



Mastering the Flow

Hydraulic Control Valve Basics: Function and Application



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Mastering the Flow

**Control Valve Basics, Maintenance, and
Troubleshooting**



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Plan for today:

1. Intro to Cimco-GC Systems

2. Cla-Val Overview

3. Control Valves

- Basic Principles, Main Body, Valve Selection
- Pressure Reducing, Pressure Relief, Pressure Sustaining

4. Maintenance

5. Troubleshooting





Puyallup, Washington



40+ years in control valves



Technical support and service



Maintenance, troubleshooting, startups



Pressure reducing valves and stations



Raeann Velasquez
Owner, CEO



Carol Wells
Founder (retired)



Rob Velasquez
Cla-Val Design and
Quoting



Sarah Sleight
Inside Sales: Val-Matic,
Safe-T-Cover



Sarah Parker
Inside Sales: Waterman,
Echologics, Hydro-Guard



Teri Todd
Inside Sales: Cla-Val
Parts, Order Tracking

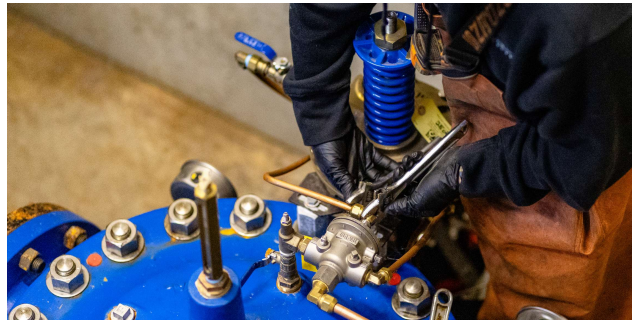


Beau Swet
Cla-Val Service and
Troubleshooting

How we support your region



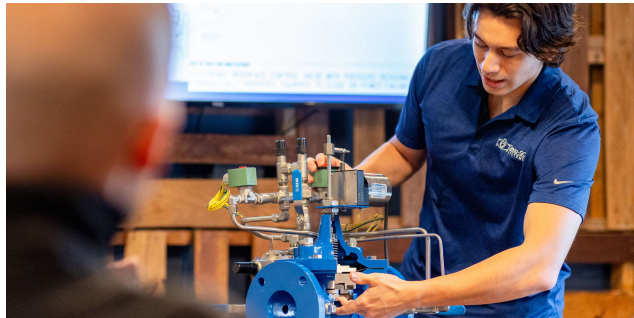
Engineering/Design Support



Troubleshooting



Price and availability



Outside Sales Support



**Only factory-authorized Cla-Val
Service Team in WA, OR, ID and AK**



**Inventory: parts, pilot, valve bodies
through 8"**





Cla-Val Overview

**A world-leading designer and
manufacturer of control valves**

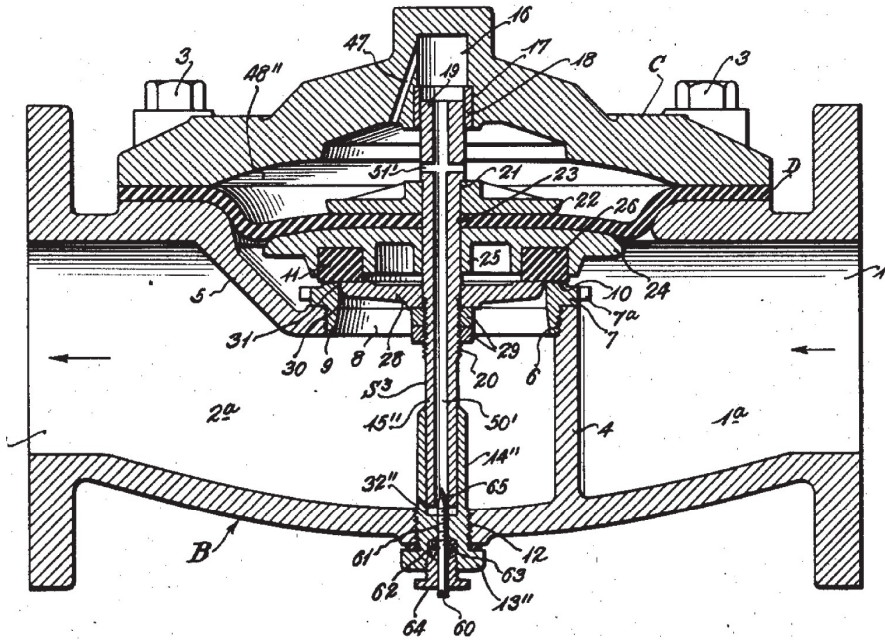
cla-val.com



More than 80 years in the making

The first of many patented products

- Since 1936, Cla-Val has produced the automatic control valves for a diverse array of industries.
- Established in South Pasadena with just five employees, Cla-Val moved to its present home, a twenty-acre property in Costa Mesa, California in 1954.
- Over the years, Cla-Val has continued to strengthen its operational with state-of-the-art production facilities and warehouses in Canada, Switzerland, France, the United Kingdom and New Zealand.



Aug. 31, 1943.

D. G. GRISWOLD

2,328,009

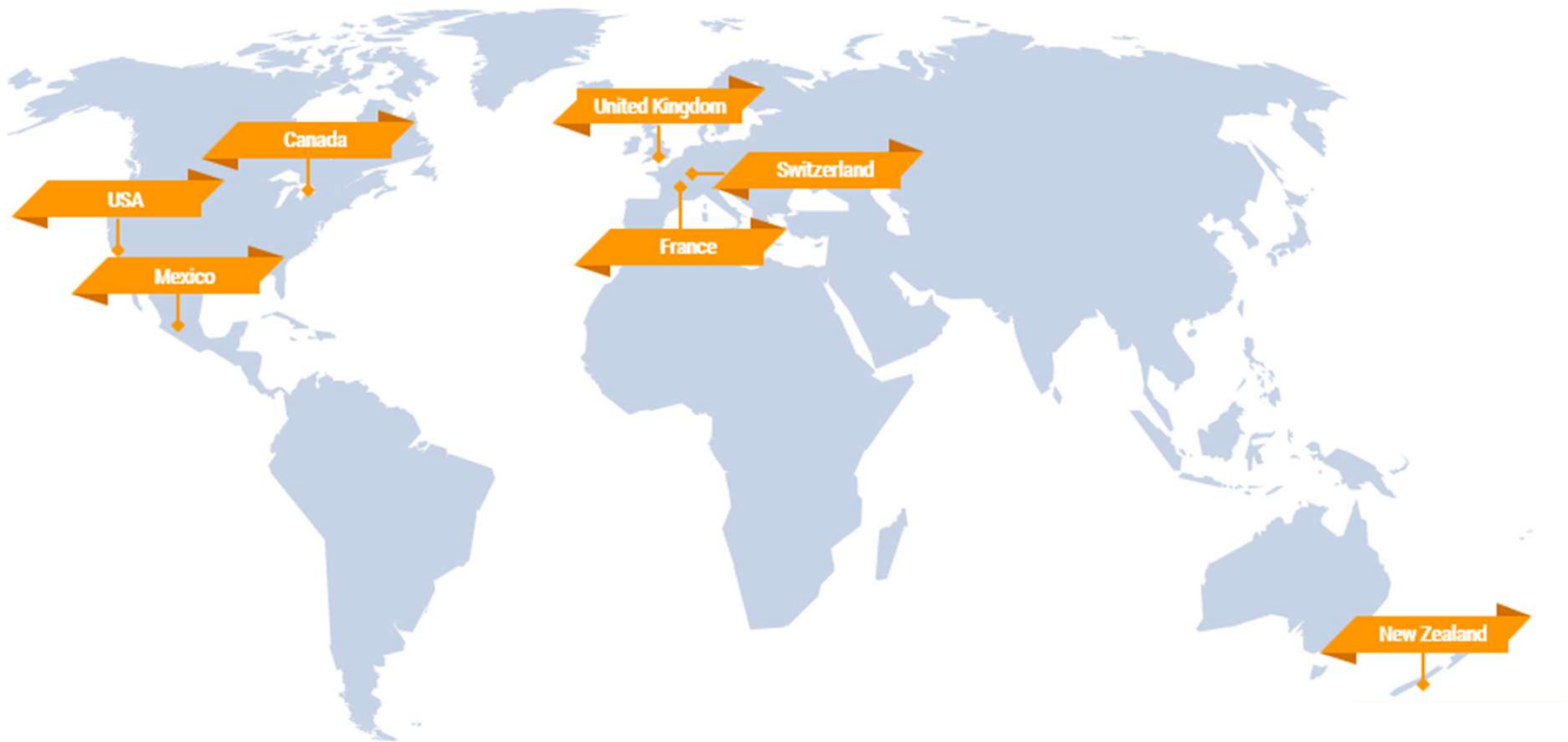
Original Filed May 1, 1940

Brief History

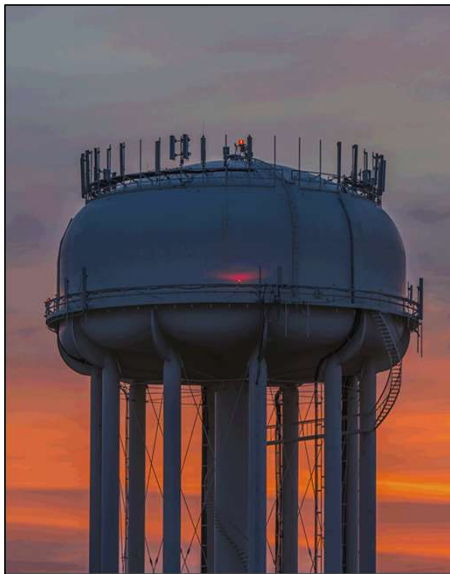
- **Founded by Donald G. Griswold 1936**
- **Based out of Costa Mesa, CA**
- **Two in-house foundries**
- **Only one generation of valves
(no additional phases, styles, etc.)**
- **Preferred brand worldwide**



HQs throughout the world



Not just waterworks...



Fire Protection



Industrial



Mining, Oil, Gas



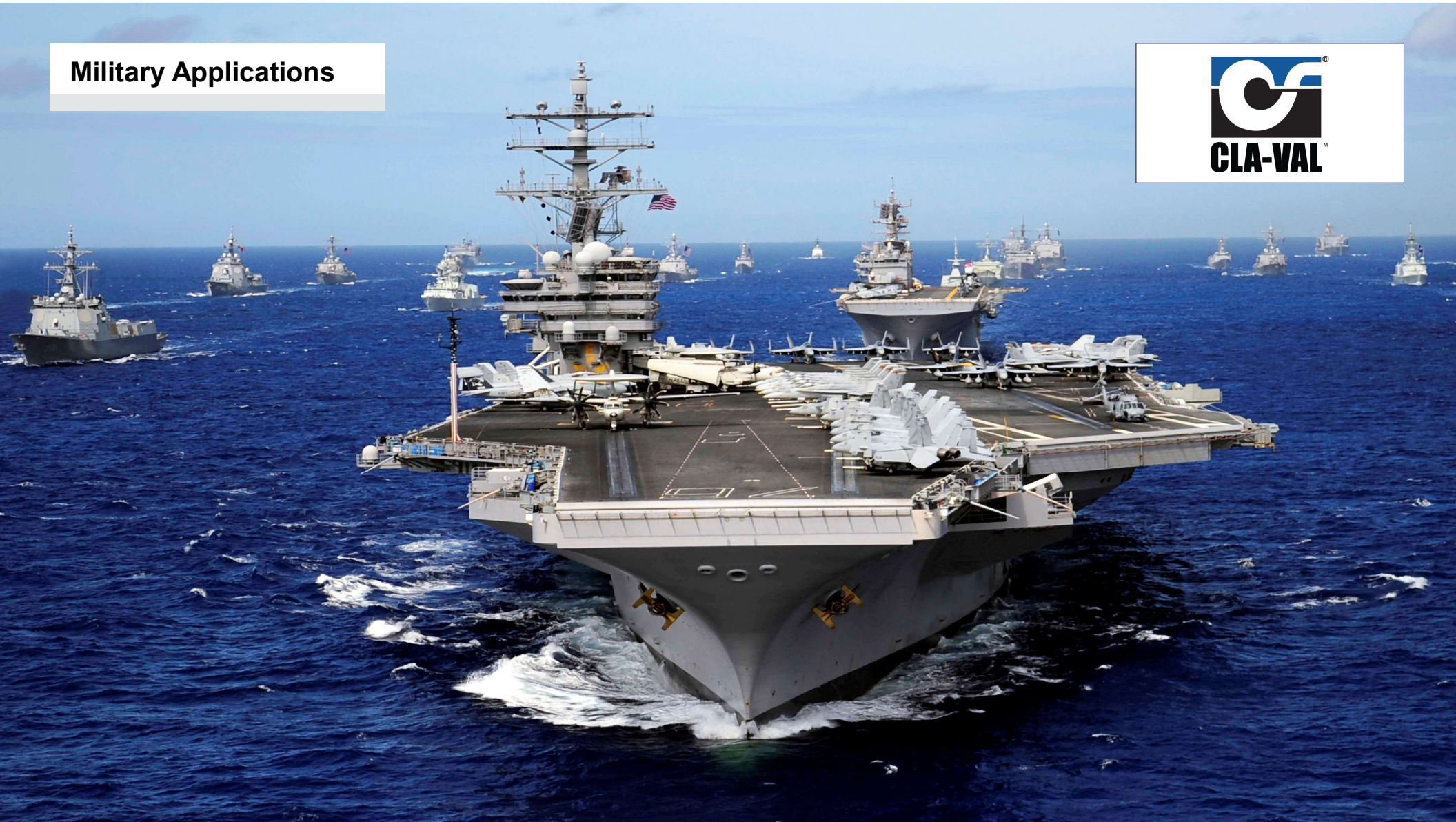
Commercial Fueling



Military-Grade Fueling



Military Applications



Burj Khalifa

Dubai, U.A.E.
(tallest building
in the world)



Bellagio Hotel Fountain

Las Vegas, NV



The White House

Washington, D.C.



Freedom Tower One

100+ Cla-Val's Domestic Water System

100+ Cla-Val's Fire Protection System

Cla-Val Factory Tours and Training





Latest Cla-Val Innovations

XP2F – Data Acquisition Packages

Cla-Val Software Support

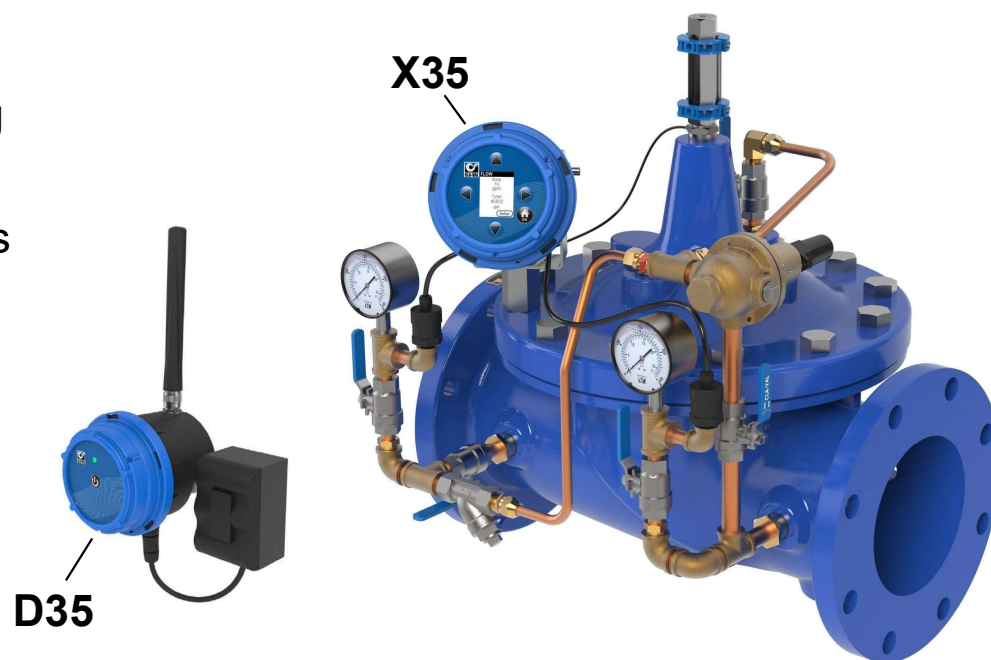


XP2F – Data Acquisition and Flow Metering Packages



What are the possibilities?

- Add flow, pressure and valve position monitoring to **any** Cla-Val
- Track water usage, create district metering areas (DMA), balance your system, adjust set points based on flow
- Better data for informed decision making, more control of your system
- Power options for **any** location:
 - **X35** (powered required)
 - **D35** (battery powered)



XP2F – Compatible with ANY Cla-Val



- Specifiable on new valves
- Easy retrofit on existing valves
- Minimal upstream/downstream straight pipe requirements
- Low maintenance, minimal fluid contact
- Easy field calibration and commissioning
- Forward and reverse metering capabilities
- Power options for **any** location:
 - **X35** (powered required)
 - **D35** (battery powered)



XP2F-X35



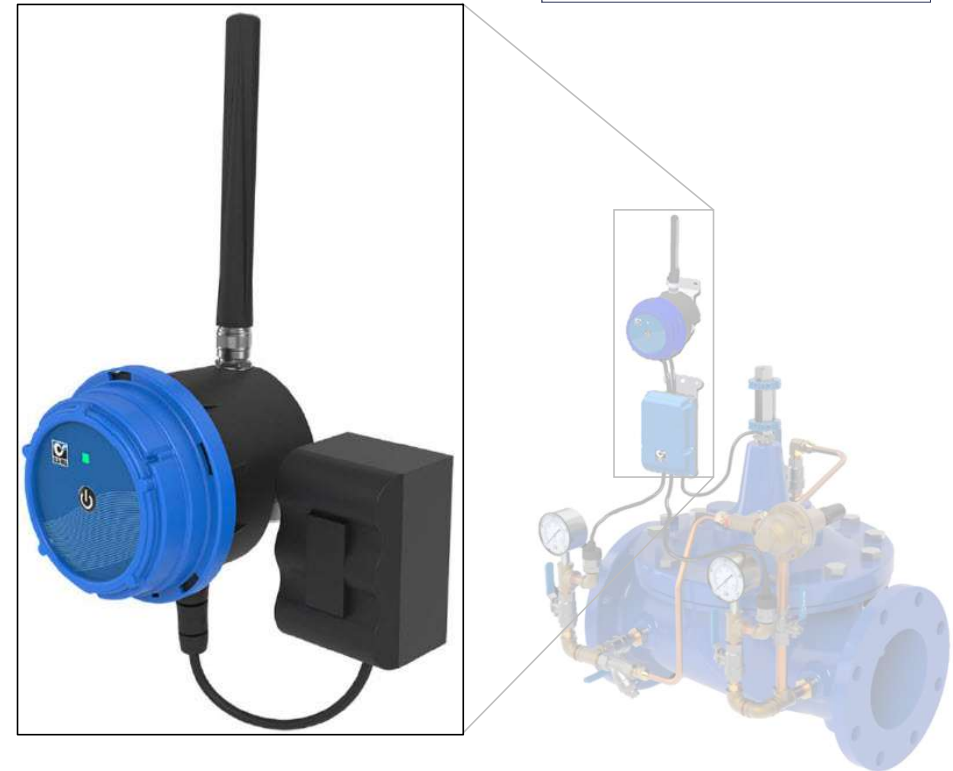
- **Requires power on-site**
- **4-20mA retransmission** of flow, valve position and inlet/outlet pressure
- No software needed
- Components:
 - **X35 Flow Calculation Module** (local display, 5 buttons)
 - X117H Valve Position Transmitter
 - X141-PT Pressure Transmitter Assembly



XP2F-D35



- **Battery powered**
- **Cellular equipped**
 - Integrates with Link2Valves for monitoring
 - WiFi connection for setup and adjustments
- 2 digital input relays
- Components:
 - **D35 Valve Controller Assembly**
 - E-Lift-35 Position Transmitter
 - X141-PTV Pressure Transmitter Assembly



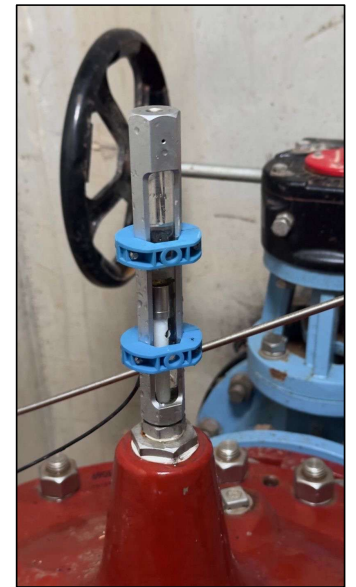
XP2F Retrofits



X35 – Walla Walla, WA



D35 – Oman



XP2F Case Study



City of Walla Walla, WA

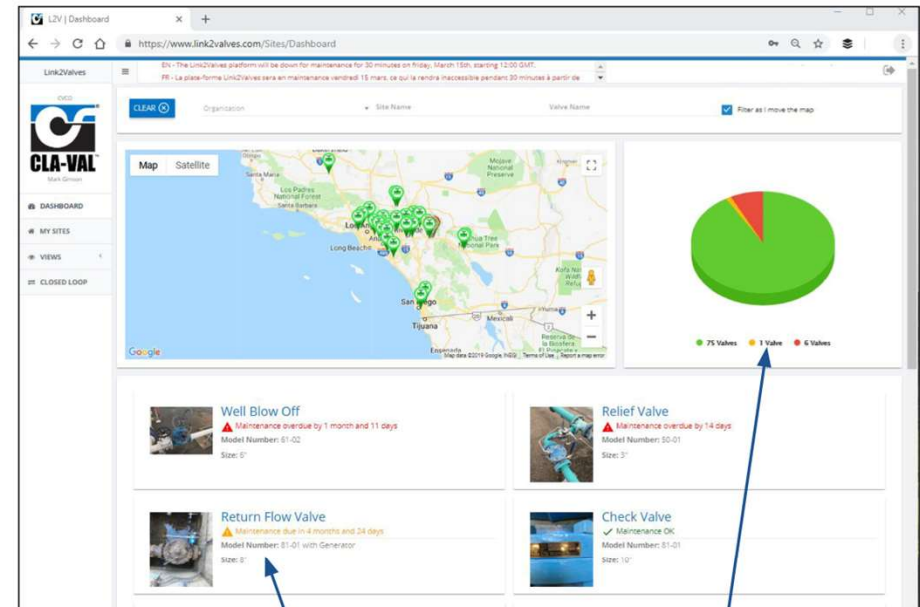
- Brought all 25+ Cla-Val valves in distribution system online with XP2F
- Stream valve data into SCADA via advanced metering infrastructure (AMI) system
- Able to track live flow, pressure and valve position
- Equips City to make informed decisions quickly without trips to the field

Cimco-GC Systems can help you determine the best approach in your system

Software Support: Link2Valves



- Free data management platform for real-time insights across water system
- Easily manage service schedules for your valves
- Desktop and Mobile App
- Secure



Brief description of all valves shown on current map, with service schedule

Easily see how many valves require service

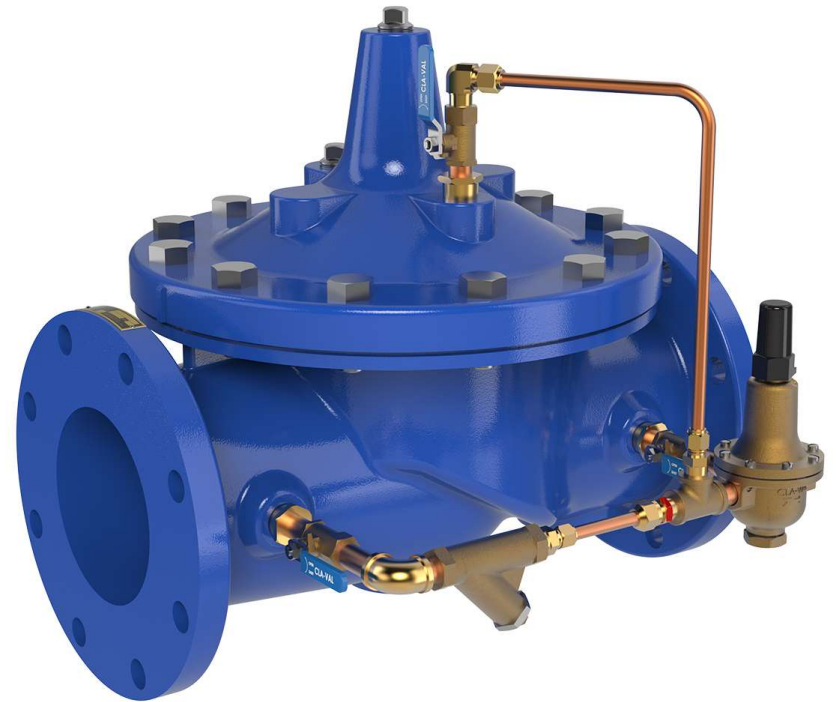
Software Support: Cla-Tools



- Programs for sizing, cavitation analysis, design and comparisons
- **Cla-Cav** analyzes cavitation risk and potential damage
- ⚠ When using Cla-Tools for **product selection or design**, it's important to balance calculations with experience from the field.
- Lean on the **Cimco-GC Systems** team for decades of experience in every application!

