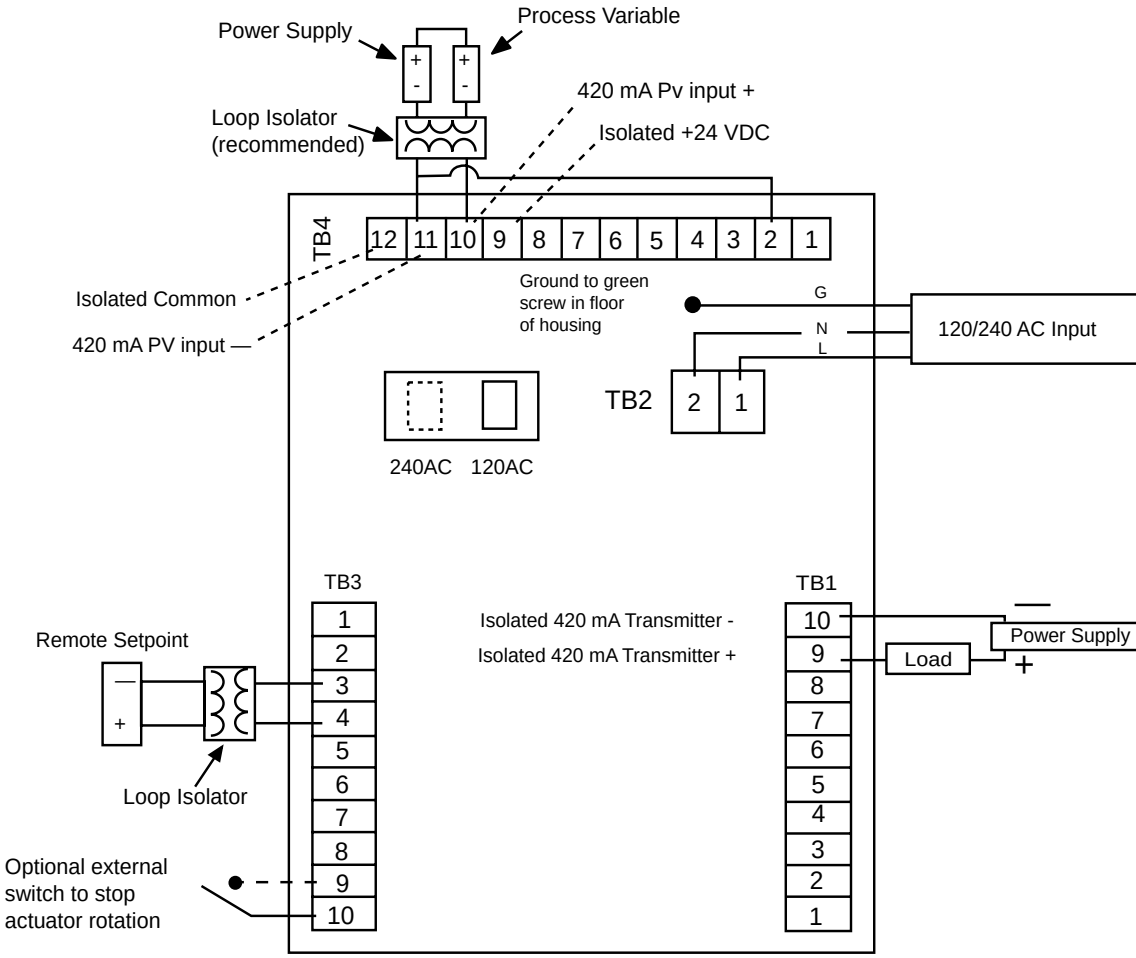

1. Remote setpoint must be isolated and powered from external source

2. PV retransmission requires an external power supply within 12 to 36 VDC . Maximum load = (Power supply VDC 8 VDC) / .020 A.

