CLA-VAL

FLUID CONTROL SOLUTIONS

Innovative Products for Waterworks Applications

The information contained in this catalog is a summary overview of Cla-Val products. Visit www.cla-val.com to see the complete range of products, new releases and the most up-to-date literature.

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https://www.cla-val.com/company-overview.php • **https://www.cla-val.com/waterworks-main-valves**

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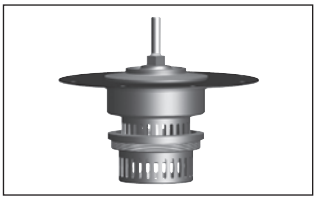

https://www.cla-val.com/100-01ko-anti-cavitationbrhytrol-valve-p-2.html

Pressure Relief Valves

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Pressure Reducing Valves

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Water Saving/Pressure Management Products

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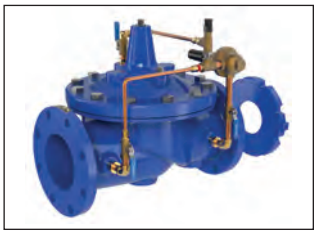
https://www.cla-val.com/flow-control-valves



Level Control Valves

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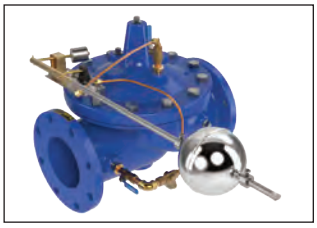

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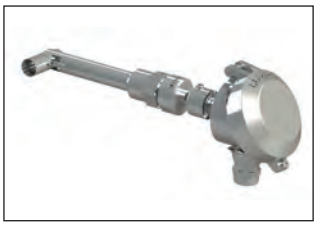

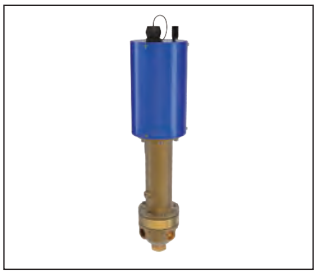

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Check Valves

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Fire Protection Valves

https://www.cla-val.com/fire-protection

Warranties and Certifications

Visit www.cla-val.com for extended coverage of our product line

Company Overview

Since 1936, Cla-Val has produced the world's highest quality automatic control valves for a diverse array of applications and market places. Our special blend of engineering expertise, craftsmanship, quality materials and sophisticated manufacturing processes has earned Cla-Val a reputation for excellence throughout the United States and around the world.

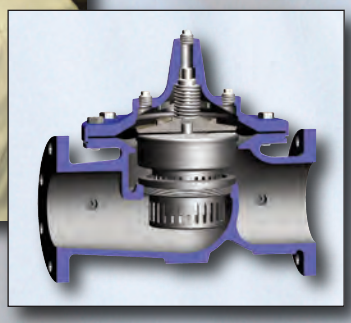
Cla-Val's Southern California facility serves as the worldwide headquarters and features an on-site foundry as well as a manufacturing operation with more than four-acres under roof. Other North American locations include state-of-the-art machine shops, production facilities and a sales office/ manufacturing operation in Ontario, Canada. Cla-Val offices and production facilities in Switzerland, France and the United Kingdom serve the European and Middle Eastern markets.

All Cla-Val automatic control valves and associated products are made from the highest quality materials and backed by the best warranty in the industry. Cla-Val provides a broad range of valve patterns and sizes in over fifty different varieties of metals and grades. To help ensure that our customers receive the technical and product support they need, we conduct the industry's most comprehensive engineering and application seminars. We also offer in-depth end-user training programs to help our customers derive the maximum benefit from their product investment.

With strategically located distribution centers and sales offices throughout the world, Cla-Val is the ideal source for superior technical know-how, unparalleled customer service and the finest quality fluid handling products.

Engineering Capabilities

One of Cla-Val's most unique characteristics is the strong focus we place on continuous improvement in our products and manufacturing processes. This focus is personified by our in-house Engineering Department. They work hand-in-hand with our customers to develop real-world solutions, such as the recently developed KO Anti-Cavitation valve trim pictured below, to help them meet their operational challenges. Cla-Val Engineers continue to create products that ultimately become the industry standard.



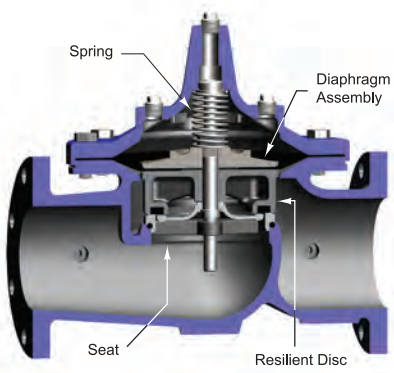
Utilizing a wide array of the most advanced technical software, including custom programs developed in-house, our Engineers analyze product applications, and study our customers' fluid handling systems to characterize conditions such as Cv, surge, flow, and the potential for valve cavitation noise and damage. This expertise enables our Engineers to take the data they gather and determine which flow or pressure control products will best meet our customers' system requirements in the most operationally efficient and cost effective manner.

Beyond analyzing and understanding our customers' existing requirements, Cla-Val Engineering uses the latest in solid modeling design software to develop new products to meet the ever-changing requirements of the industries we serve. To further enhance the value we provide, our Manufacturing Engineers continually work to develop and implement the latest technologies in our production and foundry facilities to ensure that all of our products are crafted with the highest possible quality, precision and accuracy.

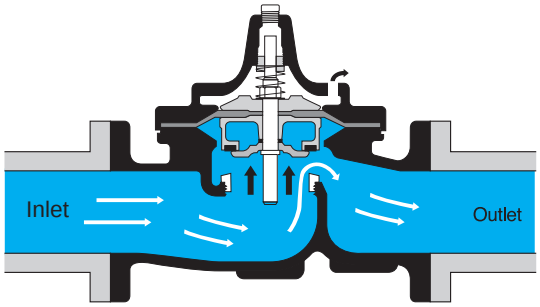
Cla-Val product innovations --
destined to become tomorrow's standards.

MAIN MAIN VALVE

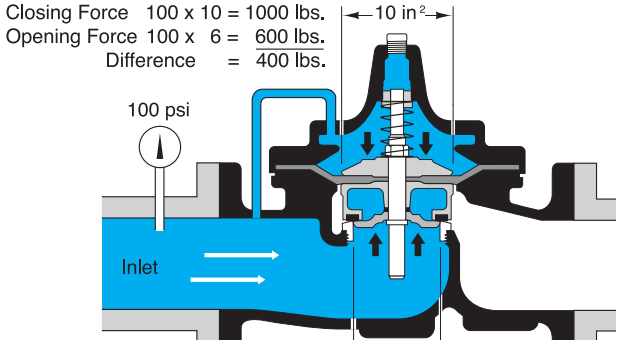
Most CLA-VAL valves consist of a main valve and pilot control system. The main main valve is called a Hytrol Valve.



When no pressure is in the valve, the spring and the weight of the diaphragm assembly hold the valve closed.



With the cover chamber vented to atmosphere, the valve will open from line pressure under the disc.

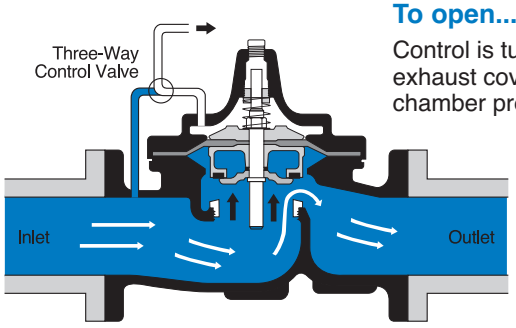


If inlet pressure is connected into the cover chamber, the valve closes tightly. In this example, the 400 pound difference is the force which pushes the disc against the seat and causes the valve to seal drip-tight.

NON-MODULATING CONTROLS

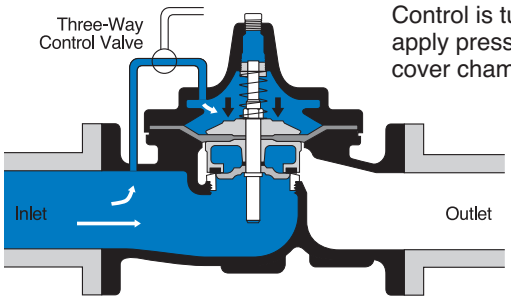
A simple control which either opens the valve wide or closes it tightly is a three-way valve. The type of operation this control gives is called “non-modulating” because the valve cannot pause in a partially open position.

Once the control is turned to either position, operating fluid flow into or out of the cover chamber until the valve is open or closed. For example...



To open...

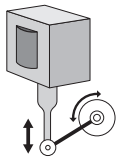
Control is turned to exhaust cover chamber pressure.



To close...

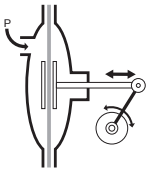
Control is turned to apply pressure to cover chamber.

Ordinary three-way valves usually are not satisfactory because they require so much force to operate. An easy-turning control which can be operated in a variety of ways is usually used. Several examples of controls and their operation are shown at right.



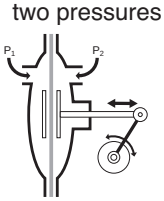
With a solenoid

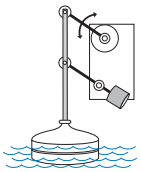
By hand



By pressure

By a difference in two pressures





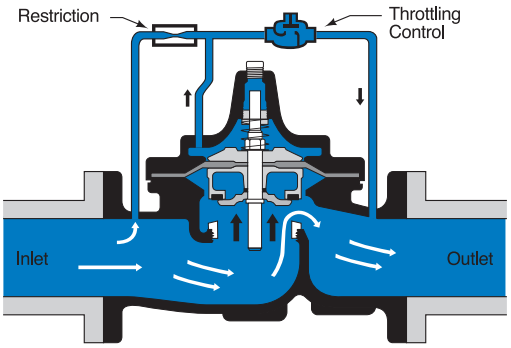
By a float

MODULATING CONTROLS

The Cla-Val Automatic Control Valve modulates if the cover pressure is held between the inlet and outlet pressure. To achieve modulating operation, a slightly different type of control system is utilized.

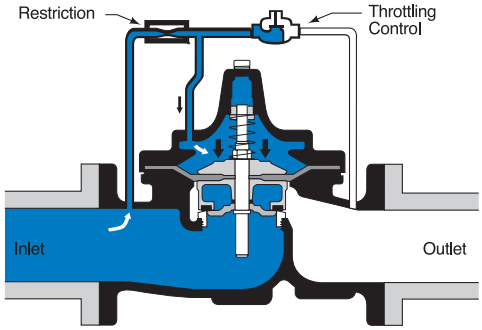
Valve Open

When the throttling control opens to a point where more pressure is relieved from the cover chamber than the restriction can supply, cover pressure is reduced and the valve opens.



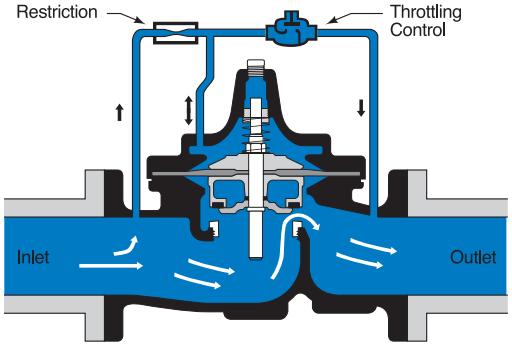
Valve Closed

When the modulating control closes sufficiently to direct a great enough pressure into the cover chamber to overcome opening forces of line pressure, the main valve closes.



Valve Throttling

The main valve modulates to any degree of opening in response to changes in the throttling control. At an equilibrium point, the main valve opening and closing forces hold the valve in balance. This balance holds the valve partially open, but immediately responds and readjusts its position to compensate for any change in the controlled condition.

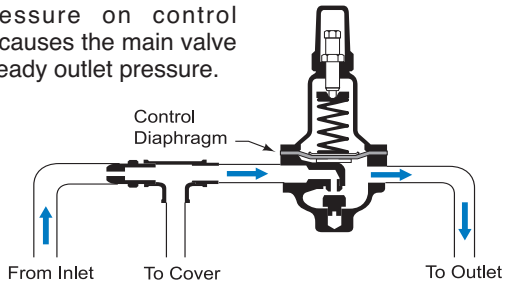


AUTOMATIC CONTROLS

The following examples illustrate several different types of operation utilizing automatic controls.

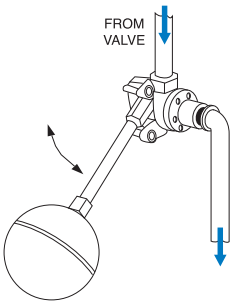
Pressure Reduction

Outlet pressure on control diaphragm causes the main valve to hold a steady outlet pressure.



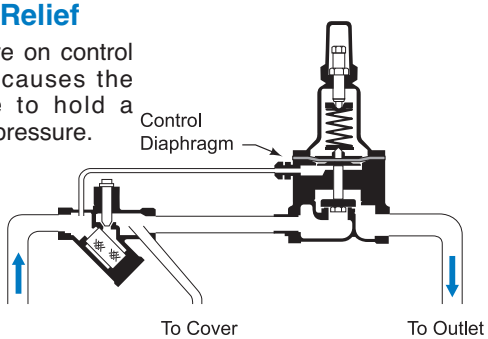
Liquid Level Controller

Slight changes in flow through the float control causes main valve to counteract changes in reservoir level so liquid level is held constant.



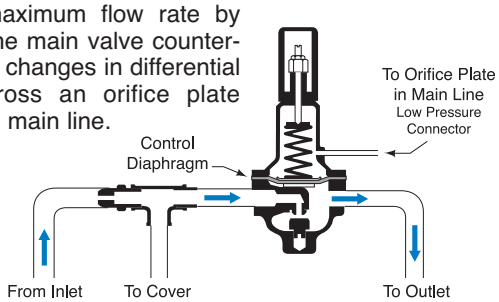
Pressure Relief

Inlet pressure on control diaphragm causes the main valve to hold a steady inlet pressure.

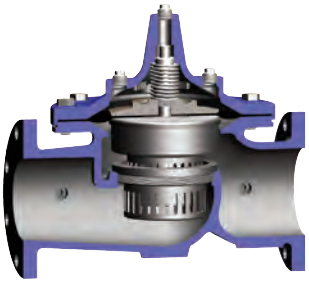


Rate of Flow Controller

Limits the maximum flow rate by changes to the main valve counteract any slight changes in differential pressure across an orifice plate located in the main line.



KO ANTI-CAVITATION OPERATION

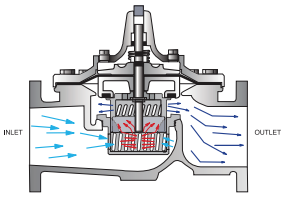


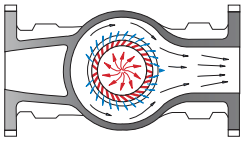
KO Anti-Cavitation Internal Trim

First Stage Pressure Reduction
- Flow enters through the seat

Second Stage Pressure Reduction
- Flow impinges upon itself within the seat and disc guide assembly to dissipate cavitation and further reduce pressure

Third Stage Pressure Reduction
- Flow exits through the disc guide for final pressure reduction
- Diagonal disc guide slots direct flow away from surfaces.



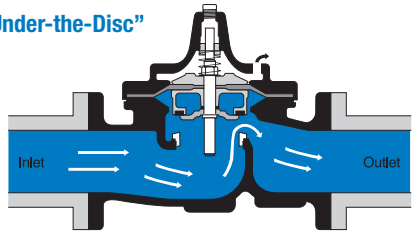


Q&A

Q Which way should fluid flow through a CLA-VAL Valve?

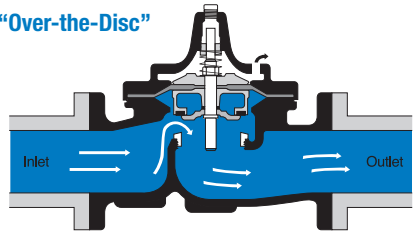
A Just as with any globe valve, the usual way is "under–the–disc" as shown. The main exception to the "under-the-disc" rule of thumb is the check valve.

"Under-the-Disc"



Standard Flow
Normal so valve closes against the pressure

"Over-the-Disc"



Reverse Flow
Acceptable only under specific conditions

Q What purpose does the internal spring in the Hytrol valve serve?

A To provide enough force to close the valve when no difference exists between inlet, cover and outlet pressures. When the inlet pressure is greater than outlet pressure (even by a small amount) the hydraulic forces, -- NOT THE SPRING hold the valve tightly closed.

Q Can pressure other than line pressure be used to operate CLA-VAL Valves?

A Yes. Frequently, when line fluid is too dirty or otherwise unsuitable, a separate source of pressure is desired. Clean water, air (with some limitations), or oil are suitable. The important point is to make sure the operating pressure is equal or greater than inlet pressure AT ALL TIMES.

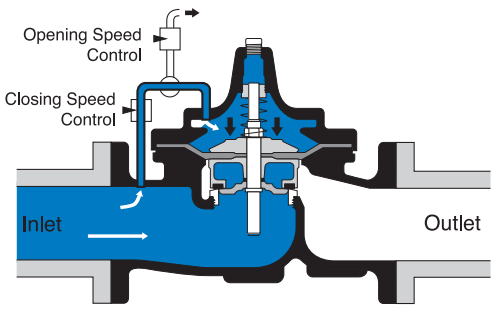
Q What should be done if line pressure is very low? (Below 10 psi)

A Usually a separate source of operating pressure is required. A spring to open the valve may be necessary. Consult the factory for recommendations.

Q Can the opening and closing speed of a CLA-VAL Valve be controlled?

A Yes. It is a matter of controlling the rate at which operating fluid flows into or out of the cover chamber.

Here is a typical valve equipped with both opening and closing speed controls. A simple needle valve can be used for these controls.



Value Added Upgrades...

Cla-Val's flexible design allows for a wide range of upgrades to further enhance system performance.

Model X144 e-FlowMeter

patent pending

Inserts directly into an inlet tapping of a control valve

Model X101 Valve Position Indicator

X143 Series Power Generators

Model X143MP Micro Turbine Power Generator

Model X143IP Intermediate Power Generator

uses the hydraulic energy of the distribution system to produce power for site equipment

Model X145 Electronic Display

Model VC-22D Electronic Valve Controller

...Go Beyond Standard

X117 Series Valve Position Indicator

X117D

Accurately monitor valve position

Electronic Pilot Controls

CRA-34

CRD-34

CRL-34

CTC-33

34 Series:
Remote electronic control

CTC Series:
Timer-based control

X105 Limit Switch Assembly

X140-01 Locking Security Cap

Prevents tampering of pilot controls

Dura-Kleen® Stem Delrin® Sleeved Stems

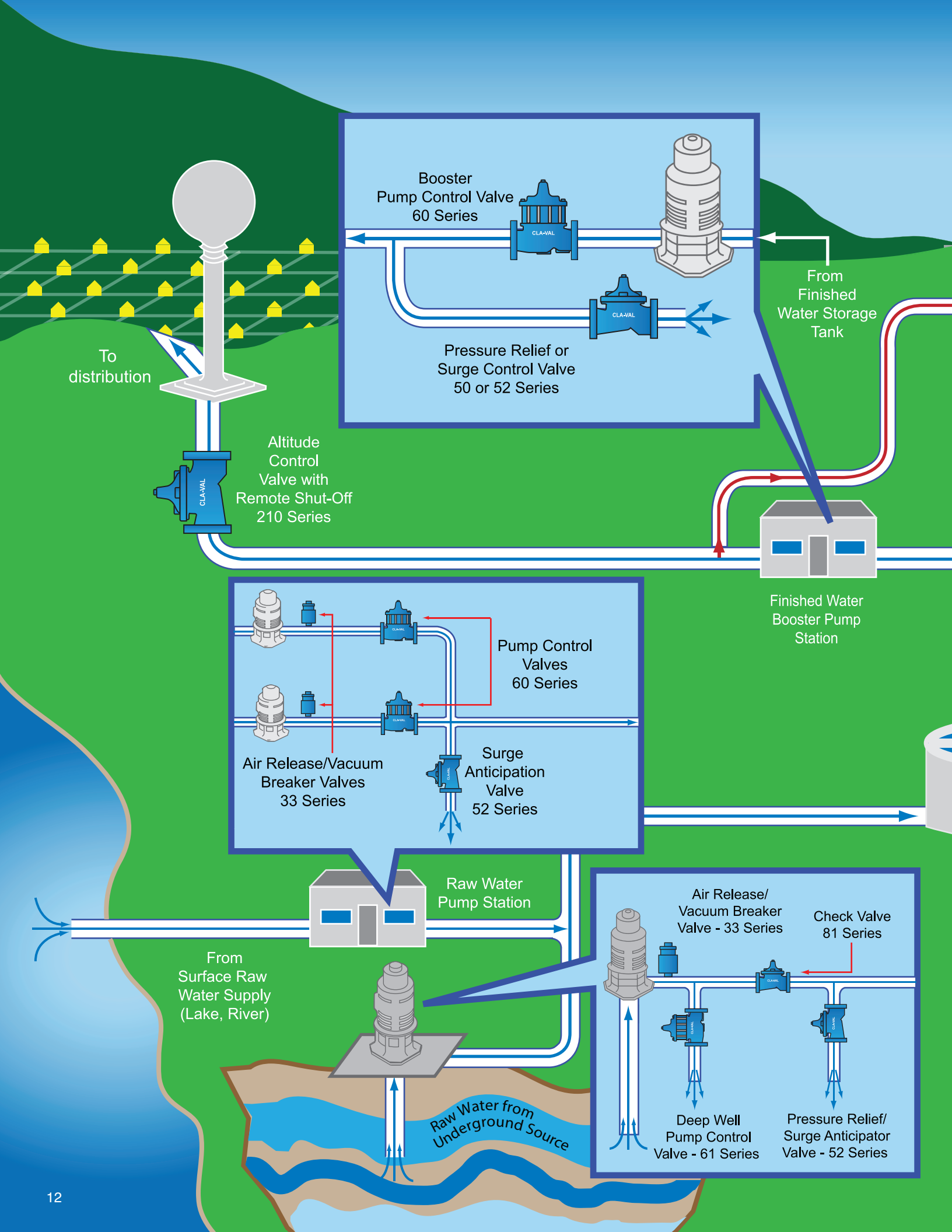
Helps to extend valve life in applications with harsh or corrosive fluids

Model X141 Pressure Gauge

Factory mounted on valve inlet and outlet

Model X43H-Style Strainer

Ductile Iron, fusion-bonded epoxy coating and Stainless Steel strainer mesh for longer service life


Booster
Pump Control Valve
60 Series
CLA-VAL
CLA-VAL
Pressure Relief or
Surge Control Valve
50 or 52 Series
From
Finished
Water Storage
Tank
To
distribution
Altitude
Control
Valve with
Remote Shut-Off
210 Series
CLA-VAL
Finished Water
Booster Pump
Station
Pump Control
Valves
60 Series
Air Release/Vacuum
Breaker Valves
33 Series
Surge
Anticipation
Valve
52 Series
Raw Water
Pump Station
From
Surface Raw
Water Supply
(Lake, River)
Air Release/
Vacuum Breaker
Valve - 33 Series
Check Valve
81 Series
Raw Water from
Underground Source
Deep Well
Pump Control
Valve - 61 Series
Pressure Relief/
Surge Anticipator
Valve - 52 Series

Cla-Val Water Treatment System Solutions: Optimum Controllability

Flow From Finished Water Booster Pump Station

Filter Backwash Control Valve - 133 Series

Electronic Level Control Valve with Metering and Hydraulic Override 131/133 Series

Filter Effluent Metering/ Flow Control Valves - 131/133 Series

Open Bed Filters

Finished Water Storage Tank

From Raw Water Settling Basins

Raw Water Reservoir

Water Treatment Plant

Raw Water Settling Basins

Electronic Level Control and Metering Valve - 131/133 Series

CLA-VAL

www.cla-val.com

100-01 — MODEL —

(Full Internal Port)

(Sizes 3/8"-36")

Hytrol Valve

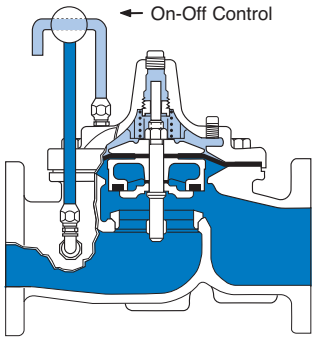
- **Drip-Tight, Positive Seating**
- **Service Without Removal From Line**
- **Threaded, Flanged or Grooved Ends**
- **Globe or Angle Pattern**
- **100% Factory Tested**

The Cla-Val Model 100-01 Hytrol Valve is a hydraulically operated, diaphragm actuated, globe or angle pattern valve. It consists of three major components: body, diaphragm assembly, and cover. The diaphragm assembly is the only moving part.

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

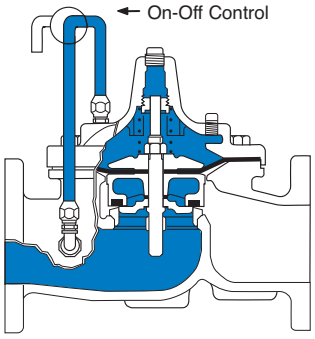
The Model 100-01 is the main valve used in nearly all Cla-Val Automatic Control Valves. It is the valve of choice for system applications requiring remote control, pressure regulation, solenoid operation, rate of flow control, liquid level control or check valve operation. The rugged simplicity of design and packless construction assure a long life of dependable, trouble-free operation. It is available in various materials and in a full range of sizes, with either threaded, flanged or grooved ends. Its applications are unlimited.

Principle of Operation



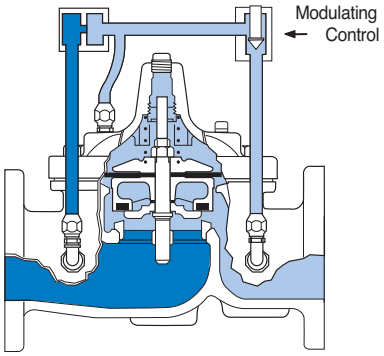
Full Open Operation

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



Tight Closing Operation

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



Modulating Action

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

Specifications

Model 100-01

Available Sizes

Pattern	Threaded	Flanged	Grooved End
Globe	⅜" - 3"	1½" - 36"	1½"-2"- 2½"- 3"- 4"- 6"- 8"
Angle	1" - 3"	1½" - 16" & 24"	2" - 3" - 4"

Operating Temp. Range

Fluids
-40° to 180° F

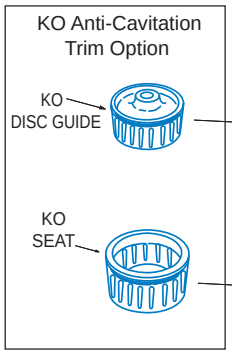
Pressure Ratings (Recommended Maximum Pressure - psi)

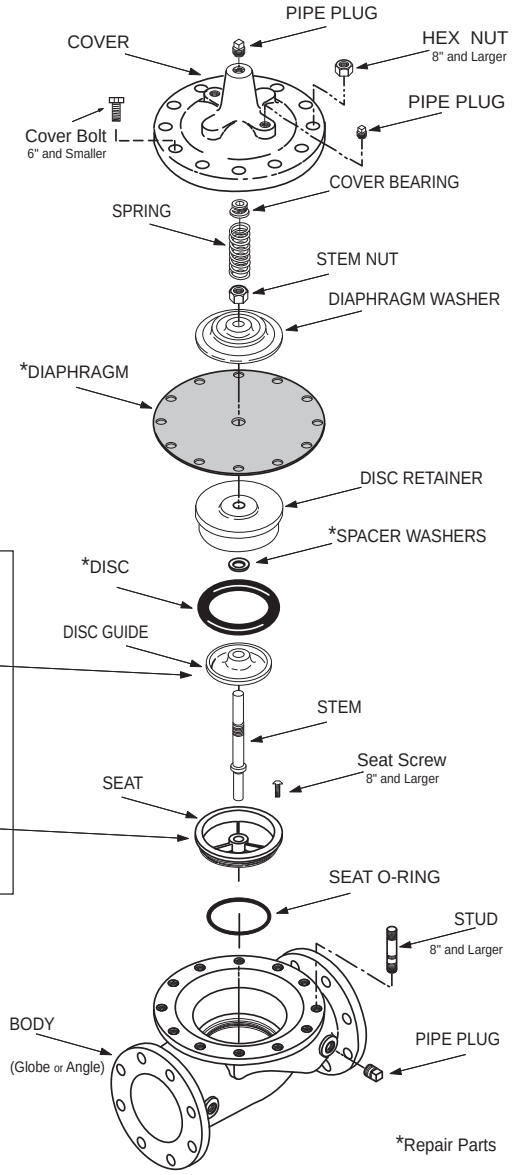
Valve Body & Cover		Pressure Class				
		Flanged			Grooved	Threaded
Grade	Material	ANSI Standards*	150 Class	300 Class	300 Class	End‡ Details
ASTM A536	Ductile Iron	B16.42	250	400	400	400
ASTM A216-WCB	Cast Steel	B16.5	285	400	400	400
UNS 87850	Bronze	B16.24	225	400	400	400

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

Materials

Component	Standard Material Combinations		
Body & Cover	Ductile Iron	Cast Steel	Bronze
Available Sizes	3/8" - 36" 10 - 900mm	1" - 16" 25 - 40mm	1" - 16" 25 - 40mm
Disc Retainer & Diaphragm Washer	Cast Iron	Cast Steel	Bronze
Trim: Disc Guide, Seat & Cover Bearing	Bronze is Standard 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.			





Viton® Rubber Parts - suffix KB
Optional diaphragm, disc and o-ring fabricated with Viton® synthetic rubber. Viton® is well suited for use with mineral acids, salt solutions, chlorinated hydrocarbons, and petroleum oils; and is primarily used in high temperature applications up to 250° F. Do not use with epoxy coatings above 175° F.

Epoxy Coating - suffix KC
The NSF/ANSI 61 fusion bonded epoxy coating option is for use with cast iron, ductile iron or steel valves. This coating is resistant to various water conditions, certain acids, chemicals, solvents and alkalies. epoxy coatings are applied in accordance with AWWA coating specifications C116-03. Do not use with temperatures above 175° F..

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

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

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

Anti-Cavitation Trim - suffix KO
Anti-Cavitation Trim components consist of a stainless steel radial slotted disc guide and seat. This system is used when high differentials are present across the valve.

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

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

Functional Data

† Non Guided Stem

Model 100-01

Valve Size		Inches	⅜†	½†	¾†	1†	1	1¼	1½	2	2½	3	4	6	8	10	12	14	16	18	20	24	30	36
		mm.	10	15	20	25	25	32	40	50	65	80	100	150	200	250	300	350	400	450	500	600	750	900
C_V Factor	Globe Pattern	Gal./Min.(gpm.)	1.8	6	8.5	13.3	20	30	32	54	85	115	200	440	770	1245	1725	2300	3130	4463	5345	7655	10150	14020
		Litres/Sec. (l/s.)	.11	.38	.54	.84	1.26	1.89	2	3.4	5.4	7.3	13	28	49	79	109	145	198	282	337	483	640	885
	Angle Pattern	Gal./Min.(gpm.)	—	—	—	—	21	27	29	61	101	139	240	541	990	1575	2500*	3060*	4200*	—	—	9950*	—	—
		Litres/Sec. (l/s.)	—	—	—	—	1.32	1.70	1.83	3.8	6.4	8.8	15	34	62	99	158	193	265	—	—	628	—	—
Equivalent Length of Pipe	Globe Pattern	Feet (ft.)	25	7	16	23	10	19	37	51	53	85	116	211	291	347	467	422	503	612	595	628	1181	2285
		Meters (m.)	7.6	2.2	4.8	7.1	3.1	5.7	12	15.5	16	26	35	64	89	106	142	129	154	187	181	192	360	696
	Angle Pattern	Feet (ft.)	—	—	—	—	9.0	28	46	40	37	58	80	139	176	217	222*	238*	247*	—	—	372*	—	—
		Meters (m.)	—	—	—	—	2.8	8.7	14	12	11	18	25	43	54	66	68	73	75	—	—	113	—	—
K Factor	Globe Pattern		16.3	3.7	5.7	6.1	2.7	3.6	5.9	5.6	4.6	6.0	5.9	6.2	6.1	5.8	6.1	5.0	4.6	5.2	3.9	4.0	6.4	6.4
	Angle Pattern		—	—	—	—	2.5	4.4	7.1	4.4	3.3	4.1	4.1	4.1	3.7	3.6	2.9	2.8	2.6	—	—	2.4	—	—
Liquid Displaced from Cover Chamber When Valve Opens		Fl. Oz	.12	.34	.34	.70	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		U.S. Gal.	—	—	—	—	.02	.02	.02	.03	.04	.08	.17	.53	1.26	2.51	4.0	6.5	9.6	11	12	29	42	90
		ml	3.5	10.1	10.1	20.7	75.7	75.7	75.7	121	163	303	643	—	—	—	—	—	—	—	—	—	—	—
		Litres	—	—	—	—	—	—	—	—	—	—	—	2.0	4.8	9.5	15.1	24.6	36.2	41.6	45.4	109.8	159	340

*Estimated

C_V Factor

Formulas for computing C_V Factor, Flow (Q) and Pressure Drop ($\blacktriangle P$):

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

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: $L = \frac{K\,d}{12\,f}$
(U.S. system units)

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

Where:

C_V = U.S. (gpm) @ 1 psi differential at 60° F water
or
= (l/s) @ 1 bar (14.5 PSIG) differential at 15° C water

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

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

K = Resistance Coefficient (calculated)

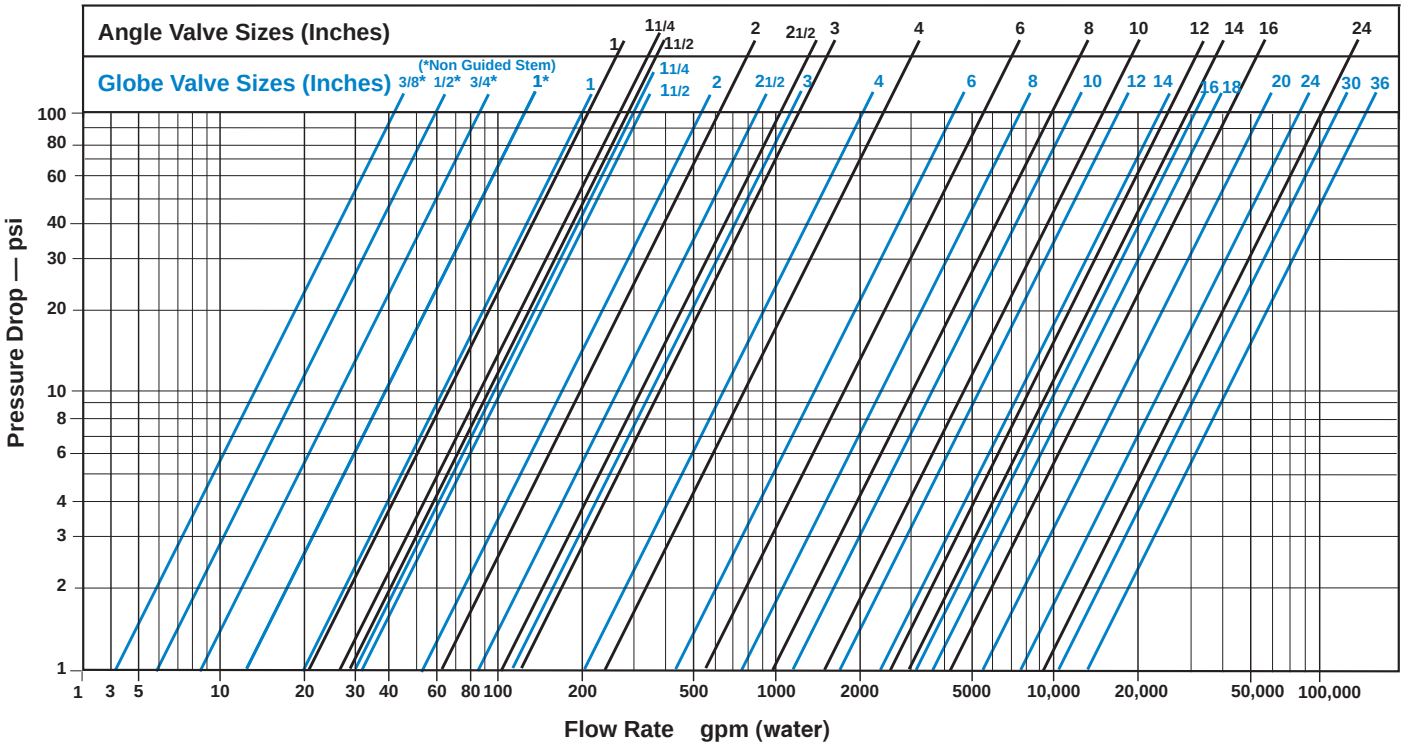
L = Equivalent Length of Pipe (feet)

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

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

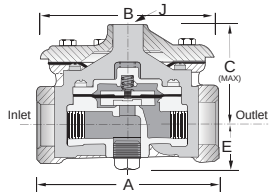
$\triangle P$ = Pressure Drop in (psi) or (bar)

Model 100-01 Flow Chart (Based on normal flow through a wide open valve)

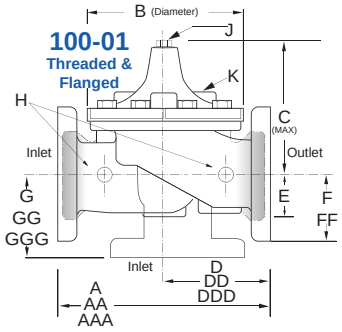


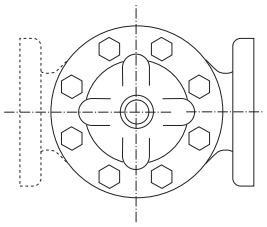
Dimensions

100-01
3/8", 1/2", 3/4", 1"
Auxillary Hytrol Valves with non Guided Stems

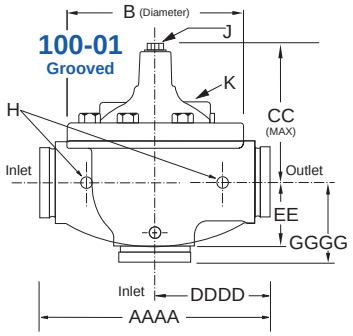


100-01
Threaded & Flanged





100-01
Grooved



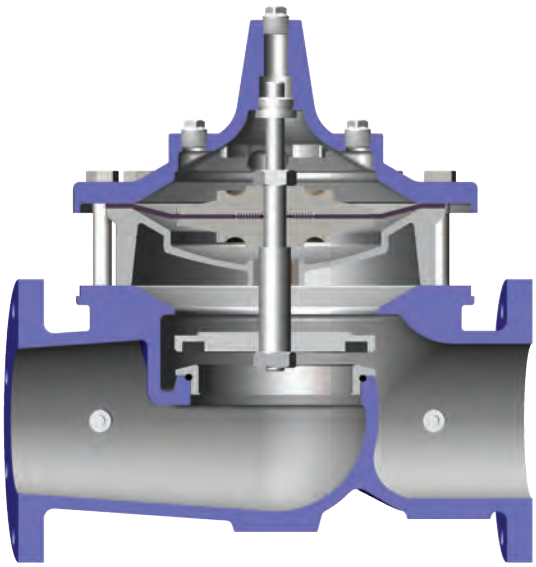
Valve Size (Inches)	3/8*	1/2*	3/4*	1*	1	1 1/4	1 1/2	2	2 1/2	3	4	6	8	10	12	14	16	18†	20†	24†	30†	36†
A Threaded	2.75	3.50	3.50	5.12	7.25	7.25	7.25	9.38	11.00	12.50	—	—	—	—	—	—	—	—	—	—	—	—
AA 150 ANSI	—	—	—	—	—	—	8.50	9.38	11.00	12.00	15.00	20.00	25.38	29.75	34.00	39.00	41.38	46.00	52.00	61.50	63.00	72.75
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	2.50	3.12	3.12	4.38	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	2.33	5.88	5.88	6.25	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	1.25	0.88	0.88	1.63	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	—	0.125	0.125	0.25	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	0.125	0.125	0.125	0.25	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	—	0.125	0.125	0.25	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
Valve Stem Int. Thread UNF	—	—	—	—	10-32	10-32	10-32	10-32	10-32	1/4-28	1/4-28	3/8-24	3/8-24	3/8-24	3/8-24	3/8-24	1/2-20	3/4-16	3/4-16	3/4-16	3/4-16	3/4-16
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)	3	3	8	8	15	15	15	35	50	70	140	285	500	780	1165	1600	2265	2982	3900	6200	7703	11720

Valve Size (mm)	10*	15*	20*	25*	25	32	40	50	65	80	100	150	200	250	300	350	400	450	500	600	750	900
A Threaded	70	89	89	130	184	184	184	238	279	318	—	—	—	—	—	—	—	—	—	—	—	—
AA 150 ANSI	—	—	—	—	—	—	216	238	279	305	381	508	645	756	864	991	1051	1168	1321	1562	1600	1848
AAA 300 ANSI	—	—	—	—	—	—	229	254	295	337	397	533	670	790	902	1029	1105	1210	1326	1606	1638	1899
AAAA Grooved End	—	—	—	—	—	—	216	228	279	318	381	508	645	—	—	—	—	—	—	—	—	—
B Diameter	64	80	80	111	143	143	143	168	203	232	292	400	508	600	711	832	902	1054	1143	1350	1422	1676
C Maximum	59	149	149	159	140	140	140	165	192	208	270	340	406	435	530	614	635	992	1064	1116	1387	1499
CC Maximum Grooved End	—	—	—	—	—	—	120	146	175	184	236	308	371	—	—	—	—	—	—	—	—	—
D Threaded	—	—	—	—	83	83	83	121	140	159	—	—	—	—	—	—	—	—	—	—	—	—
DD 150 ANSI	—	—	—	—	—	—	102	121	140	152	191	254	322	378	432	495	528	—	—	781	—	—
DDD 300 ANSI	—	—	—	—	—	—	108	127	149	162	200	267	337	395	451	514	549	—	—	803	—	—
DDDD Grooved End	—	—	—	—	—	—	—	121	—	152	191	—	—	—	—	—	—	—	—	—	—	—
E	32	23	23	42	29	29	29	38	43	52	81	110	135	235	273	321	394	329	381	451	541	624
EE Grooved End	—	—	—	—	—	—	52	64	73	79	108	152	192	—	—	—	—	—	—	—	—	—
F 150 ANSI	—	—	—	—	—	—	64	76	89	95	114	140	171	203	241	267	298	381	419	489	572	724
FF 300 ANSI	—	—	—	—	—	—	78	83	95	105	127	159	191	222	260	292	324	381	419	489	610	762
G Threaded	—	—	—	—	48	48	48	83	102	114	—	—	—	—	—	—	—	—	—	—	—	—
GG 150 ANSI	—	—	—	—	—	—	102	83	102	102	127	152	203	219	349	378	399	—	—	560	—	—
GGG 300 ANSI	—	—	—	—	—	—	102	89	110	111	135	165	216	236	368	397	419	—	—	582	—	—
GGGG Grooved End	—	—	—	—	—	—	—	83	—	108	127	—	—	—	—	—	—	—	—	—	—	—
H NPT Body Tapping	—	0.125	0.125	0.25	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	0.125	0.125	0.125	0.25	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	—	0.125	0.125	0.25	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	—	—	—	—	10	10	10	15	18	20	28	43	58	71	86	102	114	130	143	171	190	216
Approx. Ship Weight (kgs)	1.4	1.4	1.4	6	7	7	7	16	23	32	64	129	227	354	528	726	1027	1353	1769	2812	3494	5316

100-02 — MODEL —

(Full Internal Port)

Powertrol Valve



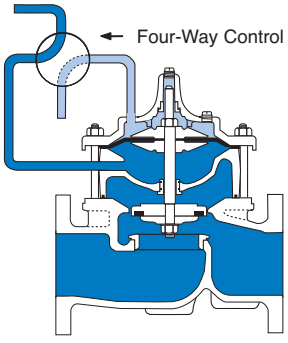
- **Drip-Tight, Positive Seating**
- **Service Without Removal From Line**
- **Threaded or Flanged Ends**
- **Globe or Angle Pattern**
- **Every Valve Factory Tested**

The Cla-Val Model 100-02 is a hydraulically operated, diaphragm actuated, globe, or angle pattern valve. It consists of four major components: body, intermediate chamber, diaphragm assembly, and cover. The diaphragm assembly is the only moving part.

The diaphragm assembly which is guided top and center by a precision machined stem, utilizes a non-wicking diaphragm of nylon fabric bonded with synthetic rubber. The diaphragm forms a seal between the cover chamber and intermediate chamber. A synthetic rubber disc retained on three and one half sides forms a drip-tight seal with the renewable seat when pressure is applied above the diaphragm. As pressure above the diaphragm is relieved and pressure is applied below the diaphragm, the valve opens wide for full flow. The rate of closing or opening can be controlled by modulating flow into or out of the diaphragm chambers.

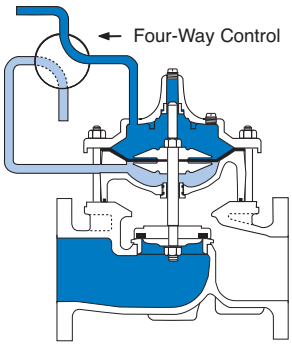
The Model 100-02 is recommended where independent operating pressure is desired. Available in various materials and in a full range of sizes, with either threaded or flanged ends, its applications are many and varied.

Principle of Operation



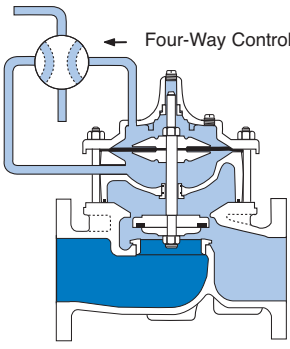
Full Open Operation

When operating pressure below the diaphragm is applied and operating, pressure is relieved from the cover chamber and, the valve is held open, allowing full flow.



Tight Closing Operation

When pressure below the diaphragm is relieved and operating pressure is applied to the cover chamber, the valve closes drip-tight.



Modulating Action

The valve holds any intermediate position when operating pressure is equal above and below the diaphragm. A Cla-Val four-way pilot control with "lock" position can maintain this balance by stopping flow in the pilot control system.

Available Sizes

Pattern	Threaded	Flanged	Grooved End
Globe	⅜" - 3"	1½" - 24"	1½"-2"- 2½"- 3"- 4"- 6"- 8"
Angle	1½" - 3"	2" - 16"	2" - 3" - 4"

Operating Temp. Range

Fluids
-40° to 180° F

Pressure Ratings (Recommended Maximum Pressure - psi)

Valve Body & Cover		Pressure Class			
		Flanged			Threaded
Grade	Material	ANSI Standards*	150 Class	300† Class	End‡ Details
ASTM A536	Ductile Iron	B16.42	250	400	400
ASTM A216-WCB	Cast Steel	B16.5	285	400	400
UNS 87850	Bronze	B16.24	225	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.
† Consult factory when Maximum Operating Pressure Differential (MOPD) is greater than 400 PSID
"Valves for higher pressure are available; consult factory for details"

Materials

Component	Standard Material Combinations		
Body & Cover	Ductile Iron	Cast Steel	Bronze
Available Sizes	1¼" - 24" 32 - 600mm	1¼" - 16" 32 - 400mm	1¼" - 16" 32 - 400mm
Disc Retainer & Diaphragm Washer	Cast Iron	Cast Steel	Bronze
Trim: Disc Guide, Seat & Cover Bearing	Bronze is Standard 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.			

Options

Epoxy Coating - suffix KC

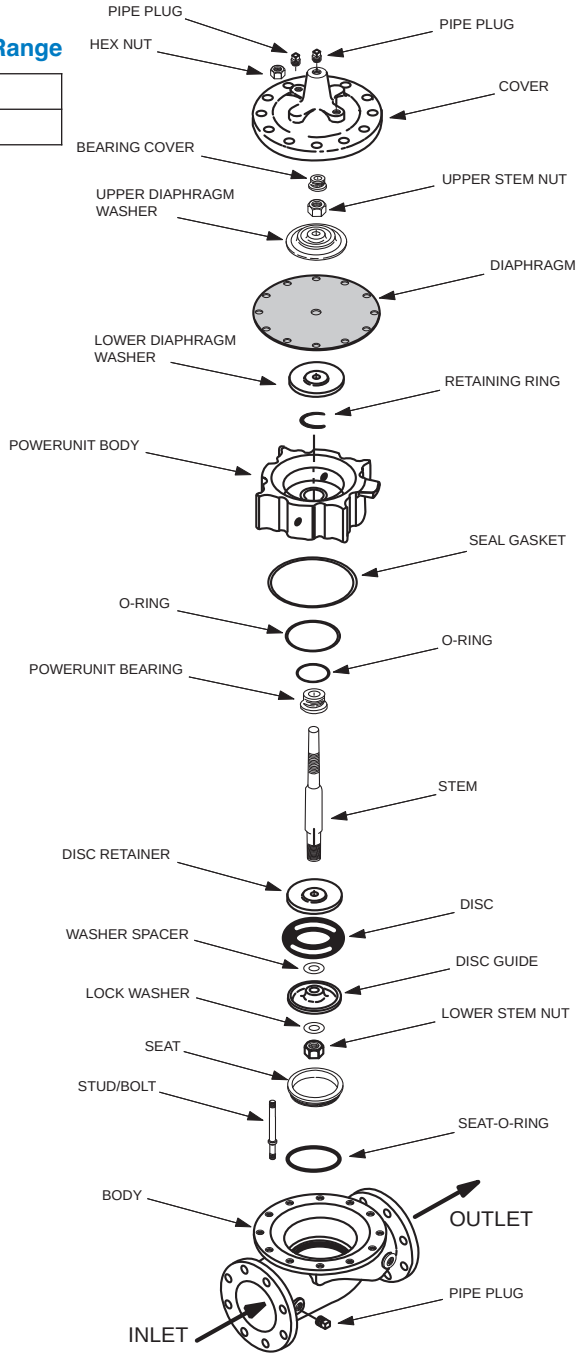
The NSF/ANSI 61 fusion bonded epoxy coating option is for use with cast iron, ductile iron or steel valves. This coating is resistant to various water conditions, certain acids, chemicals, solvents and alkalies. epoxy coatings are applied in accordance with AWWA coating specifications C116-03. Do not use with temperatures above 175° F

Viton® Rubber Parts - suffix KB

Optional diaphragm, disc and o-ring fabricated with Viton® synthetic rubber. Viton® is well suited for use with mineral acids, salt solutions, chlorinated hydrocarbons, and petroleum oils; and is primarily used in high temperature applications up to 250° F. Do not use with epoxy coating above 175°F.

Heavy Spring - suffix KH

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



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

Functional Data

Model 100-02

Valve Size		Inches	⅜	½	¾	1	1¼	1½	2	2½	3	4	6	8	10	12	14	16	18	20	24	30
		mm.	10	15	20	25	32	40	50	65	80	100	150	200	250	300	350	400	450	500	600	750
C_V Factor	Globe Pattern	Gal./Min. (gpm.)	1.8	6	8.5	13.3	30	32	54	85	115	200	440	770	1245	1725	2300	2940	3725	5345	7655	10150
		Litres/Sec. (l/s.)	.43	1.44	2.04	3.2	7.2	7.7	13	20	28	48	106	185	299	414	552	706	894	1286	1837	2436
	Angle Pattern	Gal./Min. (gpm.)	—	—	—	—	—	29	61	101	139	240	541	990	1575	2500*	3060*	4200*	—	—	—	—
		Litres/Sec. (l/s.)	—	—	—	—	—	7	15	24	33	58	130	238	378	600	734	1008	—	—	—	—
Equivalent Length of Pipe	Globe Pattern	Feet (ft.)	25	7	16	23	19	37	51	53	85	116	211	291	347	467	422	503	612	595	628	1181
		Meters (m.)	7.6	2.2	4.8	7.1	5.7	12	15.5	16	26	35	64	89	106	142	129	154	187	181	192	552
	Angle Pattern	Feet (ft.)	—	—	—	—	—	46	40	37	58	80	139	176	217	222*	238*	247*	—	—	—	—
		Meters (m.)	—	—	—	—	—	14	12	12	18	25	43	54	66	68	73	75	—	—	—	—
K Factor	Globe Pattern		16.3	3.7	5.7	6.1	3.6	5.9	5.6	4.6	6.0	5.9	6.2	6.1	5.8	6.1	5.0	5.2	5.2	4.6	4.0	5.3
	Angle Pattern		—	—	—	—	—	7.1	4.4	3.3	4.1	4.1	4.1	3.7	3.6	2.9	2.8	2.6	—	—	—	—
Liquid Displaced from Cover Chamber When Valve Opens		Fl. Oz	.12	.34	.34	.70	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		U.S. Gal.	—	—	—	—	.02	.02	.03	.04	.08	.17	.53	1.26	2.51	4.0	6.5	9.6	11	12	29	42
		ml	3.5	10.1	10.1	20.7	75.7	75.7	121	163	303	643	—	—	—	—	—	—	—	—	—	—
		Litres	—	—	—	—	—	—	—	—	—	—	2.0	4.8	9.5	15.1	24.6	36.2	41.6	45.4	109.8	197

*Estimated

C_V Factor

Formulas for computing C_V Factor, Flow (Q) and Pressure Drop ($\triangle P$):

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

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: $L = \frac{K\,d}{12\,f}$
(U.S. system units)

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

Where:

C_V = U.S. (gpm) @ 1 psi differential at 60° F water
or
= (l/s) @ 1 bar (14.5 PSIG) differential at 15° C water

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

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

K = Resistance Coefficient (calculated)

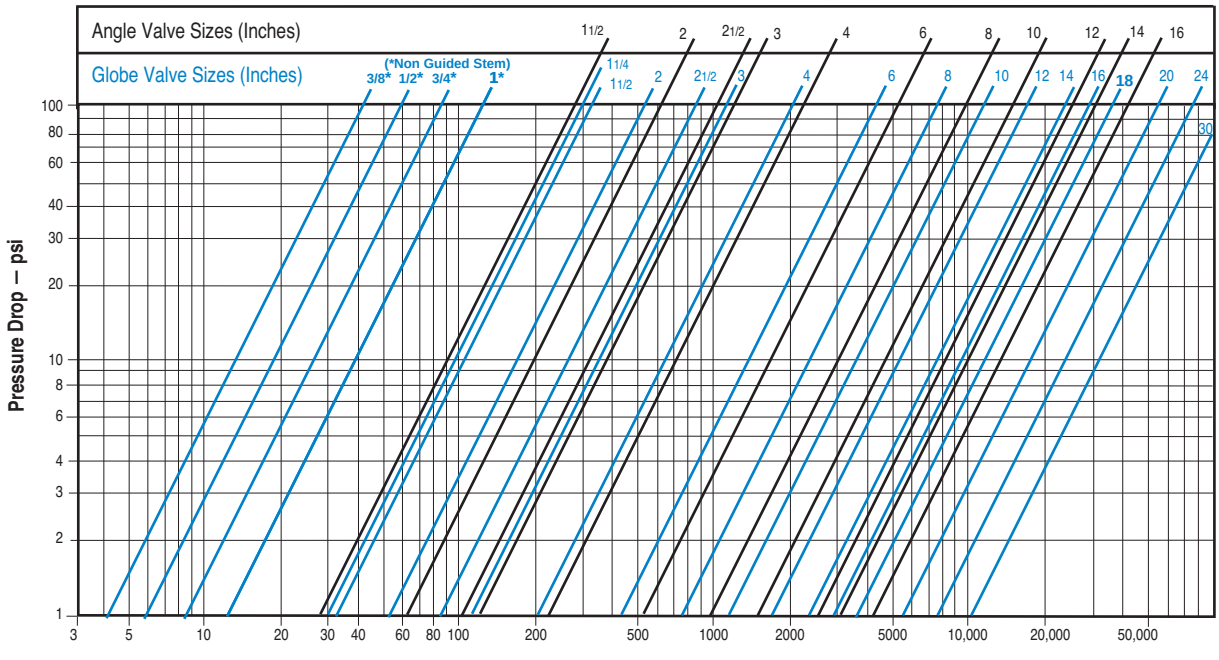
L = Equivalent Length of Pipe (feet)

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

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

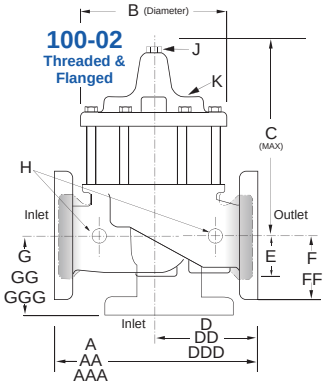
$\triangle P$ = Pressure Drop in (psi) or (bar)

Model 100-02 Flow Chart (Based on normal flow through a wide open valve)

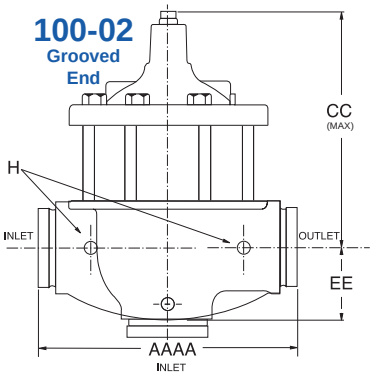


Dimensions

100-02
Threaded & Flanged



100-02
Grooved End



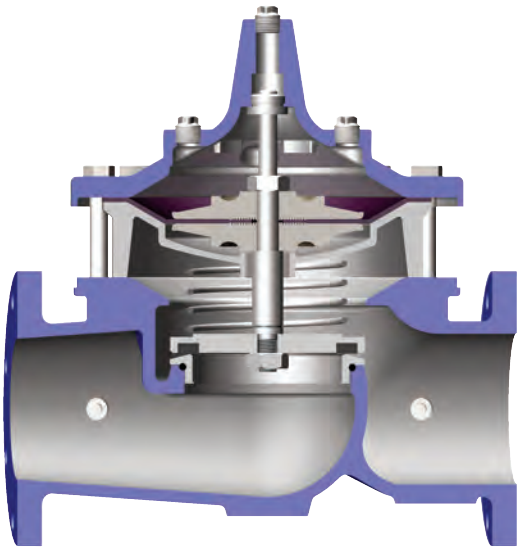
Valve Size (Inches)	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	4	6	8	10	12	14	16	18	20	24	30
A Threaded	2.75	3.50	3.50	5.12	7.25	7.25	9.38	11.00	12.50	—	—	—	—	—	—	—	—	—	—	—
AA 150 ANSI	—	—	—	—	—	8.50	9.38	11.00	12.00	15.00	20.00	25.38	29.75	34.00	39.00	41.38	46.00	52.00	61.50	63.00
AAA 300 ANSI	—	—	—	—	—	9.00	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
AAAA Grooved End	—	—	—	—	—	8.50	9.00	11.00	12.50	15.00	20.00	25.38	—	—	—	—	—	—	—	—
B Diameter	2.50	3.12	3.12	4.38	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
C Maximum	2.33	5.88	5.88	6.25	7.62	7.62	8.56	10.31	11.19	14.25	18.44	21.81	23.38	29.31	32.12	35.00	49.43	53.09	56.50	68.70
CC Maximum Grooved End	—	—	—	—	—	6.87	7.81	9.63	10.25	13.50	17.18	20.43	—	—	—	—	—	—	—	—
D Threaded	—	—	—	—	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	—	—	—	—
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	—	—	—	—
DDDD Grooved End	—	—	—	—	—	—	4.75	—	6.00	7.50	—	—	—	—	—	—	—	—	—	—
E	1.25	0.88	0.88	1.63	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
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	22.06	22.50
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	22.90	24.00
G Threaded	—	—	—	—	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	—	—	—	—
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	—	—	—	—
GGGG Grooved End	—	—	—	—	—	—	3.25	—	4.25	5.00	—	—	—	—	—	—	—	—	—	—
H NPT Body Tapping	—	0.125	0.125	0.25	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
J NPT Cover Center Plug	0.125	0.125	0.125	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	1.50	1.50	1.50	2.00
K NPT Cover Tapping	—	0.125	0.125	0.25	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
Valve Stem Int. Thread UNF	—	—	—	—	10-32	10-32	10-32	10-32	1/4-28	1/4-28	3/8-24	3/8-24	3/8-24	3/8-24	3/8-24	1/2-20	3/4-16	3/4-16	3/4-16	3/4-16
Stem Travel	—	—	—	—	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
Approx. Ship Weight (lbs)	8	8	8	13	22	22	40	65	95	190	320	650	940	1675	2460	3100	4300	5400	8150	10300

Valve Size (mm)	10	15	20	25	32	40	50	65	80	100	150	200	250	300	350	400	450	500	600	750
A Threaded	70	89	89	130	184	184	238	279	318	—	—	—	—	—	—	—	—	—	—	—
AA 150 ANSI	—	—	—	—	—	216	238	279	305	381	508	645	756	864	991	1051	1168	1321	1562	1600
AAA 300 ANSI	—	—	—	—	—	229	254	295	337	397	533	670	790	902	1029	1105	1210	1326	1606	1638
AAAA Grooved End	—	—	—	—	—	216	228	279	318	381	508	645	—	—	—	—	—	—	—	—
B Diameter	64	80	80	111	143	143	168	203	232	292	400	508	600	711	832	902	1054	1143	1350	1422
C Maximum	59	149	149	159	194	194	217	262	284	362	468	554	594	744	816	889	1255	1348	1435	1745
CC Maximum Grooved End	—	—	—	—	—	174	174	198	245	260	343	436	—	—	—	—	—	—	—	—
D Threaded	—	—	—	—	83	83	121	140	159	—	—	—	—	—	—	—	—	—	—	—
DD 150 ANSI	—	—	—	—	—	102	121	140	152	191	254	322	378	432	495	528	—	—	—	—
DDD 300 ANSI	—	—	—	—	—	108	127	149	162	200	267	337	395	451	514	549	—	—	—	—
DDDD Grooved End	—	—	—	—	—	—	121	—	152	191	—	—	—	—	—	—	—	—	—	—
E	32	23	23	42	29	29	38	43	52	81	110	135	235	273	321	394	329	381	451	541
EE Grooved End	—	—	—	—	—	52	64	73	79	108	152	192	—	—	—	—	—	—	—	—
F 150 ANSI	—	—	—	—	—	64	76	89	95	114	140	171	203	241	267	298	381	419	489	572
FF 300 ANSI	—	—	—	—	—	78	83	95	105	127	159	191	222	260	292	324	381	419	489	610
G Threaded	—	—	—	—	48	48	83	102	114	—	—	—	—	—	—	—	—	—	—	—
GG 150 ANSI	—	—	—	—	—	102	83	102	102	127	152	203	219	349	378	399	—	—	—	—
GGG 300 ANSI	—	—	—	—	—	102	89	110	111	135	165	216	236	368	397	419	—	—	—	—
GGGG Grooved End	—	—	—	—	—	—	83	—	108	127	—	—	—	—	—	—	—	—	—	—
H NPT Body Tapping	—	0.125	0.125	0.25	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
J NPT Cover Center Plug	0.125	0.125	0.125	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				2.00
K NPT Cover Tapping	—	0.125	0.125	0.25	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
Valve Stem Int. Thread UNF	—	—	—	—	10-32	10-32	10-32	10-32	1/4-28	1/4-28	3/8-24	3/8-24	3/8-24	3/8-24	3/8-24	1/2-20	3/4-16	3/4-16	3/4-16	3/4-16
Stem Travel	—	—	—	—	10	10	15	18	20	28	43	58	71	86	102	114	130	143	171	190
Approx. Ship Weight (kgs)	1.4	1.4	1.4	6	10	10	18	30	43	86	145	295	426	760	1116	1406	1950	2449	3696	4672

100-03 — MODEL —

(Full Internal Port)

Powercheck Valve



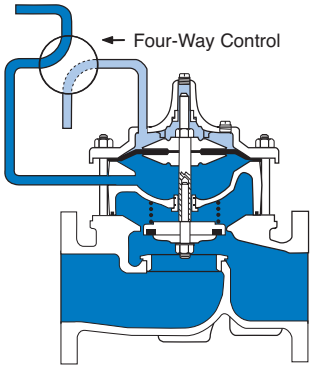
- **Built-in Automatic Check Valve**
- **Globe or Angle Pattern**
- **Drip-Tight, Positive Seating**
- **Threaded or Flanged Ends**
- **Packless Construction**

The Cla-Val Model 100-03 Powercheck Valve is a hydraulically operated diaphragm valve with a built-in check feature to prevent return flow. Available in globe or angle pattern, it consists of four major components: body, intermediate chamber, diaphragm assembly, and cover. The diaphragm assembly is the only moving part.

The diaphragm assembly is guided top and center by a precision machined stem and utilizes a non-wicking diaphragm of nylon fabric bonded with synthetic rubber. A synthetic rubber disc retained on three and one half sides forms a drip-tight seal with the renewable seat when pressure is applied above the diaphragm. When pressure above the diaphragm is relieved, the valve opens wide. The rate of closing or opening can be controlled by modulating flow into or out of the diaphragm chambers.

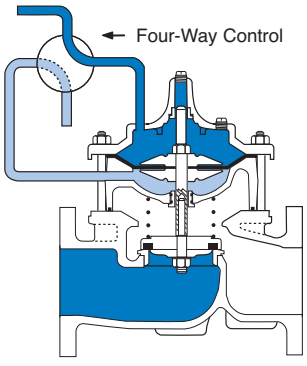
When a pressure reversal occurs, the valve will immediately close, preventing reverse flow thru the valve. The split stem will allow the disc retainer assembly to check closed regardless of the position of the diaphragm.

Principle of Operation



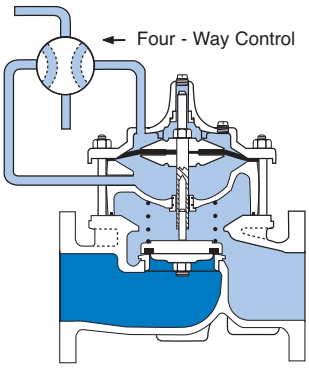
Full Open Operation

When operating pressure below the diaphragm is applied and pressure is relieved from the cover chamber, the valve is held open allowing full flow.



Tight Closing Operation

When pressure below the diaphragm is relieved and operating pressure is applied to the cover chamber, the valve closes drip-tight.



Check Action

When a static condition or pressure reversal occurs, the split stem design allows the valve to instantly check closed. Return flow is prevented regardless of the diaphragm's position.

Note: For optimum operation of built-in check feature, installation with stem vertically up is recommended.

Specifications

Available Sizes

Pattern	Threaded	Flanged
Globe	2 ½" - 3"	2 ½" - 16"
Angle	2 ½" - 3"	2 ½" - 16"

Operating Temp. Range

Fluids
-40° to 180° F

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
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

Materials

Component	Standard Material Combinations		
Body & Cover	Ductile Iron	Cast Steel	Bronze
Available Sizes	2½" - 16" 65 - 400mm	2½" - 16" 65 - 400mm	2½" - 16" 65 - 400mm
Disc Retainer & Diaphragm Washer	Cast Iron	Cast Steel	Bronze
Trim: Disc Guide, Seat & Cover Bearing	Bronze is Standard 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.			

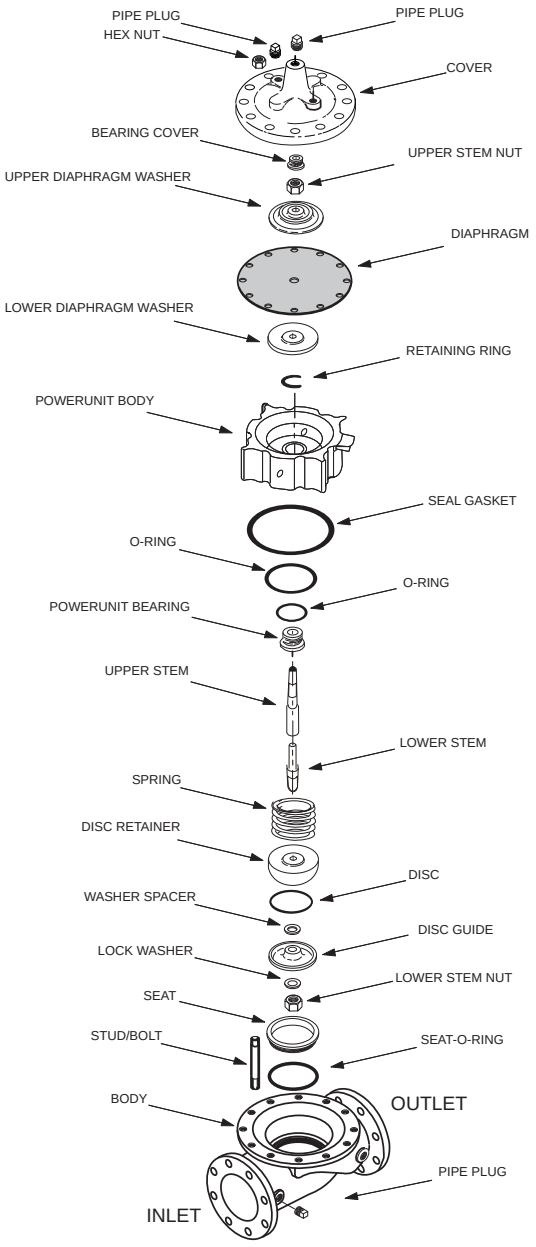
Options

Epoxy Coating - suffix KC

The NSF/ANSI 61 fusion bonded epoxy coating option is for use with cast iron, ductile iron or steel valves. This coating is resistant to various water conditions, certain acids, chemicals, solvents and alkalies. epoxy coatings are applied in accordance with AWWA coating specifications C116-03. Do not use with temperatures above 175° F

Viton® Rubber Parts - suffix KB

Optional diaphragm, disc and o-ring fabricated with Viton® synthetic rubber. Viton® is well suited for use with mineral acids, salt solutions, chlorinated hydrocarbons, and petroleum oils; and is primarily used in high temperature applications up to 250° F. Do not use with epoxy coating above 175° F.