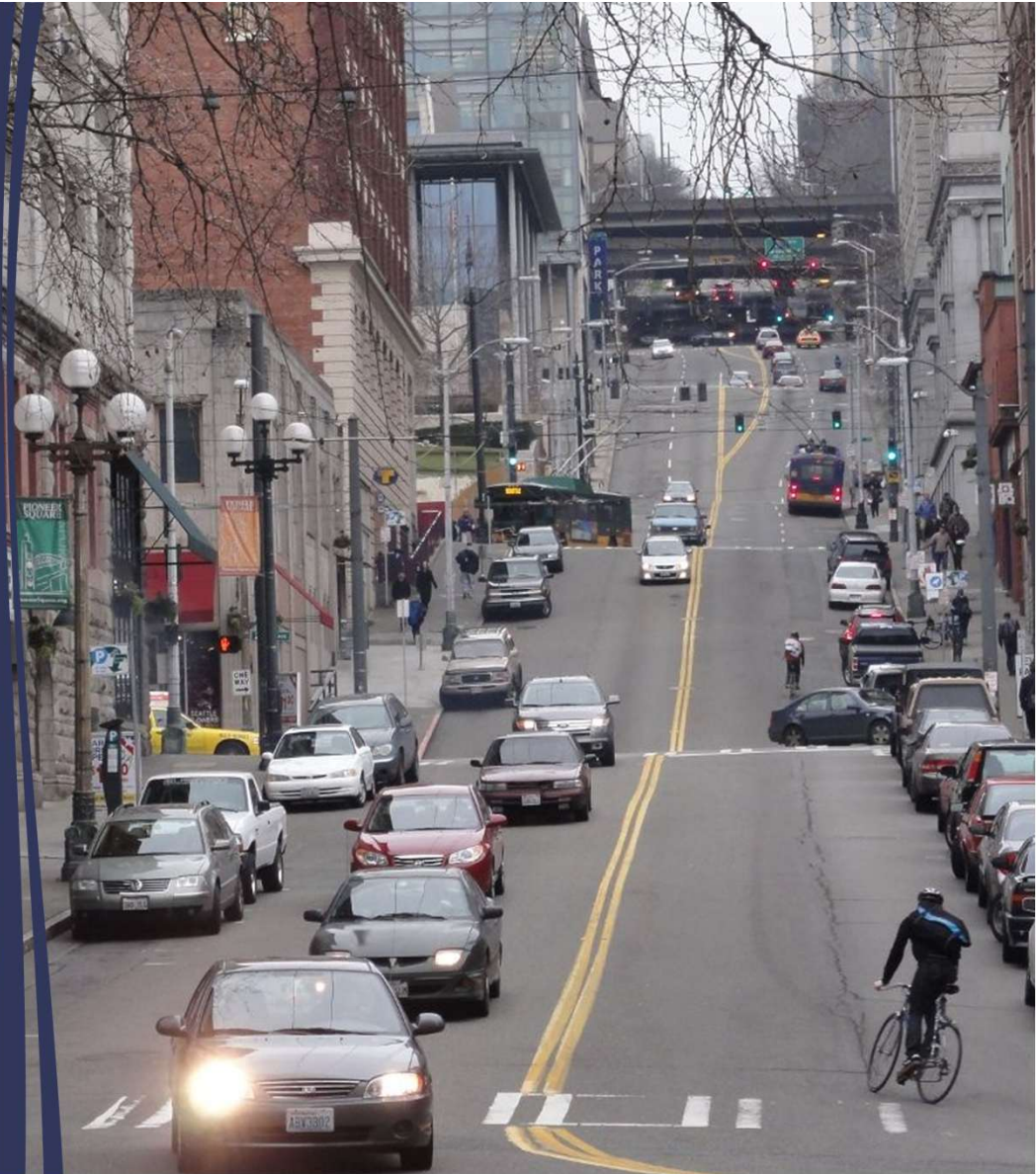


**Why do we need
control valves?**



Why do we need
control valves?

Elevation.



Why do we need
control valves?

Elevation.



Many other applications throughout the distribution system:

■ Pressure Control

- Pressure Reducing
- Pressure Sustaining
- Pressure Relief

■ Flow Control

- Hydraulic Rate-of-Flow
- Electronic flow control

■ Level Control

- Tank/Reservoir Fill

■ Surge Control

- Downstream Surge control
- Surge Anticipators

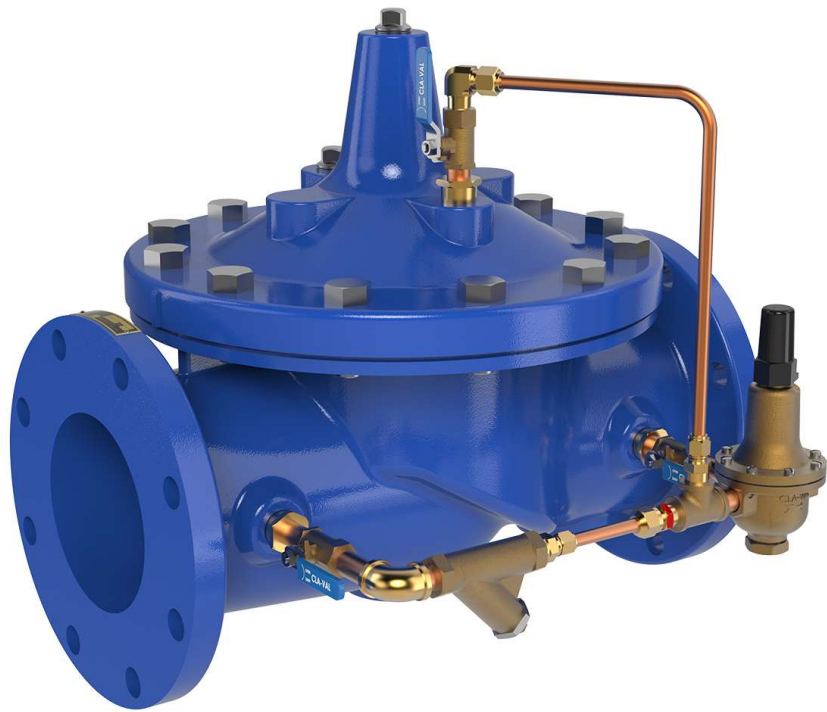
■ Pump Control

- Booster Pump Control
- Deep Well Pump Control

■ Electronic Control Valves

- Programmable Features
- SCADA Integration

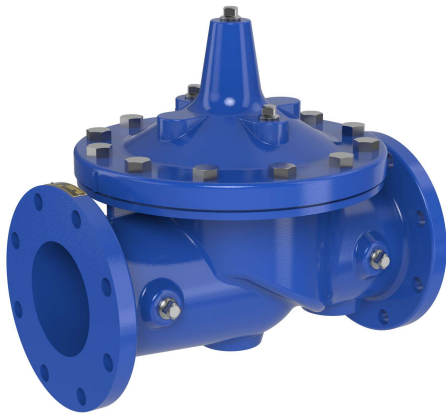
■ Check Valves



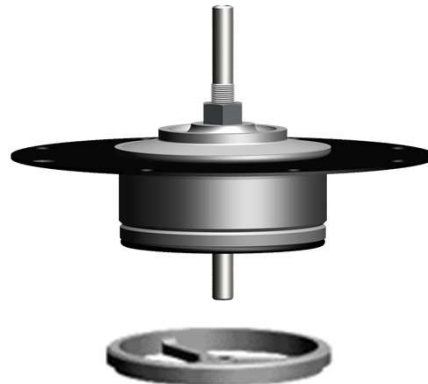
Basic Principles of Control Valves

3 Main Areas

Basic Valve Body

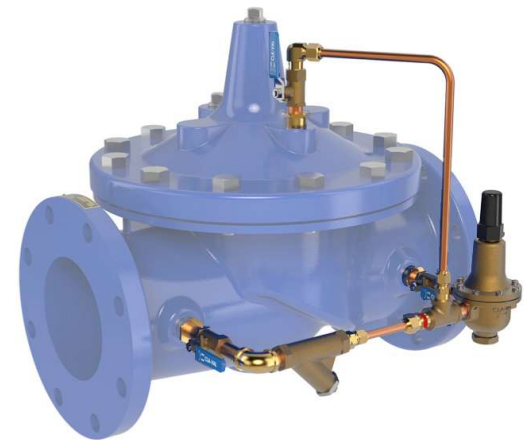


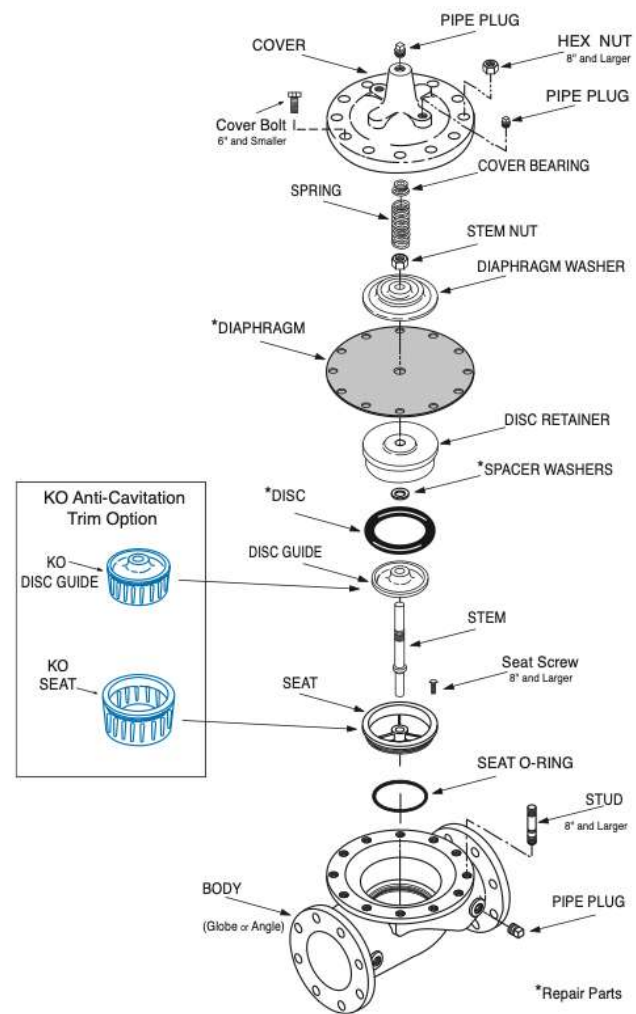
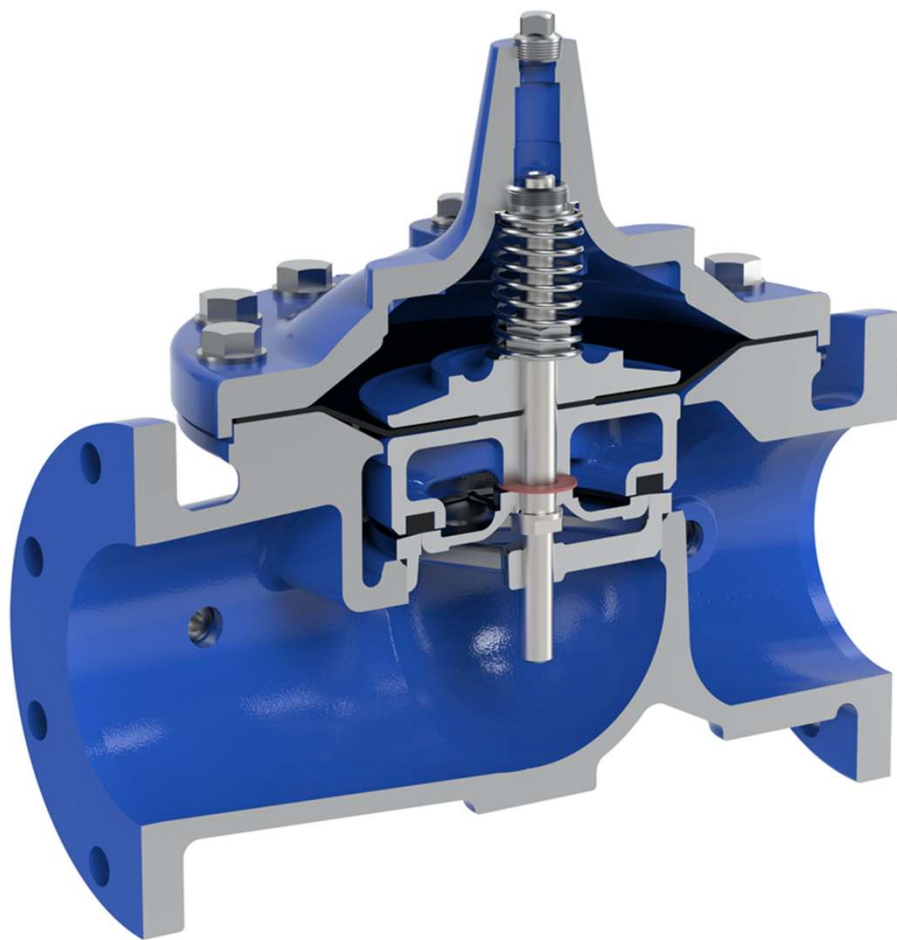
Disc /Diaphragm Assembly



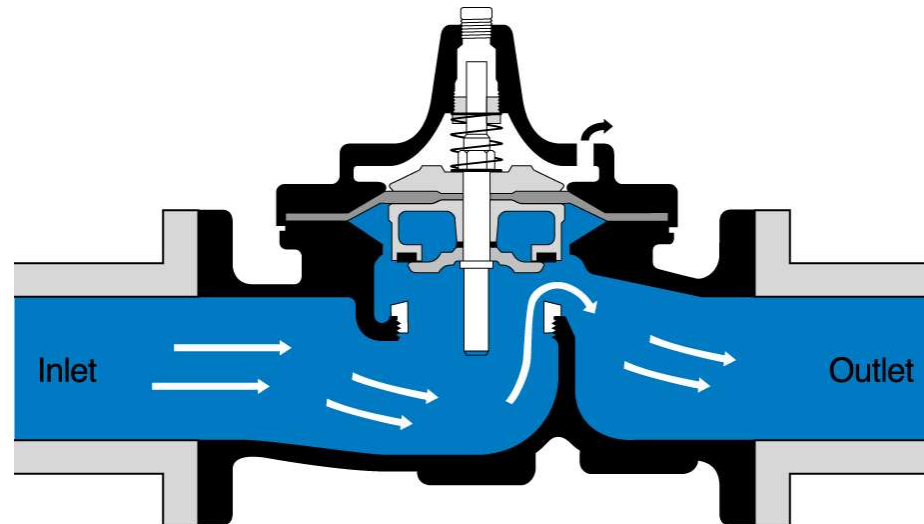
Seat

Pilot Control System





Standard Flow



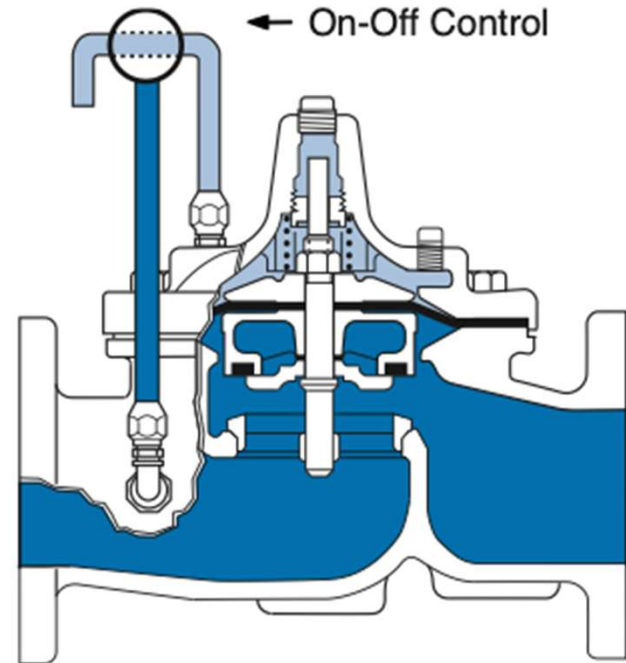
Up and Over Seat



Principles of Operation

Full Open

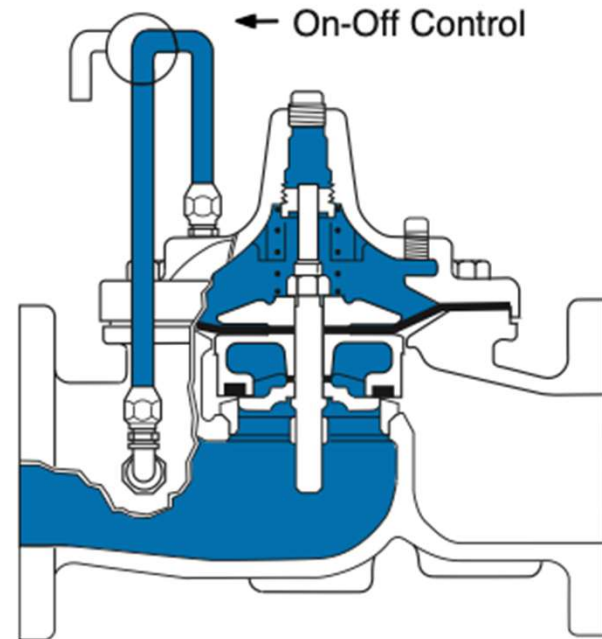
When pressure in the cover chamber is relieved to a zone of lower pressure, the line pressure at the valve inlet opens the valve, allowing full flow.



Principles of Operation

Tight Closing

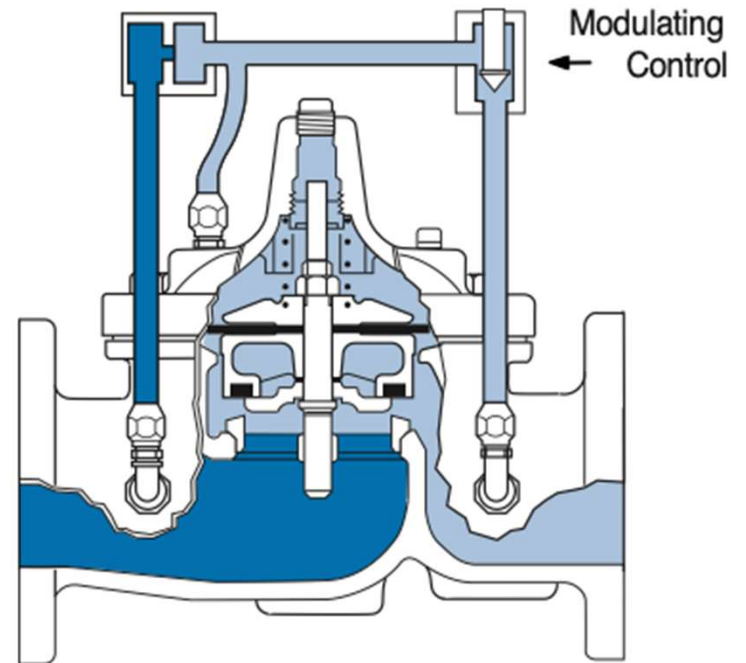
When Pressure from the valve inlet is applied to the cover chamber, the valve closes drip tight.



Principles of Operation

Modulation

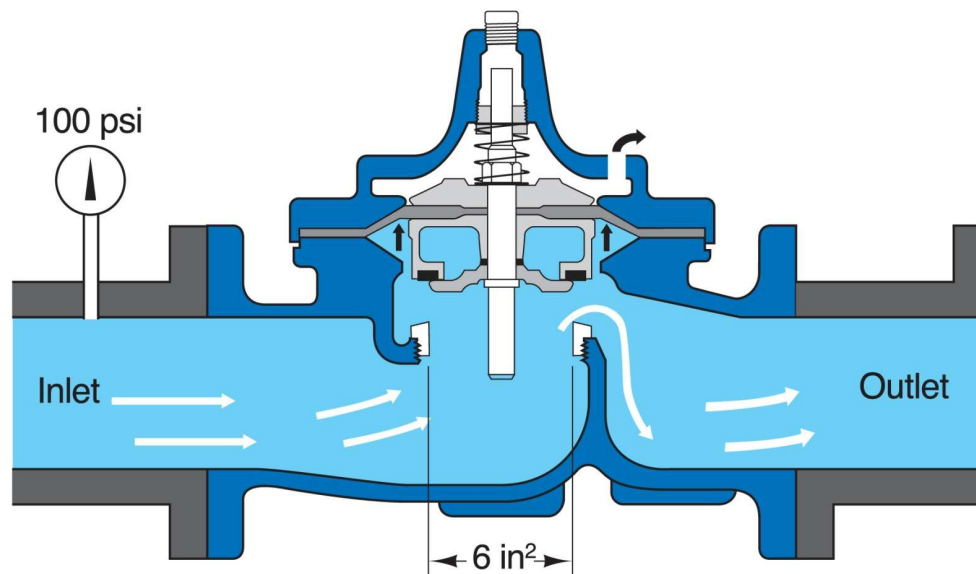
The valve holds any intermediate position when operating pressures are equal above and below the diaphragm.





Cla-Val 100-01 Hytrol Main Valve X101 Valve Position Indicator

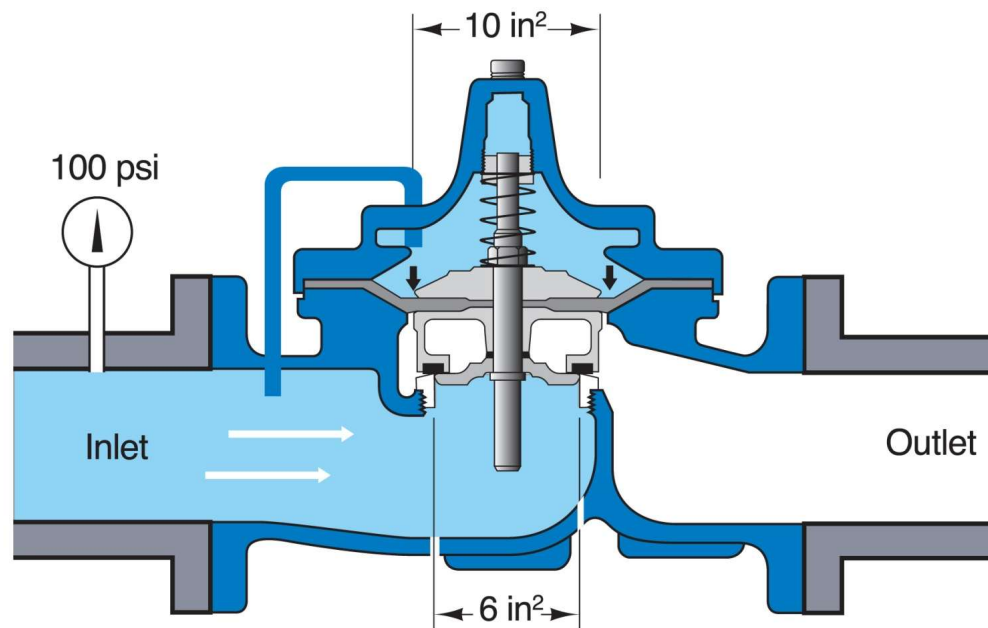
Line Pressure to Open – Opening Force



$$100\text{psi} \times 6 = 600\text{lbs.}$$

(opening force)

Line Pressure to Close – Closing Force



$$\begin{array}{lcl} \text{Closing Force} & 100 \times 10 = & 1000 \text{ lbs.} \\ \text{Opening Force} & 100 \times 6 = & 600 \text{ lbs.} \\ \text{Difference} & = & 400 \text{ lbs.} \end{array}$$

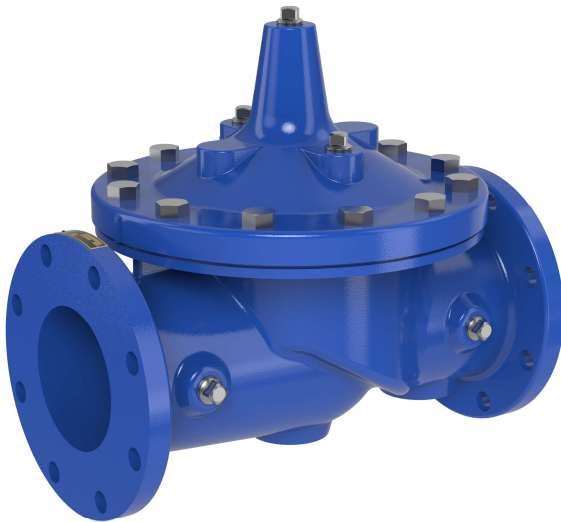


Control Valve Main Body

Hytrol Model 100-01

Hydraulic Control = **Hytrol**

Used in 75-80% of all applications



Powertrol Model 100-02

Power + Control = **Powertrol**

Used in pump control applications





From the smallest: 3/8" and 1/2"



To the BIG – 36”



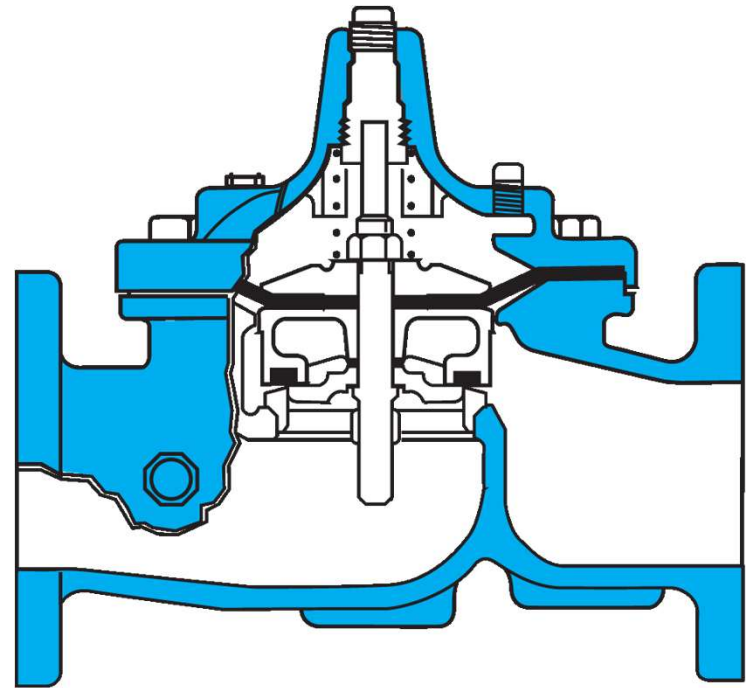
To the GIANT – 40”



To the GINORMOUS – 48”+
(with 10” reduced port bypass valve)