3. A switch may be placed between terminals 9 and 10 on **TB3** to interrupt actuator travel. Contact between 9 and 10 will stop actuator movement.
**DO NOT POWER.**

# Remote Automatic Mode

## Using external PV and external power supply to power 4-20 mA loop



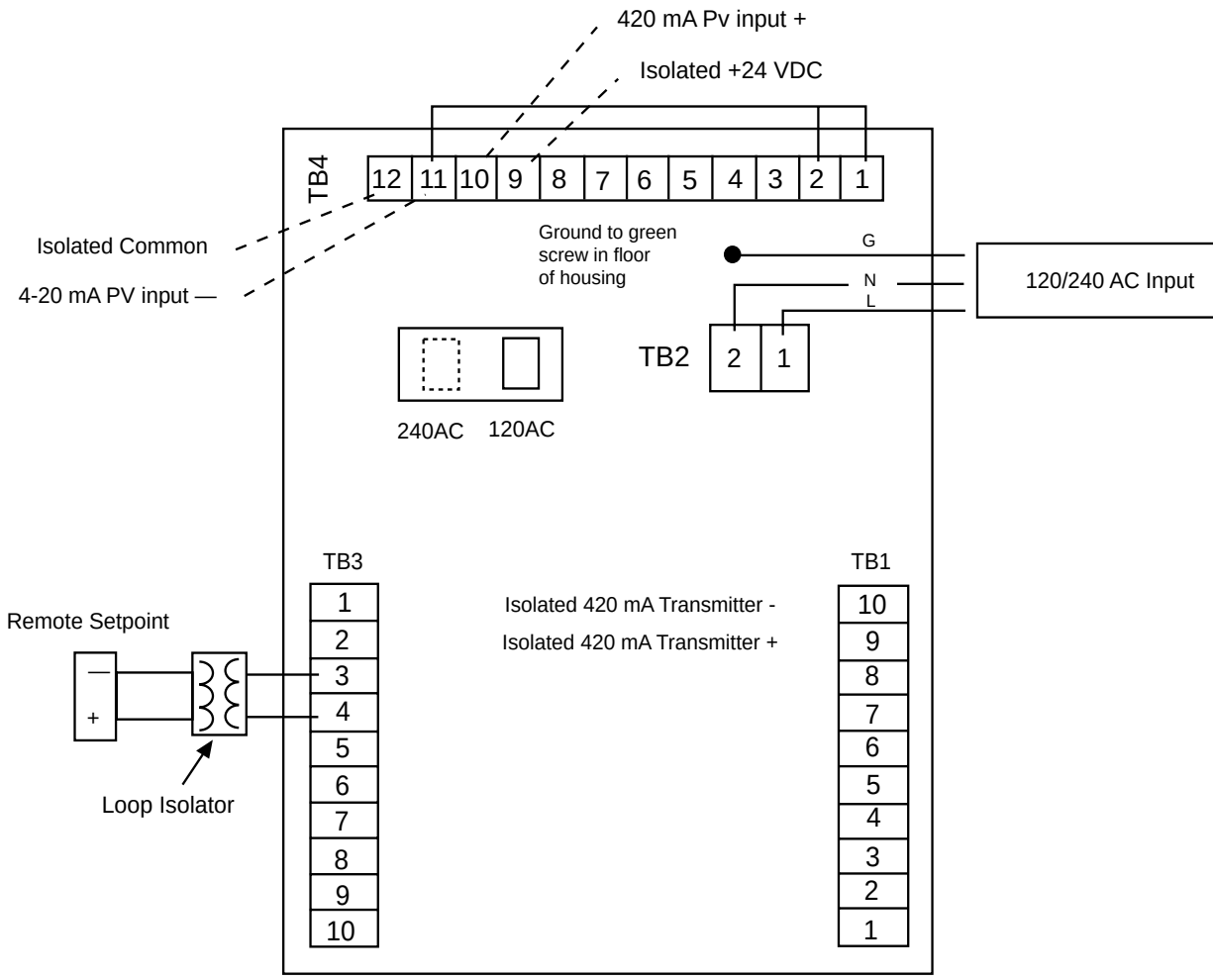

1. Remote setpoint must be isolated and powered from ecternal source.

2. PV retransmission requires an external power supply within 12 to 36 VDC.
Maximum load = (Power supply VDC - 8 VDC) / .020A.