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

Valve Size		Inches	2½	3	4	6	8	10	12	14	16
		mm.	65	80	100	150	200	250	300	350	400
C_V Factor	Globe Pattern	Gal./Min. (gpm.)	85	115	200	440	770	1245	1725	2300	2940
		Litres/Sec. (l/s.)	20	28	48	106	185	299	414	552	706
	Angle Pattern	Gal./Min. (gpm.)	101	139	240	541	990	1575	2500*	3060*	4200*
		Litres/Sec. (l/s.)	24	33	58	130	238	378	600	734	1008
Equivalent Length of Pipe	Globe Pattern	Feet (ft.)	53	85	116	211	291	347	467	422	503
		Meters (m.)	16	26	35	64	89	106	142	129	154
	Angle Pattern	Feet (ft.)	37	58	80	139	176	217	222*	238*	247*
		Meters (m.)	12	18	25	43	54	66	68	73	75
K Factor	Globe Pattern		4.6	6.0	5.9	6.2	6.1	5.8	6.1	5.0	5.2
	Angle Pattern		3.3	4.1	4.1	4.1	3.7	3.6	2.9	2.8	2.6
Liquid Displaced from Cover Chamber When Valve Opens		Fl. Oz	—	—	—	—	—	—	—	—	—
		U.S. Gal.	.04	.08	.17	.53	1.26	2.51	4.0	6.5	9.6
		ml	163	303	643	—	—	—	—	—	—
		Litres	—	—	—	2.0	4.8	9.5	15.1	24.6	36.2

*Estimated

C_V Factor

Formulas for computing C_V Factor, Flow (Q) and Pressure Drop ($\triangle P$):

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

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

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

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

Where:

C_V = U.S. (gpm) @ 1 psi differential at 60° F water
or
= (l/s) @ 1 bar (14.5 PSIG) differential at 15° C water

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

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

K = Resistance Coefficient (calculated)

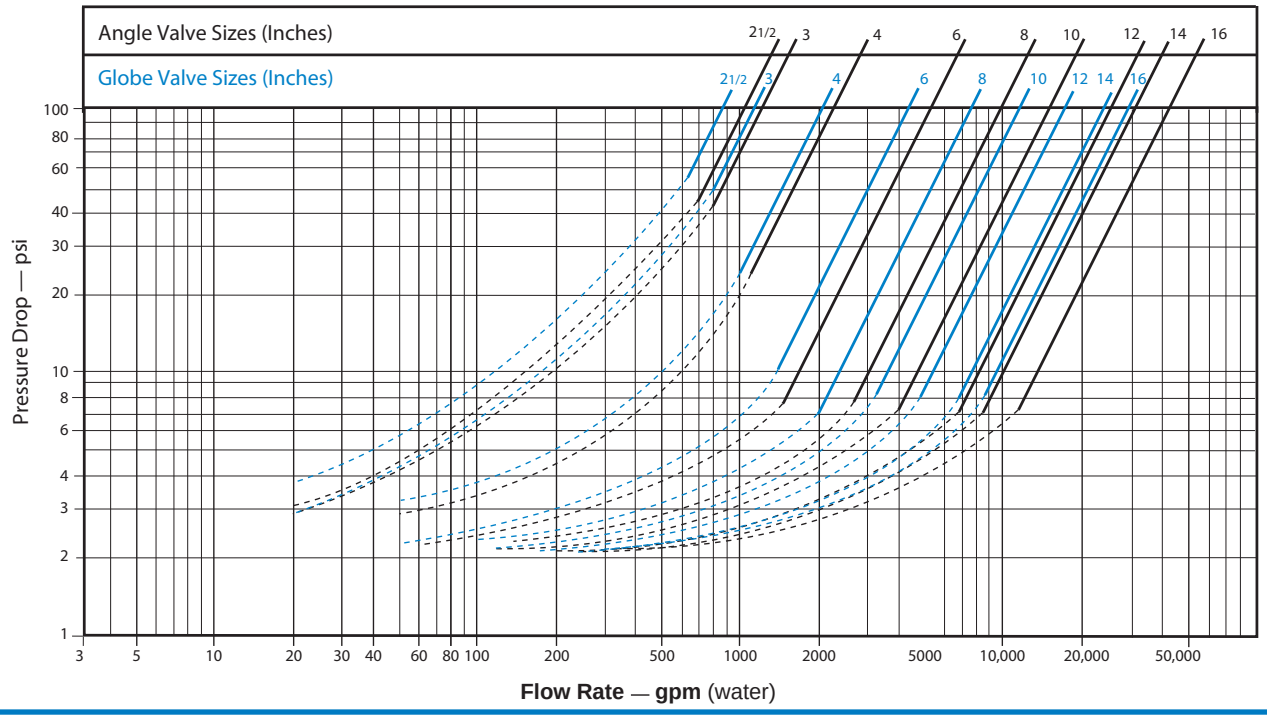
L = Equivalent Length of Pipe (feet)

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

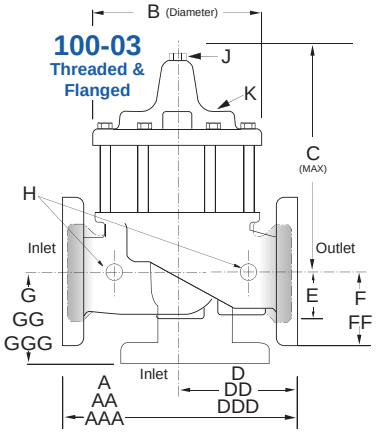
V = Fluid Velocity (feet per second) or (meters per second)

$\triangle P$ = Pressure Drop in (psi) or (bar)

Model 100-03 Flow Chart (Based on normal flow through a wide open valve)



Dimensions



Valve Size (Inches)	2½	3	4	6	8	10	12	14	16
A Threaded	11.00	12.50	—	—	—	—	—	—	—
AA 150 ANSI	11.00	12.00	15.00	20.00	25.38	29.75	34.00	39.00	41.38
AAA 300 ANSI	11.62	13.25	15.62	21.00	26.38	31.12	35.50	40.50	43.50
B Diameter	8.00	9.12	11.50	15.75	20.00	23.62	28.00	32.75	35.50
C Maximum	10.31	11.19	14.25	18.44	21.81	23.38	29.31	32.12	35.00
D Threaded	5.50	6.25	—	—	—	—	—	—	—
DD 150 ANSI	5.50	6.00	7.50	10.00	12.69	14.88	17.00	19.50	20.69
DDD 300 ANSI	5.81	6.63	7.81	10.50	13.19	15.56	17.75	20.25	21.75
E	1.69	2.06	3.19	4.31	5.31	9.25	10.75	12.62	15.50
F 150 ANSI	3.50	3.75	4.50	5.50	6.75	8.00	9.50	10.50	11.75
FF 300 ANSI	3.75	4.13	5.00	6.25	7.50	8.75	10.25	11.50	12.75
G Threaded	4.00	4.50	—	—	—	—	—	—	—
GG 150 ANSI	4.00	4.00	5.00	6.00	8.00	8.62	13.75	14.88	15.69
GGG 300 ANSI	4.31	4.38	5.31	6.50	8.50	9.31	14.50	15.62	16.50
H NPT Body Tapping	0.50	0.50	0.75	0.75	1.00	1.00	1.00	1.00	1.00
J NPT Cover Center Plug	0.50	0.50	0.75	0.75	1.00	1.00	1.25	1.50	2.00
K NPT Cover Tapping	0.50	0.50	0.75	0.75	1.00	1.00	1.00	1.00	1.00
Stem Travel	0.70	0.80	1.10	1.70	2.30	2.80	3.40	4.00	4.50
Approx. Ship Weight (lbs)	65	95	190	320	650	940	1675	2460	3100

Valve Size (Inches)	65	80	100	150	200	250	300	350	400
A Threaded	279	318	—	—	—	—	—	—	—
AA 150 ANSI	279	305	381	508	645	756	864	991	1051
AAA 300 ANSI	295	337	397	533	670	790	902	1029	1105
B Diameter	203	232	292	400	508	600	711	832	902
C Maximum	262	284	362	468	554	594	744	816	889
D Threaded	140	159	—	—	—	—	—	—	—
DD 150 ANSI	140	152	191	254	322	378	432	495	526
DDD 300 ANSI	148	168	198	267	335	395	451	514	552
E	43	52	81	109	135	235	273	321	394
F 150 ANSI	89	95	114	140	171	203	241	267	298
FF 300 ANSI	95	105	127	159	191	222	260	292	324
G Threaded	102	114	—	—	—	—	—	—	—
GG 150 ANSI	102	102	127	152	203	219	349	378	399
GGG 300 ANSI	110	111	135	165	216	236	368	397	419
H NPT Body Tapping	0.50	0.50	0.75	0.75	1.00	1.00	1.00	1.00	1.00
J NPT Cover Center Plug	0.50	0.50	0.75	0.75	1.00	1.00	1.25	1.50	2.00
K NPT Cover Tapping	0.50	0.50	0.75	0.75	1.00	1.00	1.00	1.00	1.00
Stem Travel	18	20	28	43	58	71	86	102	114
Approx. Ship Weight (lbs)	30	43	86	145	295	426	760	1116	1406

Note: Various Flange Drilling to a Foreign and intranational Standards and Specifications are Available on Request.

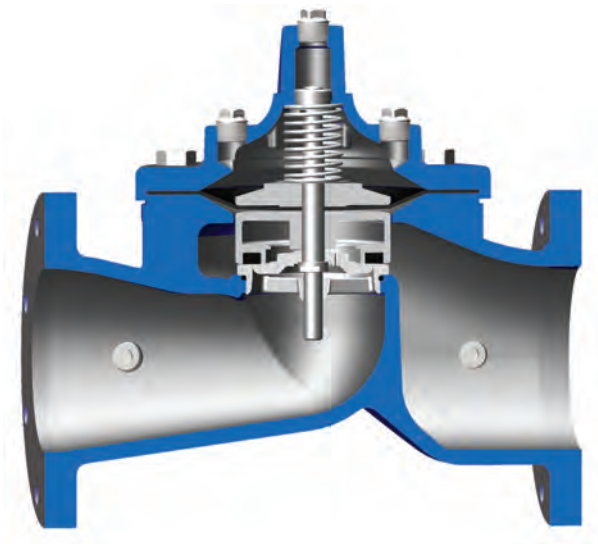
Cla-Val Control Valves operate with maximum efficiency when mounted in horizontal piping with the main valve cover UP, however, other positions are acceptable. Due to component size and weight of 8 inch and larger valves, installation with cover UP is advisable. We recommend isolation valves be installed on inlet and outlet for maintenance. Adequate space above and around the valve for service personnel should be considered essential. A regular maintenance program should be established based on the specific application data. However, we recommend a thorough inspection be done at least once a year. Consult factory for specific recommendations.

100-20 —MODEL—

(Reduced Internal Port)

600 Series

Hytrol Valve



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

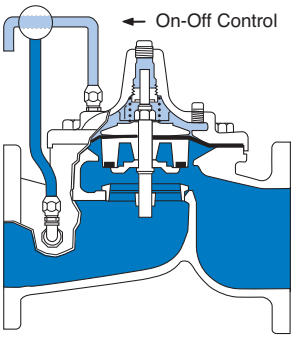
The Cla-Val Model 100-20 Hytrol Valve is a hydraulically operated, diaphragm actuated, globe or angle pattern valve. It consists of three major components: body, diaphragm assembly and cover. The diaphragm assembly is the only moving part.

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

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

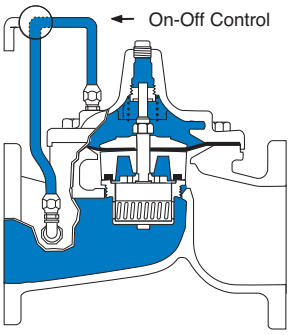
Available in various materials and in a wide range of sizes, its applications are unlimited.

Principle of Operation



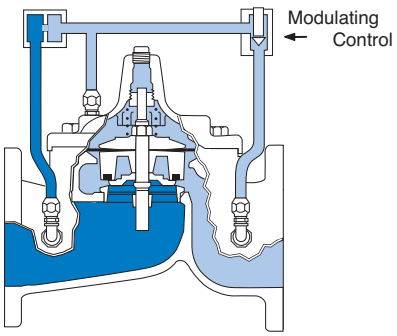
Full Open Operation

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



Tight Closing Operation

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



Modulating Action

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

Available Sizes

Pattern	Flanged
Globe	3", 4", 6", 8", 10", 12", 14", 16", 18", 20", 24", 30", 36, 42", 48"
Angle	4", 6", 8", 10", 12", 14", 16", 18", 20", 24"

Operating Temp. Range

Fluids
-40° to 180° F

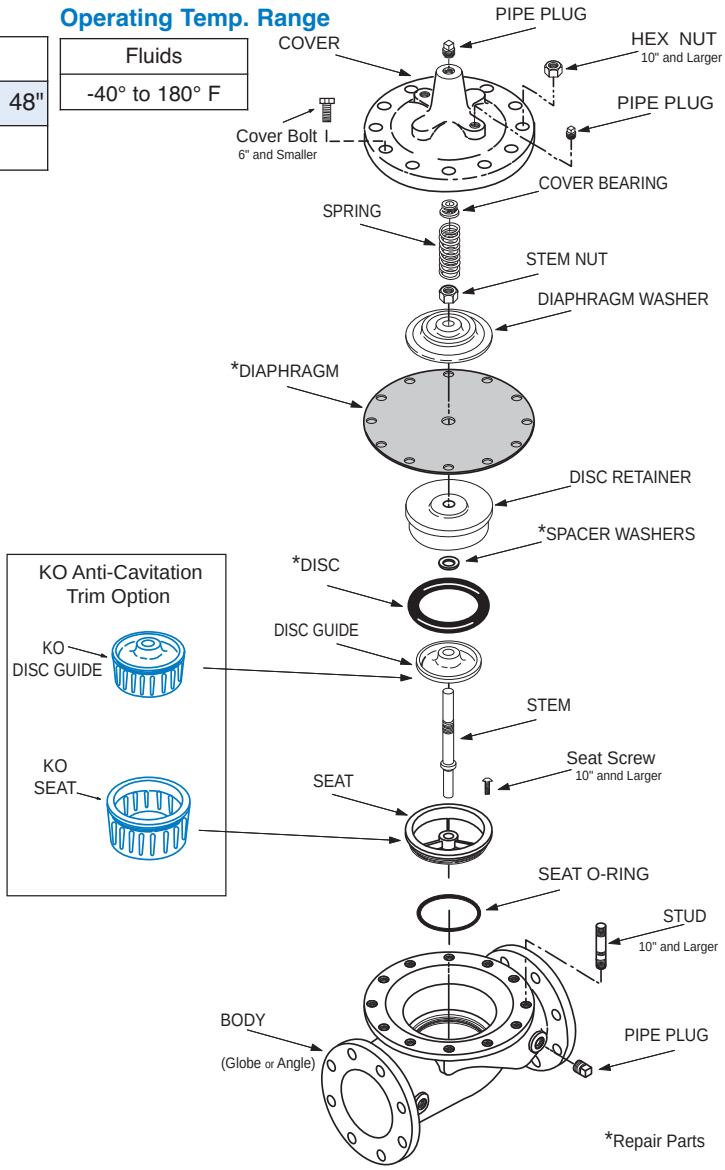
Pressure Ratings (Recommended Maximum Pressure - psi)

Valve Body & Cover		Pressure Class		
		Flanged		
Grade	Material	ANSI Standards*	150 Class	300 Class
ASTM A536	Ductile Iron	B16.42	250	400
ASTM A216-WCB	Cast Steel	B16.5	285	400
UNS 87850	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 (inches)	3" - 48"	3" - 16"	3" - 16"
Available Sizes (mm)	80 - 1200 mm	80 - 400 mm	80 - 400 mm
Disc Retainer & Diaphragm Washer	Cast Iron	Cast Steel	Bronze
Trim: Disc Guide, Seat & Cover Bearing	Bronze is Standard 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.			



Options

Viton® Rubber Parts - suffix KB
Optional diaphragm, disc and o-ring fabricated with Viton® synthetic rubber. Viton® is well suited for use with mineral acids, salt solutions, chlorinated hydrocarbons, and petroleum oils; and is primarily used in high temperature applications up to 250° F. Do not use with epoxy coatings above 175° F.

Epoxy Coating - suffix KC
The NSF/ANSI 61 fusion bonded epoxy coating option is for use with cast iron, ductile iron or steel valves. This coating is resistant to various water conditions, certain acids, chemicals, solvents and alkalies. epoxy coatings are applied in accordance with AWWA coating specifications C116-03. Do not use with temperatures above 80° C.

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

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

Anti-Cavitation Trim - suffix KO
Anti-Cavitation Trim components consist of a stainless steel radial slotted disc guide and seat. This system is used when high differentials are present across the valve.

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

Valve Size		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	460	500	600	750	900	1000	1200
C_V Factor	Globe Pattern	Gal./Min. (gpm.)	62	136	229	480	930	1458	1725	2110	2940*	3400*	4020	7900*	11910*	14500*	15800*
		Litres/Sec. (l/s.)	15	32.5	55	115	223	350	414	506	705	816	966	1895	2858	3483	3796
	Angle Pattern	Gal./Min. (gpm.)	—	135	233	545	CF**	CF**	CF**	CF**	CF**	CF**	CF**	—	—	—	—
		Litres/Sec. (l/s.)	—	32	56	132	CF**	CF**	CF**	CF**	CF**	CF**	CF**	—	—	—	—
Equivalent Length of Pipe	Globe Pattern	Feet (ft.)	293	251	777	748	621	654	750	977	983	1125	3005	2130	2862	4232	7028
		Meters (m.)	89.3	76.4	237.1	228.1	189.5	199.4	229	298	300	343	917	650	872	1290	2142
	Angle Pattern	Feet (ft.)	—	254	751	580	CF**	CF**	CF**	CF**	CF**	CF**	CF**	—	—	—	—
		Meters (m.)	—	77.6	229	176.9	CF**	CF**	CF**	CF**	CF**	CF**	CF**	—	—	—	—
K Factor	Globe Pattern		20.6	12.7	23.1	15.7	10.4	8.5	8.9	10.2	6.9	9.78	14.5	10.5	8.9	11.4	17.8
	Angle Pattern		—	12.9	22.3	12.2	CF**	CF**	CF**	CF**	CF**	CF**	CF**	—	—	—	—
Liquid Displaced from Cover Chamber When Valve Opens		Fl. Oz	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		U.S. Gal.	0.32	.08	.17	.53	1.26	2.51	4.0	4.0	9.6	9.6	9.6	29.0	42	90	90
		ml	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		Litres	.12	.30	.64	2.0	4.8	9.5	15.1	15.1	36.2	36.2	36.2	110	197	340	340

**Consult Factory

*Estimated

C_V Factor

Formulas for computing C_V Factor, Flow (Q) and Pressure Drop ($\triangle P$):

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

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: $L = \frac{K\,d}{12\,f}$
(U.S. system units)

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

Where:

C_V = U.S. (gpm) @ 1 psi differential at 60° F water
or
= (l/s) @ 1 bar (14.5 PSIG) differential at 15° C water

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

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

K = Resistance Coefficient (calculated)

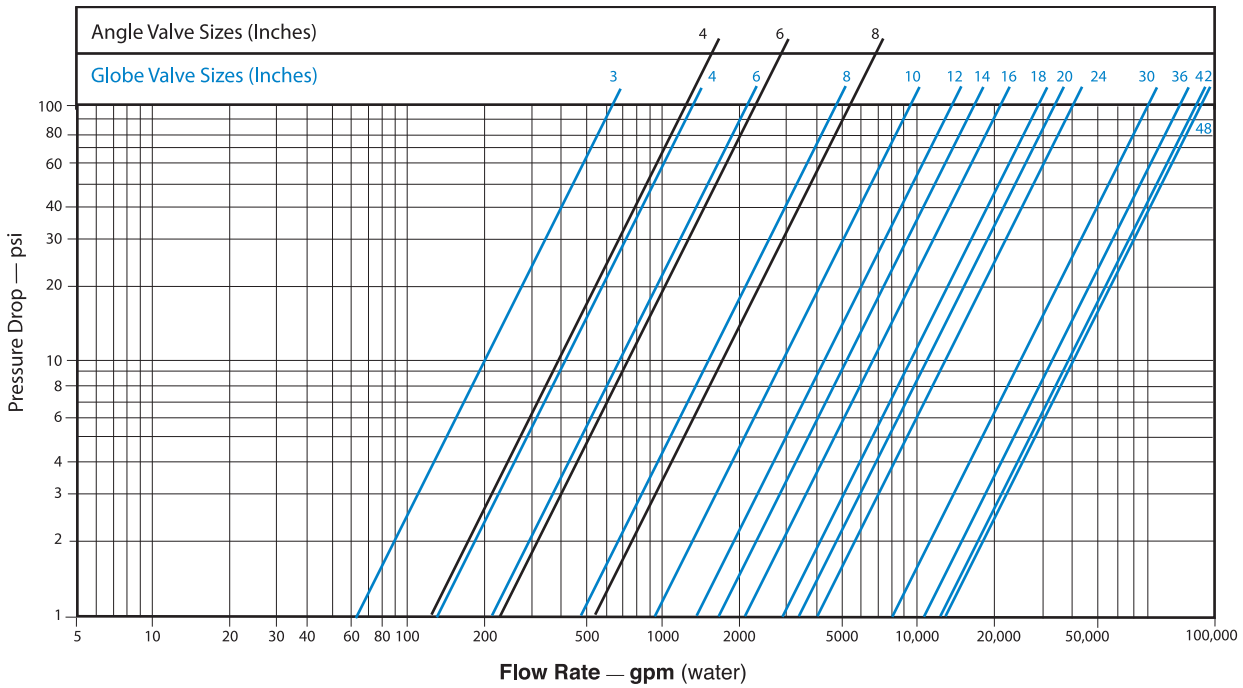
L = Equivalent Length of Pipe (feet)

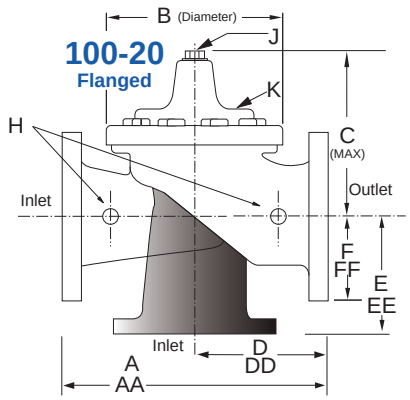
Q = Flow Rate in U.S. (gpm) or (l/s)

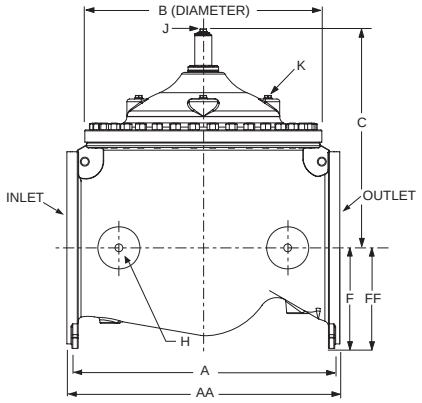
V = Fluid Velocity (feet per second) or (meters per second)

$\triangle P$ = Pressure Drop in (psi) or (bar)

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







Valve Size (Inches)	3	4	6	8	10	12	14	16	18	20	24	30	36	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	88.0
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	90.62
B Diameter	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
C Maximum	7.00	8.62	11.62	15.00	17.88	21.00	20.88	25.75	25.00	31.50	31.50	43.94	54.75	59.00
D 150 ANSI	—	6.94	8.88	10.69	CF*	17.00	CF*	CF*	CF*	CF*	21.06	—	—	—
DD 300 ANSI	—	7.25	9.38	11.19	CF*	17.75	CF*	CF*	CF*	CF*	CF*	—	—	—
E 150 ANSI	—	5.50	6.75	7.25	CF*	13.75	CF*	CF*	CF*	CF*	15.94	—	—	—
EE 300 ANSI	—	5.81	7.25	7.75	CF*	14.75	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	34.00
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	38.50
H NPT Body Tapping	0.375	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	0.50	0.50	0.75	0.75	1.00	1.00	1.25	2.00	2.00	2.00	2.00	2.00	2.00	2.00
K NPT Cover Tapping	0.375	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	0.60	0.80	1.10	1.70	2.30	2.80	3.40	4.50	4.50	4.50	6.50	7.50	7.50	8.50
Approx. Ship Weight (lbs)	45	85	195	330	625	900	1250	1380	2365	2551	2733	6500	8545	13100
Approx. X Pilot System	13	15	27	30	33	36	36	41	40	46	55	68	79	86
Approx. Y Pilot System	10	11	18	20	22	24	26	26	30	30	30	39	40	47
Approx. Z Pilot System	10	11	18	20	22	24	26	26	30	30	30	39	42	49

*Consult Factory

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

Valve Size (mm)	80	100	150	200	250	300	350	400	450	500	600	750	900	1200
A 150 ANSI	260	353	451	543	660	762	870	889	1070	1219	1219	1607	1651	2235
AA 300 ANSI	279	368	473	568	695	800	908	930	1108	1260	1263	1619	1702	2302
B Diameter	168	232	292	400	508	600	698	711	900	900	900	1351	1422	1676
C Maximum	178	219	295	381	454	533	530	654	635	800	800	1116	1391	1499
D 150 ANSI	—	176	226	272	CF*	432	CF*	CF*	CF*	CF*	535	—	—	—
DD 300 ANSI	—	184	238	284	CF*	451	CF*	CF*	CF*	CF*	CF*	—	—	—
E 150 ANSI	—	140	171	184	CF*	349	CF*	CF*	CF*	CF*	405	—	—	—
EE 300 ANSI	—	148	184	197	CF*	368	CF*	CF*	CF*	CF*	CF*	—	—	—
F 150 ANSI	95	114	140	171	203	241	279	289	403	370	432	505	648	864
FF 300 ANSI	105	127	159	191	222	260	292	324	403	408	483	559	699	978
H NPT Body Tapping	0.375	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	0.50	0.50	0.75	0.75	1.00	1.00	1.25	2.00	2.00	2.00	2.00	2.00	2.00	2.00
K NPT Cover Tapping	0.375	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	15	20	28	43	58	71	86	86	114	114	114	165	191	216
Approx. Ship Weight (kgs)	20	39	89	150	284	409	568	627	681	1157	1249	2951	3876	5942
Approx. X Pilot System	331	381	686	762	839	915	915	1042	1016	1169	1397	1728	2007	2185
Approx. Y Pilot System	254	280	458	508	559	610	661	661	762	762	762	991	1016	1194
Approx. Z Pilot System	254	280	458	508	559	610	661	661	762	762	762	991	1067	1245

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

Note: Various Flange Drilling to a Foreign and intranational Standards and Specifications are Available on Request.

Service and Installation

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

100-42 — MODEL —

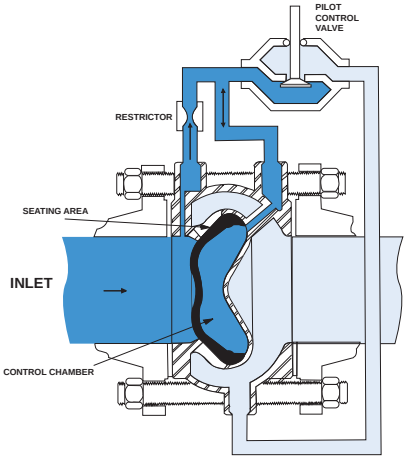
700 SERIES

ROLL SEAL

- **Compact Design, Proven Reliable**
- **Light Weight Materials**
- **High Pressure Rating Availability**
- **Easy Installation and Maintenance**

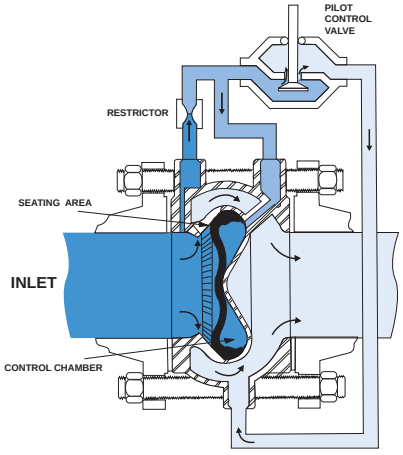
The Cla-Val Model 100-42 Roll Seal valve is a hydraulically operated valve used to control liquid flow by means of a flexible control element: the liner.
The main valve consists of only two parts: a one piece, investment cast body and an elastomeric liner. The valve body is constructed with internal ribs and slots forming a grillwork which surrounds the liner to provide support. A normally closed type valve is formed by the installed liner which covers the grillwork and seats against the raised seating surface in the valve body.
Upstream pressure actuates the valve to produce valve opening by rolling the liner off the seating surface and the slotted grillwork.
The valve is actuated by upstream pressure as the loading pressure (pressure supplied to the control chamber) is varied by an external pilot control system.
A typical pilot control system used to operate the Model 100-42 valve consists of a restriction and a suitable pilot connected to the valve.

Principle of Operation



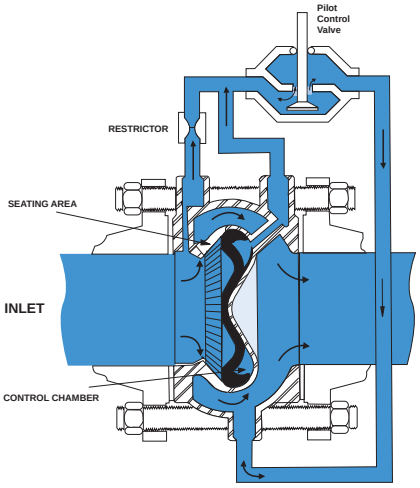
Model 100-42 Valve in Closed Position

Upstream pressure is introduced to the control chamber (the chamber formed behind the liner) of the Cla-Val Model 100-42 Roll Seal valve through the control piping and restrictor. When the pilot is closed, full inlet pressure is supplied to the control chamber, thus balancing the force developed by inlet pressure acting on the upstream face on the liner. Under these conditions, the liner remains in the fully closed position.
Since the operating pressure in the control chamber is greater than the outlet pressure, an additional closing force is developed across the liner, pressing the liner against the surrounding slotted grillwork area and seating surface.



Model 100-42 Valve in Partially Open Position

As loading pressure is lowered slightly below inlet pressure, the central portion of the liner is forced to invert and come to rest against the tip of the control chamber cavity. Reducing the loading pressure further (but still higher than outlet pressure) causes the liner to drape over the cone shaped portion of the control chamber cavity. This action causes the outer section of the liner to roll off the seating surface and a portion of the grillwork to partially open the valve.



Model 100-42 Valve in Fully Open Position

The valve is fully opened when loading pressure is sufficiently reduced to allow the liner to roll back completely and expose the full slot area. Restoring loading pressure reverses the liner rolling action to return the liner to the fully closed position.

Design Specification

Sizes:	2, 3, 4, and 6 inch wafer style 6, 8, 10, and 12 inch flanged 6, 8, 10, 12 inch Victaulic® Ends
End Detail Wafer:	Fits ANSI B16.5 class 125,150, 250, and 300 flanges
End Detail Flanged:	ANSI B16.5 class 150 (fits class 125) or ANSI B16.5 class 300 (fits class 250)
End Detail Victaulic®:	Fits standard steel pipe
Operating Pressure:	720 psi maximum Victaulic® Ends - 300 psi max.
Maximum Differential:	150 psid continuous, 225 psid intermittent*
Reverse Pressure:	125 psid maximum
Temperature Range:	32 to 160 degrees F*
Flange Operating Pressure:	Class 125-175 psi maximum Class 150-275 psi maximum Class 250-300 psi maximum Class 300-720 psi maximum
Victaulic® Ends Rating:	300 psi maximum

*Standard natural rubber 65 durometer in water service.
Temperature range depends on liner material. Higher differential pressure ratings available.

For other than standard ANSI flanges consult factory

DIN drilling available on all sizes

Performance Specification

Capacity:	See Technical Data Sheet
C_f Factor:	0.9
Cavitation:	See Technical Data Sheet
Rangeability:	500:1
Bearing Friction:	No friction from slip-type bearings

Material Specification

Body:	316L Stainless Steel
Flanges: (Slip on)	Carbon Steel/Clear Cad. Plated
Bolt Kit:	Carbon Steel/Zinc Plated
Liner:	Natural Rubber, 65 duro (standard) Viton, EPDM, Nitrile, Silicone (available)
Liner Retainer:	316 Stainless Steel

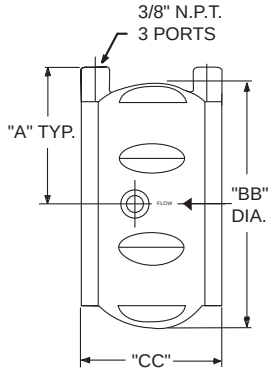
Optional Materials

Escoloy 45D
Duplex Stainless Steel
Super Duplex Stainless Steel
Nickel Aluminum Bronze
Titanium

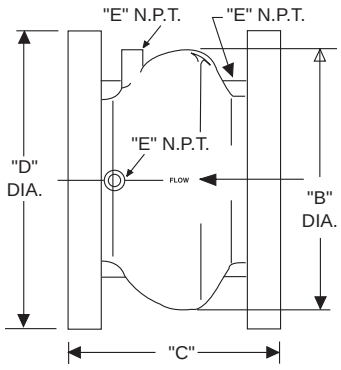
Dimensions (100-42 Main Valve)

Valve Size (Inches)	2	3	4	6	8	10	12
A	2⅞	3 3/16	4⅛	5¼	--	--	--
B	--	--	--	10⅞	14⅜	18	21⅝
BB	4⅜	5⅞	7⅜	9 13/16	--	--	--
C	--	--	--	9	11	13	15¼
CC	2½	3¼	4	5½	--	--	--
D (ANSI 150)	--	--	--	11	13½	16	19
D (ANSI 300)	--	--	--	12½	15	17½	20½
E (Ports) NPT	--	--	--	⅜	⅜	½	½
Approx. Wt. (150 lbs.)	4	7½	14	58	115	190	290
Approx. Wt. (300 lbs.)	4	7½	14	87	155	250	375
Max. Continuous Flow (gpm)	224	469	794	1787	3177	4964	7148

Valve Size (mm for ANSI)	50	80	100	150	200	250	300
A	73	90	105	133	--	--	--
B	--	--	--	276	356	457	549
BB	111	149	187	249	--	--	--
C	--	--	--	229	279	330	387
CC	64	83	102	140	--	--	--
D (ANSI 150)	--	--	--	279	343	406	483
D (ANSI 300)	--	--	--	318	381	445	521
E (Ports) NPT	--	--	--	⅜	⅜	½	½
Approx. kg. (150 lbs.)	1.81	3.63	6.35	30	54.43	89	151.5
Approx. kg. (150 lbs.)with Studs & Nuts	2.72	4.54	10	--	--	--	--
Approx. kg. (300 lbs.)	1.81	3.63	6.35	41.73	72.57	116.57	191
Approx. kg. (300 lbs.)with Studs & Nuts	5	6.35	11.8	--	--	--	--
Max. Continuous Flow (l/s.)	14	30	50	113	200	301	451



2", 3", 4" and 6" Wafer Style



6", 8",10" and 12" Flanged Style

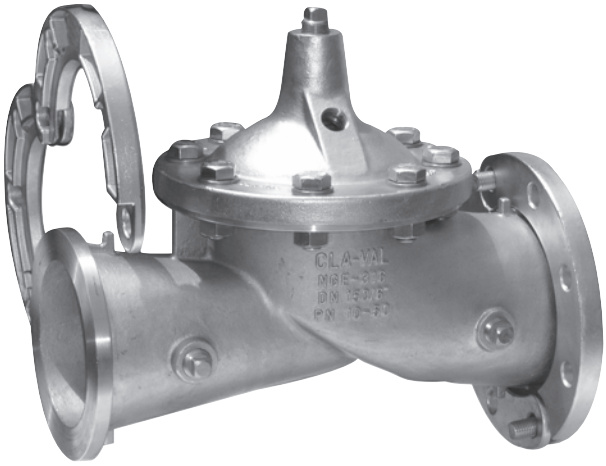
When Ordering, Please Specify

1. Catalog No. 750-01
2. Valve Size
3. Fluid Being Handled
4. Fluid Temperature Range
5. Inlet Pressure Range
6. Outlet Pressure Range
7. Maximum Differential Pressure
8. Minimum Differential Pressure
9. Maximum Flow Rate
10. Pilot Set Point

100-44 — MODEL —

(Reduced Internal Port)

316SS Hytrol Valve

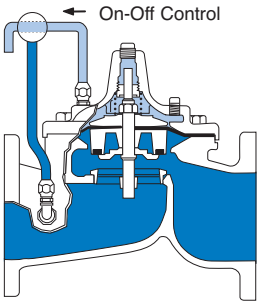


- **All 316 Stainless Steel**
- **Reduced Cavitation Design**
- **Drip-Tight, Positive Sealing Action**
- **Service Without Removal From Line**
- **Every Valve Factory Tested**
- **Three-Year Warranty**

The Cla-Val Model 100-44 Hytrol 316SS Valve is a hydraulically operated, diaphragm actuated, globe pattern valve with all 316 Stainless Steel metal parts. Specially designed 316 Stainless Steel removable slip-on flanges provide 150 or 300 ANSI class flange connections that meet ANSI and ISO standards. This valve is ideal for control valve applications where fluid compatibility is often a problem. The standard Electropolish finish on the 316 Stainless Steel parts offers extreme corrosion resistance to many industrial fluids such as seawater, high alkyl or high acid concentrations or other aggressive or corrosive fluids.

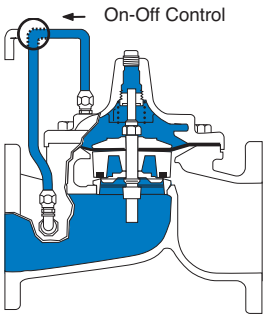
The Model 100-44 Hytrol consists of these major components: body, flanges, diaphragm assembly and cover. The diaphragm assembly is the only moving part and is guided top and bottom by a precision-machined stem. A non-wicking diaphragm of nylon fabric reinforced, synthetic rubber creates the control chamber for the valve. A resilient, synthetic rubber disc forms a drip-tight seal, with the renewable seat, when pressure is applied to the control chamber. The rugged simplicity of design and packless construction assures a long life of dependable, trouble-free operation. Smooth flow passages and fully guided diaphragm assembly assure optimum control, when used in piping systems requiring remote control, pressure regulation, solenoid operation, rate of flow control or check valve operation.

Principle of Operation



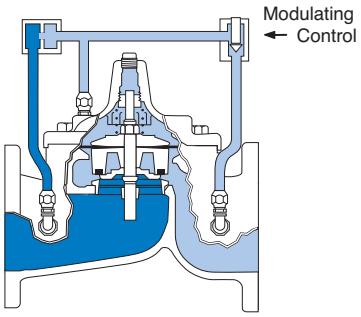
Full Open Operation

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



Tight Closing Operation

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



Modulating Action

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

100-44 Main Valve Specifications

Sizes

Globe (inch):
2", 2½", 3", 4", 6", 8", 10", 12"

End Detail

Slip-on Two Piece Flange
Dimensions Per ANSI B16.5

Pressure Rating

ANSI Class 150:
Maximum 285 psi
ANSI Class 300:
Maximum 400 psi

Higher Pressure Available
Please Contact Factory

Operating Temperature

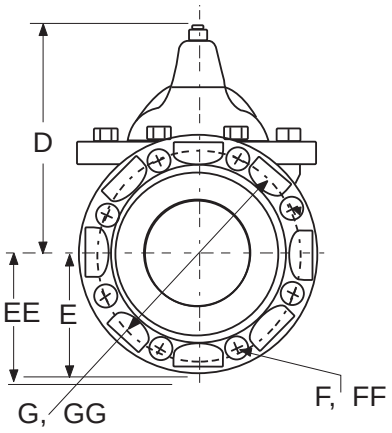
Fluids Compatible with Valve Materials
-40° to 180° F (-40° to 82° C)

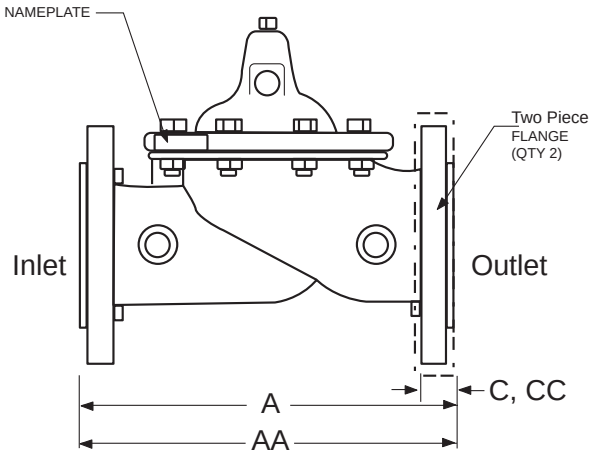
Materials

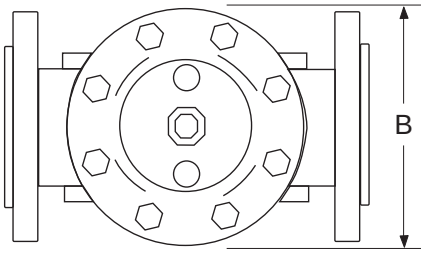
Body, Cover, Trim, Diaphragm Assembly, Flanges, and Fasteners
316 Series
Stainless Steel
Electropolished
Disc:
Buna-N® Rubber*
Diaphragm:
Nylon Fabric Reinforced
Synthetic Buna-N® Rubber*

*Contact Factory for Other Disc or Diaphragm Materials

Note: 100-44 valve uses the same internal parts as the main Cla-Val standard main reduced internal port 100-20 Hytrol.







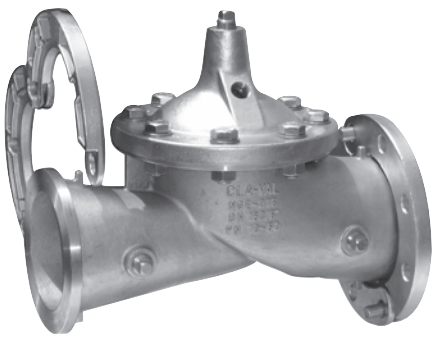
100-44 Main Valve Dimensions (inches)

Valve Size (Inches)	2	2½	3	4	6	8	10	12
A 150 ANSI	9.06	11.42	12.20	13.78	18.90	23.62	28.74	33.46
AA 300 ANSI	9.06	11.42	12.20	13.78	18.90	23.62	28.74	33.46
B	5.70	8.06	6.69	9.25	11.61	15.75	20.08	23.62
C	0.89	0.89	0.93	0.93	1.02	1.15	1.15	1.25
CC 300 ANSI	0.96	0.96	1.00	1.00	1.10	1.15	1.46	1.50
D	6.50	7.95	8.20	10.12	13.32	16.39	19.12	20.95
E	3.05	3.54	3.74	4.53	5.61	6.79	7.97	9.55
EE 300 ANSI	3.25	3.75	4.13	5.01	6.30	7.48	8.76	10.24
F	0.71	0.71	0.71	0.71	0.91	0.87	1.02	1.02
FF 300 ANSI	0.71	0.75	0.87	0.87	0.87	1.03	1.16	1.34
G	4.75	5.50	6.00	7.50	9.50	11.75	14.25	17.00
GG 300 ANSI	5.00	5.88	6.62	7.88	10.62	13.00	15.25	17.72
Flange Bolts (150 Class)	4	4	4	8	8	8	12	12
Flange Bolts (300 Class)	8	8	8	8	12	12	16	16
Approx. Wt. (Lbs.)	25	40	40	75	160	290	419	728

Reduced Port Functional Data

Size (Inches)	Cv (gpm)*	Cv (l/s)**
2	38	9
2½	50	12
3	67	16
4	138	33
6	242	58
8	555	133
10	923	222
12	1492	359

*Cv = gpm flow at 1 psi drop
**Cv = l/s flow at 1 bar drop



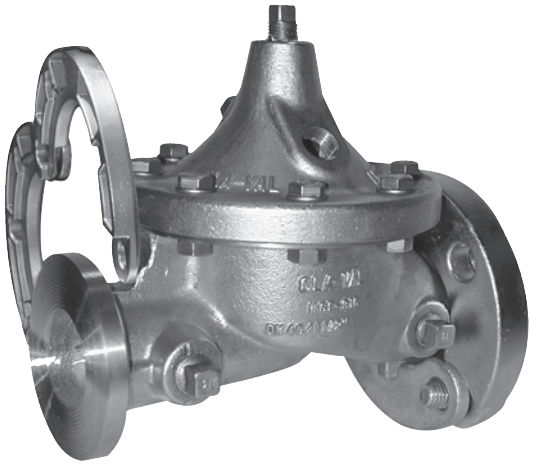
When Ordering Please Specify:

1. Catalog No. 100-44
2. Valve Size
3. Fluid Being Handled
4. Fluid Temperature
5. Inlet Pressure Range
6. Outlet Pressure Range
7. Maximum and Minimum Differential Pressure
8. Flow Rate Range

100-46 — MODEL —

(Full Internal Port)

316SS Hytrol Valve

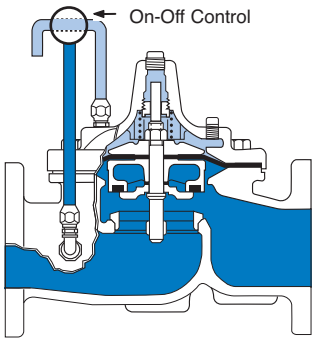


- **All 316 Stainless Steel**
- **Reduced Cavitation Design**
- **Drip-Tight, Positive Sealing Action**
- **Service Without Removal From Line**
- **Every Valve Factory Tested**
- **Three-Year Warranty**

The Cla-Val Model 100-46 Hytrol 316SS Valve is a hydraulically operated, diaphragm actuated, globe pattern valve with all 316 Stainless Steel metal parts. Specially designed 316 Stainless Steel removable slip-on flanges provide 150 or 300 ANSI class flange connections that meet ANSI and ISO standards. This valve is ideal for control valve applications where fluid compatibility is often a problem. The standard Electropolish finish on the 316 Stainless Steel parts offers extreme corrosion resistance to many industrial fluids such as seawater, high alkyl or high acid concentrations or other aggressive or corrosive fluids.

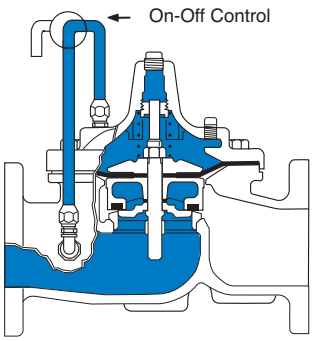
The Model 100-46 Hytrol consists of these major components: body, flanges, diaphragm assembly and cover. The diaphragm assembly is the only moving part and is guided top and bottom by a precision-machined stem. A non-wicking diaphragm of nylon fabric reinforced, synthetic rubber creates the control chamber for the valve. A resilient, synthetic rubber disc forms a drip-tight seal, with the renewable seat, when pressure is applied to the control chamber. The rugged simplicity of design and packless construction assures a long life of dependable, trouble-free operation. Smooth flow passages and fully guided diaphragm assembly assure optimum control, when used in piping systems requiring remote control, pressure regulation, solenoid operation, rate of flow control or check valve operation.

Principle of Operation



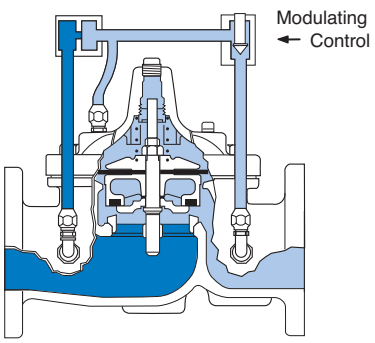
Full Open Operation

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



Tight Closing Operation

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



Modulating Action

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

100-46 Main Valve Specifications

Sizes
Globe (inch):
1½", 2", 2-1/2", 3", 4", 6", 8", 10",12"

Grooved End: 1-1/2" - 6"

End Detail
Slip-on Two Piece Flange
Dimensions Per ANSI B16.5

Grooved End AWWA/ANSI C-606

Pressure Rating
ANSI Class 150:
Maximum 285 psi
ANSI Class 300:
Maximum 400 psi

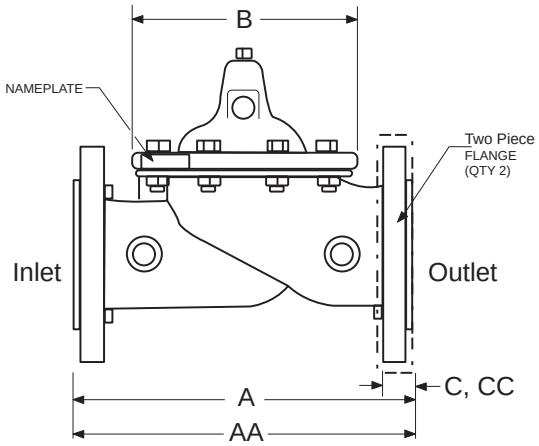
Higher Pressure Available
Please Contact Factory

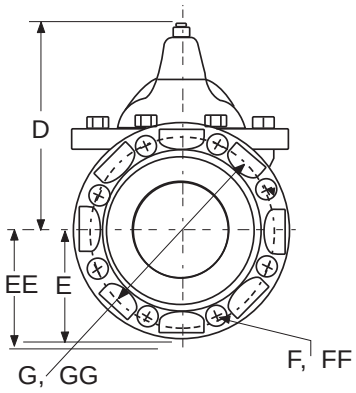
Operating Temperature
Fluids Compatible with Valve Materials
-40° to 180° F (-40° to 82° C)

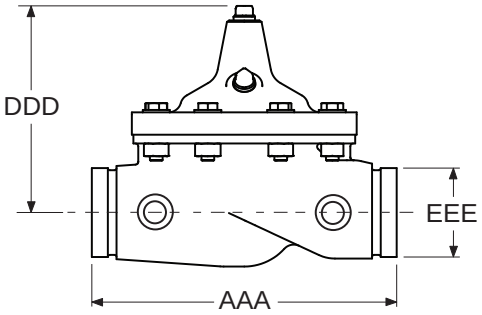
Materials
Body, Cover, Trim, Diaphragm Assembly, Flanges, and Fasteners
316 Series
Stainless Steel
Electropolished
Disc:
Buna-N® Rubber*
Diaphragm:
Nylon Fabric Reinforced
Synthetic Buna-N® Rubber*

*Contact Factory for Other Disc or Diaphragm Materials

Note: 100-46 valve uses the same internal parts as the main Cla-Val standard main full Internal port 100-01 Hytrol.







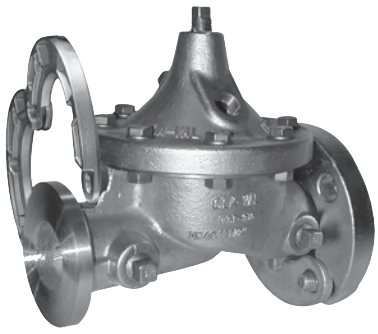
100-46 Dimensions (Inches)

Valve Size (Inches)	1½	2	2½	3	4	6	8	10	12
A 150 ANSI	7.87	9.38	11.00	12.00	15.00	20.00	25.38	29.75	34.00
AA 300 ANSI	7.87	9.38	11.00	12.00	15.00	20.00	25.38	29.75	34.00
AAA Grooved End	8.50	11.00	11.00	12.00	15.00	20.00	—	—	—
B	5.62	6.61	8.00	9.13	11.50	15.75	20.00	23.62	28.00
C	0.56	0.62	0.69	0.75	0.94	1.00	1.12	1.19	1.25
CC 300 ANSI	0.81	0.88	1.00	1.12	1.25	1.44	1.62	1.88	2.00
D	5.90	6.25	7.25	8.20	10.21	13.32	16.38	21.00	25.38
DDD Grooved End	5.29	6.34	7.43	8.14	10.30	13.03	—	—	—
E	2.56	3.05	3.54	3.75	4.53	5.61	6.75	8.00	9.50
EE 300 ANSI	3.05	3.25	3.74	4.13	5.02	6.30	7.50	8.75	10.25
EEE Grooved End	1.13	1.50	1.88	2.13	2.68	3.86	—	—	—
F	0.62	0.75	0.75	0.75	0.75	0.88	0.88	1.00	1.00
FF 300 ANSI	0.88	0.75	0.88	0.88	0.88	0.88	1.00	1.12	1.25
G	3.88	4.75	5.50	6.00	7.50	9.50	11.75	14.25	17.00
GG 300 ANSI	4.50	5.00	5.88	6.62	7.88	10.62	13.00	15.25	17.75
Flange Bolts (150 Class)	4	4	4	4	8	8	8	12	12
Flange Bolts (300 Class)	4	8	8	8	8	12	12	12	16
Approx. Wt. (Lbs.)	25	35	55	75	160	290	340	600	1000

Full Port Functional Data

Size (Inches)	Cv (gpm)*	Cv (l/s)**
1½	32	8
2	54	13
2½	85	20
3	115	27
4	200	48
6	440	105
8	770	185
10	1245	299
12	1725	414

*Cv = gpm flow at 1 psi drop
**Cv = l/s flow at 1 bar drop



When Ordering Please Specify:
1. Catalog No. 100-46
2. Valve Size
3. Fluid Being Handled
4. Fluid Temperature
5. Inlet Pressure Range
6. Outlet Pressure Range
7. Maximum and Minimum Differential Pressure
8. Flow Rate Range

Flange Dimensions and End Details

All flanged Cla-Val valves are furnished faced and drilled unless otherwise specified. The dimensions and drilling of end flanges conform to standards of the American National Standards Institute.
The ANSI tables are provided here for your convenience. When ANSI standards call for 1/16" raised face, this face is included in the dimensions for the thickness of flange. All dimensions are shown in inches.

Ductile Iron Valves* Class 150 and 300 (ANSI B16.42 — 1987)

Nominal Pipe Size	Diameter of Flange		Thickness of Flange		Diameter of Raised Face		Diameter of Bolt Circle		Number of Bolts		Diameter of Bolts		Diameter of Bolt Holes	
Pressure Class	150	300	150	300	150	300	150	300	150	300	150	300	150	300
1.5	5.00	6.12	.56	.81	2.88	2.88	3.88	4.50	4	4	.50	.75	.62	.88
2	6.00	6.50	.62	.88	3.62	3.62	4.75	5.00	4	8	.63	.63	.75	.75
2.5	7.00	7.50	.69	1.00	4.12	4.12	5.50	5.88	4	8	.63	.75	.75	.88
3	7.50	8.25	.75	1.12	5.00	5.00	6.00	6.62	4	8	.63	.75	.75	.88
4	9.00	10.00	.94	1.25	6.19	6.19	7.50	7.88	8	8	.63	.75	.75	.88
6	11.00	12.50	1.00	1.44	8.50	8.50	9.50	10.62	8	12	.75	.75	.88	.88
8	13.50	15.00	1.12	1.62	10.62	10.62	11.75	13.00	8	12	.75	.88	.88	1.00
10	16.00	17.50	1.19	1.88	12.75	12.75	14.25	15.25	12	16	.88	1.00	1.00	1.12
12	19.00	20.50	1.25	2.00	15.00	15.00	17.00	17.75	12	16	.88	1.12	1.00	1.25
14	21.00	23.00	1.38	2.12	16.25	16.25	18.75	20.25	12	20	1.00	1.12	1.12	1.25
16	23.50	25.50	1.44	2.25	18.50	18.50	21.25	22.50	16	20	1.00	1.25	1.12	1.38
18	25.00	28.00	1.56	2.38	21.00	21.00	22.75	24.75	16	24	1.12	1.25	1.25	1.38
20	27.50	30.50	1.69	2.50	23.00	23.00	25.00	27.00	20	24	1.13	1.25	1.25	1.38
24	32.00	36.00	1.88	2.75	27.25	27.25	29.50	32.00	20	24	1.25	1.50	1.38	1.62
30	38.75	43.00	2.12	3.00	—	37.19	36.00	39.25	28	28	1.25	1.75	1.38	2.00
36	46.00	50.00	2.38	3.38	—	42.69	42.75	46.00	32	32	1.50	2.00	1.62	2.25

Cast Iron Valves* Class 125 and 250 (ANSI B16.1 — 1989)

Nominal Pipe Size	Diameter of Flange		Thickness of Flange		Diameter of Raised Face		Diameter of Bolt Circle		Number of Bolts		Diameter of Bolts		Diameter of Bolt Holes	
Pressure Class	125	250	125	250	125	250	125	250	125	250	125	250	125	250
1.5	5.00	6.12	.56	.81	—	2.88	3.88	4.50	4	4	.50	.75	.62	.88
2	6.00	6.50	.62	.88	—	3.62	4.75	5.00	4	8	.63	.63	.75	.75
2.5	7.00	7.50	.69	1.00	—	4.12	5.50	5.88	4	8	.63	.75	.75	.88
3	7.50	8.25	.75	1.12	—	5.00	6.00	6.62	4	8	.63	.75	.75	.88
4	9.00	10.00	.94	1.25	—	6.19	7.50	7.88	8	8	.63	.75	.75	.88
6	11.00	12.50	1.00	1.44	—	8.50	9.50	10.62	8	12	.75	.75	.88	.88
8	13.50	15.00	1.12	1.62	—	10.62	11.75	13.00	8	12	.75	.88	.88	1.00
10	16.00	17.50	1.19	1.88	—	12.75	14.25	15.25	12	16	.88	1.00	1.00	1.12
12	19.00	20.50	1.25	2.00	—	15.00	17.00	17.75	12	16	.88	1.12	1.00	1.25
14	21.00	23.00	1.38	2.12	—	16.25	18.75	20.25	12	20	1.00	1.12	1.12	1.25
16	23.50	25.50	1.44	2.25	—	18.50	21.25	22.50	16	20	1.00	1.25	1.12	1.38
18	25.00	28.00	1.56	2.38	21.00	23.00	22.75	24.75	16	24	1.12	1.25	1.25	1.38
20	27.50	30.50	1.69	2.50	—	23.00	25.00	27.00	20	24	1.13	1.25	1.25	1.38
24	32.00	36.00	1.88	2.75	—	27.25	29.50	32.00	20	24	1.25	1.50	1.38	1.62

Bronze Valves* Class 150 and 300 (ANSI 16.24 — 1979)

Nominal Pipe Size	Diameter of Flange		Thickness of Flange		Diameter of Raised Face		Diameter of Bolt Circle		Number of Bolts		Diameter of Bolts		Diameter of Bolt Holes	
Pressure Class	150	300	150	300	150	300	150	300	150	300	150	300	150	300
1.5	5.00	6.12	.44	.69	—	—	3.88	4.50	4	4	.50	.75	.62	.88
2	6.00	6.50	.50	.75	—	—	4.75	5.00	4	8	.63	.63	.75	.75
2.5	7.00	7.50	.56	.81	—	—	5.50	5.88	4	8	.63	.75	.75	.88
3	7.50	8.25	.62	.91	—	—	6.00	6.62	4	8	.63	.75	.75	.88
4	9.00	10.00	.69	1.06	—	—	7.50	7.88	8	8	.63	.75	.75	.88
6	11.00	12.50	.81	1.19	—	—	9.50	10.62	8	12	.75	.75	.88	.88
8	13.50	15.00	.94	1.38	—	—	11.75	13.00	8	12	.75	.88	.88	1.00
10	16.00	—	1.00	—	—	—	14.25	—	12	—	.88	—	1.00	—
12	19.00	—	1.06	—	—	—	17.00	—	12	—	.88	—	1.00	—

Cast Steel Valves* Class 150 and 300 (ANSI 16.5 — 1988)

Nominal Pipe Size	Diameter of Flange		Thickness of Flange		Diameter of Raised Face		Diameter of Bolt Circle		Number of Bolts		Diameter of Bolts		Diameter of Bolt Holes	
Pressure Class	150	300	150	300	150	300	150	300	150	300	150	300	150	300
1.5	5.00	6.12	.56	.81	2.88	2.88	3.88	4.50	4	4	.50	.75	.62	.88
2	6.00	6.50	.62	.88	3.63	3.63	4.75	5.00	4	8	.63	.63	.75	.75
2.5	7.00	7.50	.69	1.00	4.13	4.13	5.50	5.88	4	8	.63	.75	.75	.88
3	7.50	8.25	.75	1.12	5.00	5.00	6.00	6.62	4	8	.63	.75	.75	.88
4	9.00	10.00	.94	1.25	6.19	6.19	7.50	7.88	8	8	.63	.75	.75	.88
6	11.00	12.50	1.00	1.44	8.50	8.50	9.50	10.62	8	12	.75	.75	.88	.88
8	13.50	15.00	1.12	1.62	10.63	10.63	11.75	13.00	8	12	.75	.88	.88	1.00
10	16.00	17.50	1.19	1.88	12.75	12.75	14.25	15.25	12	16	.88	1.00	1.00	1.12
12	19.00	20.50	1.25	2.00	15.00	15.00	17.00	17.75	12	16	.88	1.12	1.00	1.25
14	21.00	23.00	1.38	2.12	16.25	16.25	18.75	20.25	12	20	1.00	1.12	1.12	1.25
16	23.50	25.50	1.44	2.25	18.50	18.50	21.25	22.50	16	20	1.00	1.25	1.12	1.38
18	25.00	28.00	1.56	2.38	21.00	23.00	22.75	24.75	16	24	1.12	1.25	1.25	1.38
20	27.50	30.50	1.69	2.50	23.00	23.00	25.00	27.00	20	24	1.13	1.25	1.25	1.38
24	32.00	36.00	1.88	2.75	27.25	27.25	29.50	32.00	20	24	1.25	1.50	1.38	1.62

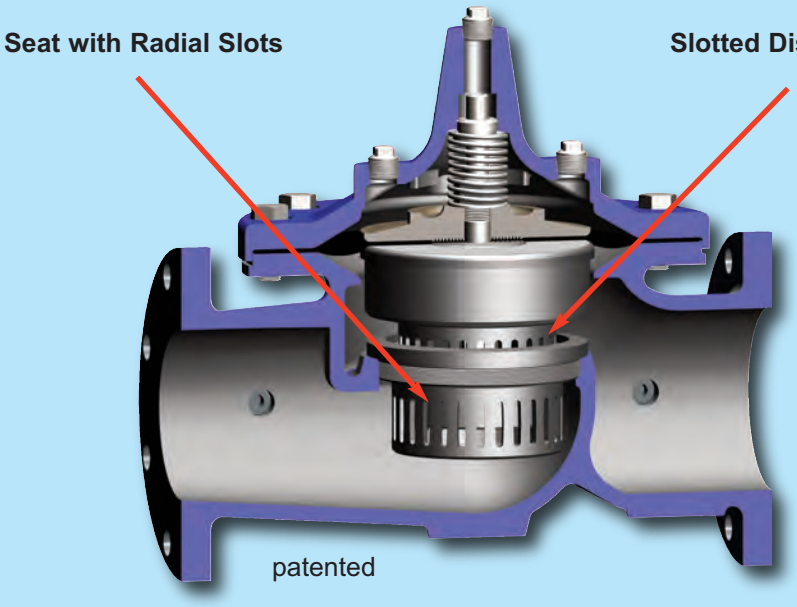
*Cla-Val valves can be furnished in aluminum.

Anti-Cavitation Main Valve

KO Anti-Cavitation Trim

Cla-Val's KO anti-cavitation trim represents a dramatic departure from the standard approaches usually employed to fight cavitation in valves that are required to undergo extreme pressure differentials and high velocity flow conditions.

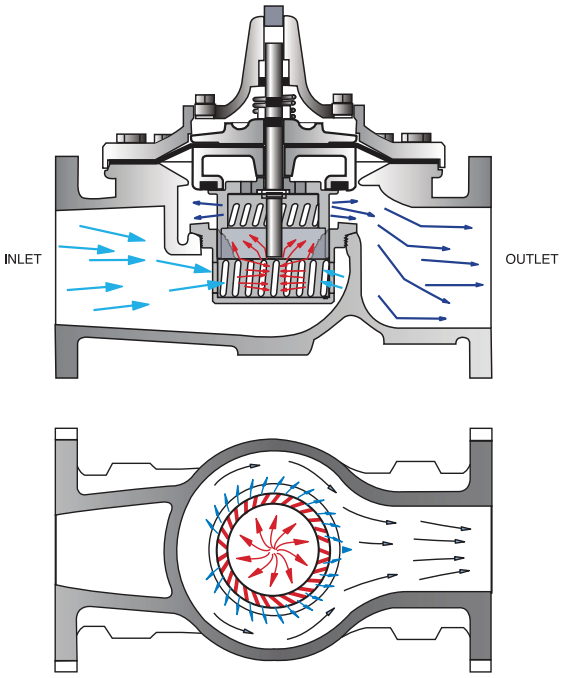
Constructed of 316 Stainless Steel, the seat and disc guide feature dual interlocked sleeves containing cast radial slots that deflect internal flow to impinge upon itself, harmlessly dissipating potential noise and cavitation damage. The cast radial slots create a larger flow path than is possible with the standard drilled holes typically employed by other anti-cavitation valves currently available in the market place. The uniquely designed radial slots in the seat and disc guides also lessen the possibility of fouling if small particles are present in the water.



Typical Applications

- Pressure Reducing Valve Stations
- Tank Fill Valve Applications
- Noise Reduction in High-Rise Building Valve Stations
- Reservoir Level Control Valve Applications
- Booster Pump Bypass Stations
- Offshore Fire Pump Relief Valve Protection
- Applications with discharge to atmosphere
- Any application where valves are subjected to extreme pressure differentials or high velocity flow conditions

Cla-Val KO Anti-Cavitation Valve Principals of Operation



First Stage Pressure Reduction

- Flow enters through seat slots and reduces pressure

Second Stage Pressure Reduction

- Flow impinges upon itself within the seat and disc guide assembly to dissipate cavitation and further reduce pressure

Third Stage Pressure Reduction

- Flow exits through disc guide for final pressure reduction
- Diagonal disc guide slots direct flow away from surfaces

Cavitation Guide

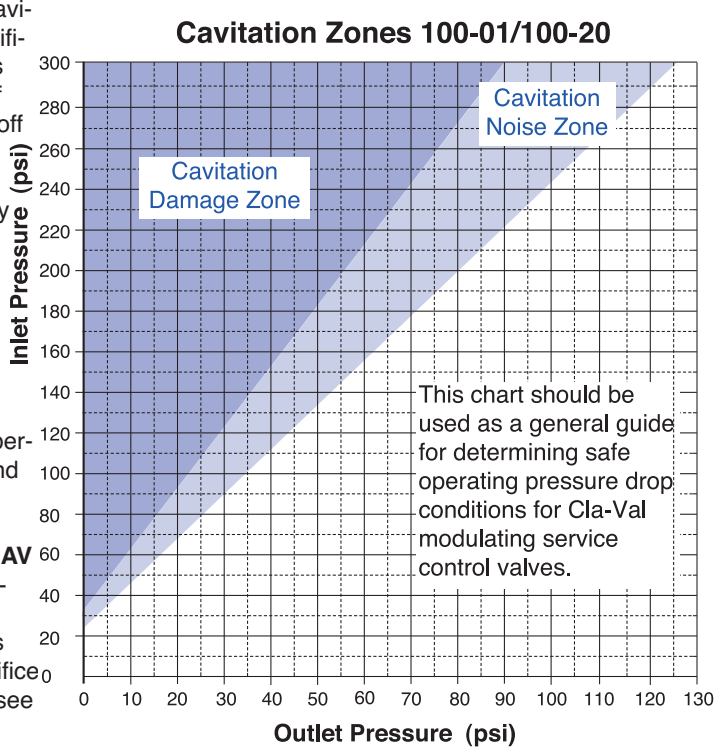
The dark shaded portion of the chart illustrates the region where cavitation damage may occur. The lighter shaded portion is where significant cavitation noise and vibration may occur. Operating conditions inside the dark shaded area is permissible for infrequent periods of short duration. The guide is for modulating service valves. For on/off valves, consult factory.

The chart is based on cavitation index (sigma) values as defined by Utah State University Water Research Laboratory.

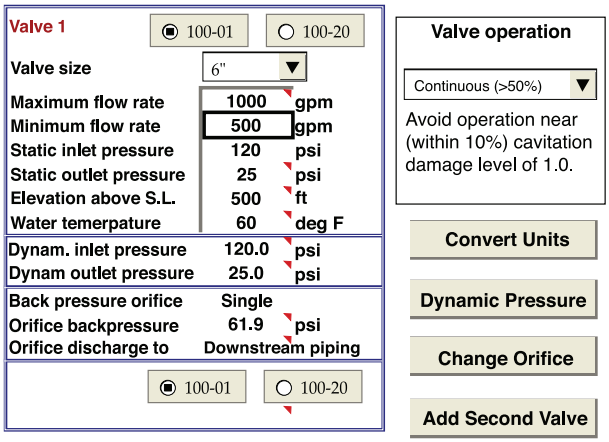
$$\sigma = \frac{(P_2 - P_v)}{(P_1 - P_2)}$$ where

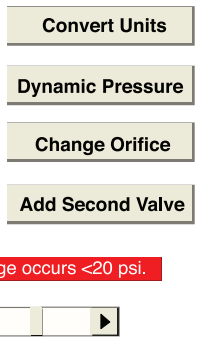
σ = cavitation index, P_1 = inlet pressure (psi), P_2 = outlet pressure (psi), P_v = water vapor pressure (psia).
The dark shaded portion is below σ of 0.5 and the lighter shaded area is below σ of 0.8. The chart is to be used for typical valve operating conditions below 40% open at standard water temperature and elevation below 1000 feet.

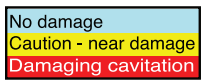
More accurate cavitation conditions are determined from the **Cla-CAV** analysis program including static and dynamic inlet and outlet pressures, flow range, elevation, water temperature, and service conditions. If operation is inside the shaded areas, the **Cla-CAV** analysis can be used to determine whether added backpressure from an orifice plate, a second valve in series, or adding **KO** Anti-Cavitation trim (see 100-01KO data sheet). is necessary.

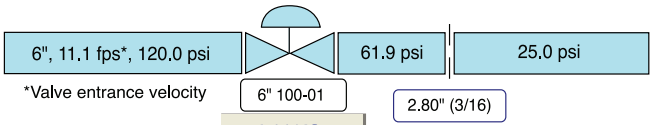


CLA-CAV Detailed Analysis Chart



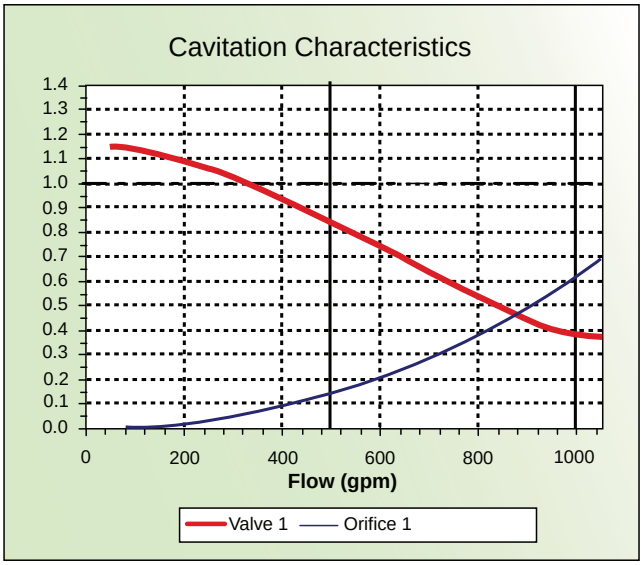






Valve 1 Flow Rate GPM	Inlet (psi)	Outlet (psi)	% Open	Pipe Vel. (ft/s)	Cav Damage
50	120.0	25.1	9.1	0.6	Yes
250	120.0	27.3	19.9	2.8	Yes
500	120.0	34.2	24.9	5.6	No
750	120.0	45.8	30.7	8.3	No
1000	120.0	61.9	37.2	11.1	No

For a more detailed cavitation analysis or if operation will be outside of the above chart, request a **Cla-CAV** computer analysis. **Cla-CAV** can evaluate what options best solve any potential cavitation problem. In the example shown, a 6 inch 100-01 modulating service valve requires an orifice plate downstream to prevent damaging cavitation. For wider flow range service, either an extra valve in series or the addition of **KO** Anti-Cavitation trim to the valve may be necessary (see 100-01KO data sheet). Consult factory for a free analysis for wide open or modulating service valves.

