

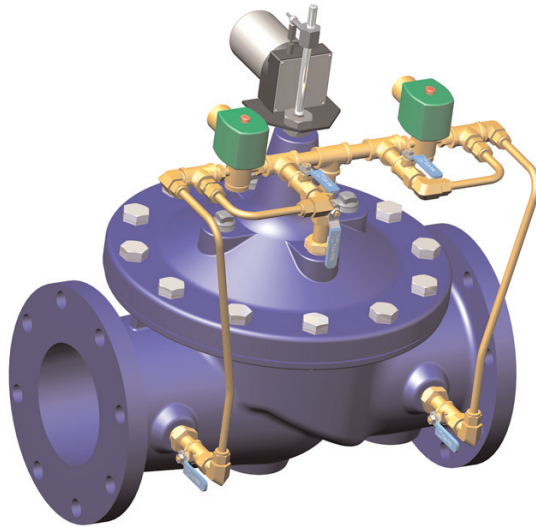


131 Series
(Full Internal Port)

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 Prevents 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 131VC-1 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.

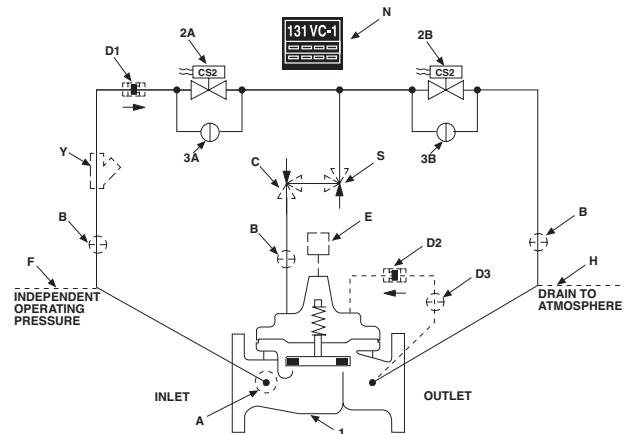
The basic 131-01/631-01 Electronic Control Valve (Schematic shown below) includes the main valve and solenoid pilot controls. Optional features include the 131VC-1 Electronic Valve Controller and the X117D Valve Position Transmitter. If the check feature option is added, and a pressure reversal occurs, the downstream pressure is admitted into the cover, closing the valve.

Schematic Diagram

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

Optional Features

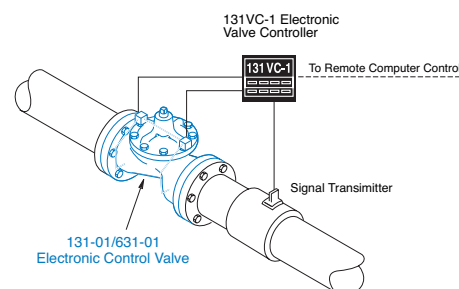
Item	Description
A	X46A Flow Clean Strainer
B	CK2 (Isolation Valve)
C	CV Flow Control (Closing)
D	Check Valves With Isolation Valve
E	X117D Position Transmitter
F	Independent Operating Pressure
H	Atmospheric Drain
N	Electronic Controller
S	CV Flow Control (Opening)
Y	X43 "Y" Strainer



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

Typical Applications

This brochure contains typical application that are modifications to the basic 131-01/631-01 Electronic Control Valve shown here. It is typical installed in a pipeline with a 131VC 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.



