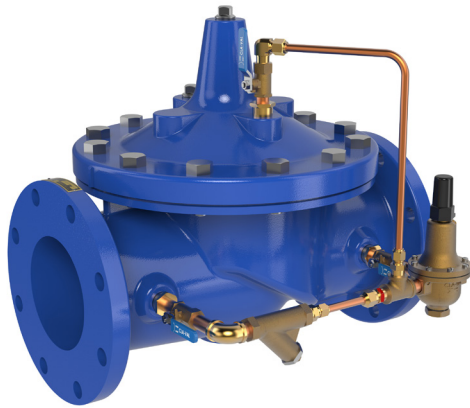




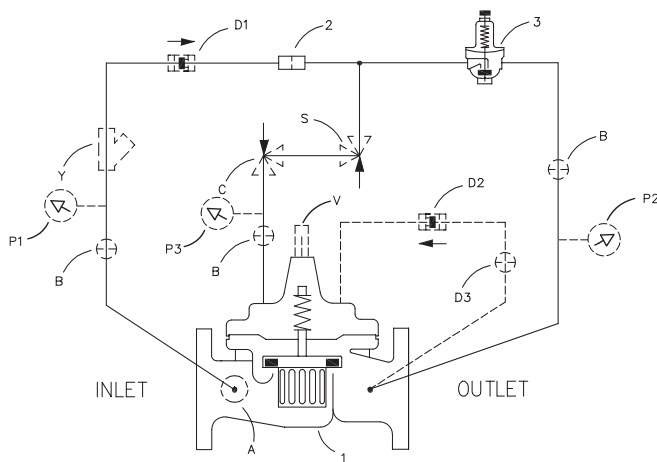
# Model 90-01KO

## ANTI-CAVITATION PRESSURE REDUCING VALVE



- Virtually Cavitation Free Operation
- Sensitive and Accurate Pressure Control
- Easy Adjustment and Maintenance
- Optional Check Feature
- Fully Supported Frictionless Diaphragm

The Cla-Val Model 90-01KO Anti-Cavitation Hytrol Pressure Reducing Valve automatically reduces a higher inlet pressure to a steady lower downstream pressure, regardless of changing flow rate and/or varying inlet pressure. This valve is an accurate, pilot-operated regulator capable of holding downstream pressure to a pre-determined limit. When downstream pressure exceeds the pressure setting of the control pilot, the main valve and pilot valve close drip-tight. If a check feature is added, and a pressure reversal occurs, the downstream pressure is admitted in the main valve cover chamber, closing the valve to prevent return flow.



| Schematic Diagram |                               |
|-------------------|-------------------------------|
| Item              | Description                   |
| 1                 | 100-01KO Hytrol Main Valve    |
| 2                 | X58 Restriction Fitting       |
| 3                 | CRD Pressure Reducing Control |

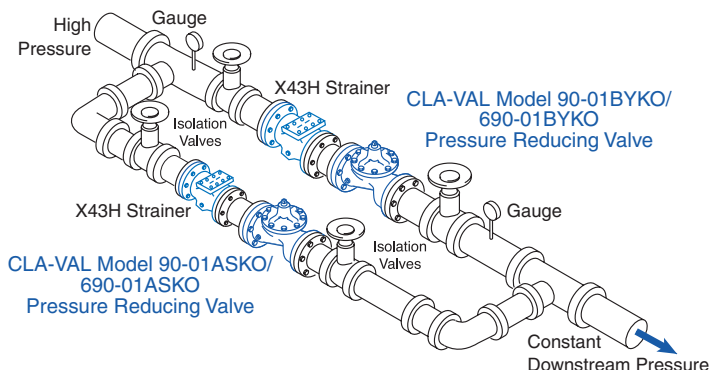
| Optional Features |                                   |
|-------------------|-----------------------------------|
| Item              | Description                       |
| A                 | X46A Flow Clean Strainer          |
| B                 | CK2 Isolation Valve               |
| C                 | CV Flow Control (Closing)*        |
| D                 | Check Valves with Isolation Valve |
| P                 | X141 Pressure Gauge               |
| S                 | CV Flow Control (Opening)         |
| V                 | X101D Valve Position Indicator    |
| Y                 | X43 "Y" Strainer                  |
| H                 | X43H Strainer                     |

For space savings, see Cla-Val Model 90-48 or 90-99 with integral Low Flow Bypass Pressure Regulator.