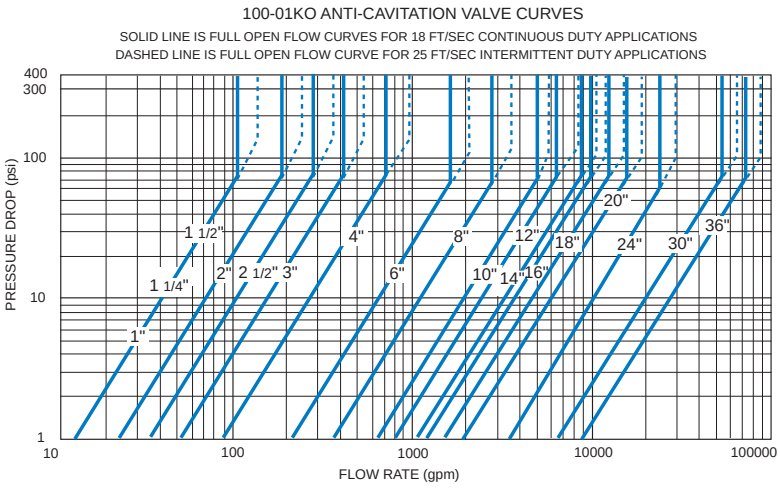


If the lines go above 1.0 there will be cavitation damage.

CLA-VAL®

— MODEL — 100-01KO
(Full Internal Port)

Anti-Cavitation Hytrol Valve



- **Virtually Cavitation Free Operation**
- **Severe Service Design - High Pressure Differentials**
- **Reduced Noise and Vibration**
- **316 Stainless Steel Disc Guide and Seat Standard**
- **Drip-Tight, Positive Sealing**
- **Service Without Removal From Line**
- **Retrofit to Standard Hytrol Valves**

The Cla-Val Model 100-01KO Anti-Cavitation Hytrol Valve is designed for applications where there is a high potential for damage from cavitation. Specify this valve series for a wide variety of control valve applications having pressure differentials up to 300 psid or for relief valves having atmospheric discharge up to 150 psid.

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.

The 100-01KO Hytrol main valve provides optimum internal pressure control through a unique anti-cavitation trim design. Constructed of 316 Stainless Steel, the seat and disc guide trim components feature dual interlocked sleeves containing radial slots that deflect internal flow to impinge upon itself in the center of the flow path, harmlessly dissipating the potential cavitation damage. This unique design also lessens the possibility of fouling if large particles in the water are present due to the large flow path of the radial slots.

The 100-01KO Hytrol is the main valve used in Cla-Val Automatic Control Valves for high differential applications requiring remote control, pressure regulation, solenoid operation, rate of flow control, or liquid level control.

The Anti-Cavitation Trim components can be retrofitted to existing valves if the application indicates an appropriate need. Please consult factory for details.

Functional Data

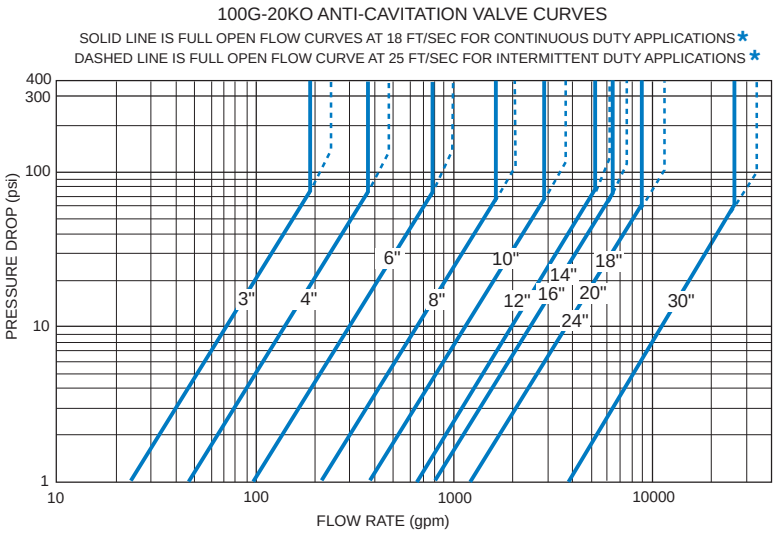
Valve Size		Inches	1¼	1½	2	2½	3	4	6	8	10	12	14	16	18	20	24	30	36
		mm.	32	40	50	65	80	100	150	200	250	300	350	400	450	500	600	750	900
C_V Factor	Globe Pattern	Gal./Min. (gpm.)	14	14	25	37	52	90	218	362	602	900	1100	1200	1550	1950	3900	4660	7100
		Litres/Sec. (l/s.)	3.4	3.4	6.0	8.9	12.5	21.6	52	87	144	216	264	288	360	469	938	1120	1706
	Angle Pattern	Gal./Min. (gpm.)	15	15	26	39	55	95	232	388	560	790	1075	1175	—	—	3775	—	—
		Litres/Sec. (l/s.)	3.6	3.6	6.2	9.4	13.2	22.8	56	93	134	190	258	282	—	—	906	—	—
Equivalent Length of Pipe	Globe Pattern	Feet (ft.)	196	196	237	277	416	572	858	1315	1483	2118	1937	3022	3537	4199	4532	6678	6567
		Meters (m.)	60	60	72	84	127	174	262	401	452	646	590	921	1078	1280	1381	2035	2002
	Angle Pattern	Feet (ft.)	171	171	219	250	372	514	757	1145	1714	2226	2021	3152	—	—	2583	—	—
		Meters (m.)	52	52	67	76	113	157	231	349	522	678	616	961	—	—	787	—	—
K Factor	Globe Pattern		30.6	30.6	26.1	24.3	29.3	29.0	25.5	27.7	24.9	27.7	22.8	31.4	30.2	29.5	15.4	30.1	25.1
	Angle Pattern		26.7	26.7	24.1	21.8	26.2	26.0	22.5	24.1	28.7	29.1	23.8	32.8	—	—	16.4	—	—
Liquid Displaced from Cover Chamber When Valve Opens		U.S. Gal.	0.2	0.2	.03	.04	.08	.17	.53	1.26	2.5	4.0	6.5	9.6	11	12	29	65	90
		Litres	0.8	0.8	.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.

100-20KO — MODEL —

(Reduced Internal Port)

Anti-Cavitation Hytrol Valve



- **Virtually Cavitation Free Operation**
- **Severe Service Design - High Pressure Differentials**
- **Reduced Noise and Vibration**
- **316 Stainless Steel Disc Guide and Seat Standard**
- **Drip-Tight, Positive Sealing**
- **Serviced Without Removal From Line**
- **Retrofit to Standard Hytrol Valves**

The Cla-Val Model 100-20KO Anti-Cavitation Hytrol Valve is designed for applications where there is a high potential for damage from cavitation. Specify this valve series for a wide variety of control valve applications having pressure differentials up to 350 psid or for relief valves having atmospheric discharge up to 150 psid.

The 100-20KO Hytrol main valve provides optimum internal pressure control through a unique anti-cavitation trim design. Constructed of 316 Stainless Steel, the seat and disc guide trim components feature dual interlocked sleeves containing radial slots that deflect internal flow to impinge upon itself in the center of the flow path, harmlessly dissipating the potential cavitation damage. This unique design also lessens the possibility of fouling if large particles in the water are present due to the large flow path of the radial slots.

The 100-20KO Hytrol is the main valve used in Cla-Val Automatic Control Valves for high differential applications requiring remote control, pressure regulation, solenoid operation, rate of flow control, or liquid level control.

The Anti-Cavitation Trim components can be retrofitted to existing valves if the application indicates an appropriate need. Please consult factory for details.

Notes: On Operating Differential

*The 100-20KO Series is the reduced internal port size version of the 100-01KO Series.

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.

Functional Data

Model 100-20KO

Valve Size		Inches	3	4	6	8	10	12	14	16	18	20	24	30
		mm.	80	100	150	200	250	300	350	400	450	500	600	760
C_V Factor	**Globe Pattern**	Gal./Min. (gpm.)	25	46	98	240	409	660	910	925	1175	1225	1271	3900
		Litres/Sec. (l/s.)	6.0	11.0	23.5	57.7	98	159	219	222	342	348	358	708
	Angle Pattern	Gal./Min. (gpm.)	—	49	105	230	—	—	—	—	—	—	—	—
		Litres/Sec. (l/s.)	—	11.8	25.2	55	—	—	—	—	—	—	—	—
Equivalent Length of Pipe	**Globe Pattern**	Feet (ft.)	1435	2191	4244	3404	3884	8107	3359	6472	4185	6961	16582	14633
		Meters (m.)	437	668	1294	1038	1184	2471	1024	1973	1276	2122	5054	4460
	Angle Pattern	Feet (ft.)	—	1931	3697	3257	—	—	—	—	—	—	—	—
		Meters (m.)	—	589	1127	993	—	—	—	—	—	—	—	—
K Factor	**Globe Pattern**		101	111	126	72	65	42	40	67	36	53	106	68
	Angle Pattern		—	98	110	69	—	—	—	—	—	—	—	—
Liquid Displaced from Cover Chamber When Valve Opens		U.S. Gal.	.03	.08	.17	.53	1.26	2.5	4.0	4.0	9.6	9.6	9.6	29.0
		Litres	.12	.30	.64	2.0	4.8	9.5	15.1	15.1	36.2	36.2	36.2	110

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

50-01
(Full Internal Port)

MODEL

650-01
(Reduced Internal Port)

Pressure Relief & Pressure Sustaining Valve

CLA-VAL™

- **Accurate Pressure Control**
- **Optional Check Feature**
- **Fast Opening to Maintain Line Pressure**
- **Slow Closing to Prevents Surges**
- **Completely Automatic Operation**

The Cla-Val Model 50-01/650-01 Pressure Relief 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 relief, pressure sustaining, back pressure, or unloading functions in a by-pass system.

In operation, the valve is actuated by line pressure through a pilot control system, opening fast to maintain steady line pressure but closing gradually to prevent surges. Operation is completely automatic and pressure settings may be easily changed.

If a check feature is added, and a pressure reversal occurs, the down-stream pressure is admitted into the main valve cover chamber, closing the valve to prevent return flow.

Schematic Diagram

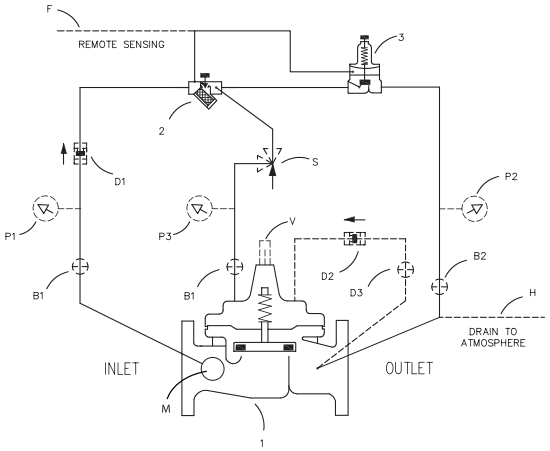
Item Description

1 100-01 Hytrol Main Valve
2 X42N-2 Strainer & Needle Valve
3 CRL-60 Pressure Relief Control

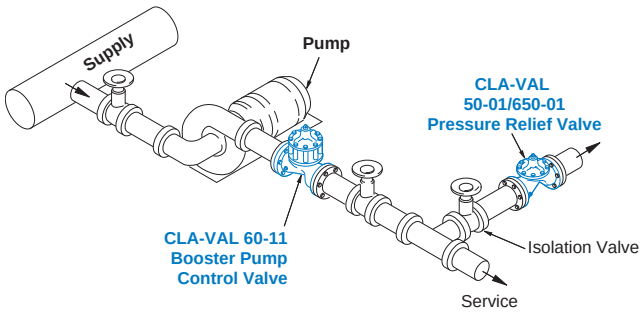
Optional Features

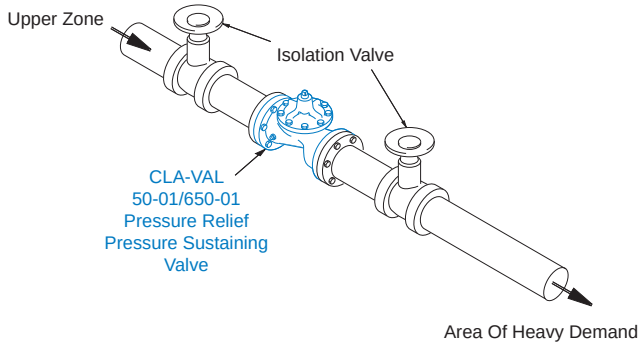
Item Description

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



Typical Applications





Pressure Relief Service

This fast opening, slow closing relief valve provides system protection against high pressure surges on pump start up and pump shut down by dissipating the excess pressure to a safe location.

Pressure Sustaining Service

When installed in a line between an upper zone and a lower area of heavy demand, the valve acts to maintain desired upstream pressure to prevent "robbing" of the upper zone. Water in excess of pressure setting is allowed to flow to an area of heavy demand, control is smooth, and pressure regulation is positive.

50-01 Valve Selection	100-01 Pattern: Globe (G), Angle (A), End Connections: Threaded (T), Grooved (GR), Flanged (F) Indicate Available Sizes																		
	Inches	1	1¼	1½	2	2½	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 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, A	G, A	G	G	G, A	G	G
	End Detail	T	T	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	55	93	125	210	300	460	800	1800	3100	4900	7000	8400	11000	14000	17000	25000	42000	50000
	Maximum Surge	120	210	280	470	670	1000	1800	4000	7000	11000	16000	19000	25000	31000	39000	56500	63000	85000
Suggested Flow (Liters/Sec)	Maximum	3.5	6	8	13	19	29	50	113	195	309	442	530	694	883	1073	1577	2650	3150
	Maximum Surge	7.6	13	18	30	42	63	113	252	441	693	1008	1197	1577	1956	2461	3560	3975	5360

100-01 Series is the full internal port Hytrol. *Globe Grooved Only

650-01 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
Main 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	57000	57000
	Maximum Surge	440	990	1760	3970	7050	11000	15900	15900	28200	28200	28200	56500	58600	90000	90000
Suggested Flow (Liters/Sec)	Maximum	16	37	65	145	258	403	581	581	1040	1040	1040	1764	2115	3596	3596
	Maximum Surge	28	62	111	250	444	693	1002	1002	1777	1777	1777	3560	3700	5678	5678

100-20 Series is the reduced internal port size version of the 100-01 Series.

Product Dimensions Data:

For the 50-01 Main Valve (100-01) dimensions, see pages 17.
For the 650-01 Main Valve (100-20) dimensions, see pages 29.

Pilot System Specifications

Adjustment Ranges

0 to 75 psi Max.
20 to 105 psi
20 to 200 psi *
100 to 300 psi

*Supplied unless otherwise specified.
Other ranges available, please consult factory.

Temperature Range

Water: to 180°F

Materials

Standard Pilot System Materials

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

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

When Ordering, Please Specify

1. Catalog No. 50-01 or No. 650-01
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

CLA-VAL™

— MODEL — **50-01KO**
(Full Internal Port)

Anti-Cavitation Pressure Relief and Pressure Sustaining 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 50-01KO Anti-Cavitation Pressure Relief 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 relief, pressure sustaining, back pressure, or unloading functions in a by-pass system.

In operation, the valve is actuated by line pressure through a pilot control system, opening fast to maintain steady line pressure but closing gradually to prevent surges. Operation is completely automatic and pressure settings may be easily changed.

If a check feature is added, and a pressure reversal occurs, the downstream pressure is admitted into the main valve cover chamber, closing the valve to prevent return flow.

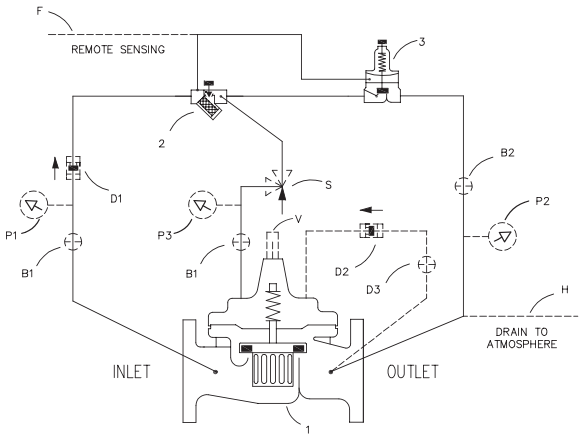
Schematic Diagram

Item	Description
1	100-01KO Hytrol Main Valve
2	X42N-2 Strainer & Needle Valve
3	CRL-60 Pressure Relief Control

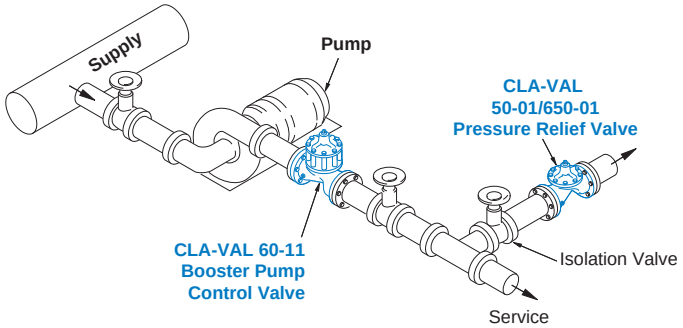
Optional Features

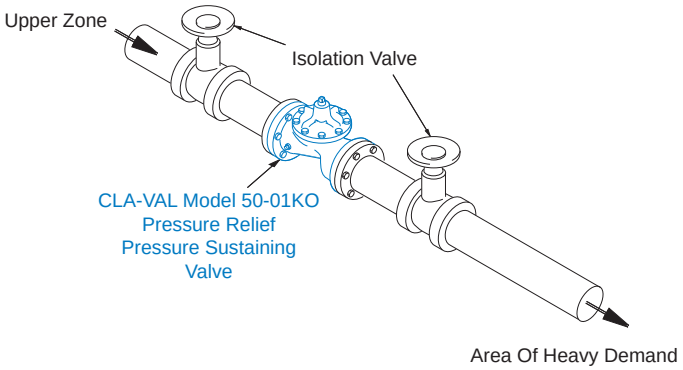
Item	Description
B	CK2 Isolation Valve
D	Check Valves with Isolation Valve
F	Remote Pilot Sensing
H	Drain to Atmosphere
P	X141 Pressure Gauge
S	CV Speed Control (Opening)
V	X101 Valve Position Indicator

Product Dimensions Data:
For the 50-01KO Main Valve (100-01) dimensions, see pages 17.



Typical Applications





Pressure Relief Service

This fast opening, slow closing relief valve provides system protection against high pressure surges on pump start up and pump shut down by dissipating the excess pressure to a safe location.

Pressure Sustaining Service

When installed in a line between an upper zone and a lower area of heavy demand, the valve acts to maintain desired upstream pressure to prevent "robbing" of the upper zone. Water in excess of pressure setting is allowed to flow to an area of heavy demand, control is smooth, and pressure regulation is positive.

52-03
(Full Internal Port)

MODEL

652-03
(Reduced Internal Port)

Pressure Relief & Surge Anticipator Valve

CLA-VAL™

- **System Saver**
- **Protects Against Water Hammer Surges**
- **Opens on Initial Low Pressure Wave**
- **Closes Slowly to Prevent Subsequent Surges**
- **Adjustable Over a Wide Range of Settings**

The Cla-Val Model 52-03/652-03 Surge Anticipator Valve is indispensable for protecting pumps, pumping equipment and all applicable pipelines from dangerous pressure surges caused by rapid changes of flow velocity within a pipeline.

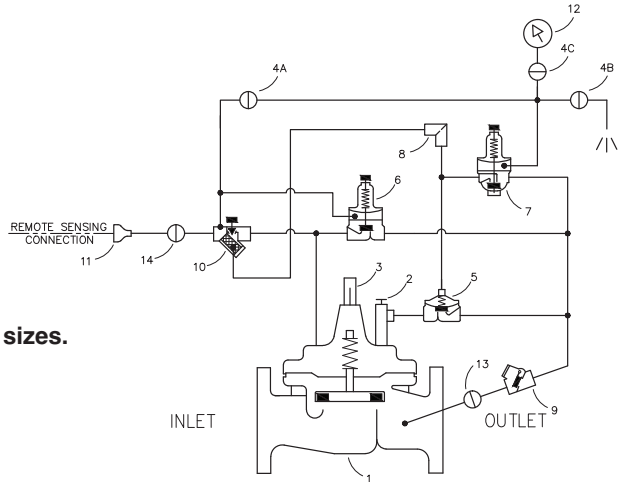
When pumping systems are started and stopped gradually, harmful surges do not occur. Should a power failure take place, however the abrupt stopping of the pump can cause dangerous surges in the system which could result in severe equipment damage.

Power failure to a pump will usually result in a down surge in pressure, followed by an up surge in pressure. The surge control valve opens on the initial low pressure wave, diverting the returning high pressure wave from the system.*In effect, the valve has anticipated the returning high pressure wave and is open to dissipate the damage causing surge. The valve will then close slowly without generating any further pressure surges.

* An adjustable hydraulic flow control limits the valve opening for a controlled initial surge relief.

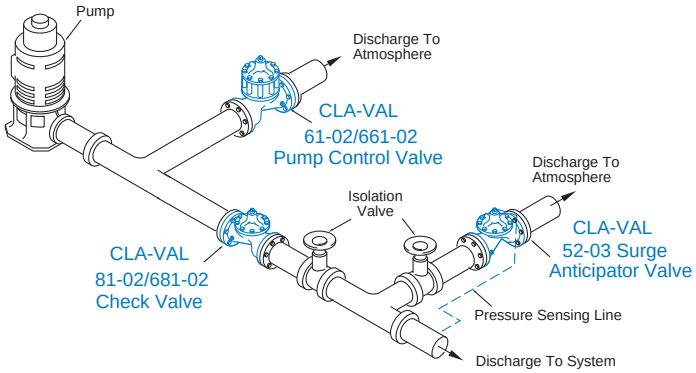
Schematic Diagram

Item	Description
1	100-01 Hytrol Main Valve
2	X102F Flow Limiter
3	X101 Valve Position Indicator *
4	CK2 Isolation Valve
5	100-01 Hytrol (Reverse Flow)
6	CRL-60 Pressure Relief Control
7	CRA Pressure Reducing Control
8	X58B Restriction Tube Assembly
9	CSC Swing Check Valve
10	X42N-3 Strainer Needle Valve
11	Bell Reducer
12	Pressure Gage
13	CK2 Isolation Valve
14	CK2 Isolation Valve



***Note: X101 or X105L Accessories not available in 4" and smaller sizes.**

Product Dimensions Data:
For the 52-03 Main Valve (100-01) dimensions, see pages 17.
For the 652-03 Main Valve (100-20) dimensions, see pages 29.



Typical Application

The 52-03/652-03 discharges to atmosphere from a tee in the pump discharge header. The valve anticipates surges caused by power failure as well as acting as a standard overpressure relief valve.

Note: The remote pressure sensing line should be ¾" minimum I.D. installed with a 2° slope from the valve to the pipeline to avoid air pockets.

Note: We recommend protecting tubing and valve from freezing temperatures.

CLA-VAL®

MODEL

58-01
(Full Internal Port)

658-01
(Reduced Internal Port)

Combination Back Pressure & Solenoid Shut-Off Valve

- **Accurate Pressure Control**
- **Wide Adjustment Ranges**
- **Optional Check Feature Available**
- **Quick Acting Solenoid Shut-Off**
- **Easy Installation and Maintenance**

The Cla-Val Model 58-01/658-01 valve performs two separate functions. It maintains a constant back pressure by discharging excess pressure downstream and when the solenoid is activated the valve closes drip-tight.

In operation, the valve is actuated by hydraulic line pressure through the pilot control system. When inlet pressure is greater than the control setting, the valve opens. When inlet pressure is equal to the control setting, the pilot modulates the valve, maintaining the preselected back pressure. When inlet pressure is less than the control setting, the pilot system closes the valve drip tight. Changing the pressure setting simply involves turning an adjusting screw on the pilot control.

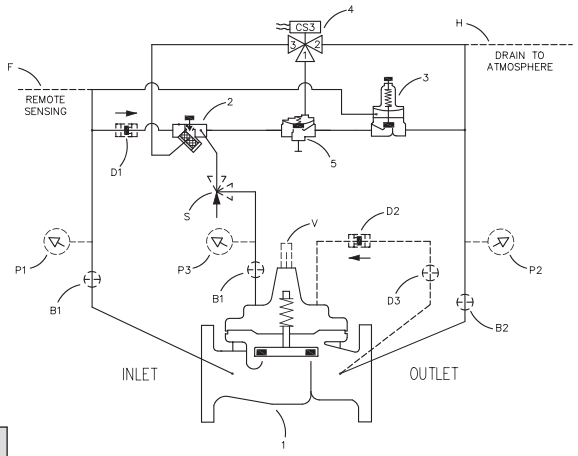
The solenoid control is available in energize to open or de-energize to open models.

Schematic Diagram

Item	Description
1	100-01 Hytrol Main Valve
2	X42N-3 Strainer & Needle Valve
3	CRL-60 Pressure Relief Control
4	CS3 Solenoid Control
5	100-01 Hytrol (Reverse Flow)

Optional Features

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

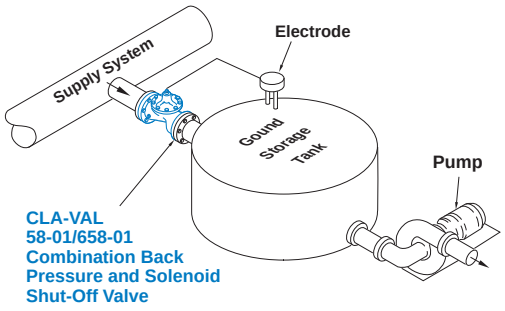


The "D" feature on a vertically installed 6" and larger valve must be horizontally oriented.

Product Dimensions Data:

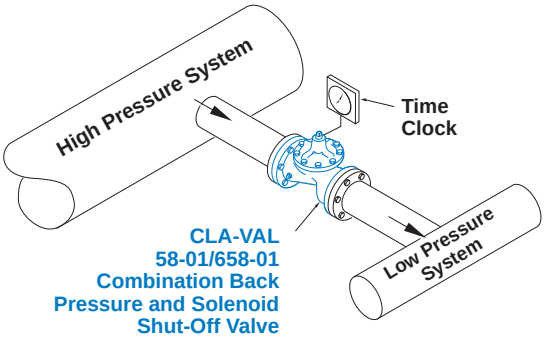
For the 58-01 Main Valve (100-01) dimensions, see pages 17.
For the 658-01 Main Valve (100-20) dimensions, see pages 29.

Typical Applications



Back Pressure Maintenance Service

A frequent application of this valve is to maintain minimum back pressure in the system while supplying water to a reservoir. The electrode in the storage tank activates the solenoid shutoff feature when the tank reaches a preset level.

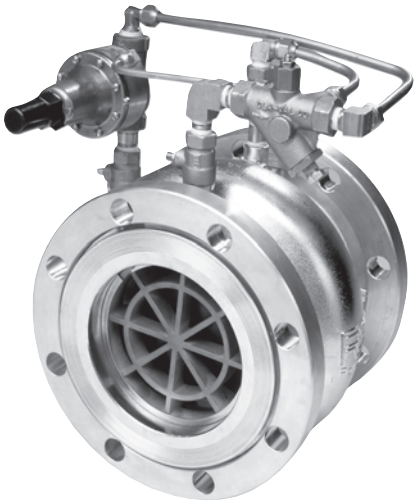


Electronic Control Service

Using a timer connected to the solenoid control of the valve, flow from the high pressure system to the low pressure system can be controlled at certain times during the day.

750-01 — MODEL —

Pressure Relief, Sustaining & Back Pressure Valve



Performance Specification

Capacity:	See Technical Data Sheet
C_f Factor:	0.9
Cavitation:	See Technical Data Sheet
Rangeability:	500:1
Bearing Friction:	No friction from slip-type bearings

Design Specification

Sizes:	2, 3, and 6 inch wafer style 6, 8, 10, and 12 inch flanged 6, 8, 10, 12, inch Victaulic® Ends
End Detail Wafer:	Fits ANSI B16.5 class 125,150, 250, and 300 flanges
End Detail Flanged:	ANSI B16.5 class 150 (fits class 125) or ANSI B16.5 class 300 (fits class 250)
End Detail Victaulic®:	Fits standard steel pipe
Operating Pressure:	720 psi maximum Victaulic® Ends - 300 psi max.
Maximum Differential:	150 psid continuous, 225 psid intermittent*
Reverse Pressure:	125 psid maximum
Temperature Range:	32 to 160 degrees F*
Flange Operating Pressure:	Class 125-175 psi maximum Class 150-275 psi maximum Class 250-300 psi maximum Class 300-720 psi maximum
Victaulic® Ends Rating:	300 psi maximum

*Standard natural rubber 65 durometer in water service. Temperature range depends on liner material. Higher differential pressure ratings available.

For other than standard ANSI flanges consult factory

DIN drilling available on all sizes

Product Dimensions Data:
For the 750-01 Main Valve (100-42) dimensions, see pages 31.

Description

The Cla-Val Model 750-01 is a hydraulically operated pilot actuated automatic control valve for pressure sustaining, relief and/or back pressure service. The main valve consists of only two parts, a stainless steel body and an elastomeric liner or control element.

The main valve will open when inlet pressure begins to exceed a preset pressure and will allow enough flow to maintain that inlet pressure. In pressure sustaining service, Model 750-01 will conserve pressure in an upper system during periods of high demand in a system below. In pressure relief service, the Model 750-01 will modulate to exhaust line pressure to keep it below a set point maximum. On a pump bypass system, the valve will allow flow back to the pump suction when pump discharge pressure exceeds the set point.

Cla-Val Model 750-01 will control from no flow to full open flow without any chattering or slamming under low flow conditions. For this reason, on by-pass, relief, and pressure sustaining service, there is never a region of control instability. There is no slip-type friction because the valve has no bearings. Cla-Val Model 750-01 valves have excellent resistance to cavitation with a C_f factor of 0.9.
These valves can be supplied as combination control valve with check. Pilot controls, options, and accessories are fully piped at the factory and the Cla-Val Model 750-01 is shipped ready for installation.

Purchase Specification

Valve and control system shall maintain inlet pressure at a predetermined set point; shall open as pressure starts to increase above the set point, and close as pressure falls below the set point. Control valve shall be constructed of two parts: a stainless steel body and an elastomeric liner or control element. Minimum rangeability shall be 500:1 based on capacity at flowing pressure conditions. Cf shall be greater than or equal to 0.9. Valve and control system shall be similar in all respects to Cla-Val Model 750-01 as manufactured by Cla-Val, Newport Beach, California.

Material Specification

Body:	316L Stainless Steel
Liner:	Natural Rubber, 65 durometer (std) Viton, EPDM, Nitrile, Silicone (available)
Liner Retainer:	316 Stainless Steel

Pilot

Body:	UNS 87850 Bronze*
Spring Cover:	UNS 87850 Bronze*
Wetted Parts:	Bronze/Stainless Steel* Buna-N®

Accessories

Shut-off Isolation Valve:	Brass*
Speed Controls:	Brass*
Check Controls:	Brass*
"Y" Strainer:	Bronze*
Control Piping:	Copper*
Control Fittings:	Brass*

*316 stainless steel available

CLA-VAL™

MODEL 250-01 (Full Internal Port) / 605-01 (Reduced Internal Port)

Differential Pressure Relief Valve

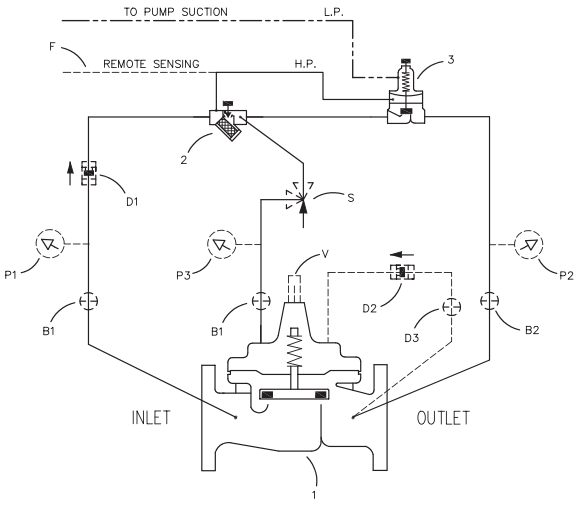
- **Accurate Differential Pressure Control**
- **Controls Maximum Flow Through Pumps**
- **Circulating Loop Flow Control**
- **Completely Automatic Operation**

The Cla-Val Model 250-01/605-01 Differential Pressure Relief Valve is a hydraulically operated, pilot-controlled, modulating valve. It is designed to maintain a constant pressure differential between any two pressure points in a system where the closing of the valve directly causes the differential pressure to increase. The valve tends to open on an increase in differential pressure and close on a decrease in differential pressure.

In operation, the valve is actuated by line pressure through a pilot control system sensing from two points across which a differential is to be maintained. Operation is completely automatic and pressure settings may be easily changed.

Schematic Diagram

Item	Description
1	100-01 Hytrol Main Valve
2	X42N-2 Strainer & Needle Valve
3	CDB-7 Differential Control

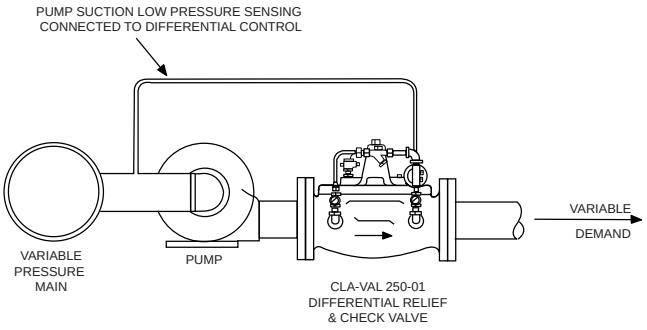


Optional Features

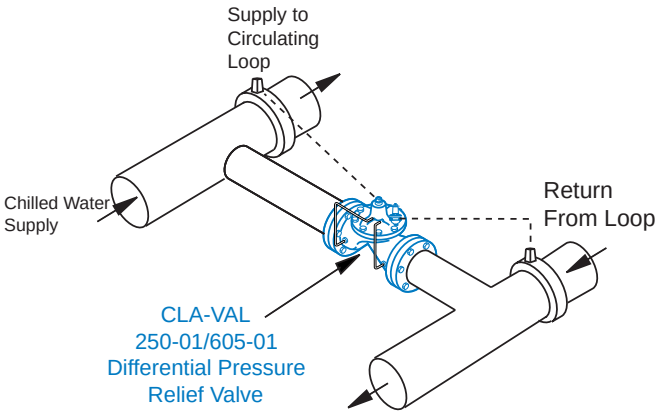
Item	Description
B	CK2 Isolation Valve
D	Check Valves with Isolation Valve
F	Remote Pilot Sensing (H.P.)
P	X141 Pressure Gauge
S	CV Speed Control (Opening)
V	X101 Valve Position Indicator

Product Dimensions Data:
For the 250-01 Main Valve (100-01) dimensions, see pages 17.
For the 605-01 Main Valve (100-20) dimensions, see pages 29.

Typical Applications



The Model 250-01/605-01 Differential Pressure Relief Valve maintains a constant differential across centrifugal pump regardless of variable upstream pressures or downstream demand.
By maintaining a constant differential pressure across a centrifugal pump operating at a known capacity, the maximum flow rate is controlled.



On a chilled water circulating loop system the 250-01/605-01 Differential Pressure Relief Valve is installed between loop supply and return lines to maintain a constant differential across the loop. The loop differential pressure remains constant regardless of the loop demand change thereby increasing cooling system efficiency.

90-01
(Full Internal Port)

690-01
(Reduced Internal Port)

MODEL

Pressure Reducing Valve

- **Sensitive and Accurate Pressure Control**
- **Easy Adjustment and Maintenance**
- **Optional Check Feature**
- **Fully Supported Frictionless Diaphragm**

The Cla-Val Model 90-01/690-01 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.

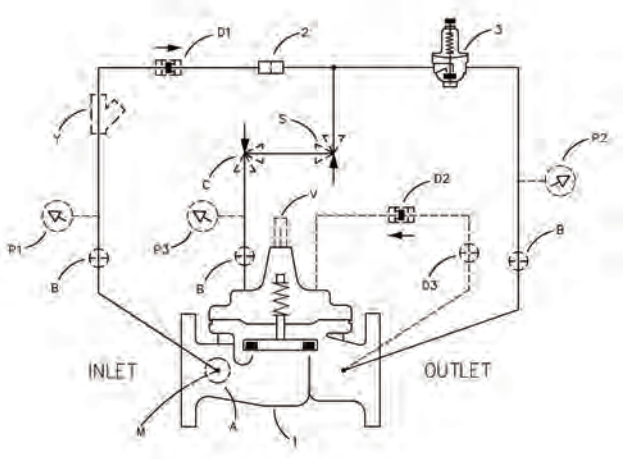
Schematic Diagram

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

Optional Features

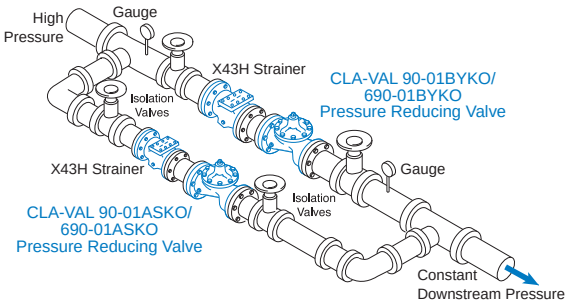
Item	Description
A	X46A Flow Clean Strainer
B	CK2 Isolation Valve
C	CV Flow Control (Closing)*
D	Check Valves with Isolation Valve
P	X141 Pressure Gauge
V	X101 Valve Position Indicator
S	CV Flow Control (Opening)
Y	X43 "Y" Strainer

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



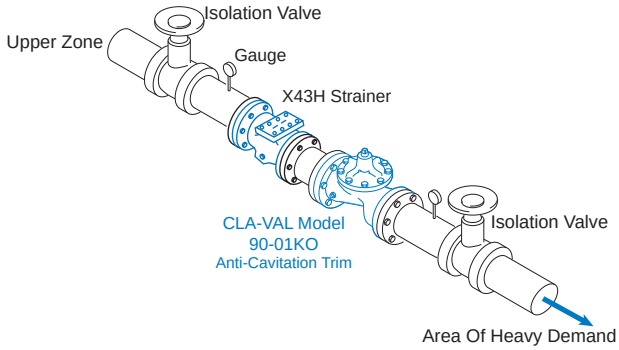
Typical Applications

Typical applications include pressure reducing valve station using Model 90-01BY/690-01BY and Model 90-01AS/690-01AS in parallel to handle wide range of flow rates. Larger Model 90-01BY/690-01BY valve meets requirements of peak loads and smaller Model 90-01AS/690-01AS handles low flows.



Cla-Val Model 90-01KO/690-01KO Pressure Reducing Valve with Anti-Cavitation Trim provides for 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.



90-01 Valve Selection	100-01 Pattern: Globe (G), Angle (A), End Connections: Threaded (T), Grooved (GR), Flanged (F) Indicate Available Sizes																		
	Inches	1	1¼	1½	2	2½	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 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, A	G, A	G	G	G, A	G	G
	End Detail	T	T	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	55	93	125	210	300	460	800	1800	3100	4900	7000	8400	11000	14000	17000	25000	42000	50000
	Maximum Intermittent	68	120	160	260	370	580	990	2250	3900	6150	8720	10540	13700	17500	21700	31300	48000	62500
	Minimum	1	1	1	1	2	2	4	10	15	35	50	70	95	120	150	275	450	650
Suggested Flow (Liters/Sec)	Maximum	3.5	6	8	13	19	29	50	113	195	309	442	530	694	883	1073	1577	2650	3150
	Maximum Intermittent	4.3	7.6	10	16	23	37	62	142	246	387	549	664	863	1104	1369	1972	3028	3940
	Minimum	.03	.03	.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

690-01 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
Main 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	57000	57000
	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	3596	3596
	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**

Product Dimensions Data:

For the 90-01 Main Valve dimensions, see pages 17.
For the 690-01 Main Valve dimensions, see pages 29.

Many factors should be considered in sizing pressure reducing 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

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

*Supplied unless otherwise specified
Other ranges available, please consult factory

Temperature Range

Water: to 180°F

Materials

Standard Pilot System Materials
Pilot Control: Low Lead Bronze
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 at additional cost.

Note: Available with remote sensing control.

When Ordering, Please Specify

1. Catalog No. 90-01 or No. 690-01
2. Valve Size
3. Pattern - Globe or Angle
4. Pressure Class
5. Threaded, Flanged or Grooved
6. Trim Material
7. Adjustment Range
8. Desired Options
9. When Vertically Installed
10. Product Enhancements

90-01KO – MODEL

(Full Internal Port)

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.

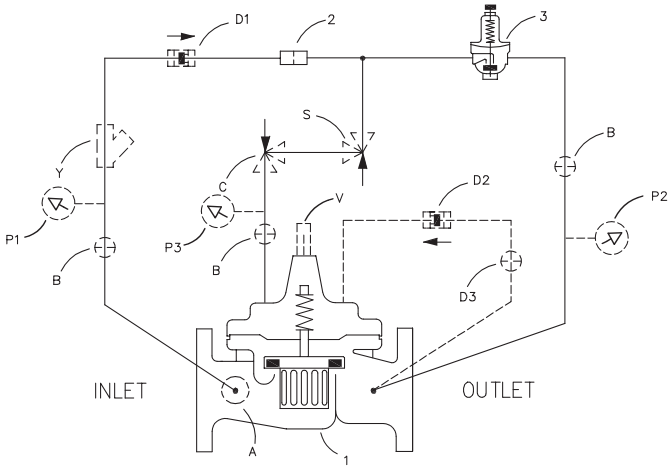
Schematic Diagram

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 Speed Control (Opening)
V	X101 Valve Position Indicator
Y	X43 "Y" Strainer

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

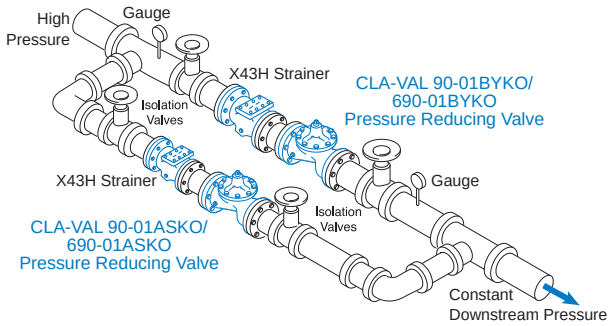


The "D" check feature on a vertically installed 6" and larger valves must be horizontally installed.

Product Dimensions Data:
For the 90-01KO Main Valve (100-01) dimensions, see pages 17.

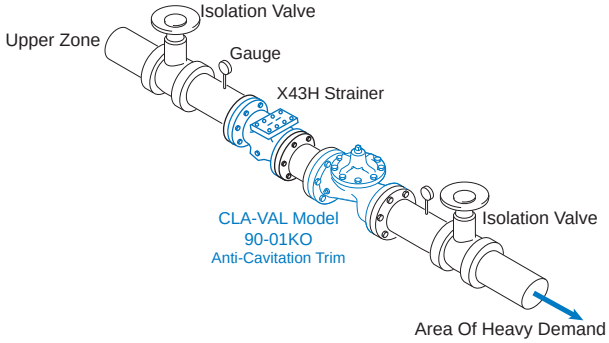
Typical Applications

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 Model 90-01BYKO valve meets requirements of peak loads and smaller Model 90-01ASKO handles low flows.



Cla-Val Model 90-01KO Pressure Reducing Valve with Anti-Cavitation Trim provides for 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.



CLA-VAL™

MODEL **90-48** (Full Internal Port)
690-48 (Reduced Internal Port)

Pressure Reducing Valve with Low Flow By-Pass

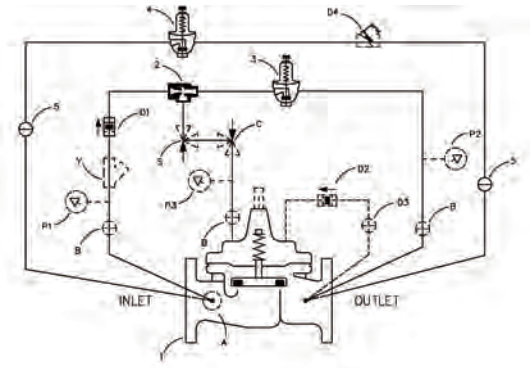
- **Modulating Control**
- **Maintains Constant Outlet Pressure Over a Wide Range of Flows**
- **Durable Construction**
- **Convenient and Space Saving**

The Cla-Val Model 90-48/690-48 Pressure Reducing Valve with Low Flow By-Pass automatically reduces a higher inlet pressure to a steady lower downstream pressure, regardless of changing flow rate. The low flow by-pass capability is achieved by using the Cla-Val Model CRD-40 Direct Acting Pressure Reducing Valve as an integral part of the main valve. By doing this, space is saved and installation and maintenance become much easier.

The pressure reducing valve is hydraulically operated and controlled by a Cla-Val CRD pilot control, which senses pressure at the main valve outlet. An increase in outlet pressure forces the CRD pilot control to close and a decrease in outlet pressure opens the control. This causes the main valve cover pressure to vary, modulating the main valve, thereby, maintaining constant outlet pressure.

The Model CRD-40 low flow pressure reducing by-pass is preset to a higher pressure than the CRD pilot control. The CRD-40 responds to pressure changes at the main valve outlet. When the CRD closes, the Model CRD-40 remains open, allowing low flow to by-pass the main valve. The CRD-40 closes when the flow decreases and the downstream pressure reaches its set-point .

The Cla-Val Model 90-48/690-48 is not a substitute for a low flow bypass valve in all cases. This valve is commonly used in building where 1-15 gpm low flows are common in off peak usage. The bypass on this valve is limited to the body tapping size on the main valve.



Schematic Diagram

Item	Description
1	100-01 Hytrol Main Valve
2	X47A Ejector
3	CRD Pressure Reducing Control
4	CRD-40 Pressure Reducing Valve
5	CK2 Isolation Valve

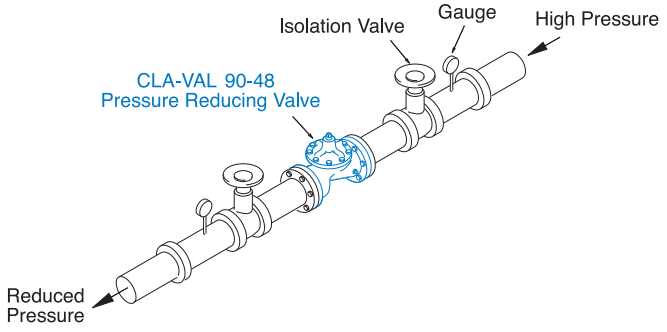
Optional Features

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 Speed Control (Opening)*
V	X101 Valve Position Indicator
Y	X43 "Y" Strainer

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

Typical Applications

This valve has the flexibility to be installed in a distribution system where the demand varies over a wide range. This frequently occurs in industrial, residential, educational, high-rise buildings and other applications. Another important feature of the valve is its space efficient configuration, allowing easy installation and maintenance.



Product Dimensions Data:

For the 90-48 Main Valve (100-01) dimensions, see pages 17.
For the 690-48 Main Valve (100-20) dimensions, see pages 29.

92-01
(Full Internal Port)

MODEL

692-01
(Reduced Internal Port)

Combination Pressure Reducing & Pressure Sustaining Valve

- **Accurate Response to Slight Pressure Changes**
- **Check Feature Available**
- **Completely Automatic Operation**
- **Drip-Tight, Positive Seating Action**
- **Operation is Fully Hydraulic**

The Cla-Val Model 92-01/692-01 Combination Pressure Reducing and Pressure Sustaining Valve automatically performs two independent functions. It maintains a constant downstream pressure, regardless of fluctuating demand and sustains the upstream pressure to a pre-determined minimum.

The pressure reducing control responds to slight variations in downstream pressure and immediately repositions the main valve to maintain the desired downstream pressure. The pressure sustaining control is normally held open by the upstream pressure, but modulates should the pressure drop to the control set point. This, in turn, modulates the main valve to sustain the desired upstream pressure.

If a check feature is added, and a pressure reversal occurs, the downstream pressure is admitted into the main valve cover chamber and the valve closes to prevent return flow.

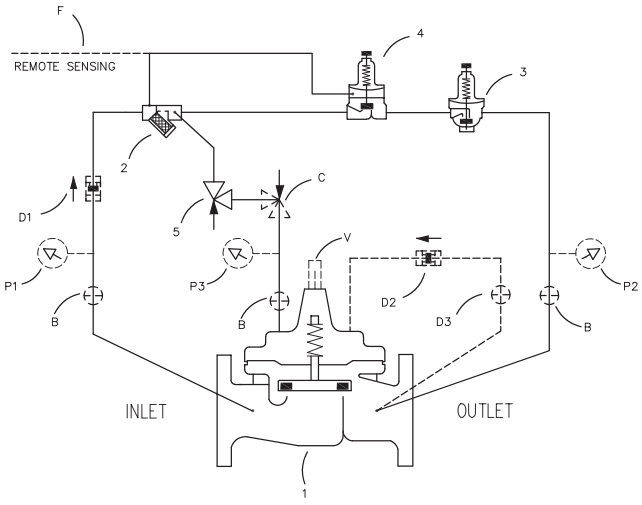
Schematic Diagram

Item	Description
1	100-01 Hytrol Main Valve
2	X44A Strainer & Orifice
3	CRD Pressure Reducing Control
4	CRL-60 Pressure Relief Control
5	CV Flow Control (Opening)

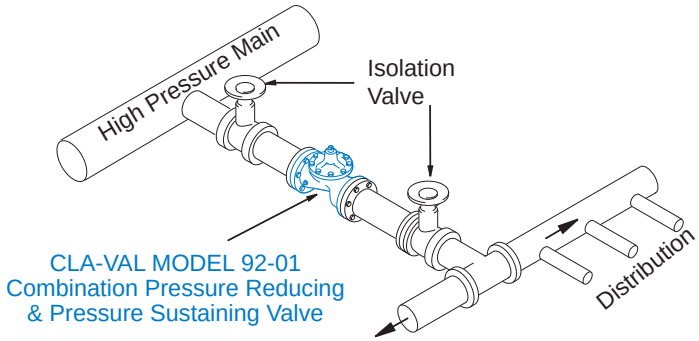
Optional Features

Item	Description
B	CK2 Isolation Valve
C	CV Flow Control (Closing)*
D	Check Valves With Isolation Valve
F	Remote Pilot Sensing
P	X141 Pressure Gauge
V	X101 Valve Position Indicator

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



Product Dimensions Data:
For the 92-01 Main Valve (100-01) dimensions, see pages 17.
For the 692-01 Main Valve (100-20) dimensions, see pages 29.



CLA-VAL MODEL 92-01
Combination Pressure Reducing
& Pressure Sustaining Valve

Typical Applications

A Combination Pressure Reducing and Pressure Sustaining Valve is typical used to automatically reduce pressure for the downstream distribution network and sustain a minimum pressure in the high pressure main regardless of distribution demand.

CLA-VAL™

MODEL

93-01
(Full Internal Port)

693-01
(Reduced Internal Port)

Pressure Reducing & Solenoid Shut-Off Valve

- **Accurate Pressure Control**
- **Wide Adjustment Ranges**
- **Optional Check Feature Available**
- **Quick Acting Solenoid Shut-Off**
- **Easy Installation and Maintenance**

The Cla-Val Model 93-01/693-01 Combination Pressure Reducing and Solenoid Shut-Off Valve consists of a Cla-Val Hytrol main valve, a reducing control and a solenoid control connected to the main valve. This valve automatically reduces higher inlet pressure to a steady lower downstream pressure, regardless of changing flow rate and/or varying inlet pressure.

The 93-01/693-01 is an accurate, pilot-operated regulator capable of holding downstream pressure to a pre-determined delivery pressure. When downstream pressure exceeds the pressure setting of the control pilot, the pilot valve and main valve close drip-tight. A solenoid control is provided to intercept the operation of the pressure reducing control and close the main valve. This valve is furnished either normally open (de-energized to open), or normally closed (energized to open). Pressure setting adjustment is made with a single adjusting screw.

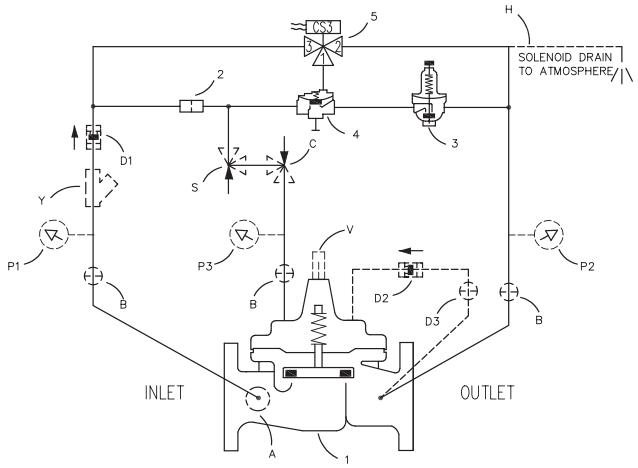
Schematic Diagram

Item	Description
1	100-01 Hytrol Main Valve
2	X58C Restriction Assembly
3	CRD Pressure Reducing Control
4	100-01 Hytrol (Reverse Flow)
5	CS3 Solenoid 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
H	Solenoid Drain To Atmosphere
P	X141 Pressure Gauge
S	CV Speed Control (Opening)
V	X101 Valve Position Indicator
Y	X43 "Y" Strainer

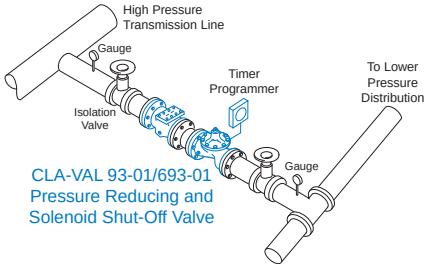
*The closing speed control (optional) on this valve should always be open at least three (3) turns off its seat.



Product Dimensions Data:

For the 93-01 Main Valve (100-01) dimensions, see pages 17.
For the 693-01 Main Valve (100-20) dimensions, see pages 29.

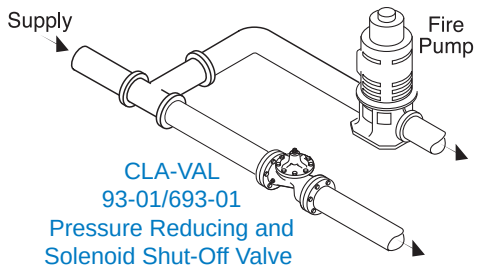
Typical Applications



CLA-VAL 93-01/693-01
Pressure Reducing and
Solenoid Shut-Off Valve

Electronic Control Service

A typical application for this valve is to reduce high transmission line pressures to lower distribution system levels, while opening and closing on command. The solenoid control feature can be activated by an electrical signal from a timer or programmer.



CLA-VAL
93-01/693-01
Pressure Reducing and
Solenoid Shut-Off Valve

Fire Service

The 93-01/693-01 can be installed in a distribution line where there is a need to close the valve on the starting of a fire pump. The solenoid control is activated on pump start-up and closes the valve.

94-01
(Full Internal Port)

MODEL

694-01
(Reduced Internal Port)

Combination Pressure Reducing and Surge Control Valve

CLA-VAL™

- **Sensitive and Accurate Pressure Control**
- **Easy Adjustment and Maintenance**
- **Optional Check Feature**
- **Fully Supported Frictionless Diaphragm**

The Cla-Val Model 94-01/694-01 Combination Pressure Reducing and Surge Control 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 control valve capable of holding downstream pressure to a pre-determined limit. When downstream pressure rapidly exceeds the pressure setting of the pressure reducing control pilot, the surge pilot (CRL) will open quickly to prevent a rapid pressure rise downstream.
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.

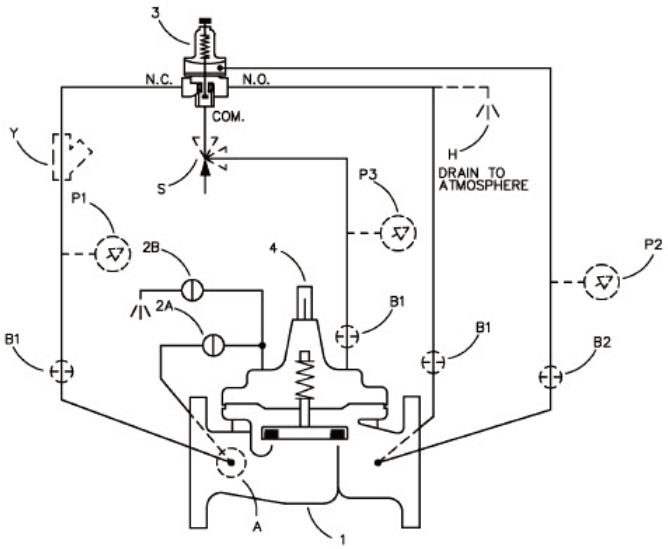
Schematic Diagram

Item	Description
1	100-01 Hytrol Main Valve
2	X58C Restriction Assembly
3	CRD Pressure Reducing Control
4	CRL Pressure Relief 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
F	Remote Pilot Sensing
P	X141 Pressure Gauge
S	CV Speed Control (Opening)
V	X101 Valve Position Indicator
Y	X43 "Y" Strainer

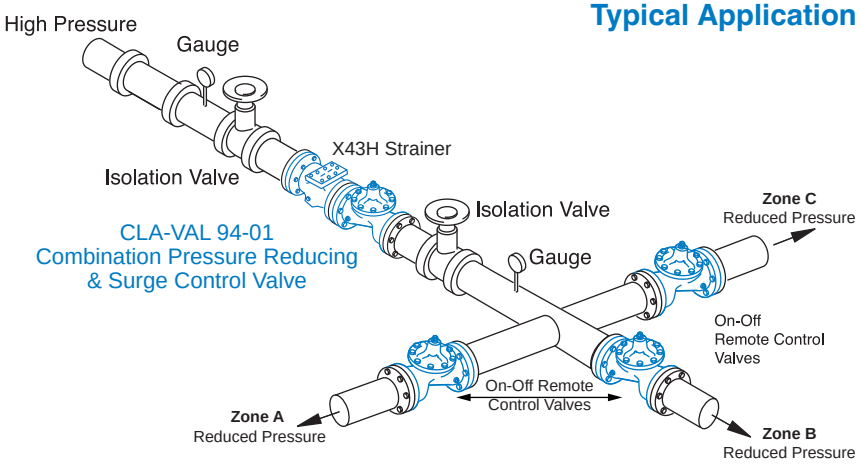
*The closing speed control (optional) on this valve should always be open at least three (3) turns off its seat.



Product Dimensions Data:
For the 94-01 Main Valve (100-01) dimensions, see pages 17.
For the 694-01 Main Valve (100-20) dimensions, see pages 29.

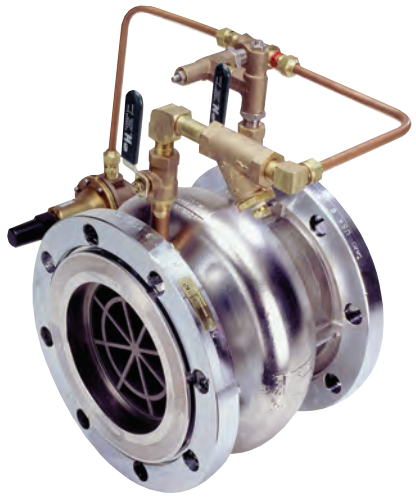
Should the downstream pressure suddenly increase above the setting of the pressure reducing control due to on-off operation of two or more downstream systems, the Surge Control tracks rapidly enough to prevent high pressure surges from entering any of the downstream systems, when any one of the downstream systems is rapidly closed off. The typical combination pressure reducing and surge control valve station uses Model 94-01BY/694-01BY to control surges in downstream piping as remote control valves change from one downstream zone to another. Surge Control is set approximately 10 psi above Pressure Reducing Control to prevent high pressure surge entering other downstream zones.

Typical Application



790-01 — MODEL —

Pressure Reducing Valve



Performance Specification

Capacity:	See Technical Data Sheet
C_f Factor:	0.9
Cavitation:	See Technical Data Sheet
Rangeability:	500:1
Bearing Friction:	No friction from slip-type bearings

Design Specification

Sizes:	2, 3, and 6 inch wafer style 6, 8, 10, and 12 inch flanged 6, 8, 10, 12 inch Victaulic® Ends
End Detail Wafer:	Fits ANSI B16.5 class 125,150, 250, and 300 flanges
End Detail Flanged:	ANSI B16.5 class 150 (fits class 125) or ANSI B16.5 class 300 (fits class 250)
End Detail Victaulic®:	Fits standard steel pipe
Operating Pressure:	720 psi maximum Victaulic® Ends - 300 psi max.
Maximum Differential:	225 psid For higher differential consult factory
Reverse Pressure:	125 psid maximum
Approvals:	PUB Listed.....Sizes 2" thru 6"
Temperature Range:	32 to 160 degrees F*
Flange Operating Pressure:	Class 125-175 psi maximum Class 150-275 psi maximum Class 250-300 psi maximum Class 300-720 psi maximum
Victaulic® Ends Rating:	300 psi maximum

*Standard natural rubber 65 durometer in water service. Temperature range depends on liner material. Higher differential pressure ratings available.

For other than standard ANSI flanges consult factory

DIN drilling available on all sizes

Description

The Cla-Val Model 790-01 is a hydraulically operated, pilot actuated automatic control valve for pressure reducing service. The main valve consists of only two parts: a stainless steel body, and an elastomeric liner or control element.

Pressure reducing valves are used to lower pipeline pressure to a predetermined set point. Cla-Val Model 790-01 automatically controls downstream pressure, from no flow to full open flow, without regard to changes in inlet pressure. Outlet pressure control is smooth and precise since the friction and hysteresis of the valve and pilot is negligible.

Because the valve will not chatter or slam under low flow conditions, it is not necessary to parallel Cla-Val Model 790-01 with a second smaller size control valve to obtain accurate pressure control at low flow rates. In any size, Cla-Val Model 790-01 will control pressure right down to shutoff.

Pressure reducing valves can be supplied as a combination with check valve. Control systems are fully piped at the factory and the Cla-Val Model 790-01 is shipped ready for installation.

Purchase Specification

Valve and control system shall lower line pressure to a predetermined set point and shall maintain that set point regardless of variations in flow or inlet pressure. Control valve shall be constructed of two parts: a stainless steel body, and an elastomeric liner or control element. Minimum rangeability shall be 500:1 based on capacity at flowing pressure conditions. C_f shall be greater than or equal to 0.9. Valve and control system shall be similar in all respects to Cla-Val Model 790-01 as manufactured by Cla-Val, Newport Beach, California.

Material Specification

Body:	316L Stainless Steel
Liner:	Natural Rubber, 65 durometer (standard) Viton, EPDM, Nitrile, Silicone (available)
Liner Retainer:	316 Stainless Steel

Pilot

Body:	UNS 87850 Bronze*
Spring Cover:	UNS 87850 Bronze*
Wetted Parts:	Bronze/Stainless Steel*, Buna-N®

Accessories

Shut-off Isolation Valve:	Brass*
"Y" Strainer:	Bronze*
Speed Controls:	Brass*
Check Controls:	Brass*
Control Piping:	Copper*
Control Fittings:	Brass*

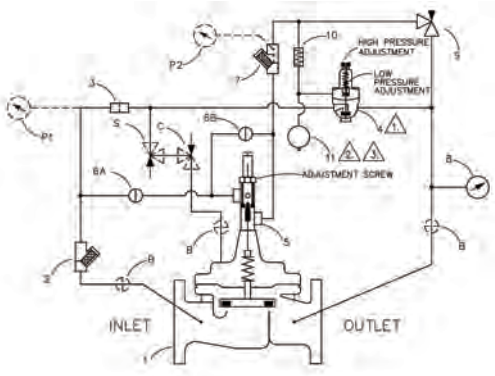
*316 stainless steel available

Product Dimensions Data:
For the 790-01 Main Valve (100-42) dimensions, see pages 31.

CLA-VAL®

MODEL 98-06 (2"-10") (Full Internal Port)
698-06 (3"-12") (Reduced Internal Port)

Hydraulic Pressure Management Control Valve with Dual Setpoints



- **100% Hydraulic Control**
- **Two Adjustable Downstream Set Points for High and Low Pressure**
- **Simple to Setup and Adjust**
- **Smooth Transition from High to Low Pressure**
- **Retrofits to Existing Valve Without Removal From Pipeline**
- **Helps Prevent Pipe Breaks and Background Leaks**

The Cla-Val Model 98-06/698-06 Pressure Management Control Valve is a pressure reducing valve that allows for two downstream set points. A high pressure set point is selected for high flow demand and a low pressure set point is selected for low flow demand. This dual set point arrangement allows for reduction in water loss by not over pressurizing the system during times of low demand, while providing adequate pressure during high or fire demand. The design is 100% hydraulic and in addition to the dual pressure set points the transition point at which the pressure changes based on the flow is adjustable as well. The patent pending design of the valve allows for smooth transition from one set point to the other.

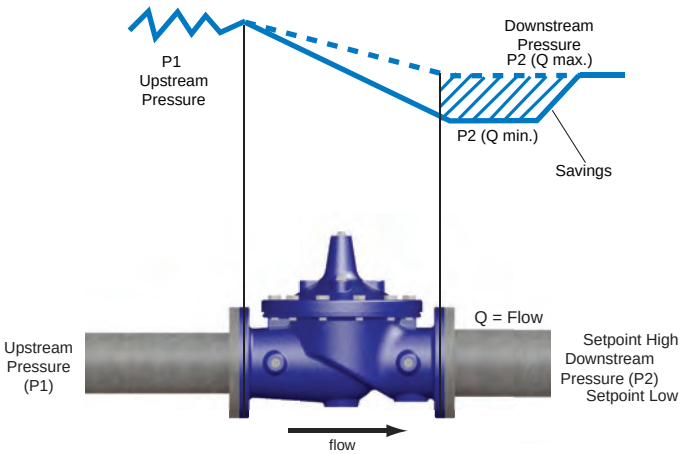
Schematic Diagram

Item	Description
1	100-01 Hytrol Main Valve
2	X43 "Y" Strainer
3	X58C Restriction Assembly
4	CPM-A Pressure Management Control
5	X78-4 Stem Assembly + X101 Valve Position Indicator Assembly
6	CK2 Isolation Valve
7	X44A Strainer Orifice Assembly
8	X141 Gage Assembly
9	6120 Needle Valve
10	X58E Restriction Assembly
11	Accumulator (Air Charged)

Optional Features

Item	Description
B	CK2 Isolation Valve
C	CV Flow Control (Closing)
P	X141 Gage Assembly
S	CV Flow Control (Opening)

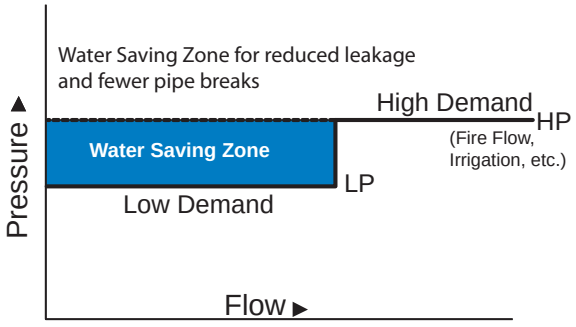
Modulating Profile



Go to www.cla-val.com for Purchase Specification

Typical Performance

A dual system pressure with reduced system pressure during low demand periods is illustrated in the chart. At low flows a minimum pressure is maintained and as flow increases to the switch point delivery pressure increases to the maximum pressure set point for switch. The point between low pressure and high pressure setpoints is adjustable to fine tune valve to system requirements.The "water saving zone" below maximum pressure line represents valve effectiveness in reducing water losses and pipeline breakage in a system.



40-01
(Full Internal Port)

640-01
(Reduced Internal Port)

MODEL

Rate of Flow Control Valve

- **Accurately Limits Flow Rate**
- **Completely Automatic Operation**
- **Includes Orifice Plate with Holder**
- **Optional Check Feature**
- **Easily Adjusted**

The Cla-Val Model 40-01/640-01 Rate of Flow Control Valve prevents excessive flow by limiting flow to a preselected maximum rate, regardless of changing line pressure. It is a hydraulically operated, pilot controlled, diaphragm valve. The pilot control responds to the differential pressure produced across an orifice plate installed downstream of the valve. Accurate control is assured as very small changes in the controlling differential pressure produce immediate corrective action of the main valve. Flow rate adjustments are made by turning an adjusting screw on the pilot control.

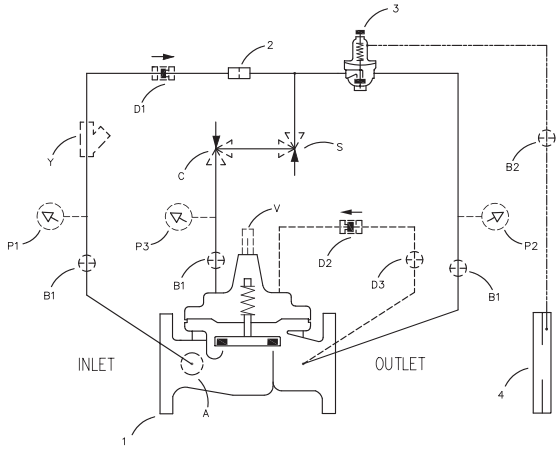
The Model 40-01/640-01 includes an orifice plate with a holder that should be installed one to five pipe diameters downstream of the valve. If the check feature option is added and a pressure reversal occurs, the downstream pressure is admitted into the main valve cover chamber and the valve closes to prevent return flow. See X52E data sheet for sizing selection.