3. A switch may be placed between terminals 9 and 10 on **TB3** to interrupt actuator travel. Contact between 9 and 10 will stop actuator movement.
**DO NOT POWER.**

# Remote Automatic Mode

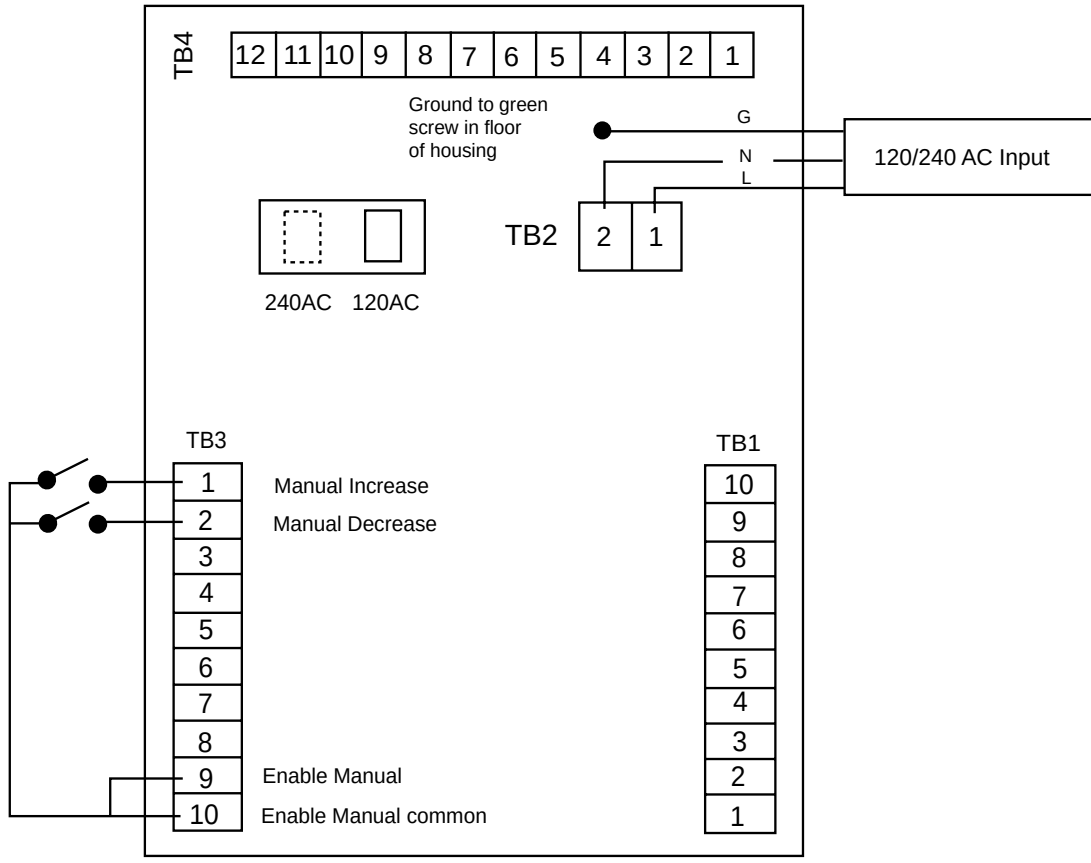
## Using internal potentiometer as Process Variable




1. Remote setpoint must be isolated and powered from ecternal source.

2. PV retransmission requires an external power supply within 12 to 36 VDC. Maximum load = (Power supply VDC-8 VDC) / 0,20 A.