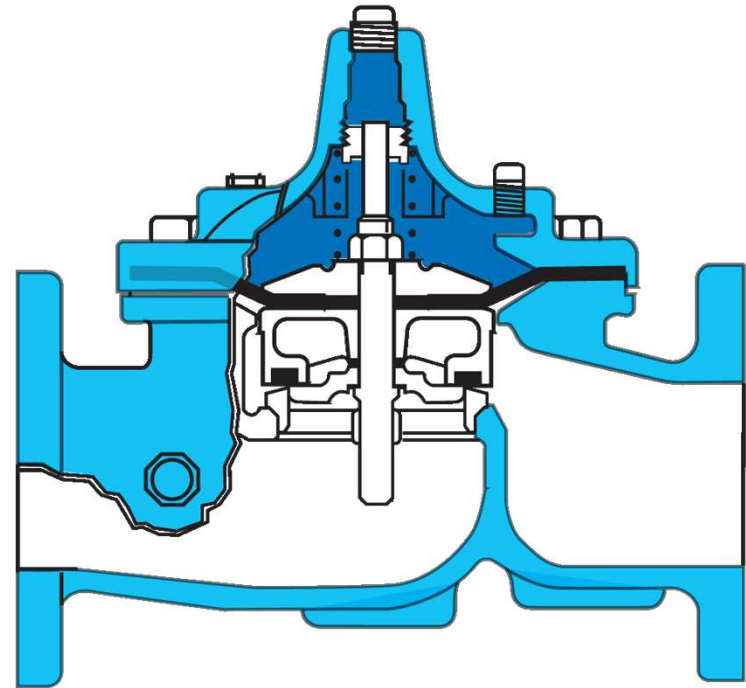
Four Basic Design Ideas

1. Modified Globe Design



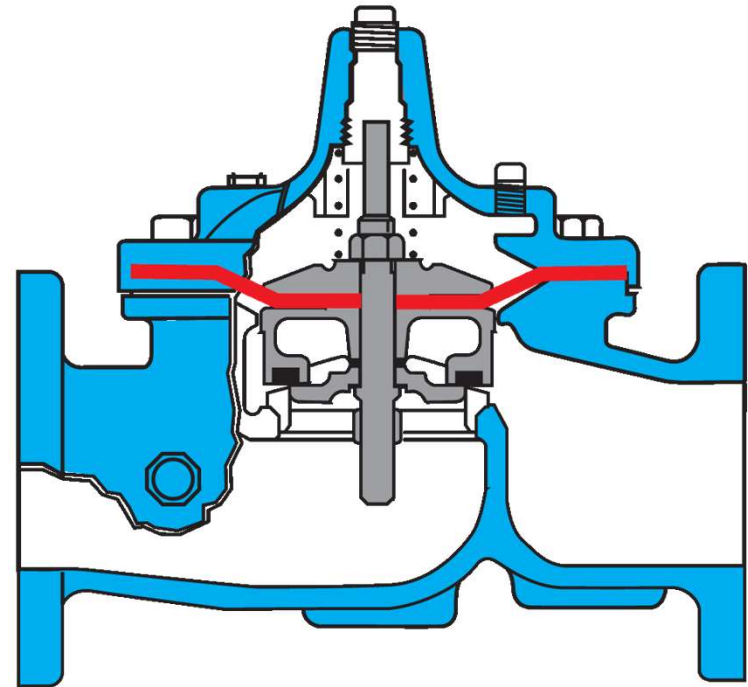
Four Basic Design Ideas

1. Modified Globe Design
2. Hydraulically Operated



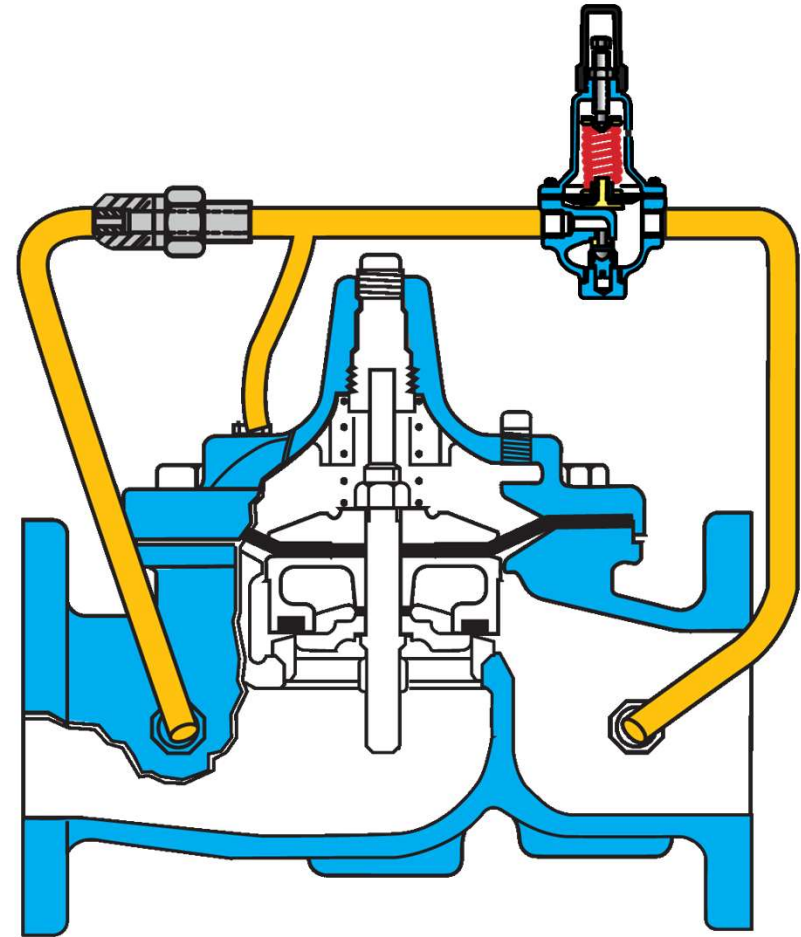
Four Basic Design Ideas

1. Modified Globe Design
2. Hydraulically Operated
- 3. Diaphragm Actuated**



Four Basic Design Ideas

1. Modified Globe Design
2. Hydraulically Operated
3. Diaphragm Actuated
- 4. Pilot Controlled**

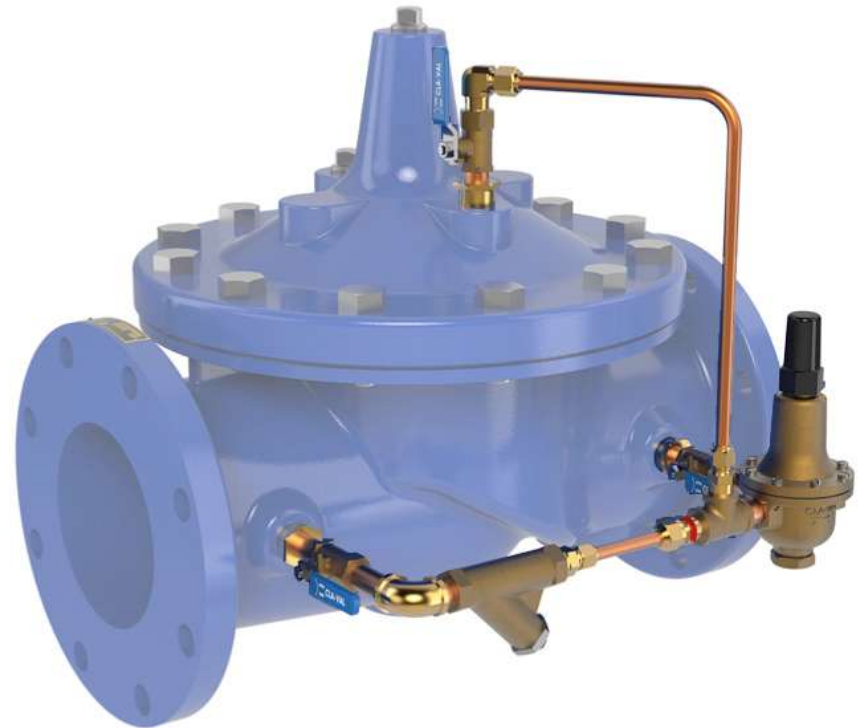


Intro To Pilot Systems

How many different pilot control configurations or combinations?

33,000!

Remember – one valve can do multiple jobs



Pilot Controls

Provide functionality of the valve Standard Features

- CRD, CRL, CRA, CDS6A, etc.
- 3/8" Pilot Tubing Lines (Copper)
- Brass Fittings*

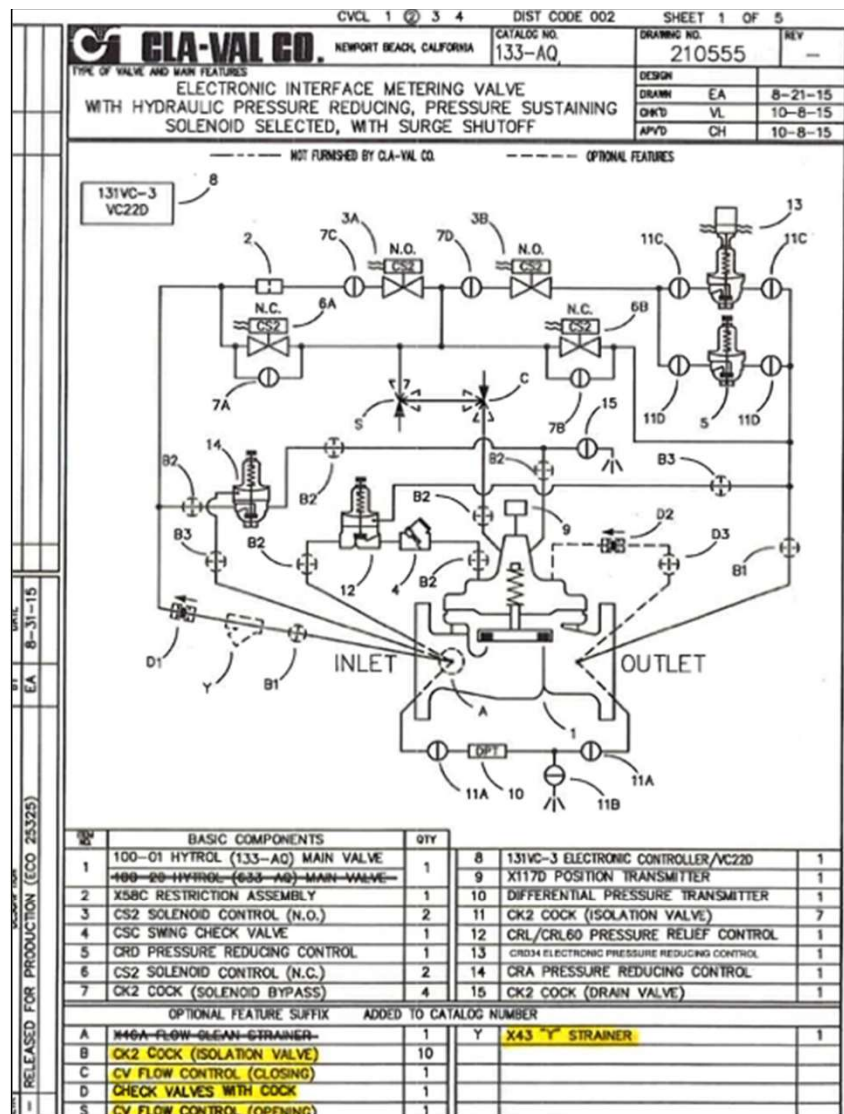
Optional Features

- Strainers, Speed Controls, Position Indicators
- Check Features, etc.

Connections made to main valve ports

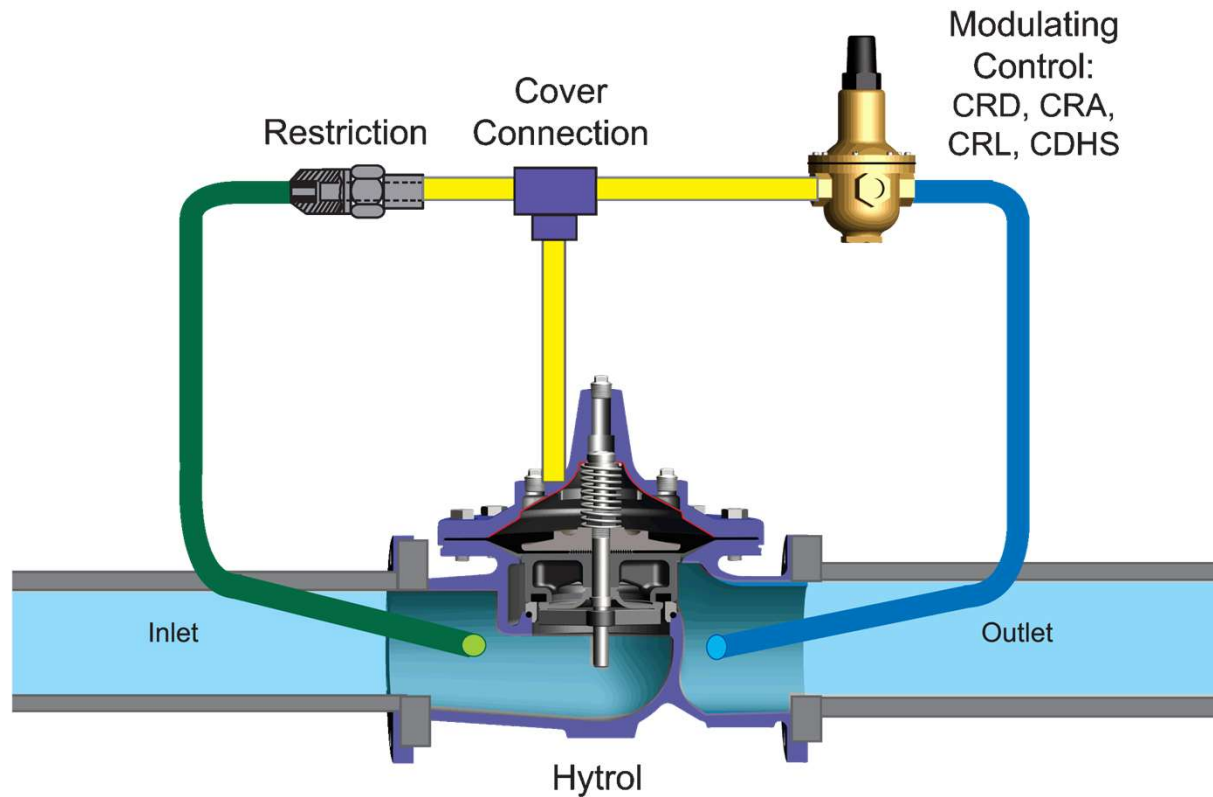


**We recommend Stainless Steel tubing and fittings due to new low-lead copper and brass*





All modulating, hydraulic control valves will have...



X58 Restrictors

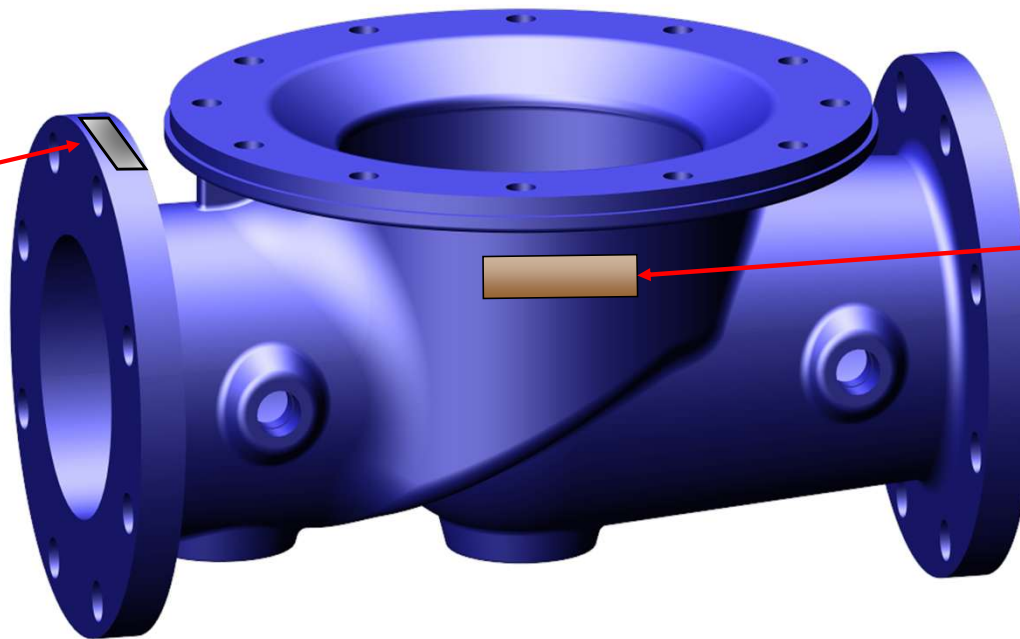
- Small orifice stained **BLUE** – 3/32"
- Large orifice stained **RED** – 1/8"



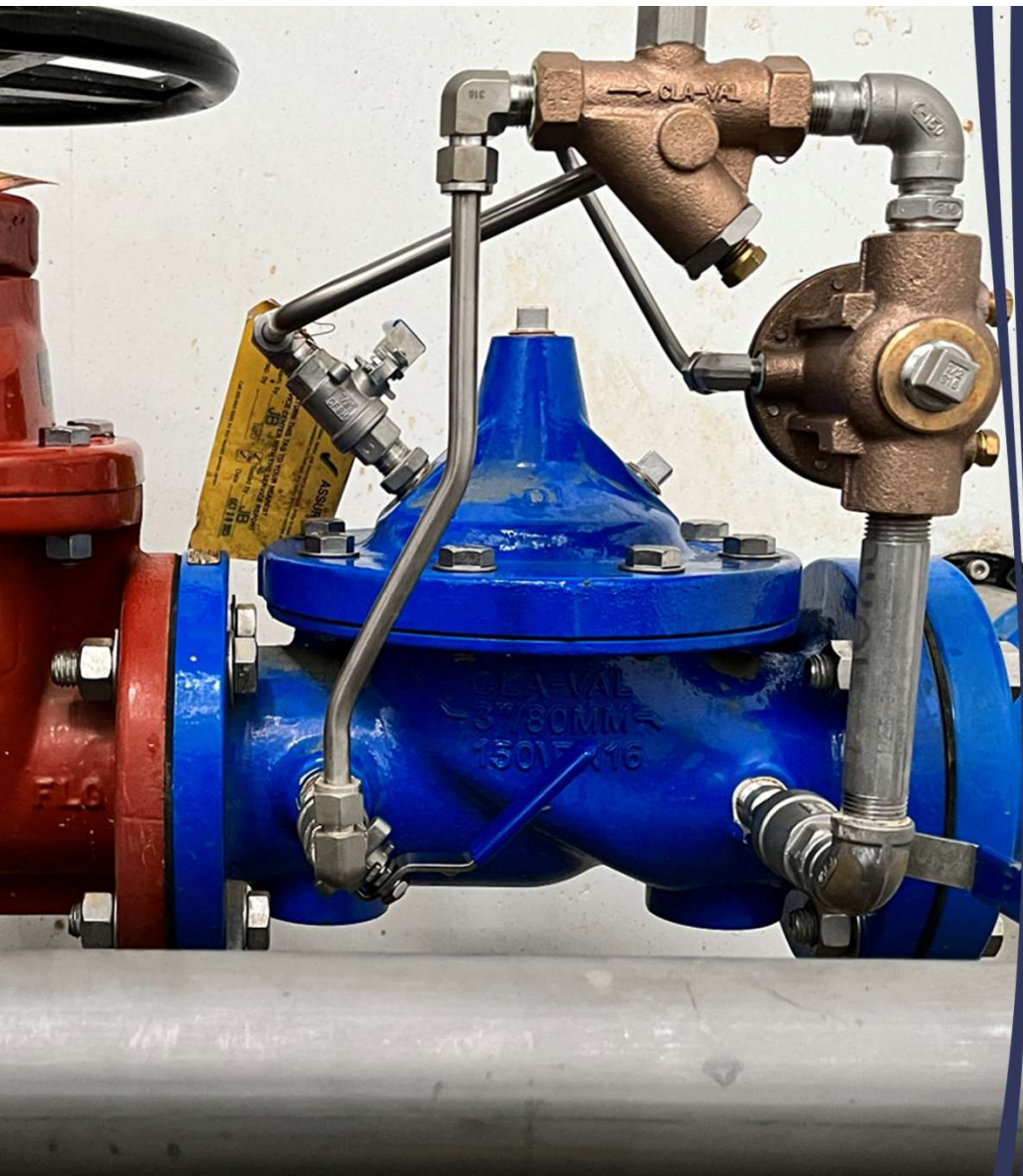
Cla-Val Nameplate Locations

INLET	SIZE & CAT NO.	
EINTRITT	STOCK NO.	
ENTREE	CODE	
ENTRADA	MFD. BY CLA-VAL NEWPORT BEACH, CALIF, U.S.A.	

2-1/2" and larger
flanged valves



2" and smaller
flanged valves
and all threaded
and grooved
valves



Cimco-GC
SYSTEMS

Selecting the Right Control Valve

Selecting the right control valve

Give us a call!

Trusted Cla-Val experts since 1981

(253) 939-8322

office@cimco-gcsystems.com

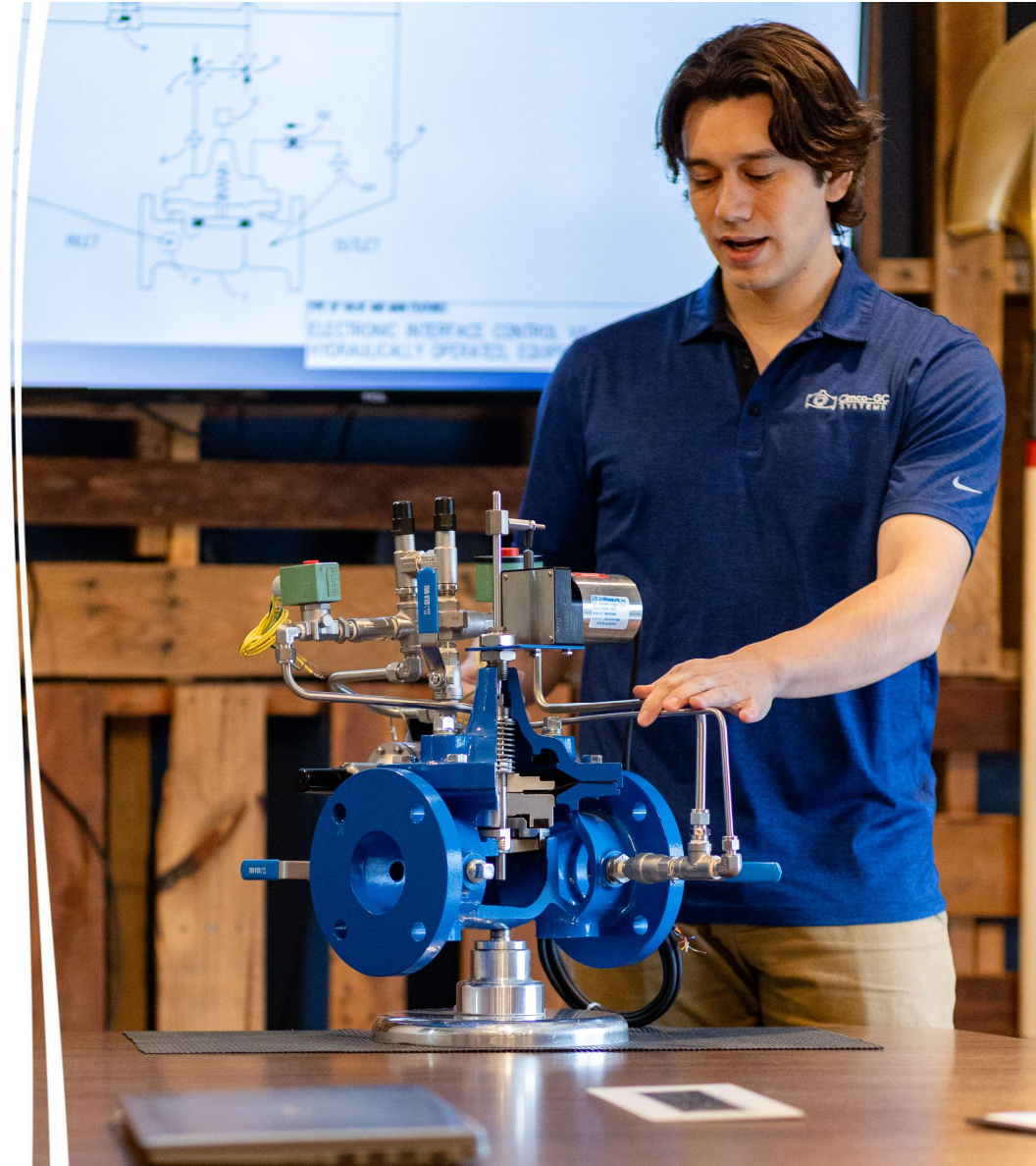
Monday – Friday | 8:00am - 4:30pm

*closed for lunch between 12-1pm

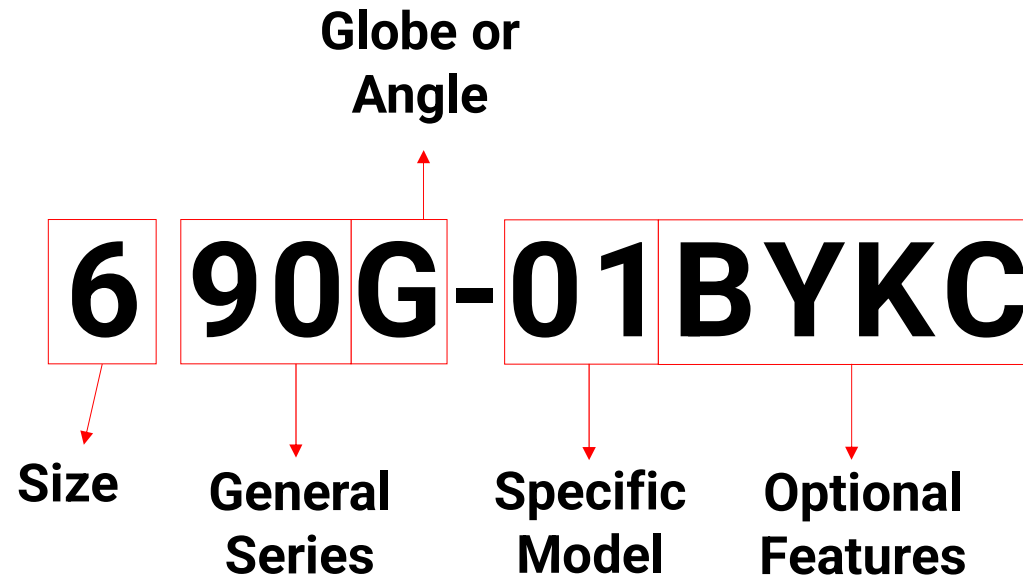


What We'll Ask: Pressure Control Valves

- ✓ Maximum continuous flow
- ✓ Minimum continuous flow
- ✓ Expected upstream pressure at valve
- ✓ Pressure Reducing: desired downstream pressure
- ✓ Pressure Sustaining: Desired minimum, maintained upstream pressure
- ✓ Size of piping
- ✓ Complex applications: What's the big picture? What are you trying to achieve?