Schematic Diagram

Item	Description
1	100-01 Hytrol Main Valve
2	X58C Restricting Fitting
3	CDHS18 Differential Control
4	X52E Orifice Plate Assembly

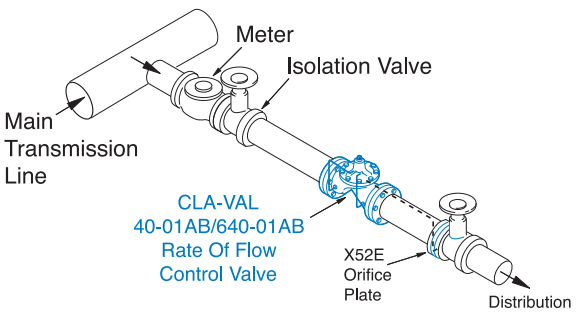
Optional Features

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 Speed Control (Opening)
V	X101 Valve Position Indicator
Y	X43 "Y" Strainer

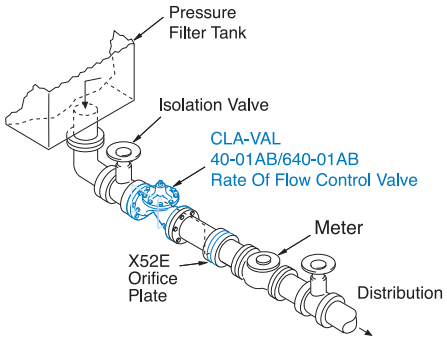


Product Dimensions Data:
For the 40-01 Main Valve (100-01) dimensions, see pages 17.
For the 640-01 Main Valve (100-20) dimensions, see pages 29.

Typical Applications



The 40-01/640-01 is typically installed where water supply to a system must be limited to a preset maximum flow rate. The valve is easily set to maintain the maximum allowable flow rate.



The 40-01/640-01 is typically installed as a pressure type filter effluent control valve where a constant flow rate is maintained as head loss through the filter varies.

CLA-VAL™

MODEL 43-01 (Full Internal Port)
643-01 (Reduced Internal Port)

Combination Rate of Flow Control & Solenoid Shut-Off Valve

- **Multi-functional Capability**
- **Includes Orifice Plate with Holder**
- **Optional Check Feature**
- **Easily Adjusted**
- **Every Valve Factory Tested**

The Cla-Val Model 43-01/643-01 Combination Rate of Flow Control and Solenoid Shut-Off Valve limits the maximum flow rate, regardless of changing line pressure. It is a hydraulically operated, pilot controlled, diaphragm valve. The pilot control is actuated by the differential pressure produced across an orifice plate installed downstream of the valve. Accurate control is assured as very small changes in the controlling differential pressure produce immediate corrective action of the main valve. A solenoid control is provided to intercept the operation of the differential control and close the main valve.

The Model 43-01/643-01 includes a orifice plate with a holder that should be installed one to five pipe diameters downstream of the main valve. If the check feature option is added and a pressure reversal occurs, the downstream pressure is admitted into the main valve cover chamber and the valve closes to prevent return flow.

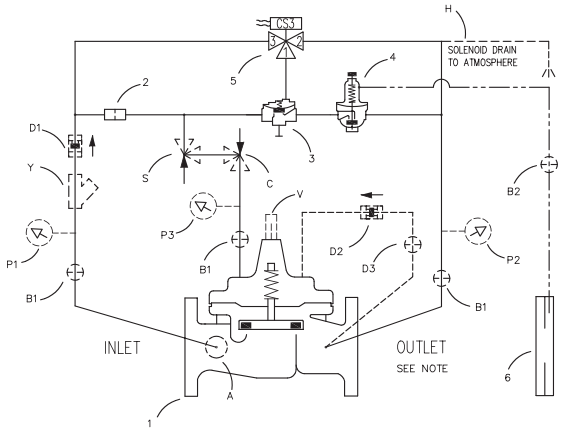
Schematic Diagram

Item	Description
1	100-01 Hytrol Main Valve
2	X58C Restriction Fitting
3	100-01 Hytrol (Reverse Flow)
4	CDHS18 Differential Control
5	CS3 Solenoid Control
6	X52E Orifice Plate Assembly

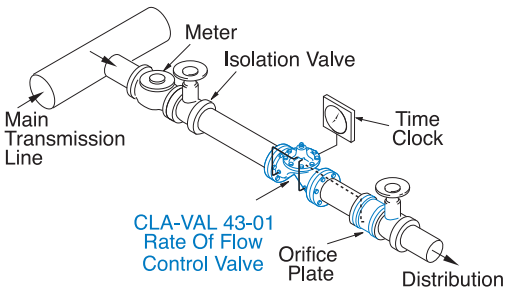
Optional Features

Item	Description
A	X46A Flow Clean Strainer
B	CK2 Isolation Valve
C	CV Flow Control (Closing)
D	Check Valves with Isolation Valve
H	Solenoid Drain to Atmosphere
P	X141 Pressure Gauge
S	CV Speed Control (Opening)
V	X101 Valve Position Indicator
Y	X43 "Y" Strainer

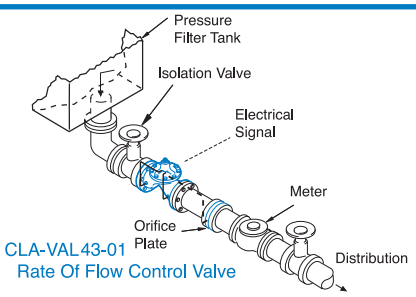
Product Dimensions Data:
For the 43-01 Main Valve (100-01) dimensions, see pages 17.
For the 643-01 Main Valve (100-20) dimensions, see pages 29.



The "D" feature on a vertically installed 6" and larger valves must be horizontally installed.



The 43-01/643-01 is typically installed where water supply to a system must be limited to a pre-set maximum flow rate at certain times of day. The valve is easily set to maintain the maximum allowable flow rate and is to open or close on an electrical signal.



The 43-01/643-01 is typically installed as a pressure type filter effluent control valve where a constant flow rate is maintained as head loss through the filter varies. The valve opens or closes on an electrical signal.

49-01
(Full Internal Port)

MODEL

649-01
(Reduced Internal Port)

Combination Rate of Flow & Pressure Reducing Valve

- **Multi-Functional Capability**
- **Accurate and Immediate Control**
- **Includes Orifice Plate with Holder**
- **Optional Check Feature**
- **Easily Adjustable Controls**

The Cla-Val Model 49-01/649-01 Rate of Flow and 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, as long as the flow rate is below a preset maximum. It also prevents excessive flow by limiting flow to a preselected maximum rate.

This valve is a hydraulically operated, pilot controlled diaphragm valve. The pilot system includes a direct acting pressure reducing pilot and a rate of flow differential control. The pressure reducing pilot is responsive to slight variations in downstream pressure and immediately controls the main valve to maintain the desired line pressure.

The rate of flow control responds to the differential pressure produced across an orifice plate in the main line. Accurate control is assured as very small changes in the controlling differential pressure produce immediate corrective action by the main valve.

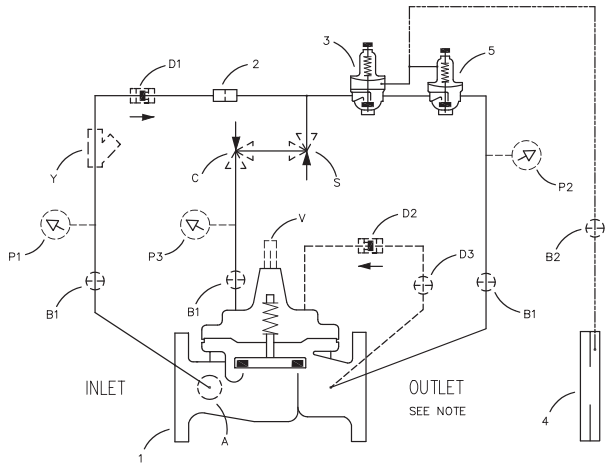
If the check feature option is added and a pressure reversal occurs, the downstream pressure is admitted into the main valve cover chamber and the valve closes to prevent return flow.

Schematic Diagram

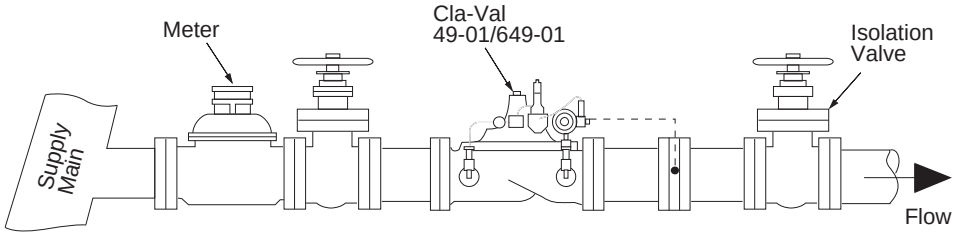
Item	Description
1	100-01 Hytrol Main Valve
2	X58A Restriction Fitting
3	CRA Pressure Reducing Control
4	X52E Orifice Plate Assembly
5	CDHS18 Differential Control

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 Speed Control (Opening)
V	X101 Valve Position Indicator
Y	X43 "Y" Strainer



Product Dimensions Data:
For the 49-01 Main Valve (100-01) dimensions, see pages 17.
For the 649-01 Main Valve (100-20) dimensions, see pages 29.



Typical Application

Installed where water supply to a system must be limited to a preset flow to prevent lowering the supply pressure. Easily set to maintain the maximum allowable flow rate.

CLA-VAL™

— MODEL

124-01
(Sizes 1/2"- 6" Full Internal Port)

624-01
(Sizes 3"- 8" Reduced Internal Port)

Float Valve

- **Accurate and Repeatable Level Control**
- **On-Off or Non-Modulating Action**
- **Fully Adjustable High and Low Level Settings**
- **Simple Design, Proven Reliable**
- **Easy Installation and Maintenance**

The Cla-Val Model 124-01/624-01 Float Valve is a non-modulating valve that accurately controls the liquid level in tanks. This valve is designed to open fully when the liquid level reaches a pre-set low point and close drip-tight when the level reaches a preset high point.

This is a hydraulically operated, diaphragm valve with the pilot control and float mechanism mounted on the cover of the main valve. The float positions the pilot control to close the valve when the float contacts the upper stop. The high and low liquid levels are adjusted by positioning the stop collars on the float rod. The difference between high and low levels can be adjusted to as little as one inch, or to as much as eighteen inches.

Level settings can be as much as eleven and one half feet below the valve. The float mechanism may be located remotely from the main valve. See the technical data sheet on Model CF1-C1 Float Control for additional information.

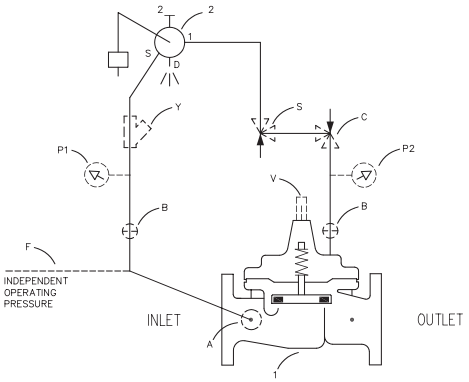
Note: For 8" and Larger Float Valve Sizes use Model 124-02/624-02

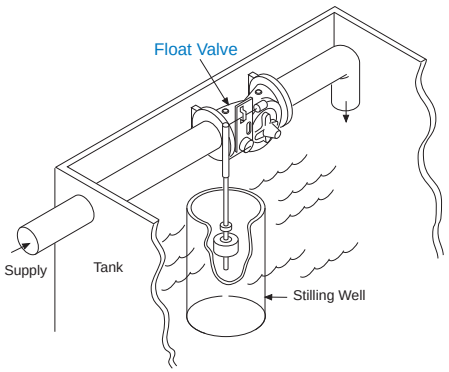
Schematic Diagram

Item	Description
1	100-01 Hytrol Main Valve
2	CF1-C1 Float Control

Optional Features

Item	Description
A	X46A Flow Clean Strainer
B	CK2 Isolation Valve
C	CV Flow Control (Closing)
F	Independent Operating Pressure
P	X141 Pressure Gauge
S	CV Speed Control (Opening)
V	X101 Valve Position Indicator
Y	X43 "Y" Strainer





Typical Applications

The Model 124-01/624-01 Float Valve is commonly mounted above the high water level in a tank. Globe pattern valves are supplied standard with the float control mounted on the cover as illustrated, with a horizontal discharge. Angle valves are configured to discharge downward.

Note: 1. We recommend protecting tubing and valve from freezing temperatures.
2. Must be inspected periodically

Installation

A stilling well (8" minimum diameter) must be provided around the float. When the valve is mounted on top of the tank roof, a 2" clearance hole should be provided for side movement of the float rod where the rod goes through the top of the tank.

A clear independent source of air or water may be used to operate the valve (option F). The pressure from this independent source must at all times be equal to or greater than pressure at the valve inlet.

If minimum flowing line pressure is less than 10 psi, consult factory.

If the float control is remotely mounted from the main valve, the control may be installed at any elevation above the valve, provided the flowing line pressure in psi is greater than the vertical distance in feet between the valve and the float control. See the technical data sheet on Model CF1-C1 for additional information.

Product Dimensions Data:

For the 124-01 Main Valve (100-01) dimensions, see pages 17.
For the 624-01 Main Valve (100-20) dimensions, see pages 29.

129-01
(Full Internal Port)

MODEL

629-01
(Reduced Internal Port)

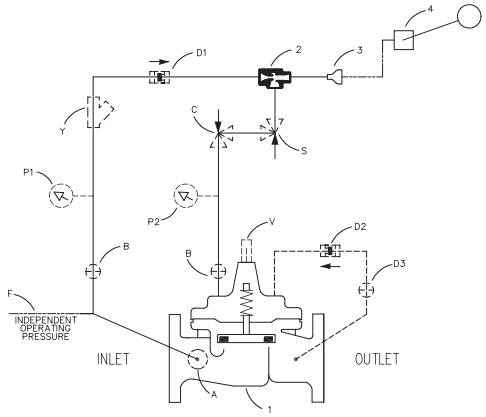
Float Valve

- **Accurate and Repeatable Level Control**
- **Proportional Flow**
- **Reliable Hydraulic Operation**
- **Drip-Tight Positive Shut-Off**
- **Completely Automatic Operation**

The Cla-Val Model 129-01/629-01 Float Valve maintains a relatively constant level in storage tanks and reservoirs by admitting flow into the tank in direct proportion to the flow out of the tank. It is a hydraulically operated, pilot controlled, diaphragm valve. The rotary disc type float operated pilot control is installed at the high liquid level in the reservoir and is connected via tubing or pipe to the main valve. As the liquid level changes, the float control proportionally opens or closes the main valve, keeping the liquid level nearly constant. If the check feature option "D" is added and a pressure reversal occurs, the downstream pressure is admitted into the main valve cover chamber and the valve closes to prevent return flow.

Schematic Diagram

Item	Description
1	100-01 Hytrol Main Valve
2	X47A Ejector
3	Bell Reducer
4	CFM2 Float Control

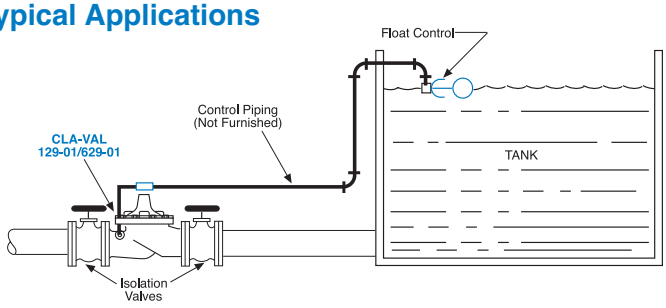


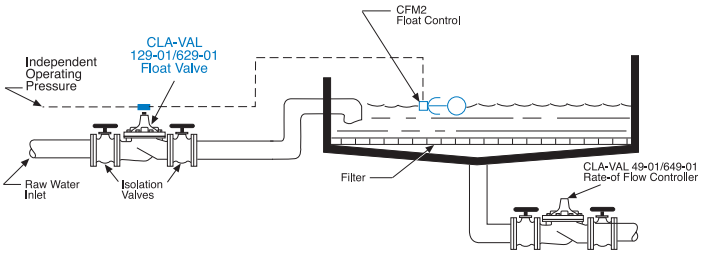
Optional Features

Item	Description
A	X46A Flow Cleaner Strainer
B	CK2 Isolation Valve
C	CV Flow Control (Closing)
D	Check Valves With Isolation Valve
F	Independent Operating Pressure
P	X141 Pressure Gauge
S	CV Speed Control (Opening)
V	X101 Valve Position Indicator

Product Dimensions Data:
For the 129-01 Main Valve (100-01) dimensions, see pages 17.
For the 629-01 Main Valve (100-20) dimensions, see pages 29.

Typical Applications





Piping and Tank Sizing

Install valve and control as shown in the diagram above. The float control should be located in a still liquid surface. If it is necessary to obtain this condition, a stilling well should be constructed. Mount the float control on the connecting piping with the outlet port at the desired high water level. When a separate source of supply pressure (Option F) is used by the pilot control system, that pressure must at all times be constant and equal to or greater than the pressure at the valve inlet.

Filter Liquid Level Control

Maintains constant level in rapid sand filter. Usually requires the use of an independent operating pressure as shown.

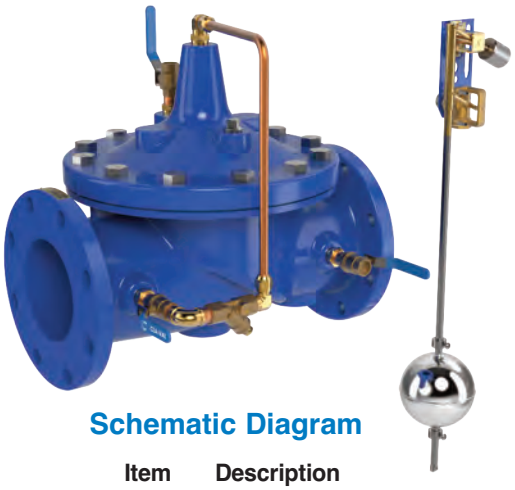
DO NOT USE FOR ON-OFF SERVICE.

Note: We recommend protecting tubing and valve from freezing temperatures.

CLA-VAL™

MODEL 428-01 (Full Internal Port) 628-01 (Reduced Internal Port)

Modulating Float Valve



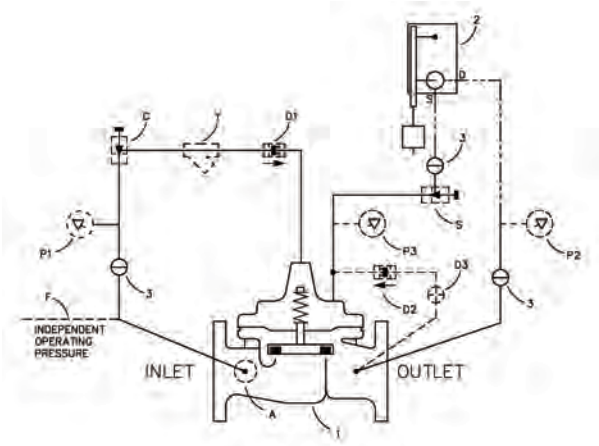
- **Accurate Level Control**
- **Completely Automatic Operation**
- **Simple Operation**
- **Easy Installation and Maintenance**

The Cla-Val Model 428-01/628-01 Float Valve modulates to maintain a constant liquid level in a storage tank by compensating for variations in supply or demand. It can be installed to control the flow into or out of the tank by either closing on a rising level or opening on a rising level. This valve is a hydraulically operated, pilot controlled diaphragm valve.

The pilot control system consists of an integral variable orifice in the main valve cover and a remotely mounted float control. A slight change in liquid level moves the float control. This action varies the pressure in the valve cover, causing the main valve to seek a new position. The integral variable orifice automatically regulates the flow into the cover chamber until the valve reaches a position that is in direct relation to the position of the float control.

Schematic Diagram

Item	Description
1	100-01 Hytrol Main Valve
2	CFM-9 Float Control
3	CK2 Isolation Valve



Optional Features

Item	Description
A	X46A Flow Clean Strainer
D	Check Valves with Isolation Valve
F	Independent Operating Pressure
P	X141 Pressure Gauge
Y	X43 “Y” Strainer

Product Dimensions Data:
For the 428-01 Main Valve (100-32) dimensions, see pages 17.
For the 628-01 Main Valve (100-33) dimensions, see pages 29.

Installation Data

The valve may be installed in any position. The remote float control may be mounted at any convenient location above the liquid level. Float rods are available in lengths from 2' to 12' in one-foot increments.

A stilling well (8" min. diameter) should be provided around the float if the liquid surface is subject to turbulence, ripples or wind.

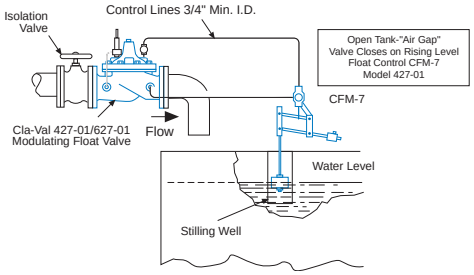
The float control may be installed at any elevation above the valve providing that the amount of flowing line pressure (in psi) is equal to or greater than the vertical distance in feet between the valve and the float control.

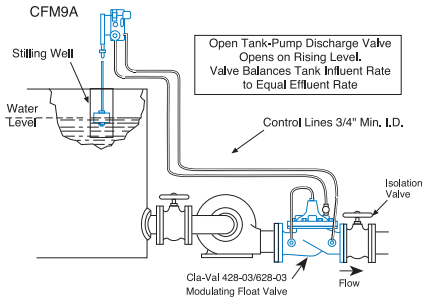
When a separate source of supply pressure (Option F) is used by the pilot control system, that pressure must at all times be constant and equal to or greater than the pressure at the valve inlet.

DO NOT USE FOR ON-OFF SERVICE.

Note: We recommend protecting tubing and valve from freezing temperatures.

Typical Applications



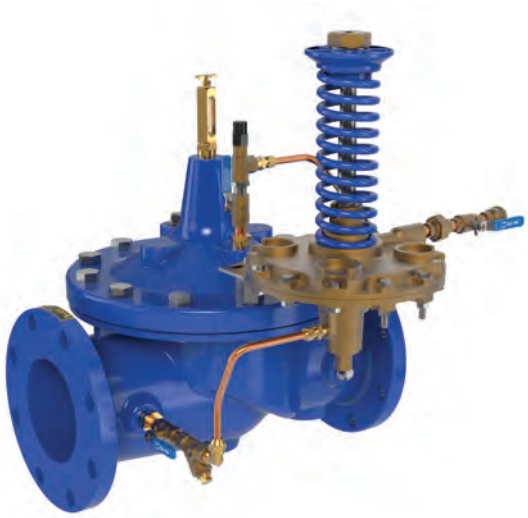


210-01
(Full Internal Port)

610-01
(Reduced Internal Port)

MODEL

Altitude Valve For One-Way Flow



- **Accurate and Repeatable Level Control**
- **Drip-Tight, Positive Shut-Off**
- **Reliable Hydraulic Operation**
- **Easily Adjustable Control**
- **Completely Automatic Operation**

The Cla-Val Model 210-01/610-01 Altitude Valve controls the high water level in reservoirs without the need for floats or other devices. It is a non-throttling valve that remains fully open until the shut-off point is reached. This valve is designed for one-way flow only.

This valve is hydraulically operated and pilot controlled. The pilot control operates on the differential in forces between a spring load and the water level in the reservoir. The desired high water level is set by adjusting the spring force. The pilot control measures the reservoir head through a customer supplied sensing line* connected directly to the reservoir.

This valve can also be furnished with auxiliary controls to meet the need for multiple functions, such as: pressure sustaining, pressure reduction, rate of flow control, solenoid override, etc.

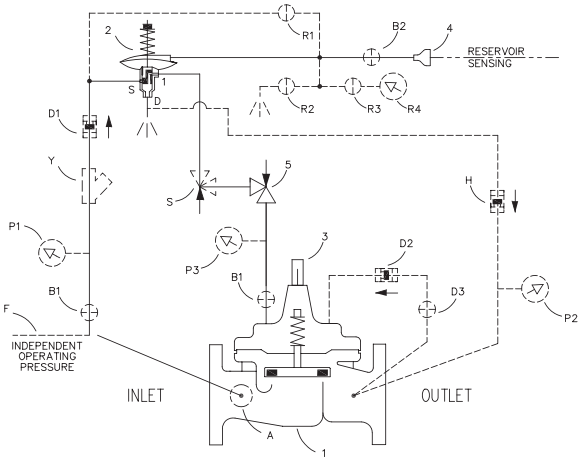
If the check feature option is added and a pressure reversal occurs, the downstream pressure is admitted into the main valve cover chamber and the valve closes to prevent return flow.

Schematic Diagram

Item	Description
1	100-01 Hytrol Main Valve
2	CDS6A Altitude Control
3	X101 Valve Position Indicator
4	Bell Reducer
5	CV Flow Control (Closing)

Optional Features

Item	Description
A	X46A Flow Clean Strainer
B	CK2 Isolation Valve
D	Check Valve with Isolation Valve
F	Independent Operating Pressure
H	Dry Drain
P	X141 Pressure Gauge
R	Reservoir Gauge with Tester
S	CV Flow Control (Opening)
Y	X43 "Y" Strainer



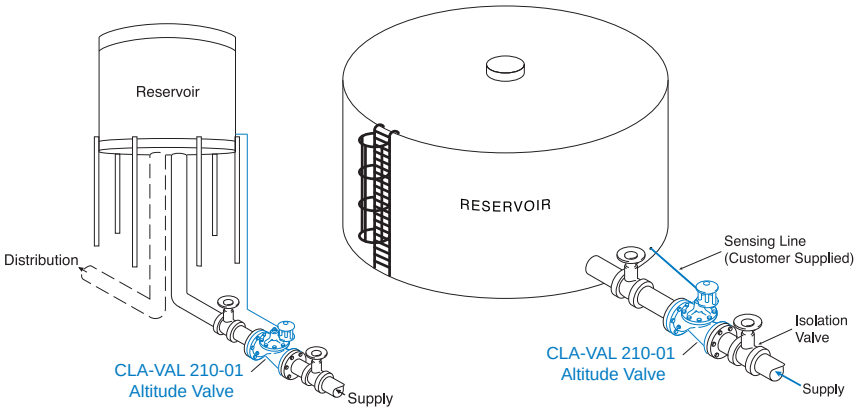
Note: When "D" check feature is ordered, the "H" feature is required.

Typical Applications

Used on reservoirs where the water is withdrawn through a separate line or through a bypass equipped with a check valve. The valve opens to refill the reservoir when the water lowers below the shut-off level. For more information see data sheet E-CDS6A.

*Note: The reservoir pressure sensing line should be ¾" minimum I.D. installed with a 2° slope from the valve to the reservoir to avoid air pockets.

Note: We recommend protecting tubing and valve from freezing temperatures.



Product Dimensions Data:
For the 210-01 Main Valve (100-01) dimensions, see pages 17.
For the 610-01 Main Valve (100-20) dimensions, see pages 29.

CLA-VAL®

MODEL

210-09
(Full Internal Port)

610-09
(Reduced Internal Port)

Combination Altitude and Back Pressure Valve

- **Accurate and Repeatable Level Control**
- **Prevents Low Supply Pressure When Filling**
- **Drip Tight Positive Shut-Off**
- **Reliable Hydraulic Operation**
- **Easily Adjustable Controls**

The Cla-Val Model 210-09/610-09 Combination Altitude and Back Pressure Valve controls the high water level in reservoirs without the need for floats or other devices. The valve modulates to maintain upstream pressure within close limits to prevent over drawing system supply while filling reservoir. When the shut-off point of the hydraulic pilot control is reached, the valve closes smoothly without surges. This valve is designed for one-way flow only.

The 210-09/610-09 Valve is hydraulically-operated and pilot-controlled for optimum automatic level and pressure control. The level pilot control operates on a differential in forces between spring load and reservoir head level. When force of spring is overcome by force of reservoir head, the pilot shifts and closes main valve. Desired high water level is set by adjusting spring force. The level pilot control measures the reservoir head through a customer supplied separate sensing line* connected directly to reservoir. The pressure sustaining pilot control senses upstream system pressure and modulates the main valve more open on a rise in pressure to maintain a minimum inlet pressure when filling reservoir.

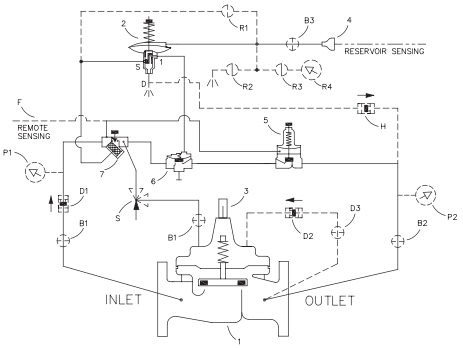
The valve can also be furnished with auxiliary controls to meet the need for additional functions, such as: rate of flow control, pressure reduction, solenoid override, etc. If the check feature option is added and a pressure reversal occurs, reservoir pressure is admitted into main valve cover chamber and valve closes to prevent return flow.

Schematic Diagram

Item	Description
1	100-01 Hytrol Main Valve
2	CDS6A Altitude Control
3	X101 Valve Position Indicator
4	Bell Reducer
5	CRL-60 Pressure Relief Valve
6.	100-01 Hytrol (Reverse Flow)
7	X42N-3 Strainer

Optional Features

Item	Description
B	CK2 Isolation Valve
D	Check Valve with Isolation Valve
F	Remote Pilot Sensing
R	Reservoir Gauge with Tester
S	CV Flow Control (Opening)



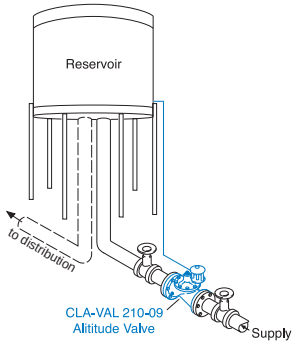
Product Dimensions Data:
For the 210-09 Main Valve (100-01) dimensions, see pages 17.
For the 610-09 Main Valve (100-20) dimensions, see pages 29.

Typical Applications

Used on reservoirs where water is withdrawn through a separate line or through a bypass equipped with a check valve. Valve closes at the desired high water level and reopens for filling when reservoir head lowers below the shut off level. Valve controls minimum supply pressure to keep from overdrawing supply while filling reservoir. Water in excess of system pressure flows to reservoir at controlled rate. For more information see data sheet E-CDS6A.

*Note: The reservoir pressure sensing line should be ¾" minimum I.D. installed with a 2° slope from the valve to the reservoir to avoid air pockets.

Note: We recommend protecting tubing and valve from freezing temperatures.

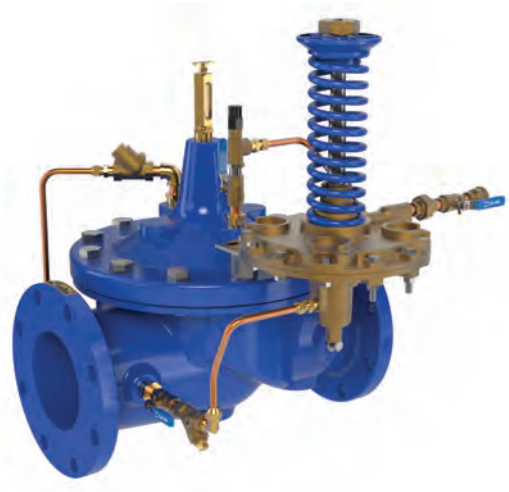


210-16
R(Full Internal Port)

610-16
(Reduced Internal Port)

MODEL

Altitude Valve For Two-Way Flow



- **Accurate and Repeatable Level Control**
- **Drip-Tight Positive Shut-Off**
- **Reliable Hydraulic Operation**
- **Easily Adjustable Control**
- **Completely Automatic Operation**

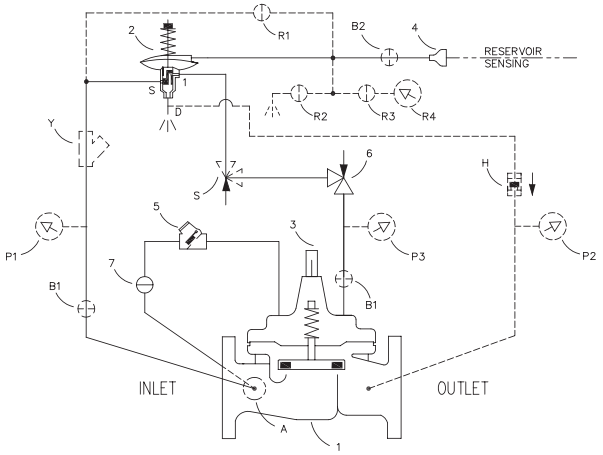
The Cla-Val Model 210-16/610-16 Altitude Valve controls the high water level in reservoirs without the need for floats or other devices. It is a non-throttling valve that remains fully open until the shut off point is reached. This valve closes at a high water level, and opens for return flow when the pressure at the valve inlet is less than the reservoir pressure.

This valve is hydraulically operated and pilot controlled. The pilot control operates on the differential in forces between a spring load and the water level in the reservoir. When the force of the spring is overcome by the force of the reservoir head, the pilot closes the main valve. The desired high water level is set by adjusting the spring force. The pilot control measures the reservoir head through a customer supplied sensing line* connected directly to the reservoir.

This valve can also be furnished with auxiliary controls to meet the need for multiple functions, such as: pressure sustaining, pressure reduction, rate of flow control, solenoid override, etc.

Schematic Diagram

Item	Description
1	100-01 Hytrol Main Valve
2	CDS6A Altitude Control
3	X101 Valve Position Indicator
4	Bell Reducer
5	Check Valve
6	CV Flow Control (Closing)
7	CK2 Isolation Valve



Optional Features

Item	Description
A	X46A Flow Clean Strainer
B	CK2 Isolation Valve
H	Dry Drain
P	X141 Pressure Gauge
R	Reservoir Gauge with Tester
S	CV Flow Control (Opening)
Y	X43 "Y" Strainer

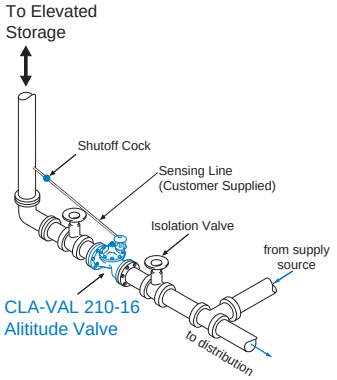
Typical Applications

Used on reservoirs where water is withdrawn through the Altitude Valve. The valve closes at the high water level and opens for return flow when the pressure at the valve inlet lowers below the reservoir pressure.

For more information see data sheet E-CDS6A

*Note: The reservoir pressure sensing line should be ¾" minimum I.D. installed with a 2° slope from valve to reservoir to avoid air pockets.

We recommend protecting tubing and valve from freezing temperatures.



Product Dimensions Data:
For the 210-16 Main Valve (100-01) dimensions, see pages 17.
For the 610-16 Main Valve (100-20) dimensions, see pages 29.

CLA-VAL®

MODEL 210-17 (Full Internal Port)
610-17 (Reduced Internal Port)

Altitude & Solenoid Shut-Off Valve

- **Accurate and Repeatable Level Control**
- **Easy Interface With Remote Control Systems**
- **Drip Tight Positive Shut Off**
- **Reliable Hydraulic Operation**
- **Easily Adjustable Control**

The Cla-Val Model 210-17/610-17 Altitude Valve controls the high water level in reservoirs with out the need for floats or other devices. It is a non-throttling valve that remains fully open until the solenoid is activated or the shut-off point of the hydraulic pilot control is reached. The valve closes at high water level and opens for return flow when the pressure at the valve inlet is less than reservoir pressure.

This valve is hydraulically-operated and pilot-controlled. The level pilot control operates on the differential in forces between a spring load and reservoir head level. When force of the spring is overcome by the force of reservoir head, the pilot shifts and closes main valve. Desired high water level is set by adjusting the spring force. The pilot control measures the reservoir head through a customer supplied separate sensing line* connected directly to the reservoir. A three-way solenoid control and a high-capacity three-way pilot control valve provide override shut-off of valve from a remote location, such as a SCADA control system. It is furnished either normally open (de-energize solenoid to open) or normally closed (energize solenoid to open).

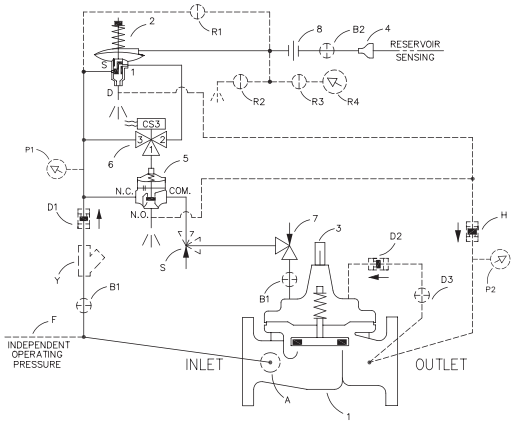
The valve can also be furnished with auxiliary controls to meet the need for additional functions, such as: pressure sustaining, rate of flow control, pressure reduction, etc.

Schematic Diagram

Item	Description
1	100-01 Hytrol Main Valve
2	CDS6A Altitude Control
3	X101 Valve Position Indicator
4	Bell Reducer
5	102C-3H Three-way Valve
6	CS3 Solenoid Control
7	CV Flow Control (Closing)
8	Union

Optional Features

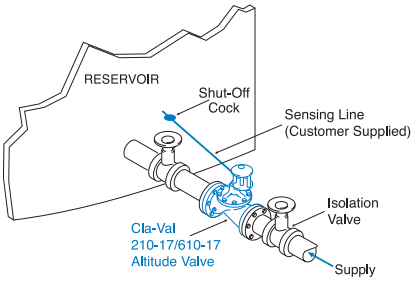
Item	Description
A	X46A Flow Clean Strainer
B	CK2 Isolation Valve
D	Check Valve with Isolation Valve
F	Independent Operation Pressure
H	Dry Drain
R	Reservoir Gauge with Tester
P	X141 Pressure Gauge
S	CV Flow Control (Opening)
Y	X43 "Y" Strainer



Product Dimensions Data:
For the 210-17 Main Valve (100-01) dimensions, see pages 17.
For the 610-17 Main Valve (100-20) dimensions, see pages 29.

Typical Applications

Used on reservoirs where water is supplied and withdrawn through the Altitude Valve. Valve closes at the desired high water level controlled remotely via SCADA system signal to solenoid or automatically with preset level control (usually set higher). Also, valve automatically opens for return flow when the pressure at the valve inlet lowers below the reservoir head pressure. For more information see data sheet E-CDS6A.



*Note: The reservoir pressure sensing line should be ¾" minimum I.D. installed with a 2° slope from valve to reservoir to avoid air pockets.

Note: We recommend protecting tubing and valve from freezing temperatures.

CDS6A — MODEL —

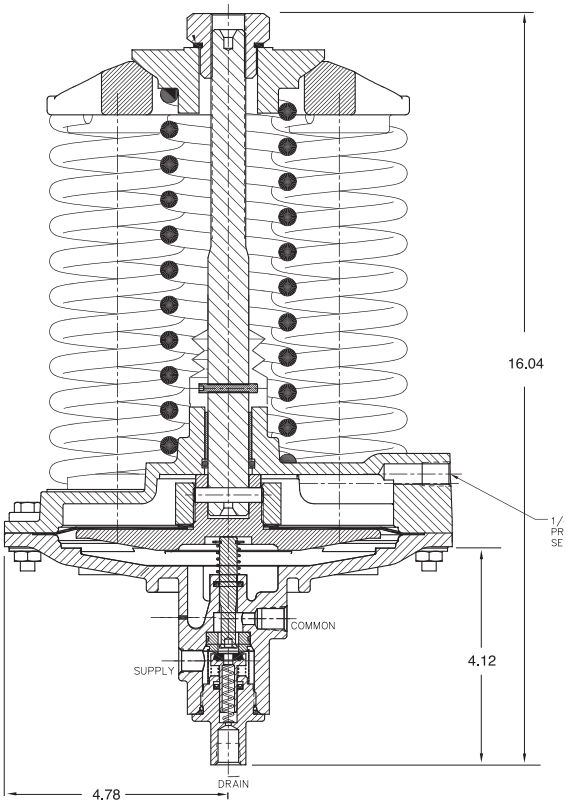
Altitude Pilot Control

- **Very Accurate and Reliable**
- **Low Maintenance**
- **Bronze and Stainless Steel Wetted Parts**

The Cla-Val Model CDS6A Altitude Pilot Control is a spring-loaded, three-way, diaphragm-actuated control that provides high-level shutoff for Cla-Val 210 Series Altitude Control Valves. The CDS6A controls the high water level in a reservoir or tank without the need for floats or other devices. It is a non-throttling pilot that remains fully open until the reservoir reaches the high level shutoff point. High accuracy is assured by remotely sensing the pressure head of the reservoir or tank. The single adjusting nut can be easily set in the field to close the main valve when liquid level reaches the desired high level set-point within five adjustment ranges.

The CDS6A operating principle uses a differential in forces between the spring load and the hydraulic head of the fluid level in the reservoir or tank to activate the pilot valve of the control. When the force of the spring setting (or the desired high level shutoff point) is overcome by the force of the reservoir head, the pilot valve shifts positions automatically and closes the main valve. When the reservoir head is eight to ten inches less than the spring setting, the pilot valve shifts to open the main valve.

Dimensions



Specifications

		Adjustment Ranges:
Temperature Range:	Water to 180˚F Max	
Materials:		
Body & Cover:	ASTM B-62	5 - 40ft.
Trim:	Brass & Stainless Steel	30 - 80ft.
Seals & Diaphragm:	Nitrile	70 - 120ft.
Optional Materials:	Consult Factory	110 - 160ft.
Pressure Rating:	200 PSI MAX*	150 - 200ft.

Remote Sensing Connection

The CDS6A Altitude Pilot Control is normally supplied mounted on a Cla-Val 210 Series valve and should be installed in a horizontal run of pipe with the main valve cover UP. If the CDS6A is remotely mounted from the main valve, it is recommended to be installed with adjustment springs UP for ease of adjustment and servicing. Consult factory for recommendations.

After the Cla-Val 210 Series valve is installed in the line, it is necessary to install a sensing line from the CDS6A control to the reservoir. The sensing line should be 3/4" or larger copper tubing or Schedule 40 PVC pipe. Galvanized pipe is not recommended. The line should slope upward from the CDS6A toward the reservoir to self purge air out of the line. The slope of the sensing line should not have high points that would entrap air. The line connection point on the reservoir should be a minimum 12" to 18" above the center line of the control.

NOTE: The sensing line should not be installed into the flowing line between the valve and reservoir, or to a turbulent area, which may not reflect the true reservoir head.

* Consult Factory

Note: We recommend protecting tubing and valve from freezing temperatures.

CLA-VAL™

MODEL 211-01

Altitude Valve For One-Way Flow

- **Accurate and Repeatable Level Control**
- **Drip-Tight Positive Shut-Off**
- **Reliable Hydraulic Operation**
- **Easily Adjustable Control**
- **Completely Automatic Operation**

The Cla-Val Model 211-01 Altitude Valve controls the high water level in reservoirs without the need for floats or other devices. It is a non-throttling valve that remains fully open until the shut off point is reached. This valve is designed for one-way flow only.

This valve is hydraulically operated and pilot controlled. The pilot control operates on the differential in forces between a spring load and the water level in the reservoir. When the force of the spring is overcome by the force of the reservoir head, the pilot closes the main valve. The desired high water level is set by adjusting the spring force. The pilot control measures the reservoir head through a customer supplied sensing line* connected directly to the reservoir.

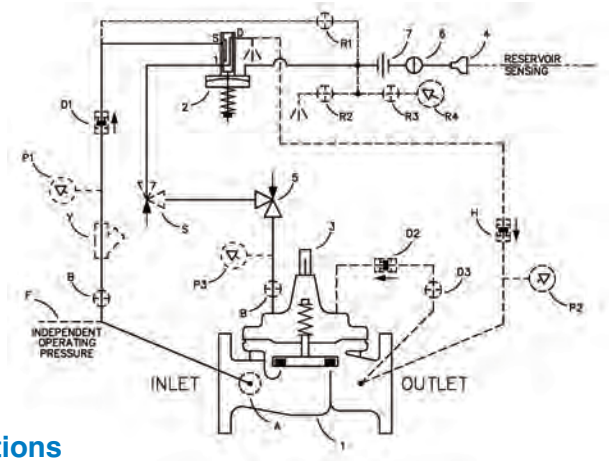
This valve can also be furnished with auxiliary controls to meet the need for multiple functions, such as: pressure sustaining, pressure reduction, rate of flow control, solenoid override, etc. For applications requiring delayed opening, please refer to Cla-Val Model 211-03 Altitude Valve with Delayed Opening e-sheet.

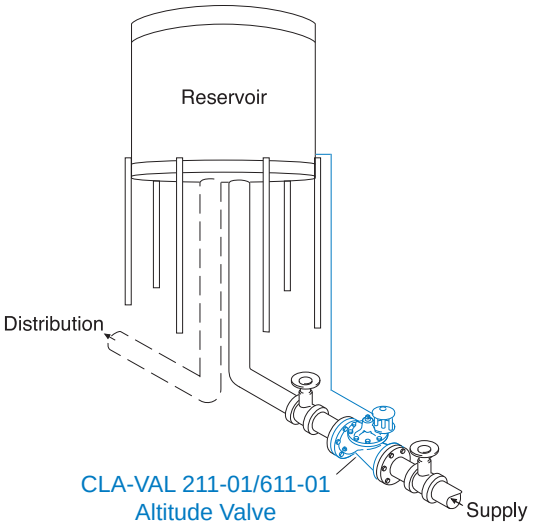
Schematic Diagram

Item	Description
1	100-01 Hytrol Main Valve
2	CDS7 Altitude Control
3	X101 Valve Position Indicator
4	Bell Reducer
5	CV Flow Control (Closing)

Optional Features

Item	Description
A	X46A Flow Clean Strainer
B	CK2 Isolation Valve
H	Dry Drain
P	X141 Pressure Gauge
R	Reservoir Gauge with Tester
S	CV Flow Control (Opening)
Y	X43 "Y" Strainer





CLA-VAL 211-01/611-01
Altitude Valve

Typical Applications

Used on reservoirs where water is withdrawn through the Altitude Valve. The valve closes at the high water level and opens for return flow when the pressure at the valve inlet lowers below the reservoir pressure. For more information see data sheet E-CDS7

***Notes:**

- The reservoir pressure sensing line should be ¾" minimum I.D. installed with a 2° slope from valve to reservoir to avoid air pockets.
- The sensing line should not be installed in the flowing line between the valve and the reservoir or into a turbulent flow area. These locations do not reflecy the true static head of the reservoir.
- We recommend protecting tubing and valve from freezing temperatures.

Product Dimensions Data:
For the 211-01 Main Valve (100-01) dimensions, see pages 17.
For the 611-01 Main Valve (100-20) dimensions, see pages 29.

CLA-VAL™

MODEL 211-02

Altitude Valve For Two-Way Flow with Delayed Opening

- **Accurate and Repeatable Level Control**
- **Drip-Tight Positive Shut-Off**
- **Reliable Hydraulic Operation**
- **Easily Adjustable Control**
- **Completely Automatic Operation**

The Cla-Val Model 211-02 Altitude Valve controls the high water level in reservoirs without the need for floats or other devices. It is a non-throttling valve that remains fully open until the shut-off point is reached. This valve closes at the high water level, and for return flow, delays its opening until the pressure at the valve inlet lowers to a preset adjustable pressure of one to seven pounds.

This valve is hydraulically operated and pilot controlled. The pilot control operates on the differential in forces between a spring load and the water level in the reservoir. When the force of the spring is overcome by the force of the reservoir head, the pilot closes the main valve. The desired high water level is set by adjusting the spring force. The pilot control measures the reservoir head through a customer supplied sensing line* connected directly to the reservoir.

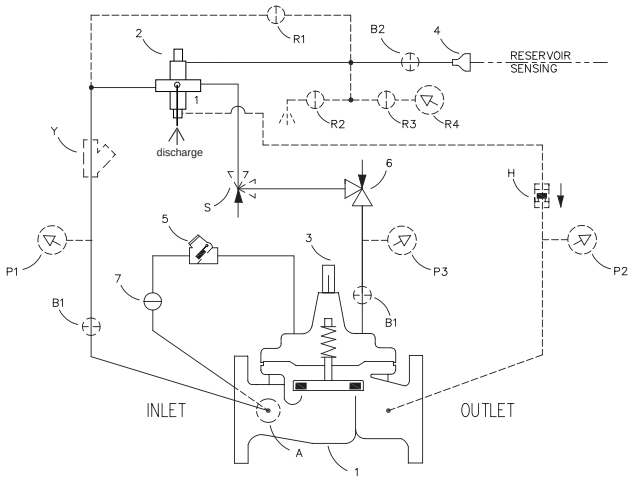
This valve can also be furnished with auxiliary controls to meet the need for multiple functions, such as: pressure sustaining, pressure reduction, rate of flow control, solenoid override, etc.

Schematic Diagram

Item	Description
1	100-01 Hytrol Main Valve
2	CDS7-DO Altitude Control
3	X101 Valve Position Indicator
4	Bell Reducer
5	Check Valve
6	CV Flow Control (Closing)
7	CK2 Isolation Valve

Optional Features

Item	Description
A	X46A Flow Clean Strainer
B	CK2 Isolation Valve
H	Dry Drain
P	X141 Pressure Gauge
R	Reservoir Gauge with Tester
S	CV Flow Control (Opening)
Y	X43 "Y" Strainer

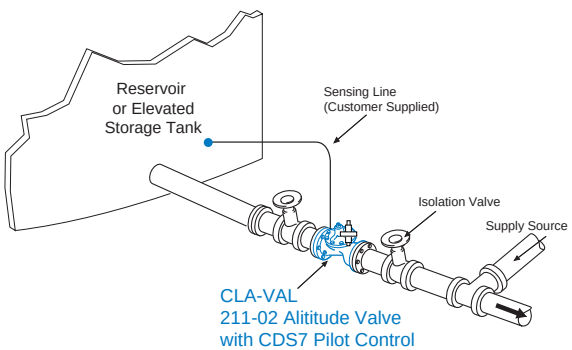


Product Dimensions Data:
For the 211-02 Main Valve (100-01) dimensions, see pages 17.
For the 611-02 Main Valve (100-20) dimensions, see pages 29.

Typical Applications

Used on reservoirs where water is withdrawn through the Altitude Valve. The valve closes at the high water level and opens for return flow when the pressure at the valve inlet lowers below the reservoir pressure. For more information see data sheet E-CDS7-DO

*Notes:
- The reservoir pressure sensing line should be ¾" minimum I.D. installed with a 2° slope from valve to reservoir to avoid air pockets.
- The sensing line should not be installed in the flowing line between the valve and the reservoir or into a turbulent flow area. These locations do not reflecy the true static head of the reservoir.
- We recommend protecting tubing and valve from freezing temperatures.



CLA-VAL®

— MODEL — CDS7

Altitude Pilot Control

- **Very Accurate and Reliable**
- **Low Maintenance**
- **Stainless Steel Wetted Parts**

The Cla-Val Model CDS7 Altitude Pilot Control is a spring-loaded, three-way, diaphragm-actuated control that provides high-level shutoff for Cla-Val 211 Series Altitude Control Valves. The CDS7 controls the high water level in a reservoir or tank without the need for floats or other devices. It is a non-throttling pilot that remains fully open until the reservoir reaches the high level shutoff point. High accuracy is assured by remotely sensing the pressure head of the reservoir or tank. The single adjusting nut can be easily set in the field to close the main valve when liquid level reaches the desired high level set-point within standard adjustment range.

The CDS7 operating principle uses a differential in forces between the spring load and the hydraulic head of the fluid level in the reservoir or tank to activate the pilot valve of the control. When the force of the spring setting (or the desired high level shutoff point) is overcome by the force of the reservoir head, the pilot valve shifts positions automatically and closes the main valve. When the reservoir head is eight to ten inches less than the spring setting, the pilot valve shifts to open the main valve.

— MODEL — CDS7-DO

Altitude Pilot Control With Delayed Opening

- **Very Accurate and Reliable**
- **Low Maintenance**
- **Stainless Steel Wetted Parts**
- **DO- Delayed Opening**

The Cla-Val Model CDS7-DO Altitude Pilot Control is a spring-loaded, three-way, diaphragm-actuated control that provides high-level shutoff for Cla-Val 211 Series Altitude Control Valves. The CDS7-DO controls the high water level in a reservoir or tank without the need for floats or other devices. It is a non-throttling pilot that remains fully open until the reservoir reaches the high level shutoff point. High accuracy is assured by remotely sensing the pressure head of the reservoir or tank. The single adjusting nut can be easily set in the field to close the main valve when liquid level reaches the desired high level set-point within standard adjustment range.

The CDS7-DO operating principle uses a differential in forces between the spring load and the hydraulic head of the fluid level in the reservoir or tank to activate the pilot valve of the control. When the force of the spring setting (or the desired high level shutoff point) is overcome by the force of the reservoir head, the pilot valve shifts position automatically and closes the main valve. When the reservoir head is eight to ten inches less than the spring setting, the pilot valve shifts to open the main valve.

The DO feature provides an integral Delayed Opening function for independently adjusting the distance between the high and low water level. Example: To increase the delay to re-open main valve, turn the adjusting screw clockwise. To decrease the delay, turn the adjusting screw counterclockwise. Adjustment range on the delayed opening function is 1' to 16' feet of water. When delayed opening water level is achieved, the pilot control opens the main valve.

See individual e-sheets for more details

60-08
(Full Internal Port)

MODEL

660-08
(Reduced Internal Port)

Booster Pump Control Valve
with High Capacity Pilot System

- **Designed for Larger Sized Pump Stations**
- **Low Head Loss**
- **Built-in Check Valve**
- **Opening and Closing Rates Separately Adjusted**
- **Proven Reliable Design**

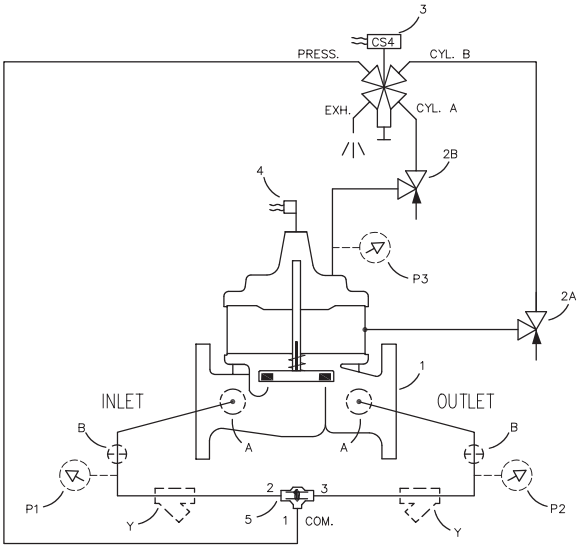
The Cla-Val Model 60-08/660-08 Pump Control Valve is a pilot-operated valve designed for installation on the discharge of booster pumps to eliminate pipeline surges caused by the starting and stopping of the pump.

The pump starts against a closed valve. When the pump is started, the solenoid control is energized and the valve begins to open slowly, gradually increasing line pressure to full pumping head. When the pump is signaled to shut-off, the solenoid control is de-energized and the valve begins to close slowly, gradually reducing flow while the pump continues to run. When the valve is closed, a limit switch assembly, which serves as an electrical interlock between the valve and the pump, releases the pump starter and the pump stops.

Should a power failure occur, a built-in, lift-type check valve closes the moment flow stops, preventing reverse flow regardless of solenoid or diaphragm assembly position.

Schematic Diagram

Item	Description
1	100-03 Powercheck Main Valve
2	CV Flow Control
3	CS4SM 4-Way Solenoid Control
4	X105LCW Switch Assembly
5	CVS-1 Shuttle Valve



Optional Features

Item	Description
A	X46A Flow Clean Strainer
B	CK2 Isolation Valve
P	X141 Pressure Gauge
Y	X43 "Y" Strainer

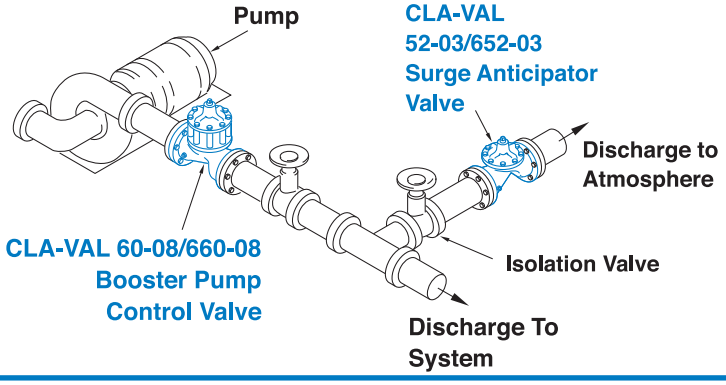
Product Dimensions Data:
For the 60-08 Main Valve (100-03) dimensions, see pages 25.
For the 660-08 Main Valve (100-22) dimensions, www.cla-val.com

Typical Installation

Install Model 60-08/660-08 valve as shown. Flexible conduit should be used for electrical connections to the solenoid control and the limit switch. A Model 52-02/652-03 Surge Anticipator Valve is recommended for power failure protection.

Note: For optimum operation of built-in check feature, installation must be with valve stem vertically up.

The Model 60-08/660-08 is for 10" and larger valves or when the pressure is above 300 psi.



CLA-VAL®

MODEL 60-11 (Full Internal Port)
660-11 (Reduced Internal Port)

Booster Pump Control Valve

- **Built-in Check Valve**
- **Valve Uses Line Pressure for Operation**
- **Opening and Closing Rates Adjusted Separately**
- **Solenoid Control Can Be Operated Manually**

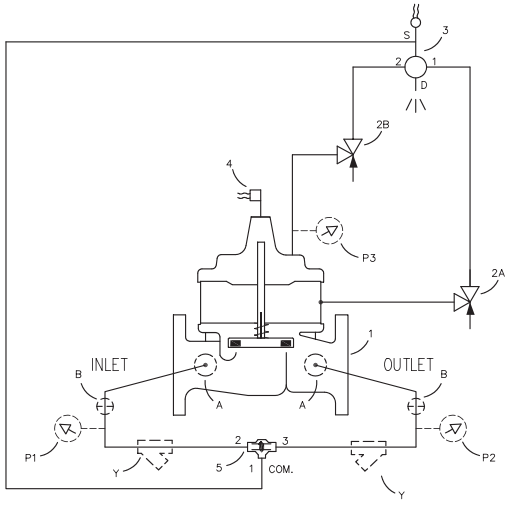
The Cla-Val Model 60-11/660-11 Booster Pump Control Valve is a pilot-operated valve designed for installation on the discharge of booster pumps to eliminate pipeline surges caused by the starting and stopping of the pump.

The pump starts against a closed valve. When the pump is started, the solenoid control is energized and the valve begins to open slowly, gradually increasing line pressure to full pumping head. When the pump is signaled to shut-off, the solenoid control is de-energized and the valve begins to close slowly, gradually reducing flow while the pump continues to run. When the valve is closed, a limit switch assembly, which serves as an electrical interlock between the valve and the pump, releases the pump starter and the pump stops.

Should a power failure occur, a built-in lift-type check valve closes the moment flow stops, preventing reverse flow regardless of solenoid or diaphragm assembly position.

Schematic Diagram

Item	Description
1	100-03 Powercheck Main Valve
2	CV Flow Control
3	CSM11-A2-2 Solenoid Control
4	X105LCW Switch Assembly
5	CVS-1 Shuttle Valve



Optional Features

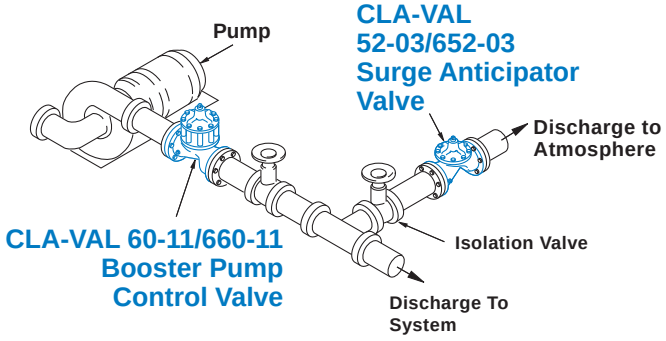
Item	Description
A	X46A Flow Clean Strainer
B	CK2 Isolation Valve
P	X141 Pressure Gauge
Y	X43 "Y" Strainer

Product Dimensions Data:
For the 60-11 Main Valve (100-03) dimensions, see pages 25.
For the 660-11 Main Valve (100-22) dimensions, www.cla-val.com

Typical Installation

Install Model 60-11/660-11 valve as shown. Flexible conduit should be used for electrical connections to the solenoid control and the limit switch. A Cla-Val Model 52-03/652-03 Surge Anticipator Valve is recommended for power failure protection.

Note: Installation with valve stem vertical up is recommended. For horizontal stem installation use Cla-Val Model 60-73/660-73.



60-31
(Full Internal Port)

660-31
(Reduced Internal Port)

MODEL –

Booster Pump Control Valve

- **Simple Hydraulic Operation**
- **Low Head Loss**
- **Built-in Check Valve**
- **Proven Reliable Design**

The Cla-Val Model 60-31/660-31 Booster Pump Control valve is a pilot-operated valve designed for installation on the discharge of booster pumps to eliminate pipeline surges caused by the starting and stopping of the pump.

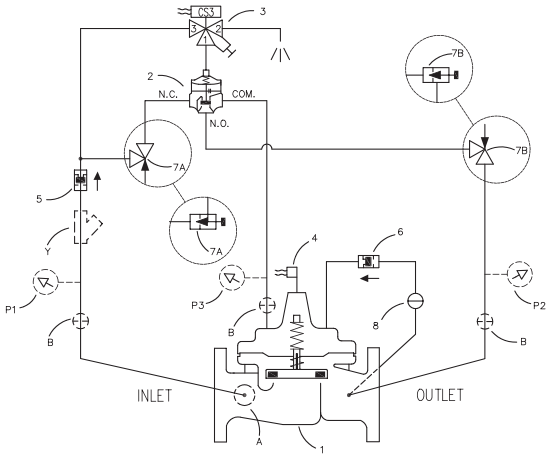
The pump starts against a closed valve. When the pump is started, the solenoid control is energized and the valve begins to open slowly, gradually increasing line pressure to full pumping head. When the pump is signaled to shut-off, the solenoid control is de-energized and the valve begins to close slowly, gradually reducing flow while the pump continues to run. When the valve is closed, a limit switch assembly, which serves as an electrical interlock between the valve and the pump, releases the pump starter and the pump stops.

The Model 60-31/660-31 is an automatic valve of a modified globe-type design with a built-in, lift type, check feature. It is hydraulically operated and diaphragm-actuated. A three-way solenoid valve controls the valve operation. Flow control valves located in the pilot control system provide regulation of both the opening and closing rate. Pilot system strainer insures that the pilot control supply is clean.

Schematic Diagram

Item	Description
1	100-04 Hycheck Main Valve
2	102C-3H Three Way Hytrol
3	CS3SM Solenoid Control
4	X105LCW Switch Assembly
5	CDC Disk Check Valve
6	CDC/CSC Check Valve
7	CNA Angle Valve
8	CK2 Isolation Valve

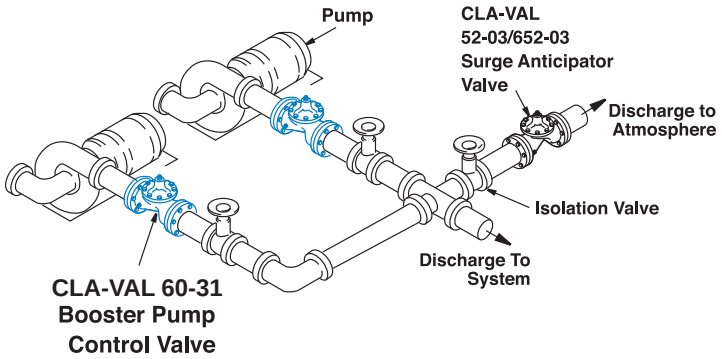
Item	Description
A	X46A Flow Clean Strainer
B	CK2 Isolation Valve
P	X141 Pressure Gauge
Y	X43 "Y" Strainer



Product Dimensions Data:
For the 60-31 Main Valve (100-04) dimensions, see www.cla-val.com
For the 660-31 Main Valve (100-23) dimensions, www.cla-val.com

Typical Application

Install Model 60-31/660-31 valve as shown in multiple pump applications. Flexible conduit should be used for electrical connections to the solenoid control and the limit switch. A Model 52-03/652-03 Surge Anticipator Valve is recommended for power failure protection.



CLA-VAL™

MODEL 60-32 (Full Internal Port) 660-32 (Reduced Internal Port)

Combination Pump Control and Back Pressure Valve (4" and Larger)

- **Built-in Check Valve**
- **Accurate Pressure Control**
- **Low Head Loss**
- **Smooth Control of Pump Surges**
- **Easy Maintenance Design**

The Cla-Val Model 60-32/660-32 Combination Pump Control and Back Pressure Valve is a pilot-operated control valve designed for booster pump discharge installation to eliminate pipeline surges caused by starting and stopping of pump and to provide adjustable back pressure on pump while it is running. The valve features a modified globe-design with diaphragm-actuation, and hydraulic operation for smooth, reliable automatic operation during pump starting and stopping. A built-in lift-type check feature automatically closes valve on electric power failure or any time pressure reversal occurs to protect pump from back spinning.

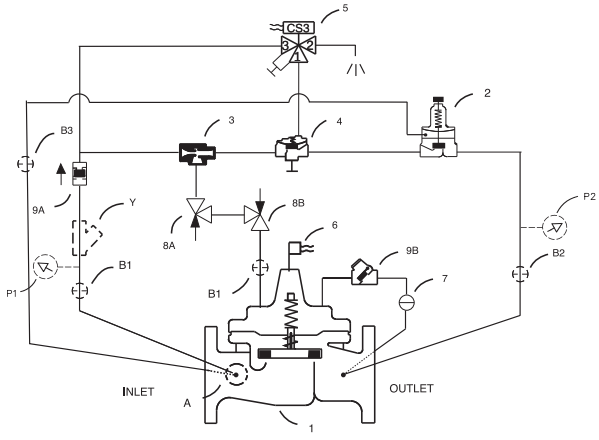
In operation, when pump is off, the pump control valve is closed by downstream system pressure. When pump is started, the solenoid control is energized and valve opens slowly to gradually increase pump flow and line pressure to desired back pressure setting for pumping conditions. When pump is signaled to shut-off, the solenoid control is de-energized and the valve begins to slowly close, gradually reducing flow while pump continues to run. When valve is closed, the included limit switch assembly turns off pump. Adjustable flow controls are included to easily regulate valve opening and closing speed to prevent surges. Using Cla-Val wiring diagram (see page 4) ensures safe electrical interlock control of pump and valve.

Schematic Diagram

Item	Description
1	100-04 Hycheck Main Valve
2	CRL-60 Pressure Relief Control
3	X47A Ejector
4	100-01 Hytrol (Reverse Flow)
5	CS3M Solenoid Control
6	X105LCW Switch Assembly
7	CK2 Isolation Valve
8	CV Flow Control (Opening and Closing Speed)
9	CDC/CSC Check Valve

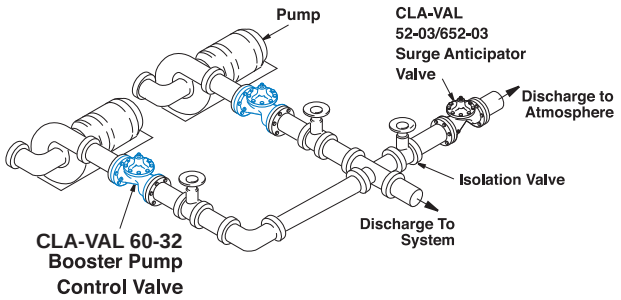
Optional Features

Item	Description
A	X46A Flow Clean Strainer
B	CK2 Isolation Valve
P	X141 Pressure Gauge
Y	X43 "Y" Strainer



Typical Application

Install Model 60-32/660-32 valve as shown in multiple pump applications. Flexible water-tight conduit should be used for electrical connections to the solenoid control and the limit switch. A Model 52-03/652-03 Surge Anticipator Valve is recommended for power failure protection.



Product Dimensions Data:
For the 60-32 Main Valve (100-04) dimensions, see www.cla-val.com
For the 660-32 Main Valve (100-23) dimensions, www.cla-val.com

61-02
(Full Internal Port)

661-02
(Reduced Internal Port)

MODEL

Deep Well Pump Control Valve

- **Prevent Surges in Pipelines**
- **Simple Hydraulic Operation**
- **Adjustable Opening and Closing Speeds**
- **Solenoid Control Can Be Operated Manually**
- **Proven Reliable Design**

The Cla-Val Model 61-02/661-02 Deep Well Pump Control Valve is designed to protect pipelines from surges caused by the starting and stopping of deep well pumps. This is a hydraulically operated diaphragm valve which is controlled by a solenoid pilot valve. Separate adjustable flow control valves in the pilot system regulate the opening and closing rates. A limit switch on the valve stem serves as an electrical interlock between the valve and the pump motor.

The operation of the valve is completely automatic and controlled by the solenoid valve. With the pump off, the valve is wide open. When the pump is started, the solenoid is energized and the valve begins to close slowly, discharging air and the initial rush of sand and water from the pump column to atmosphere. As the valve closes the pump output is gradually diverted into the main line, preventing the development of a starting surge.

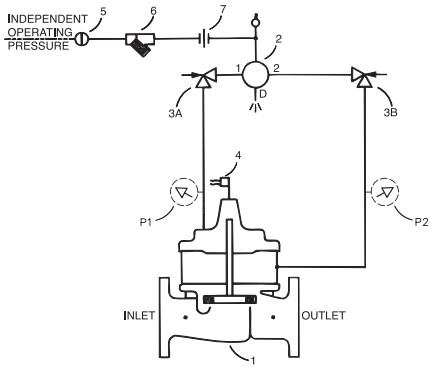
When it is time to shut-off the pump, the solenoid is de-energized. The pump continues to run while the pump control valve opens slowly, diverting pump output to atmosphere. As pump pressure gradually decreases, the main line check valve closes slowly, preventing shock or slam during the pump stopping cycle. When the pump control valve is wide open, the limit switch assembly releases the pump starter and the pump stops.

Schematic Diagram

Item	Description
1	100-02 Powertrol Main Valve
2	CSM11-A2-2 Solenoid Control
3	CV Flow Control
4	X105LOW Switch Assembly
5	CK2 Isolation Valve
6	X43 "Y" Strainer
7	Union

Item	Description
P	X141 Pressure Gauge

Note: For main valve option descriptions, refer to 100-02 (61-02) or 100-21 (661-02) Technical Data Sheets.