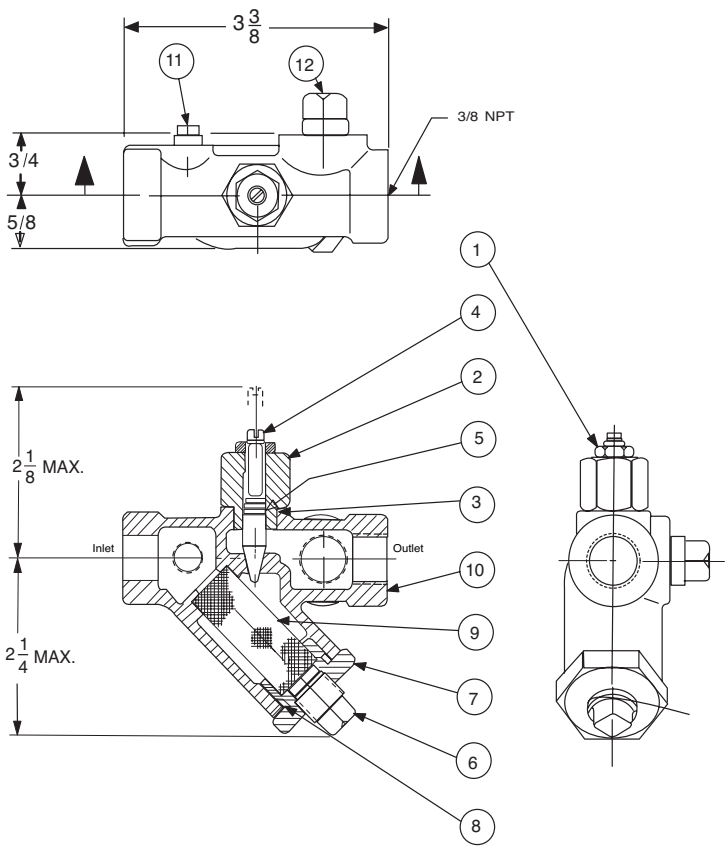
## Remote Manual Operation - Wiring Diagram
## Position actuator using contact closure




1. DO NOT POWER MANUAL INPUTS!
2. Use unpowered mechnaical or solid state relays.
3. Use external jumper across terminal 9 and 10.

# X42N-2

## Strainer and Needle Valve Assembly




**When ordering parts, please specify:**

- All nameplate data
- Item Number
- Description

| Size | Stock Number |
|---|---|
| 3/8" x 3/8" | 68372C |

| ITEM | DESCRIPTION | MATERIAL | PART NO. |
|---|---|---|---|
| 1 | Jam Nut - Hex | Sil Brz | 6779806G |
| 2 | Bonnet | S.S. | 67910A |
| 3 | O-Ring - Bonnet | Syn Rub | 00713J |
| 4 | Stem | S.S. | 67907G |
| 5 | O-Ring - Stem | Syn Rub | 00708J |
| 6 | Plug - Pipe 1/4” | Bre. | 6784702A |
| 7 | Strainer Plug | 303 | 67911J |
| 8 | O-Ring - Plug | NBR | 00751J |
| 9 | Screen | Monel | 68373A |
| 10 | Body | Rd Brs | 67905A |
| 11 | Plut - Pipe 1/8 | Brass | 6784701C |
| 12 | Plug - Pipe 3/8 | Brass | 67660-03F |

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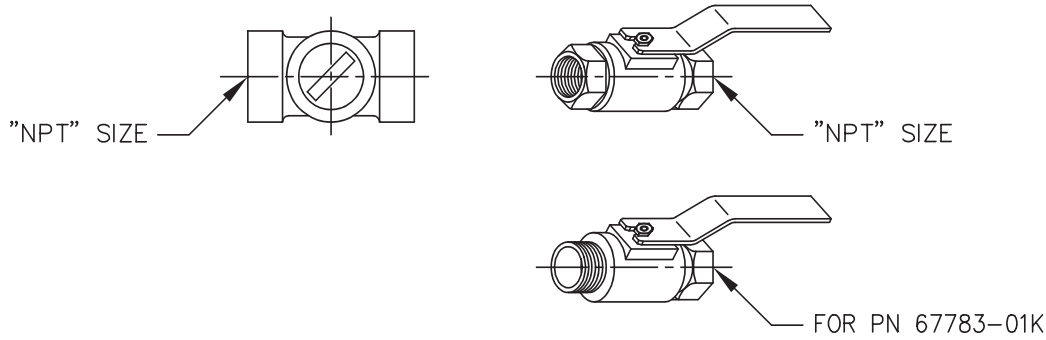
| CLA-VAL CO. NEWPORT BEACH, CALIFORNIA | CATALOG NO. | DRAWING NO. 67783 | REV BD |
|---|---|---|---|

TYPE OF VALVE AND MAIN FEATURES

# CK2 COCK/BALL VALVE

| | | |
|---|---|---|
| DESIGN | | |
| DRAWN | MGR | 4-02-80 |
| CHK'D | KD | 4-03-80 |
| APV'D | 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 | 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<br>-52C | -42D SUPSD BY-02H | -55F | | 1/4" |
| -03F*<br>-59H*** | -11J | -19B | -27E | -46E SUPSD BY-27E<br>-53A | -45G<br>-57B** | -48A SUPSD BY-49J | -63K | 3/8" |
| -04D<br>-60F *** | -12G | -20K | -28C | -54J | -43B SUPSD BY-04D | -49J | -62B | 1/2" |
| -05A<br>-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).