Catalog Numbering System



Model Numbers

6" **90**G-**01**BYKC

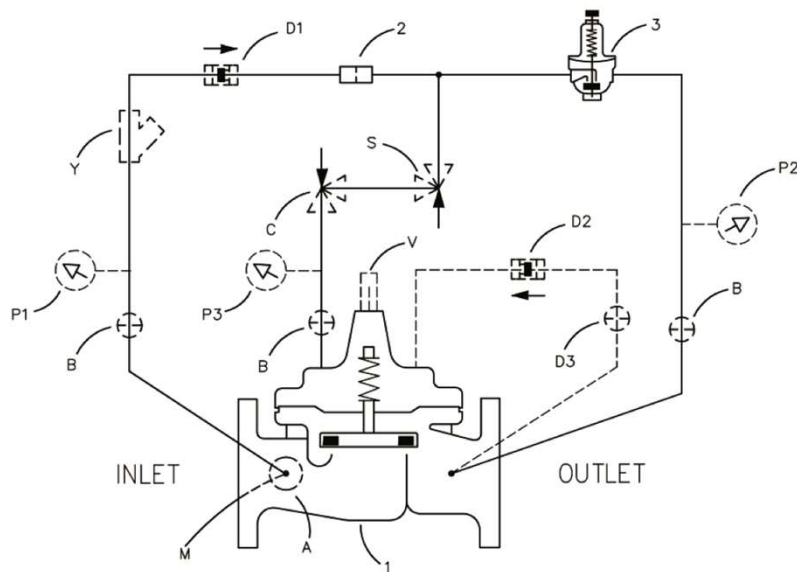
Model numbers are based
on application category

Thousands of specific
models in each category

APPLICATION CATEGORIES	SERIES
Rate of Flow (Flow Limiting)	40 - 49
Pressure Relief/Sustaining	50 - 59
Pump Control (Booster/Deep Well)	60 - 69
Check	80 - 89
Pressure Reducing	90 - 99
Float (Modulating & Non-Modulating)	120 - 129
Solenoid /Electronic & Metering	130 - 139
Altitude (Level Control)	206 - 210
Differential Relief	250 - 259
Float (Modulating Only)	420 - 429

Optional Features

6" 90**G**-01BYKC



Schematic Diagram

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

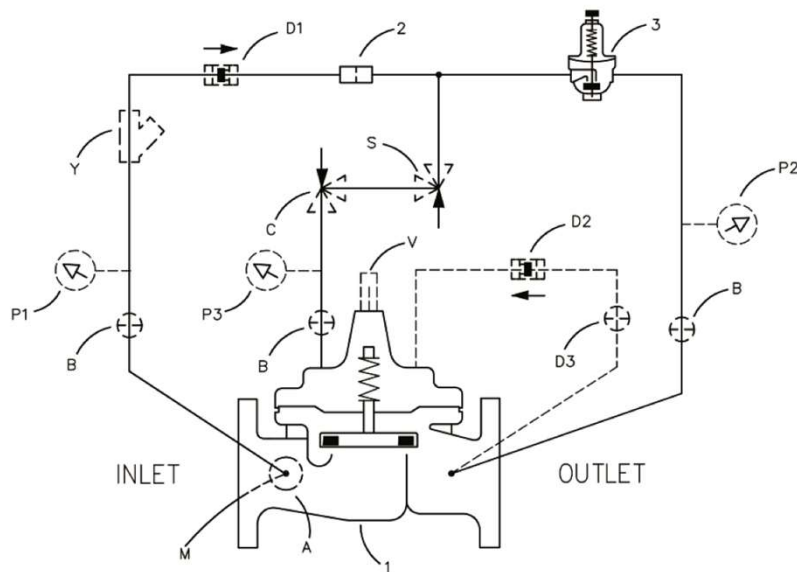
Optional Features

Item	Description
A	X46A Flow Clean Strainer
B	CK2 Isolation Valve
C	CV Flow Control (Closing)*
D	Check Valves with Isolation Valve
M	X144 e-FlowMeter
P	X141 Pressure Gauge
S	CV Flow 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.

Optional Features

6" 90G-01 **BYKC**



SUFFIX / OPTIONS

A	X46 Flow Clean Strainer
Y	X43 "Y" Pattern Strainer
B	CK2 Isolation Valves
F	Independent Operating Pressure
C	CV Closing Speed Control
D	Check Valves with Isolation Valves
E	X117D Valve Position Transmitter
H	Atmospheric Drain
N	VC-22D Electronic Controller
M	X144D Flow Meter
S	CV Opening Speed Control
P	Inlet/Outlet Pressure Gauges
V	X101 Valve Position Indicator
KC	Epoxy Coating (Main Valve)
KD	Dura-Kleen® Stem
KE	Motorized Pilot Valve
KG	Delrin Stem Sleeve
KO	Anti-Cavitation Trim
KR	Reverse Flow (Main Valve)
KB	KB Viton Rubber Parts
X	Extra/Unique, i.e. Adders

Main Valve Standard Materials

Component	Standard Material Combinations		
Body & Cover	Ductile Iron	Cast Steel	Bronze
Available Sizes	1¼" - 48"	1¼" - 16"	1¼" -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.			

End Connections

Available Sizes

Pattern	Threaded	Flanged	Grooved End
Globe	¾" - 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						

Note

Other Customer Specified Options

Special factory testing and documentation

- Mil thickness or Holiday Free

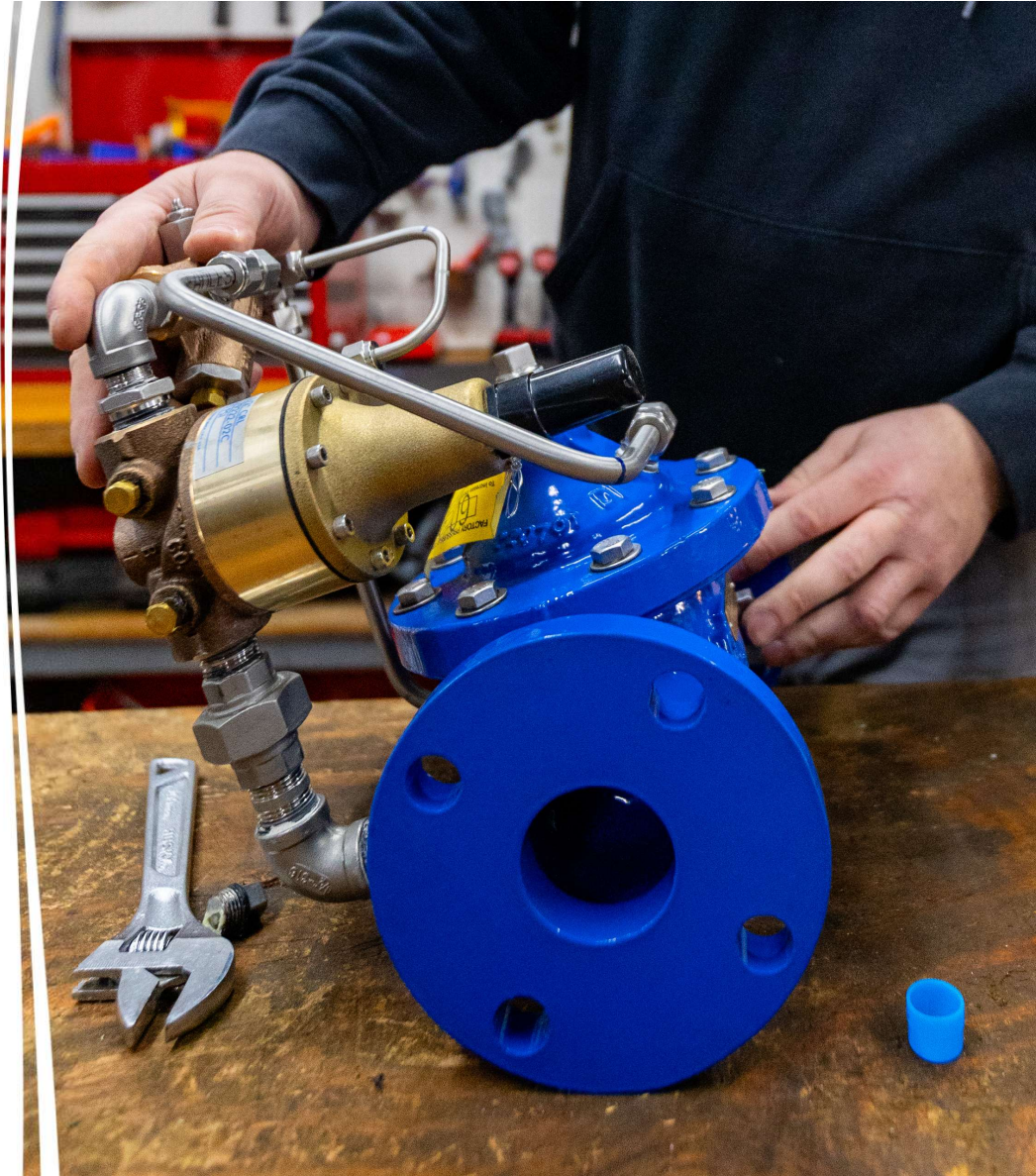
Special paint or coating

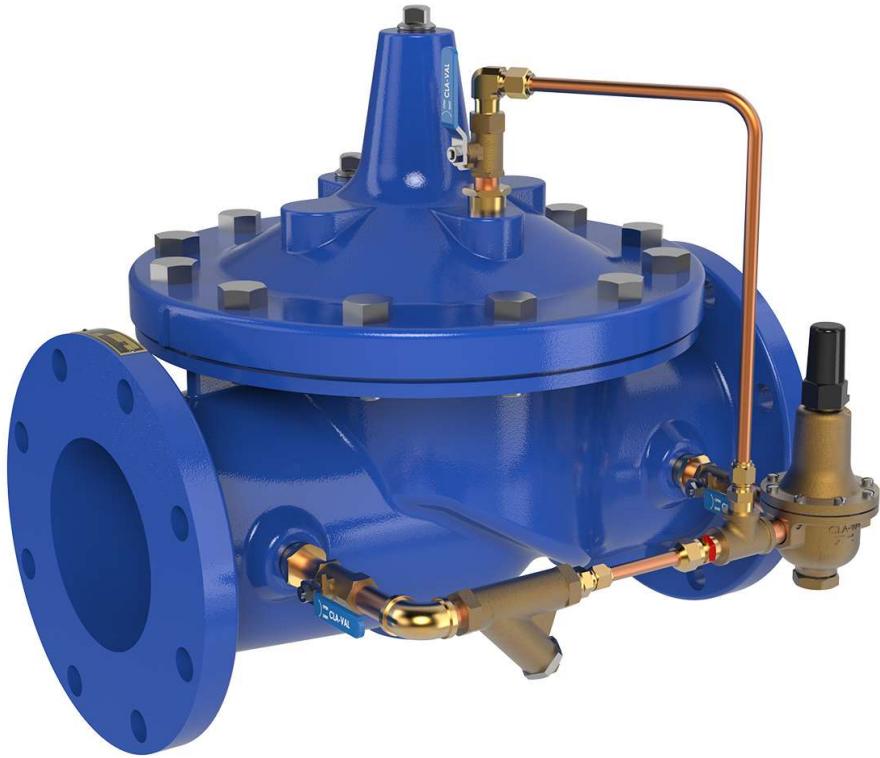
Special components in pilot system

- Example: speed controls, valve position indicator, stainless steel tubing and fittings

Special mounting pilot system

- Example: Remote left hand as opposed to right hand





Pressure Reducing Valves

Pressure Reducing Application

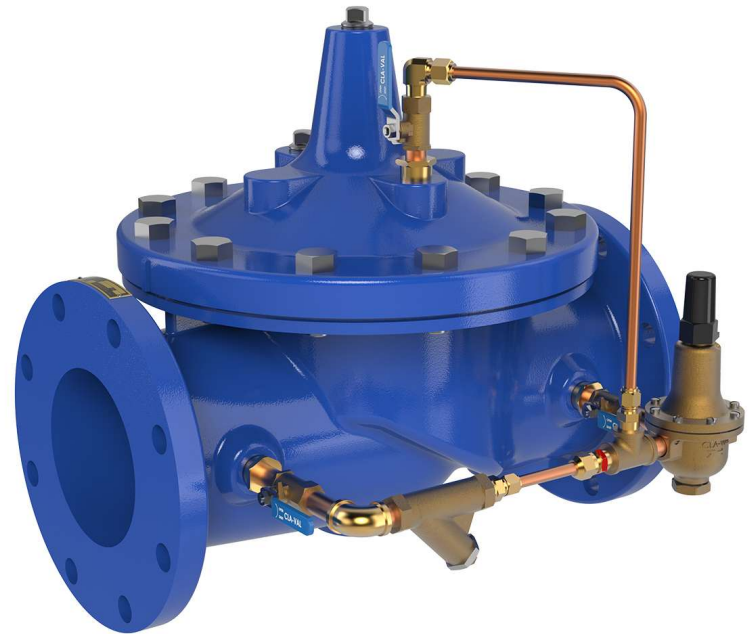
CRD Disassembly

Troubleshooting

Bypass Design

Pressure Reducing Valves (90-01)

Designed to maintain a constant downstream pressure regardless of inlet pressure or changes in flow rate



CRD Pressure Reducing Pilot Control

C = Control

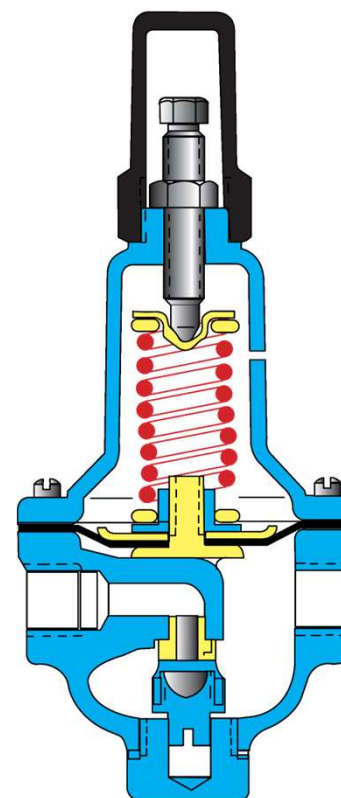
R D = Reduce



CRD

CRD Pressure Reducing Pilot Control

- Normally open
- Senses outlet pressure
- Yoke pushes the disc retainer assembly away from the seat from spring pressure
- Closes on pressure increase against internal diaphragm and spring
- 3/8" connection | 1/4" orifice
- Design/repair parts have not changed since the 1950's



CRD

CRD Adjustment Ranges

Green	30 ----- 300	27 psi per turn
Black	20 ----- 105	13 psi per turn
Red	15 ----- 75	9 psi per turn
Silver	2 ----- 30	3 psi per turn

Color	psi range	psi per turn
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Regulator Spring Color Coding Chart

Dwg#47117

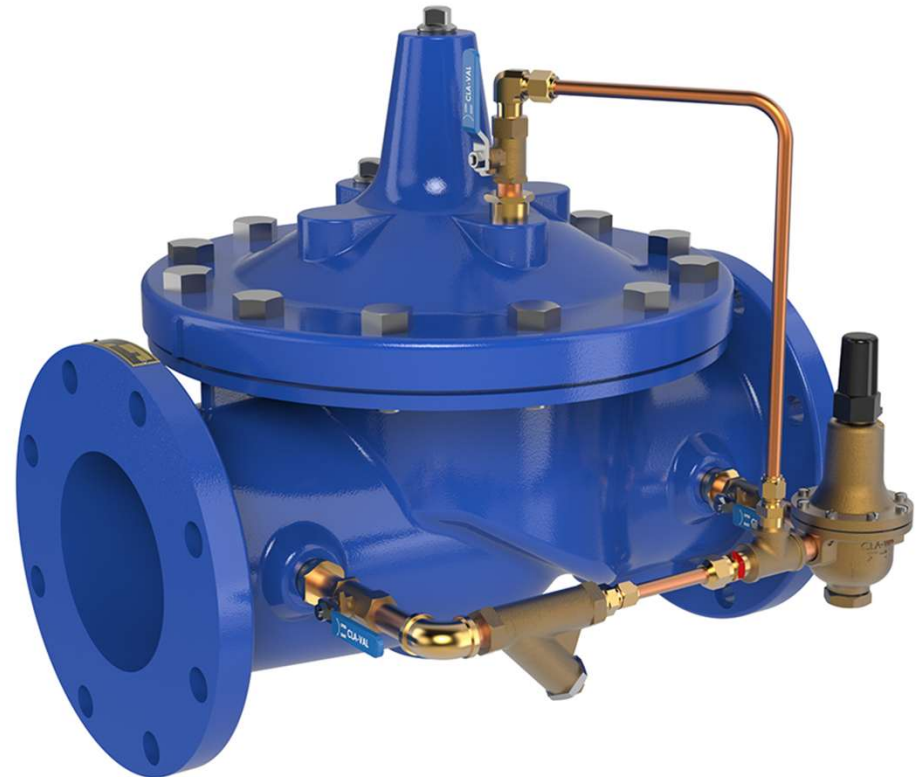
* THESE FIGURES ARE ONLY APPROXIMATE. FINAL ADJUSTMENTS SHOULD BE MADE WITH A PRESSURE GAUGE.

CATALOG NUMBER	SPRING NUMBER	COLOR	WIRE MATERIAL	PSI RANGE	*PSI PER TURN	TYPICAL FACTORY SETTING	
CDB-7	C0492D	BLUE	STAINLESS STEEL	0 - 7	.75	5	
	36773A	-	316 STAINLESS STEEL	5 - 25	4.0	20	
	32447F	-	302 STAINLESS STEEL	10 - 80	12.0	40	
	V6959B	YELLOW	MUSIC WIRE	20 - 80	14.5	60	
	C1124B	CADMIUM PLATE	MUSIC WIRE	50 - 150	29.5	100	
	V8515A	RED	MUSIC WIRE	65 - 180	44.0	120	
CDHS-18	36773A	-	316 STAINLESS STEEL	30 - 480 INCHES	-	240 INCHES	
CDHS-34	36773A	-	316 STAINLESS STEEL	30 - 480 INCHES	-	-	
CDS-5A	(1 SPRING) 87719B	BLUE	CHROME SILICON	5 - 40 FEET	1.0 FEET	25 FEET	
	(2 SPRINGS) 87719B	BLUE	CHROME SILICON	30 - 80 FEET	2.0 FEET	60 FEET	
	(3 SPRINGS) 87719B	BLUE	CHROME SILICON	70 - 120 FEET	3.0 FEET	100 FEET	
	(4 SPRINGS) 87719B	BLUE	CHROME SILICON	110 - 120 FEET	4.0 FEET	130 FEET	
CDS-6A	(5 SPRINGS) 87719B	BLUE	CHROME SILICON	150 - 200 FEET	5.0 FEET	180 FEET	
	(1 SPRING) 2933502H	BLUE	CHROME SILICON	5 - 40 FEET	.75 FEET	25 FEET	
	(2 SPRINGS) 2933502H	BLUE	CHROME SILICON	30 - 80 FEET	1.50 FEET	60 FEET	
	(3 SPRINGS) 2933502H	BLUE	CHROME SILICON	70 - 120 FEET	2.20 FEET	100 FEET	
	(4 SPRINGS) 2933502H	BLUE	CHROME SILICON	110 - 160 FEET	3.00 FEET	130 FEET	
	(5 SPRINGS) 2933502H	BLUE	CHROME SILICON	150 - 200 FEET	3.70 FEET	180 FEET	
CDS-7, CDS7-DO	71884B	RED	CHROME VANADIUM	5 - 40 FEET	5.0 FEET	-	
CDS7-DO (DELAYED OPENING ADJUSTMENT)	71885J	GREEN	CHROME VANADIUM	10 - 80 FEET	14 FEET	-	
	C8477G	-	302 STAINLESS STEEL	1 - 16 FEET	1 FEET	-	
	C0492D	Blue	STAINLESS STEEL	0 - 7	.75	5	
	82575C	-	STAINLESS STEEL	1.9 - 6.5 (4.5 - 15 FEET)	.61 (1.4 FEET)	3.5 (8 FEET)	
	81594E	-	STAINLESS STEEL	2 - 30	3.0	10	
	71884B	RED	CHROME VANADIUM	15 - 75	9.0	20	
	20632101E	BLACK	STAINLESS STEEL	20 - 105	13.0	40	
	71885J	GREEN	CHROME VANADIUM	30 - 300	27.0	60	
	CRA18	1630201A	YELLOW	CHROME VANADIUM	150 - 600	26.0	200
	CRA-34	81594E	-	STAINLESS STEEL	2 - 30	3.0	10
CRA	82575C	-	STAINLESS STEEL	1.9 - 6.5 (4.5 - 15 FEET)	.61 (1.4 FEET)	3.5 (8 FEET)	
	81594E	-	STAINLESS STEEL	2 - 30	3.0	10	
	V6551A	GREEN	CHROME SILICON	10 - 40	4.0	30	
	71884B	RED	CHROME VANADIUM	15 - 75	9.0	20	
	20632101E	BLACK	STAINLESS STEEL	20 - 105	13.0	40	
	71885J	GREEN	CHROME VANADIUM	30 - 300	27.0	60	
	20971701A	LIGHT GREEN	CHROME ALLOY STEEL	15 - 85	3.5	20	
	20967101F	GREEN	CHROME ALLOY STEEL	25 - 100	6.0	40	
	20957201E	DARK BLUE	CHROME ALLOY STEEL	80 - 150	10.0	90	
	21080701K	YELLOW	CHROME ALLOY STEEL	125 - 250	23.0	150	
CRDL	20974701E	LIGHT GREEN	CHROME ALLOY STEEL	3 - 60	6.0	30	
	20974701E	GREEN	CHROME ALLOY STEEL	25 - 100	6.0	40	
	20974801D	BLUE	CHROME ALLOY STEEL	75 - 160	12.0	90	
	20974601F	LIGHT GREEN	CHROME ALLOY STEEL	18 - 50	2.0	20	
	20974701E	GREEN	CHROME ALLOY STEEL	30 - 95	3.0	40	
	21081501K	BLACK	OIL TEMPERED CHROME SILICON	75 - 200	8.0	150	
	20974601F	LIGHT GREEN	CHROME ALLOY STEEL	18 - 70	2.0	20	
	20974701E	GREEN	CHROME ALLOY STEEL	50 - 95	3.0	90	
	21081501K	BLACK	OIL TEMPERED CHROME SILICON	75 - 200	8.0	150	
	CRD18	1630201A	YELLOW	CHROME VANADIUM	150 - 600	26.0	200
	CRD-34	81594E	-	STAINLESS STEEL	2 - 30	3.0	-
		71884B	RED	CHROME VANADIUM	15 - 75	9.0	-
71885J		GREEN	CHROME VANADIUM	40 - 140	27.5	-	
CRL	71884B	RED	CHROME VANADIUM	0 - 75	8.5	50	
	20632101E	BLACK	STAINLESS STEEL	20 - 105	13.0	60	
	71885J	GREEN	CHROME VANADIUM	20 - 200	28.0	60	
	1630201A	YELLOW	CHROME VANADIUM	100 - 300	19.0	100	

Spring Color Coding Chart
(available online)

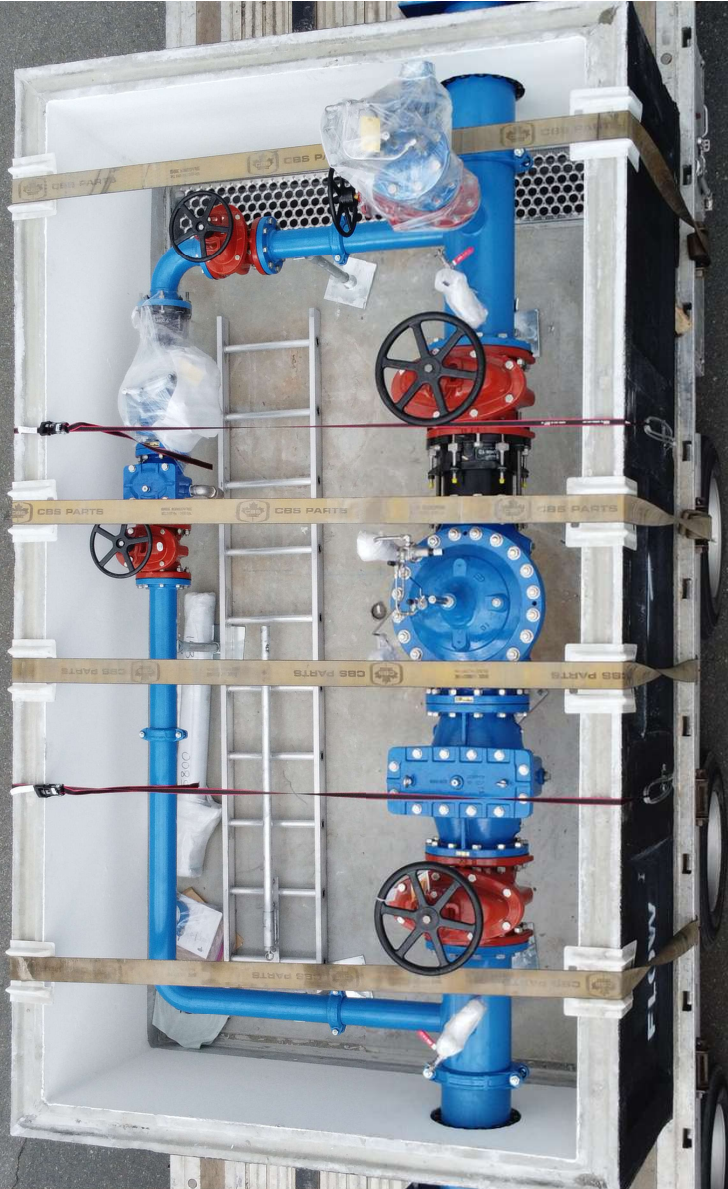
90-01 Operation

- Modulates all day based on system demand to maintain set point
- Utilizes CRD Component to sense pressure change
- Drop in Downstream Pressure, Valve Opens
- Rise in Downstream Pressure, Valve Closes
- +/- 1psi accurate
- Reacts very quickly to change
- Needs at least 10psi Differential Pressure for control