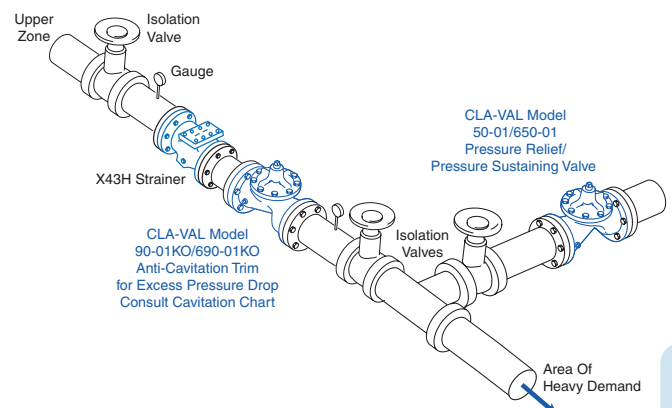
\*The closing speed control (optional) on this valve should always be open at least three (3) turns off its seat.

### Typical Applications

Typical applications include pressure reducing valve station using Model 90-01BYKO and Model 90-01ASKO in parallel to handle wide range of flow rates. Larger valve meets requirements of peak loads. The smaller valve handles low flows. A downstream pressure relief valve is recommended for this type of application.



Cla-Val Model 90-01KO provides optimum downstream pressure control while reducing noise and eliminating damage associated with cavitation. See Cavitation Guide to determine if the valve is a candidate for the KO Anti-Cavitation Trim. A downstream pressure relief valve is recommended for this type of application.



## Model 90-01KO (Uses 100-01KO Hytrol Main Valve)

Recommended Maximum Pressure - psi

### Pressure Ratings

| Valve Body & Cover |              | Pressure Class  |           |           |           |              |
|--------------------|--------------|-----------------|-----------|-----------|-----------|--------------|
|                    |              | Flanged         |           | Grooved   | Threaded  |              |
| Grade              | Material     | ANSI Standards* | 150 Class | 300 Class | 300 Class | End† Details |
| ASTM M536          | Ductile Iron | B16.42          | 250       | 400       | 400       | 400          |
| ASTM A216-WCB      | Cast Steel   | B16.5           | 285       | 400       | 400       | 400          |
| UNS 87850          | 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

| Pattern | Globe    | Angle              | Grooved End |
|---------|----------|--------------------|-------------|
| Size    | 1" - 36" | 1 1/4" - 16" & 24" | 1 1/4" - 8" |

### Materials

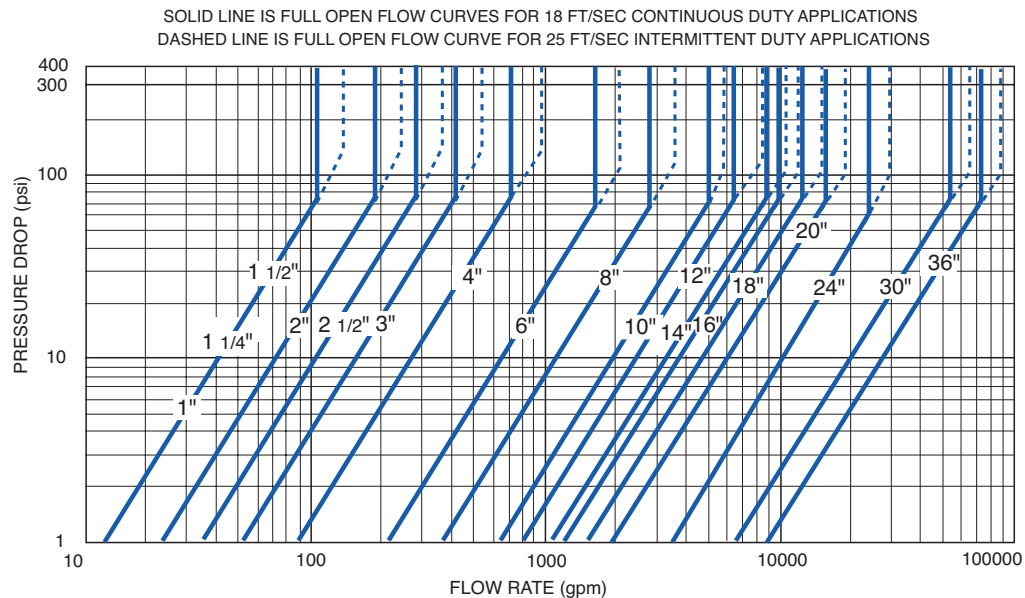
| Component                              | Standard Material Combinations  |            |          |
|----------------------------------------|---------------------------------|------------|----------|
| Body & Cover                           | Ductile Iron                    | Cast Steel | Bronze   |
| Available Sizes                        | 1" - 36"                        | 3" - 16"   | 3" - 16" |
| Disc Retainer & Diaphragm Washer       | Cast Iron                       | Cast Steel | Bronze   |
| Trim: Disc Guide, Seat & Cover Bearing | 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.