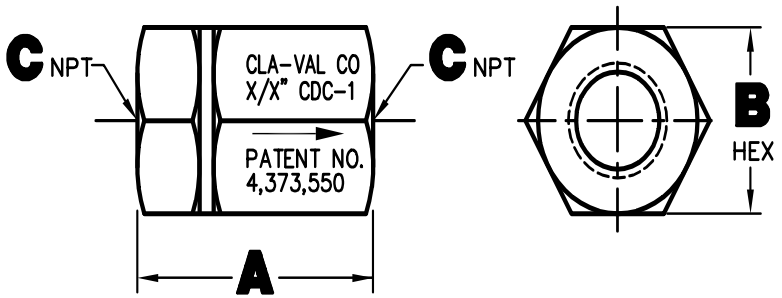
** HAMMOND VALVE 8501 ONLY.

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

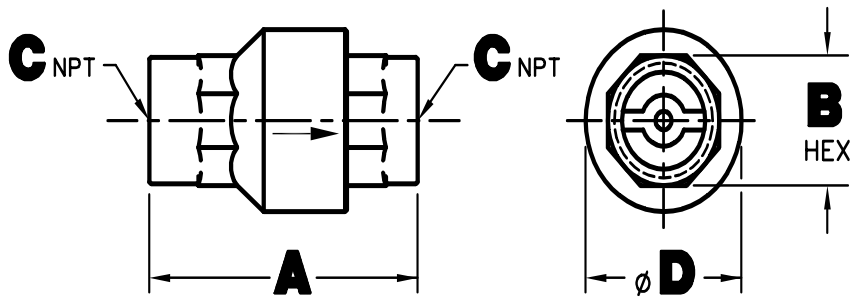
CAD REVISION RECORD - DO NOT REVISE MANUALLY

| LTR | DESCRIPTION | BY | DATE |
|---|---|---|---|
| A-AY | SEE REVISION FILE | | |
| BA | ADDED PN'S 67783-59H, 67783-60F & 67783-61D (ECO 20434) | AK | 03-14-06 |
| BB | ADDED PN'S 67783-62B (NED 62200) | AK | 07-10-08 |
| BC | ADDED PN'S 67783-63K (NED 62218) | AK | 08-14-08 |
| BD | ADDED PN 67783-64H (NED 62446) | PC | 10-1-2008 |

| REVISION | | | |
|---|---|---|---|
| REV | DESCRIPTION | DATE | APPROVED |
| A-E | SEE REVISION FILE | | |
| F | ADDED BONOMI (MFG) CHECK VALVE CONFIG WITH RELATED DIMENSIONS (ECO 21854) | 3-23-2010 | PC |

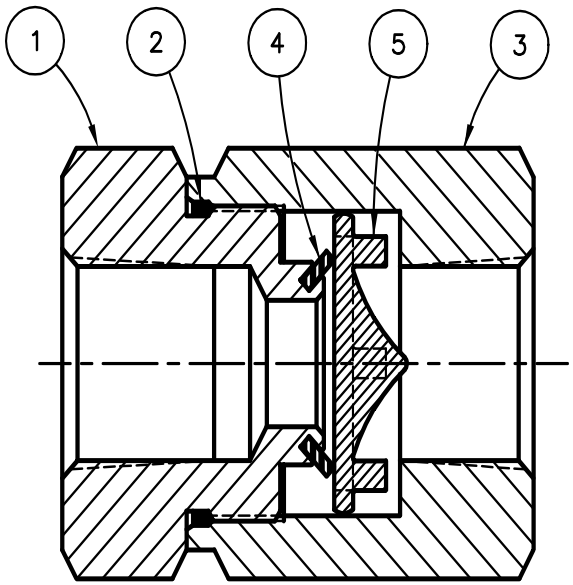



CLA-VAL CHECK VALVE (1/2" SIZE SHOWN)