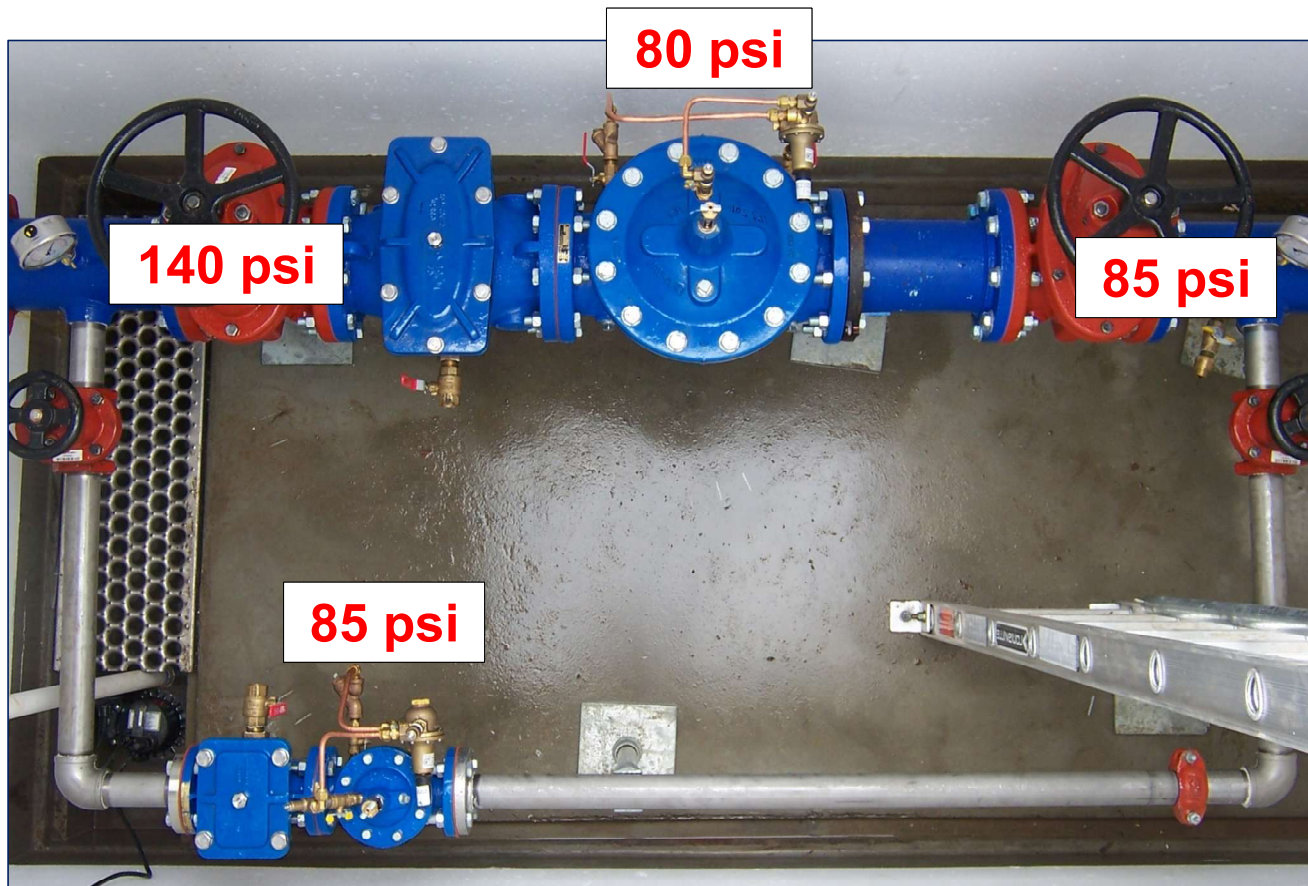




Cla-Val 90-01 Pressure Reducing Valve



Pressure Reducing Bypass Design



Pressure Reducing Bypass Design

Bypass Advantages

Individual valves are sized for low and high demand

- Allows them to specialize for optimal performance

No downtime when servicing

- Isolate one for maintenance and flow through the other

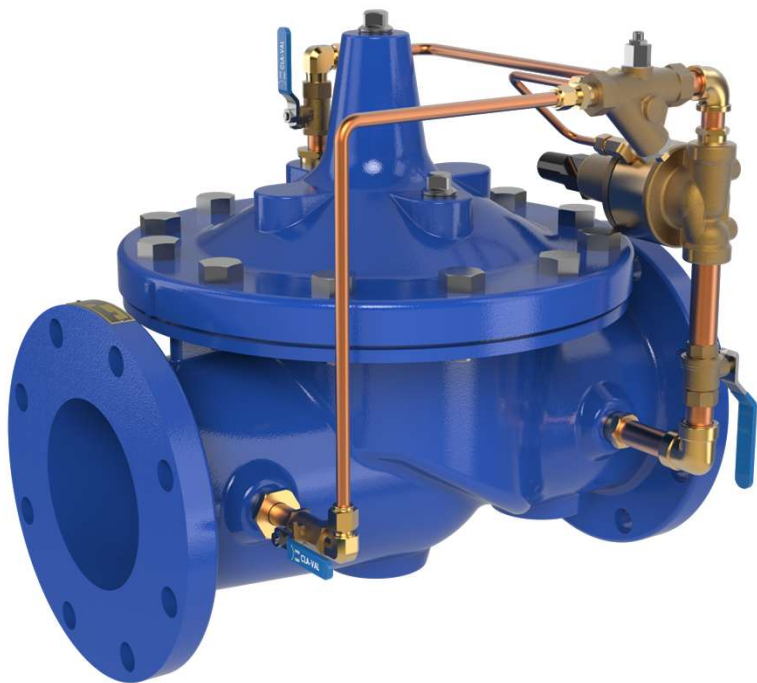
Built in redundancy



Bypass Sizing

- Minimum flow of the large valve and maximum flow of the small valve must overlap by at least 100 GPM
- Provides smooth transition from small valve to the opening of large valve

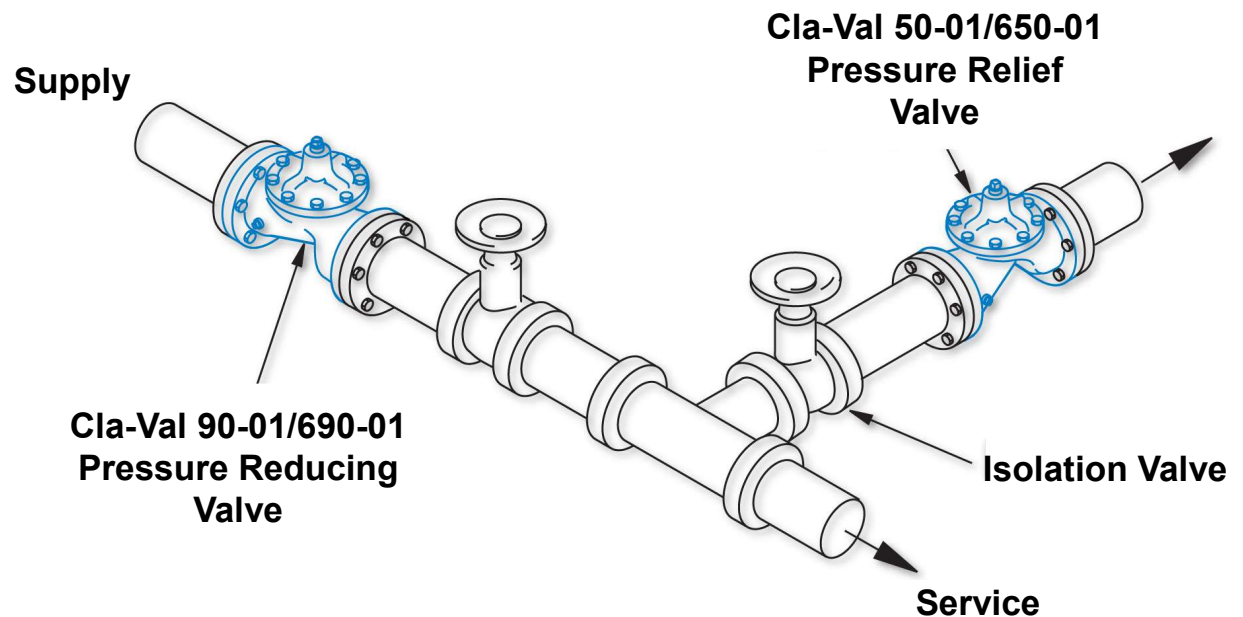




Pressure Relief Valves

Pressure Relief Valves

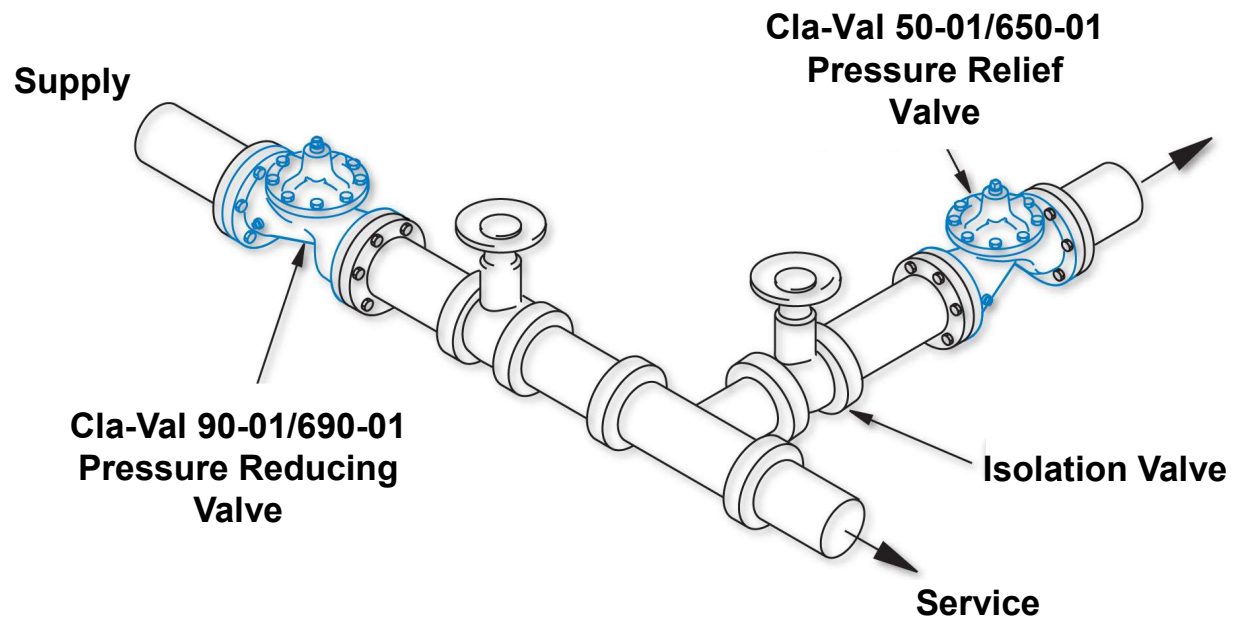
Opens rapidly when inlet pressure rises above pilot setting, then closes slowly when pressure drops below pilot setting



Pressure Relief Valves: Sizing

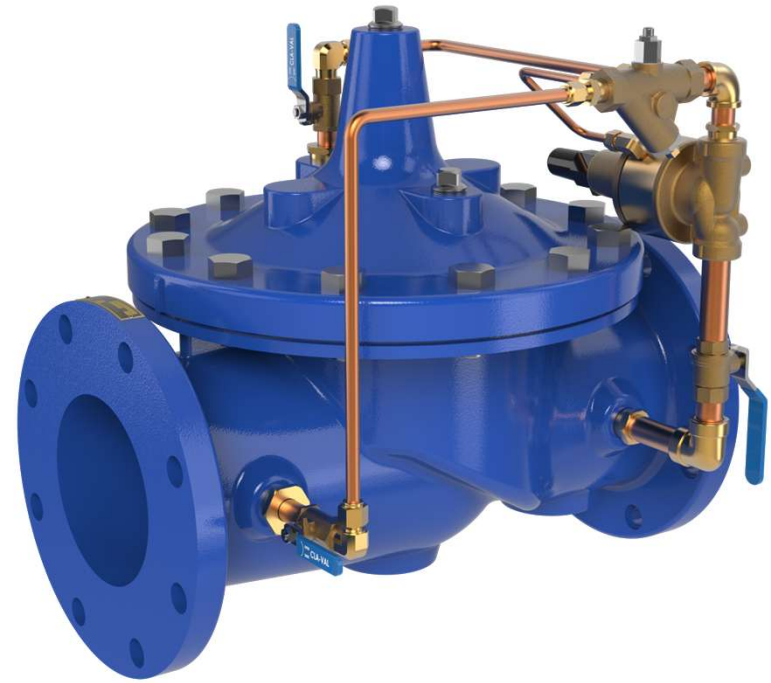
Size according to flow!

- Relief valves should be sized to $\frac{1}{3}$ to $\frac{1}{2}$ of mainline total flow
- Always consult with Cimco-GC Systems for relief valve sizing!



Pressure Relief Valves (50-01)

Designed to maintain a maximum upstream pressure regardless of outlet pressure or changes in flow rate.



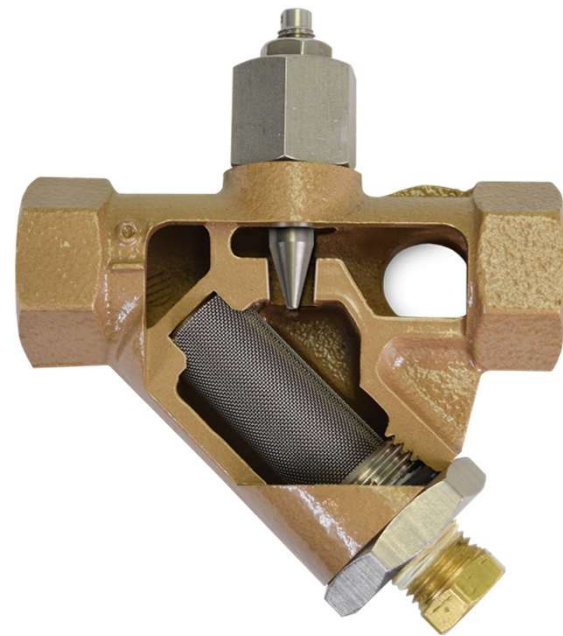
X42N-2 Strainer Needle Valve



X42N-2 Adjustment

Close the needle fully and then loosen 1/4-1/3 turn depending on valve size

Does Not Come Preset



CRL / CRL 60 Pressure Relief Pilot Control

C = Control

R L = Relief



CRL



CRL-60

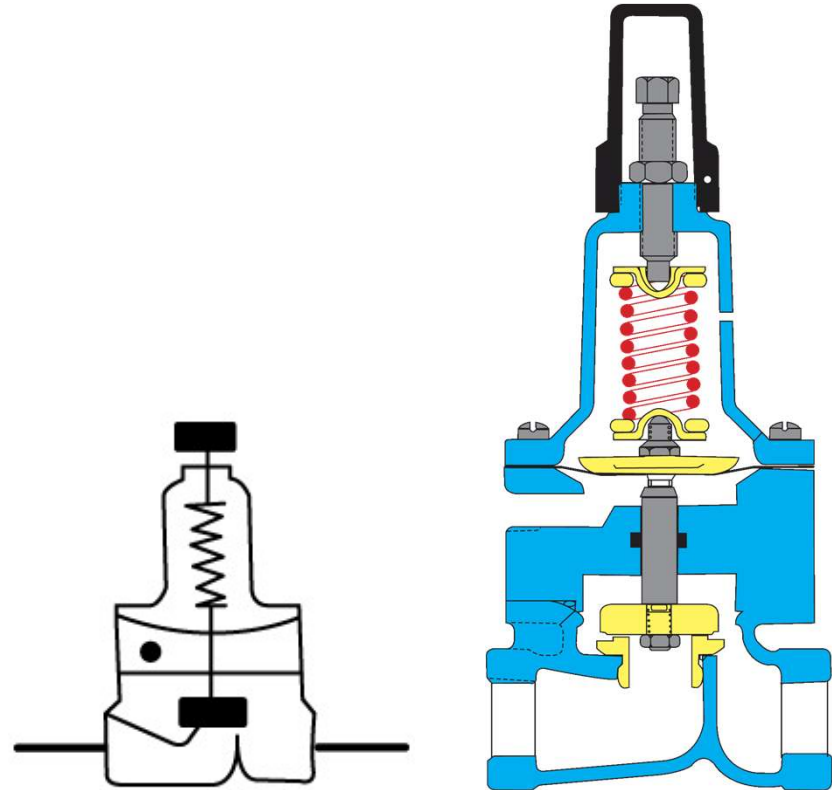
CRL Pressure Relief Pilot Control

Normally closed

Opens on pressure rise

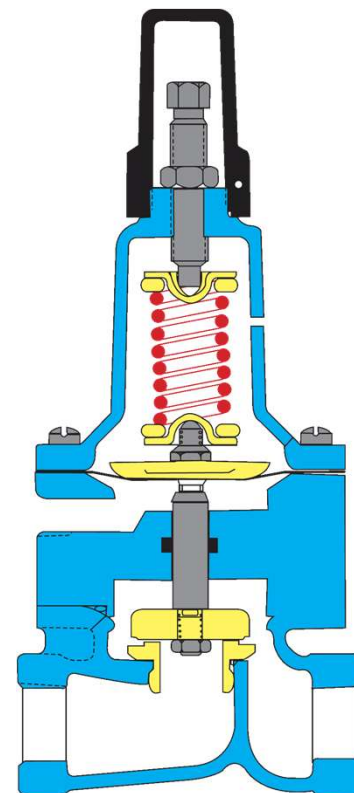
Senses inlet pressure remotely

11/16" seat



CRL Adjustment Ranges

Yellow	100 ----- 300	18 psi per turn
Green	20 ----- 200	28 psi per turn
Black	20 ----- 105	12 psi per turn
Red	0 ----- 75	8.5 psi per turn
Color	psi range	psi per turn

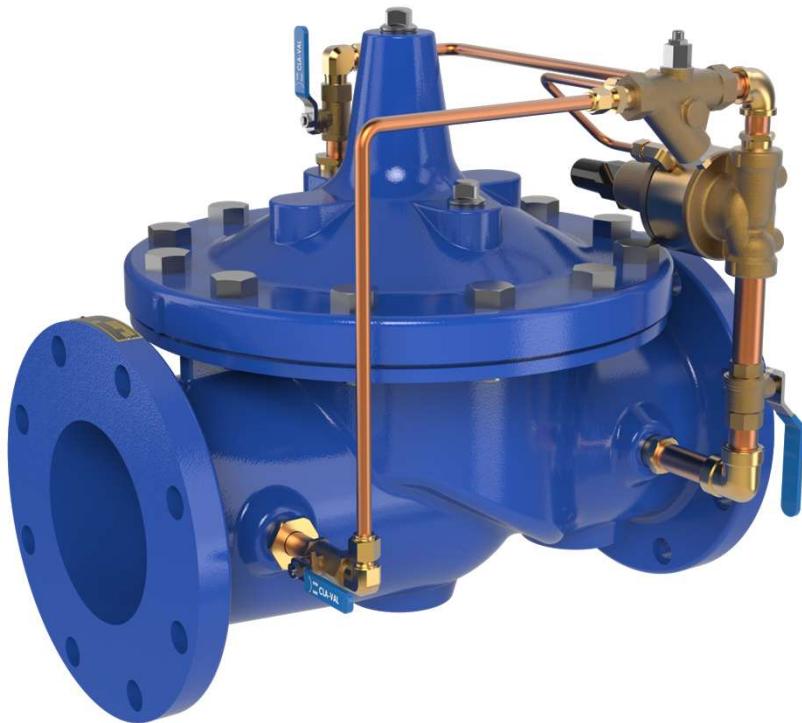




Cla-Val 50-01 Pressure Relief Valve



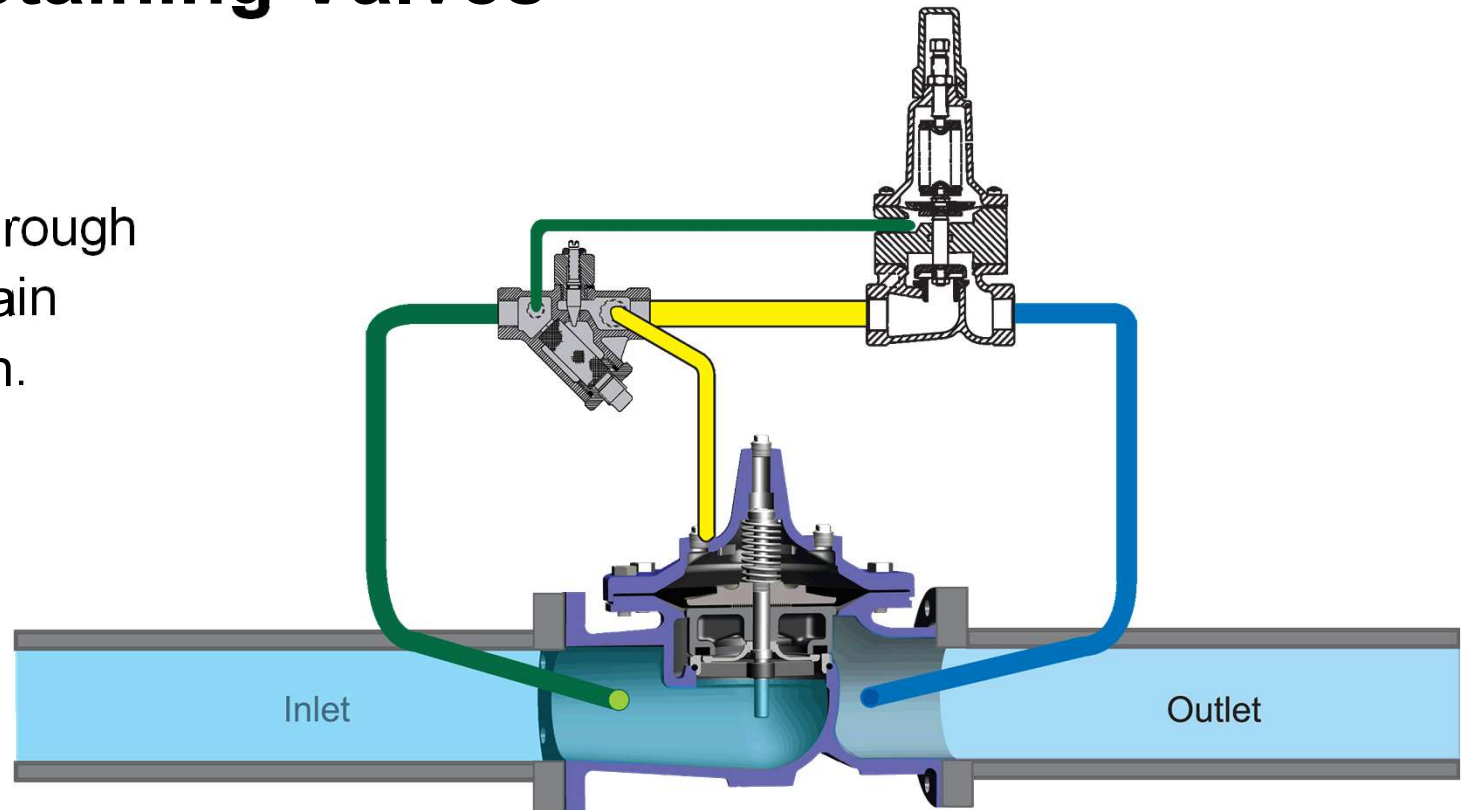
Installation: 6-Inch 50-01



Pressure Sustaining Valves

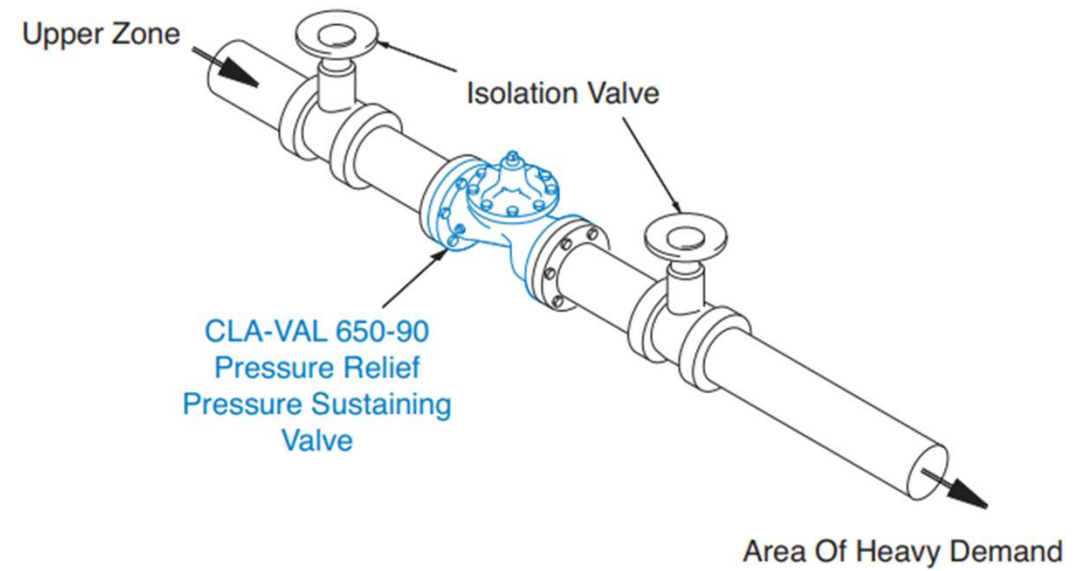
Pressure Sustaining Valves

Flow is continuous through pilot system when main valve is partially open.