### Operating Temp. Range

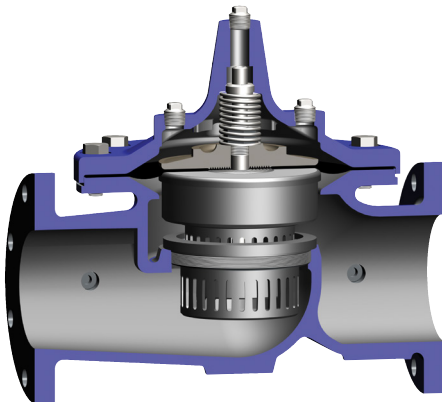
Fluids: -40° to 180° F

### 100-01KO ANTI-CAVITATION VALVE CURVES



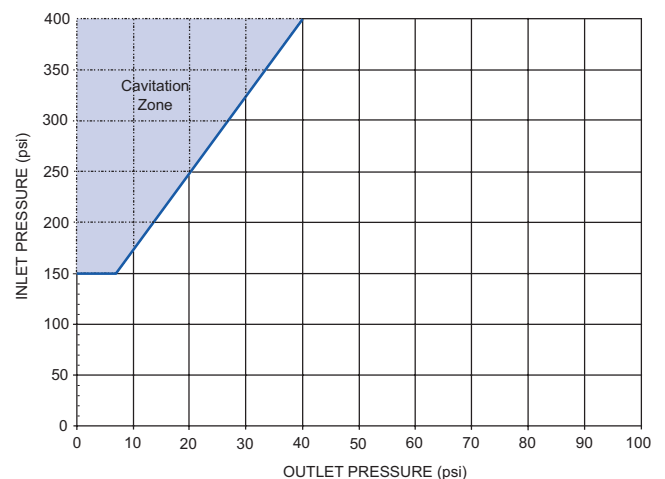
### Notes: On Operating Differential

1. For atmospheric discharge, the maximum inlet pressure cannot exceed 150 psi.
2. For pressure differentials greater than 300 psi, the maximum flow velocity should not exceed 18 ft/sec.
3. Flow velocities greater than 25 ft/sec are not recommended.
4. Recommended minimum flow velocity is 1 ft/sec.
5. Consult factory for conditions exceeding these recommendations.



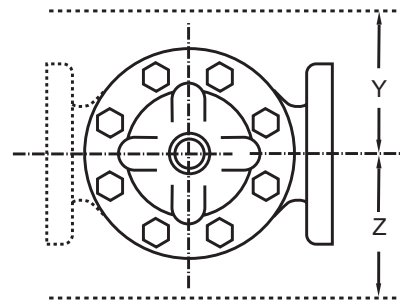
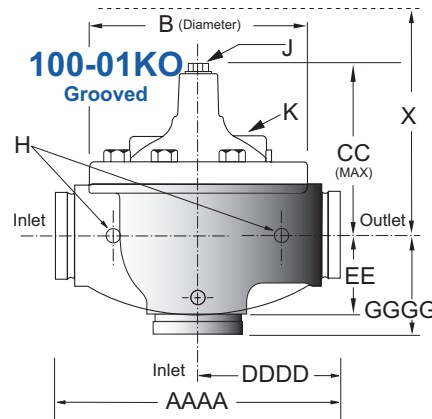
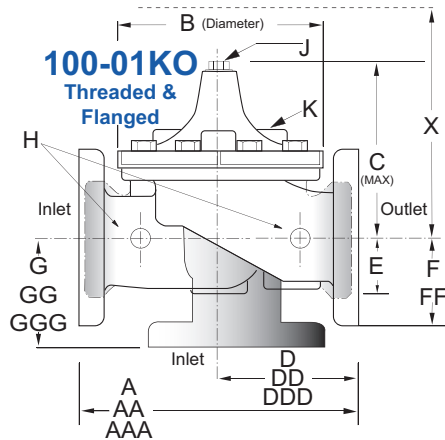
100-01KO Hytrol Main Valve