BONOMI CHECK VALVE, MODLE 100002 (1/2" SIZE SHOWN)

| DESCRIPTION | A | B HEX | C NPT | ø D |
|---|---|---|---|---|
| 3/8" CHECK VALVE | 2.06 | 1.06 | .38 (3/8)-18 NPT | – |
| 3/8" CHECK VALVE (BONOMI) | 1.73 | .79 | .38 (3/8)-18 NPT | 1.06 |
| 1/2" CHECK VALVE | 2.12 | 1.38 | .50 (1/2)-14 NPT | – |
| 1/2" CHECK VALVE (BONOMI) | 2.32 | .98 | .50 (1/2)-14 NPT | 1.35 |




CLA-VAL CHECK VALVE CONFIG. (1/2" SIZE SHOWN)
(SCALE: 2/1)

| ITEM NO. | QTY REQD | NOMENCLATURE OR DESCRIPTION |
|---|---|---|
| 5 | 1 | PLATE, VALVE |
| 4 | 1 | SEAL, VALVE RING |
| 3 | 1 | RETAINER, VALVE |
| 2 | 1 | O-RING |
| 1 | 1 | RETAINER, SEAL |

PARTS LIST (FOR CLA-VAL CHECK VALVE ONLY)

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ARE:
FRACTIONS ± 1/32 DECIMALS .XX± .03 .XXX± .010 ANGULAR ± .5°
MAX = +.00 -.09
MIN = +.09 -.00
SURFACE FINISH 125
BREAK CORNERS .010 MAX
---DO NOT SCALE DRAWING---

CONTRACT NO. — — — — —

| APPROVALS | | DATE |
|---|---|---|
| DRAWN | JC | 11-30-84 |
| CHECKED | LFH | 12-4-84 |
| APPROVED | CH | 12-6-84 |
| ENGR | | |