Pressure Sustaining Valves

Maintains a minimum upstream pressure regardless of outlet pressure or changes in flow rate.

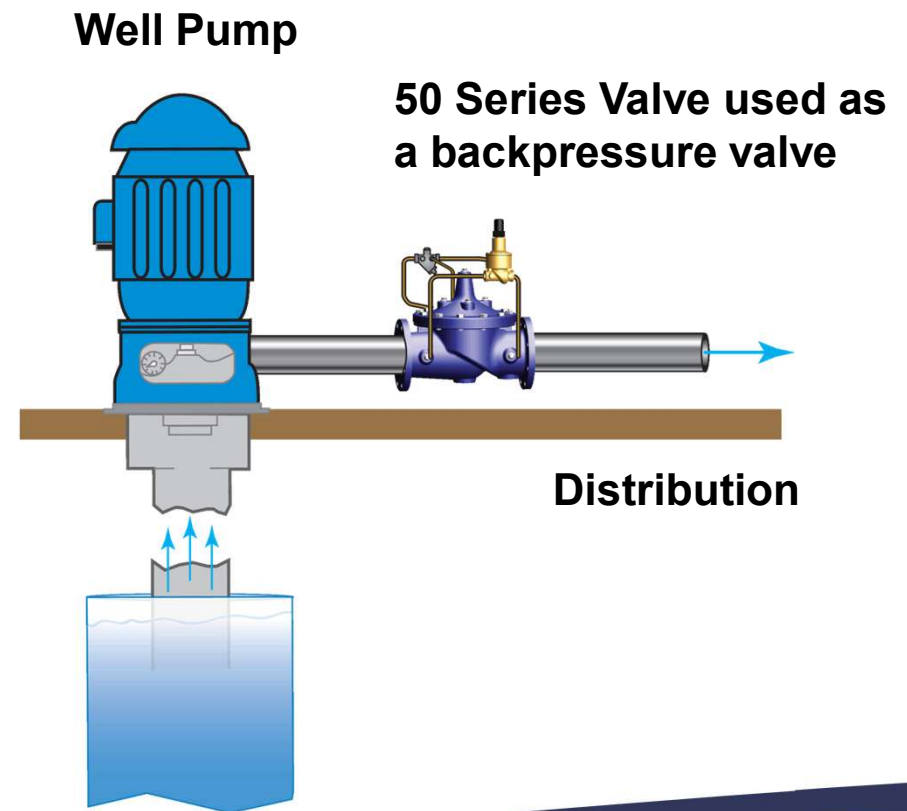


Back Pressure Sustaining Application

Keep pump on its curve by operating in its most efficient flow range.

Keep pump from breaking suction.

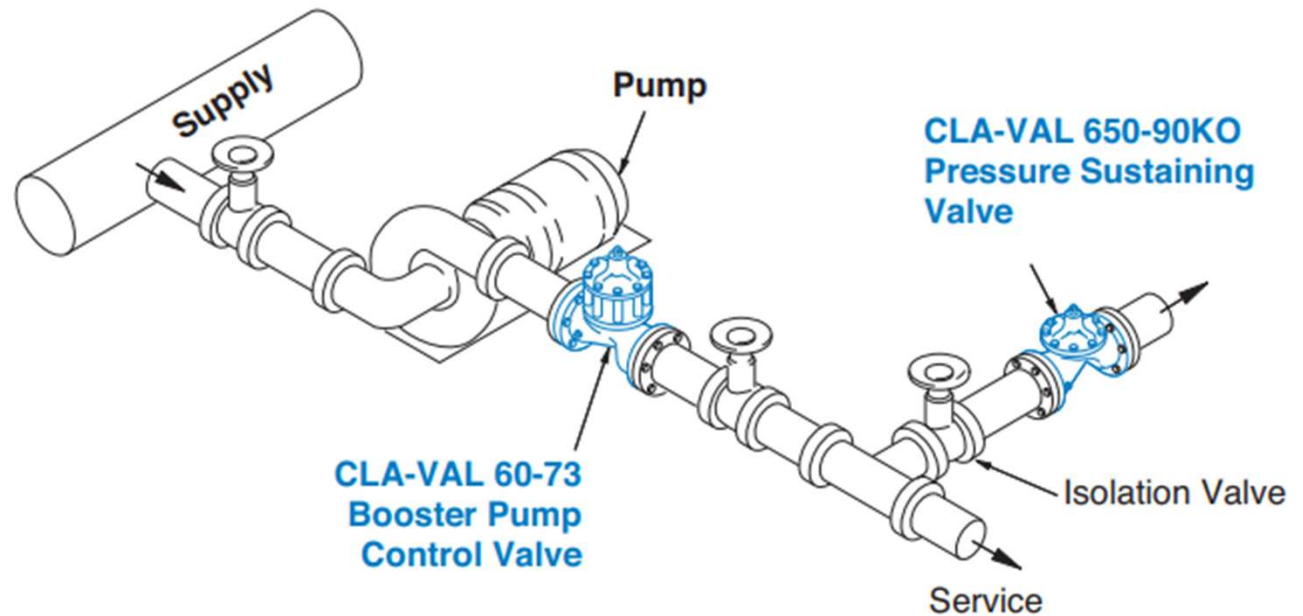
Not suitable for all pump applications – always consult with Cimco-GC Systems



Sustaining as a Part of Pump Control

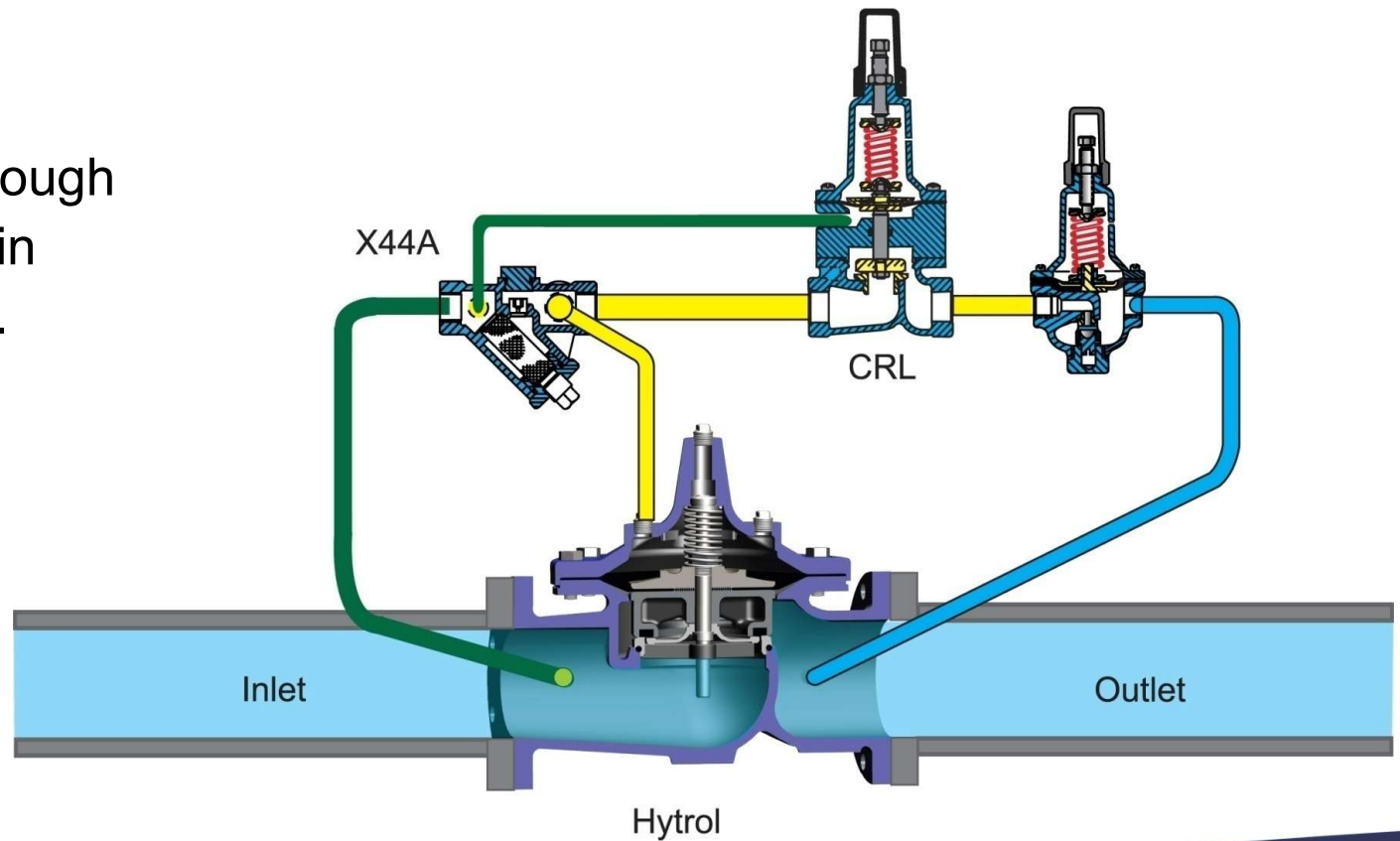
Pressure Service

This typical application controls the maximum system pressure when VFD pumps are at minimum speed.



Basic Operation of 92-01 (Pressure Sustaining/Reducing Valve)

Flow is continuous through pilot system when main valve is partially open.

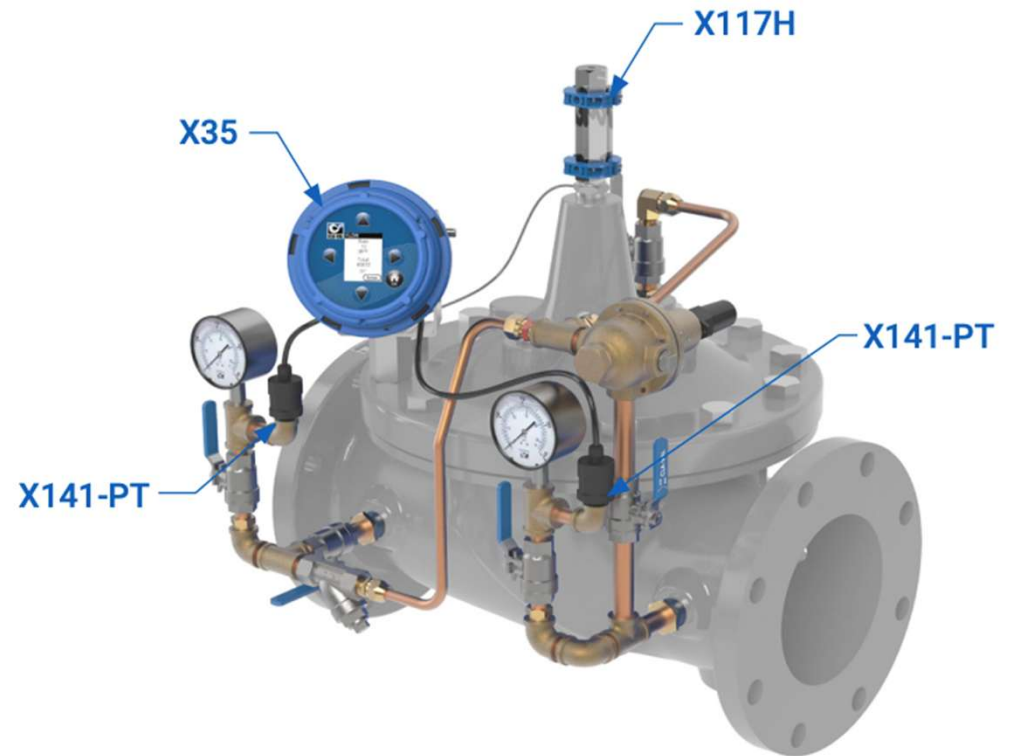


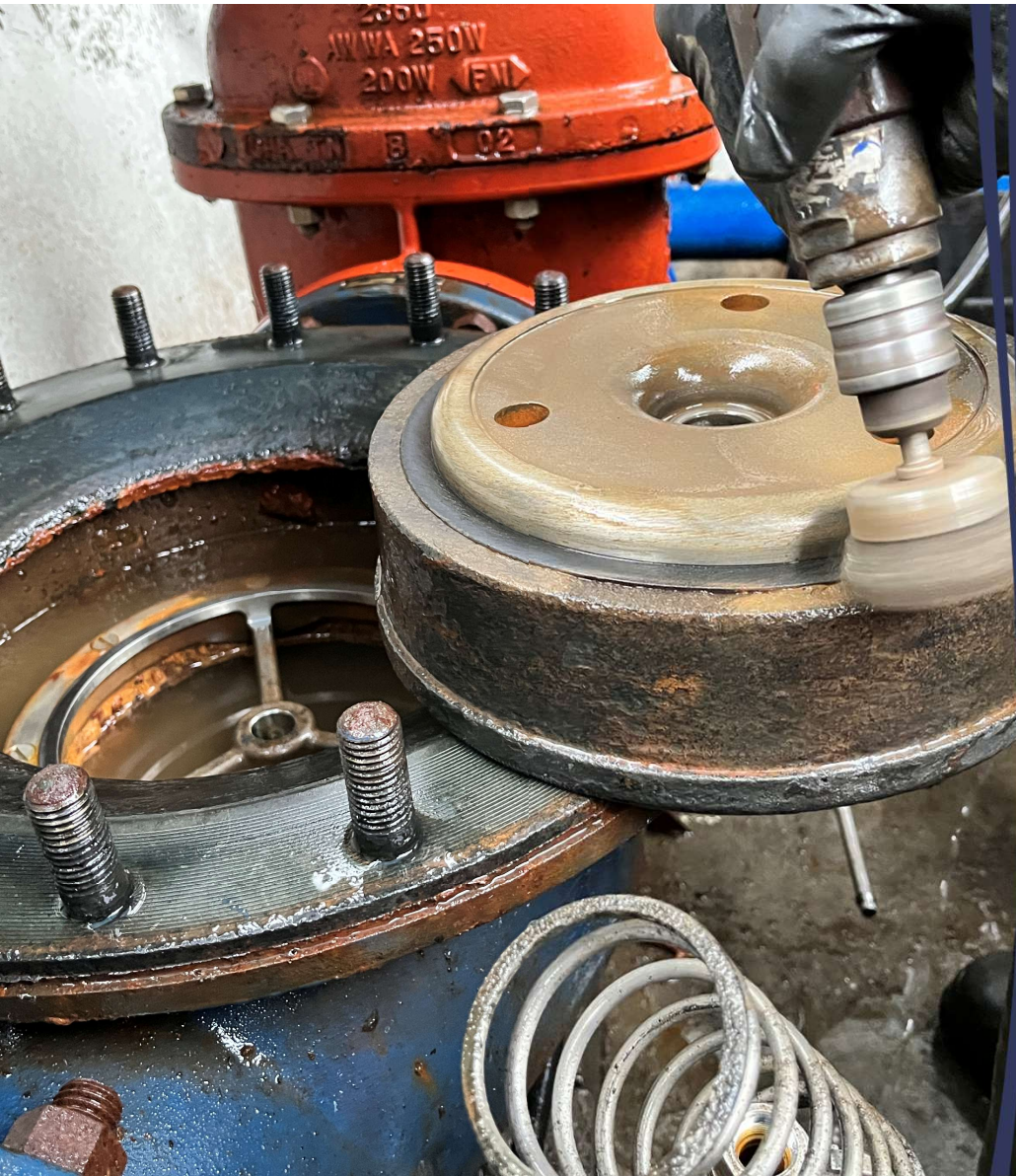
Electronic accessories to fit all applications



NEW – XP2F Flow Metering Package

- Uses data from a position transmitter (X117H) and pressure transmitters (X141-PT)
- Calculates the flow based on this information (X35)
- Retrofittable to an existing valve
- Needs an electricity source, not battery powered
- Has minimal upstream/downstream straight pipe requirements





Control Valve Main Body Maintenance

Why Control Valves Don't Work: Common Causes

- Misapplication
- Power and/or sensing lines external to the valve not connected
- Years without preventative maintenance
- User error



Preventative Maintenance

- **Reduces Operating Costs**
 - Valves that can't go full open cause more friction loss
 - Valves that can't go closed may over pressurize line

Preventative Maintenance

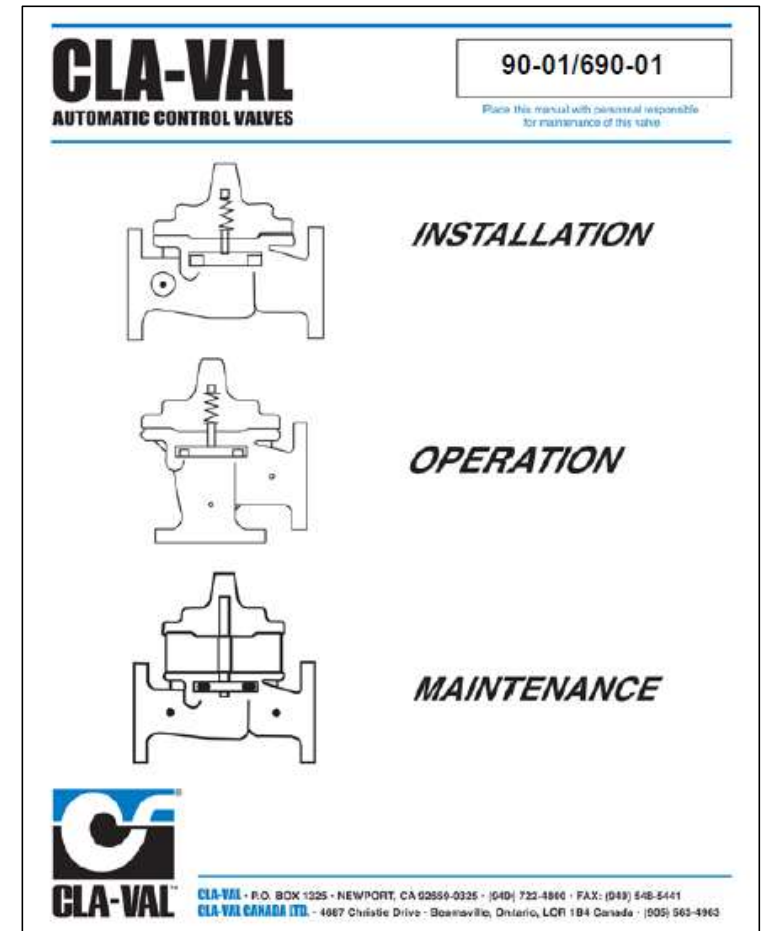
- **Reduces Operating Costs**
 - Valves that can't go full open cause more friction loss
 - Valves that can't go closed may over pressurize line
- **Reduces Emergencies**
 - Proactive Maintenance reduces the chance of emergencies

Preventative Maintenance

- **Reduces Operating Costs**
 - Valves that can't go full open cause more friction loss
 - Valves that can't go closed may over pressurize line
- **Reduces Emergencies**
 - Proactive Maintenance reduces the chance of emergencies
- **Reduces Valve Replacement costs**
 - Cheaper to fix than to replace

Typical Preventative Maintenance Program:

- **Make a Complete Valve List** (include site location)
- **Obtain IOM Manuals**
- **Schedule Maintenance**
 - Yearly Inspections
 - 3-5 Year Full Rebuilds
- **Frequency depends on conditions such as:**
 - Fluid Corrosiveness, Differential, Velocity
- **Keep accurate service records**



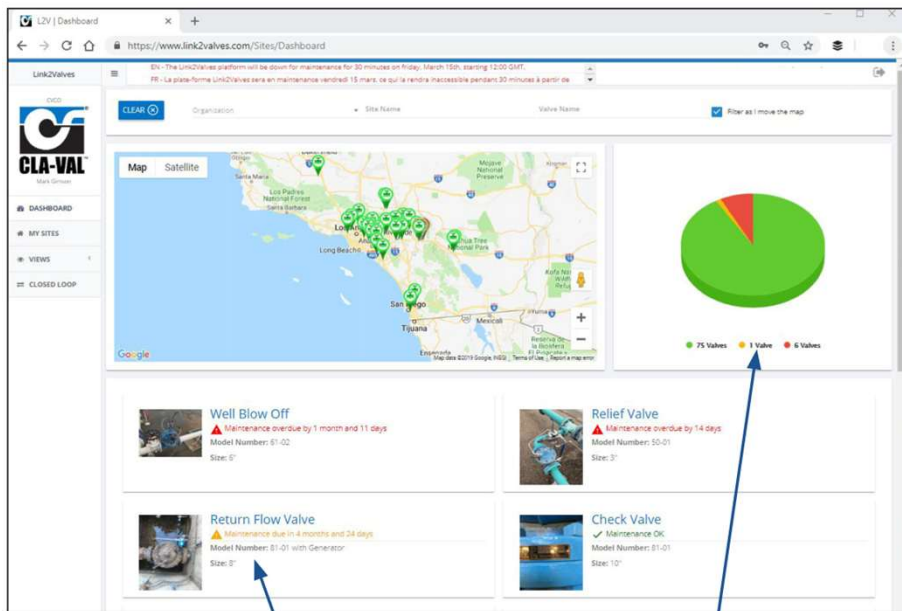
Link2Valves

- Data management platform for real-time insights across water system
- Manage service schedules for your automatic control valves.
- Desktop and Mobile App
- Secure