### SELECTION GUIDELINE FOR KO ANTI-CAVITATION VALVES



## Model 90-01KO Dimensions (Uses 100-01KO Hytrol Main Valve)

### Model 100-01KO Full Port Hytrol Main Valve



Note: Consult Factory on 10", 12", 16" angle pattern

In inches

### Model 90-01KO Dimensions

| Valve Size (Inches)       | 1     | 1 1/4 | 1 1/2 | 2     | 2 1/2 | 3     | 4     | 6     | 8     | 10    | 12    | 14    | 16    | 18    | 20    | 24    | 30    | 36    |
|---------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| A Threaded                | 7.25  | 7.25  | 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 | 72.75 |
| 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 | 74.75 |
| AAAA Grooved End          | —     | —     | 8.50  | 9.00  | 11.00 | 12.50 | 15.00 | 20.00 | 25.38 | —     | —     | —     | —     | —     | —     | —     | —     | —     |
| B Diameter                | 5.62  | 5.62  | 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 Maximum                 | 5.50  | 5.50  | 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 | 59.00 |
| CC Maximum Grooved End    | —     | —     | 4.75  | 5.75  | 6.88  | 7.25  | 9.31  | 12.12 | 14.62 | —     | —     | —     | —     | —     | —     | —     | —     | —     |
| D Threaded                | 3.25  | 3.25  | 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  | 1.12  | 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 | 28.50 |
| 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 | 30.00 |
| G Threaded                | 1.88  | 1.88  | 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        | 0.375 | 0.375 | 0.375 | 0.375 | 0.50  | 0.50  | 0.75  | 0.75  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 2.00  | 2.00  |
| J NPT Cover Center Plug   | 0.25  | 0.25  | 0.25  | 0.50  | 0.50  | 0.50  | 0.75  | 0.75  | 1.00  | 1.00  | 1.25  | 1.50  | 2.00  | 1.00  | 1.00  | 1.00  | 2.00  | 2.00  |
| K NPT Cover Tapping       | 0.375 | 0.375 | 0.375 | 0.375 | 0.50  | 0.50  | 0.75  | 0.75  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 2.00  | 2.00  |
| Stem Travel               | 0.40  | 0.40  | 0.40  | 0.60  | 0.70  | 0.80  | 1.10  | 1.70  | 2.30  | 2.80  | 3.40  | 4.00  | 4.50  | 5.10  | 5.63  | 6.75  | 7.50  | 8.50  |
| Approx. Ship Weight (lbs) | 15    | 15    | 15    | 35    | 50    | 70    | 140   | 285   | 500   | 780   | 1165  | 1600  | 2265  | 2982  | 3900  | 6200  | 7703  | 11720 |
| Approx. X Pilot System    | 11    | 11    | 11    | 13    | 14    | 15    | 17    | 29    | 31    | 33    | 36    | 40    | 40    | 43    | 47    | 68    | 79    | 85    |
| Approx. Y Pilot System    | 9     | 9     | 9     | 9     | 10    | 11    | 12    | 20    | 22    | 24    | 26    | 29    | 30    | 32    | 34    | 39    | 40    | 45    |
| Approx. Z Pilot System    | 9     | 9     | 9     | 9     | 10    | 11    | 12    | 20    | 22    | 24    | 26    | 29    | 30    | 32    | 34    | 39    | 42    | 47    |

Cla-Val Control Valves with KO ANTI-CAVITATION Trim operate with maximum efficiency when mounted in horizontal piping with the main valve cover Up. We recommend isolation valves be installed on inlet and outlet for maintenance. Adequate space above and around the valve for service personnel should be considered essential. A regular maintenance program should be established based on the specific application data. However, we recommend a thorough inspection be done at least once a year. Consult factory for specific recommendations.