CLA-VAL CO. NEWPORT BEACH, CALIFORNIA

TITLE: 3/8" & 1/2" CDC-1 CHECK VALVE

| SIZE | CAGE CODE | DWG NO. | REV. |
|---|---|---|---|
| B | 86184 | 98345 | F |

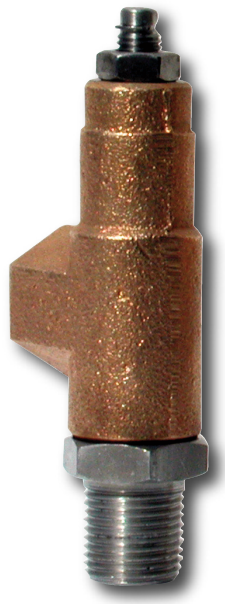
SCALE 1/1 SHEET 1 OF 1

DIST. CODE 007A

PC 4-7-2010

CLA-VAL

# —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 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.

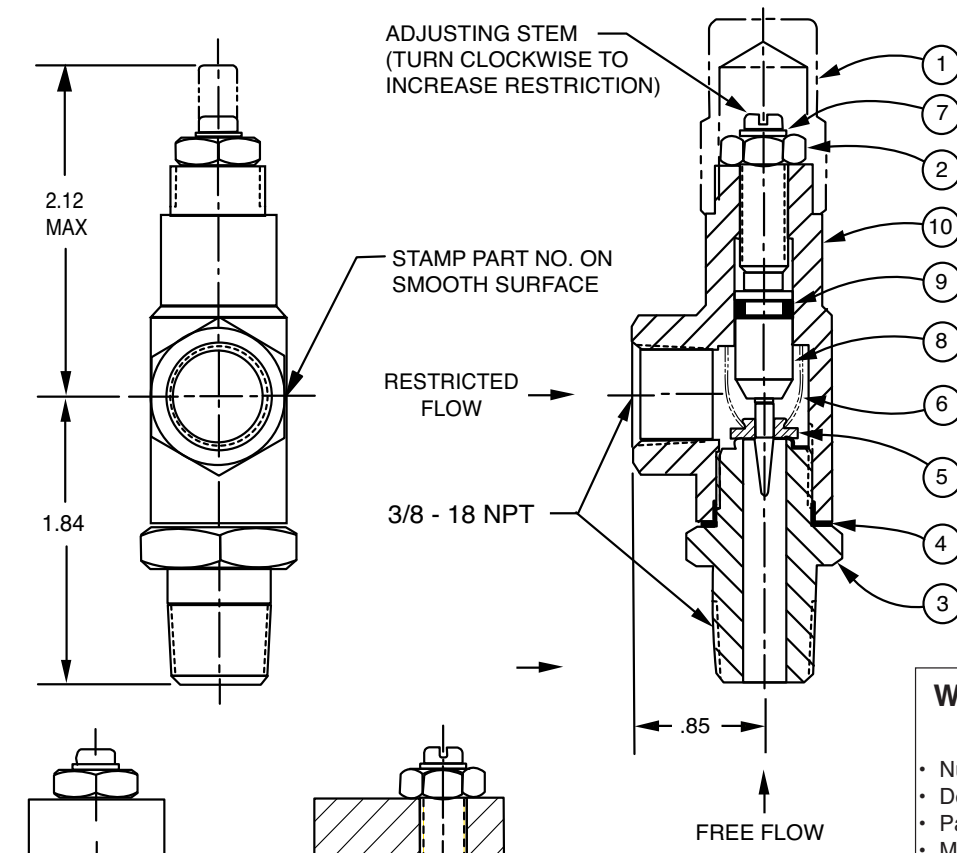
## REASSEMBLY
Reassembly is the reverse of disassembly; no special tools are required.

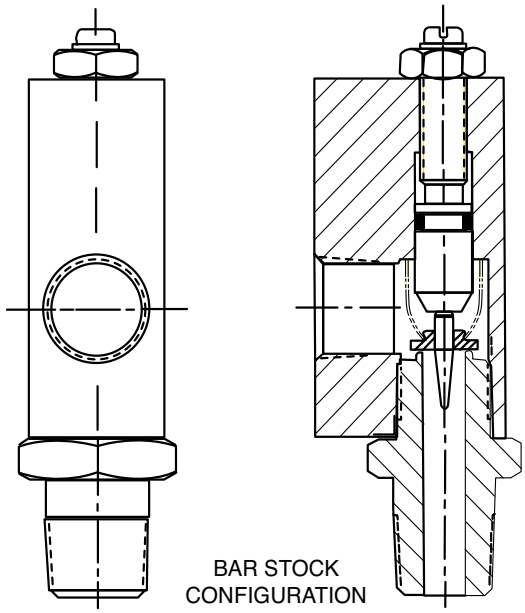
## TEST PROCEDURE
No testing of the flow Control is required prior to reassembly to the pilot control system on Cla-Val Main Valve.

CLA-VAL 1701 Placentia Ave • Costa Mesa CA 92627 Phone: 949-722-4800 • Fax: 949-548-5441 • E-mail: info@cla-val.com • www.cla-val.com

CLA-VAL

# CV
## 3/8" Flow Control




**When ordering parts, please specify:**

- Number Stamped on Side
- Description (CV Flow Control)
- Part Description
- Material

| ITEM | DESCRIPTION | QTY |
|---|---|---|
| 1 | Cap (SS only) | 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 | Housing | 1 |

# Cla-Val Product Identification

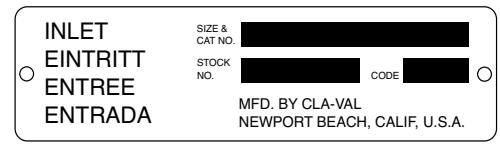
# How to Order

## Proper Identification

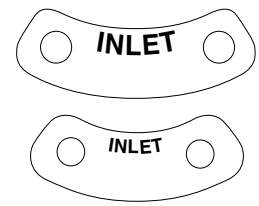
For ordering repair kits, replacement parts, or for inquiries concerning valve operation, it is important to properly identify Cla-Val products already in service by including all nameplate data with your inquiry. Pertinent product data includes valve function, size, material, pressure rating, end details,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

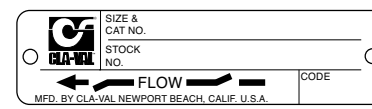



This brass plate appears on valves sized 2 1/2" and larger and is located on the top of the inlet flange.