 **Link2Valves™**
Simplified Control Valve Service Management

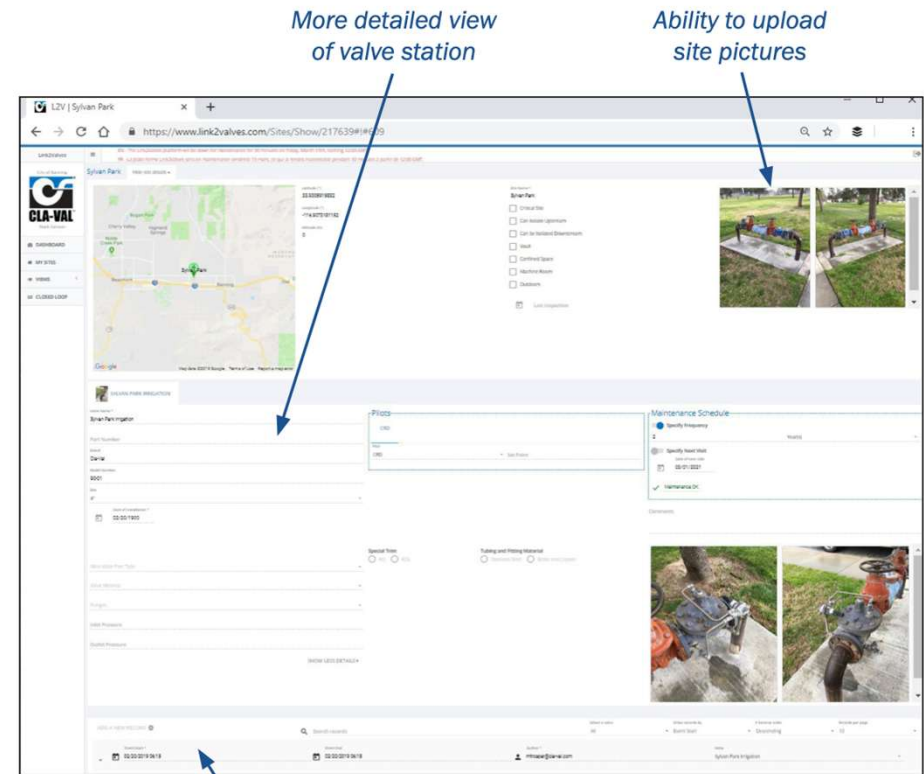


Link2Valves Interface



Brief description of all valves shown on current map, with service schedule

Easily see how many valves require service



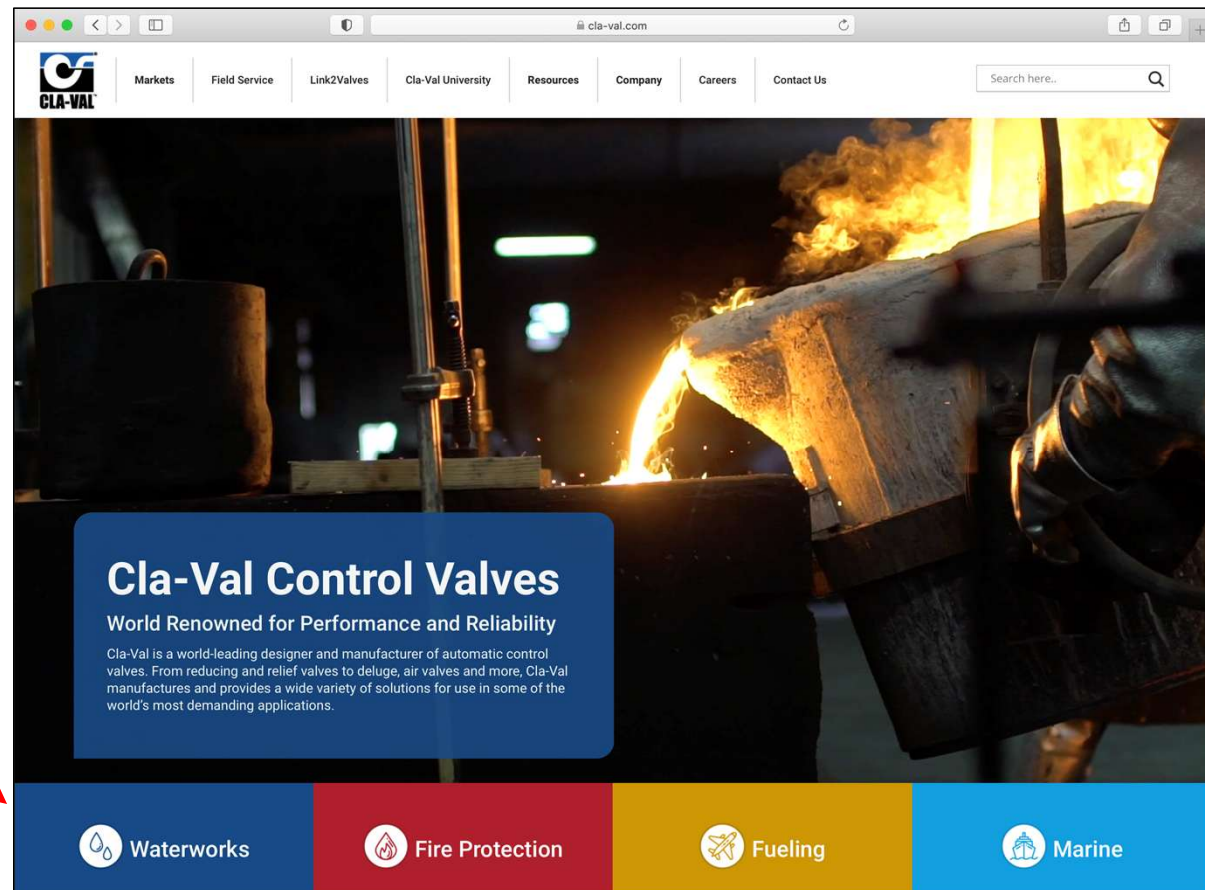
More detailed view of valve station

Ability to upload site pictures

Service details for every event are easily recorded

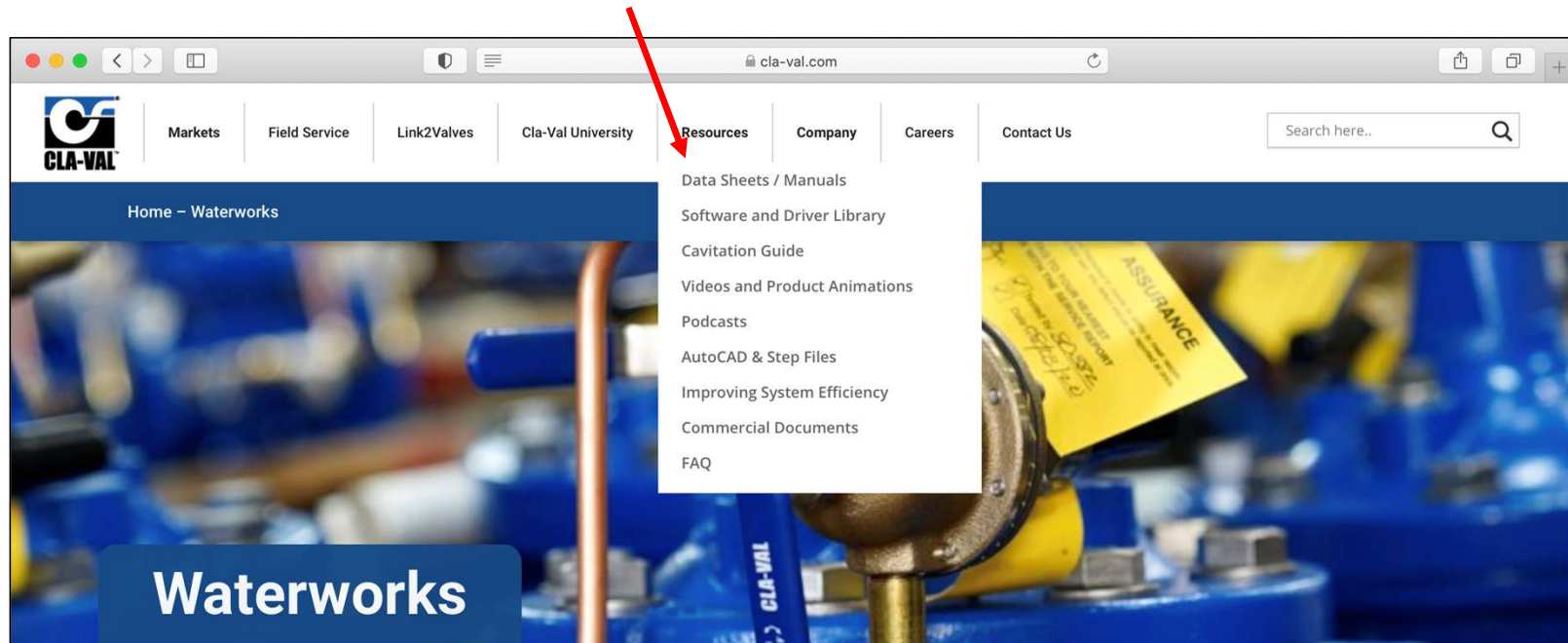
Finding the IOM Manual

Go to Cla-Val.com and
click “Waterworks” tab.



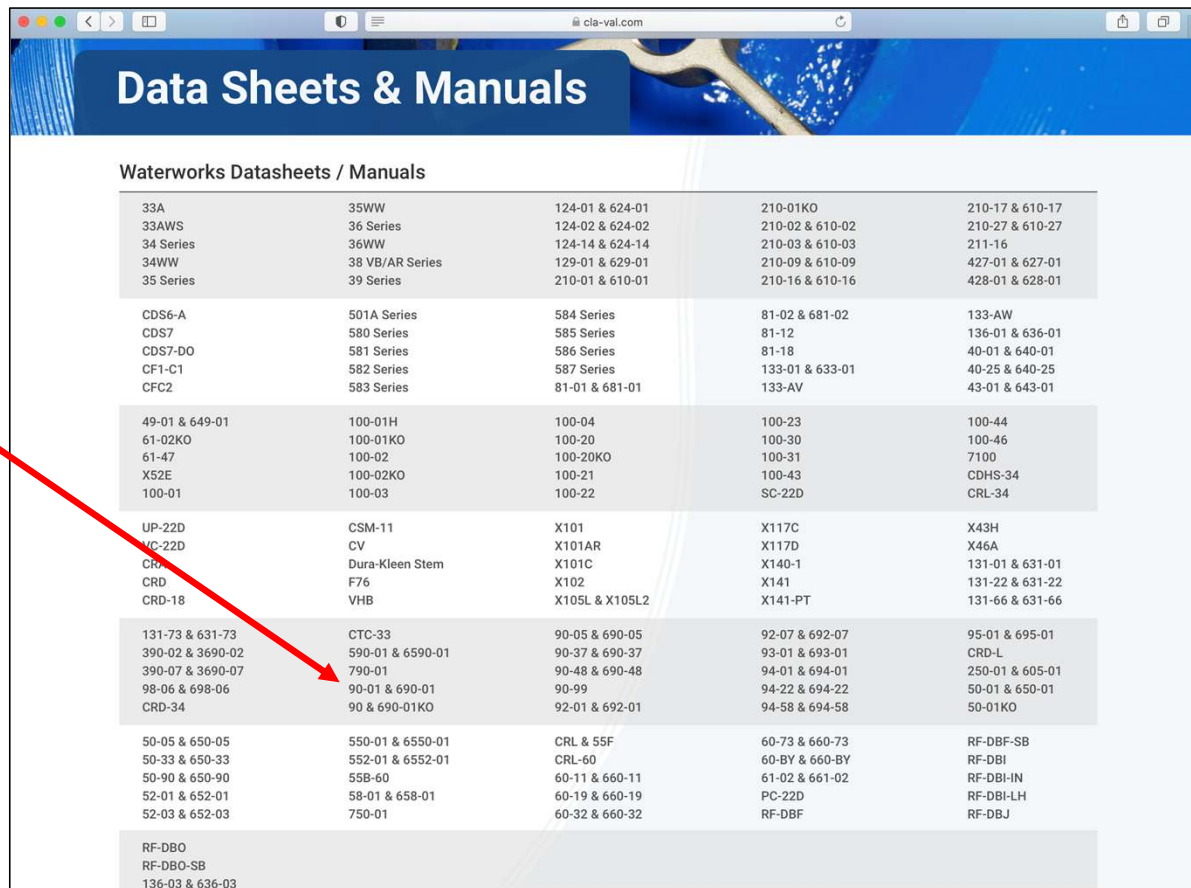
Finding the IOM Manual

Select “Data Sheets / Manuals” from “Resources” drop-down.



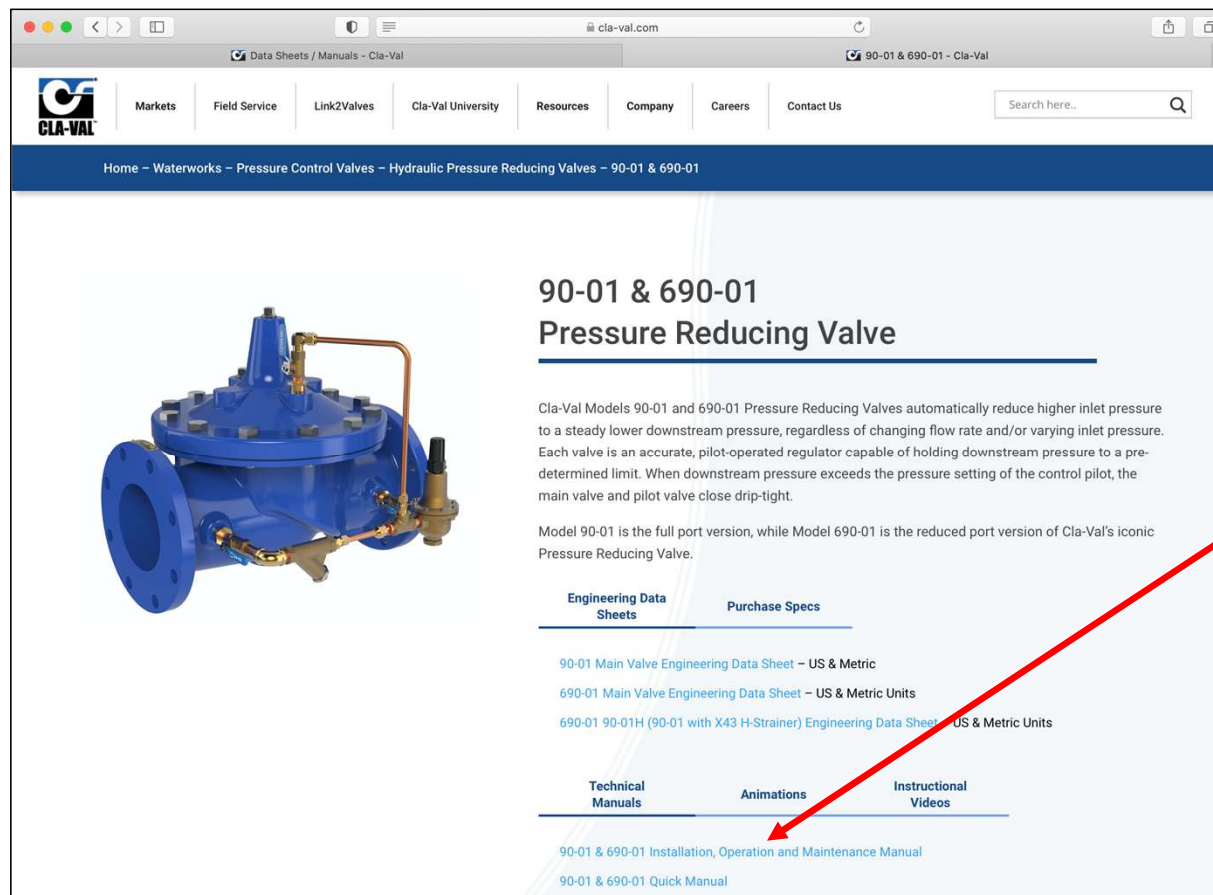
Finding the IOM Manual

Select the particular valve.



Data Sheets & Manuals				
Waterworks Datasheets / Manuals				
33A	35WW	124-01 & 624-01	210-01KO	210-17 & 610-17
33AWS	36 Series	124-02 & 624-02	210-02 & 610-02	210-27 & 610-27
34 Series	36WW	124-14 & 624-14	210-03 & 610-03	211-16
34WW	38 VB/AR Series	129-01 & 629-01	210-09 & 610-09	427-01 & 627-01
35 Series	39 Series	210-01 & 610-01	210-16 & 610-16	428-01 & 628-01
CDS6-A	501A Series	584 Series	81-02 & 681-02	133-AW
CDS7	580 Series	585 Series	81-12	136-01 & 636-01
CDS7-DO	581 Series	586 Series	81-18	40-01 & 640-01
CF1-C1	582 Series	587 Series	133-01 & 633-01	40-25 & 640-25
CFC2	583 Series	81-01 & 681-01	133-AV	43-01 & 643-01
49-01 & 649-01	100-01H	100-04	100-23	100-44
61-02KO	100-01KO	100-20	100-30	100-46
61-47	100-02	100-20KO	100-31	7100
X52E	100-02KO	100-21	100-43	CDHS-34
100-01	100-03	100-22	SC-22D	CRL-34
UP-22D	CSM-11	X101	X117C	X43H
UC-22D	CV	X101AR	X117D	X46A
CRD-17	Dura-Kleen Stem	X101C	X140-1	131-01 & 631-01
CRD	F76	X102	X141	131-22 & 631-22
CRD-18	VHB	X105L & X105L2	X141-PT	131-66 & 631-66
131-73 & 631-73	CTC-33	90-05 & 690-05	92-07 & 692-07	95-01 & 695-01
390-02 & 3690-02	590-01 & 6590-01	90-37 & 690-37	93-01 & 693-01	CRD-L
390-07 & 3690-07	790-01	90-48 & 690-48	94-01 & 694-01	250-01 & 605-01
98-06 & 698-06	90-01 & 690-01	90-99	94-22 & 694-22	50-01 & 650-01
CRD-34	90 & 690-01KO	92-01 & 692-01	94-58 & 694-58	50-01KO
50-05 & 650-05	550-01 & 6550-01	CRL & 55F	60-73 & 660-73	RF-DBF-SB
50-33 & 650-33	552-01 & 6552-01	CRL-60	60-BY & 660-BY	RF-DBI
50-90 & 650-90	55B-60	60-11 & 660-11	61-02 & 661-02	RF-DBI-IN
52-01 & 652-01	58-01 & 658-01	60-19 & 660-19	PC-22D	RF-DBI-LH
52-03 & 652-03	750-01	60-32 & 660-32	RF-DBF	RF-DBJ
RF-DBO				
RF-DBO-SB				
136-03 & 636-03				

Finding the IOM Manual



The screenshot shows the Cla-Val website's product page for 90-01 & 690-01 Pressure Reducing Valves. The page features a blue header with the Cla-Val logo and navigation links. A large blue valve is shown on the left. The main content area includes a title, a description of the valve's function, and a list of links to technical manuals. A red arrow points to the '90-01 & 690-01 Installation, Operation and Maintenance Manual' link.

90-01 & 690-01 Pressure Reducing Valve

Cla-Val Models 90-01 and 690-01 Pressure Reducing Valves automatically reduce higher inlet pressure to a steady lower downstream pressure, regardless of changing flow rate and/or varying inlet pressure. Each 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.

Model 90-01 is the full port version, while Model 690-01 is the reduced port version of Cla-Val's iconic Pressure Reducing Valve.

Engineering Data Sheets **Purchase Specs**

[90-01 Main Valve Engineering Data Sheet – US & Metric](#)
[690-01 Main Valve Engineering Data Sheet – US & Metric Units](#)
[690-01 90-01H \(90-01 with X43 H-Strainer\) Engineering Data Sheet – US & Metric Units](#)

Technical Manuals **Animations** **Instructional Videos**

[90-01 & 690-01 Installation, Operation and Maintenance Manual](#)
[90-01 & 690-01 Quick Manual](#)

**Click the
Installation,
Operation, and
Maintenance
Manual**

Work Safely

Be aware of traffic

- Keep defensible space
- Light boards, cones, etc.

Vaults/Confined Space

- Pump to remove water, gas detectors, harness, crane to help cover removal

Work as a team

- One works on main valve, other works on pilots



Hytrol Service Tips

1. Index the cover to the body to ensure proper alignment of tubing.
2. Pull STRAIGHT UP on cover and diaphragm assembly to avoid damage to seat and stem.
3. Record service activity on preventive maintenance form.

Cla-Val Automatic Control Maintenance Record		
Form to be completed at the jobsite		
Date:	Time Arrived:	Time Departed:
Cla-Val Technician:		Customer Contact:
Customer Co. Name:		Location/Site Name:
Equipment Serviced		
Valve Model:	Serial #:	Service/Repair Performed:
Follow-Up Requirements		
Valve Model:	Serial #:	Required action:
Preventative Recommendations		
Valve Model:	Serial #:	Date for return service:

Customer signature _____ Date _____

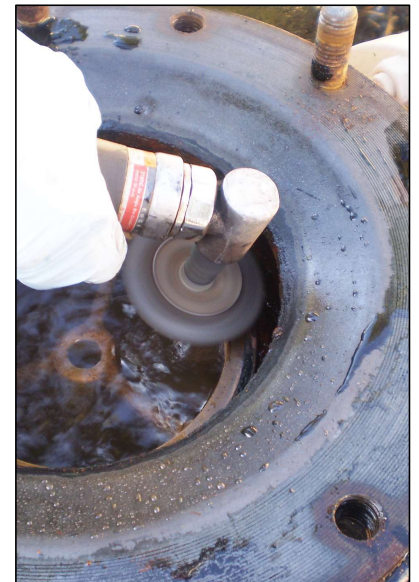
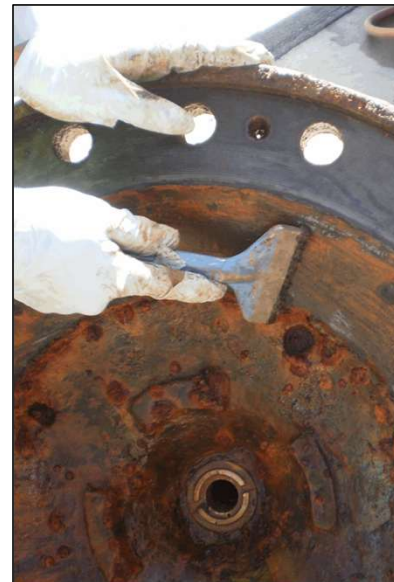
Cla-Val • 800.942.6326 • www.cla-val.com



Excessive build up

Hytrol Service: Clean Internal Parts

- **Clean inside cover**
- **Clean seat**
- **Clean body ports**
- **Clean pilot system**
(pilots, strainers, speed controls, etc.)





Clean exposed threads carefully



Before



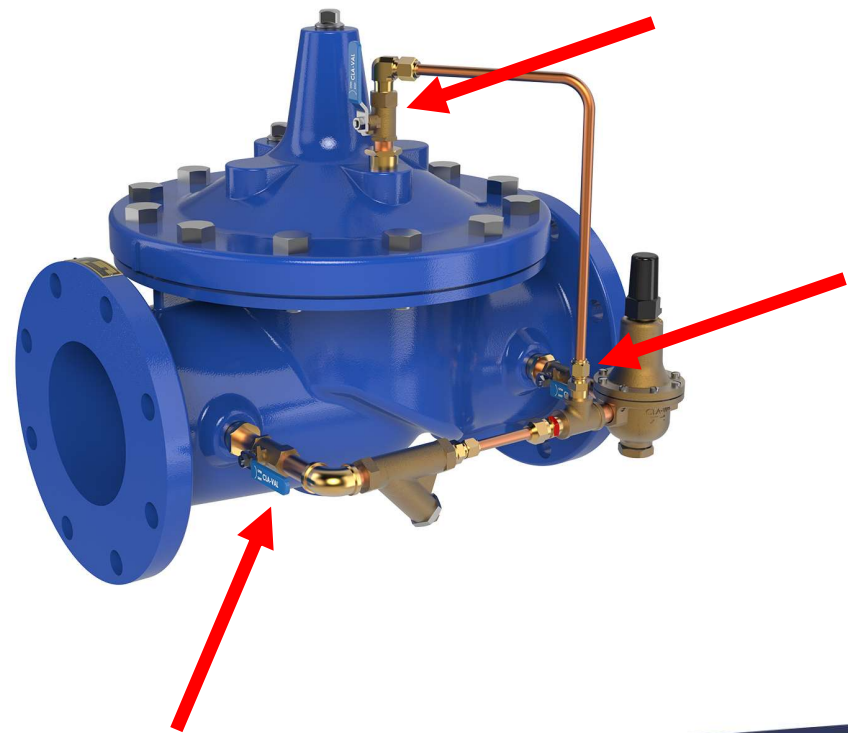
After



Troubleshooting Pressure Reducing Valves

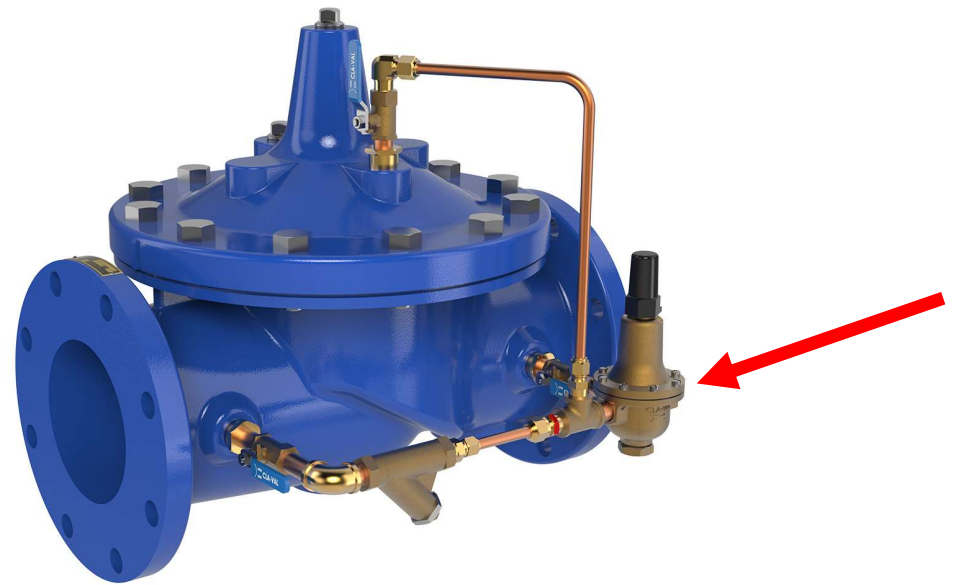
PRV Troubleshooting

Make sure all 3 isolation valves are open first!



Adjust the CRD

Varying the adjustment on the CRD control pilot is one of the best ways to know if you PRV is functioning properly with pressure gauges up and downstream



PRV Won't Go OPEN

- **Check the pilot adjustment**
 - It may be set too low / set screw is “out too far”


PRV Won't Go OPEN

- Check the pilot adjustment
 - It may be set too low / set screw is “out too far”
- **Upstream pressure may be insufficient**
 - AKA low/no differential

PRV Won't Go OPEN

- Check the pilot adjustment
 - It may be set too low / set screw is “out too far”
- Upstream pressure may be insufficient
 - AKA low/no differential
- **Make sure restriction fitting is installed** (cover may be flooded without)

PRV Won't Go OPEN

- Check the pilot adjustment
 - It may be set too low / set screw is “out too far”
 - Upstream pressure may be insufficient
 - AKA low/no differential
 - Make sure restriction fitting is installed (cover may be flooded without)
 - **Confirm all ball valves are open**
- 


PRV Won't Go CLOSED

- **Pilot adjustment may be set too high** (set screw in “too far”)


PRV Won't Go CLOSED

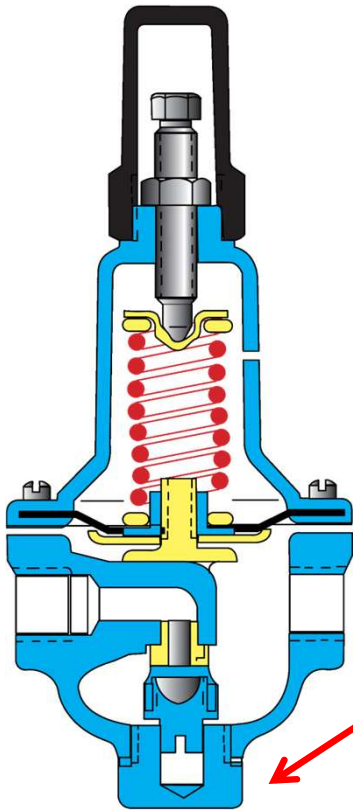
- Pilot adjustment may be set too high (set screw in “too far”)
 - **Clogged pilot strainer or restricted orifice** (can't supply water into cover)
- 

PRV Won't Go CLOSED

- Pilot adjustment may be set too high (set screw in “too far”)
 - Clogged pilot strainer or restricted orifice (can't supply water into cover)
 - **If valve has a check feature, inspect it**
- 

PRV Won't Go CLOSED

- Pilot adjustment may be set too high (set screw in “too far”)
 - Clogged pilot strainer or restricted orifice (can't supply water into cover)
 - If valve has a check feature, inspect it
 - **Check the CRD disc assembly** (pilot not closing/seating properly)
- 



When pressure at the outlet control valve rises to the same value as the inlet pressure, the disc retainer assembly on the CRD control pilot probably needs to be replaced.