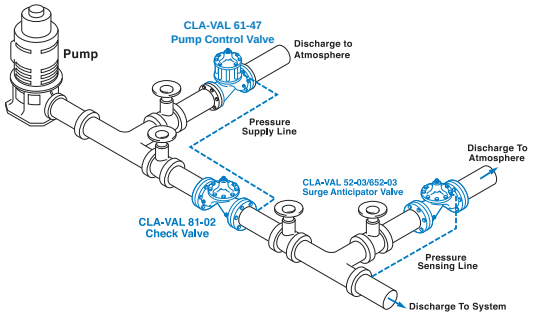


Product Dimensions Data:

For the 61-02 Main Valve (100-02) dimensions, see pages 21.
For the 661-02 Main Valve (100-21) dimensions, www.cla-val.com

Typical Installation

Install Model 61-02/661-02 valve as shown. Use a minimum of 1/2" tubing to connect operating pressure connection of the valve to the system side of check valve. Flexible conduit should be used for electrical connections to the solenoid control and the limit switch assembly. A Model 52-02/652-03 Surge Anticipator is recommended for power failure and surge protection.



131 Series
(Full Internal Port)

MODEL

631 Series
(Reduced Internal Port)

Electronic Control Valves

Model 131-01/631-01

- **Simple Proven Design**
- **Quality Solenoid Pilot Controls**
- **Ideal For SCADA Systems**
- **Multi-Function Capability; Hydraulic Backup**
- **Security System to Prevent Unauthorized Changes**
- **Easy to Maintain**

The Cla-Val Series 131/631 Electronic Control Valves are designed specifically for applications where remote control of the valve is preferred. It is a hydraulically operated, pilot controlled, diaphragm valve. The solenoid pilot controls are actuated by electrical signals from the optional VC-22D Electronic Valve Controller. The solenoid pilots either add or relieve line pressure from the cover chamber of the valve, causing it to open or close as directed by the electronic controller.

Series 131/631 Electronic Control valves can be configured to perform a wide range of functions, such as; pressure reducing, pressure sustaining, flow control, or level control. The electric controls can also be combined with hydraulic controls to create dual function, or fail-safe capability.

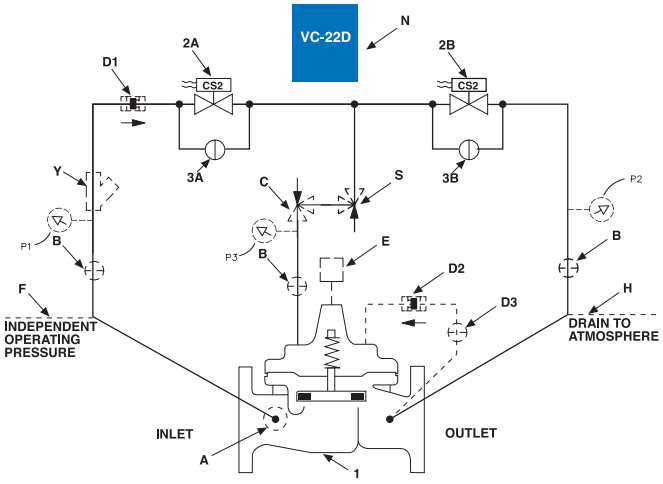
The main 131-01/631-01 Electronic Control Valve (Schematic shown below) includes the main valve and solenoid pilot controls. Optional features include the VC-22D Electronic Valve Controller and the X117 Series Valve Position Transmitter. If the check feature option is added, and a pressure reversal occurs, the downstream pressure is admitted into the cover, closing the valve.

Schematic Diagram

Item	Description
1	100-01 Hytrol Main Valve
2	CS2 Solenoid Control
3	CK2 (Solenoid By-Pass)

Optional Features

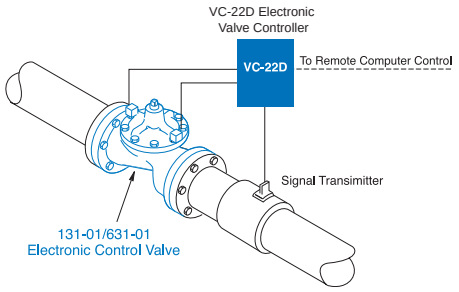
Item	Description
A	X46A Flow Clean Strainer
B	CK2 Isolation Valve
C	CV Flow Control (Closing)
D	Check Valves With Isolation Valve
E	X117 Series Position Transmitter
F	Independent Operating Pressure
H	Atmospheric Drain
N	Electronic Controller
P	X141 Pressure Gauge
S	CV Flow Control (Opening)
Y	X43 "Y" Strainer

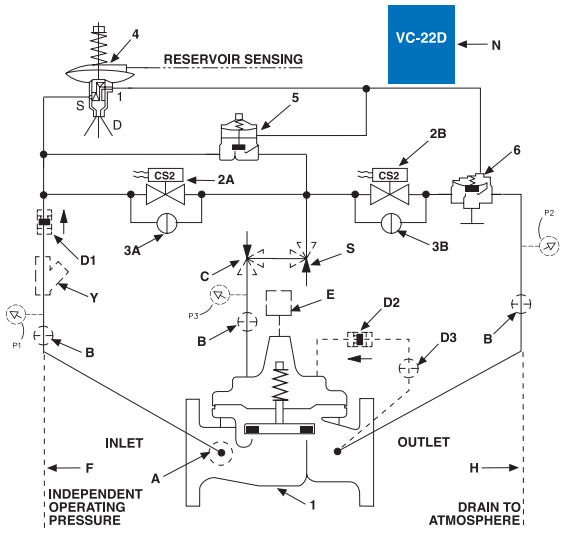


Product Dimensions Data:
For the 131 Series Main Valve dimensions, see pages 17.
For the 631 Series Main Valve dimensions, see pages 29.

Typical Applications

This brochure contains typical application that are modifications to the main 131-01/631-01 Electronic Control Valve shown here. It is typical installed in a pipeline with a VC-22D Series Controller that receives a process variable signal that is compared to set-point and adjusts the main valve's capacity until the signals match. There are many different variations not shown in this brochure. Contact us with your specific application and we will provide a field proven solution.





Schematic Diagram

Item	Description
1	100-01 Hytrol Main Valve
2	CS2 Solenoid Control
3	CK2 Cock (Solenoid By-Pass)
4	CDS6A Altitude Control
5	100-02 Powertrol (Reverse Flow)
6	100-01 Hytrol (Reverse Flow)

Optional Features

Item	Description
A	X46A Flow Clean Strainer
B	CK2 Isolation Valve
C	CV Flow Control (Closing)
D	Check Valves with Isolation Valve
E	X117 Series Position Transmitter
F	Independent Operating Pressure
H	Atmospheric Drain
N	Electronic Controller
P	X141 Pressure Gauge
S	CV Flow Control (Opening)
Y	X43 "Y" Strainer

131-06/631-06

Combination Electronic Control And High Level Shut-Off Valve

This valve is used in reservoir applications where the filling or draining rate is controlled and modulated by the electronic controller. Flow pressure and valve position can also be controlled. Should the liquid in the reservoir reach a high level, the hydraulic altitude control automatically overrides the electronic control and closes the valve. The altitude control can be adjusted to close the valve over a wide range of settings. The optional check feature will close the valve if there is a pressure reversal in the line.

131-09/631-09

Modulating Float Valve With Solenoid Lockout of Float Control and Electronic Positioning

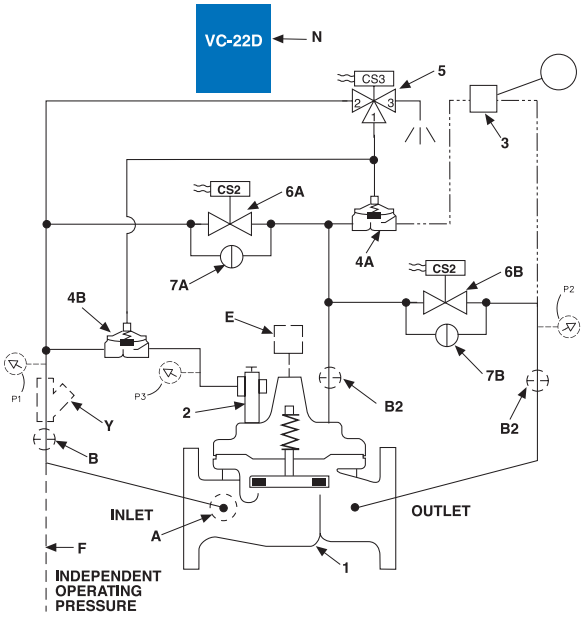
The electronic controller modulates the flow through this valve to control liquid level in a tank. If power failure should occur, the third solenoid shifts, and the float control will allow the valve to modulate using hydraulic line pressure. The VC-22D Electronic Valve Controller and X117 Series Valve Position Transmitter are used in combination with an electronic level sensing device to provide modulating flow control of the valve.

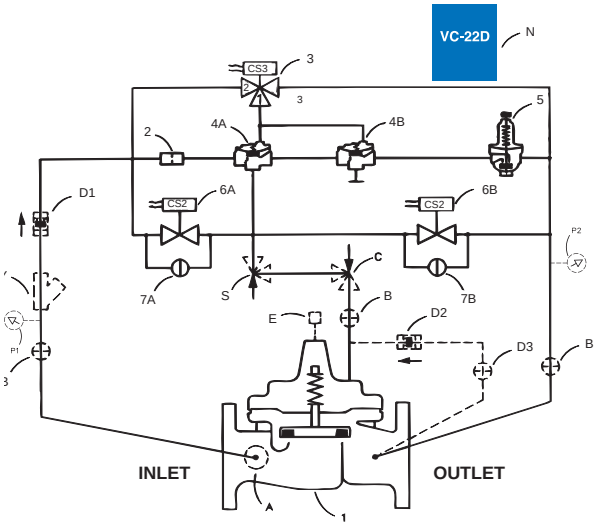
Schematic Diagram

Item	Description
1	100-01 Hytrol Main Valve
2	X74B-3 Stem Valve
3	CFM-7 Float Pilot
4	100-01 Hytrol (Reverse Flow)
5	CS3 Solenoid Control
6	CS2 Solenoid Control
7	CK2 Solenoid By-Pass

Optional Features

Item	Description
A	X46A Flow Clean Strainer
B	CK2 Isolation Valve
E	X117 Series Position Transmitter
F	Independent Operating Pressure
N	Electronic Controller
P	X141 Pressure Gauge
Y	X43 "Y" Strainer





Schematic Diagram

Item	Description
1	100-01 Hytrol Main Valve
2	X58C Restriction Assembly
3	CS3 Solenoid Control
4	100-01 Hytrol (Reverse Flow)
5	CRD Pressure Reducing Control
6	CK2 Solenoid Control
7	CK2 Solenoid Bypass

Optional Features

Item	Description
A	X46A Flow Clean Strainer
B	CK2 Isolation Valve
C	CV Flow Control (Closing)
D	Check Valves Isolation Valve
E	X117 Series/X117E Position Transmitter
N	Electronic Controller (Single)
P	X141 Pressure Gauge
S	CV Flow Control (Opening)
Y	X43 "Y" Strainer

131-18/631-18

Electronic Control Valve Equipped with Hydraulic Pressure Reducing Solenoid Selected

Flow, pressure, level or valve position is normally controlled by the electronic controller that operates two solenoids to modulate the valve to maintain the process variable. Should a power failure occur, a parallel hydraulically operated pressure reducing pilot system takes control of the valve maintaining a preset outlet pressure. When power is restored, the valve automatically reverts back to the electronic mode. The optional check feature automatically will close the valve if a pressure reversal occurs in the pipeline.

131-22/631-22

Electronic Control Valve (Power Fail Closed)

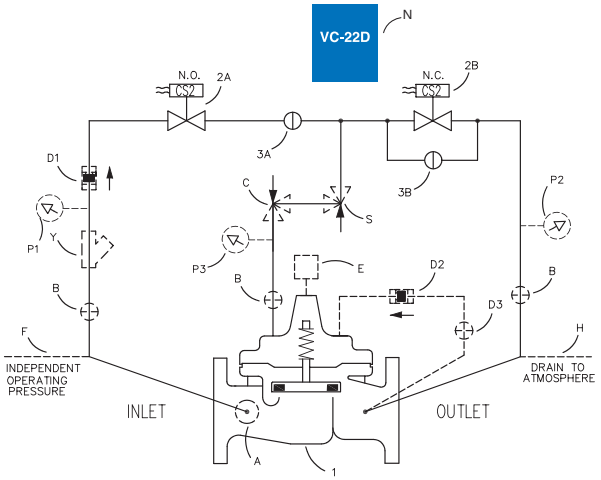
Flow, pressure, level or valve position is normally controlled by the electronic controller that operates two solenoids to modulate the valve to maintain the process variable. Should a power failure occur, the valve can be configured to go open or closed. The optional check feature automatically will close the valve if a pressure reversal occurs in the pipeline.

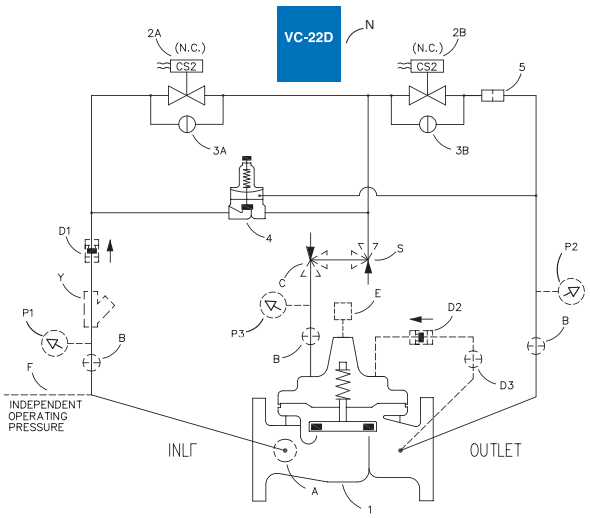
Schematic Diagram

Item	Description
1	100-01 Hytrol Main Valve
2	CS2 Solenoid Control
3	CK2 (Solenoid By-Pass)

Optional Features

Item	Description
A	X46A Flow Clean Strainer
B	CK2 Isolation Valve
C	CV Flow Control (Closing)
D	Check Valves with Isolation valve
E	X117 Series Position Transmitter
F	Independent Operating Pressure
H	Atmospheric Drain
N	Electronic Controller
P	X141 Pressure Gauge
S	CV Flow Control (Opening)
Y	X43 "Y" Strainer





Schematic Diagram

Item	Description
1	100-01 Hytrol Main Valve
2	CS2 Solenoid Control
3	CK2 Solenoid By-Pass
4	CRL5 Pressure Relief Control
5	X58C Restriction Assembly

Optional Features

Item	Description
A	X46A Flow Clean Strainer
B	CK2 Isolation Valve
C	CV Flow Control (Closing)
D	Check Valves with Isolation Valve
E	X117 Series Position Transmitter
F	Independent Operating Pressure
N	Electronic Controller (Single)
P	X141 Pressure Gauge
S	CV Flow Control (Opening)
Y	X43 "Y" Strainer

131-CW/631-CW

Electronic Interface Control with Pressure Reducing Feature, Hydraulically Operated

Flow, pressure, level or valve position is normally controlled by the electronic controller that operates two solenoids to modulate the valve to maintain the process variable. Should a power failure occur, a parallel hydraulically operated pressure reducing pilot system takes control of the valve limiting the maximum outlet pressure. When power is restored, the valve automatically reverts back to the electronic mode. The optional check feature automatically will close the valve if a pressure reversal occurs in the pipeline

131-EJ/631-EJ

Electronic Interface Control with Pressure Sustaining Feature, Hydraulically Operated

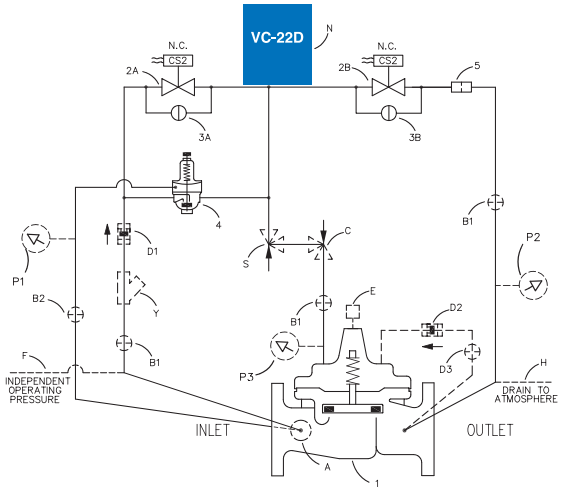
Flow, pressure, level or valve position is normally controlled by the electronic controller that operates two solenoids to modulate the valve to maintain the process variable. Should a power failure occur, a parallel hydraulically operated pressure sustaining pilot system takes control of the valve limiting the minimum inlet pressure. When power is restored, the valve automatically reverts back to the electronic mode. The optional check-feature automatically will close the valve if a pressure reversal occurs in the pipeline

Schematic Diagram

Item	Description
1	100-01 Hytrol Main Valve
2	CS2 Solenoid Control
3	CK2 Solenoid By-Pass
4	CRA Pressure Reducing Control
5	X58C Restriction Assembly

Optional Features

Item	Description
A	X46A Flow Clean Strainer
B	CK2 Isolation Valve
C	CV Flow Control (Closing)
D	Check Valves with Isolation Valve
E	X117 Series Position Transmitter
F	Independent Operating Pressure
H	Atmospheric Drain
N	Electronic Controller (Single)
P	X141 Pressure Gauge
S	CV Flow Control (Opening)
Y	X43 "Y" Strainer



MODEL

VC-22D

IP-68 Electronic Valve Controller

Model VC-22D
IP-68 Valve
Controller

- Provides remote or local setpoint control for valves in a variety of fluid applications
- Highly accurate and stable valve control
- Controller is supplied with pre-loaded ValvApps™ for most common valve functions
- Custom ValvApps™ can be created for Multi-Function Control
- Simple Control Curves graphical programming
- High resolution color screen graphics with color-coded indicators
- Communications via standard 4-20 mA retransmission and relays or by Modbus RTU/TCP
- Internal logging : programmable and download to USB
- Less than 3 Watts power: solar or hydro powered remote valve control
- Simple and intuitive programming and set-up
- IP-68 Submersible (verified by independent lab)

CE 1253

Product Description

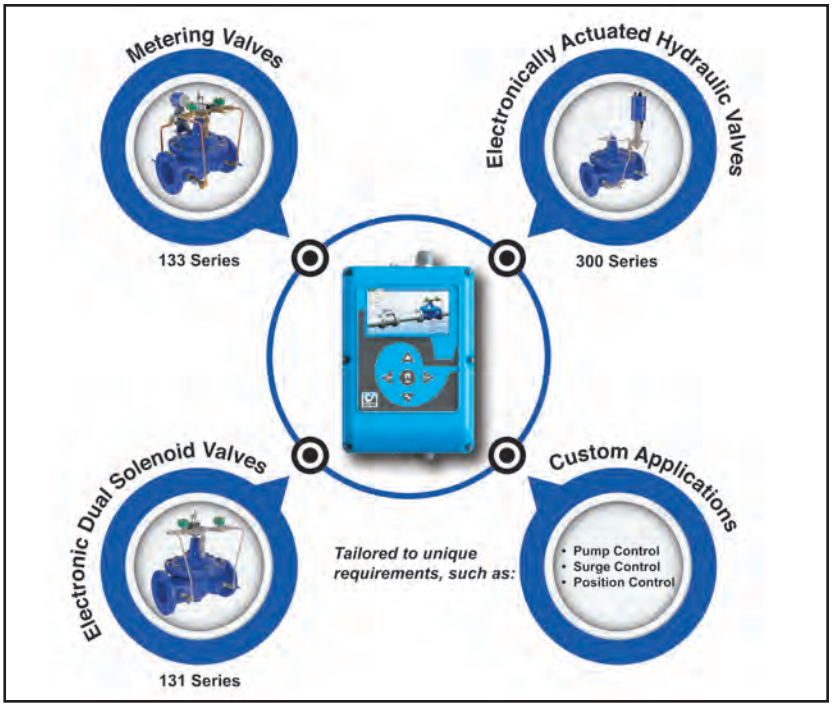
The Cla-Val VC-22D is designed to provide state of the art valve control for a variety of fluid control parameters. Intuitive programming screens allow easy and fast programming for standard and customized applications such as flow, pressure, level, or position. Complete capabilities allow either stand-alone operation or easy integration into SCADA systems with standard wired signals or Modbus (TCP or RTU) communications.

For ease of use, the controller is pre-loaded with a wide variety of typical valve applications (ValvApps™). Additional custom ValvApps™ can be created by Cla-Val to meet any operational requirement. For example 2 or 3 modulating control functions can be combined into one custom ValveApp.

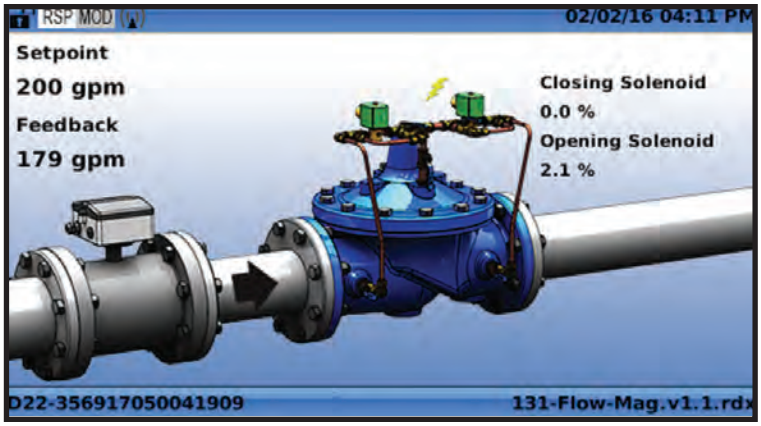
Pre-Loaded Typical ValvApps™ include:

- Flow Control with Mag Meter or e-Flowmeter Feedback
- Pressure Control with Upstream or Downstream Feedback
- Position Control with Position Feedback
- Modulating Level Control with Level and Position or Flow Feedback
- Metering Valve with Position and DP or P1-P2 Feedback
- Ratio Control with 2 Flowmeter feedbacks
- Altitude On/Off Level Control with Delayed Opening and Level Feedback
- Pressure Management with CRD-34 Electronic Pilots and Flow Feedback

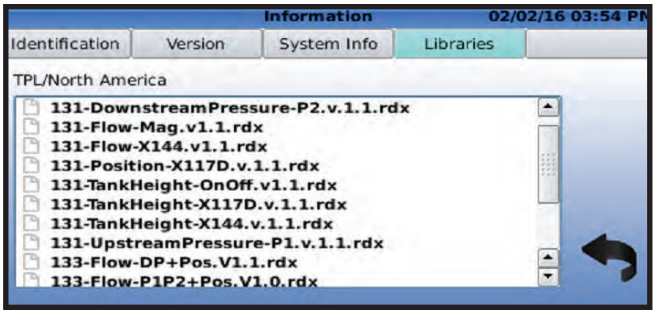
Controller Applications



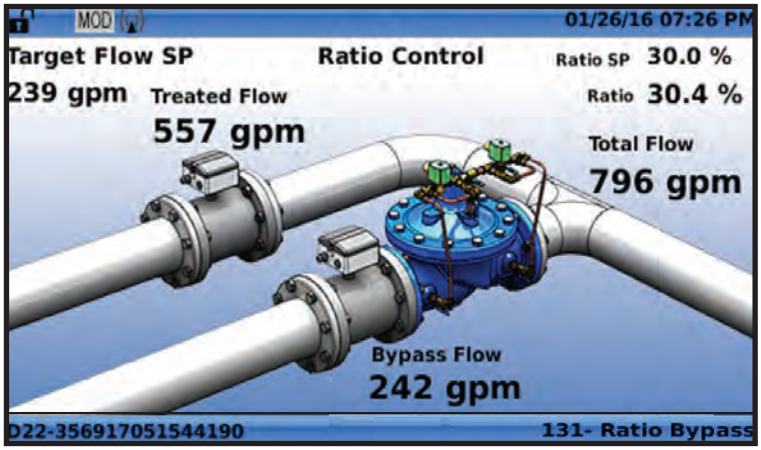
VC-22D Standard & Custom ValvApps™



Standard ValveApps™

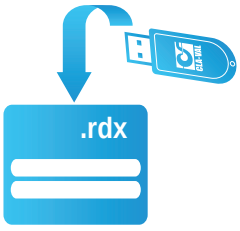


At startup the user can select from an internal library of Standard ValveApps designed for the most common control applications such as flow, pressure, level, position, or pressure management. Pre-configured graphics displays actual valve installation and minimizes startup time.



Custom ValveApps™

Special requirements can easily be handled by importing Custom ValveApps from the USB port. Program files may be either pre-programmed into the controller or sent by email and downloaded into the controller. All within minutes. Typical non-standard applications include ratio (blending), multiple functions, multiple inputs, custom graphics, differential pressure, temperature, salinity, electrical conductivity, parallel valves, etc.



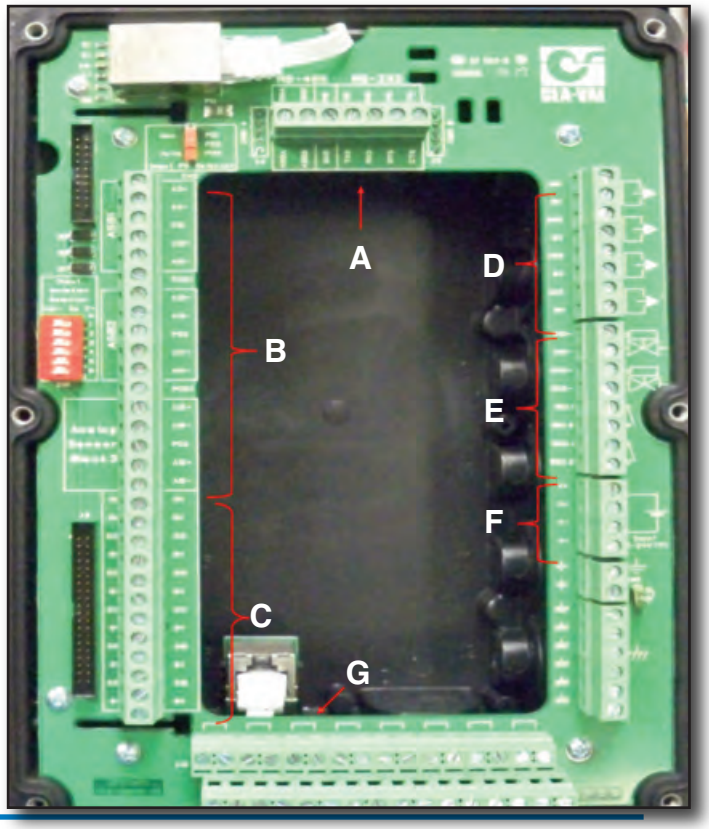
Import Application

Inputs, Outputs & Communications

Features

A) RS-232/485
B) Six 4-20 mA Analog Inputs
C) Six Digital inputs
D) Four 4-20 mA Analog Outputs
E) Two Solenoid + Two Relay Outputs
F) 12 - 24 VDC Power
G) Ethernet Connection (External)

Typical installation with mounting bracket



CLA-VAL®

MODEL 133-01 (Full Internal Port)
633-01 (Reduced Internal Port)

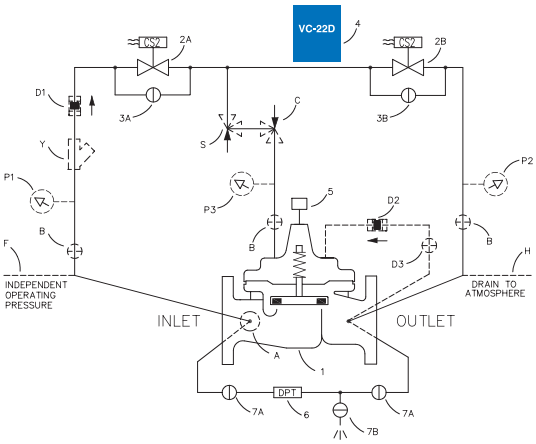
Metering Valve

- **Automatically Measures and Controls Flow Rate Without a Separate Metering Device**
- **Completely Self Contained**
- **Reliable Analog Communications**
- **Retransmission Capabilities**
- **Ideal for Retrofitting Existing Valves**
- **Security System to Prevents Unauthorized Changes**
- **Optional Totalizing Capabilities**

The Cla-Val Model 133-01/633-01 Metering Valve is a completely self contained valve and control system that accurately meters and/or controls flow rate when used on valves with pressure differentials of less than 100 psid.

Using a VC-22D Electronic Controller, data from valve mounted differential pressure and position transmitters are assimilated into a proprietary algorithm program that is based on valve size and configuration to arrive at a flow measurement. This information is used for retransmission and/or compared with a local or remote set-point for valve flow control.
The 133-01 Control System can also be installed on new or existing hydraulic pilot control valves such as: pressure reducing, pressure sustaining, flow limiting and level control to transmit flow rate without disturbing the valve's primary hydraulic function(s). Specify Kit 133-01 for these applications. Consult factory.

For all applications, specify voltage, minimum/maximum pressures and flow rates, valve size, pressure class and optional features. Consult your local representative or the Factory for engineering assistance and valve selection.



Schematic Diagram

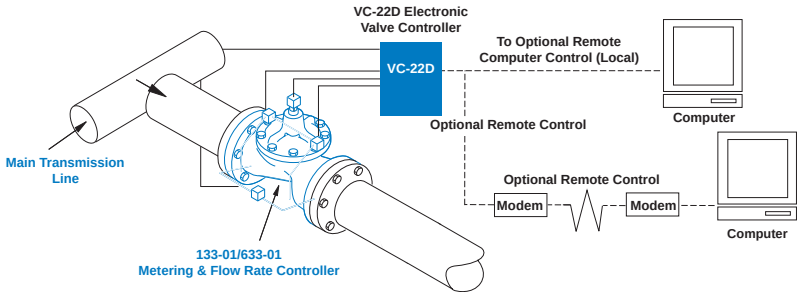
Item	Description
1	100-01 Hytrol Main Valve
2	CS2S Solenoid Control
3	CK2 Solenoid By-Pass
4	VC-22D Electronic Controller
5	X117 Series Position Transmitter
6	DPT Differential Pressure Transmitter
7	CK2 Isolation Valve

Optional Features

Item	Description
A	X46A Flow Clean Strainer
B	CK2 Isolation Valve
C	CV Flow Control (Closing)
D	Check Feature
F	Independent Operation Pressure
H	Atmospheric Drain
P	X141 Pressure Gauge
S	CV Flow Control (Opening)
Y	X43 "Y" Strainer

Typical Applications

The Model 133-01/633-01 Metering and Flow Rate Controller is typically installed in a fluid delivery system where the flow rate is measured and changed from a remote location such as a SCADA system.



Product Dimensions Data:
For the 133-01 Main Valve (100-01) dimensions, see pages 17.
For the 633-01 Main Valve (100-20) dimensions, see pages 29.

Improved Filter Backwashing

Advanced Cla-Val Electronic Backwash Valves with metering capability

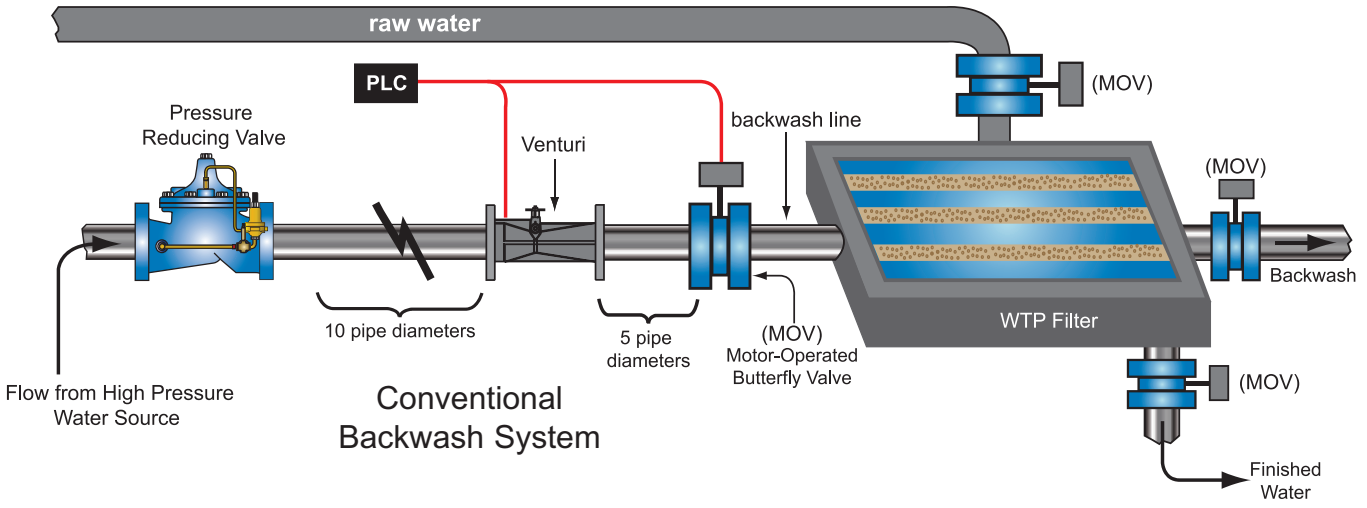
All water treatment plant filters must be regularly backwashed to clear away impurities left by raw water and to ensure optimum filtration results. Conventional systems, utilizing a combination of devices, often succumb to the ravages of cavitation caused by high system pressure and pose space challenges because of the long runs of piping required between components to guarantee proper function.

Cla-Val electronic metering valves equipped with KO anti-cavitation trim can handle the pressure and can perform the backwashing function without external metering or control components, greatly reducing space requirements and installation/maintenance costs.

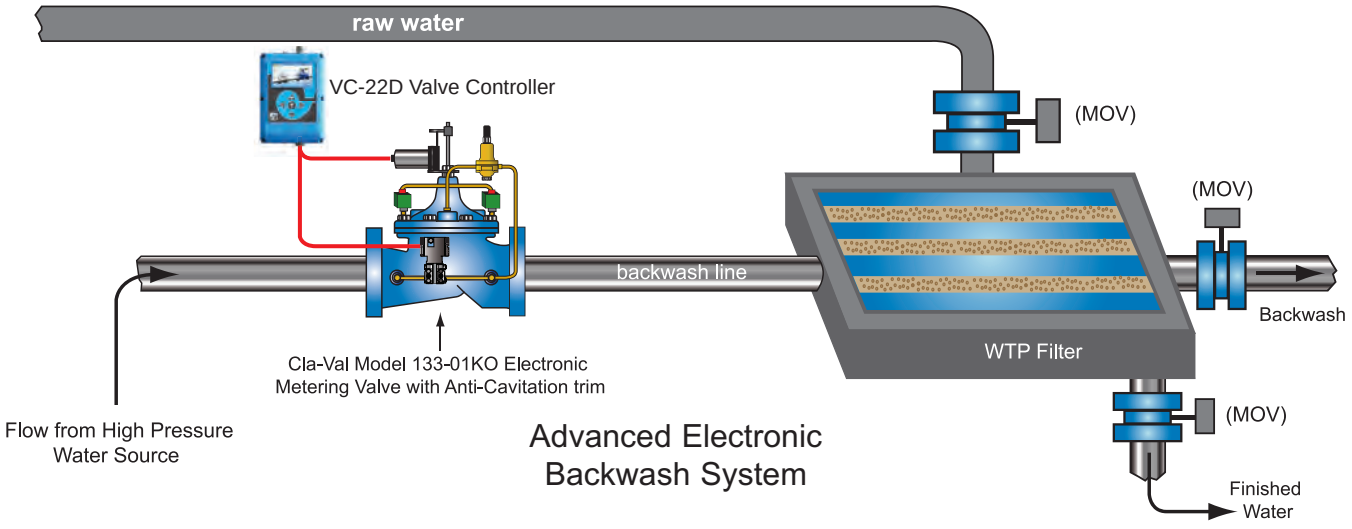
This multi-functional control valve cost effectively meets the following operational requirements:

- Low-rate wash
- Remote valve closure
- Hydraulic pressure override
- High-rate wash
- Flow metering and totalizing
- Can interface with SCADA systems

In addition to being available on new valves, any existing, installed Cla-Val Pressure Reducing Valve can be field retrofitted with the Model 133 electronic control and metering kit to perform backwashing at peak efficiency.



Conventional Backwash System



Advanced Electronic Backwash System

340-02
(Full Internal Port)

MODEL

3640-02
(Reduced Internal Port)

Electronic Actuated Rate of Flow Control Valve

- **Simplified Remote Valve Set-Point Control**
- **12 to 24 VDC Input Power**
- **Isolated Input**
- **Reverse Polarity Protection**
- **Reliable Hydraulic Operation**
- **IP-68 Submersible**
- **Use with the VC-22D Electronic Controller**

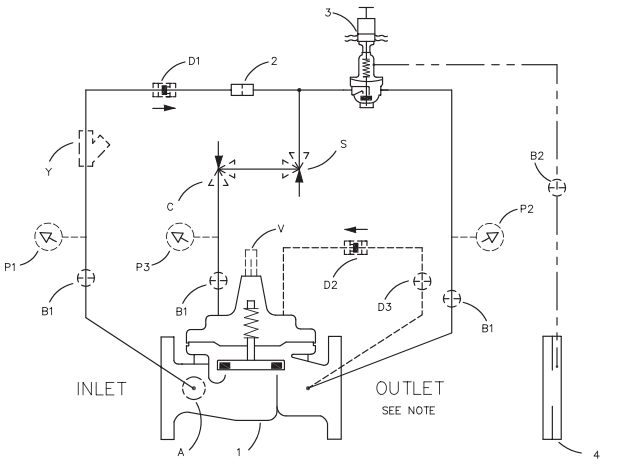
The Cla-Val Model 340-02/3640-02 Electronic Actuated Rate of Flow Control Valve combines the precise control of field proven Cla-Val hydraulic pilots and simple remote valve control. The Model 340-02/3640-02 valve controls flow by limiting flow to a preselected maximum rate (within a four to one ratio), regardless of changing line pressure. It is a hydraulically operated, pilot controlled, diaphragm actuated control valve. The valve uses a CDHS-34 actuated pilot control, consisting of a hydraulic pilot and integral controller that accepts a remote set-point command input and makes set-point adjustments to the pilot. The recommended control method is simple remote set point change from an RTU (Remote Telemetry Unit) to the CDHS-34 where the 4-20 mA command signal is ranged to specific flow range of orifice plate and hydraulic pilot control components. Very accurate control can be achieved when span does not exceed 4:1 turndown. Since the CDHS-34 is pre-ranged to full spring range, some on-site calibration may be necessary when this control method is used. Free downloadable software is available from Cla-Val website for this purpose. The CDHS-34 can also accommodate control systems where the RTU compares flow rate transmitter signal to the remote set point command signal. The RTU adjusts the CDHS-34 with 4-20 mA command signal containing an adequate deadband to prevent actuator dithering after the two signals agree. Internal continuous electronic monitoring of actuator position results in virtually instantaneous position change with no backlash or dithering when control signal is changed. In the event of a power or control input failure, the CDHS-34 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	100-01 Hytrol Main Valve
2	X58C Restriction Fitting
3	CDHS-34 Electronic Differential Control
4	X52E Orifice Plate Assembly

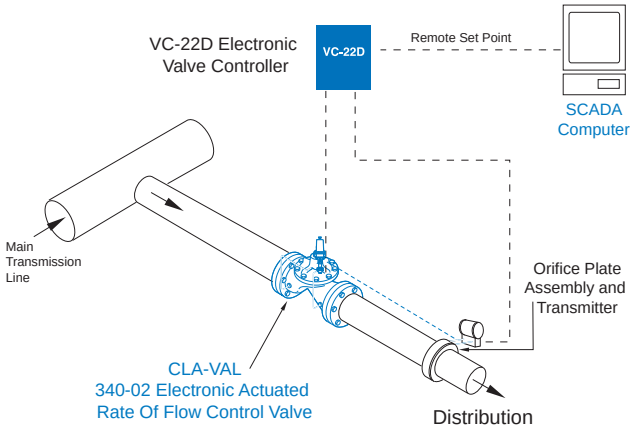
Optional Features

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	X101 Valve Position Indicator
Y	X43 "Y" Strainer



Typical Applications

The valve is designed to be used with supervisor control systems (SCADA), having an isolated remote analog set-point output and a process variable flow transmitter input. It is also an effective solution for lowering costs associated with “confined space” requirements by eliminating the 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.

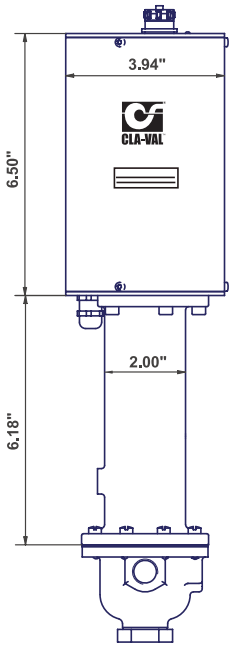


Product Dimensions Data:
For the 340-02 Main Valve (100-01) dimensions, see pages 17.
For the 3640-02 Main Valve (100-20) dimensions, see pages 29.

CLA-VAL®

— MODEL — **CDHS-34**

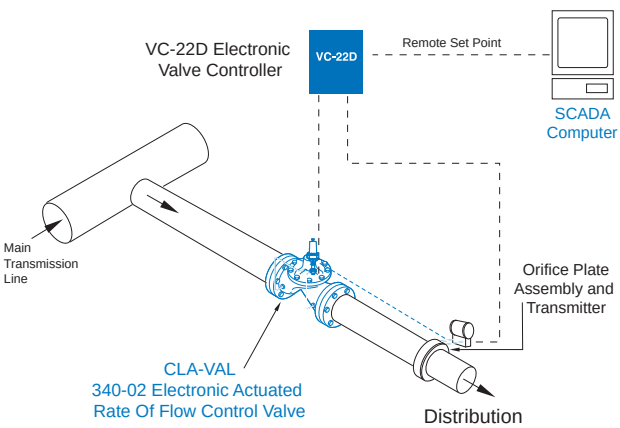
Electronic Actuated Rate of Flow Pilot Control



- **Simplified Remote Valve Set-Point Control**
- **12-24VDC Input Power**
- **Isolated Input**
- **Reverse Polarity Protection**
- **Reliable Hydraulic Operation**
- **IP-68 Submersible**
- **Use with the VC-22D Electronic Controller**

The Cla-Val Model CDHS-34 Electronic Actuated Differential Pressure Pilot Control provides remote set-point adjustment and accurate differential pressure control for rate of flow control on Cla-Val 340 Series Control Valves. Remote set-point command signals can be from any SCADA-type control system using analog 4-20 mA signal or by contact closure for cc/ccw rotation. A precision orifice plate installed with valve creates differential pressure used for rate of flow control by the CDHS-34. Operating on 12 to 24 VDC and consuming very little power, it is an ideal control system for remote valve sites that may even be solar powered. Existing manually-set Cla-Val 40 Series Rate-of-Flow control valves can be retrofitted with CDHS-34 to add remote set-point control. Verification of differential pressure and corresponding flow rate may be sent to SCADA system from customer supplied differential pressure sensor attached to orifice plate.

The CDHS-34 consists of a hydraulic pilot and integral controller that accepts a 4-20 mA remote set-point and positions the pilot to maintain a maximum pressure differential at orifice plate and corresponding flow rate within preset limits. Pressure differential settings are linear between these settings. Special USB connector cable and free downloadable software can be used to change built-in electronic range limits for differential pressure and corresponding flow rate. Continuous internal monitoring of actuator position results in smooth transitions between pilot set-points with no backlash or dithering. When power or control input fail, the CDHS-34 pilot remains in automatic hydraulic control assuring system stability under all conditions.



Typical Applications

The CDHS-34 Is installed on Cla-Val 340 Series valves that maintain flow rate and require this flow to be changed from a remote location. It is also an effective solution for lowering costs associated with "confined space" requirements by eliminating the need for entry in valve structure for set-point adjustment. Additional pilot controls, hydraulic and/or electronic, are also available to perform multiple functions to fit exact system requirements.

350-02
(Full Internal Port)

MODEL

3650-02
(Reduced Internal Port)

Electronic Actuated Pressure Sustaining Control Valve

- **Simplified Remote Valve Set-Point Control**
- **12 to 24 VDC Input Power**
- **Isolated Input**
- **Reverse Polarity Protection**
- **IP-68 Submersible**
- **Use with the VC-22D Electronic Controller**

The Cla-Val Model 350-02/3650-02 Electronic Actuated Pressure Sustaining Control Valve combines precise control of field proven Cla-Val hydraulic pilots and simple, remote valve control. The Model 350-02/3650-02 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 valve uses a CRL-34 pilot control, consisting of a hydraulic pilot and integral controller, that accepts a remote set-point command input and makes set-point adjustments to the pilot.

The recommended control method is simple remote set point change from an RTU (Remote Telemetry Unit) to the CRL-34 where the 4-20 mA command signal is ranged to specific pressure range. Very accurate control can be achieved when span does not exceed 100 psi. Since the CRL-34 is pre-ranged to the full spring range, some on-site calibration may be necessary when this control method is used. Free downloadable software is available from the Cla-Val website for this purpose. The CRL-34 can also accommodate control systems where the RTU compares pressure transmitter signal to the remote set point command signal. The RTU adjusts the CRL-34 with 4-20 mA command signal containing an adequate deadband to prevent actuator dithering after the two signals agree.

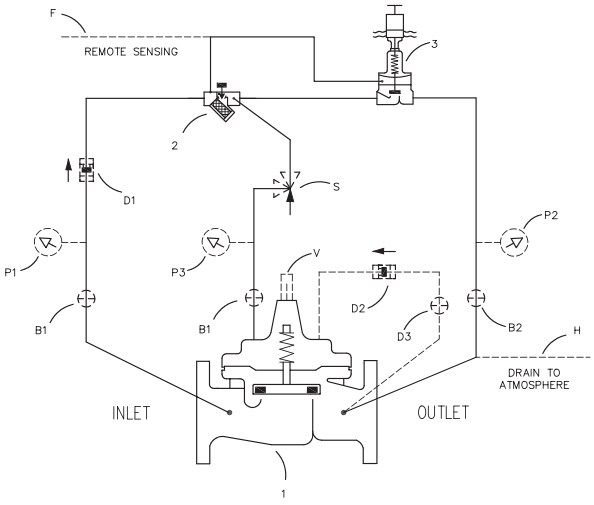
Internal continuous electronic monitoring of actuator position results in virtually instantaneous position change with no backlash or dithering when control signal is changed. In the event of a power or control input failure, the CRL-34 pilot remains in hydraulic control virtually assuring system stability 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	100-01 Hytrol Main Valve
2	X42N-2 Strainer & Needle Valve
3	CRL-34 Electronic Pressure Sustaining Control

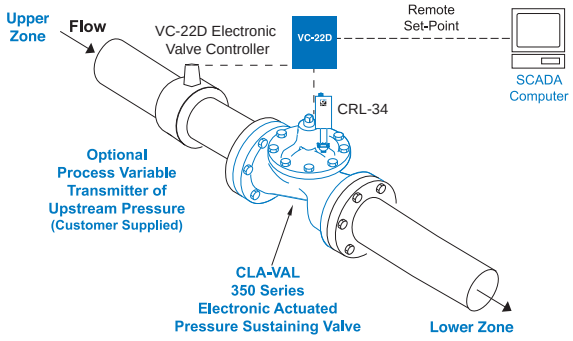
Optional Features

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 (SCADA), having remote analog set-point output and process variable upstream pressure input. 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 adjustment.
Additional pilot controls, hydraulic and/or electronic, can be easily added to perform multiple control functions to fit exact system requirements.

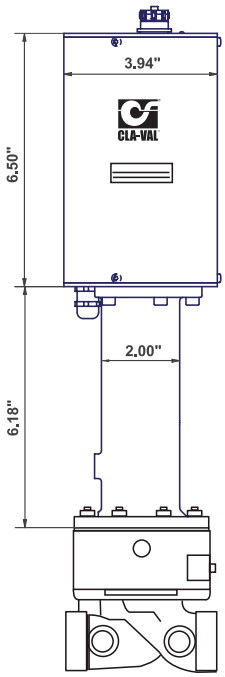


Product Dimensions Data:
For the 350-02 Main Valve (100-01) dimensions, see pages 17.
For the 3560-02 Main Valve (100-20) dimensions, see pages 29.

CLA-VAL™

MODEL – CRL-34

Electronic Actuated Pressure Sustaining Pilot Control

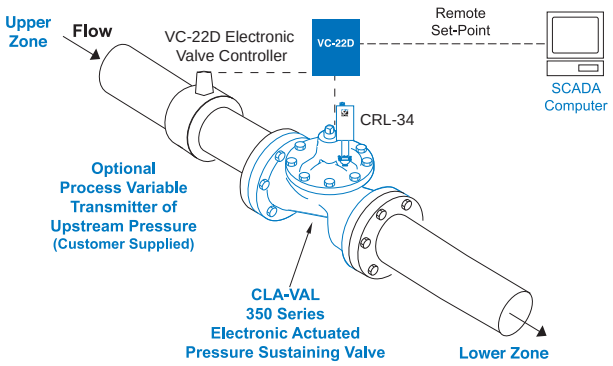


- **Simplified Remote Valve Set-Point Control**
- **12-24VDC Input Power**
- **Isolated Input**
- **Reverse Polarity Protection**
- **Reliable Hydraulic Operation**
- **IP-68 Submersible**
- **Use with the VC-22D Electronic Controller**

The Cla-Val Model CRL-34 Electronic Actuated Pressure Sustaining Pilot Control provides remote set-point adjustment and accurate pressure sustaining control on Cla-Val 350 Series Control Valves. Remote set-point command signals can be from any SCADA-type control system using an analog 4-20 mA signal or by contact closure for cc/ccw rotation.

The CRL-34 senses upstream pressure with a remote hydraulic connection. Operating on 12 to 24 VDC and consuming very little power, it is an ideal control system for remote valve sites that may even be solar powered. Existing manually-set Cla-Val 50 Series Pressure Sustaining control valves can be retrofitted with CRL-34 to add remote set-point control of minimum inlet pressure. Verification of inlet pressure may be sent to SCADA system from customer supplied pressure sensor attached upstream of valve.

The CRL-34 consists of a hydraulic pilot and integral controller that accepts a 4-20 mA remote set-point and positions the pilot to maintain a minimum pressure at valve inlet within preset limits. Pressure settings are linear between these settings. Pressure settings are calibrated to the specific spring range of the control. Special USB connector cable and free downloadable software can be used to change this range if needed. Continuous internal monitoring of actuator position results in smooth transitions between pilot set-points with no backlash or dithering. Should power or control input fail, the CRL-34 pilot remains in automatic hydraulic control assuring system stability under all conditions.



Typical Applications

The CRL-34 is installed on Cla-Val 350 Series valves that maintain minimum upstream pressure by relieving excess pressure to lower zone and require this pressure setting to be changed from a remote location. It is also an effective solution for lowering costs associated with "confined space" requirements by eliminating the need for entry in valve structure for set point adjustment. Flow information can also be provided from the main valve, see E-133VF. Additional pilot controls, hydraulic and/or electronic, are also available to perform multiple functions to fit exact system requirements.

390-02
(Full Internal Port)

MODEL

3690-02
(Reduced Internal Port)

Electronic Actuated Pressure Reducing Valve

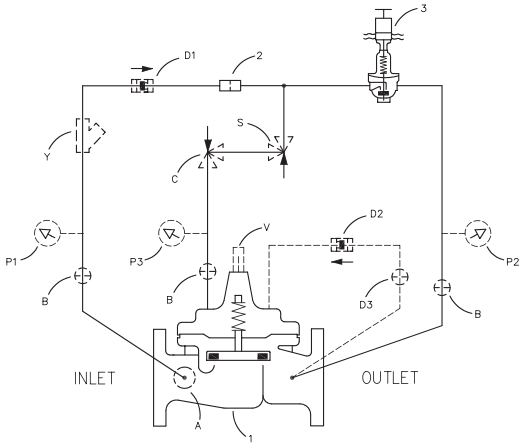
- **Simplified Remote Valve Set-Point Control**
- **Isolated Input**
- **Ideal for Pressure Management**
- **12-24VDC Input Power**
- **Reverse Polarity Protection**
- **IP-68 Submersible**
- **Use with the VC-22D Electronic Controller**

Schematic Diagram

Item	Description
1	100-01 Hytrol Main Valve
2	X58C Restriction Fitting
3	CRD-34 Electronic 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	X101 Valve Position Indicator



The Cla-Val Model 390-02/3690-02 Electronic Actuated Pressure Reducing Control Valve combines precise control of field proven Cla-Val hydraulic pilots and simple, remote valve control. The Cla-Val Model 390-02/3690-02 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. The valve uses a CRD-34 pilot control, consisting of a hydraulic pilot and integral controller, that accepts a remote set-point command input and makes set-point adjustments to the pilot.

The recommended control method is simple remote set-point change from an RTU (Remote Telemetry Unit) to the CRD-34 where the 4-20 mA command signal is ranged to specific pressure range. Very accurate control can be achieved when span does not exceed 100 psi. Since the CRD-34 is pre-ranged to the full spring range, some on-site calibration may be necessary when this control method is used. Free downloadable software is available from Cla-Val website for this purpose. The CRD-34 can also accommodate control systems where the RTU compares pressure transmitter signal to the remote set point command signal. The RTU adjusts the CRD-34 with 4-20 mA command signal containing an adequate deadband to prevent actuator dithering after the two signals agree.

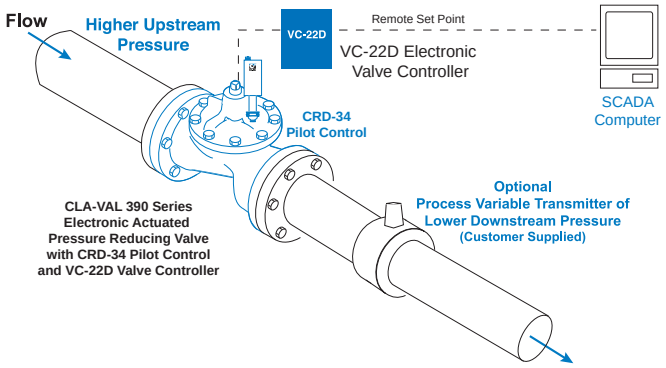
Internal continuous electronic monitoring of actuator position results in virtually instantaneous position change with no backlash or dithering when control signal is changed. In the event of a power or control input failure, the CRD-34 pilot remains in hydraulic control virtually assuring system stability under changing conditions. If check feature ("D") is added, and pressure reversal occurs, the valve closes to prevent return flow.

Product Dimensions Data:

For the 390-02 Main Valve (100-01) dimensions, see pages 17.
For the 3690-02 Main Valve (100-20) dimensions, see pages 29.

Typical Applications

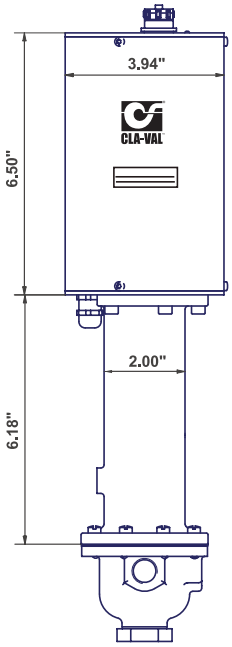
The Cla-Val 390 Series valves that maintain downstream pressure and require this pressure to be changed from a remote location. It can be an effective solution for lowering costs associated with "confined space" requirements by eliminating the need for entry in valve structure for set-point adjustment. It is also ideal for pressure management, and can be programmed to minimum night time and optimum daytime pressures. Optional profiler can be used to create custom correlation between pressure and flow information.



—MODEL— CRD-34 and CRA-34

Electronic Actuated Pressure Reducing Pilot Control

CRD-34 shown



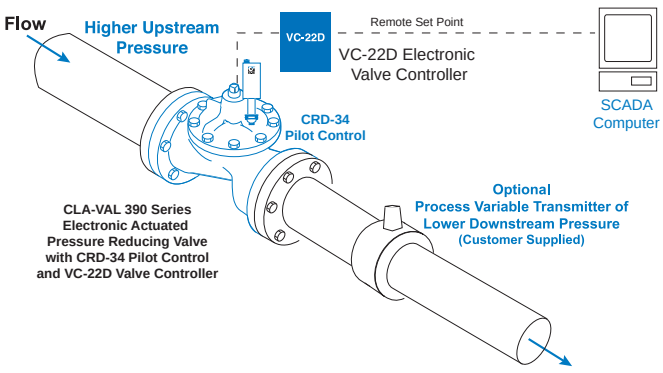
- **Ideal for Pressure Management**
- **Simplified Remote Valve Set-Point Control**
- **Isolated Input**
- **12-24VDC Input Power**
- **Reverse Polarity Protection**
- **IP-68 Submersible**
- **Use with the VC-22D Electronic Controller**

The Cla-Val Model CRD-34 and CRA-34 Electronic Actuated Pressure Reducing Pilot Controls provide remote set-point adjustment and accurate downstream pressure control on Cla-Val 390 Series Control Valves. Remote set-point command signals can be from any SCADA-type control system using an analog 4-20 mA signal or by contact closure for cc/ccw rotation.

The CRD-34 senses valve outlet pressure directly and the CRA-34 senses downstream pressure with remote hydraulic connection. Operating on 12 to 24 VDC and consuming very little power, they are an ideal control system for remote valve sites that may even be solar powered. Existing manually-set Cla-Val 90 Series Pressure Reducing control valves can be retrofitted with CRD-34 or CRA-34 to add remote set-point control of delivery pressure. Verification of downstream pressure may be sent to SCADA system from customer supplied pressure sensor attached to valve outlet.

The CRD-34 and CRA-34 consists of a hydraulic pilot and integral controller that accepts a 4-20 mA remote set-point and positions the pilot to maintain a pressure at valve outlet within preset limits. Pressure settings are linear between these settings. Pressure settings are calibrated to the specific spring range of the control. Special USB connector cable and free downloadable software can be used to change this range if needed. Continuous internal monitoring of actuator position results in smooth transitions between pilot set-points with no backlash or dithering. Should power or control input fail, the CRD-34 or CRA-34 pilot remains in automatic hydraulic control assuring system stability under all conditions.

Typical Applications



The CRD-34 and CRA-34 are installed on Cla-Val 390 Series valves that maintain downstream pressure and require this pressure to be changed from a remote location. It can be an effective solution for lowering costs associated with "confined space" requirements by eliminating the need for entry in valve structure for set-point adjustment. It is also ideal for pressure management, and can be programmed to minimum night time and optimum daytime pressures. Optional profiler can be used to create custom correlation between pressure and flow information. Flow information can also be provided from the main valve, see E-133VF. Additional pilot controls, hydraulic and/or electronic, are also available to perform multiple functions to fit exact system requirements.

136-01 (Sizes 1/2"-4")
(Full Internal Port)

MODEL

636-01 (Sizes 3"-6")
(Reduced Internal Port)

Solenoid Control Valve

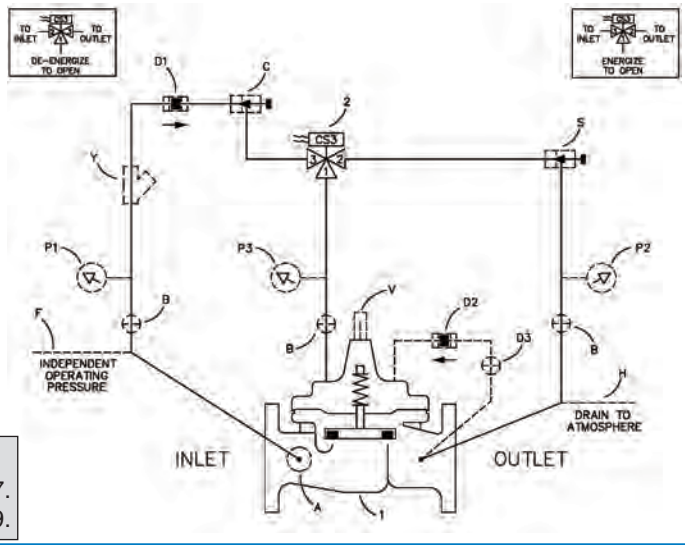
- **Fast Acting Solenoid Control**
- **Reliable, Drip-Tight Shut-Off**
- **Simple Design, Proven Reliable**
- **Optional Check Feature**
- **Easy Installation and Maintenance**

The Cla-Val Model 136-01/636-01 Solenoid Control Valve is an on-off control valve that either opens or closes upon receiving an electrical signal to the solenoid pilot control. This valve consists of a Hytrol main valve and a three-way solenoid valve that alternately applies pressure to or relieves pressure from the diaphragm chamber of the main valve. It is furnished either normally open (de-energized solenoid to open) or normally closed (energized solenoid to open).

If the check feature option is added and a pressure reversal occurs, the downstream pressure is admitted into the main valve cover chamber and the valve closes to prevent return flow.

Schematic Diagram

Item	Description
1	100-01 Hytrol Main Valve
2	CS3 Solenoid Control

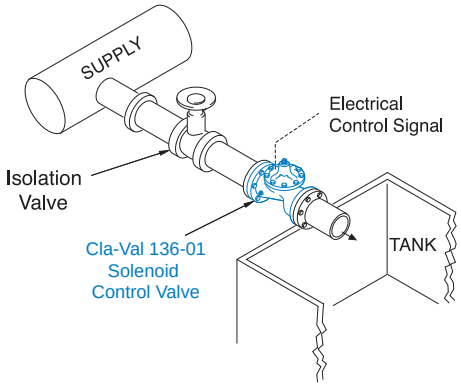


Optional Features

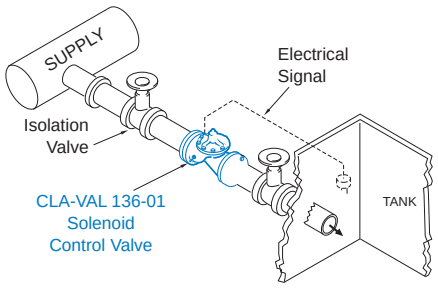
Item	Description
A	X46A Flow Clean Strainer
B	CK2 Isolation Valve
C	CNA Closing Speed Control
D	Check Valves with Isolation Valve
P	X141 Pressure Gauge
S	CNA Needle Valve (Opening)
V	X101 Valve Position Indicator
Y	X43 "Y" Strainer

Product Dimensions Data:
For the 136-01 Main Valve (100-01) dimensions, see pages 17.
For the 636-01 Main Valve (100-20) dimensions, see pages 29.

Typical Applications



Industrial uses for the solenoid control valve are many and include accurate control of process water for batching, mixing, washing, blending or other on-off type uses.



Liquid level control can be provided by using a float switch or electrode probe which sends an electrical signal to open or close the valve as needed.

CLA-VAL®

MODEL

136-03 (Sizes 4" and Larger)
(Full Internal Port)

636-03 (Sizes 6" and Larger)
(Reduced Internal Port)

Solenoid Control Valve

- **Fast Acting Solenoid Control**
- **Drip Tight Shut-Off**
- **Simple Design, Proven Reliable**
- **Optional Check Feature**
- **Easy Installation & Maintenance**

The Cla-Val Model 136-03/636-03 Solenoid Control Valve is an on-off control valve which either opens fully or closes drip-tight upon receiving an electrical signal to the solenoid pilot control. This valve consists of a Hytrol main valve, a three way solenoid and a high capacity three-way pilot valve. The solenoid control operates the three-way valve which alternately applies pressure to or relieves pressure from the diaphragm chamber of the main valve. It is furnished either normally open (de-energize solenoid to open) or normally closed (energize solenoid to open).

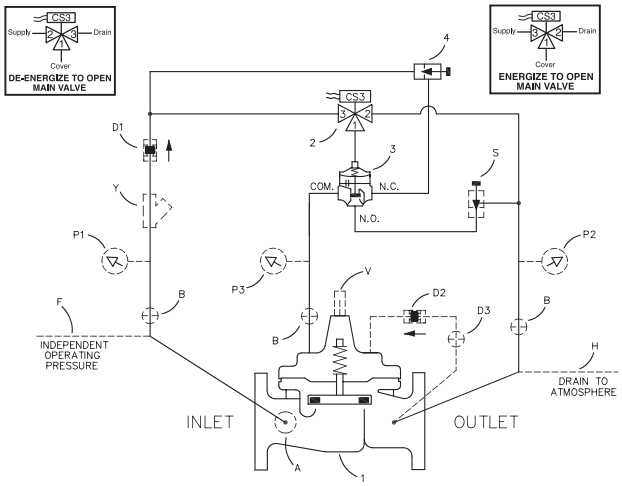
If the check feature option is added and a pressure reversal occurs, the downstream pressure is admitted into the main valve cover chamber and the valve closes to prevent return flow.

Schematic Diagram

Item	Description
1	100-01 Hytrol Main Valve
2	CS3 Solenoid Control
3	102C-3H Three-Way Valve
4	CNA Needle Valve (Closing)

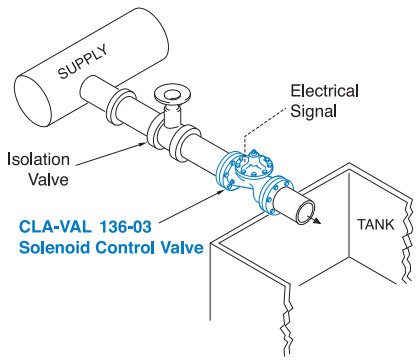
Optional Features

Item	Description
A	X46 Flow Clean Strainer
B	CK2 Isolation Valve
D	Check Valves With Isolation Valve
F	Independent Operating Pressure
H	Atmospheric Drain
P	X141 Pressure Gauge
S	CNA Needle Valve (Opening)
V	X101 Valve Position Indicator
Y	X43 "Y" Strainer

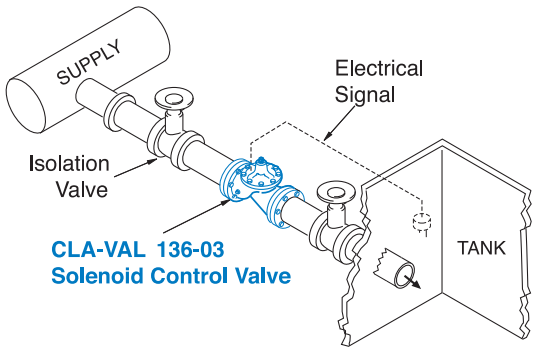


Product Dimensions Data:
For the 136-03 Main Valve (100-01) dimensions, see pages 17.
For the 636-03 Main Valve (100-20) dimensions, see pages 29.

Typical Applications



Industrial uses for the solenoid control valve are many and include accurate control of process water for batching, mixing, washing, blending or other on-off type uses.



Liquid level control can be provided by using a float switch or electrode probe which sends an electrical signal to open or close the valve as needed.

139-10 MODEL

Programmable Timer Control Valve

- **Precise Valve On-Off Control**
- **Completely Self-contained**
- **High Energy Efficiency**
- **Retains Stored Data Even After Battery is Depleted**
- **Direct Control of Valve Opening or Closing 4 Times Daily**
- **IP68 submersible Timer Control can be factory preset**
- **Use this valve for Pressure Management and Water Quality Control applications**
- **Combines with Pressure, Flow or Level Control**
- **Ideal for Remote Valve Location Control**

The Cla-Val Model 139-10 Programmable Timer Control Valve is an on-off control valve for applications using a programmable time schedule. Using the CTC-33 Electronic Timer Control up to four opening and closing times per day can be set for a weekly schedule.

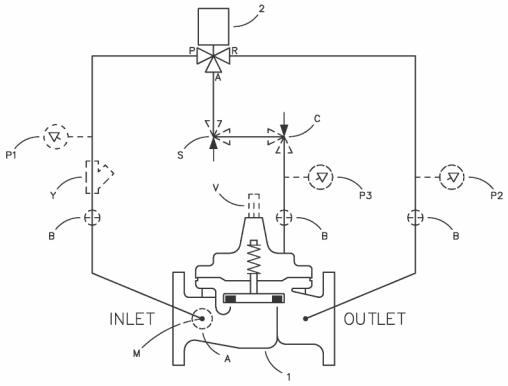
Timer function and parameters are changed using downloadable software from the Cla-Val website www.cla-val.com and special USB cable (part number 20519203A). Future software and firmware upgrades will be available from Cla-Val website. Powered by a long-life lithium battery, the CTC-33 control offers exceptional valve control for remote locations and other valve automation applications.

Schematic Diagram

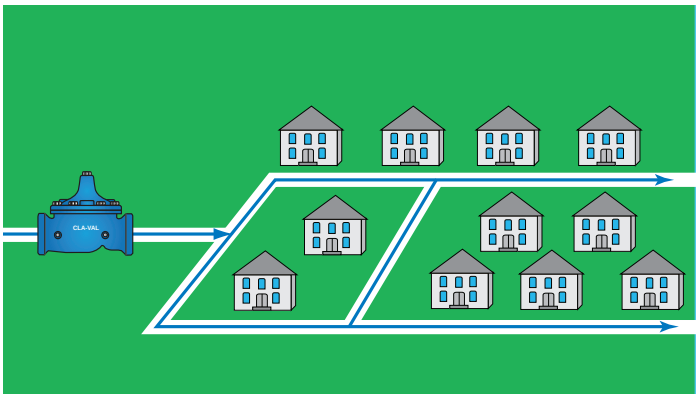
Item	Description
1	100-10 Hytrol Main Valve
2	CTC-33 Electronic Timer Control

Optional Features

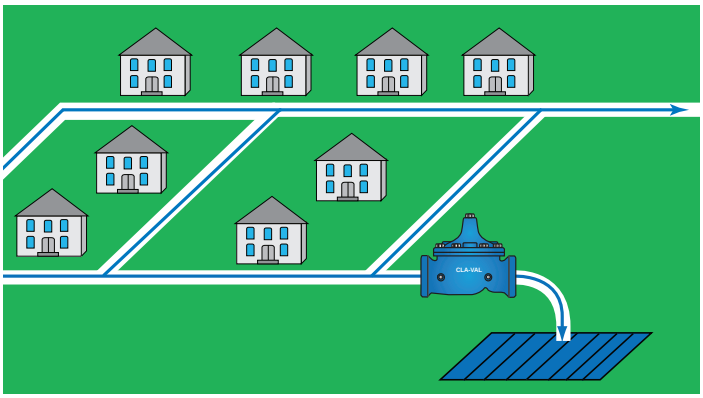
Item	Description
A	X46A Flow Clean Strainer
B	CK2 Isolation Valve
P	X141 Pressure Gauge
V	X101 Valve Position Indicator
Y	X43 “Y” Strainer



Typical Applications



The CTC-33 Timer Control is used for pressure management applications in water distribution systems where SCADA control is not available. Use a 139 Series Cla-Val Pressure Control Valve equipped with the CTC-33 Timer to change pressure during periods of high and low demand according to pre-set schedule to reduce leaks and pipe burst frequency, while delivering adequate supply.