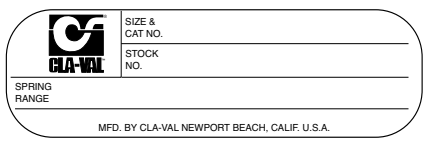



These two brass plates appear on 3/8", 1/2", and 3/4" size valves and are located on the valve cover.

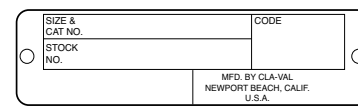

This brass plate appears on altitude valves only and is found on top of the outlet flange.



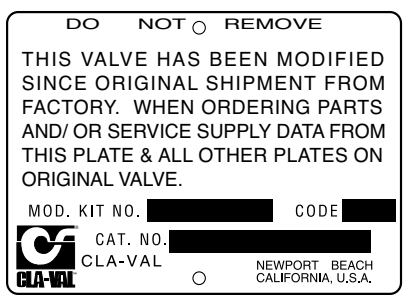

These two brass plates appear on threaded valves 1" through 3" size or flanged valves 1" through 2". It is located on only one side of the valve body.



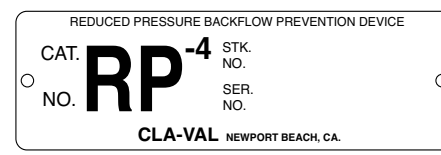

This tag is affixed to the cover of the pilot control valve. The adjustment range appears in the spring range section.




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. Electronic components manufactured by Cla-Val are warranted for one year from the date of shipment.

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

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

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

## DISCLAIMER OF WARRANTIES AND LIMITATIONS OF LIABILITY

The foregoing warranty is exclusive and in lieu of all other warranties and representations, whether expressed, implied, oral or written, including but not limited to any implied warranties or merchantability or fitness for a particular purpose. All such other warranties and representations are hereby 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 $100.00.

### RESPONSIBILITY

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

### RISK

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

### EXPORT SHIPMENTS

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

### RETURNED GOODS

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

CLA-VAL®

E-Product I.D. (R-3/2011)


**CLA-VAL**
PO Box 1325 Newport Beach CA 92659-0325
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4687 Christie Drive
Beamsville, Ontario
Canada L0R 1B4
Phone: 905-563-4963
Fax: 905-563-4040

**CLA-VAL EUROPE**
Chemin dés Mesanges 1
CH-1032 Romanel/
Lausanne, Switzerland
Phone: 41-21-643-15-55
Fax: 41-21-643-15-50

www.cla-val.com




Represented By:

CLA-VAL

—MODEL— **REPAIR KITS**

## Model 100-01 Hytrol Main Valve

| BUNA-N MATERIAL | | | | |
|---|---|---|---|---|
| | RUBBER KIT | REPAIR KIT | REBUILD KIT | STUD & NUT KIT |
| | STOCK NO. | STOCK NO. | STOCK NO. | STOCK NO. |
| 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 | 21176624K | 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 | REPAIR KIT | REBUILD KIT | STUD & NUT KIT |
| | STOCK NO. | STOCK NO. | STOCK NO. | STOCK NO. |
| 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 |

Consult factory for larger sizes

**Rubber Kit Includes:** Diaphragm, Disc, Spacer Washers

**Repair Kit Includes:** Diaphragm, Disc, Spacer Washers, Epoxy Coated Disc Retainer, Epoxy Coated Diaphragm Washer, Protective Washer

**Rebuild Kit 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

**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 100-02 | Valve Size | Kit Stock Number | |
|---|---|---|---|---|
| | | | 100-02 & 100-03 | 100-21 & 100-22 |
| ⅜" | 9169901H | 2½" | 9169910J | N/A |
| ½" & ¾" | 9169902F | 3" | 9169911G | 9169905J |
| 1" | 9169903D | 4" | 9169912E | 9169911G |
| 1¼" & 1½" | 9169904B | 6" | 9169913C | 9169912E |
| 2" | 9169905J | 8" | 99116G | 9169913C |
| | | 10" | 9169939H | 99116G |
| | | 12" | 9169937B | 9169939H |

Larger Sizes: Consult Factory.

## 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 |

Larger Sizes: Consult Factory.

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