131-02/631-02

Electronic Control Valve, Powertrol Type

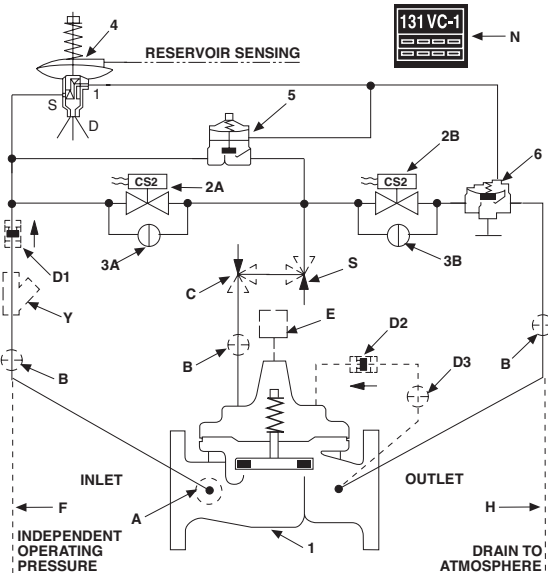
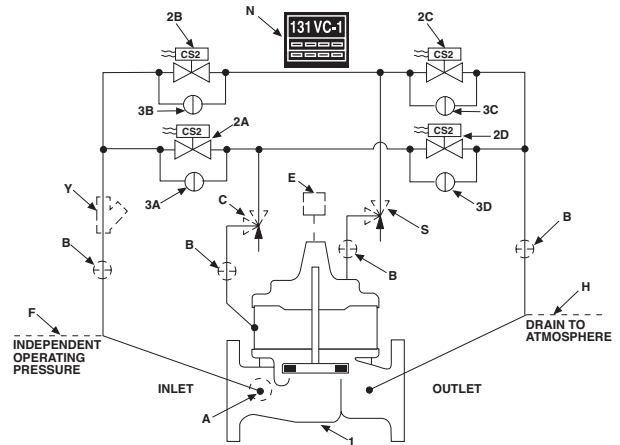
The electronically controlled Powertrol valve is well suited for applications where the line pressure is low and precise control is required. It is also ideal where independent operating pressure is to be used for operating the valve. The pilot system includes four solenoid controls which apply or relieve hydraulic pressure to either side of the diaphragm, causing the valve to open or close as desired. The electronic controller modulates the valve to control flow, pressure, level or valve position.

Schematic Diagram

Item	Description
1	Powertrol (Main Valve)
2	CS2 Solenoid Control
3	CK2 Cock (Solenoid By-Pass)

Optional Features

Item	Description
A	X46A Flow Clean Strainer
B	CK2 (Isolation Valve)
C	CV Flow Control (Closing)
E	X117D Position Transmitter
F	Independent Operating Pressure
H	Drain To Atmosphere
N	Electronic Controller
S	CV Flow Control (Opening)
Y	X43 "Y" Strainer



Schematic Diagram

Item	Description
1	Hytrol (Main Valve)
2	CS2 Solenoid Control
3	CK2 Cock (Solenoid By-Pass)
4	CDS5 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 Cock (Isolation Valve)
C	CV Flow Control (Closing)
D	Check Valves with Isolation Valve
E	X117D Position Transmitter
F	Independent Operating Pressure
H	Atmospheric Drain
N	Electronic Controller
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

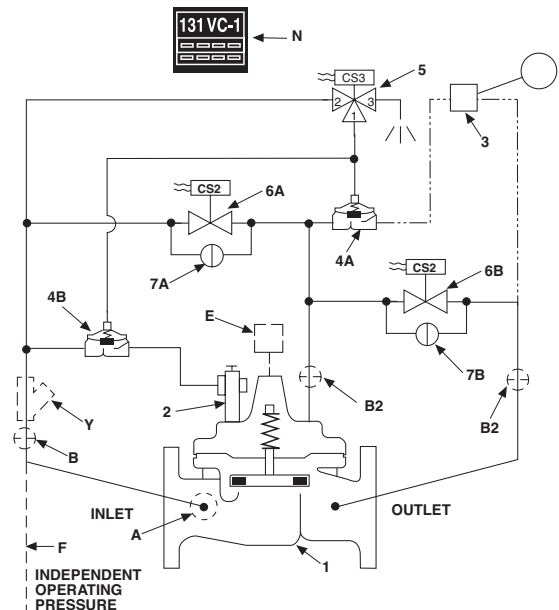
The electronic controller modulates the flow through this valve to control liquid level in a tank. If power failure should occur, the third solenoid shifts, and the float control will allow the valve to modulate using hydraulic line pressure. The 131VC Electronic Valve Controller and X117D Valve Position Transmitter are used in combination with an electronic level sensing device to provide modulating flow control of the valve.