The CTC-33 Electronic Timer Control is used in 139 Series Control Valves to automate circulating water requirements (anti-stagnation) in distribution system applications. Valve opening and closing time of day and duration can be set according to system requirements for convenient flushing and circulating during times of low flow to optimize water quality.

CLA-VAL™

— MODEL — **CTC-33**

Electronic Timer Control

- **Precise valve on-off control**
- **Completely self-contained**
- **Programmable daylight savings times**
- **High energy efficiency**
- **Battery life exceeds 2 years**
- **Retains stored data even after battery is depleted**
- **Direct control of valve opening and closing 4 times daily**
- **IP68 submersible**
- **Use this valve for Pressure Management and Water Quality Control applications**
- **Combines with pressure, flow or level control**
- **Ideal for remote valve location control**

CTC-33 Electronic Timer Control Specifications

Maximum Pressure:	232 psi (16 bar)
Temperature Range:	14° - 176°F (-10°- +80°C) Battery:14° - 140°F (-10°- +60°C)
Enclosure Protection:	IP68; Validated 1 month at 0.2 bar (2m water depth)
Battery Type:	Lithium 9V/PP3 (Lifetime: ~2 years for 2 actions/day @ 20°C)
Solenoid:	3-Way Bi-Stable Orifice Size: 0.05 in (1.2mm) Voltage: 6VDC (minimum)
Rules:	Up to 8 actions (4X opening-closing per day) • Time and calendar
Fluids:	Water
Port Size:	1/8-inch FNPT Threaded

The Cla-Val CTC-33 Electronic Timer Control is a battery powered, programmable on-off control used for opening and closing Cla-Val main valves according to time schedule. Up to four opening and closing times per day can be set for a weekly schedule.

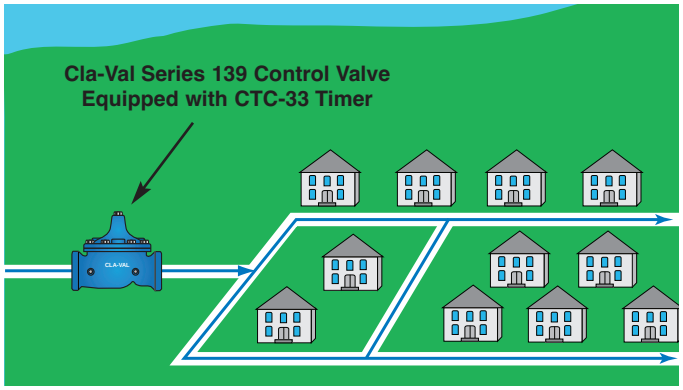
The CTC-33 offers powerful valve control for remote locations and valve automation applications.

Materials

Electronic Enclosure:	PVC
Solenoid Body:	Stainless Steel
Seals:	NBR
Programming Interface:	Compatible with Windows 8, 7 Vista and XP

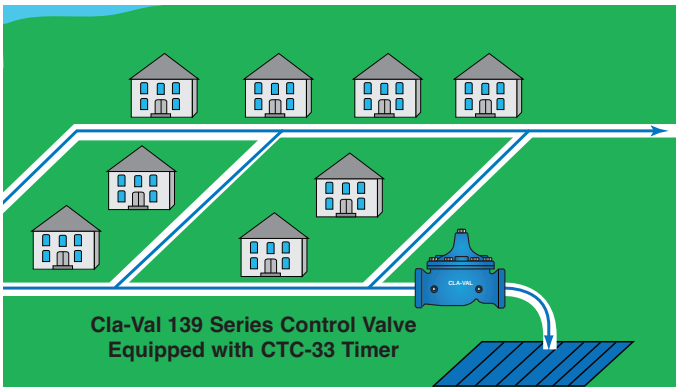
CTC-33 Electronic Timer Control Typical Applications

Pressure Management / Water Savings



The CTC-33 Timer Control is used for pressure management applications in water distribution systems where SCADA control is not available. Use a 139 Series Cla-Val Pressure Control Valve equipped with the CTC-33 Timer to change pressure during periods of high and low demand according to pre-set schedule to reduce leaks and pipe burst frequency, while delivering adequate supply.

Maintaining Water Quality



The CTC-33 Electronic Timer Control is used in 139 Series Control Valves to automate circulating water requirements in distribution system applications. Valve opening and closing time of day and duration can be set according to system requirements for convenient flushing and circulating during times of low flow to optimize water quality.

CRA & CRD – MODELS –

Pressure Reducing Control Valves

CLA-VAL™

CRA

CRD
(also available with X140-1 Security Cap Option)

- **Direct Acting**
- **Hydraulic or Pneumatic Operation**
- **Simplified Design, Easy Adjustments**
- **Operates in Any Position**
- **Gauge Connection Port**

The Cla-Val Models CRA and CRD Pressure Reducing Control automatically reduce a higher inlet pressure to a lower outlet pressure. They are direct acting, spring loaded, diaphragm type control regulators that operate hydraulically or pneumatically. These valves are held open by the force of the compression spring above the diaphragm, and close when the downstream pressure acting on the underside of the diaphragm exceeds the spring setting. The CRD senses downstream pressure directly and the CRA senses downstream pressure remotely.

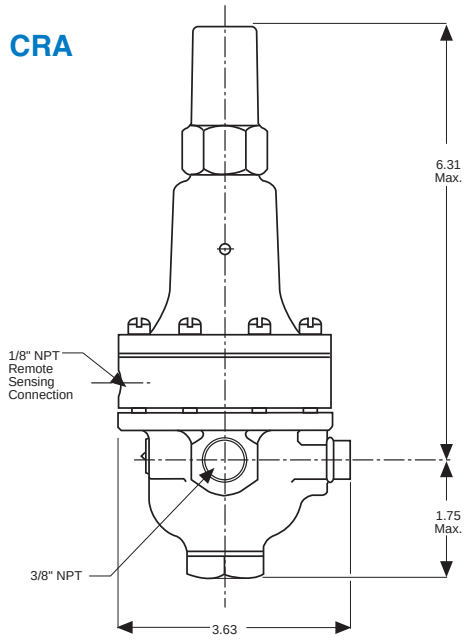
Flow through the control responds to changes in downstream pressure. Turning the adjusting screw clockwise increases the delivery pressure. Turning it counterclockwise decreases the pressure. A resilient disc assures tight shut-off on dead-end service.

Models CRA and CRD may be installed in any position. There is one inlet port and two outlets for either straight or angle installation. The second outlet port can be used for a gauge connection.

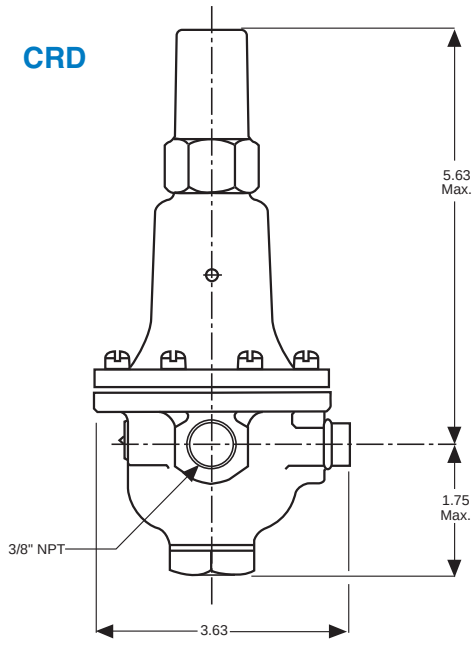
These valves are ideal small capacity regulators for applications such as water coolers, fountains, humidifiers, gas refrigerators, and air supply to tools and instruments. Remote pressure sensing is available with the CRA. They also have numerous applications as pilot controls on many Cla-Val Automatic Control Valves.

Dimensions (In Inches)

CRA



CRD



CLA-VAL™

— MODEL — **CRD-L**

Direct Acting Pressure Reducing Valve

- **Meets Requirements of "Reduction of Lead in Drinking Water Act"**
- **Sizes: 1/2" • 3/4" • 1" • 1-1/4" • 1-1/2" • 2" • 2-1/2"**
- **Operates in Any Position**
- **Easy Installation**
- **Stainless Steel Trim Standard**
- **Gauge Connections Standard**
- **Bronze Body and Cover Standard**
- **. Stainless Steel Body and Cover also available**

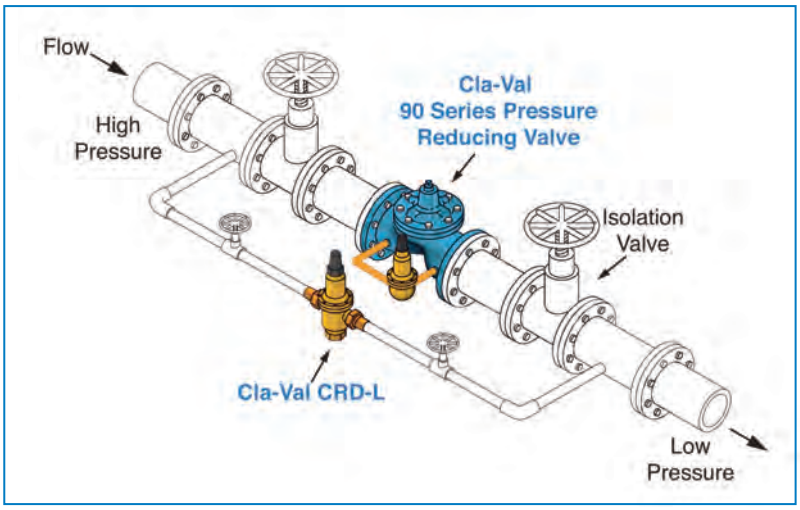
The Cla-Val Model CRD-L Pressure Reducing Valve automatically reduces a higher inlet pressure to a steady lower downstream pressure with our unique design. This valve is an accurate regulator capable of holding downstream pressure to a predetermined amount, regardless of upstream pressure fluctuations.

Periodic maintenance consists of regular internal cleaning which can be facilitated by removing the bottom plug; and periodic inspection and cleaning of the inlet filter which is accessed by loosening the inlet tailpiece connection.

Typical Applications

High rise buildings use CRD-L Pressure Reducing Valves in various water systems (potable water, boiler feed air conditioning, etc.) to control pressure fluctuations between floors.

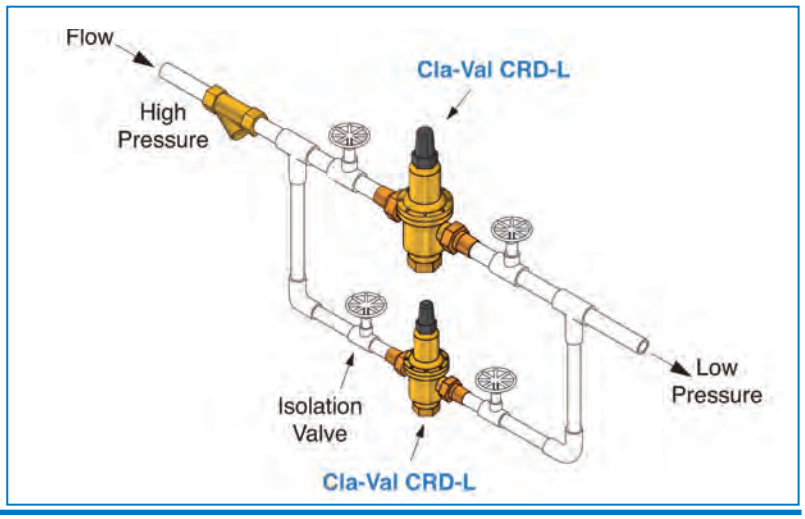
Industrial plants use CRD-L Pressure Reducing Valves between a high pressure supply system and equipment requiring lower pressure. Typically CRD-L Pressure Reducing Valves are used at supply connections for water heaters, boiler feed water or other process water systems.



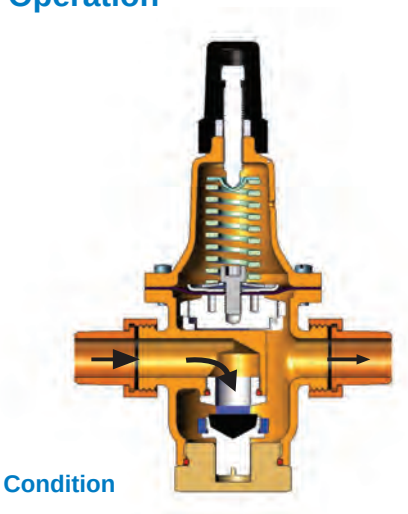
Municipal water systems use CRD-L Pressure Reducing Valves at service connections in a high pressure distribution zone. Depending on flow requirements, CRD-Ls may be installed in parallel.

One CRD-L provides desired outlet pressure while the second CRD-L handles low flow conditions. If necessary, additional CRD-Ls can be added for more flow capacity. The CRD-L is also ideal for a low flow bypass around a larger Cla-Val 90 Series Pressure Reducing Valve.

For applications with water temperatures over 100°F (38°C), use Cla-Val Model CRD-LHW.

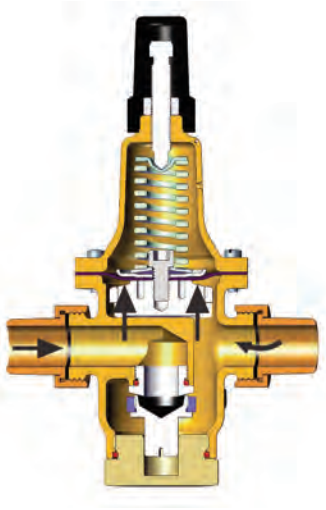


Valve Operation



Flow Condition

When flow begins, the pressure on the underside of the diaphragm will be lower than the set-point of the spring causing the diaphragm to move the valve seat away from the valve seal allowing flow to occur. As the flow increases downstream, the pressure acting on the spring pushes the diaphragm and the valve seat away from the valve seal to regulate outlet pressure to desired value.



No Flow Condition

When there is no flow, the downstream pressure increases and acts against the under side of the diaphragm, pulling the valve seat up against the valve seal to close the valve.

Reduced Pressure Falloff

Unlike pilot controlled pressure reducing valves, direct acting valves are subject to "reduced pressure falloff" (RPF). Reduced pressure falloff is the decrease in downstream regulated pressure that occurs when the flow increases. When the demand for flow increases, the valve must open wider and wider to permit the flow. The only way the valve can open is for the spring force to be greater than the hydraulic force under the diaphragm (the force trying to close the valve). The downstream pressure therefore, must "fall off" or decrease before the spring can open the valve. All spring actuated direct acting valves have similar operating characteristics.

Noise and Velocity Guidelines

Noise in water piping systems can sometimes be attributed to high velocities of water through the valve seat. In general, as the water velocity increases, the noise produced by the installation will increase.

Where noise levels are important, such as residences, hospitals, or schools, pipeline velocities should be in the range of 5 to 10 fps. The chart below shows velocity and the corresponding reduced pressure falloff.

Velocity Guide Chart

Velocity Delta from Set Point, fps	Set Point Pressure Falloff psi			
	1/2, 3/4" and 1"	1-1/4" and 1-1/2"	2"	2-1/2"
5.0	6.0	7.0	15	13
7.5	9.5	12.0	17	17
10.0	12.5	15.0	22	24

Sizing

Step One

Determine the following from the application:

1. Inlet pressure and desired outlet pressure
2. Maximum and minimum flow rate
3. Allowable reduced pressure falloff or maximum velocity based on acceptable noise level

Step Two

Determine the pressure differential across the valve by subtracting the desired outlet pressure from the inlet pressure. If there will be any fluctuations in the inlet pressure, calculate both high and low differentials. At all times the differential must be at least 14.5 psi. When the differential is greater than 150 psi, use two valves in series.

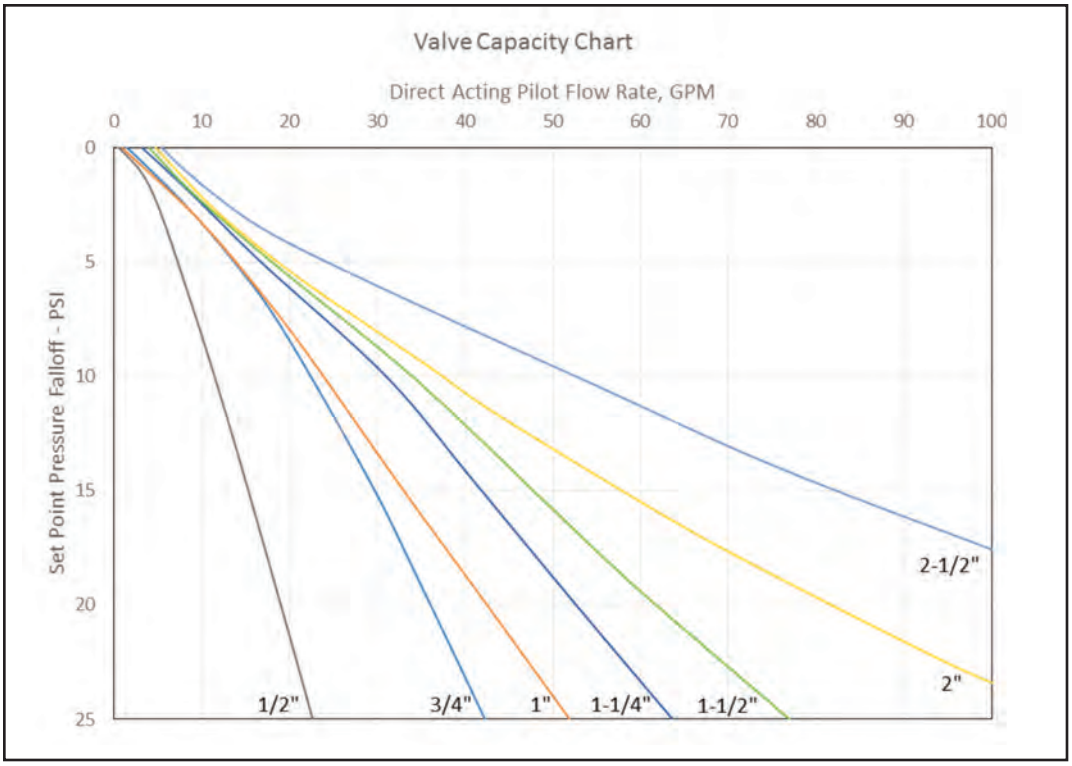
Step Three

Determine the valve size by using the Valve Capacity Charts on the next page. Start by referring to the valve capacity chart for the system's maximum flow rate. Locate the value for the maximum allowable reduced pressure falloff for your application. Select the valve size with a RPF value that is less than the maximum RPF.

For further assistance, contact a Cla-Val representative to utilize Cla-REG sizing software for system design and optimization. Cla-Val's software follows industry standard for single or parallel pressure regulators to prevent under and oversizing. Sizing software allows for wide range of flow requirements to avoid cavitation and noise.

See page 3 for a brief overview of the software.

Valve Capacity Chart



Valve Size and Adjustment Range

1/2, 3/4" and 1"	1-1/4" and 1-1/2"	2”	2-1/2”
15-65	5-60	18-50	18-50
25-100	25-100	30-95	30-95
80-150	75-160	75-200	75-200
125-250	--	--	--

Cla-REG: Pressure Reducing Valve Size Software

Introducing Cla-REG, a proprietary size selection tool developed specifically for Cla-Val Direct Acting Pressure Reducing Valves (CRD-Ls) and Pilot-Operated Pressure Reducing Valves (90 Series). Cla-Reg is a design tool for sizing both the CRD-L direct acting and 90 Series pilot operated pressure reducing valves for buildings. Well established rules are followed to prevent problems of cavitation damage and noise as well as excessive velocity. When pressure drop is too high or flow range is too wide the program automatically places valves in series and/or in parallel to perform over the entire design range.

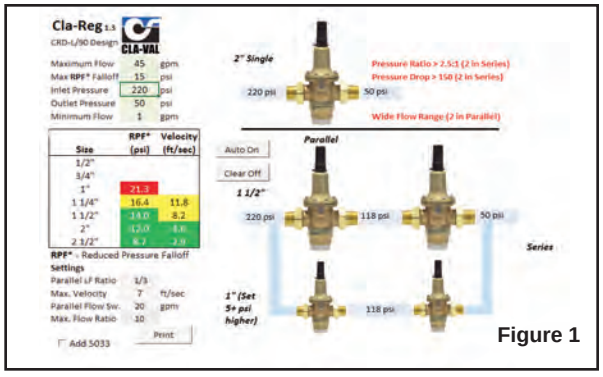


Figure 1

Figure 1 illustrates an example of high pressure drop and very low flow, particularly during low demand. Larger CRD-L pressure regulators are placed in parallel with smaller models to allow optimum performance over typical flow ranges. Because of the high pressure drop they are also placed in series.

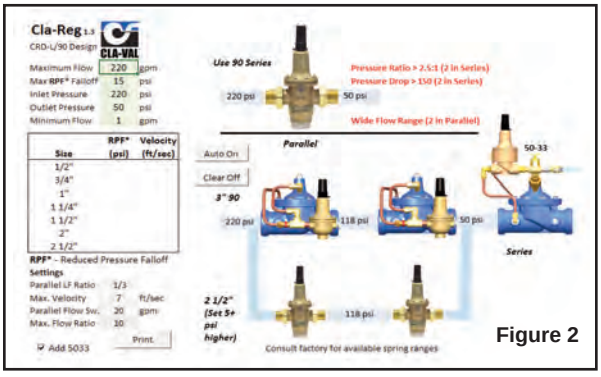


Figure 2

Figure 2 illustrates an even wider range of flows where the high flows are best handled with the 90 Series pilot operated pressure reducing valves. In addition, for protection In the event of malfunction, a safety model 50-33 Series valve is placed downstream which automatically closes on an over pressure condition to protect against damage to downstream plumbing.

Specifications

Temperature Range

Water: to 100°F (38°C) Max

Diaphragm: Buna-N®

Disc: EPDM

Strainer: Inline Mesh

Materials

Body and Cover: Low Lead Bronze- Standard
Stainless Steel - Optional

Pressure Ratings

Maximum Inlet Pressure: 400 psi (25 Bar)
Maximum Differential Pressure: 150 psi (10 Bar)
Minimum Differential Pressure: 14.5 psi

Dimensions (Inches)

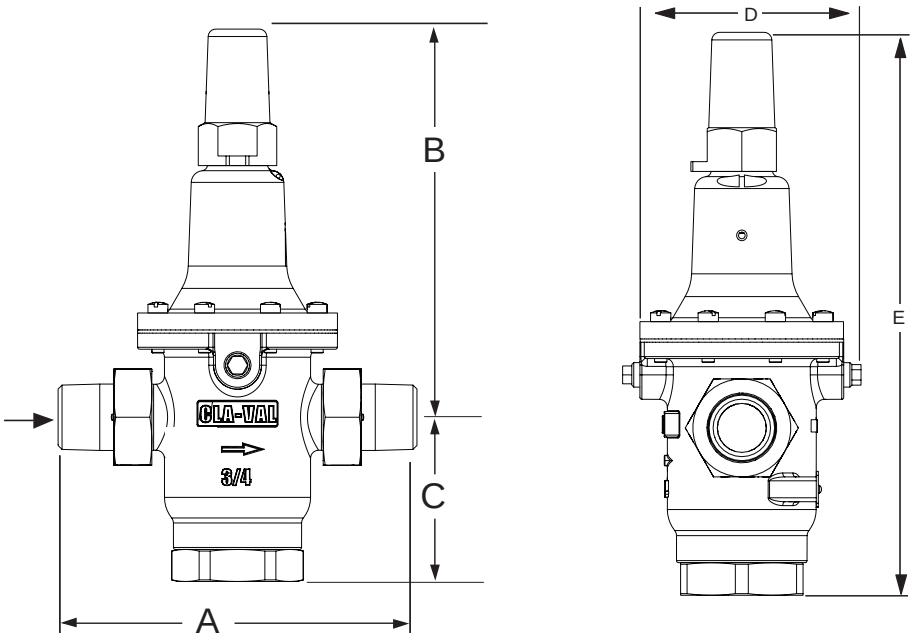
Size	A	B	C	D	E	Weight (lbs.)
1/2"	5.72	6.06	2.56	3.12	8.62	4.0
3/4"	5.60	6.06	2.56	3.12	8.62	4.0
1"	6.68	6.06	2.56	3.12	8.62	4.0
1-1/4"	8.40	7.84	2.75	4.13	10.59	7.5
1-1/2"	9.56	7.84	2.75	4.13	10.59	8.5
2”	11.37	8.11	3.06	4.91	11.17	12.5
2-1/2”	12.19	8.11	3.06	4.91	11.17	13.75

Dimensions (mm)

Size	A	B	C	D	E	Weight (kgs.)
13	143	154	66	80	219	1.8
20	143	154	66	80	219	1.8
25	170	154	66	80	219	1.8
32	214	199	70	105	269	3.4
40	243	199	70	105	269	3.9
50	289	205	78	105	283	5.6
65	310	205	78	105	283	6.2

Gauge Connections

1/2" through 2-1/2" has 1/8" FNPT



When Ordering, Please Specify

1.Catalog No. CRD-L 2. Size 3. Adjustment Range 4. Optional Locking Cap

CLA-VAL

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Lausanne, Switzerland
Phone: 41-21-643-15-55
E-mail: cla-val@cla-val.ch

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Phone: 44-1892-514-400
E-mail: info@cla-val.co.uk

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ZAC du Champ du Périer
France - 01700 Neyron
Phone: 33-4-72-25-92-93
E-mail: cla-val@cla-val.fr

E-CRD-L (R-07/2019)

CLA-VAL®

—MODELS— CRL & 55F

Pressure Relief Valves

- **Direct Acting - Precise Pressure Control**
- **Positive Dependable Opening**
- **Drip Tight Closure**
- **No Packing Glands or Stuffing Boxes**
- **Sensitive to Small Pressure Variations**

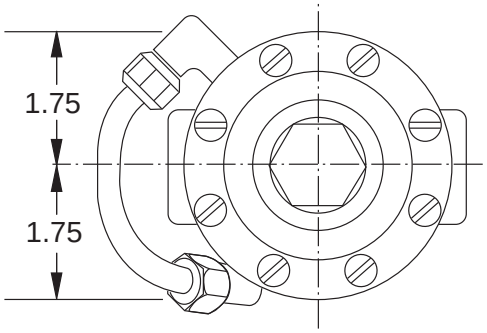
The Cla-Val Model CRL and 55F Pressure Relief Valves are direct-acting, spring loaded, diaphragm type relief valves. Often used as pilot controls for Cla-Val Hytrol valves, they can also be used as self-contained pressure relief valves. These valves may be installed in any position and open and close within very close pressure limits.

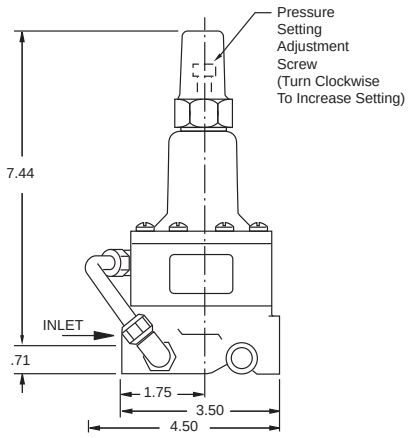
The Model CRL and 55F are normally held closed by the force of the compression spring above the diaphragm. Control pressure is applied under the diaphragm. When the controlling pressure exceeds the spring setting, the disc is lifted off its seat, permitting flow through the control. When control pressure drops below the spring setting, the spring forces the control back to its normally closed position. The controlling pressure is applied to the chamber beneath the diaphragm through an external tube on the Model 55F and a sensing port on the CRL.

Pressure adjustment is simply a matter of turning the adjusting screw to vary the spring pressure on the diaphragm. The CRL & 55F are available in four pressure ranges: 0 to 75 psi, 20 to 105 psi, 20 to 200 psi, and 100 to 300 psi. To prevent tampering, the adjustment cap can be wire sealed by using the lock wire holes provided in the cap and cover.

Dimensions (In Inches)

55F Model





Note: Also Available in Seawater Service Material

Specifications

Size	1/2" & 3/4" Threaded
Temperature Range	Water, Air: to 180°F Max.
Materials	
Body & Cover:	Cast Bronze UNS 87850
	Cast Aluminum 356-T6
	Stainless Steel ASTM A743-CF-16Fa
Trim:	Brass & Stainless Steel 303
Rubber:	Buna-N® Synthetic Rubber
Pressure Ratings	Cast Bronze 400 psi Max.
	Cast Aluminum 275 psi Max.
	Stainless steel 400 psi Max.
Other Materials	Available on special order
Adjustment Ranges	0 to 75 psi
	20 to 105 psi
	20 to 200 psi
	100 to 300 psi
	250 to 600 psi (see E-CRL-18)

CRL-60 — MODEL

Pressure Relief Control

Available in a wide range of materials including seawater service nickel aluminum bronze and stainless steel. Meets low lead requirements.

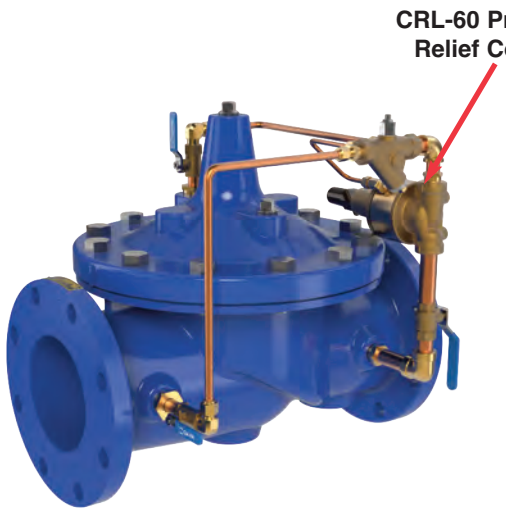
- **Direct Acting - Precise Pressure Control**
- **Positive Dependable Opening**
- **Drip Tight Closure**
- **Remote Sensing**
- **Sensitive to Small Pressure Variations**

The Cla-Val Model CRL-60 Pressure Relief Valve is a direct-acting, spring loaded, diaphragm type relief valve. Often used as a pilot control for Cla-Val Hytrol valves, it can also be used as a standalone pressure relief valve. The CRL-60 may be installed in any position. It opens and closes within very close pressure limits. The bottom plug may be removed and installed in the inlet to convert it to an angle pattern flow path.

The Model CRL-60 is normally held closed by the force of the compression spring above the diaphragm. Control pressure is applied under the diaphragm. When the controlling pressure exceeds the spring setting, the disc is lifted off its seat, permitting flow through the control. When control pressure drops below the spring setting, the spring forces the control back to its normally closed position. The controlling pressure is applied to the chamber beneath the diaphragm through a sensing port on the CRL-60 body.

Pressure adjustment is simply a matter of turning the adjusting screw to vary the spring pressure on the diaphragm. The CRL-60 is available in four pressure ranges: 0 to 75 psi, 20 to 105 psi, 20 to 200 psi, and 100 to 300 psi. To prevent tampering, the adjustment cap can be wire sealed by using the lock wire holes provided in the cap and cover; or supplied with a X140-1 Locking Cap. The X140-1 is a key and six-pin cylinder locking security cap that completely encapsulates the pilot control adjustment screw and cannot be removed without the appropriate key.

Typical Application for CRL-60 Pressure Relief Control



50 Series Pressure Relief Control Valve

Model CRL-60 Pressure Relief Control is ideally suited as pilot control for Cla-Val Series 50 pressure relief or pressure sustaining automatic control valves. The 50 Series valves are hydraulically operated, pilot controlled, modulating type valves, used where pressure relief is needed in a waterworks pipeline distribution system downstream of any high pressure source, such as pressure reducing stations or pump stations, or they can also be used in a bypass to control pump delivery pressure.

Model CRL-60 is designed to maintain constant upstream pressure to close limits at a remote point in many Cla-Val pilot control systems. Cla-Val 50 Series Pressure Relief Valves use CRL-60 to sense and actuate main valve using inlet line pressure through pilot system. In event of a pressure surge in pipeline, CRL-60 remotely sensing valve inlet pressure opens quickly to control main valve opening and maintains water flow to atmosphere to dissipate pressure surge. CRL-60 closes slowly as the inlet pressure lowers to a safe pressure to prevent new surges, and finally when inlet pressure is below the pressure setting, the main valve closes drip tight. Pressure setting adjustment is made with a single adjusting screw that has a protective cap to discourage tampering.

Specifications

Size 1/2", 3/4" & 1"Threaded
Temperature Range Water, Air: to 180°F Max.
Standard Materials
Body & Cover: Low Lead Bronze
Trim: Stainless Steel 303
Rubber: Buna-N® Synthetic Rubber

Pressure Ratings Bronze 400 psi Max.
Stainless Steel 400 psi Max.
Other Materials Available on special order
Adjustment Ranges 0 to 75 psi
20 to 105 psi (on 1/2" size only)
20 to 200 psi
100 to 300 psi

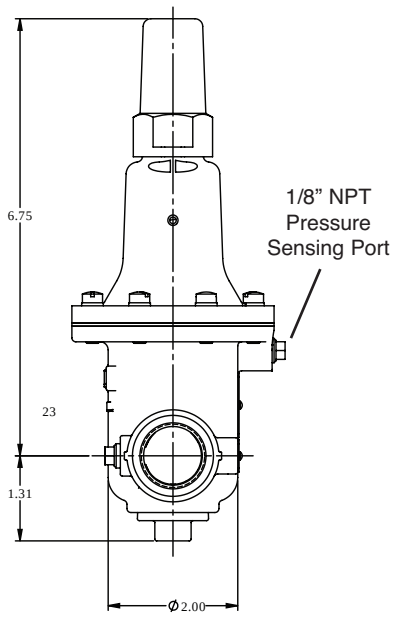
CRL-60 PSI	Approximate Increase For Each Clockwise Turn Of Adjusting Screw
0 to 75	8.5 psi
20 to 105	12.0 psi
20 to 200	28.0 psi
100 to 300	18.0 psi

Pressure Drop Chart (Full Open Valve)

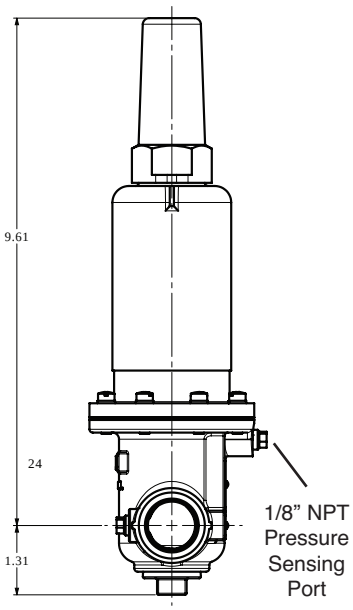
Valve Size	Cv Factor	Flow of Water - gpm					
		5	10	15	20	30	40
1/2"	6.0	0.7	2.7	6.0	11.0	- -	- -
3/4"	8.5	0.3	1.4	3.1	5.5	12.2	- -
1"	12.5	0.2	0.6	1.4	2.6	5.8	10.2

Dimensions 1/2" and 3/4" Sizes

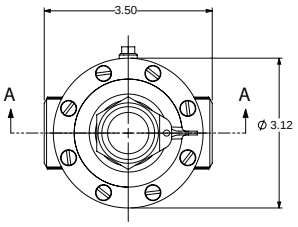
0 to 75, 20 - 105 and 20 to 200 psi design



100 to 300 psi design

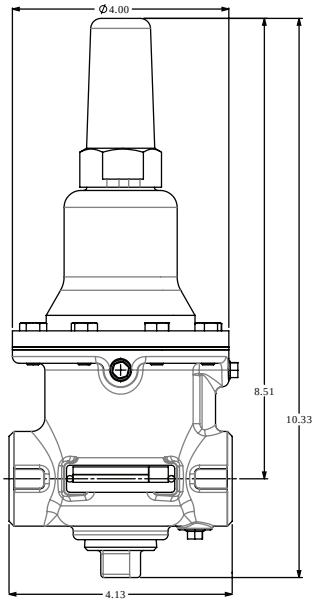


(applies to both configurations)



Dimensions 1" Size

20 - 75, 40 - 400 and 100 - 300 psi design

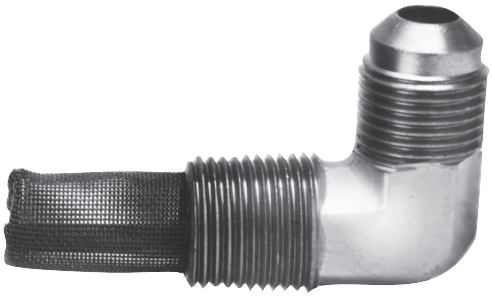


When Ordering, Specify:

1. Catalog No. CRL-60
2. Valve Size
3. Adjustment Range Desired
4. Optional Materials
5. Optional Security Cap

Pilot System Strainers & Restriction Assemblies

X46A Straight



X46B Angle

- **X46A/X46B Flow Clean Strainer**
- **Self Scrubbing Cleaning Action**
- **Straight Type or Angle Type**
- **Many Sizes Available**

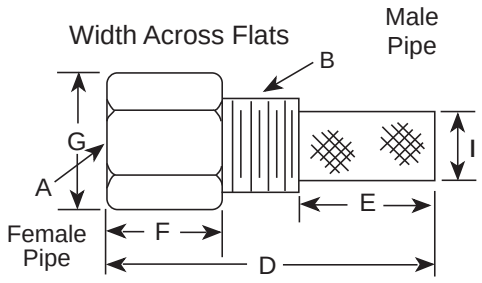
The Cla-Val Model X46 Flow Clean Strainer is composed of a heavy mesh monel inner screen covered with a fine mesh monel outer screen. These two elements are securely soldered to a sturdy brass bar stock housing. The outer screen is a 40 x 40 mesh screen with .008" wire. This strainer is designed to prevent passage of foreign particles larger than .015". It is especially effective against such contaminates as algae, mud, scale, wood pulp, moss, and root fibers. Available in several different sizes as shown. There is a model for every Cla-Val. Valve.

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

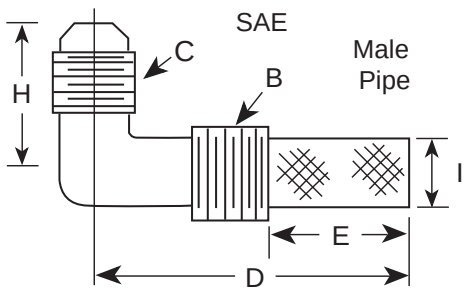
The strainer can be installed in any piping system where there is a moving stream to keep it clean. On Cla-Val Valves the installation is made in the body tapping so the screen is projecting into the flow stream.

Dimensions (In Inches)

Straight Type A (In Inches)								
A	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**
⅛	⅛	-	1¾	¾	½	½	-	¼
¼	¼	-	2¼	1	¾	¾	-	⅜
⅜	⅜	-	2½	1	⅞	⅞	-	½
⅜	½	-	2½	1¼	½	⅞	-	¾
½	½	-	3	1¼	1	1⅛	-	¾
⅜	¾	-	3⅜	2	½	1	-	⅞
¾	¾	-	4	2	1	1½	-	⅞
⅜	1	-	4¼	2¾	½	1⅜	-	⅞
1	1	-	4½	2¾	1¼	1¾	-	⅞
½	1	-	4¼	2¾	½	1⅜	-	⅞
Angle Type B (In Inches)								
-	⅛	¼	1⅜	⅝	-	-	⅞	¼
-	¼	¼	1¾	¾	-	-	1	⅜
-	⅜	¼	2	⅞	-	-	1	½
-	⅜	⅜	1⅞	⅞	-	-	1	½
-	½	⅜	2⅜	1	-	-	1¼	⅝



Straight Type A



Angle Type B

Specifications

Body — Brass (also available in stainless steel on special order)
Strainer Screen — fabricated from Monel wire.

When Ordering, Please Specify:

- Catalog No. X46
- Straight Type or Angle Type

X42N-2
Strainer and Needle Valve Assembly

Size	Body Material.	Screen Material.
3/8"	Standard: Bronze	Monel
3/8"	Option: Bronze	Stainless Steel
3/8"	Option: Stainless Steel	Stainless Steel

X42N-3
Strainer and Needle Valve Assembly

Size	Body Material.	Screen Material.
3/8"	Standard: Bronze	Monel
3/8"	Option: Bronze	Stainless Steel
3/8"	Option: Stainless Steel	Stainless Steel

X43
"Y" Pattern Strainer

Size	Body Material	Screen Material
3/8"	Standard: Bronze	Stainless Steel

X44A
Strainer and Orifice Assembly

Size	Body Material	Screen Material
3/8 "	Standard: Bronze	Monel
3/8 "	Option: Bronze	Stainless Steel
3/8 "	Option: Stainless Steel	Stainless Steel

X58B
Restriction Assembly

Size	Body Material	Restriction Fitting Material
1/4 - 3/8"	Standard: Bronze	Delrin
	Option: Bronze	Delrin
	Option: Stainless Steel	Stainless Steel

X58C
Restriction Assembly

Size	Body Material	Restriction Fitting Material
1/4 - 3/8"	Standard: Bronze	Bronze
	Option: Bronze	Delrin
	Option: Stainless Steel	Stainless Steel

CV
MODEL –
CVS-1
Flow Controls

CLA-VAL®

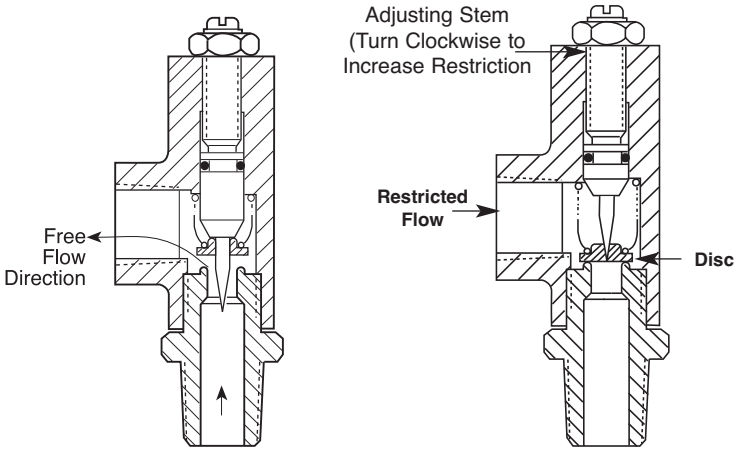
- **Corrosion Resistant**
- **Easy Adjustments**
- **Automatic Operation**
- **No Lubrication**
- **Operates In Any Position**
- **Easy Maintenance**

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.

Specifications

Size	3/8"
End Detail	3/8" NPT – One connection male & one connection female
Pressure Rating	400 psi Max.
Temperature Range	250°F Max.
Materials	Housing: Bronze ASTM B61 Trim: Stainless Steel 303 Other Materials available: All Stainless Steel Bronze & Monel

Principle of Operation



Free Flow, is against the direction of the needle. The disc is forced off its seat by line pressure allowing full capacity flow through the control

Restricted Flow, is in the direction of the needle. This disc is forced against its seat by line pressure. Flow is metered through the control by the fine taper of the needle and the small openings in the disc.

- **No Lubrication**
- **Corrosion Resistant**
- **One Moving Part**
- **Replaceable Teflon Coated Seal**
- **Fast Acting, Non-Sticking**
- **Easy Maintenance**

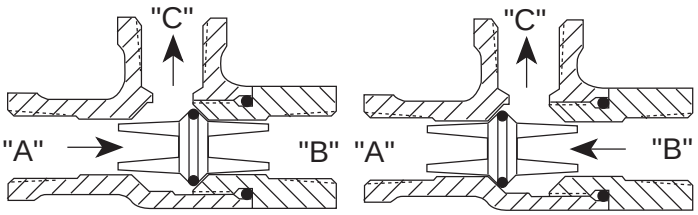
The CVS-1 Shuttle Valve is precision engineered for lasting dependable service. The CVS-1 combines instantaneous action with one moving part designed for smooth positive operation with minimum wear. The flow pattern interconnects the highest pressure from two separate pressure zones (ports "A" or "B") to a common port "C". The two pressure zones, ports A or B can never flow to one another.

The design incorporates precision sealing required for low pressure or high pressure operation. The seal is teflon coated to prevent sticking under the most adverse conditions of exposure or prolonged actuation in one position. The CVS-1 Shuttle Valve incorporates all the required features for lasting dependable service.

Specifications

Size	3/8"
End Detail	3/8" NPT — Three Female Connections
Pressure Rating	400 psi Max.
Shifting Differential	10" Water Column Differential
CV Factor	"A" to "C" 3.5 "B" to "C" 3.1
Temperature Range	Water to 140°F
Materials	**Body** Cast Bronze ASTM B-62 **Internal Trim** Delrin **Rubber Parts** Static Seal Buna-N® Synthetic Rubber Shuttle Seal Buna-N® Synthetic Rubber Teflon Coated

Principle of Operation



Flow Direction "A" to "C" **Flow Direction "B" to "C"**

Product Dimensions Data:

For the CV Flow Control dimensions see www.cla-val.com.
For the CVS-1 Flow Control dimensions see www.cla-val.com.

CLA-VAL™

— MODEL — **X43H**

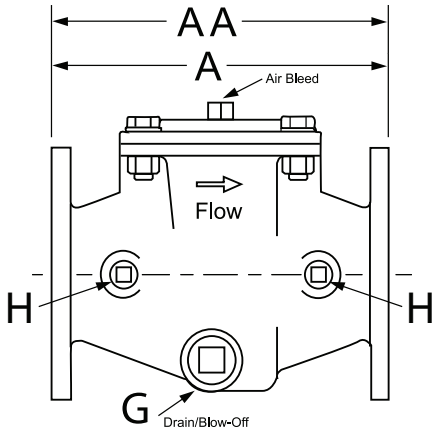
H Style Strainer

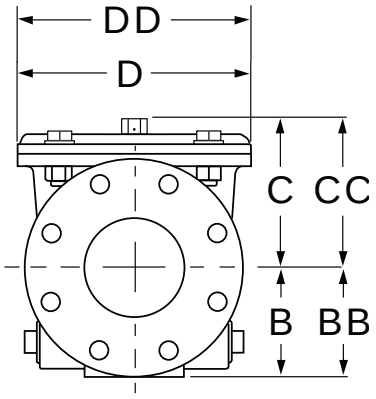
- **Low Pressure Drop**
- **Ductile Iron with NSF/ANSI 61 Fusion Bonded Epoxy Coating Construction with a 316 Stainless Steel Strainer**
- **Large Flow Area H-Style Design**
- **Service Without Removal From Line**

The Cla-Val Model X43H Strainer offers an effective means of removing unwanted solid particles in pipeline flow. These strainers are ideal for preventing fouling, debris and particle buildup in Cla-Val Automatic Control Valves. The large flow area design, with a flat stainless steel strainer mesh perpendicular to flow, is optimized for low pressure drop applications.

Optional accessories that can be added to the X43H Strainer include the Differential Pressure Switch and the X141DP Differential Pressure Gauge Assembly.

Maintenance is fast and easy with the compact H-pattern, requiring only top cover removal. Though the strainer may be installed in any position, installation with the cover up is recommended.





Dimensions

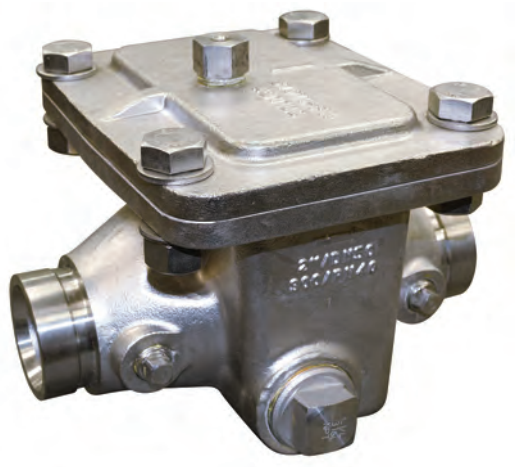
Strainer Size (inches)	**1 ½**	**2**	**2 ½**	**3**	**4**	**6**	**8**	**10**	**12**	**14**	**16**	**18**	**20**	**24**	**30**	**36**	**48**
A 150 ANSI	9.06	9.06	9.06	11.81	11.81	15.75	19.69	22.83	24.02	25.59	31.50	31.50	37.40	43.31	45.27	45.67	45.67
AA 300 ANSI	9.13	9.13	9.13	11.89	11.89	15.83	19.76	22.91	24.09	25.67	31.57	31.57	37.48	43.39	- -	- -	- -
B 150 ANSI	2.50	3.26	3.66	4.06	4.33	5.63	6.69	8.40	9.40	10.24	12.20	13.18	19.09	19.09	22.49	26.00	34.00
BB 300 ANSI	3.26	3.26	3.66	4.06	5.02	5.63	7.50	8.86	10.20	10.94	12.70	15.00	19.09	19.09	- -	- -	- -
C Max. 150 ANSI	3.78	3.78	3.78	5.91	5.91	7.52	8.82	11.61	15.16	14.96	19.69	19.69	23.98	23.98	25.10	36.20	34.11
CC Max. 300 ANSI	5.20	5.20	5.35	6.22	6.22	7.99	9.33	12.79	15.67	15.67	19.69	19.69	23.98	23.98	- -	- -	- -
D Dia. 150 ANSI	7.87	7.87	7.87	9.25	9.25	15.74	18.11	22.05	26.77	26.77	35.43	35.43	46.85	46.85	46.85	61.65	61.65
DD Dia. 300 ANSI	7.99	7.99	7.99	9.37	9.37	15.86	18.23	22.17	26.85	26.85	35.43	35.43	46.85	46.85	- -	- -	- -
H Inlet/Outlet Plugs NPT	½	½	½	½	½	½	½	½	½	½	½	½	½	½	½	½	½
G Drain/Blow-off Plug NPT	1¼	1¼	1¼	1¼	1¼	1¼	1¼	1¼	2	2	2	2	2	2	2	2	2
Approx. Ship Wt. Lbs.	33	36	39	59	73	143	212	432	626	683	970	1073	1175	1962	2249	4123	4828

Strainer Size (mm)	**40**	**50**	**65**	**80**	**100**	**150**	**200**	**250**	**300**	**350**	**400**	**450**	**500**	**600**	**750**	**900**	**1200**
A 150 ANSI	230	230	230	300	300	400	500	580	610	650	800	800	950	1100	1150	1160	1160
AA 300 ANSI	232	232	232	302	302	402	502	582	612	652	802	802	952	1102	- -	- -	- -
B 150 ANSI	64	83	93	103	110	143	170	213	240	260	310	335	485	485	571.5	660.5	862.5
BB 300 ANSI	83	83	93	103	128	143	191	225	259	278	321	380	485	486	- -	- -	- -
C Max. 150 ANSI	96	96	96	150	150	191	224	295	385	380	500	500	609	609	637.5	919.5	866.5
CC Max. 300 ANSI	132	132	136	158	158	203	237	325	398	398	500	500	609	609	- -	- -	- -
D Dia. 150 ANSI	200	200	200	235	235	400	460	560	680	680	900	900	1190	1190	1190	1566	1566
DD Dia. 300 ANSI	203	203	203	238	238	403	463	563	682	682	900	900	1190	1190	- -	- -	- -
H Inlet/Outlet Plugs NPT	½	½	½	½	½	½	½	½	½	½	½	½	½	½	½	½	½
G Drain/Blow-off Plug NPT	1¼	1¼	1¼	1¼	1¼	1¼	1¼	1¼	2	2	2	2	2	2	2	2	2
Approx. Ship Wt. (kg)	15	16	18	27	33	65	96	196	284	310	440	600	810	890	1020	1870	2190

CLA-VAL®

— MODEL — X43H

Stainless Steel H Style Strainer

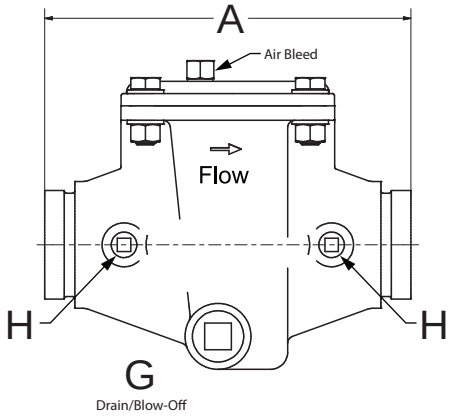


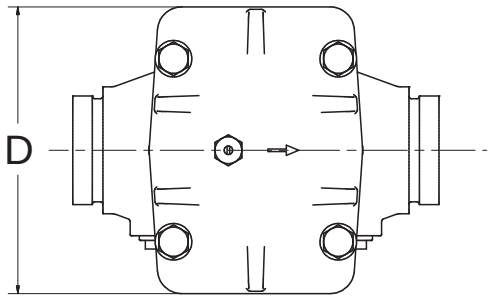
- **Low Pressure Drop**
- **316 Stainless Steel Construction**
- **Large Flow Area H-Style Design**
- **Service Without Removal From Line**
- **The materials of construction used in this product meets the intent of the federal lead content mandate.**

The Cla-Val Model X43H Strainer offers an effective means of removing unwanted solid particles in pipeline flow. These strainers are ideal for preventing fouling, debris and particle buildup in Cla-Val Automatic Control Valves. The large flow area design, with a flat stainless steel strainer mesh perpendicular to flow, is optimized for low pressure drop applications. Maintenance is fast and easy with the compact H-pattern, requiring only top cover removal. Though the strainer may be installed in any position, installation with the cover up is recommended.

Specifications

Sizes (Inches): 1½, 2, 2½, 3, 4, 6
Sizes (mm): 40, 50, 65, 80, 100, 150
Ends: Grooved, ANSI Class 300
Max Pressure Rating: 300# - 400 psi
Temperature: Maximum 175°F
Materials:
Body & Cover: 316 Stainless Steel
Cover Seal: Buna-N® Synthetic Rubber
Strainer: 316 Stainless Steel
Strainer Mesh Sizes: Standard 10 mesh / 2000 Micron / Openings 0.078 inch • Optional .039 and .059 inch openings available
Drain/Blow-Off: Connection furnished with Standard Stainless Steel Plug
Cover Fasteners: Stainless Steel



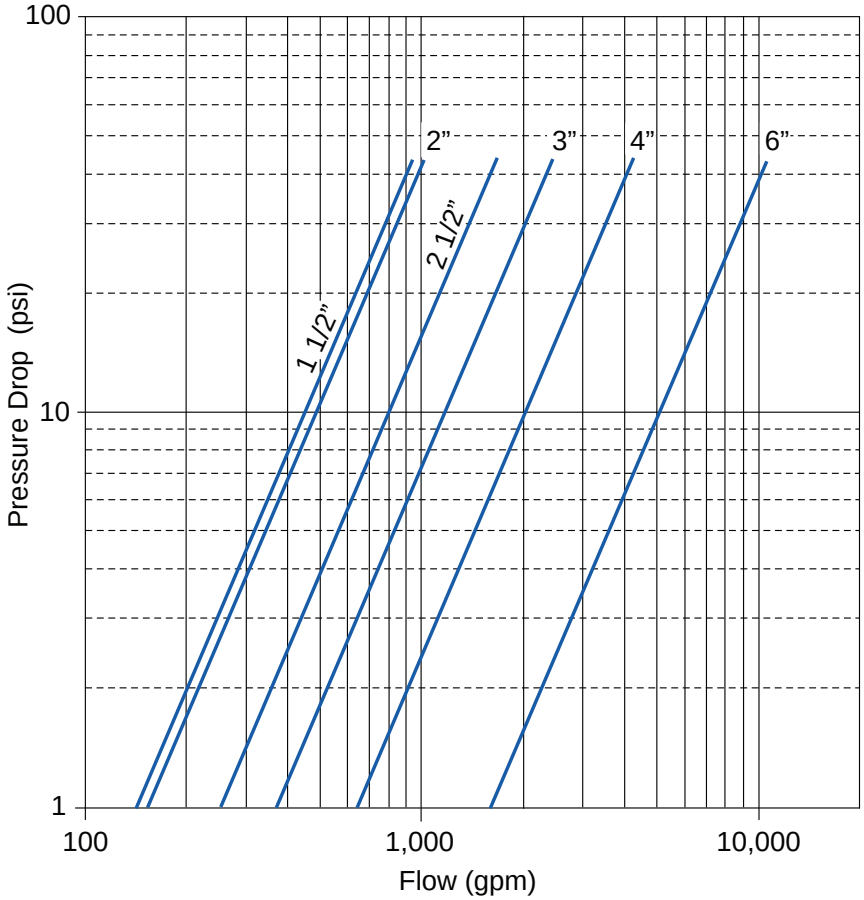


Dimensions

Strainer Size (inches)	1 ½	2	2 ½	3	4	6
A Grooved End	9.06	9.06	9.06	11.81	11.81	15.75
D	7.87	7.87	7.87	9.25	9.25	14.96
H Inlet/Outlet Plugs	½	½	½	½	½	½
G Drain/Blow-off Plug	1¼	1¼	1¼	1¼	1¼	1¼

Strainer Size (mm)	40	50	65	80	100	150
A Grooved End	230	230	230	300	300	400
D	200	200	200	235	235	380
H Inlet/Outlet Plugs	½	½	½	½	½	½
G Drain/Blow-off Plug	1¼	1¼	1¼	1¼	1¼	1¼

Model X43H Flow Chart

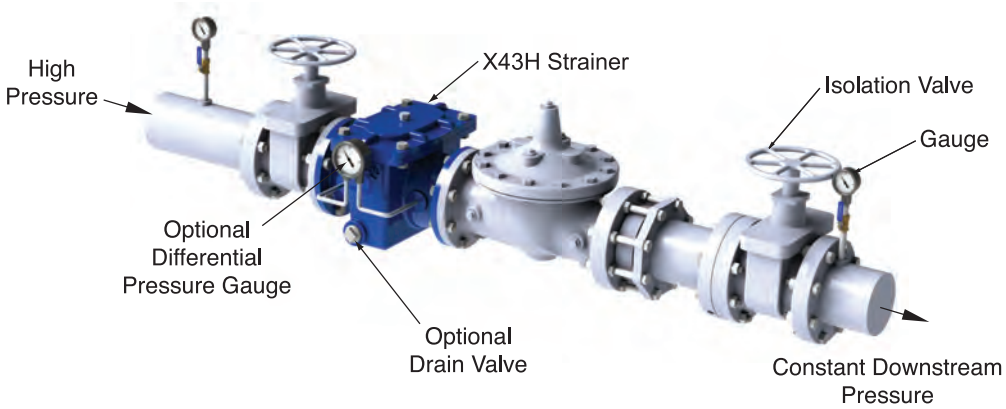


C_V Factor

Size (inches)	1 ½	2	2 ½	3	4	6
Size (millimeters)	40	50	65	80	100	150
C_V (Gal/Min. - gpm.)	96	150	254	367	654	1644
C_V (Litres/Sec - l/s.)	23	36	61	85	157	395

C_V in gpm = gpm @ 1psid head loss • C_V in l/s = l/s @ 1bar head loss

Model X43H Strainer Typical Application



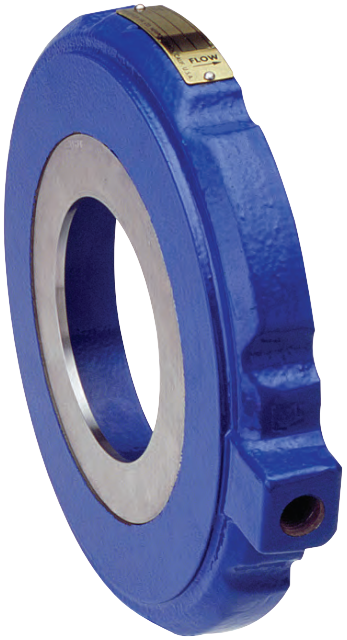
Strainer Options

X141DP Differential Pressure Gauge

Differential Pressure Switch

X52E — MODEL —

Orifice Plate Assembly



- **Wafer Design**
- **Fits ANSI 125, 150, 250, 300**
- **Optional Materials Available**
- **Easy to use size Selection Chart**

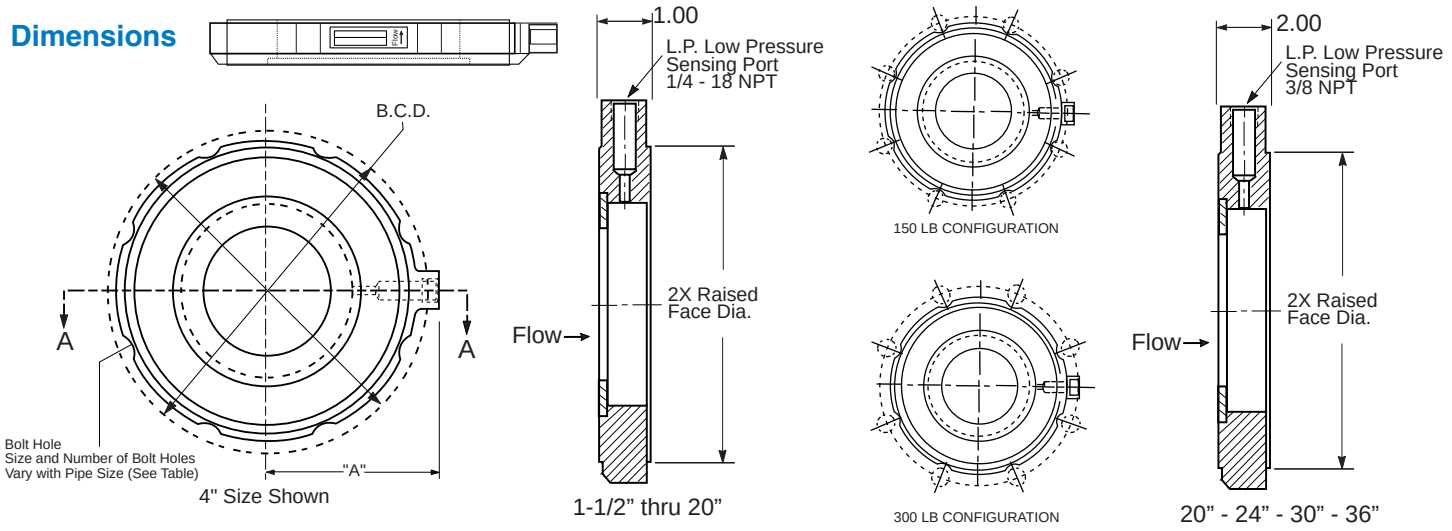
The Cla-Val Model X52E Orifice Plate Assembly is typically used with Cla-Val flow control valves. The orifice plate is an essential component used to generate a specific, predictable pressure drop in the system. The X52E uses a wafer design holder which offers a compact light-weight assembly that is easy to install. The X52E has a Chamfered "Inlet" side so even after installation, correct orientation can be easily verified.

The orifice plate portion of the assembly is made of 302 stainless steel with other materials options also available. The plate is machined to a recommended "square edge". The plate holder portion of the assembly is Ductile Iron standard. Fusion-bonded epoxy coating is an option. The holder may be made of other materials.

Selecting an orifice plate bore size is made by using charts provided.

We recommend installation of this assembly with the sensing port to the side of the pipeline to prevent air pockets and obstructions in the sensing line. Installation adjacent to a butterfly valve is not recommended as the orifice plate assembly may interfere with the opening of this type of valve.

Dimensions



NOMINAL PIPE SIZE (inches)		1-1/2	2	2-1/2	3	4	6	8	10	12	14	16	18	20	24	30	36
Diameter of Flange		3.63	4.25	5.00	5.75	7.00	9.75	12.00	14.14	16.50	19.00	21.12	23.50	25.62	27.25	30.26	36.26
Diameter of Raised Face		2.88	3.63	4.13	5.00	6.19	8.50	10.63	12.75	15.00	16.25	18.50	21.00	23.00	23.50	29.25	35.25
"A" Dim from CL to top of boss		2.31	2.62	3.00	3.38	4.00	5.38	6.50	7.62	8.75	10.00	11.06	12.50	13.75	16.00	19.50	22.88
Diameter of Bolt Circle (B.C.D.)		3.88	4.75	5.50	6.00	7.50	9.50	11.75	14.25	17.00	18.75	21.25	22.75	25.00	29.50	36.00	42.75
150 Lb.	Number of Bolts	4	4	4	4	8	8	8	12	12	12	16	16	20	20	28	32
	Radius of Bolt Holes	.31	.38	.38	.38	.38	.44	.44	.50	.50	.56	.56	.62	.62	.69	.69	.81
300 Lb.	Diameter of Bolt Circle	4.50	5.00	5.50	6.63	7.88	10.63	13.00	15.25	17.75	20.25	22.50	24.75	27.00	30.38	CF*	CF*
	Number of Bolts	4	8	8	8	8	12	12	16	16	20	20	24	24	20	CF*	CF*

*Consult Factory

CLA-VAL™

—MODEL— **X101**

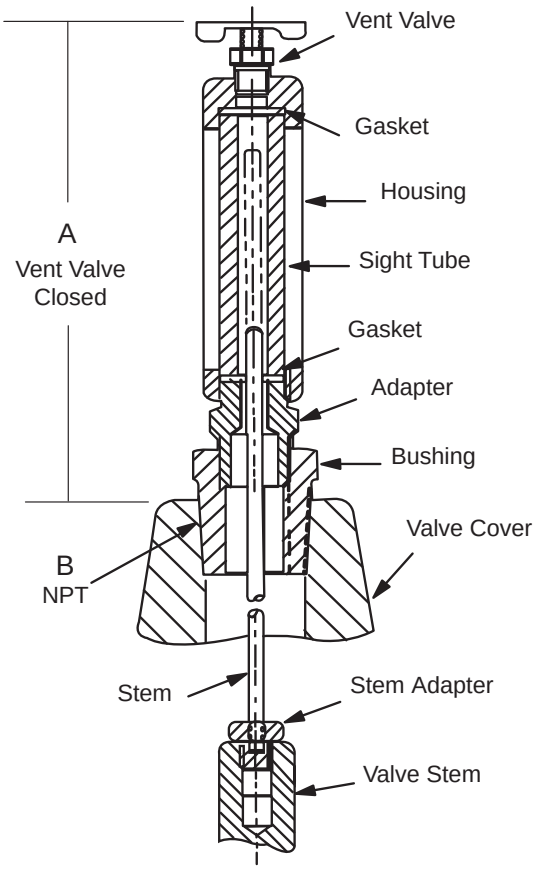
Valve Position Indicator & Pilot System Components

- **Positive Visual Indicator**
- **Frictionless**
- **Leak Proof**
- **Easy Maintenance and Cleaning**
- **Protected Indicator Rod**

The Cla-Val Model X101 Visual Position Indicator is designed to display Cla-Val valve position quickly and easily. A solid brass indicator rod fastened directly to the valve stem moves up and down inside a pyrex tube. The tube is contained within a brass housing which is open on two opposite sides to permit clear vision of the indicator rod.

To purge air that may be trapped in the valve cover, a vent valve in the top of the housing is provided. Model X101 valve position indicator is furnished complete for installation on specified size Cla-Val Automatic Control Valve.

Dimensions



VALVE SIZE	A INCHES	B NPT
1"	5.88	1/4"
1 1/4"	3.21	1/4"
1 1/2"	3.21	1/4"
2"	3.33	1/2"
2 1/2"	3.33	1/2"
3"	3.33	1/2"
4"	4.52	3/4"
6"	4.52	3/4"
8"	5.83	1"
10"	7.70	1"
12"	8.20	1 1/4"
14"	8.20	1 1/2"
16"	10.81	2"
24"	12.04	1"

Dimension "A" is height added to valve by indicator assembly

Specifications

Sizes:	1" thru 24"
Materials:	Brass, Pyrex Tube
Pressure Rating:	400 psi
Optional Material:	Stainless Steel

Installation

Can be installed on any Cla-Val main main valve in a few minutes. Simply replace the fitting on top of the valve cover with the indicator assembly.

When Ordering, Please Specify

1. Valve Size
2. Catalog No. X101
3. Valve Series No. (Appears on Valve Nameplate)
4. Optional Material
   Stainless Steel

X105L
X105L2

MODEL

Limit Switch Assemblies

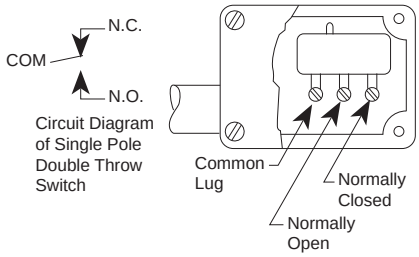
Switch only

- **UL Listed Switches**
- **Positive Action**
- **Rugged and Dependable**
- **Weather Proof or Explosion Proof**
- **Easy To Adjust**

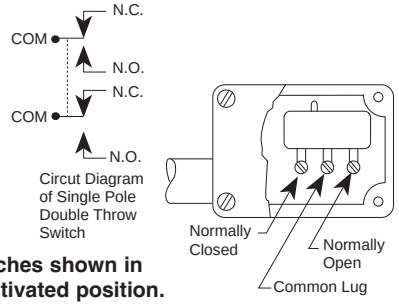
The Cla-Val Model X105L/X105L2 Limit Switch Assembly is a rugged, dependable and positive acting switch assembly actuated by the opening or closing of a Cla-Val control valve on which it is mounted. The single pole, double throw micro switch can be connected either to open or to close an electrical circuit when actuated. By loosening the allen screw on the actuating collar and raising or lowering the collar on the stem, the X105L is easily adjusted to signal that the valve has fully reached the desired position (open or closed).

Installation

Single Pole Double Throw Switch



Double Pole Double Throw Switch

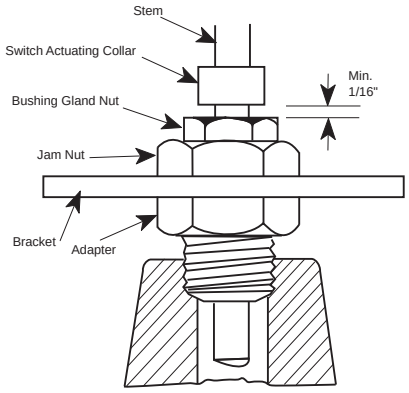


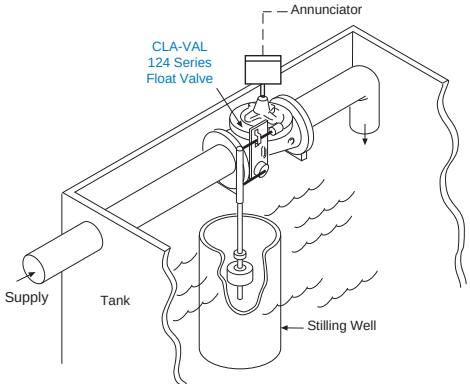
Switches shown in unactivated position.

1. Remove plug in top of valve cover.
2. Screw actuating stem into main valve stem.
3. Slip adapter down over stem and screw into place on valve cover.
4. Attach micro switch housing and bracket to adapter with jam nut.
5. Bring electrical supply circuit into unit through the 1/2" tapping in micro switch housing.
6. Adjust switch collars. (Set collar to trip switch after valve is positioned fully open or fully closed)

Actuating Collar Adjustment Minimum Setting

When adjusting actuating collar for proper switch action, a clearance of at least 1/16" (1/8" for 24" valve) must be provided between the collar and the bushing gland nut when valve is in the fully closed position.