| 90-0KO<br>Valve<br>Selection                      | 100-01KO Pattern: Globe (G), Angle (A), End Connections: Threaded (T), Grooved (GR), Flanged (F) Indicate Available Sizes |     |       |              |             |              |             |       |        |                                 |      |      |       |       |       |       |       |       |       |                     |  |
|---------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|-----|-------|--------------|-------------|--------------|-------------|-------|--------|---------------------------------|------|------|-------|-------|-------|-------|-------|-------|-------|---------------------|--|
|                                                   | Inches                                                                                                                    | 1   | 1 1/4 | 1 1/2        | 2           | 2 1/2        | 3           | 4     | 6      | 8                               | 10   | 12   | 14    | 16    | 18    | 20    | 24    | 30    | 36    |                     |  |
|                                                   | mm                                                                                                                        | 25  | 32    | 40           | 50          | 65           | 80          | 100   | 150    | 200                             | 250  | 300  | 350   | 400   | 450   | 500   | 600   | 750   | 900   |                     |  |
| Main Valve<br>100-01KO                            | Pattern                                                                                                                   | G   | G, A  | 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   | T     | T, F,<br>Gr* | T, F,<br>Gr | T, F,<br>Gr* | T, F,<br>Gr | F, Gr | F, Gr* | F, Gr*                          | F    | F    | F     | F     | F     | F     | F     | F     | F     |                     |  |
| Suggested<br>Flow<br>(gpm)                        | Max. Continuous                                                                                                           | 84  | 84    | 115          | 190         | 270          | 410         | 710   | 1620   | 2810                            | 4420 | 6280 | 7590  | 9920  | 12550 | 14900 | 22600 | 37700 | 52450 |                     |  |
|                                                   | Max. Intermittent                                                                                                         | 120 | 120   | 160          | 260         | 370          | 580         | 990   | 2250   | 3900                            | 6150 | 8720 | 10540 | 13700 | 17500 | 21700 | 31300 | 48000 | 62500 |                     |  |
|                                                   | Min. Continuous                                                                                                           | 10  | 10    | 10           | 15          | 20           | 30          | 50    | 115    | 200                             | 300  | 400  | 500   | 650   | 560   | 1073  | 1577  | 2650  | 3150  |                     |  |
| Suggested<br>Flow<br>(Liters/<br>Sec)             | Max. Continuous                                                                                                           | 5.3 | 5.3   | 7.3          | 12          | 17           | 26          | 45    | 102    | 177                             | 279  | 397  | 479   | 694   | 792   | 940   | 1427  | 2379  | 3309  |                     |  |
|                                                   | Max. Intermittent                                                                                                         | 7.6 | 7.6   | 10           | 16          | 23           | 37          | 62    | 142    | 246                             | 387  | 549  | 664   | 863   | 1104  | 1369  | 1972  | 3028  | 3940  |                     |  |
|                                                   | Min. Continuous                                                                                                           | .60 | .60   | .60          | .90         | 1.3          | 1.9         | 3.2   | 7.2    | 13                              | 19   | 25   | 32    | 41    | 41    | 57    | 110   | 132   | 180   |                     |  |
| 100-01KO Series is the full internal port Hytrol. |                                                                                                                           |     |       |              |             |              |             |       |        | For Lower Flows Consult Factory |      |      |       |       |       |       |       |       |       | *Globe Grooved Only |  |