Schematic Diagram

Item	Description
1	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 Cock (Isolation Valve)
E	X117D Position Transmitter
F	Independent Operating Pressure
N	Electronic Controller
Y	X43 "Y" Strainer



131-12/631-12

Electronic Interface Control with Pressure Reducing Feature, Hydraulically Operated

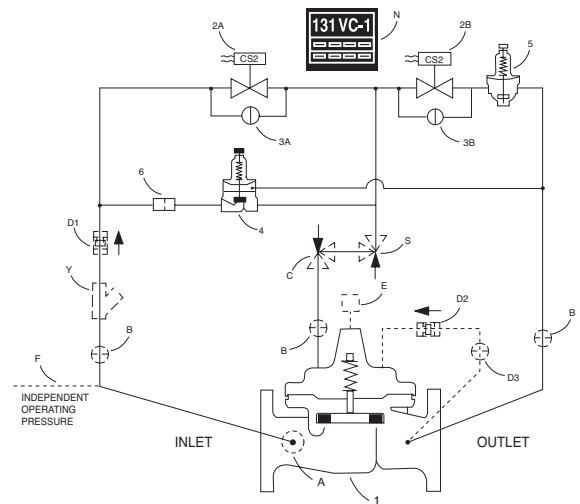
Flow, pressure, level or valve position is normally controlled by the electronic controller that operates two solenoids to modulate the valve to maintain the process variable. Should a power failure occur, a parallel hydraulically operated pressure reducing pilot system takes control of the valve maintaining 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

Schematic Diagram

Item	Description
1	Hytrol (Main Valve)
2	CS2 Solenoid Control
3	CK2 Solenoid By-Pass
4	CRL5 Pressure Relief Control
5	CRD Pressure Reducing Valve
6	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	X117D Position Transmitter
F	Independent Operating Pressure
N	Electronic Controller (Single)
S	CV Flow Control (Opening)
Y	X43 "Y" Strainer



Schematic Diagram

Item	Description
1	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

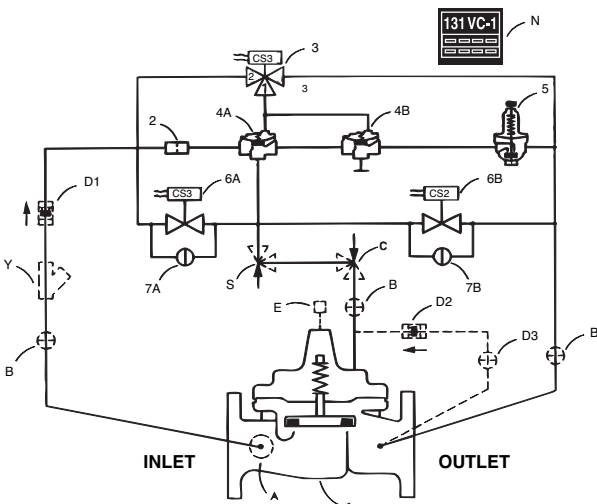
Optional Features

Item	Description
A	X46A Flow Clean Strainer
B	CK2 Isolation Valve
C	CV Flow Control (Closing)
D	Check Valves Isolation Valve
E	X117D Position Transmitter
N	Electronic Controller (Single)
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

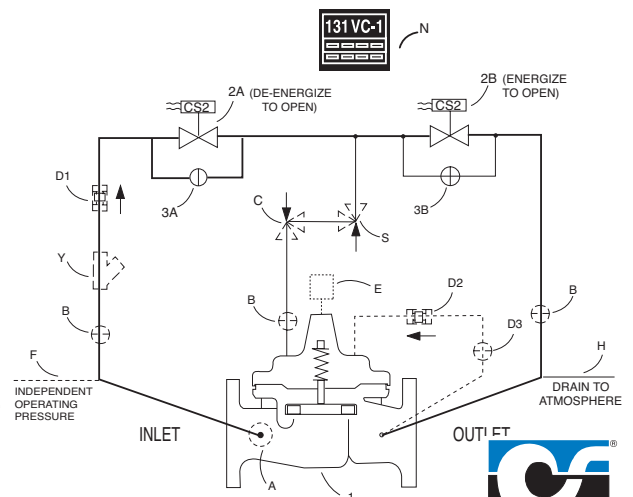
Flow, pressure, level or valve position is normally controlled by the electronic controller that operates two solenoids to modulate the valve to maintain the process variable. Should a power failure occur, the valve can be configured to go open or closed. The optional check feature automatically will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