Typical Application

Used for any electrical operation which can be performed by either opening or closing a switch; such as alarm systems, process control, pump control, motor starting or stopping, etc. Readily attached to most Cla-Val Valves.

CLA-VAL

— MODEL — X140-1

Locking Security Cap

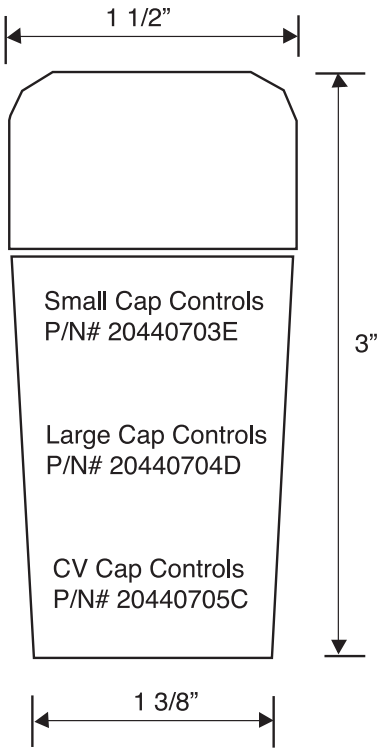
X140-1
Locking
Security Cap

- **Controlled Security for Pilot Control Adjustment**
- **Long Life Stainless Steel Construction**
- **Tamper-Resistant Design**
- **X140-1 Key and Six Pin Cylinder Lock Supplied**

The Cla-Val Model X140-1 Locking Security Cap is designed to completely encapsulate the pilot control adjustment screw with Stainless Steel. Even in the harshest environment, the X140-1 offers an extra level of protection, security and peace of mind for the system operator that pilot control settings will not change until appropriate personnel are present.

The X140-1 Locking Security Cap is available in three sizes for attaching to Cla-Val pilot controls in place of the standard plastic cap.

Dimensions (In Inches)



Specify on order complete pilot-control nameplate data to ensure proper selection of the X140-1.

X141 — MODEL —

Cla-Val Gauge Option

Model X141
4" Pressure Gauge

- **Liquid-Filled**
- **Dual Scale (PSI / BAR)**
- **Long Life Stainless Steel Construction**
- **Tamper-Resistant Design**
- **2 ½" and 4" Diameter Sizes**
- **Isolation Valve Included**

The Cla-Val Model X141 Pressure Gauge Option consists of glycerin-filled pressure gauges with the Cla-Val Logo and ¼" CK2 Bronze Isolation Valves on the main valve inlet and outlet. Cla-Val gauges are waterproof, shock resistant, and fully enclosed with a stainless steel case and bronze wetted parts. Ambient temperature ratings are -4 Degrees F to +140 Degrees F (-20 Degrees C to +60 Degrees C).

All gauges have dual scale (PSI/BAR) and are supplied with a 1/4" NPT bottom connection. Model X141 gauges are available installed on new valves and must be specified on the customer Purchase Order. Consult factory for other available materials.

Available Pressure Ranges

X141 Gauge Assembly (2 1/2" Diameter Dial)

Pressure Range*	Part Number
0 - 60 psi	20534301A
0 - 100 psi	20534302K
0 - 200 psi	20534303J
0 - 300 psi	20534304H
0 - 400 psi	20534305G

X141 Gauge Assembly (4" Diameter Dial)

Pressure Range*	Part Number
0 - 60 psi	20534301A
0 - 100 psi	20534307E
0 - 200 psi	20534308D
0 - 300 psi	20534309C
0 - 400 psi	20534310K

*Specify desired pressure range and valve location (inlet or outlet) on order.

Typical X141 Installation

Typical Installation with two X141 Gauges

MODEL **X144D**

e-FlowMeter with Display

- **Plug and Play Metering**
- **Built-In LCD Touch Screen**
- **Can be factory assembled on a new valve**
- **Alleviates the need for an in-line meter and the associated installation costs**
- **IP68 Submersible**
- **Stainless Steel Construction**
- **Independent laboratory tested:**
  - **Utah State University, Imperial College - London**

Installation view of the X144D e-FlowMeter
Note: Consult Factory for Angle Pattern Applications

The Cla-Val Model X144D e-FlowMeter is a vortex shedding insertion flow meter designed to be retrofitted into a Cla-Val Automatic Control Valve to provide accurate flow measurement data without the need to install a separate meter.

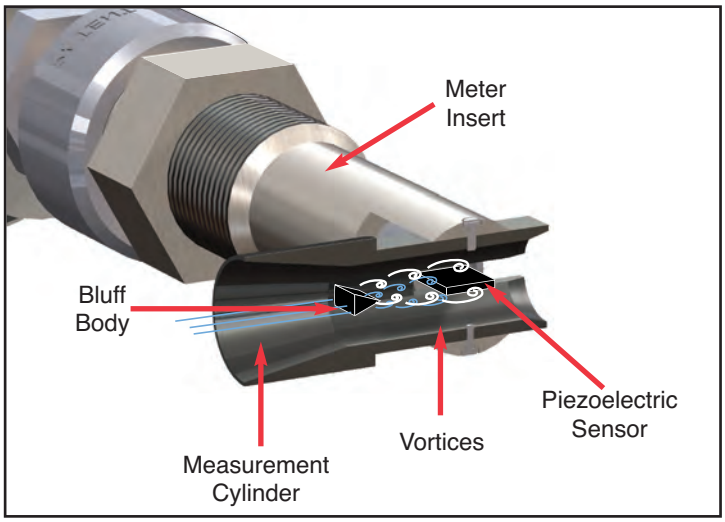
Configured for installation in the inlet tapping of a Cla-Val Automatic Control Valve, the X144D can be used in valves directly downstream of a flow disturbance such as elbows, valves or a reducer. (See page 2 for installation guidelines)

The X144D e-FlowMeter employs an innovative swivel mechanism which allows the meter to be inserted into tappings as small as 1/2-inch. For applications involving installation in close proximity to pump discharge, please consult factory with details.

Frequency Measurement

The X144D e-FlowMeter uses the vortex shedding method to measure flow. The meter is inserted into the inlet tapping of the valve and the measurement cylinder is oriented parallel to the direction of flow. The flow enters the measurement cylinder where it encounters the bluff body, generating vortices, which in turn, deflects off the piezoelectric sensor.

The sensor counts the vortices and communicates the data to the meter's integral circuit board. The flow data signal is converted to 4-20mA, or transistor (NPN) pulse, depending on the desired application.

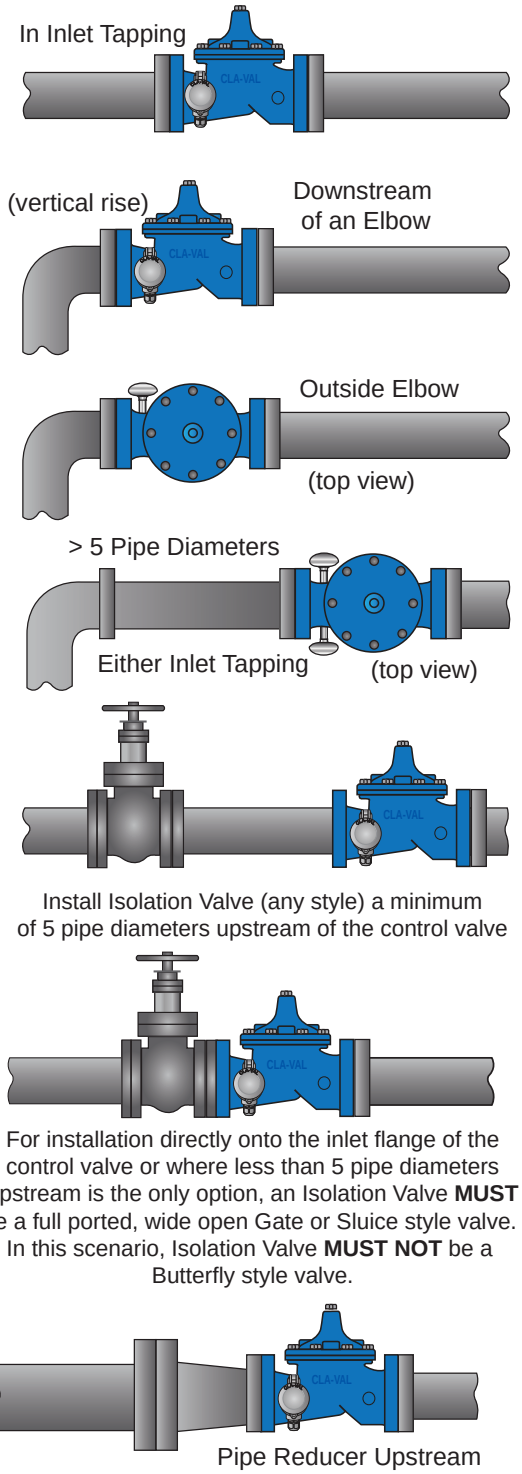


Installation Guidelines and Typical Applications

Installation Locations

For optimum performance, it is recommended that the valve in which the X144D e-FlowMeter is installed be located as shown below.

Optimum Installations

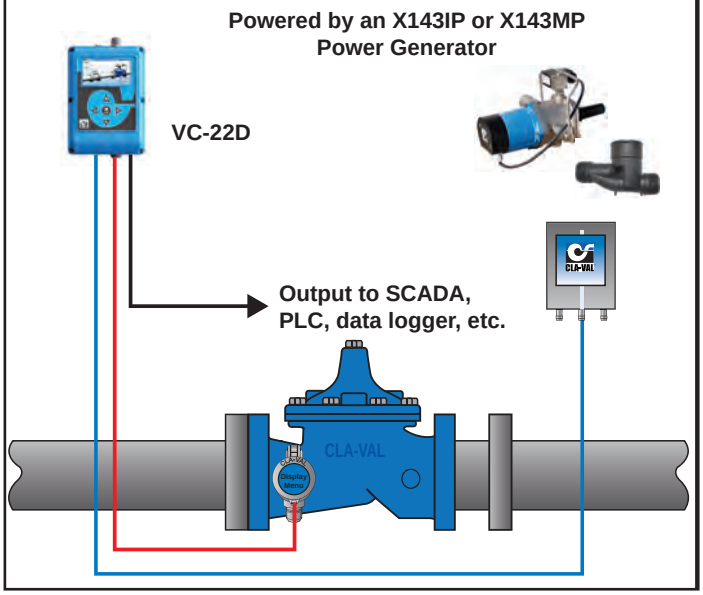


Typical Applications

The X144D e-FlowMeter is ideal for installation in any application where metering is desired.

Combining additonal Cla-Val electronic products with the X144D e-FlowMeter provides even more access to valve performance data installed in remote locations.

Data Acquisition and Storage plus Power



Data Acquisition and Storage using Cla-Val Power Generator

- The X144D e-FlowMeter connects to most commercially available loggers with the choice of 4-20mA or pulse output
- The VC-22D Controller and X145 e-Display are ideal companions to the X144D e-flowMeter, providing access to real-time data
- The VC-22D Controller, e-Display and e-FlowMeter can be powered by the X143 Series Power Generators

Typical Menus

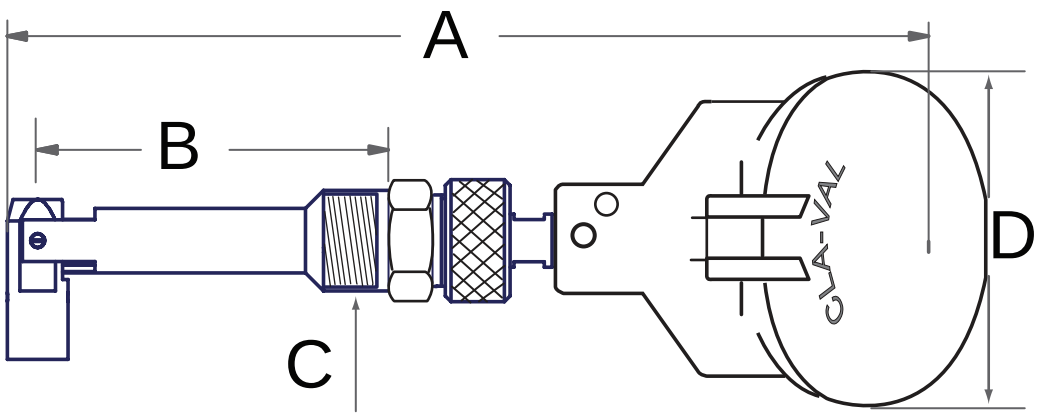
Display Menu **Settings Menu**

Installation Notes:

- Consult factory for other installation configurations
- Do not use butterfly valves as isolation valves adjacent to X144D installations

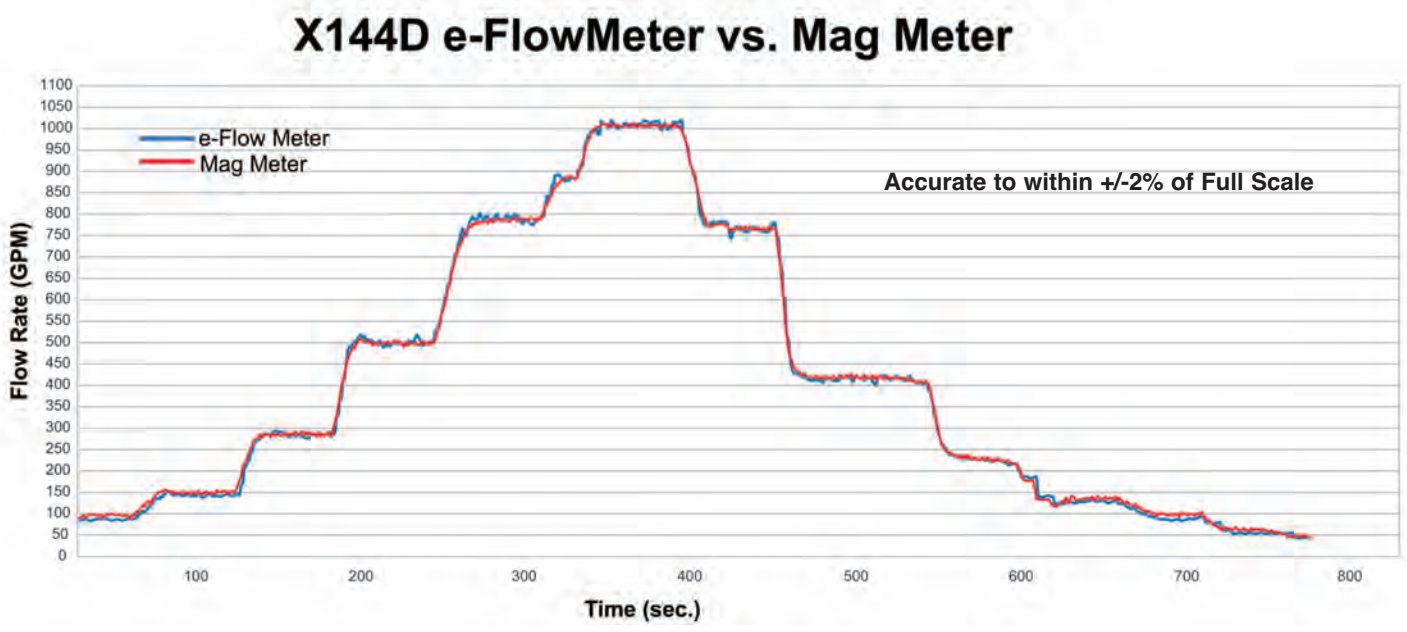
X144D Dimensions

X144D Sizes		1			2		3		4						
Full Port Valve Sizes (inches)		2	2-1/2	3	4	6	8	10	12	14	16	18	20	24	30
Reduced Port Valve Sizes (inches)		4	4	4	6	8	10	12	14	16	18	20	24	CF	CF
Overall Length (in inches)	A	8.85	8.85	8.85	9.45	9.45	13.18	13.18	17.91	17.91	17.91	17.91	17.91	17.91	17.91
Insertion Length (in inches)	B	2.3	2.3	2.3	2.8	2.8	6.8	6.8	11.25	11.25	11.25	11.25	11.25	11.25	11.25
Pipe Thread (NPT)	C	1/2	1/2	1/2	3/4	3/4	1	1	1	1	1	1	1	1	1
Overall Width (in inches)	D	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25



*2" X144D e-FlowMeter may be installed on new valves only. Consult factory for larger applications

Typical Performance



Product Details

Insertion Tool and Locking Ring

- Required for installation
- Tool allows the proper installation and alignment of the bluff body to be parallel to upstream flow

Power Requirement

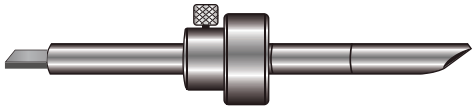
- 12/24 VDC, 1.0 Watts minimum

X144D e-Flow Meter Sizing

- The X144D threads directly into the inlet tapping of a Cla-Val Control Valve. The size of the e-FlowMeter is dependent on the specific valve size for which it has been calibrated - no additional fittings are required. **See dimension chart on previous page.**

Cabling

- The unit is supplied with 20 feet of shielded cable.



X144D Insertion Tool

Maximum Operating Pressure : 400 PSI

X144D e-FlowMeter Operational Flow Range = from 0.5 ft/s to 20 ft/s

X144D e-FlowMeter Analog Range (4-20mA Scaling): Factory Settings

Port Style	Line Size inches (mm)	**2" (50) (100-49 Body)	2-1/2" (65)	3" (80)	4" (100)	6" (150)	8" (200)	10" (250)	12" (300)	14" (350)	16" (400)	18" (450)	20" (500)	24" (600)	30" (750)
Full Port Valves 4mA = 0 (GPM - l/s)	20mA Range (GPM)	260	375	575	1000	2250	3900	6000	8750	10500	14000	17500	22000	31000	52000
	20mA Range (l/s)	16.4	23.7	36.3	63.1	140	245	380	550	660	880	1100	1390	1950	3280
Full Port Pulse Weight*	Gal/Pulse	5	6.5	9.5	17	38	65	100	150	175	235	290	365	515	865
	l/Pulse	19	25	36	65	145	245	380	565	660	890	1100	1380	1950	3275
Reduced Port Valves 4mA = 0 (GPM- l/s)	20mA Range (GPM)	**Not Available**			675	1600	2900	4500	5650	7750	9350	**Consult Factory**			
	20mA Range (l/s)				42.5	100	180	285	355	490	590				
Reduced Port Valves Pulse Weight*	Gal/Pulse				11.5	26	48	75	95	130	155				
	l/Pulse				44	99	180	285	360	495	585				

* Pulse Width = 250ms

**2" X144D e-FlowMeter may be installed on new valves only

CLA-VAL®

— MODEL — **X117D**

Valve Position Transmitter

- **Accurately Monitors Valve Position**
- **Environmentally Sealed to IP-68**
- **Featured on Electronic Control Valves**
- **Easy Field Adjustments**
- **Compact and Rugged Construction**

The Cla-Val Model X117D Valve Position Transmitter is an accurate monitor of valve position. Through an industry standard 4-20 mA output, the X117D delivers the accuracy required for computer-guided control valve systems (SCADA).

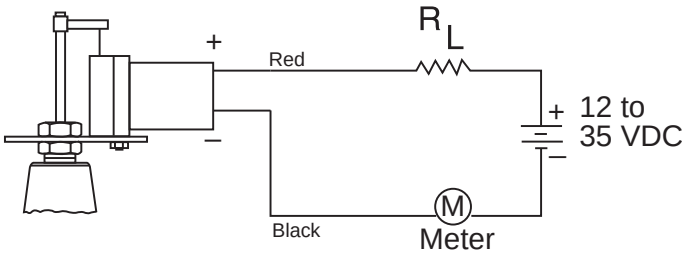
The electronic components are enclosed in a rugged, sealed aluminum and stainless steel housing. The assembly is mounted externally on the cover of a Cla-Val main valve. An extension of the valve stem projects outside of the cover at the center boss and is mechanically linked to the electronic components with an extensible wire rope.

As the valve stem rises and lowers, the X117D provides an output signal in direct proportion to the valves position. An internal spring maintains constant tension on the wire rope for virtually no hysteresis error throughout valve stroke.

Wiring Diagram

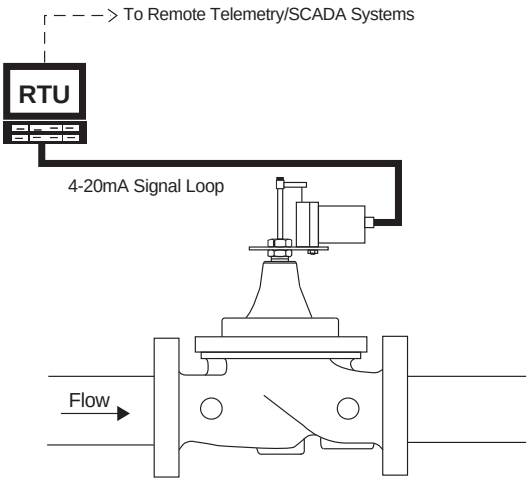
The signal from the position sensing mechanism wire rope is converted to a two-wire 4 to 20 mA current output. The voltage compliance range is 14 to 35 VDC. The required, but not supplied, maximum load resistance can be calculated using the following formula:

$$R_L \text{ Max.} = \frac{\text{Vsupply} - 12.5}{.020}$$



Typical Installation

The X117D Valve Position Transmitter can be used to transmit valve position to the optional 131VC-3 Electronic Valve Controller.



X143 SERIES

Power Generators

retrofittable X143IP Power Generator

X143IP Intermediate Turbine Power Generator

- Uses the hydraulic energy of the system to generate power
- Retrofits to an existing Cla-Val Control Valve
- Can be specified on a new valve
- Ideal for isolated locations and confined spaces
- Generates up to 14 watts of power to operate onsite equipment without tying into the grid, including the following:
  - Electronic Control Valves
  - Communications Equipment
  - Data loggers that capture and store information

all you need is flow and differential pressure

retrofittable X143MP Power Generator

X143MP Micro Turbine Power Generator

- Uses the hydraulic energy of the system to generate power
- Retrofits to an existing Cla-Val Control Valve
- Can be specified on a new valve
- Ideal for isolated locations and confined spaces
- Generates up to .7 watts of power to operate onsite equipment when there is no available power
- Ideal for applications using:
  - Cell phones and GSM communication devices
  - Data loggers that capture and store information

effective option for low power requirements

onsite power without tying into the grid

for detailed Engineering Data Sheets (E-Sheets), visit www.cla-val.com

CLA-VAL™

— MODEL — **X145**

Cla-Val e-Display

Model X145

- **Displays: Flow Rate, Total, Pressure, Position and mA**
- **IP-67 Submersible**
- **SCADA compatible**
- **Customizable units**
- **Backlight optional**
- **Integral wall-mount hardware included**

The Cla-Val Model X145 “e-Display” displays rate up to five digits and totals up to eight digits. The e-Display can be programmed to automatically or manually toggle between rate and totalizing functions. Standard features include an optional backlit display with bargraph, on-screen custom engineering units, max/min display and alarm and pulse outputs.

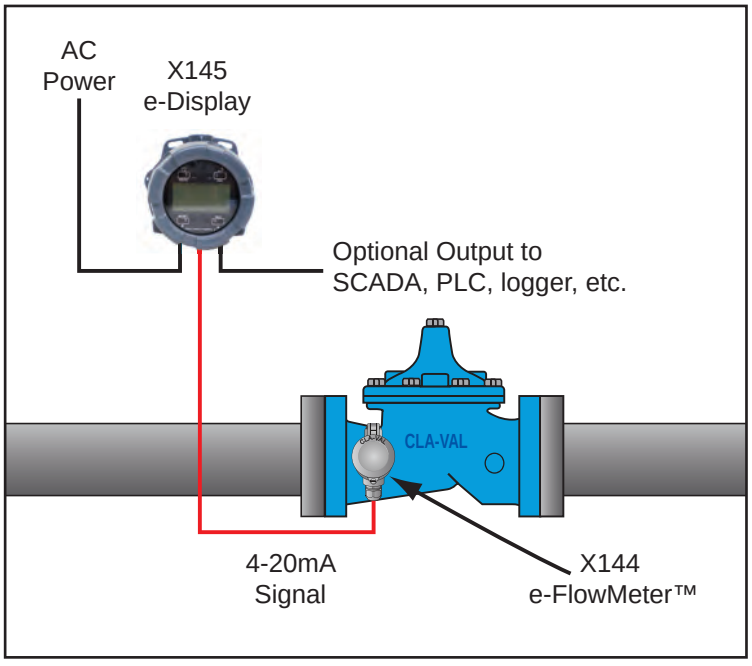
Designed to be wall-mounted, the X145 e-Display is easy to set-up and is ideal for installation with the Cla-Val X144 e-FlowMeter.

Advanced Features

- **Pulse output available for SCADA, PLC and logging applications**
- **Configurable for low-flow cut-off**
- **Noise filter**
- **Optional password protection**
- **Math functions (Linear, Square Root, Programmable Exponent)**

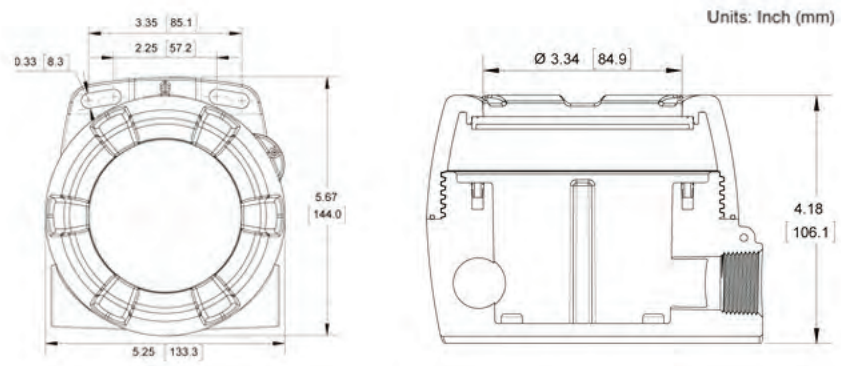
The Cla-Val Model X144 e-FlowMeter™ is a vortex shedding insertion flow meter designed to be retrofitted into a Cla-Val Automatic Control Valve to provide accurate flow measurement data without the need to install a separate meter.

Typical Installation



To learn more about Cla-Val Electronic Products, visit www.cla-val.com

Dimensions



Technical Data

Power Input:	**AC: 110 - 240V 50/60Hz DC: 8 -24VDC**
Display:	**Configurable**
Operating Temp. Range:	**-15° F to +150° F (-25° C to +65° C)**
Protection:	**IP67**
Configuration:	**Factory Configured - Field Adjustable**

Complementary Electronic Products

X143MP
Micro Turbine

X143IP Power Generator

X144 Electronic
FlowMeter

VC-22D Electronic
Valve Controller

CLA-VAL®

MODEL 81-01 (Full Internal Port)
681-01 (Reduced Internal Port)

Check Valve

- **Simple Proven Design**
- **No-Slam Operation**
- **Drip-Tight Shut-Off**
- **No Packing Glands or Stuffing Boxes**
- **Easy to Install & Maintain**

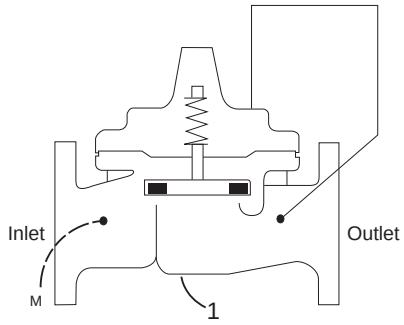
The Cla-Val Model 81-01/681-01 Check Valve is a hydraulically operated No-Slam Check Valve. This valve opens when the pressure at the inlet exceeds the discharge pressure. A gradual rate of opening prevents sudden opening surges. When a pressure reversal occurs the higher downstream pressure is applied to the cover chamber through the control tube lines, and the valve closes drip tight.

This valve is ideally suited for use where a positive shutoff is required. The rubber disc assures tight sealing even if the fluid contains grit or other small-size particles. The simple packless design insures reliable operation and freedom from leaks.

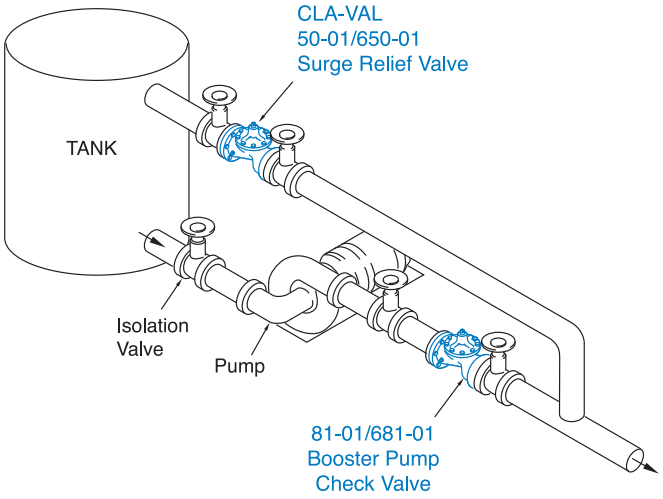
Note: The effectiveness of this valve is related to pipeline velocity. We recommend a maximum flow based on pipeline velocity of 6 feet per second. If pipeline velocities exceed 6 feet per second, consideration should be given to adding a Cla-Val Model 50-01 Pressure Relief Valve or a Cla-Val Model 52 Series Surge Control Valve to the system.

Schematic Diagram

Item	Description
1	Hytrol (Reverse Flow Main Valve)



Product Dimensions Data:
For the 81-01 Main Valve (100-01) dimensions, see pages 17.
For the 681-01 Main Valve (100-20) dimensions, see pages 29.



Typical Applications

Smaller sizes of this valve are used in pilot control systems in Cla-Val Automatic Control valves. This valve can also be used in any piping system where one-way flow is desired.

Install on the discharge of booster pumps to prevent return flow into tank when pump is off. Relief valve as shown is good practice to minimize surges when pump stops.

For valve sizes larger than 3", use Model 81-02.

81-02
(Full Internal Port)

MODEL

681-02
(Reduced Internal Port)

Check Valve

CLA-VAL™

- **Simple Proven Design**
- **No-Slam Operation**
- **Drip-Tight Shut-Off**
- **Dual Speed Control**
- **No Packing Glands or Stuffing Boxes**
- **Available in a Variety of Materials**

The Cla-Val Model 81-02/681-02 Check Valve is a hydraulically operated No-Slam Check Valve with dual speed controls. This valve opens when the pressure at the inlet exceeds the discharge pressure. A gradual rate of opening prevents sudden opening surges. When a pressure reversal occurs, the higher downstream pressure is applied to the cover chamber through the control tube lines, and the valve closes drip tight.

This valve is ideally suited for use where a positive shutoff is required. The rubber disc assures tight sealing even if the fluid contains grit or other small-size particles. The simple packless design insures reliable operation and freedom from leaks.

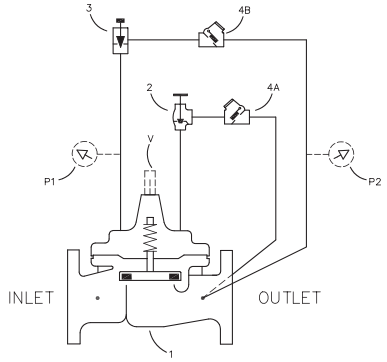
Note: The effectiveness of this valve is related to pipeline velocity. We recommend a maximum flow based on pipeline velocity of 6 feet per second. If pipeline velocities exceed 6 feet per second, consideration should be given to adding a Cla-Val Model 50-01 Pressure Relief Valve or a Cla-Val Model 52 Series Surge Control Valve to the system.

Schematic Diagram

Item	Description
1	Hytrol (Reverse Flow Main Valve)
2	CGA Angle Valve (Closing)
3	CNA Needle Valve (Opening)
4	CSC Swing Check Valve

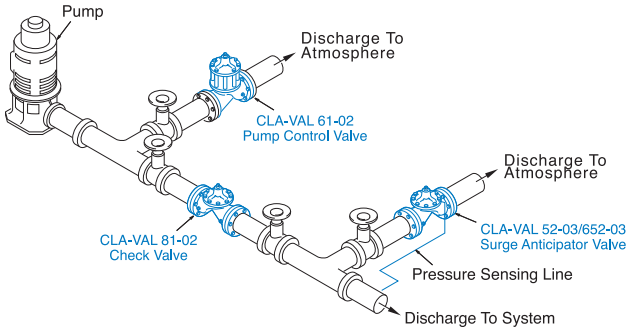
Optional Features

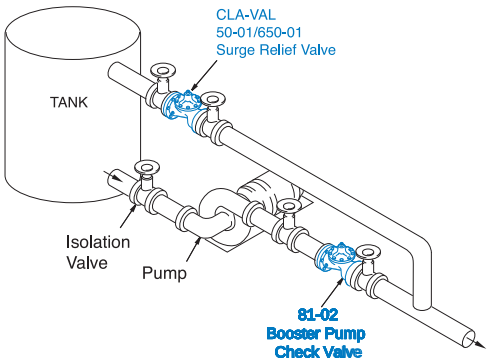
Item	Description
P	X141 Pressure Gauge
V	X101 Valve Position Indicator



Product Dimensions Data:
For the 81-02 Main Valve (100-01) dimensions, see pages 17.
For the 681-02 Main Valve (100-20) dimensions, see pages 29.

Typical Applications





Deep Well Pump

This valve should be an integral part of any well designed pumping system. It is used to prevent damaging and sometimes expensive flow reversal.

Booster Pump

Install on the discharge of booster pumps to prevent return flow into tank when pump is off. Relief valve as shown is good practice to minimize surges when pump stops.

CLA-VAL®

MODEL 81-12 (Full Internal Port)
681-12 (Reduced Internal Port)

Check Valve

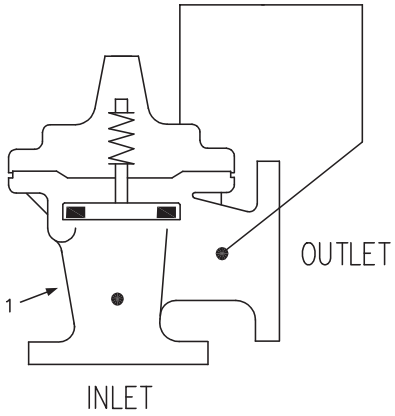
- **Simple Proven Design**
- **No-Slam Operation**
- **Drip-Tight Shut-Off**
- **Recommended for Variable Speed Pumps**
- **No Packing Glands or Stuffing Boxes**
- **Easy to Install & Maintain**

The Cla-Val Model 81-12 Check Valve is a hydraulically operated No-Slam Check Valve. This valve opens when the pressure at the inlet exceeds the discharge pressure. A gradual rate of opening prevents sudden opening surges. When a pressure reversal occurs the higher downstream pressure is applied to the cover chamber through the control tube lines, and the valve closes drip tight.

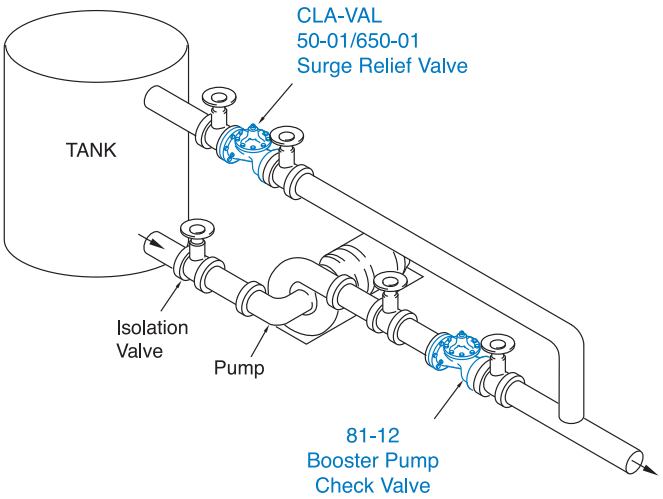
This valve is ideally suited for use where a positive shutoff is required. The rubber disc assures tight sealing even if the fluid contains grit or other small-size particles. The simple packless design insures reliable operation and freedom from leaks.

Schematic Diagram

Item	Description
1	100-01 Hytrol Main Valve



Product Dimensions Data:
For the 81-12 Main Valve (100-01) dimensions, see pages 17.



Typical Applications

Install on the discharge of booster pumps to prevent return flow when pump is off. Relief valve as shown is good practice to minimize surges when pump stops.

For valve sizes 3" and larger consult factory

Series 501A

Wafer Swing Check Valve

Standard Style
2”-12”

- **Low Head Loss**
- **Watertight Nitrile Seat**
- **Spring Assisted, Fast Closure**
- **Extremely Light Weight**

DESCRIPTION

Cla-Val Series 501A Wafer Swing Check Valve has a quick, spring-assisted closure that minimizes the possibility of water hammer. The swing check design offers low head loss and a full-flow passageway making it ideal for water or waste-water applications. The short lay length of the valve allows for a space-saving design. It is available in sizes 2” to 30”, with either a 125 lb. or 150 lb. pressure class rating.

Available in a variety of materials, including all 316 stainless steel, the Cla-Val Wafer Swing Check Valve uses a standard soft seat to ensure a drip-tight seal. For ease of installation, valves 6” and larger are supplied with a tapped hole to mount an eye bolt for lifting. All materials conform to ASTM specifications, ensuring performance reliability.

SPECIFICATIONS

The wafer swing check valve shall have torsional a spring-assisted fast closure to minimize possibility of water hammer. The valve shall be constructed of either cast iron or steel body.

The body shall have a machined dovetail groove to retain a field replaceable Nitrile (Buna-N®) Seal that provides water-tite shut-off at low/high pressure

The valve disc/arm assembly shall be one piece design utilizing an integral disc arm for connection to the shalt for positive shut-off and no disc flutter.

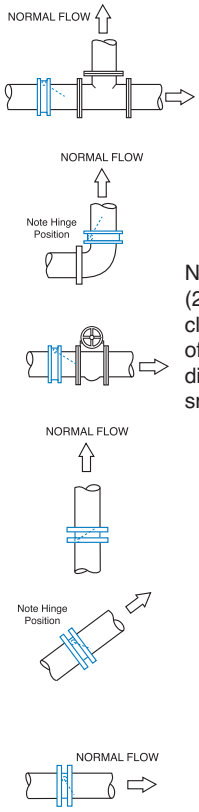
For corrosion resistance the valve shall be Electroless Nickel Plated

Valve Body:
2" -12" Cast Iron ASTM A48
Electroless-Nickel Plated
14" - 30" Carbon Steel ASTM A216 WCB
Electroless-Nickel Plated

Valve Trim:
2" - 12" 316 Stainless Steel ASTM A23,
14" - 30" Carbon Steel ASTM A216 WCB
Electroless-Nickel Plated
Seat O-ring: Nitrile, Other Seat Materials Available

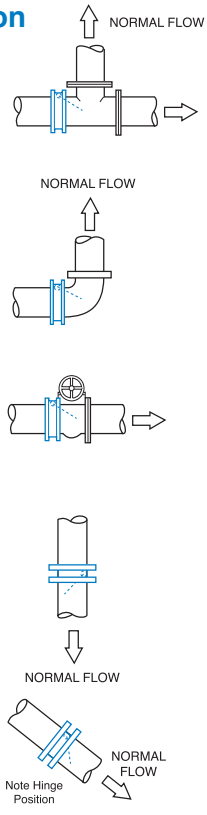
All materials conform to ASTM specifications, The valve shall be a Cla-Val Series 501A Wafer Swing Check Valve, Newport Beach, CA 92659-0325

Typical Applications with Correct Valve Location



Note: Allow minimum (2) pipe diameters clearance downstream of check valve with disc open to promote smooth flow

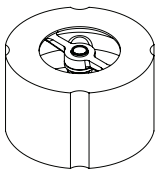
Avoid These Applications with Incorrect Valve Location



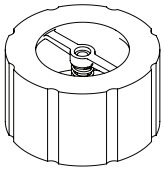
Recommendations for Installation Position
1. Install the valve in horizontal or upward flow for proper valve closure.
Caution: Do not use with reciprocating compressors, or in other pulsating services.

Series 580

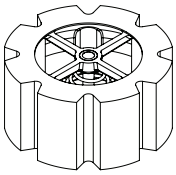
Silent Wafer Check Valve



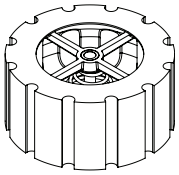
580 Main Silent Wafer



150# & 300# - 1-6 inches



150# - 8-10 inches



300# - 8-10 inches

Approvals & Certifications

- 125/150 Class Valves 4 - 10-inches - FM Approved
- 125/150 & 250/300 Class Valves 1 - 10-inches meet Federal Mandate for Lead Content Limits

Product Advantages

- **Operates Horizontally or Vertically**
- **Watertight Metal-to-Metal Seating**
- **Field Replaceable Parts**
- **Factory Mutual Approved – 4 through 10-inches**
- **Optional Resilient Seat**

The Cla-Val Series 580 Silent Wafer Check Valve has a spring-loaded poppet that allows the valve to close before flow reversal occurs, resulting in a silent, non-slam closure. It is a truly silent check valve. For ease of installation, the valve can be installed in vertical or horizontal positions with flow up or flow down. The short lay length of the valve allows for a space-saving design. Silent Wafer Check Valves are available in sizes 1" to 10", with either a 125/150# or 250/300# pressure class rating.

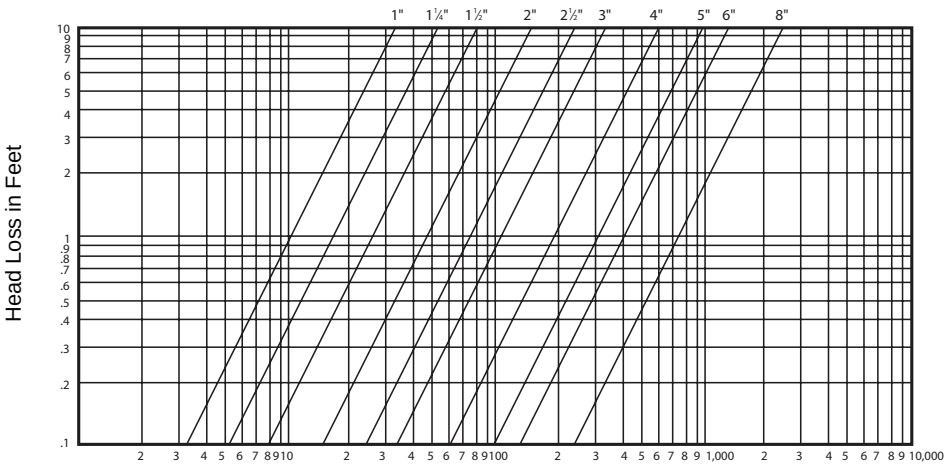
Constructed of an epoxy coated ductile iron body with stainless steel trim, the Cla-Val Silent Wafer Check Valve offers watertight shutoff with metal-to-metal seating. For special applications, Buna-N® resilient seats are available as options. All materials conform to ASTM specifications, ensuring long lasting reliable performance. As a confirmation of Cla-Val's commitment to quality, all Series 580 125/250# class valves are Factory Mutual approved except those supplied with Buna-N® resilient seats.

Pressure Ratings

- 125/150 (Rated to 250 psi)
- 250/300 (Rated to 640 psi)

FM APPROVED

Head Loss Characteristics for 580 Series
Wafer Style Silent Check Valves



Materials

Valve Body:
Ductile Iron - ASTM 536 65-45-12

Disc & Seat:
304 Stainless Steel - SS ASTM A276 T304

Spring:
316 Stainless Steel; Stone Tumbled and Stress Relieved - SS ASTM A276 T16

Note:
Standard offering is two-part epoxy coating interior and exterior

Series 581

Silent Globe Check Valve

Product Advantages

- **Operates Horizontally or Vertically**
- **Watertight Metal-to-Metal Seating**
- **Field Replaceable Parts**
- **Factory Mutual Approved – 4 through 12-inches**
- **Optional Resilient Seat**

The Cla-Val Series 581 Silent Globe Check Valve has a spring-loaded poppet that allows the valve to close at 1/4 psi before flow reversal occurs, resulting in a silent, non-slam closure.

Constructed of a ductile iron body with stainless steel trim, the Cla-Val Silent Globe Check Valve offers watertight shutoff with metal-to-metal seating. Buna-N® resilient seats are available as an option for special applications,

Specifications

The silent globe check valve shall consist of an epoxy-coated ductile iron body, stainless steel seat, disc and spring. The valve disc shall be center guided at both ends with an integral shaft and shall be spring loaded for silent operation. The spring shall be helical or conical and stone tumbled to achieve a micro-finish to resist mineral deposits. For ease of maintenance, the seat and disc shall be replaceable in the field.

Check valve shall be capable of silent operation when installed in vertical or horizontal positions with either flow up or flow down. The flow area through the body shall be equal to or greater than the cross-section area of the equivalent pipe size. Sizes 2 1/2" to 10" shall allow bolting a wafer style butterfly valve directly to the outlet flange without a spool piece.

Approvals & Certifications

- 125/150 and 250/300 Class Valves 4 through 12-inches - FM Approved
- 125/250 & 250/300 Class valves 3 through 42-inches meet Federal Mandate for Lead Content Limits

FM APPROVED

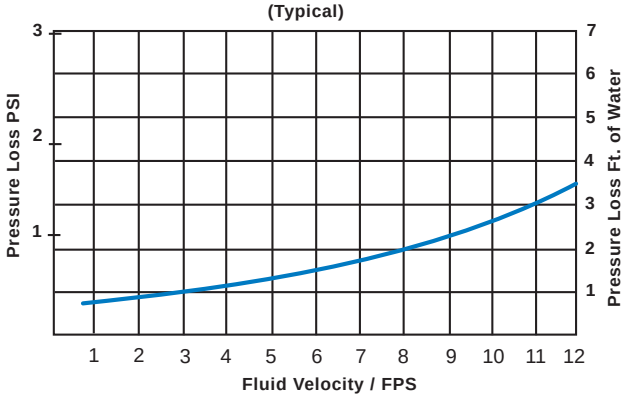
4 through 12-inches

Pressure Ratings

- 125/150 (Rated to 250 psi)
- 250/300 (Rated to 640 psi)

Series 581 Pressure Loss Curve

(Typical)



Materials

Valve Body:
Ductile Iron - ASTM 536 65-45-12

Disc & Seat:
304 Stainless Steel - SS ASTM A276 T304

Spring:
316 Stainless Steel; Stone Tumbled and Stress Relieved - SS ASTM A276 T16

ASTM INTERNATIONAL Standards Worldwide

Note:
Standard offering is two-part epoxy coating interior and exterior

Series 582

Two-Door Wafer Check Valve

- **Low Head Loss**
- **Resilient Seat**
- **Non-Slam Closure**
- **Stabilizer Spheres Prevent Vibration Wear**

The Cla-Val Series 582 Two-Door Wafer Check Valve has torsion springs that force the two doors to shut before flow reversal, reducing the water hammer potential that normally occurs with single-door swing check valves. To help reduce water hammer, the two-door design also reduces the travel distance from open to shutoff for a quicker response. Extremely short in lay length, the valve is both a compact and economical solution. Two-Door Wafer Check Valves are available in sizes 2" to 36". Valve sizes 2”- 6” are dual rated to 150 and 300 pressure classes. Valve sizes 8” - 36” are rated to 150 pressure class.

Although lighter in weight than globe style swing check valves, Cla-Val Two-Door Wafer Check Valves are designed for heavy-duty applications. For ease of installation, valves 10" and larger are supplied with a tapped hole for installing a lifting eye bolt.

SPECIFICATIONS

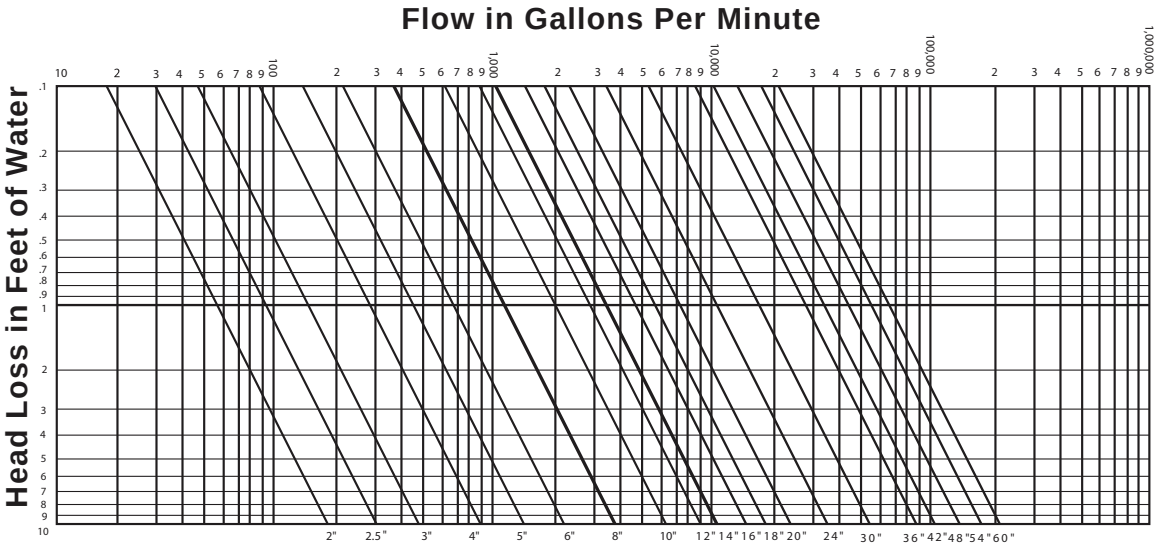
The two-door wafer check valve shall be compact wafer design to fit between ANSI flanges. The check valve doors shall be spring -loaded closed, by means of one or more heavy-duty stainless steel torsion springs. Flow shall cause the doors to open and upon pump shut down, the torsion spring will shut the doors, before reverse flow starts, for non-slam closure.

Seating shall be resilient Buna-N®, watertight and molded to the body. Valves 10” and larger shall be supplied with an eye bolt for lifting. The valve shall be a Cla-Val Series 582 Valves sizes 2” - 6” with alignment grooves for mounting between 150 or 300 lb. flanges. Valves sizes 8’ - 36” inches will be wafer style to be mounted between 150 lb. flanges.

Materials

Valve Body:
Ductile Iron - ASTM 536 65-45-12
Doors:
Aluminum Bronze ASTM B148
Disc & Seat:
Stainless Steel
Spring:
Stainless Steel
Note: Standard offering is two-part epoxy coating interior and exterior

Lug pattern available - consult factory



FM APPROVED

4 through 12-inches

C UL US

8 through 12-inches

ASTM INTERNATIONAL Standards Worldwide

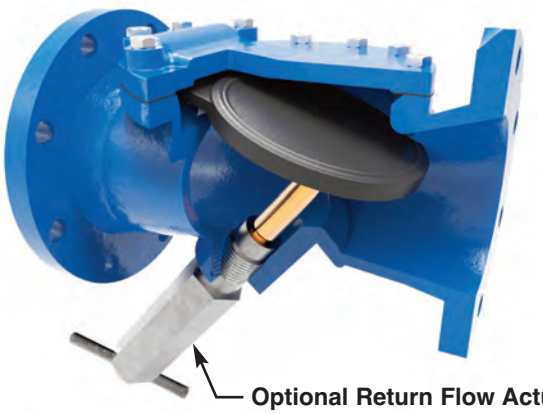
Model 584

Flex-Check Valve

- **Full Pipe Size Flow Area**
- **Drip Tight Seating**
- **Non-Slam Closure**
- **Fusion Bonded Epoxy**
- **Available with Integral Surge Protector, Position Indicator and Backflushing features**
- **Sizes 1 through 24 inches available**
- **Meets the Federal Mandate Limiting Lead in Drinking Water**

The Cla-Val Seriesl 584 Flex-Check Valve has a full-flow area body with integral seat at 45° angle to reduce head loss. This minimizes disc travel to 35° degrees for improved non-slam check action and for reliable vertical up flow operation even on slurry applications. Body and Cover are fusion bonded epoxy coated for long service life on potable and non-potable systems. Unique one-piece steel and nylon reinforced BUNA-N rubber flapper flexes to eliminate traditional metal hinge problems. During system flowing conditions the flapper flexes up to the open position allowing unrestricted flow through the valve. When system reverse flow conditions occur the flapper flexes down to the closed position for drop-tight seal preventing reverse flow. The flapper reliability is test-proven to over one million cycles. The optional Return Flow Actuator offers manual opening for pump priming, back flushing, draining lines, or system testing needs and is easy to field install.

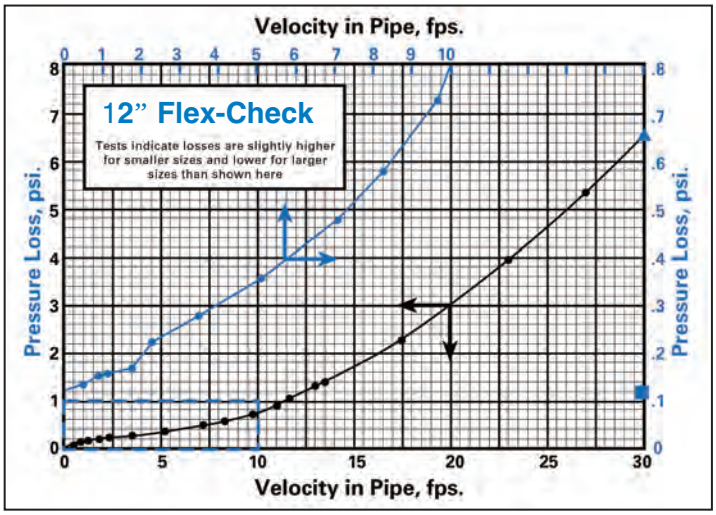
Model 584BF Backflushing Flex-Check Valve - Sizes 3" - 24"



Optional Return Flow Actuator 3-inches and larger

Typical Applications

- Water Systems
- Industrial Waste
- Erosive Services
- Acid Lines
- Light Slurries
- Leaching Lines
- Brine & Salt Water Systems
- Raw Sewage
- Chemical Lines
- Ash Service
- Tailings Systems
- Corrosive Services
- Scrubbers



RF-DB Series
Rubber-Flex Duckbill Check Valves

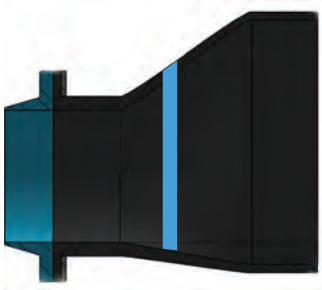
CLA-VAL™

RF-DBF

Rubber-Flex Flanged Duckbill Check Valve
- Available in sizes 1" - 72" (25mm - 1800mm)
- Standard flange drilling is ANSI 125/150# but can be supplied with ANSI 250/300, DIN, JIS, BS or AS Flange patterns
- 1" - 2" (25mm - 50mm) cracking pressure enables these valves to have the lowest head loss in the industry
- 316SS retaining rings are supplied as standard

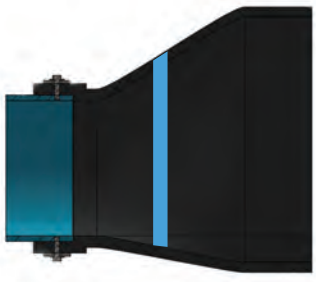
RF-DBO

Rubber-Flex Slip-On Duckbill Check Valve
- Available in sizes 1" - 72" (25mm - 1800mm)
- Designed to slip directly over an existing pipe
- Supplied with heavy duty stainless steel clamps
- Can be installed in either a vertical or horizontal position
- 1" - 2" cracking pressure enables the lowest head loss in the industry



RF-DBF-SB

Rubber-Flex Duckbill Flanged Sloped Bottom Check Valve
- Available in sizes 1" - 72" (25mm - 1800mm)
- Standard flange drilling is ANSI 125/150# but can be supplied with ANSI 250/300, DIN, JIS, BS or AS Flange patterns
- 1" - 2" (25mm - 50mm) cracking pressure enables these valves to have the lowest head loss in the industry
- 316SS retaining rings are supplied as standard



RF-DBO-SB

Rubber-Flex Slip-On Sloped Bottom Duckbill Check Valve
- Available in sizes 1" - 72" (25mm - 1800mm)
- Designed to slip directly over an existing pipe
- Supplied with heavy duty stainless steel clamps
- Can be installed in either a vertical or horizontal position
- 1" - 2" cracking pressure (25mm - 50mm) enables the lowest head loss in the industry

RF-DBI

Rubber-Flex Flanged In-Line Duckbill Check Valve
- Available in sizes 2" - 72" (50mm - 1800mm)
- This valve can be slipped inside of a pipe and installed between two existing pipe flanges, eliminating the need for a valve body
- Standard flange drilling is ANSI 125/150# but can be supplied with ANSI 250/300, DIN, JIS, BS or AS Flange patterns

RF-DBI-IN

Rubber-Flex Slip-In In-Line Duckbill Check Valve
- Available in sizes 2" - 36" (50mm - 900mm)
- Ideal for corrosive materials
- Designed to fit directly inside of an existing pipe
- Includes Stainless Steel Expansion Clamp to secure valve in place
- Can be installed in either a vertical or horizontal position

RF-DBI-LH

Rubber-Flex Low Head Loss In-Line Duckbill Check Valve
- Available in sizes 3" - 72" (80mm - 1800mm)
- Use this valve for airport runway run-offs, railway washouts, highway flood damage prevention and odor control and more
- Ensures 100% (flush) operation on heavy sewage applications

RF-DBJ

Rubber-Flex Jacket Style Duckbill Check Valve
- Available in sizes 2" - 36" (50mm - 900mm)
- Ideal forheavy duty service, abrasive slurries and sludge
- An internal valve (RF-DBF) provides low head loss with a full port design
- Materials include Carbon Steel (Epoxy Coated), Stainless Steel and other materials

Series 33A

Sizes 1" - 2" - 3" - 4" - 6"

Air Release & Vacuum Breaker Valve (Threaded & Flanged)

Threaded

Flanged

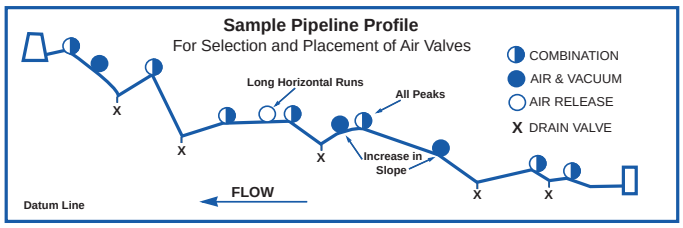
NSF/ANSI 61 & 372

- **Standard Maximum Operating Pressure 300 psi**
- **Standard Epoxy Coated Ductile Iron Body**
- **Automatically Eliminates Entrapped Air Pockets and Provides Vacuum Protection**
- **Easily Serviced**
- **Tested to Seal at 2 psi**
- **Meets AWWA C512 Requirements**

Designed to protect pipelines and vertical turbine pump applications from air lock and vacuum collapse, the Cla-Val Model 33A High Performance Combination Air Release and Vacuum Breaker Valve eliminates air and prevents vacuum formations in pipelines. A large venting orifice and large float clearances freely exhaust or admits air during pipeline filling or draining.

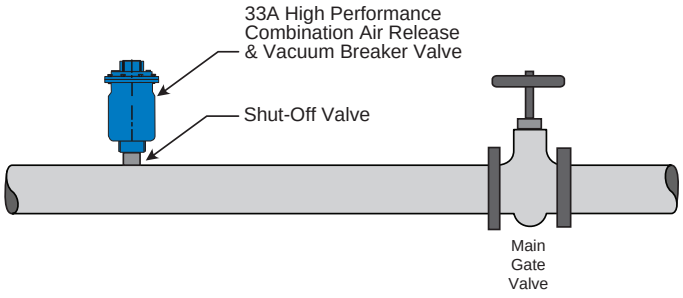
During normal pipeline operation, air accumulation and buoyancy cause the float ball to lower or lift. As the water level lowers inside the valve, small amounts of accumulated air are released through the small orifice. Once air is released, the float poppet system closes drip tight.

Valve servicing is simple because the entire float poppet system can be replaced without removal of the valve body from the pipeline.



Typical Applications

- **Transmission Pipeline High Points**
- **Water Treatment Plant Piping High Points**
- **Vertical Turbine Pump Discharge**



Installation

Series 33A Combination Air Release and Vacuum Breaker Valves are typically installed at high points in pipelines for air release, or at anticipated pipeline vacuum occurrence locations. Install Series 33A at regular intervals (approximately 1/2 mile) along uniform grade line pipe. Mount the unit in the vertical position on top of the pipeline, and include an isolation/shutoff valve.

Series 33A is often installed upstream of check valves in pump discharges to vent air during start-up and to allow air reentry when the pump stops.

Operation

Air Release Mode—Valve is normally open.
When line is filled or pump started, air is exhausted through the normally open 33A valve. As liquid fills the valve, float ball rises to form a drip-tight closure and remaining air is exhausted through small orifice.

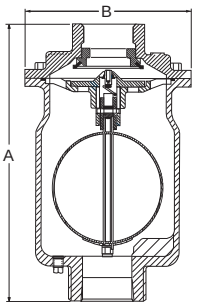
Vacuum Prevent Mode When line pressure drops below positive pressure and the liquid level lowers, the float drops, unseating the valve and allowing air into the line, thus preventing a vacuum.

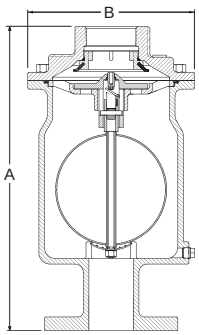
Note: Available for Sea Water Service See Material Specifications

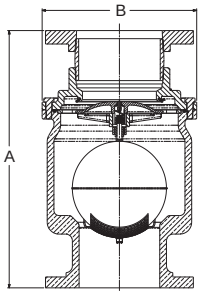
Dimensions (In Inches)

MODEL 33A Sizes - 1" - 2" - 3" - 4" - 6"

	33A Pressure Class 300 Lb Threaded X Threaded				33A Pressure Class 150 Lb Threaded X Flanged				33A Pressure Class 150 Lb Flanged X Flanged
Valve Size	1"	2"	3"	4"	2"	3"	4"	6"	6"
A	9.10	12.44	12.75	12.75	13.88	15.56	15.75	16.38	19.14
B	6.25	7.50	9.00	9.00	7.50	9.25	9.25	11.00	11.00
C	—	—	—	—	.62	.75	.94	1.00	1.06
Inlet (ANSI)	1" NPT	2" NPT	3" NPT	4" NPT	2"	3"	4"	6"	6"
Outlet (NPT)	1" NPT	2" NPT	3" NPT	4" NPT	2" NPT	3" NPT	4" NPT	6" NPT	6"
Number of Holes	—	—	—	—	4	4	8	8	8"
Diameter of Bolts	—	—	—	—	.63	.63	.75	.75	.75
Shipping Wt. (Lb.)	25	29	38	40	39	48	50	70	75







Pressure Ratings

Size	Orifice Dia.	Std Max. Pressure	Available Materials of Construction
1"	.076"	300 psi	• Epoxy Coated Ductile Iron ASTM A536 65-45-12 • Epoxy Coated Cast Steel ASTM A 216WCB • ASTM B61 Naval Bronze • ASTM B 148 NI Aluminum Bronze • 316 Stainless Steel • Duplex Stainless Steel • Super Duplex Stainless Steel • Bronze
2"	.076"	500 psi	
3" & 4"	.076"	300 psi	
6"	.076"	300 psi	
3" & 4"	Optional upon request .125"	300 psi	
Note: Higher Pressures Available upon Request for sizes 2", 3", & 4"			

Specifications

Standard Internals

Float: Stainless Steel 304SS Standard, Optional T316 or Monel

Seals: Nitrile Rubber or Optional Viton®

Remainder of Internal Components: Stainless Steel and Delrin

Temperature Range

Water to 180° F

Optional:

1. Hood / Screen Assembly

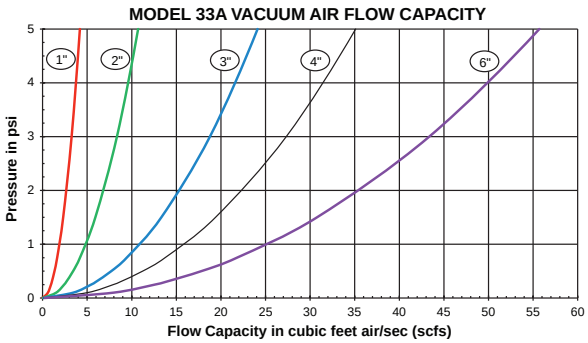
When Ordering, Specify:

1. Catalog # 33A 2. Valve Size 3. Pressure Rating. 4. Materials

Valve Sizing Selection

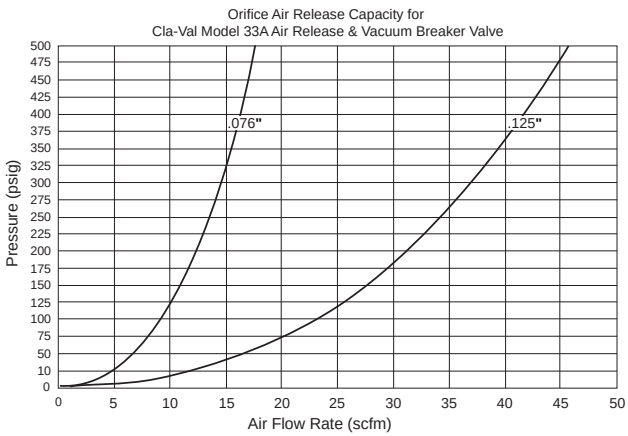
Large Orifice Vacuum Capacity

Determine anticipated water flow and allowable pressure differential for the pipeline application. Select valve from chart to exhaust or admit air at the same rate as water filling or draining (in CFS). For larger flows, two or more Model 33A's may be installed in parallel



Small Orifice Capacity - Air Release

During pressurized pipeline operation, small pockets of entrapped air will be released through the float actuated 0.076 or optional 0.125 inch orifice. Use chart to determine discharge capacity.



Series 34

Air Release Valves

- **Ductile Iron Body**
- **Stainless Steel Trim and Float**
- **Easily serviced without removal from pipeline**
- **Working pressures to 800 psi**
- **Engineered for drip tight seal at low pressures**

Cla-Val Series 34 Air Release Valves are designed to vent entrained air that collects at high points in a pipeline. This valve continuously eliminates air from a system by releasing small quantities of air before large air pockets can occur. In many installations, continuing accumulations of air in the pipeline (lacking air release valves); cause flow capacity to slowly decrease; power consumption slowly increases; un-noticeable at first, until flow drops dramatically, even stopping due to air blocks in the piping. Another problem resulting from excessive air accumulation is unexplained pipeline rupture. These ruptures are passed off as the result of ground settling or defective pipe, Where as in reality its large air pockets that greatly increase pressure surges (normally occurring) when flow stops and starts causing the rupture. During normal pipeline operation, air accumulation at the high point will displace the liquid within the air valve and lower the water level in relation to the float. As level of the liquid lowers, where the float is no longer buoyant, the float drops and opens the valve orifice seat and permitting accumulated air to be exhausted to atmosphere. After air is released, the liquid level in the air valve rises and closes the valve orifice seat. This cycle automatically repeats as air accumulates inside the air release valve, thereby preventing the formation of air pockets.

Installation

Series 34 Air Release Valves are typically installed at high-points in pipelines and at regular intervals, of approximate 1/2 mile, along uniform grade line pipe.

Mount the unit in the vertical position on top of the pipeline with an isolation valve installed below each valve in the event servicing is required. A vault with adequate air venting and drainage is recommended.

Note:

Vacuum check valves can be supplied on the discharge of all size air release valves to prevent air re-entering the system; during negative pressure conditions

Purchase Specifications

The air release valve shall be of the float operated, simple lever or compound lever design, and capable of automatically releasing accumulated air from a fluid system while the system is pressurized and operating.

An adjustable designed orifice button shall be used to seal the valve discharge port with drip-tight shut-off. The orifice diameter must be sized for use within a given operating pressure range to insure maximum air venting capacity.

The float shall be of all stainless steel construction and guaranteed to withstand the designed system surge pressure without failure. The body and the cover shall be ductile iron and valve internal parts shall be stainless steel and Viton™ or Buna-N® (standard)for water tight shut-off.

The air release valve shall be manufactured per ANSI/AWWA C512-04 Series 34 from Cla-Val in Newport Beach, CA, USA.

Product Specifications

Sizes
1/2", 3/4", 1", 2", 3" NPT

Pressure Ratings (see note)
150 psi
175 psi
300 psi
800 psi

Temperature Range
Water to 180°F

Note: Specify when operating pressure below 10 PSI

Materials
Body and Cover:
Ductile Iron ASTM 536 65-45-12

Float:
Stainless Steel

Internal Parts:
Stainless Steel

Seal:
Viton™ or Buna-N® (Standard)

visit www.cla-val.com to see our complete line of air and check valves.

Series 35

Air and Vacuum Valves

- **Provides High Capacity Air Venting and Air Intake**
- **Stainless Steel Trim Standard**
- **Stainless Steel Floats Guaranteed**
- **Fully Ported Valves - No Restrictions**
- **Designed For Drip Tight Seal At Low Pressures**

The Cla-Val Series 35 Air and Vacuum Valve is designed to perform two separate functions. First, it will allow large quantities of air to be exhausted from the pipeline as it is being filled with water. When this air has been vented completely, water will enter the valve causing the float to seal tightly against the seat to prevent water flow. Secondly, if the line is being drained, either intentionally or as a result of pipeline breakage, the valve responds to the loss in pressure and opens. This allows air to re-enter the pipeline and prevents potentially damaging vacuum from developing.

Note: The Series 35 does not open under pressure to exhaust small quantities of air which may collect at high points during system normal operation. The Series 34 Air Release Valve is required for this function.

Installation

Series 35 Air and Vacuum Valves should be installed at high points or at grade changes within the pipeline. Mount the unit in the vertical on top of the pipeline with isolation valve below each valve in the event servicing is required. A vault with adequate venting and drainage should also be provided.

Purchase Specifications

The air and vacuum valve shall be able to automatically exhaust large quantities of air during filling of a pipeline and allows air to re-enter pipeline during the draining or when a negative pressure occurs.

The inlet and outlet of the air and vacuum valve shall have the same cross-section area as the pipe size. The float shall be guided by a stainless steel bottom guide shaft. The 4" and larger valve floats shall have top and bottom guide shafts of hexagonal cross section and have a protective steel discharge hood.

The float shall be of all stainless steel construction guaranteed to withstanding the design system surge pressure without failure. The body and cover shall be concentrically located and of ductile iron and the valve internal parts shall be of Stainless Steel with Buna-N® rubber seat.

The Air and Vacuum Valve shall be manufactured per ANSI/AWWA C512-04, Series 35 from Cla-Val, Newport Beach, CA USA.