## Functional Data

| Valve Size                                           |               | Inches             | 1    | 1 1/4 | 1 1/2 | 2    | 2 1/2 | 3    | 4    | 6    | 8    | 10   | 12   | 14   | 16   | 18   | 20   | 24   | 30   | 36   |
|------------------------------------------------------|---------------|--------------------|------|-------|-------|------|-------|------|------|------|------|------|------|------|------|------|------|------|------|------|
|                                                      |               | mm                 | 25   | 32    | 40    | 50   | 65    | 80   | 100  | 150  | 200  | 250  | 300  | 350  | 400  | 450  | 500  | 600  | 750  | 900  |
| C <sub>V</sub> Factor                                | Globe Pattern | Gal./Min. (gpm.)   | 14   | 14    | 14    | 25   | 37    | 52   | 90   | 218  | 362  | 660  | 810  | 1100 | 1200 | 1550 | 1950 | 3900 | 6100 | 9150 |
|                                                      |               | Litres/Sec. (l/s.) | 3.4  | 3.4   | 3.4   | 6.0  | 8.9   | 12.5 | 21.6 | 52   | 87   | 159  | 194  | 264  | 288  | 360  | 469  | 938  | 1466 | 2199 |
|                                                      | Angle Pattern | Gal./Min. (gpm.)   | —    | 15    | 15    | 26   | 39    | 55   | 95   | 232  | 388  | 479  | 790  | 1075 | 1175 | —    | —    | —    | —    | —    |
|                                                      |               | Litres/Sec. (l/s.) | —    | 3.6   | 3.6   | 6.2  | 9.4   | 13.2 | 22.8 | 56   | 93   | 115  | 190  | 258  | 282  | —    | —    | —    | —    | —    |
| Equivalent Length of Pipe                            | Globe Pattern | Feet (ft.)         | 196  | 196   | 196   | 237  | 277   | 416  | 572  | 858  | 1315 | 2444 | 2118 | 1937 | 3022 | 3537 | 4199 | 4532 | 3897 | 3954 |
|                                                      |               | Meters (m.)        | 60   | 60    | 60    | 72   | 84    | 127  | 174  | 262  | 401  | 745  | 646  | 590  | 921  | 1078 | 1280 | 1381 | 1188 | 1205 |
|                                                      | Angle Pattern | Feet (ft.)         | —    | 171   | 171   | 219  | 250   | 372  | 514  | 757  | 1145 | 2133 | 2226 | 2021 | 3152 | —    | —    | —    | —    | —    |
|                                                      |               | Meters (m.)        | —    | 52    | 52    | 67   | 76    | 113  | 157  | 231  | 349  | 650  | 678  | 616  | 961  | —    | —    | —    | —    | —    |
| K Factor                                             | Globe Pattern |                    | 30.6 | 30.6  | 30.6  | 26.1 | 24.3  | 29.3 | 29.0 | 25.5 | 27.7 | 41.0 | 27.7 | 22.8 | 31.4 | 30.2 | 29.5 | 28.9 | 17.6 | 15.1 |
|                                                      | Angle Pattern |                    | —    | 26.7  | 26.7  | 24.1 | 21.8  | 26.2 | 26.0 | 22.5 | 24.1 | 35.8 | 29.1 | 23.8 | 32.8 | —    | —    | —    | —    | —    |
| Liquid Displaced from Cover Chamber When Valve Opens | U.S. Gal.     |                    | .20  | .20   | .20   | .03  | .04   | .08  | .17  | .53  | 1.26 | 2.5  | 4.0  | 6.5  | 9.6  | 11   | 12   | 29   | 65   | 90   |
|                                                      | Litres        |                    | .80  | .80   | .80   | .12  | .16   | .30  | .64  | 2.0  | 4.8  | 9.5  | 15.1 | 25.6 | 36.2 | 41.6 | 45.4 | 110  | 246  | 340  |

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

### C<sub>V</sub> Factor

Formulas for computing C<sub>V</sub> Factor, Flow (Q) and Pressure Drop (ΔP):

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

### K Factor (Resistance Coefficient)

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

### Equivalent Length of Pipe

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

### Fluid Velocity

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

### Where:

C<sub>V</sub> = U.S. (gpm) @ 1 psi differential at 60° F water or

C<sub>V</sub>-l/s = (l/s) @ 1 bar (14.5 PSIG) differential at 15° C water

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

f = friction factor for clean, new Schedule 40 pipe (dimensionless) (from Cameron Hydraulic Data, 18th Edition, P 3-119)

K = Resistance Coefficient (calculated)

L = Equivalent Length of Pipe (feet)

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

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

ΔP = Pressure Drop in (psi) or (bar)

## Pilot System Specifications

### Adjustment Range

2 to 30 psi  
15 to 75 psi  
20 to 105 psi  
30 to 300 psi\*

\*Supplied unless otherwise specified

### Temperature

Water: to 180° F

\*Consult factory for hot water applications

### Materials

#### Standard Pilot System Materials

Pilot Control: Low Lead Bronze  
Trim: Stainless Steel Type 303  
Rubber: Buna-N® Synthetic Rubber  
Tubing & Fitting: Cooper and Bronze

#### 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

- Catalog No. 90-01KO
- Valve Size
- Pattern - Globe or Angle
- Pressure Class
- Threaded, Flanged or Grooved End
- Trim Material
- Adjustment Range
- Desired Options
- When Vertically Installed

**CLA-VAL™**

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

E-90-01KO (R-12/2025)

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