Schematic Diagram

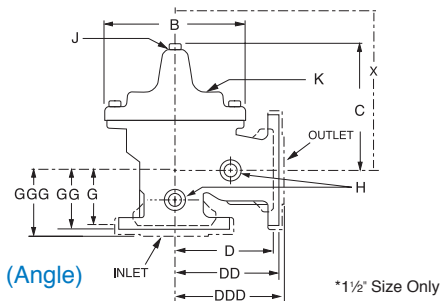
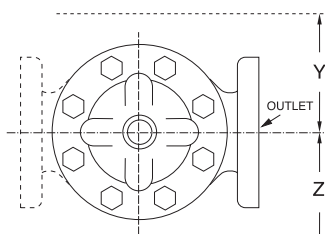
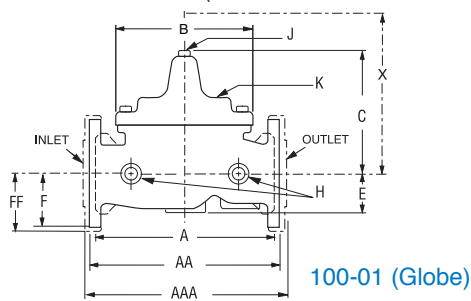
Item	Description
1	100-01 Hytrol (Main Valve)
2	CS2 Solenoid Control
3	CK2 (Solenoid By-Pass)

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	X117D Position Transmitter
F	Independent Operating Pressure
H	Atmospheric Drain
N	Electronic Controller
S	CV Flow Control (Opening)
Y	X43 "Y" Strainer

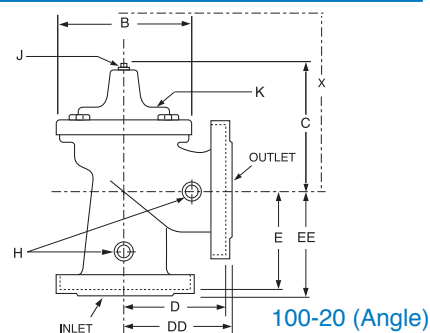
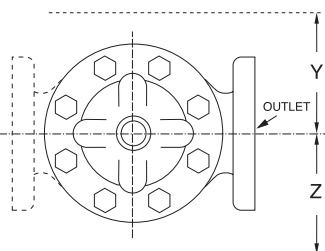
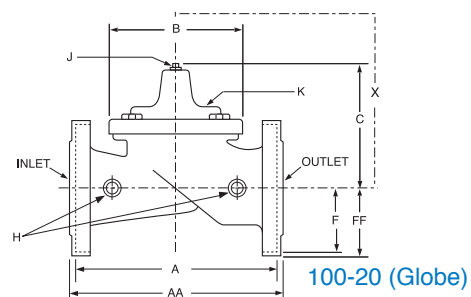


Model 131 Series (Uses Basic Valve Model 100-01)