90-01/690-01 Repair Kit



CRD
Diaphragm



CRD
Gasket



CRD
Disc Retainer



Spacer
Washers



Main Valve
Disc



Main Valve
Diaphragm

CRD Troubleshooting

- Make a visual check



CRD Troubleshooting

- Make a visual check
- Vary the control adjustment



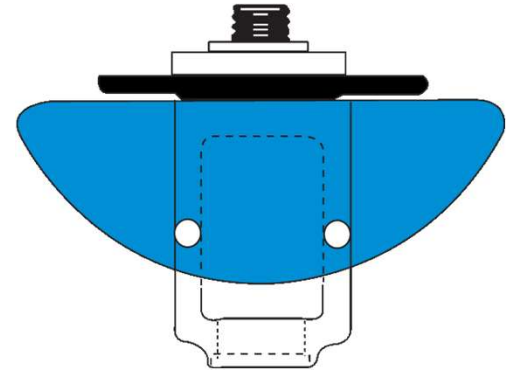
CRD Troubleshooting

- Make a visual check
- Vary the control adjustment
- Check the disc



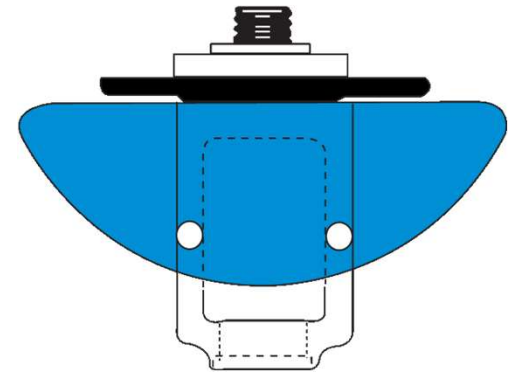
CRD Troubleshooting

- Make a visual check
- Vary the control adjustment
- Check the disc
- Check the yoke alignment



CRD Troubleshooting

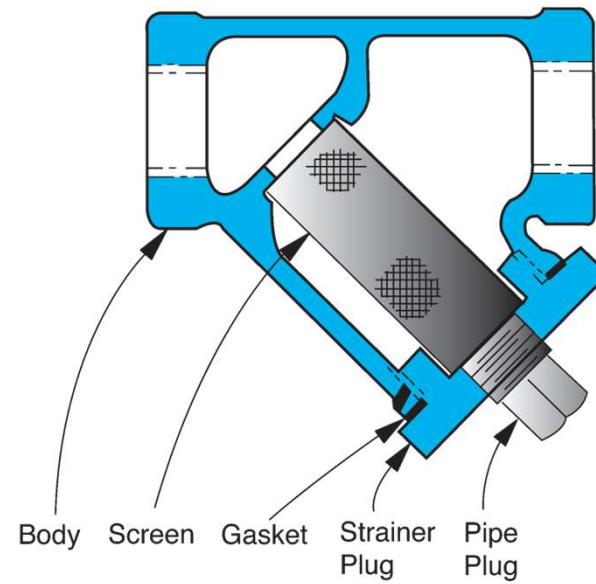
- Make a visual check
- Vary the control adjustment
- Check the disc
- Check the yoke alignment
- Water coming out of cover venthole indicates blown diaphragm or a loose stem nut



Strainers



X46 Flow Clean Strainer



X43 Strainer

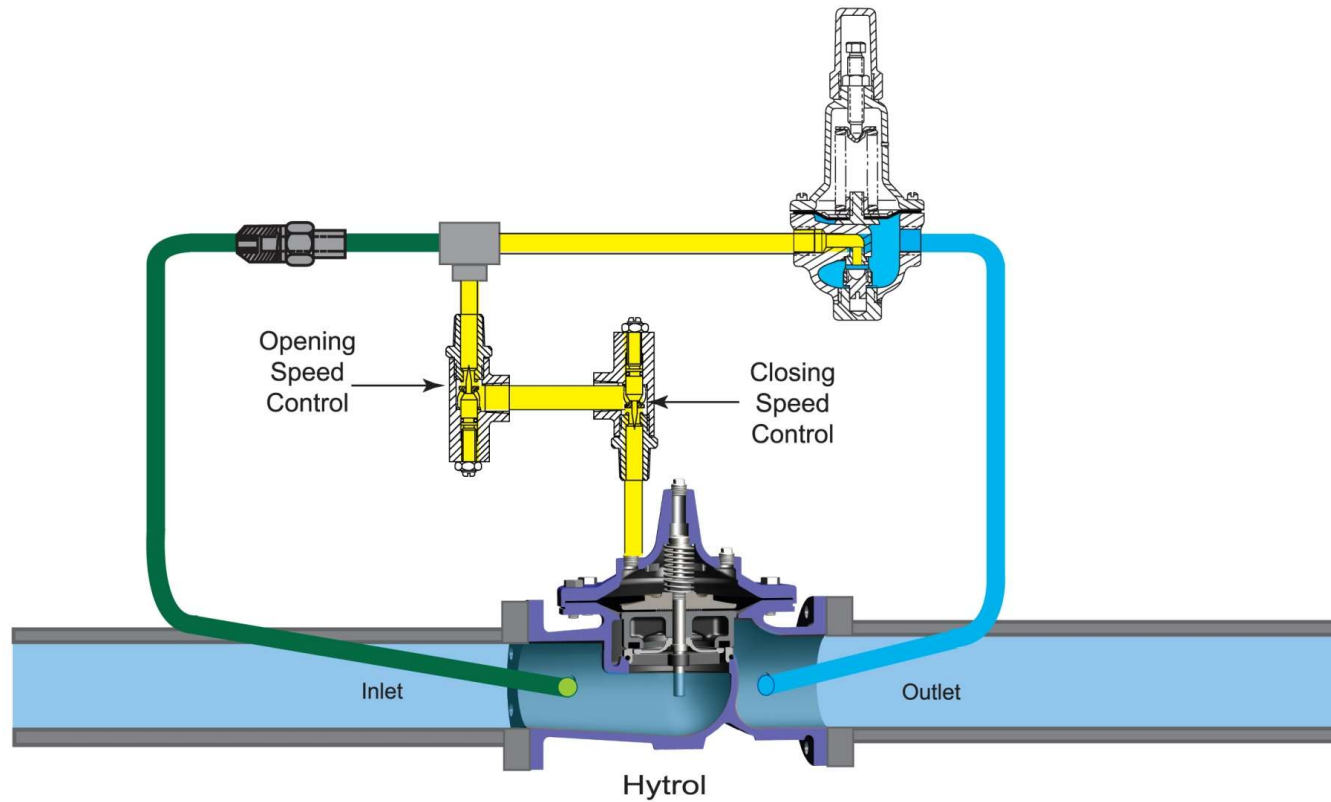


Plug into body

Servicing



Opening and Closing Speed Controls



Speed Controls

Slows down the valve going opened and closed by restricting flow (prevents water hammer)



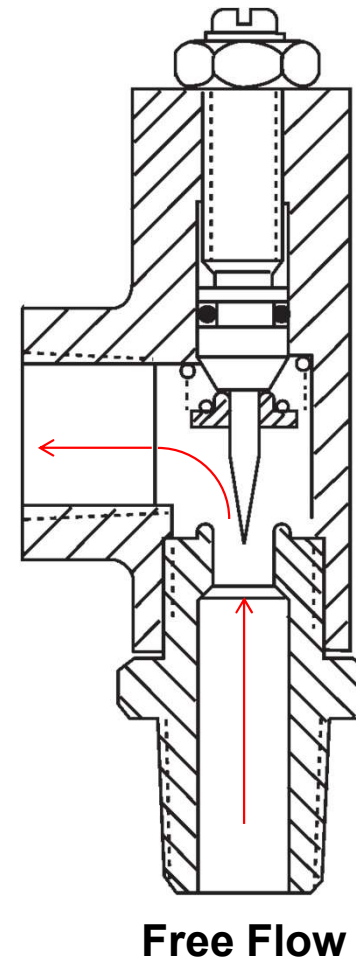
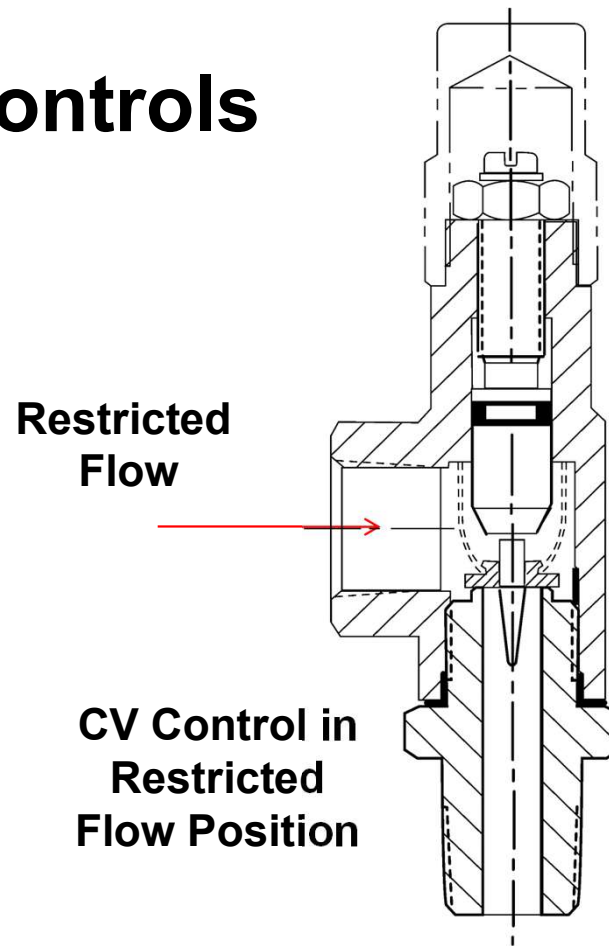
Speed Controls

Slows down the valve going opened and closed by restricting flow (prevents water hammer)

Controls opening, closing, or both



CV Speed Controls



Speed Controls

Slows down the valve going opened and closed by restricting flow (prevents water hammer)

Controls opening, closing, or both

PRV Start Point: Screw all the way back in, back out 3 turns



Speed Controls

Slows down the valve going opened and closed by restricting flow (prevents water hammer)

Controls opening, closing, or both

PRV Start Point: Screw all the way back in, back out 3 turns

Relief Set Point: Screw in all the way, back out ½" turn



Speed Controls

Slows down the valve going opened and closed by restricting flow (prevents water hammer)

Controls opening, closing, or both

PRV Start Point: Screw all the way back in, back out 3 turns

Relief Set Point: Screw in all the way, back out 1/2" turn

Servicing: Clean the Disc and Needle





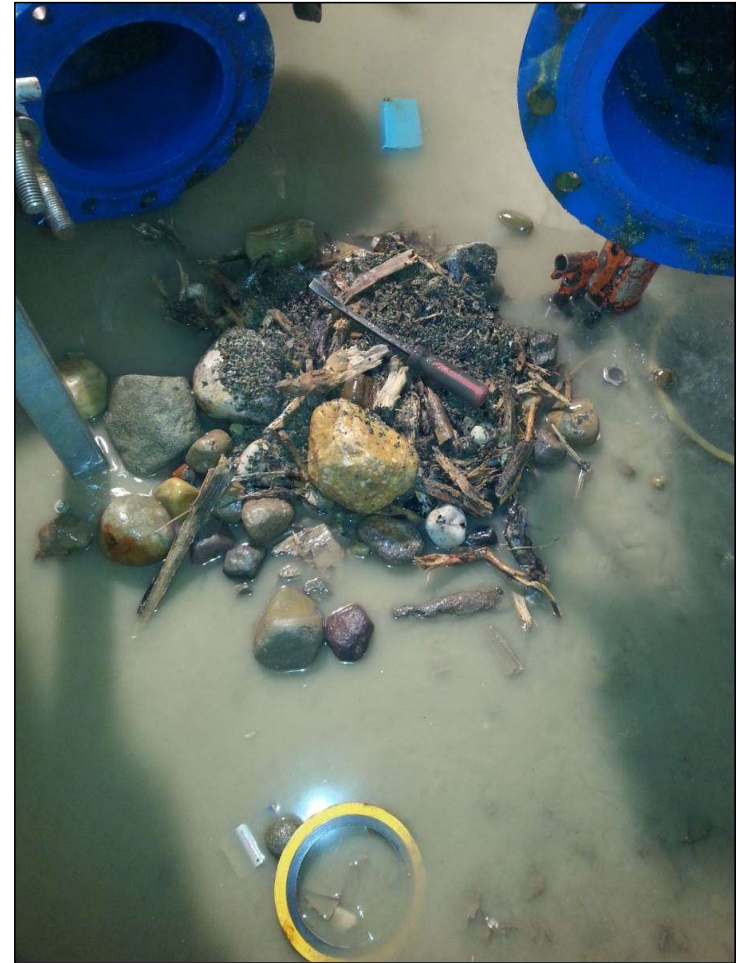


Opening vs. Closing?



X43-H Style Strainer

What happens if a PRV can't go closed?







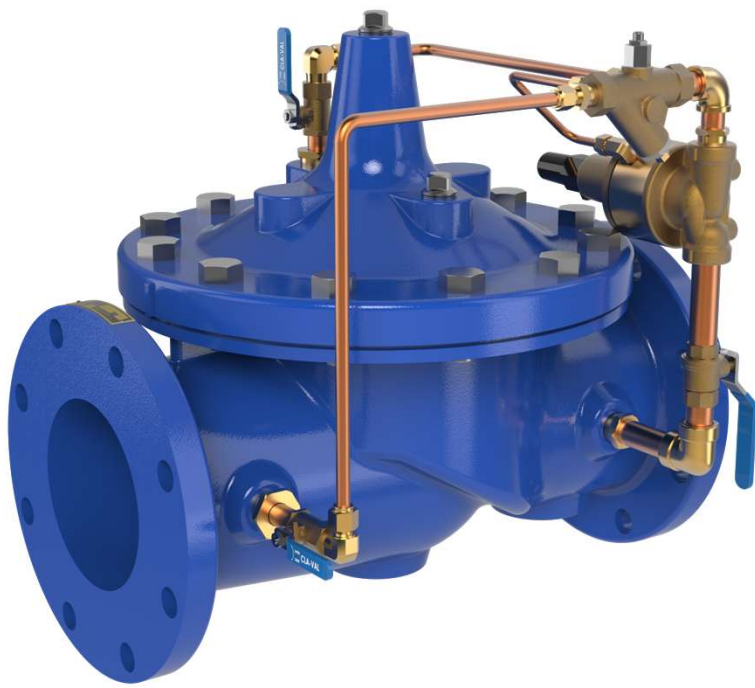


Don't forget to flush the lines!

X43-H Strainer

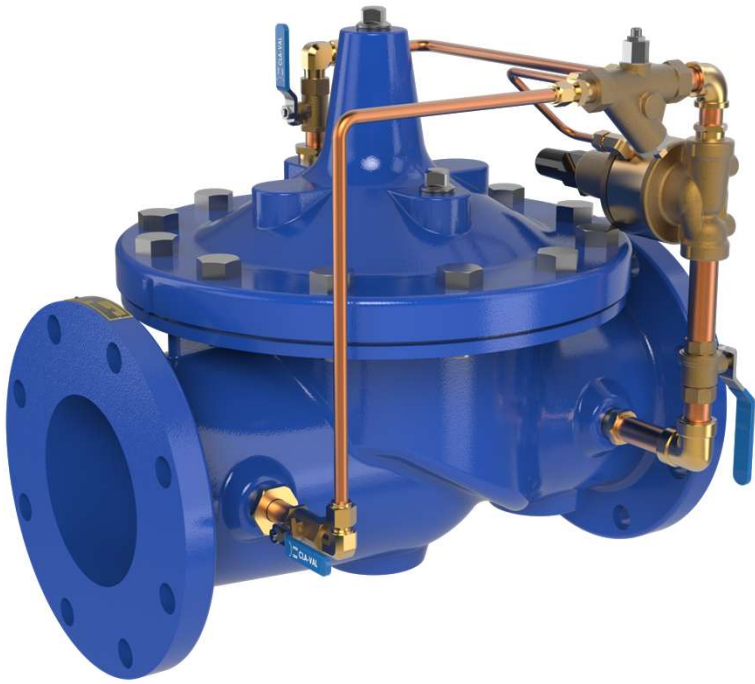
- Can be flanged directly to the Cla-Val inlet flange
- 1 ¼" plugs for easy flushing
- Remove top cover and pull out screen to clean
- Max pressure rated 250psi
- Ductile Iron Body
- 316SS Strainer Mesh
 - 10 mesh/2000 micron/ .078 opening
- 1 ½" to 24" Sizes
- Fusion-bonded epoxy coating standard





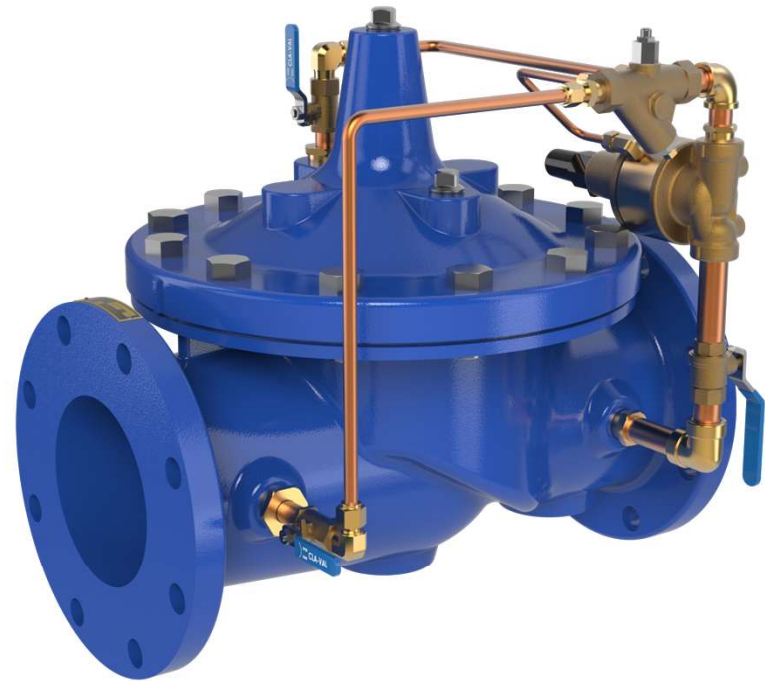
Troubleshooting Pressure Relief / Sustaining Valves

50 Series Troubleshooting



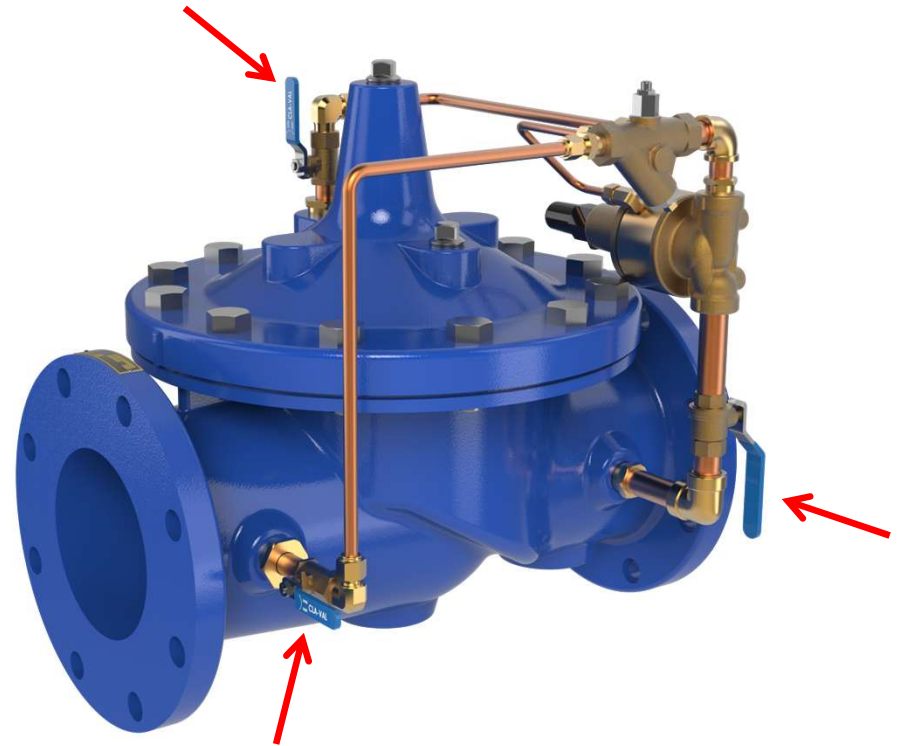
Troubleshooting Tip:

The best method to check the function of the 50 Series valve is to vary the adjustment.



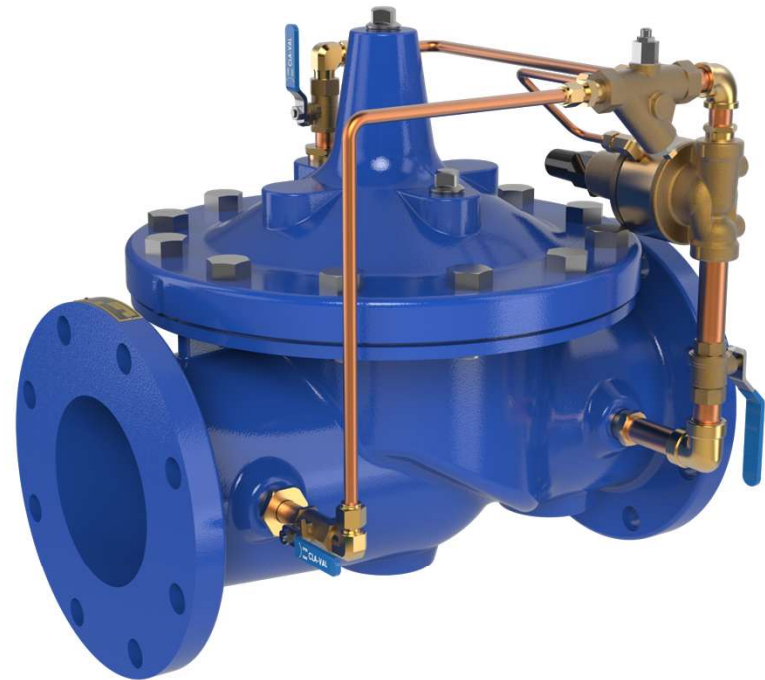
Before you begin:

Always start by confirming that all three isolation ball valves are open.



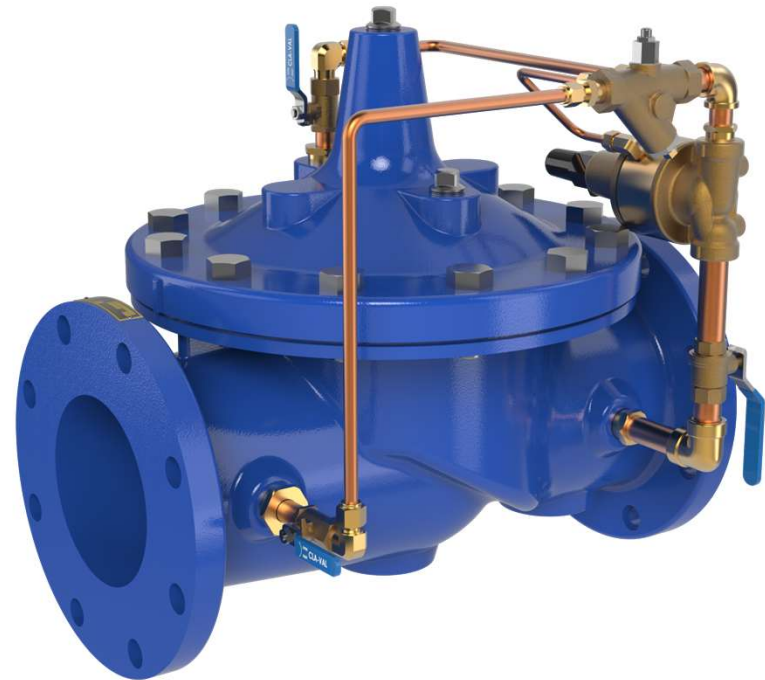
Main Valve Doesn't Open

- **Check pilot adjustment** (it may be set too high)
- **Mineral deposit buildup on stem and bearing or in CRL pilot**
- **X42N-2 strainer/needle valve is too far out** (cover “flooded”)
- **Restriction insert missing/damaged**



Main Valve Doesn't Close

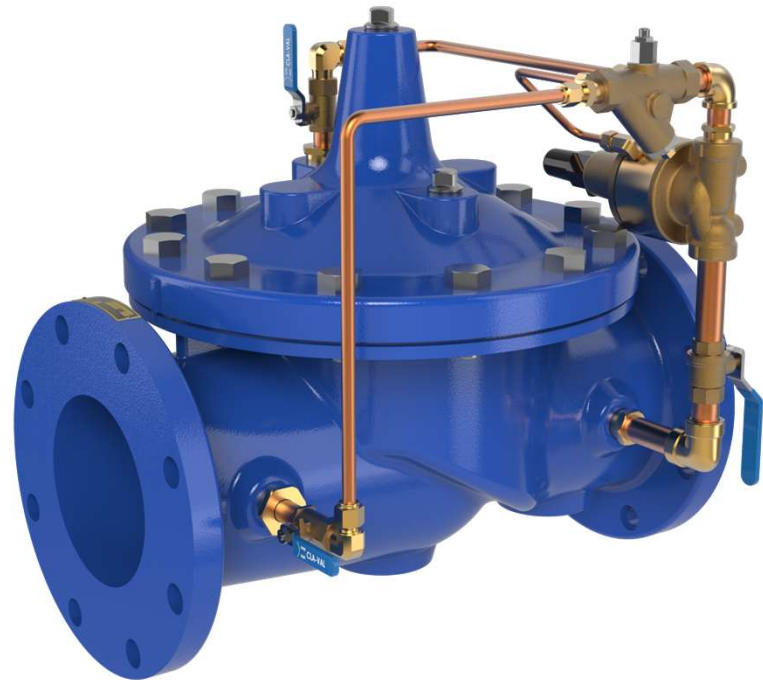
- **Check system pressure** (in a relief application it may be doing its job!)
- **Pilot adjustment may be set too low**
- **Y-Strainer/ needle valve may be clogged** (no supply pressure to the cover)
- **Needle valve may be closed too tight**
- **Check main valve diaphragm**
- **Check for obstructions in the main valve**



50 Series: Recommended Spares / Repair Kit

Repair Kit for sizes 2" through 16"
contains:

- **Main Valve Diaphragm (or Disc Assembly)**
- **Spare Washers**
- **O-Rings**
- **Universal CRL or CRL-60 Repair Kit**
(includes pilot diaphragm)
- **CRL or CRL-60 Disc Retainer and Screws**





Questions?



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Questions?



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