Design Specifications

Sizes
1/2", 1", 2", 3" NPT
4" through 12"
125 lb. flanged ANSI Rated
250 lb. flanged ANSI Rated
14" through 24"

Pressure Ratings
175 psi
300 psi

Temperature Range
Water to 180°F

Note: Specify when operating pressure below 10 PSI

Materials
Body and Cover
(1/2" - 12" 125 & 250 lb.)
- Ductile Iron

Body and Cover 14"- 24"
- Cast Iron A126

Float:
Stainless Steel

Internal Parts:
Stainless Steel

Seal:
Buna-N® Rubber

When Ordering, Please Specify:

1. Model Number
2. Inlet Size - NPT or Flanged
3. Inlet Pressure Rating

Optional:
For anti-shock air valve shut-off order with arrestor check device (suffix "AC").

Series 36

Combination Air Release and Vacuum Valve

- **Stainless Steel Standard**
- **Stainless Steel Floats Guaranteed**
- **Fully Ported Valves - No Restrictions**
- **Easily Serviced Without Removal From Pipeline**
- **Engineered For Drip Tight Seal At Low Pressures**

The Cla-Val Series 36 Air and Vacuum Valve is a multipurpose valve that combines the operation of both the Model 34 Air Release Valve and Model 35 Air and Vacuum Valve. It functions to exhaust large quantities of air in the pipeline during the filling cycle and to admit air, as necessary, to prevent potentially dangerous vacuum from forming when being emptied either intentionally or as a result of pipeline breakage.

Note: Cla-Val Air Valves are manufactured to meet ANSI-AWWA C512-92 Standards.

Installation

The Series 36 Combination Air Valve should be installed at high points at grade changes within the pipeline.

Mount the unit in the vertical position on top of the pipeline with an isolation valve installed below each valve in the event servicing is required. A vault with adequate venting and drainage should also be provided.

Design / Purchase Specifications

The combination air valve shall combine the operating features of both an air and vacuum valve and an air release valve in one housing. The air and vacuum valve portion shall automatically exhaust large quantities of air during the filling of the pipeline and automatically allow air to reenter the pipeline when the internal pressure of the pipeline approaches a negative value due to column separation, draining of the pipeline, or other emergency. The air release valve portion shall automatically release small amounts of air from the pipeline while it is under pressure.

The inlet and outlet of the valve shall have the same cross-section area. The float shall be guided by a stainless steel guide shaft and seat drip tight against a synthetic rubber seal. 4" and larger valves shall have dual guided shafts of hexagonal cross section and a protective discharge hood.

The float shall be of all stainless steel construction and capable of withstanding maximum system surge pressure without failure. The body and cover shall be concentrically located and of ductile iron and the valve internal parts shall be stainless steel or Buna-N® rubber.

The Combination Air Release and Vacuum Valve shall be manufactured per ANSI/AWWA C512-04 Series 36 from Cla-Val., Newport Beach, CA, U.S.A.

Design Specifications

Size Inlet/Outlet
1", 2", 3", 4" NPT or Flanged
3" through 8"
125 lb. flange & ANSI
300 lb. flange & ANSI

Pressure Ratings (see note)
150 psi
300 psi

Temperature Range
Water to 180°F

Note: Specify when operating pressure is below 10 PSI

Materials
Body and Cover:
Ductile Iron ASTM A536 65-45-12

Float:
Stainless Steel

Plug:
Stainless Steel

Internal Parts:
Stainless Steel

Seal: Buna-N® Rubber

Note: Manufactured to meet ANSI/AWWA C512-04

When Ordering, Please Specify

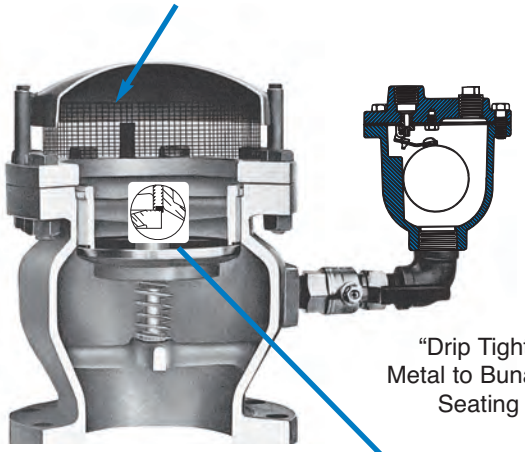
1. Model Number
2. Inlet/Outlet Size
3. Inlet Pressure Rating
4. Orifice Size

Optional:
For Anti-Shock Air Valve shut-off, order with arrestor check device (suffix “AC”).

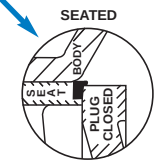
Series 38VB/AR

Vacuum Breaker / Air Release Valves for Water and Wastewater

Hooded
Screened Outlet
Standard



"Drip Tight"
Metal to Buna-N®
Seating



Flanged Style
125 Lb & 250 Lb. Class
4" Thru 36" Size

Vacuum Prevention And Slow Air Release For Pressure Surge Control

Cla-Val Vacuum Breakers are reliable and economical pipeline surge control components, requiring no regular maintenance.

Standard valves are designed to open with minimal (1/4 psi) pressure differential across the orifice. Higher or lower relief settings are available.

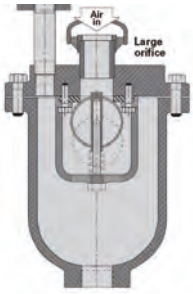
The Vacuum Breaker Valve (Large orifice combined with Air Release Valve (small orifice) are normally closed. But when installed at points where water column separation can occur, both orifices open admitting air into pipeline, then instantly close to trap air and thereby cushioning rejoining of the water column. In this manner severe pressure surge/water hammer is prevented as the system returns to normal operation.

Simultaneously the small orifice Air Release Valve opened due to vacuum and stays open venting the discharge of trapped air from pipeline slowly until gradual normal pipeline pressure is achieved. Various small orifice are available. See small orifice chart.

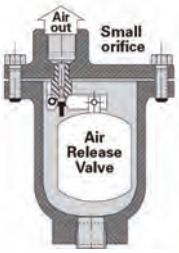
Water column separation in a pipeline may create high levels of vacuum only momentarily, but severe damage, such as a pipeline rupture can occur when the water column rejoins. Also momentarily vacuum conditions can easily cause a thin wall pipeline or sealed water tank to collapse due to vacuum when draining fluid. Metal to Buna-N® insures "drop tight" seal at any pressure. For these reasons it is sound engineering practice to use Cla-Val Vacuum Breaker Air Release Valves to prevent water column separation in pipelines and collapse of tanks.

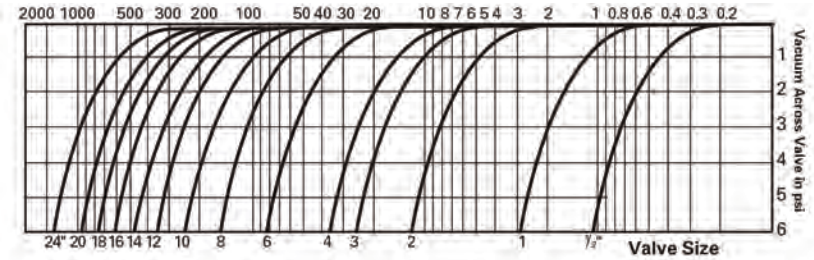
Air Inflow through Valve in Standard Cubic Feet of Free Air/Second (scfs)

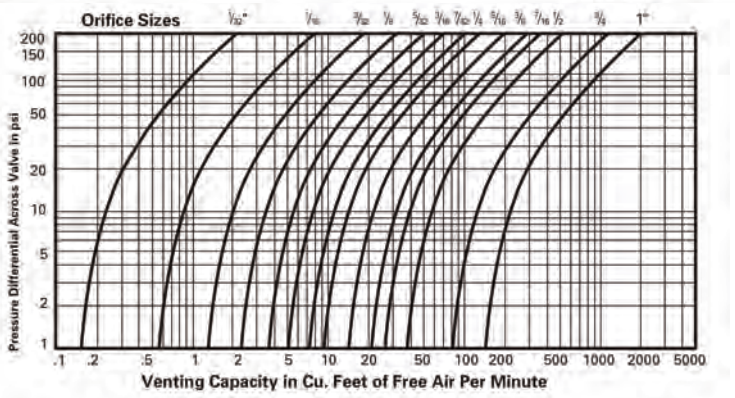
Inflow: Large Orifice Air Inlet/Vacuum Valves



Outflow: Small Orifice Air Release Valves







Series 34-WW
Wastewater Service Air Release Valves

- **Stainless Steel Trim Standard**
- **Stainless Steel Floats Guaranteed**
- **Easily Serviced Without Removal From Pipeline**
- **Engineered For Drip Tight Seal At Low Pressures**
- **Optional Backwash Kit Available**

The Cla-Val Series 34WW Air Release Valve is specially designed for sewage service. It will protect pipelines from entrained air or gases that collect at high points in sewage pipelines. This valve effectively eliminates air from a system by releasing small amounts of air before large air pockets can occur. In extreme cases, the continued accumulation of air without release valves can actually stop flow completely. Increased power consumption and associated power costs can be anticipated if systems are not properly designed to release accumulated air.

During normal operation, air and gas accumulation will displace the liquid within the valve and lower the liquid level in relation to the float. When the level of the liquid lowers to where the float is no longer buoyant, the float will lower and using a mechanical lever will open the valve seat to permit the accumulated air to be exhausted to atmosphere. As air is released, liquid level in the valve raises the float and closes the valve seat. This cycle is automatically repeated as often as necessary.

Installation

Series 34WW Air Release Valves are typically installed at high points in pipelines and at regular intervals of approximately 1/2 mile, along horizontal pipelines.

Mount the unit in the vertical position on top of the pipeline with an isolation valve installed below each valve in the event servicing is required. A vault with adequate venting and drainage should also be provided.

For regular cleaning to keep sewage equipment in good working condition use the optional customer installed BWKT Backwash Kit with back flushing hose and quick disconnect couplings.

General Specifications

Sizes
2", 3", 4" NPT

Pressure Ratings
150 psi with 1/4" Orifice
300 psi with 5/32" Orifice

Note: Specify when operating pressure below 10 psi

Materials
Body and Cover:
Ductile Iron
ASTM A536 65-45-12

Float:
Stainless Steel

Internal Parts:
Stainless Steel

Seal:
Buna N® Rubber

Purchase Specifications

The air release valve shall be of the float operated, compound lever design, and capable of automatically releasing accumulated air, gas or vapor from a pressurized fluid system while it is in operation.

An adjustable featured orifice shall be used to seal the valve discharge port with drip-tight shut-off. The orifice diameter must be sized for use within a given operating pressure range to insure maximum discharge capacity.

The float shall be of all stainless steel construction and capable of withstanding maximum system surge pressure without failure. The body and the cover shall be of ductile iron and the valve internal parts shall be of stainless steel with a Buna-N® rubber seat.

The air release valve shall be Series 34WW from Cla-Val, Newport Beach, CA, U.S.A.

Series 35-WW
Wastewater Service Air and Vacuum Valves

- **Stainless Steel Trim Standard**
- **Stainless Steel Floats Guaranteed**
- **Fully Ported Valves - No Restrictions**
- **Designed For Drip Tight Seal At Low Pressures**
- **Optional Backwash Kit Available**

The Cla-Val Series 35WW Air and Vacuum Valve is designed to perform two separate functions in a sewage or wastewater system. First, it will allow large quantities of air to be exhausted from the pipeline as it is being filled. When this air has been vented completely, liquid will enter the valve causing the float to seal tightly against the seat. Secondly, if the line is being drained, the valve responds to the loss in pressure and opens. This allows air to re-enter the pipeline and prevents potentially damaging vacuum from developing.

The Series 35WW does not open under pressure to exhaust small quantities of air which may collect at high points during normal system operation. Model 34WW Air Release Valve is required for this function. For both functions, select Model 36WW Combination Air Release and Vacuum Valve.

Installation

Series 35WW Air and Vacuum Valves should be installed at high points or at grade changes within the pipeline. Mount the unit in the vertical position on top of the pipeline with isolation valve below each valve in the event servicing is required. A vault with adequate venting and drainage should also be provided.

For regular cleaning to keep sewage equipment in good working condition use the optional customer installed BWKT Backwash Kit with back flushing hose and quick disconnect couplings.

Purchase Specifications

The air and vacuum valve shall be able to automatically exhaust large quantities of air during filling of a pipeline and allows air to re-enter pipeline during the draining or when a negative pressure occurs.

The inlet and outlet of the valve shall have the same cross-section area. The float shall be guided by a synthetic rubber seal.

The float shall be of all stainless steel construction and capable of withstanding maximum system surge pressure without failure. The body and cover shall be concentrically located and of ductile iron and the valve internal parts shall be of stainless steel with Buna-N® rubber seat.

The Air and Vacuum Valve shall be manufactured per ANSI/AWWA C512-04 Series 35WW from Cla-Val Newport Beach, CA, U.S.A.

Specifications

Sizes
2", 3", 4" NPT
4", 6" 8" flanged ANSI
Class 125 lb.
Class 250 lb.

Pressure Rating
150 psi & 300 psi ratings

NOTE: SPECIFY WHEN OPERATING PRESSURE BELOW 10 PSI

Materials

Body and Cover:
Ductile Iron ASTM A536 65-45-12

Float:
Stainless Steel

Internal Parts:
Stainless Steel

Seal:
Buna-N® Rubber

When Ordering, Please Specify:

1. Model Number
2. Inlet Size
3. Optional Backwash Kit

Series 36-WW

Combination Air Valves
(Single Body Style)

- **Stainless Steel Trim Standard**
- **Stainless Steel Floats Guaranteed**
- **Fully Ported Valves - No Restrictions**
- **Engineered For Drip Tight Seal At Low Pressures**
- **Optional Backwash Kit Available**

The Cla-Val Series 36WW Combination Air and Vacuum Valve is a multipurpose valve that combines the operation of both the Series 34WW Air Release Valve and Series 35WW Air and Vacuum Valve, especially for sewage and wastewater applications. It functions to exhaust large quantities of air in the pipeline during the filling cycle and to admit air, as necessary, to prevent a potentially dangerous vacuum from forming when being emptied either intentionally or as a result of pipeline breakage.

Note: Cla-Val Air Valves are manufactured to meet ANSI-AWWA C512-92 Standards.

Installation

The Series 36WW Combination Air Valve should be installed at high points and grade changes within the pipeline.

Mount the unit in the vertical position on top of the pipeline with an isolation valve installed below each valve in the event servicing is required. A vault with adequate venting and drainage should also be provided.

For regular cleaning to keep sewage equipment in good working condition use the optional customer installed BWKT Backwash Kit with back flushing hose and quick disconnect couplings.

Purchase Specification

The combination air valve shall combine the operating features of both an air and vacuum valve and an air release valve in one housing. The air and vacuum valve portion shall automatically exhaust large quantities of air during the filling of the pipeline and automatically allow air to reenter the pipeline when the internal pressure of the pipeline approaches a negative value due to column separation, draining of the pipeline, or other emergency. The air release valve portion shall automatically release small amounts of air from the pipeline while it is under pressure.

The inlet and outlet of the valve shall have the same cross-section area. The float shall be guided by a stainless steel guide shaft and seat drip-tight against a synthetic rubber seal.

The float shall be of all stainless steel construction and capable of withstanding maximum system surge pressure without failure. The body and cover shall be concentrically located and of ductile iron and all valve internal parts shall be stainless steel with Buna-N® rubber seat. Must be Manufactured per ANSI/AWWA C512-04

The Combination Air Release and Vacuum Valve shall be Model 36WW from Cla-Val., Newport Beach, CA, U.S.A.

Specifications

Sizes - Inlet & Outlet
2", 3", 4" NPT

Working Pressure Ratings
175 psi & 300 psi ratings

Standard Pressure
Air Release Orifice
1/8" Diameter

NOTE: SPECIFY WHEN OPERATING PRESSURE BELOW 10 PSI

Materials
Body and Cover:
Ductile Iron ASTM 536 65-45-12

Float:
Stainless Steel

Internal Parts:
Stainless Steel

Seal:
Buna-N® Rubber

When Ordering, Please Specify

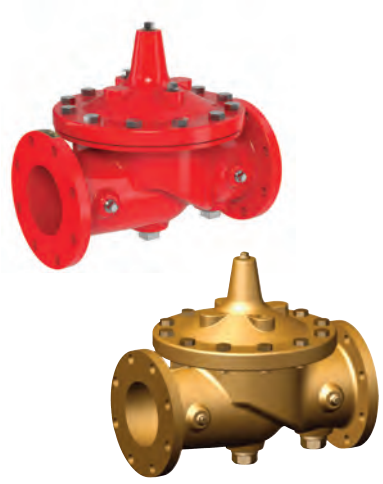
1. Model Number
2. Inlet Size (minimum is 2" NPT)
3. Inlet Pressure Rating
4. Orifice Size (175 psi 1/8") (300 psi 3/32")
5. Optional Backwash Kit (see page 70)

100G/2100G Fresh Water Version
100GS/2100GS Seawater Version

MODELS

Deluge Valve

CLA-VAL™



- **UL Listed / ULC Listed/ABS Approved**
- **Globe or Angle Pattern**
- **Proven Reliable Design**

UL LISTED c UL US LISTED ABS Type Approved

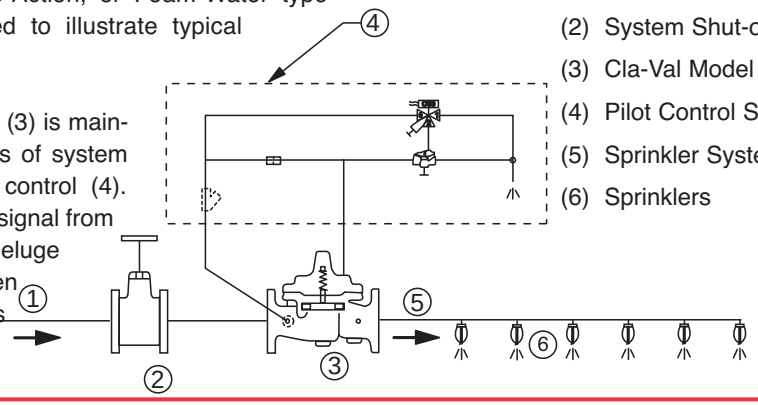
The Cla-Val Model 100G/2100G Deluge Valve is designed for use in controlling water flow to Deluge, Pre-Action, or Foam-Water type fire protection sprinkler systems. This valve is UL Listed in "Special Systems Water Control Valves Class I (VLFT) for both vertical and horizontal installation applications. This valve is UL/ULC Listed for operation manually, electronically, with hydraulic or pneumatic pilot control system for a wet pilot line of sprinklers.

The Model 100G/2100G is a hydraulically-operated, diaphragm-actuated, globe or angle pattern Deluge Valve. It consists of three major components: the body, the cover, and the diaphragm assembly. The only moving part is the diaphragm assembly. Packless construction and simplicity of design assures long service life and dependable low maintenance for this valve. All ferrous parts are fusion epoxy coated internally and externally for added corrosion resistance, along with a Dura-Kleen™ stem.

Typical Application

The Model 100G/2100G-100GS/2100GS is installed to control the water flow to the sprinklers in Deluge, Pre-Action, or Foam-Water type systems. A simplified system is used to illustrate typical operation.

The Model 100G/2100G Deluge Valve (3) is maintained in the closed position by means of system water pressure controlled by a pilot control (4). When the pilot control valve receives a signal from the fire detection system, it allows the deluge valve to open. Firefighting water (1) then enters system piping (5) and discharges from sprinklers (6).



(1) From System Water Supply
(2) System Shut-off Valve (Visual Stem)
(3) Cla-Val Model 100G or 2100G
(4) Pilot Control System
(5) Sprinkler System Piping
(6) Sprinklers

Specifications

Sizes *Globe:* 3" – 12" • *Angle:* 3" – 12"

End Details Ductile Iron 150 ANSI B16.42 flanged
Ductile Iron 300 Grooved Ends

Pressure Rating Cast Steel 150 ANSI B16.5 flanged
150 class, 250 psi maximum (Ductile Iron)
150 class, 285 psi maximum (All other materials)
300 class, 300 psi maximum (All materials)

Temperature Range Water, to 180°F MAX.

Materials ***Main Valve Body & Cover:***

- Ductile Iron ASTM A-536* **UL**, **ULC**
- Cast Steel ASTM A216-WCB* **UL**, **ULC**
- Nickel Aluminum Bronze ASTM B148 **UL**, **ULC**
- Naval Bronze ASTM B61 **UL**, **ULC**
- 316 Stainless Steel - ASTM A743 Grades CF3M and CFM8
- Super Austenitic Stainless Steel - ASTM A351 Grade CK3MCuN (SMO 254)
- Super Duplex Stainless Steel - ASTM A890 Grade 5A (CE3MN)

Main Valve Internal Trim:
Bronze ASTM B61 • Monel QQ-N-281 Class B

Diaphragm and Disc: Buna-N® synthetic rubber

***Internally & Externally Epoxy Coated**

Specifications Seawater Service Option

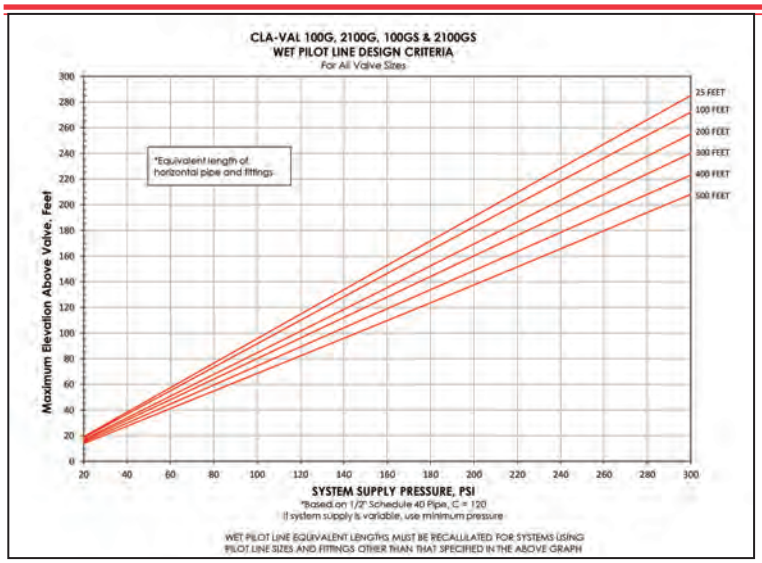
Sizes
Globe: 3" - 12" flanged
Globe: 3" - 8" grooved
Angle: 3" - 12" flanged

Consult factory for materials and flange ratings.

When Ordering, Please Specify

1. Catalog No. 100G or 2100G
2. Size
3. Body and Cover Material
4. Globe or Angle Pattern
5. Pressure Class
6. Internal Trim Material

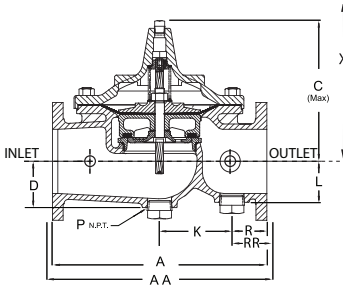
***optional Teflon™ coated seat upon request.**

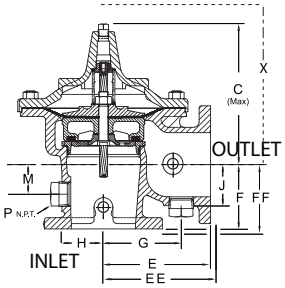


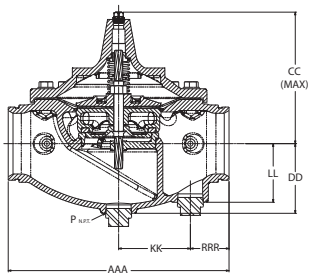
To calculate the maximum wet sprinkler pilot height above the valve, use the graph shown.

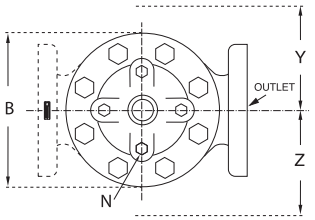
Functional Data

Valve Size		Inches	3	4	6	8	10	12
		mm	80	100	150	200	250	300
C_V Factor	Globe Pattern	Gal./Min. (gpm)	115	200	440	770	1245	1725
		Litres/Sec. (l/s)	27.6	48	105.6	184.8	299	414
	Angle Pattern	Gal./Min. (gpm)	139	240	541	990	1575	2500*
		Litres/Sec. (l/s)	33.4	58	130	238	378	600









Valve Size (in.)	3	4	6	8	10	12
A 150 ANSI	12.00	15.00	20.00	25.38	29.75	34.00
AA 300 ANSI	13.25	15.62	21.00	26.38	31.12	35.50
AAA Grooved	12.50	15.00	20.00	25.38	—	—
B Dia.	9.12	11.50	15.75	20.00	23.62	28.00
C Max.	8.19	10.62	13.38	16.00	17.12	21.00
CC Max.	7.50	9.94	12.13	15.00	—	—
D	2.56	3.19	4.31	5.16	8.50	9.39
DD	3.62	4.50	6.31	7.81	—	—
E 150 ANSI	7.00	8.50	10.00	12.69	14.88	17.00
EE 300 ANSI	--	8.81	10.50	13.19	--	17.75
F 150 ANSI	4.00	4.97	6.00	8.00	8.62	13.75
FF 300 ANSI	--	5.28	6.50	8.50	--	14.50
G	4.75	5.94	7.25	8.50	10.50	17.00
H	2.69	2.81	3.88	5.31	6.56	7.00
J	2.56	2.81	3.81	4.81	5.81	7.00
K	7.00	4.03	6.75	17.00	15.50	21.00
KK	3.50	4.56	6.50	7.00	—	—
L	2.56	2.81	3.81	4.81	8.50	9.39
LL	3.25	4.00	5.31	7.00	—	—
M	1.75	2.41	2.75	4.00	4.24	8.75
N NPT	1/2 -14	3/4 -14	3/4 - 14	1 - 11-1/2	1 - 11-1/2	1 - 11-1/2
P NPT	1-1/4 - 11-1/2	2 - 11-1/2				
R 150 ANSI	2.50	3.47	3.25	4.19	7.12	6.50
RR 300 ANSI	3.12	3.78	3.75	4.69	7.81	7.25
RRR Grooved	2.75	2.94	3.50	5.69	—	—
X Pilot System	15.00	17.00	29.00	31.00	33.00	35.00
Y Pilot System	11.00	12.00	20.00	22.00	24.00	26.00
Z Pilot System	11.00	12.00	20.00	22.00	24.00	26.00

Valve Size (mm)	80	100	150	200	250	300
A 150 ANSI	305	381	508	645	756	864
AA 300 ANSI	337	397	533	670	791	902
AAA Grooved	318	381	508	645	—	—
B Dia.	232	292	400	508	600	711
C Max.	208	270	340	406	435	533
CC Max.	191	252	308	381	—	—
D	65	81	110	131	216	239
DD	92	114	160	198	—	—
E 150 ANSI	178	216	254	322	378	432
EE 300 ANSI	--	224	267	350	--	451
F 150 ANSI	102	126	152	203	219	349
FF 300 ANSI	--	134	165	216	--	368
G	121	151	184	216	267	432
H	68	71	99	135	167	178
J	65	71	97	122	148	178
K	178	102	171	432	394	533
KK	89	116	165	178	—	—
L	65	71	97	122	216	239
LL	83	102	135	178	—	—
M	45	61	70	102	108	222
N NPT	1/2 - 14	3/4 - 14	3/4 - 14	1 - 11-1/2	1 - 11-1/2	1 - 11-1/2
P NPT	1-1/4 - 11- 1/2	2 - 11-1/2				
R 150 ANSI	64	88	83	106	181	165
RR 300 ANSI	79	96	95	119	198	184
RRR Grooved	70	75	89	145	—	—
X Pilot System	381	432	737	787	838	889
Y Pilot System	279	305	508	559	610	660
Z Pilot System	279	305	508	559	610	660

50B-4KG1 Globe
2050B-4KG1 Angle

MODEL

Fire Protection Pressure Relief Valve

CLA-VAL™

LISTED

c UL US LISTED

FM APPROVED

DESIGN ABS ASSESSED

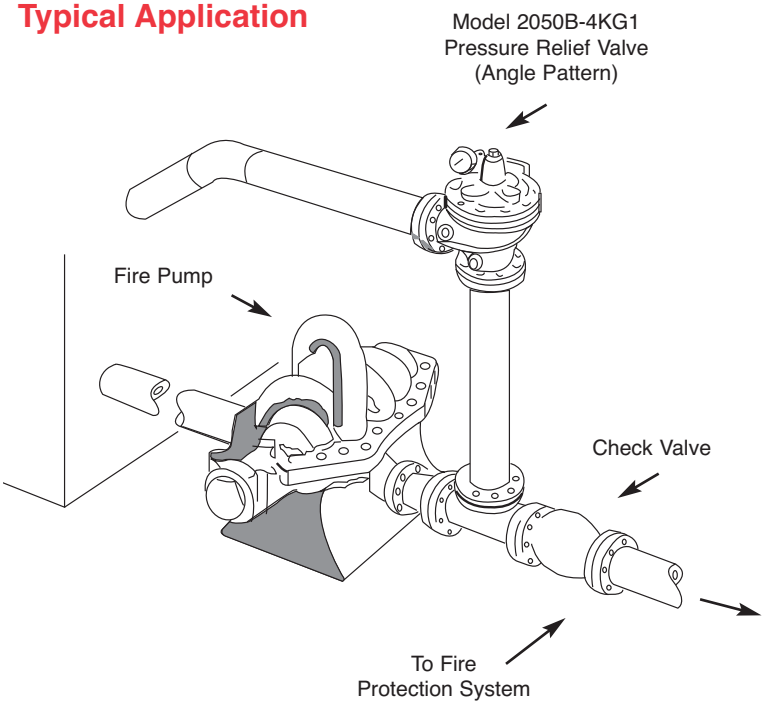
Type Approved

UL Listed.....Sizes 3" thru 8"
FM Approved.....Sizes 3" thru 8"
ULC Listed.....Sizes 2" thru 10"

- **UL Listed / ULC Listed**
- **Factory Mutual Approved**
- **Fast Opening to Maintain Steady Line Pressure**
- **Accommodates Wide Range of Flow Rates**
- **Closes Gradually for Surge-Free Operation**
- **Adjustable Pressure Settings, Not Affected by Pressure At Valve Discharge**

The Cla-Val Model 50B-4KG1 Globe / 2050B-4KG1 Angle Pressure Relief Valve is designed specifically to automatically relieve excess pressure in fire protection pumping systems. Pilot controlled, it maintains constant system pressure at the pump discharge within very close limits as demands change. The 50B-4KG1 and 2050B-4KG1 can be supplied with optional internal and external epoxy coating of the main valve wetted surfaces.

Typical Application



Operation Sequence

At pump start, Cla-Val Relief Valve modulates to relieve excess pump capacity, maintaining positive system pressure at the pump discharge.

When fire demand slows or ceases, Cla-Val Model 50B-4KG1 opens, diverting entire pump output to discharge, allowing fire pump to be stopped without causing surging in the lines.

(Please note that if the Model 50B-4KG1 is to be used on a continuous duty basis to maintain fire-system pressure, suitable back pressure must be provided on the valve to prevent cavitation damage. Consult the factory for details.)

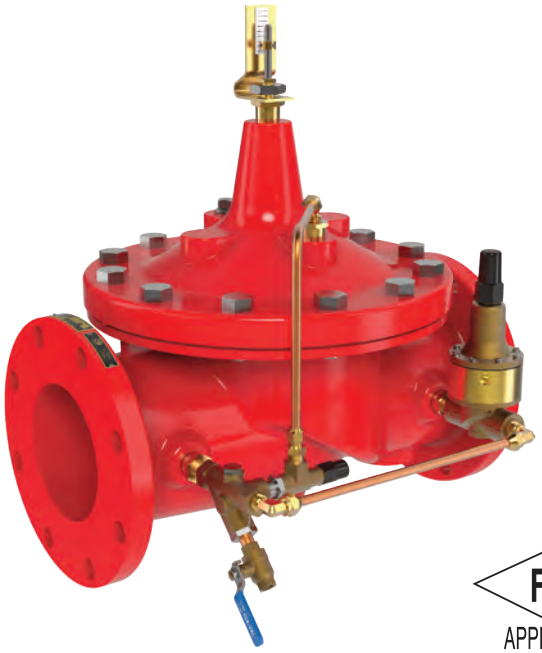
Optional UL Listed Materials for Seawater and Severe Service Applications:

- Nickel Aluminum Bronze (NAB) - ASTM B148 Alloy C95800
- Monel - QQ-N-288 Comp B - ASTM A494 Grade M30H
- Cast Steel - ASTM A216 Grade WCB
- 316 Stainless Steel - ASTM A743 Grades CF3M and CFM8
- Super Austenitic Stainless Steel - ASTM A351 Grade CK3MCuN (SMO 254)
- Super Duplex Stainless Steel - ASTM A890 Grade 5A (CE3MN)

CLA-VAL™

MODEL — 50B-5KG

Pump Suction Control Valve



FM APPROVED

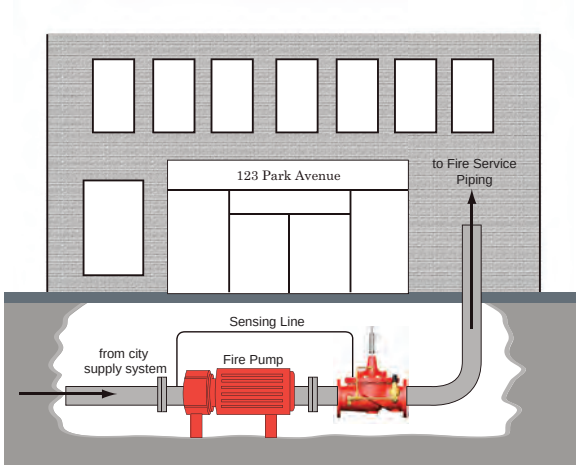
- **Adjustable Opening Speed For Pump Suction Protection**
- **Pilot Control Provides Wide Flow Range With Minimal Pressure Variations**
- **Controlled Closing For System Protection**
- **Modulates Within 5% of Setting for Accurate Pressure Control**
- **Pressure Setting Adjustable**
- **Pressure Setting Not Affected by Pressure at Valve Discharge**

The Model 50B-5KG Pump Suction Control Valve is designed specifically for Fire Pump Suction Control Service. It modulates to maintain the pump discharge in relation to the suction head available, thus assuring that the suction head pressure does not fall below the pre-set minimum. The 50B-5KG can be supplied with optional internal and external epoxy coating of the main valve wetted surfaces.

Typical Installation

When there is a demand in the Fire System, the pump is started, delivering water from the supply source to the area of demand. To assure that the fire pump draw does not exceed the available water supply, the Model 50B-5KG, sensing the pump suction, modulates to prevent suction pressure from dropping below a pre-set minimum.

By maintaining minimum pressure requirements in the supply main, the main is protected from possible damage or backflow conditions. Also, a minimum supply pressure is provided for local fire apparatus.



Specifications

Sizes	*Globe:* 3" - 8" flanged *Angle:* 3" - 8" flanged
End Details	150 and 300 ANSI B16.42
Pressure Ratings	150 class - 250 psi Max. 300 class - 400 psi Max
Temperature Range	Water, to +180°F Max.
Materials	***Main valve body & cover*** Ductile Iron ASTM A-536 ***Main valve trim:*** Brass QQ-B-626 Bronze Seat ASTM B61 Stainless Steel Stem 303 Delrin Sleeved ***Pilot control system:*** Cast Bronze UNS 87850 with 303 Stainless Steel trim
Adjustment Range	Available in the following pressure range only: 5 to 25 psi Set at 10 psi

85-09-1
(Full Internal Port)

MODEL

685-09-1
(Reduced Internal Port)

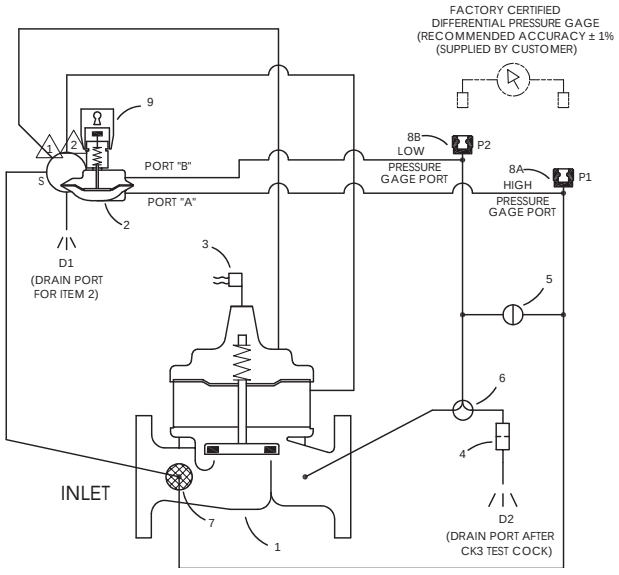
AUTOMATIC BREACH CONTROL VALVE

CLA-VAL®™

- **Simple Proven Design**
- **Non-Surge Operation**
- **Drip-Tight Shut-Off**
- **No Packing Glands or Stuffing Boxes**
- **Static System Operational Testing**
- **Available in a Variety of Materials**

The Cla-Val Model 85-09-1/685-09-1 Automatic Breach Containment Valve (ABCV) will isolate portions of distribution piping when catastrophic downstream breach occurs. The ABCV is designed for protecting commercial building water distribution systems, such as fire protection, potable water service, or chill water circulation. Strategically located to isolate portions of water systems, the ABCV prevents significant water losses and resultant damage, and allows limited continued service when distribution systems are damaged or out of service.

During normal conditions the ABCV is fully open allowing normal water flows. When excessive flows occur due to pipe damage or breach, the ABCV closes drip-tight, isolating the breached downstream portion of system. When the ABCV is closed, normal water flow occurs through remaining upstream distribution piping. Once closed, the ABCV will automatically re-open when downstream pressure is restored.



Schematic Diagram

Item	Description
1	100-02 Powertrol (Main Valve)
2	CDH4-A3 Differential Control
3	X105L Limit Switch
4	X58C Restriction
5	CK2 Isolation Valve Manual Reset
6	CK3 (Isolation Valve) DP Test
7	X46A Flow Clean Strainer
8	QD Socket, Gage Connection
9	X140 Locking Security Cap

The Cla-Val Model 85-09-1/685-09-1 Automatic Breach Containment Valve is a pilot controlled, hydraulically-operated, diaphragm-actuated, globe pattern valve. The valve consists of a Powertrol main valve and a pre-installed pilot control system. Using line fluid as operating medium, the ABCV is completely self-contained, requiring no additional power to operate. The Powertrol can be supplied with optional fusion bonded epoxy coating for longer service life and lower maintenance costs.

The custom pilot control senses pressure differential across valve, and is factory-preset to shift at differential corresponding to specified breach flow. The control smoothly closes Powertrol hydraulically. The pilot control has locking cap to protect calibrated settings. Supplied valve position electric switch assembly provides remote confirmation or alarm signal that ABCV is fully closed. Two quick-connect ports allow verification of differential pressure setting and conducting operational ABCV testing when water system is static. Test Kit consisting of differential gauge and hose connections is available option. The ABCV operates most efficiently when installed in horizontal pipe with Powertrol cover and internal-stem oriented vertically up.

CLA-VAL™

—MODELS 90G-21 and 90G-21P 90A-21 and 90A-21P

Fire Protection Pressure Reducing Valves

90-21P UL Listed Fire Protection Pressure Reducing Valve with Gauges

MEA Approved

90-21 UL Listed Grooved End Fire Protection Pressure Reducing Valve

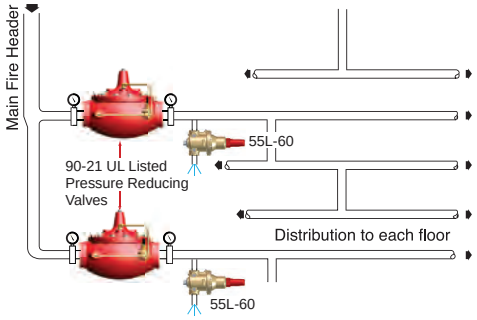
Special System Water Control Valves – Class II
UL Product Category VLMT – File No. Ex 2534

- **U.L. Listed, ULC Listed, MEA Approved**
- **Globe or Angle Pattern**
- **Proven Reliable Design**
- **Available in Cast Bronze, Ductile Iron and Cast Steel**
- **Accurate Pressure Control**
- **In Line Service**
- **Grooved Ends (1 1/2" - 8")**

Cla-Val 90-21 and 90-21P Pressure Reducing Valves are indispensable in any fire protection system. Available in globe (90G-21/90G-21P) and angle patterns (90A-21and 90A-21P), our diaphragm actuated design is proven to be highly reliable and easy to maintain. Globe and angle pattern valves feature a full range of adjustments. These valves are also available in a variety of material options. Epoxy coating is strongly recommended for all fire system valves (excluding bronze valves). All configurations of the valve can be supplied with optional internal and external epoxy coating of the main valve wetted surfaces.

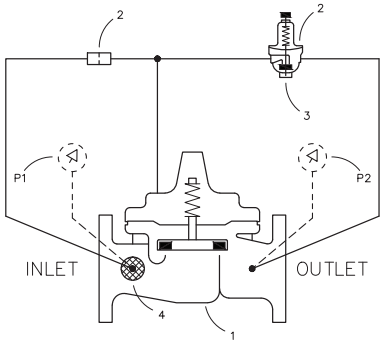
Function

Cla-Val 90G-21 (globe) and 90A-21 (angle) Pressure Reducing Valves automatically reduce a higher inlet pressure to a steady lower outlet pressure regardless of changing flow rate and/or varying inlet pressure. The valves pilot control system is very sensitive to slight downstream pressure fluctuations, and will automatically open or close to maintain the desired pressure setting. The downstream pressure can be set over a wide range by turning the adjustment screw on the CRD pilot control. The adjustment screw is protected by a screw-on cover, which can be sealed to discourage tampering.



Schematic Diagram

Item	Description
1	100KX Hytrol Main Valve
2	X58C Restriction Assembly
3	CRD Pressure Reducing Control (see note)
4	X46A Flow Clean Strainer
P	Gauge Option



Note:
For Steel and Ductile Iron 300 Class Valves, use CRDKX with a special diaphragm washer, yoke and screws (30- 165)

Typical Application

Underwriters Laboratories requires the installation of pressure gauges upstream and downstream of the Pressure Reducing Valve.

A relief valve of not less than 1/2 inch in size must also be installed on the downstream side of the pressure control valve. Adequate drainage for the relief valve discharge must be provided.

The valve made be installed in either vertical or horizontal positions.

UL / ULC Listings

Size	Ductile Iron 150# Flanged	Ductile Iron 300# Screwed	Ductile Iron 300 # Flanged	Bronze 300# Threaded	Bronze 150# Flanged	Bronze 300# Flanged	Cast Steel 300# Flanged & Grooved End	Globe Pattern Ductile Iron Grooved End	Angle Pattern Ductile Iron Grooved End
1 1/2"	UL / ULC	UL / ULC	UL / ULC	UL / ULC			UL / ULC	UL / ULC	
2"	UL / ULC	UL / ULC	UL / ULC	UL / ULC	ULC	ULC	UL / ULC	UL / ULC	UL / ULC
2 1/2"	UL / ULC	UL / ULC	UL / ULC	UL / ULC	ULC	ULC	UL / ULC	UL	
3"	UL / ULC	UL / ULC	UL / ULC	UL / ULC	ULC	ULC	UL / ULC	UL / ULC	UL / ULC
4"	UL / ULC		UL / ULC		ULC	ULC	UL / ULC	UL / ULC	UL / ULC
6"	UL / ULC		UL / ULC				UL / ULC	UL / ULC	UL / ULC
8"	UL / ULC		UL / ULC					UL / ULC	
10"	ULC		ULC						

CLA-VAL®

— MODEL — 134-05

Solenoid Operated Deluge Valve

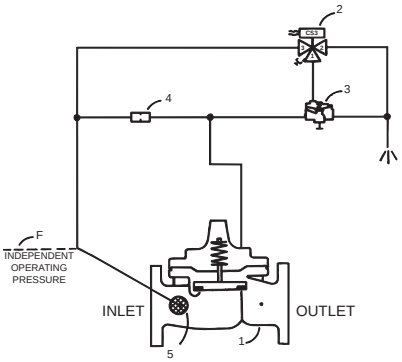
- **UL Listed / ULC Listed Main Valves - 3 - 12 inch sizes***
- **Fast Acting Solenoid Control**
- **Reliable Drip Tight Shut-off**
- **Simple Design, Proven Reliable**
- **Easy Installation & Maintenance**

The Cla-Val Model 134-05 Solenoid Control Valve is an on-off control valve which either opens or closes upon receiving an electrical signal to the solenoid pilot control. This valve consists of a 100G/2100G UL/ULC Listed Hytrol Main Valve, a three-way solenoid valve and an auxiliary pilot valve. This pilot control system alternately applies pressure to/or relieves pressure from the diaphragm chamber of the main valve. It is furnished either normally open (de-energize solenoid to open) or normally closed (energize solenoid to open).

Note: For seawater applications use 100GS/2100GS main valve

Schematic Diagram

Item	Description
1	100G/2100G UL/ULC Listed Hytrol Main Valve
2	CS3 Solenoid Control
3	100-01 Hytrol Pilot Valve
4	X58C Restriction Orifice
5	X46A Flow Clean Strainer



Specifications

SIZES Globe: 3" - 12" flanged
Globe: 3" - 8" grooved
Angle: 3" - 12" flanged

END DETAILS Ductile Iron 150 ANSI B16.42 flanged
Ductile Iron 300 grooved
Cast Steel 150 ANSI B16.5 flanged

PRESSURE RATINGS
150 class, 250 psi maximum (Ductile Iron)
150 class, 285 psi maximum (All other materials)
300 class, 300 psi maximum (All materials)

TEMPERATURE RANGE Water: to 180° F. Max

Materials

Main valve body & cover:
Ductile Iron ASTM A-536*
Cast Steel ASTM A216-WCB*
Naval Bronze ASTM B61
Nickel Aluminum Bronze ASTM B148
Super Duplex Stainless Steel
Stainless Steel ASTM A743-CF-8M

Main valve trim:
Bronze / Stainless Steel

Pilot control system:
Cast Bronze ASTM B62
UL /ULC Listed 3" - 12"

Functional Data

Valve Size		Inches	3	4	6	8	10	12
		mm	80	100	150	200	250	300
C_V Factor	Globe Pattern	Gal./Min. (gpm)	115	200	440	770	1245	1725
		Litres/Sec. (l/s)	27.6	48	105.6	184.8	299	414
	Angle Pattern	Gal./Min. (gpm)	139	240	541	990	1575	2500*
		Litres/Sec. (l/s)	33.4	58	130	238	378	600

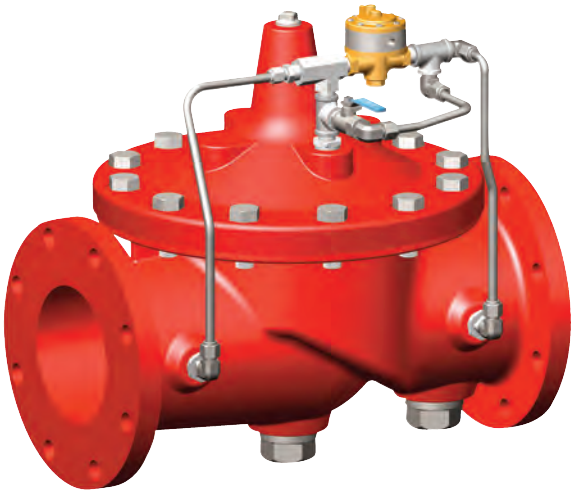
Cover Capacity

Valve Size	Displacement
3"	.080 gal
4"	.169 gal
6"	.531 gal
8"	1.26 gal
10"	2.51 gal
12"	4.00 gal

CLA-VAL™

— MODEL — Series 403

Pneumatically Operated Remote Control Valve For Freshwater and Seawater Service



403G-11A

- **Single Seat with Resilient Disc Insures Tight Seal**
- **Simply Designed with Few Working Parts**
- **Quick Response to Remote Control**
- **Fully Supported Frictionless Diaphragm**
- **Leak-proof Service Assured – No Packing Glands**
- **Single Tube Line Required for Control**
- **Opens Wide for Minimum Flow Resistance**

The Cla-Val 403 Series Remote Control Valve is used where "on-off" control is required. Pressure signals from a remote control "open or close" a small auxiliary valve installed on the main valve cover, which in turn opens or closes the main valve. Only the small amount of fluid in the auxiliary valve cover must pass through the remote control pilot in order to fully open or close the larger main valve.

The Model 403 Series consists of a 100-01 Hytrol main valve and a small Hytrol auxiliary valve. Both the main valve and the auxiliary valve are single-seated, diaphragm operated globe type valves. Line pressure applied to the auxiliary valve cover closes the main valve drip tight.

For Seawater Service use 100S/2100S or 100GS/2100GS Main Valve

Specifications

Sizes Globe: 1 1/2" - 24" flanged
Angle: 1 1/2" - 16" flanged

End Details 125 and 250 ANSI B16.1

Pressure Ratings 150 class - 250 psi Max.
300 class - 400 psi Max.

Temperature Range Water: to 180° F. Max.

Materials

Main valve body & cover:
Ductile Iron ASTM A-536*
Cast Steel ASTM A216-WCB*
Naval Bronze ASTM B-61
Nickel Aluminum Bronze ASTM B148
Super Duplex Stainless Steel
Stainless Steel ASTM A743-CF-8M

Main valve trim:
Bronze ASTM B61
Monel
Stainless Steel 316

Pilot control system:
Cast bronze ASTM B61 with monel trim
Stainless Steel 316 Tubing & Fitting

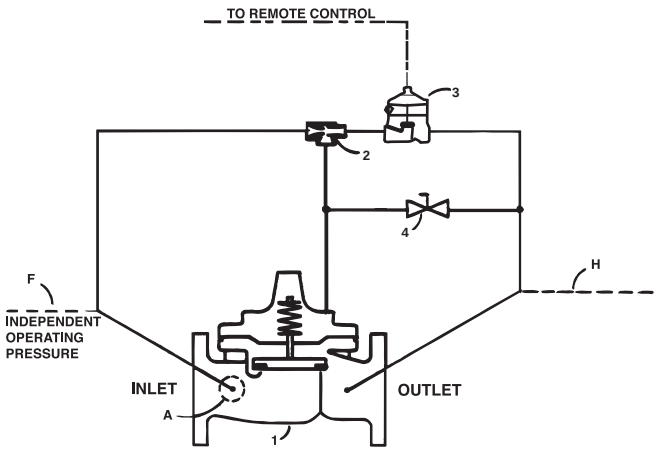
***Internally & Externally Epoxy Coated**

Schematic Diagram

Item	Description
1	100-01 Hytrol Main Valve
2	X47A Ejector
3	100-02 Powertrol
4	CK2 Ball Valve

Optional Features

Item	Description
A	X46A Flow Clean Strainer
F	Independent Operating Pressure
H	Drain to Atmosphere



CLA-VAL®

— MODEL — 834-05

800 Series (Tubular Diaphragm Valve)

Fire Deluge Valve

FM APPROVED

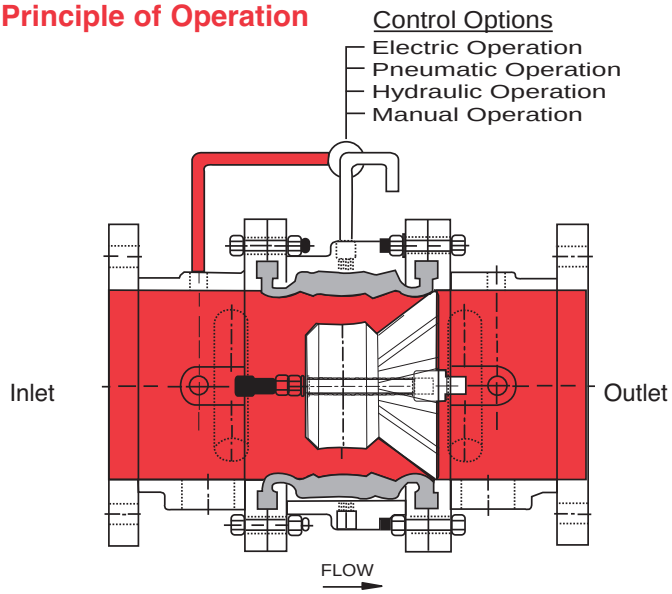
- **Low Head Loss**
- **Cast Steel Construction**
- **Stainless Steel Pilot and Tubing**
- **Stainless Steel Solenoid**
- **Anti-Cavitation Design**
- **Fusion Coated Epoxy Inside and Out**
- **Nickel Aluminum Bronze Construction Option (Alloy C95800)**
- **Duplex Stainless Steel Construction Option (Alloy 2205)**
- **Low Maintenance**
- **Simple and Reliable Operation**
- **1-Year Warranty**

The Cla-Val 834-05 Deluge Valve is a pressure-operated, in-line axial valve. A tube diaphragm actuates the valve, which is comprised of three major components: 1) Tube 2) Barrier and 3) Body. There is only one moving part in the valve - the tube diaphragm. There are no shafts, packing, stem guides or springs.

The tube diaphragm is a one piece, homogeneous nitrile rubber part which is extremely durable. The ends of the tube are thick solid rubber, designed to fit between mating flanges. This design eliminates the possibility of cutting the tube diaphragm due to over tightening or piping misalignment during installation.

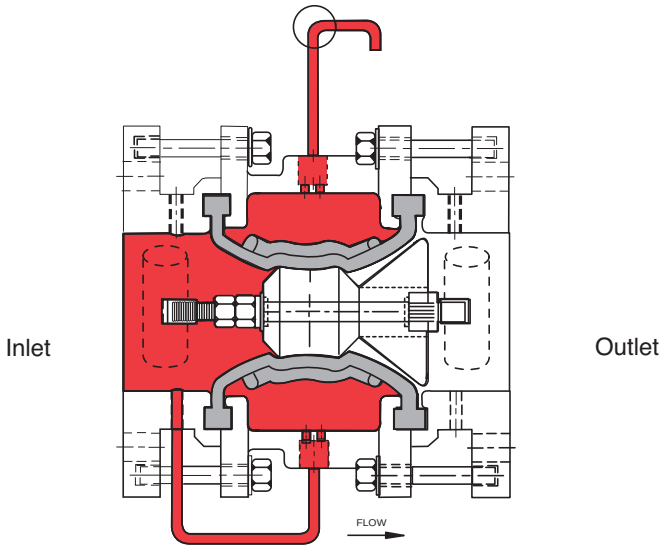
The tube forms a drip tight seal around the barrier when the pressure is equalized between the valve inlet and the control chamber. When pressure is removed from the control chamber, the valve is open. The minimum recommended operating pressure is 40 P.S.I. of inlet pressure.

Principle of Operation



Full Open Operation

When pressure in control chamber is relieved, the valve is open.



Tight Closing Operation

Water pressure from valve inlet is applied to the control chamber. Valve closes bubble tight.

CLA-VAL™

— MODEL — 850B-4

800 Series (Tubular Diaphragm Valve)

Fire Relief Valve

FM APPROVED

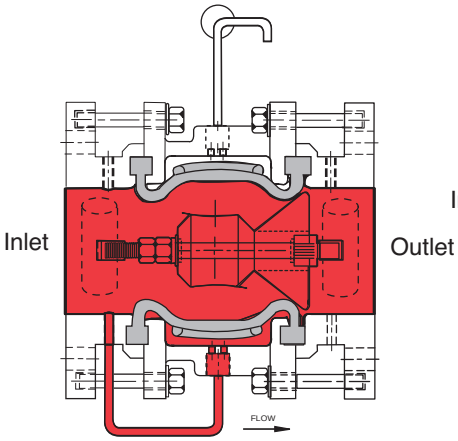
- **Low Head Loss**
- **One Spring for all Pressure Ranges between 30 and 200 PSIG**
- **Cast Steel Construction**
- **Pressure Excursions Do Not Exceed 3% of Set Pressure**
- **Fusion Coated Epoxy Inside and Out**
- **Anti-Cavitation Design**
- **Nickel Aluminum Bronze Construction Option (Alloy C95800)**
- **Duplex Stainless Steel Construction Option (Alloy 2205)**
- **Low Maintenance**
- **Simple and Reliable Operation**
- **1-Year Warranty**

The Cla-Val Model 850B-4 Fire Relief Valve is a pressure-operated, in-line axial valve. A tube diaphragm actuates the valve, which is comprised of three major components: 1) Tube 2) Barrier and 3) Body. There is only one moving part in the valve — the tube diaphragm. There are no shafts, packing, stem guides or springs.

The tube diaphragm is a one piece, homogeneous nitrile rubber part which is extremely durable. The ends of the tube are thick solid rubber, designed to fit between mating flanges. This design eliminates the possibility of cutting the tube diaphragm due to over tightening or piping misalignment during installation.

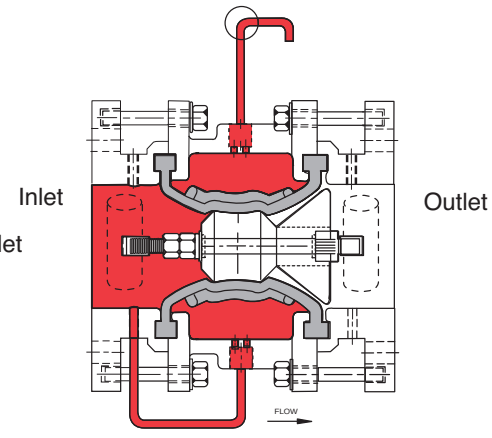
The tube forms a drip tight seal around the barrier when the pressure is equalized between the valve inlet and the control chamber. When pressure is removed from the control chamber, the valve is open. The minimum recommended operating pressure is 40 P.S.I. of inlet pressure.

Principle of Operation



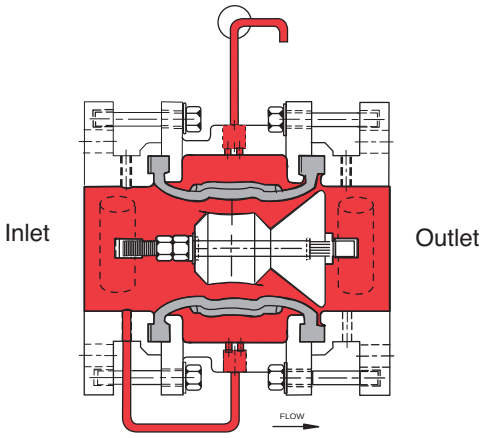
Full Open Operation

The valve opens when pilot set pressure is reached and pressure in the control chamber is relieved.



Tight Closing Operation

Water pressure (equal to inlet pressure) from valve inlet or from upstream of valve is applied to the control chamber. Valve closes bubble tight.



Modulating Action

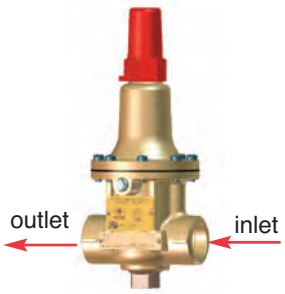
The valve tube diaphragm holds any intermediate position when a quantity of water is exhausted from the control chamber via the pilot. The quantity of water in the control chamber is established by the “set pressure” of the pilot.

The control chamber is filled or exhausted to atmosphere, maintaining “set pressure.”

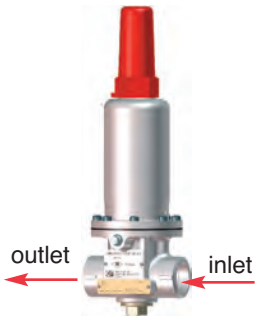
CLA-VAL

— MODEL — 55L-60
Pressure Relief Valve/ Pump Casing Relief Valve

1/2" and 3/4"
Globe
Configuration

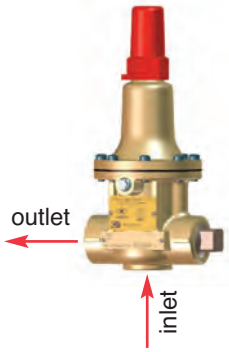


0-75 psi
20-200 psi

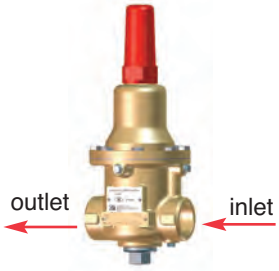


100-300 psi

1/2", 3/4" and **1"**
Angle Configuration



1" Size
20-75 psi
40-200 psi
100-300 psi



more materials available

- **Available sizes 1/2", 3/4" and 1"**
- **UL Listed/FM Approved for use as a Fire Pump Casing Relief Valve**
- **Direct Acting - Precise Pressure Control**
- **Drip Tight Closure**
- **No Packing Glands or Stuffing Boxes**
- **Globe or Angle configurations available**
- **Sensitive to Small Pressure Variations**
- **Meets low lead requirements**
- **Available in Cast Bronze, 316 Stainless Steel, Monel & Super Duplex Stainless Steel**

The Cla-Val Model 55L-60 **(UL Listed, FM Approved)** Pressure Relief Valve is a direct-acting, spring loaded, diaphragm type relief valve. The valve may be installed in any position and will open and close within very close pressure limits. The bottom plug may be removed and installed in the inlet to convert it to an angle pattern flow path.

The Model 55L-60 is normally held closed by the force of the compression spring above the diaphragm. When the controlling pressure applied under the diaphragm exceeds the spring setting, the disc is lifted off its seat, permitting flow through the control. When control pressure drops below the spring setting, the spring forces the control back to its normally closed position. The controlling pressure is applied to the chamber beneath the diaphragm through an internal passage. A gauge port is provided for accurate pressure setting.

Pressure adjustment is done by turning the adjusting screw to vary the spring load on the diaphragm. The 55L-60 is available in pressure ranges suited to agency approval tests. To prevent tampering, the adjustment cap can be wire sealed by using the lock wire holes provided in the cap and cover.

UL LISTED

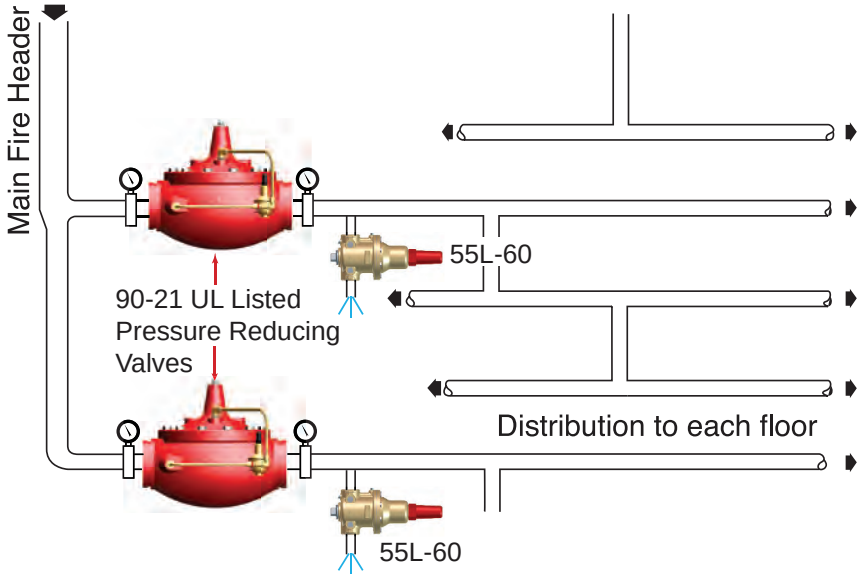
FM APPROVED

Fire Protection System Service
The **Model 55L-60** is typically used in a fire protection system to trim water pressure, thus preventing pressure build-up whenever line pressure exceeds the setting of the spring.

The 55L-60 will relieve excess pressure to atmosphere to prevent damage to the distribution network.

NOTE: Model 55L-60 is not suitable for discharging the full-rated pump capacity of a fire pump. See Model 50B-4KG1 Fire Pump Relief Valve for such applications.

Typical Application for Fresh Water or Seawater Service



X43HL — MODEL —

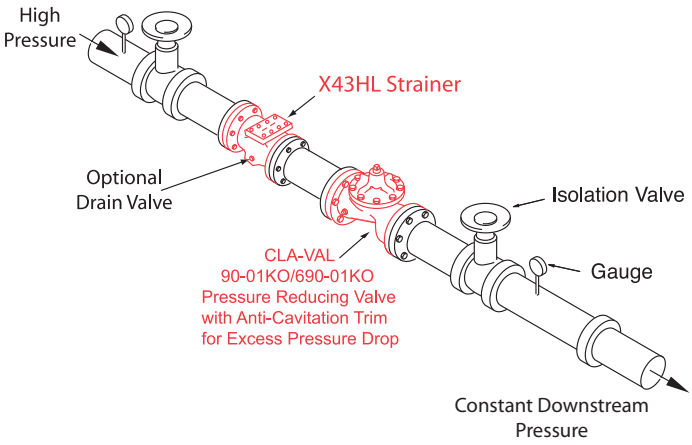
X43HL Strainer

Now available up to 48-inches/1200 mm

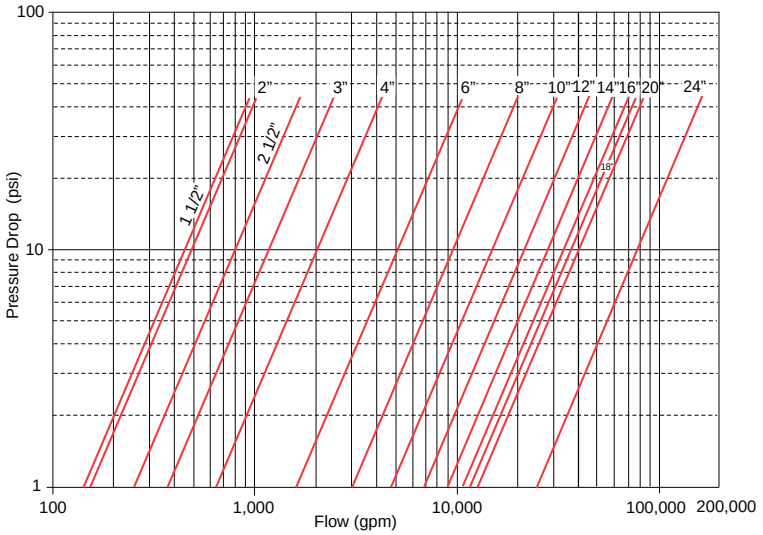
- **Low Pressure Drop**
- **Ductile Iron Fusion Bonded Epoxy Coated construction with a 316 Stainless Steel Strainer**
- **Also available: Nickel Aluminum Bronze Construction with a Titanium Strainer**
- **Large Flow Area H-Style Design**
- **Service Without Removal From Line**

The durable Cla-Val Model X43HL Strainer is the easiest and most cost effective way to protect piping and equipment from damage caused by pipeline debris. Its large flow area and durable materials of construction means it can withstand the harsh conditions often encountered in refinery and offshore applications. The body port allows for installation of a manual flush valve to clear small amounts of debris from the strainer without removing the cover. For more thorough cleaning, the top cover can easily be removed without taking strainer out of the pipeline. The strainer may be installed in any position, however, installation with cover up is recommended

Model X43HL Strainer Typical Application



Model X43HL Flow Chart



Please consult factory to confirm flow data for 36-inch/900 mm and 48-inch/1200 mm strainers

C_V Factor

Strainer Size (inches)	**1 ½**	**2**	**2 ½**	**3**	**4**	**6**	**8**	**10**	**12**	**14**	**16**	**18**	**20**	**24**
C_V (Gal/Min. - gpm.)	96	150	254	367	654	1644	3922	4566	6800	8949	11692	12796	18264	26302
C_V (Litres/Sec - l/s.)	23	36	61	85	157	395	702	1097	1580	2150	2809	3555	4388	6319

C_V in gpm = gpm @ 1psid head loss • C_V in l/s = l/s @ 1bar head loss

CLA-VAL WARRANTY

3 Year Warranty on Cla-Val Quality Products

This is a 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 which is returned to our factory, transportation charges prepaid, provided that after inspection the material is found to have been defective at time of shipment. The warranty is expressly conditioned on the purchaser's giving Cla-Val immediate written notice upon discovery of the defect.

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

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

Disclaimer of Warranties & Limitation 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.

CLA-VAL

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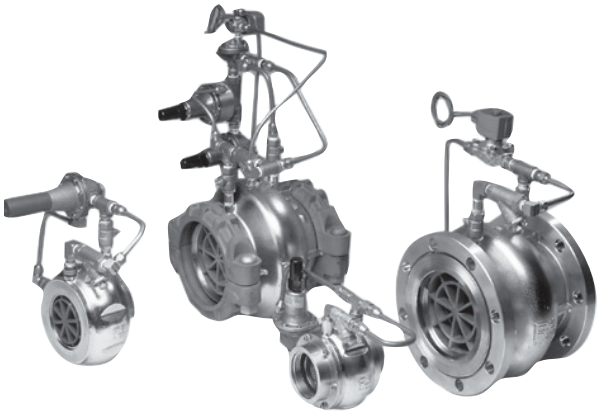
CLA-VAL WARRANTY

1 Year Warranty on Cla-Val 700 Series Quality Products



This is a Limited Warranty

Roll Seal automatic valves and controls as manufactured by Cla-Val are warranted for one year 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 which is returned to our factory, transportation charges prepaid, provided that after inspection the material is found to have been defective at time of shipment. The warranty is expressly conditioned on the purchaser's giving Cla-Val immediate written notice upon discovery of the defect.

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

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

Disclaimer of Warranties & Limitation 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.

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CLA-VAL™

Global Headquarters, US Factory & Foundries

Cla-Val is a global manufacturer with headquarters and a 20-acre production/foundry complex in Costa Mesa, California. Since 1936, we have provided the industry's finest automatic control valves to customers in every part of the world. Other global locations include Canada, Mexico, Switzerland, France, the United Kingdom and New Zealand. For a comprehensive overview of Cla-Val's capabilities, please view our virtual factory tour on YouTube.com.


Cla-Val Global Headquarters • Costa Mesa, CA

Cla-Val automatic control valves are renowned for their quality and superior performance. The company itself is known for consistently excellent customer service as well as innovation, specifically related to products that help to conserve water and improve system efficiency.

Cla-Val's long history of manufacturing and industry excellence also enables us to provide the industry's most comprehensive program of hands-on, personalized technical/product training at our in-house training facilities in each of our global offices.

Onsite Foundries

Soundcast

Griswold Casting (Lost Wax Foundry)

Global Locations


Cla-Val European Headquarters


Cla-Val France


Cla-Val UK


Cla-Val Canada


Cla-Val Pacific New Zealand

Innovative Products for Waterworks Applications

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