Valve Size (Inches)	1¼-1½	2	2 ½	3	4	6	8	10	12	14	16	24	36
A Threaded	7.25	9.38	11.00	12.50	—	—	—	—	—	—	—	—	—
AA 150 ANSI	8.50*	9.38	11.00	12.00	15.00	20.00	25.38	29.75	34.00	39.00	41.38	61.50	76.00
AAA 300 ANSI	9.00*	10.00	11.62	13.25	15.62	21.00	26.38	31.12	35.50	40.50	43.50	63.24	78.00
B Dia.	5.62	6.62	8.00	9.12	11.50	15.75	20.00	23.62	28.00	32.75	35.50	53.16	66.00
C Max.	5.50	6.50	7.56	8.19	10.62	13.38	16.00	17.12	20.88	24.19	25.00	43.93	61.50
D Threaded	3.25	4.75	5.50	6.25	—	—	—	—	—	—	—	—	—
DD 150 ANSI	4.00*	4.75	5.50	6.00	7.50	10.00	12.75	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	—	—
E	1.12	1.50	1.69	2.56	3.19	4.31	5.31	9.25	10.75	12.62	15.50	17.75	24.56
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	19.25	28.00
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	—	—
G Threaded	1.88	3.25	4.00	4.50	—	—	—	—	—	—	—	—	—
GG 150 ANSI	4.00*	3.25	4.00	4.00	5.00	6.00	8.00	8.62	13.75	14.88	15.69	—	—
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	—	—
H NPT Body Tapping	¾	¾	½	½	¾	¾	1	1	1	1	1	1	2
J NPT Cover Center Plug	¼	½	½	½	¾	¾	1	1	1¼	1½	2	1½	2
K NPT Cover Tapping	¾	¾	½	½	¾	¾	1	1	1	1	1	1	2
Valve Stem Internal Thread UNF	10-32	10-32	10-32	¼-28	¼-28	¾-24	¾-24	¾-24	¾-24	¾-24	¾-24	½-20	¾-16
Stem Travel	0.4	0.6	0.7	0.8	1.1	1.7	2.3	2.8	3.4	4.0	4.5	6.75	10.12
Approx. Ship Wt. Lbs.	15	35	50	70	140	285	500	780	1165	1600	2265	6200	11470
X Pilot System	11.00	13.00	14.00	15.00	17.00	29.00	31.00	33.00	36.00	40.00	40.00	68.00	86.00
Y Pilot System	9.00	9.00	10.00	11.00	12.00	20.00	22.00	24.00	26.00	29.00	30.00	39.00	45.00
Z Pilot System	9.00	9.00	10.00	11.00	12.00	20.00	22.00	24.00	26.00	29.00	30.00	39.00	45.00

Model 631 Series (Uses Basic Valve Model 100-20)



Valve Size (Inches)	3	4	6	8	10	12	14	16	18	20	24	30
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
AA 300 ANSI	11.00	14.50	18.62	22.38	27.38	31.50	—	36.62	43.63	49.62	49.75	—
B Dia.	6.62	9.12	11.50	15.75	20.00	23.62	28.00	28.00	35.44	35.44	35.44	53.19
C Max.	7.00	8.62	11.62	15.00	17.88	21.00	20.88	25.75	25.00	31.00	31.00	43.94
D 150 ANSI	—	6.94	8.88	10.69	—	—	—	—	—	—	—	—
DD 300 ANSI	—	7.25	9.38	11.19	—	—	—	—	—	—	—	—
E 150 ANSI	—	5.50	6.75	7.25	—	—	—	—	—	—	—	—
EE 300 ANSI	—	5.81	7.25	7.75	—	—	—	—	—	—	—	—
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
FF 300 ANSI	4.12	5.00	6.25	7.50	8.75	10.25	—	12.75	15.88	16.06	19.00	—
H NPT Body Tapping	¾	½	¾	¾	1	1	1	1	1	1	1	1
J NPT Cover Center Plug	½	½	¾	¾	1	1	1¼	1¼	2	2	2	2
K NPT Cover Tapping	¾	½	¾	¾	1	1	1	1	1	1	1	1
Valve Stem Internal Thread UNF	10-32	¼-28	¼-28	¾-24	¾-24	¾-24	¾-24	¾-24	½-20	½-20	½-20	¾-16
Stem Travel	0.6	0.8	1.1	1.7	2.3	2.8	3.4	3.4	3.4	4.5	4.5	6.5
Approx. Ship Wt. Lbs.	45	85	195	330	625	900	1250	1380	1500	2551	2733	6500
X Pilot System	13.00	15.00	27.00	30.00	33.00	36.00	36.00	41.00	40.00	46.00	55.00	68.00
Y Pilot System	10.00	11.00	18.00	20.00	22.00	24.00	26.00	26.00	30.00	30.00	30.00	39.00
Z Pilot System	10.00	11.00	18.00	20.00	22.00	24.00	26.00	26.00	30.00	30.00	30.00	39.00

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.

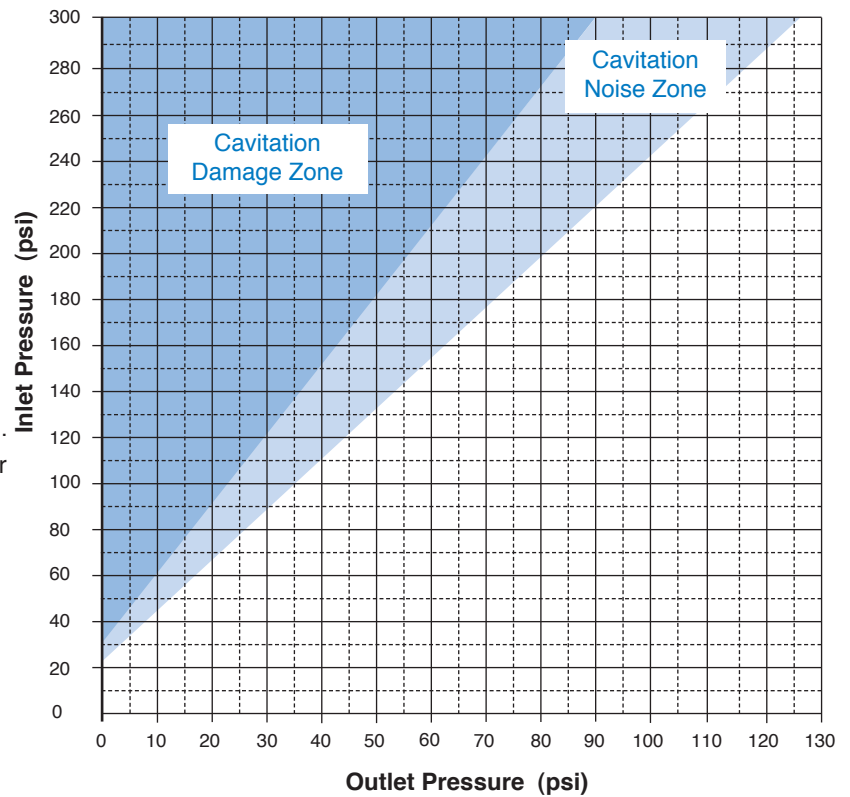
$$\sigma = \frac{(P_2 - P_v)}{(P_1 - P_2)} \quad \text{where}$$

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 back pressure from an orifice plate, a second valve in series, or adding **KO** Anti-Cavitation trim (see 100-01KO data sheet) is necessary. Contact your Cla-Val representative for a free analysis.

Cavitation Zones 100-01/100-20



This chart should be used as a general guide for determining safe operating pressure drop conditions for Cla-Val modulating service control valves.

Valve 1 100-01 100-20

Valve size: 6"

Maximum flow rate: 1000 gpm
 Minimum flow rate: 500 gpm

Static inlet pressure: 120 psi
 Static outlet pressure: 25 psi
 Elevation above S.L.: 500 ft
 Water temperature: 60 deg F

Dynam. inlet pressure: 120.0 psi
 Dynam outlet pressure: 25.0 psi

Back pressure orifice: Single
 Orifice backpressure: 61.9 psi
 Orifice discharge to: Downstream piping

100-01 100-20

Valve operation

Continuous (>50%)

Avoid operation near (within 10%) cavitation damage level of 1.0.

Convert Units

Dynamic Pressure

Change Orifice

Add Second Valve

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.

No damage

Caution - near damage

Damaging cavitation

Valve damage occurs <20 psi.

6", 11.1 fps*, 120.0 psi

61.9 psi

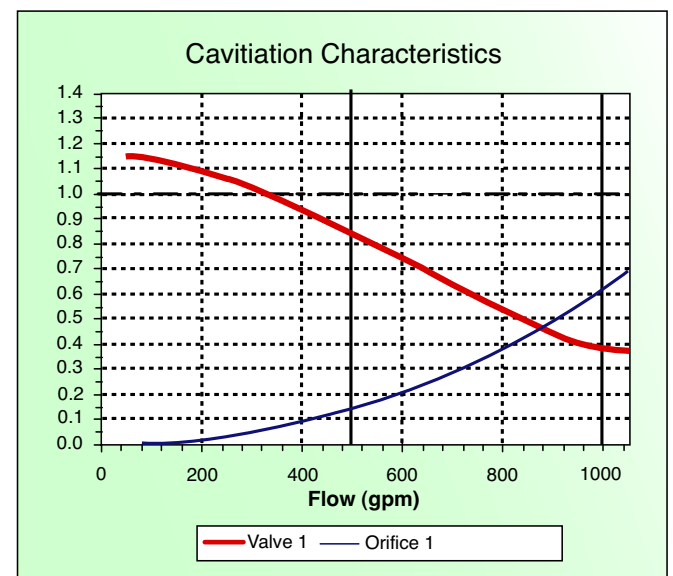
25.0 psi

6" 100-01




























































2.80" (3/16)

Add KO

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



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

Valve Selection		These Symbols  and  Indicate Available Sizes																			
		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		
End Detail		Threaded	Threaded & Flanged						Flanged												
Model 131 Series	Basic Valve 100-01	Globe																			
		Angle																			
	Suggested Flow (gpm)	Max. Continuous	93	125	210	300	460	800	1800	3100	4900	7000	8400	11000					25000		50000
		Max. Intermittent	120	160	260	370	580	990	2250	3900	6150	8720	10540	13700					31300		62500
	Suggested Flow (Liters/Sec)	Min. Continuous	10	10	15	20	30	50	115	200	300	400	500	650					1750		2900
		Max. Intermittent	6	8	13	19	29	50	113	195	309	441	529	693					1575		3150
Suggested Flow (Liters/Sec)	Min. Continuous	.6	.6	.9	1.3	1.9	3.2	7.2	13	19	25	32	41					110		180	
	Max. Intermittent	7.6	10.1	16.4	23	37	62	142	246	387	549	664	863					1972		3940	
Model 631 Series	Basic Valve 100-20	Globe																			
		Angle																			
	Suggested Flow (gpm)	Max. Continuous					260	580	1025	2300	4100	6400	9230	9230	16500	16500	16500	28000			
		Min. Continuous					15	30	50	115	200	300	500	500	900	900	900	1850			
	Suggested Flow (Liters/Sec)	Max. Continuous					16	37	65	145	258	403	581	581	1040	1040	1040	1764			
		Min. Continuous					.9	1.9	3.2	7.2	13	19	32	32	57	57	57	117			

631 Series is the reduced internal port size version of the 131 Series. For 100-01 basic valves, suggested flow calculations were based on flow through Schedule 40 Pipe. Maximum continuous flow is approx. 20 ft/sec (6.1 meters/sec) & maximum intermittent is approx. 25 ft/sec (7.6 meters/sec) and minimum continuous flow is approx. 1 ft/sec (.3 meters/sec). For 100-20 basic valves, suggested flow calculations were based on flow through the valve seat. Approx. 26 ft/sec (7.9 meters/sec) was used for maximum continuous flow & 1 ft/sec (.3 meters/sec) is used for minimum continuous flow. Maximum continuous flow through the valve seat for the 30" 100-20 is approx. 20 ft/sec (6.1 meters/sec). **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.**

**Flanged End Detail Only

Pressure Ratings (Recommended Maximum Pressure - psi)

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

Materials

Component	Standard Material Combinations		
Body & Cover	Ductile Iron	Cast Steel	Bronze
Available Sizes 100-01 Series Hytrol	1¼" - 36"	1¼" - 16"	1¼" - 16"
600 Series Hytrol	3" - 48"	3" - 16"	3" - 16"
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.

131 Series/631 Series Pilot System Specifications

Temperature Range

Water: to 180°F

Rubber Parts:

Buna-N® Rubber Synthetic

Solenoid Control

Body:

Brass ASTM B283

Enclosure:

NEMA Type 1,2,3,3S,4,4X general purpose watertight*

NEMA Type 6,6P,7,9 watertight Explosion

Proof available at additional cost

Voltages:

110, 220, -50Hz Ac

24, 120, 240, 480 - 60Hz AC

6, 12, 24, 120, 240 - DC

Others available at extra cost

Max. operating pressure differential: 200 psi*

Coil:

Insulation molded Class F

Watts AC 6

AC Volt Amps Inrush 30

AC Volt Amps Holding 16

Watts DC 10.6

*Supplied unless otherwise specified

For specifications on other 131/631 series valves, please consult factory.

Pilot System Adjustment Ranges, Please Consult Factory