

Booster Pump Control Valve



- **Built-in Check Valve**
- **Valve Uses Line Pressure for Operation**
- **Opening and Closing Rates Can Be 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.

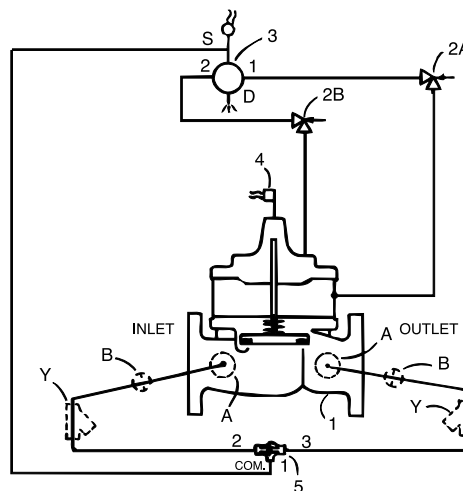
Should a power failure occur, a built-in lift-type check valve closes the moment flow stops, preventing reverse flow regardless of solenoid or diaphragm assembly position.

Schematic Diagram

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

Optional Features

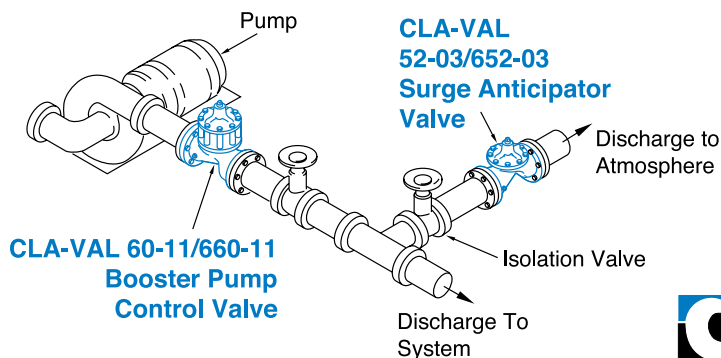
Item	Description
A	X46A Flow Clean Strainer
B	CK2 Cock (Isolation Valve)
Y	X43 "Y" Strainer



















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 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.



Valve Selection

These Symbols  and  Indicate Available Sizes						
Inches	2 1/2	3	4	6	8	
mm	65	80	100	150	200	
End Detail	Screwed & Flanged			Flanged		
Model 60-11	Basic Valve 100-03	Globe				
		Angle				
	Suggested Flow (GPM)	Max. Continuous	300	460	800	1800
		Max. Intermittent	370	580	990	2250
	Suggested Flow (Liters/sec)	Max. Continuous	19	29	50	113
		Max. Intermittent	23	37	62	142
Model 660-11	Basic Valve 100-22	Globe				
		Angle				
	Suggested Flow (GPM)	Max. Continuous		580	1025	2300
	Suggested Flow (Liters/sec)	Max. Continuous		37	65	145

* **660-11 is the reduced internal port size version of the 60-11.**

For 100-03 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). For 100-22 basic valves suggested flow calculations were based on flow through the valve seat. Approx. 26 ft/sec (7.9 meters/sec) is used for maximum continuous flow.

Valve Sizing

Sizing Model 60-11 or 660-11 Booster Pump Control Valves is similar to sizing non-modulating type valves. Simply select the smallest size valve that will handle the pump output at an acceptable head loss for the application.

Do not oversize. Oversizing a Booster Pump Control Valve will nullify its ability to prevent surges caused by the starting and/or stopping of the pump. Maximum flow values are given in the selection table above. For further information on flow characteristics of these valves, see the 100-03 (60-11) or 100-22 (660-11) technical data sheets in the main valve section of catalog.

Cla-Val offers the most complete line of automatic control valves for virtually any type of pump control system available. Please call your Cla-Val regional office or sales agent for complete design assistance. Our goal is to provide the best automatic control valve solution for each application.

Example:

A booster pump station with a rated output of 1000 GPM and 3 psi is an acceptable head loss for the applications. The flow chart for the 100-22 (660-11) indicates that a 10" globe valve has less than a 3 psi pressure drop at 1000 GPM.

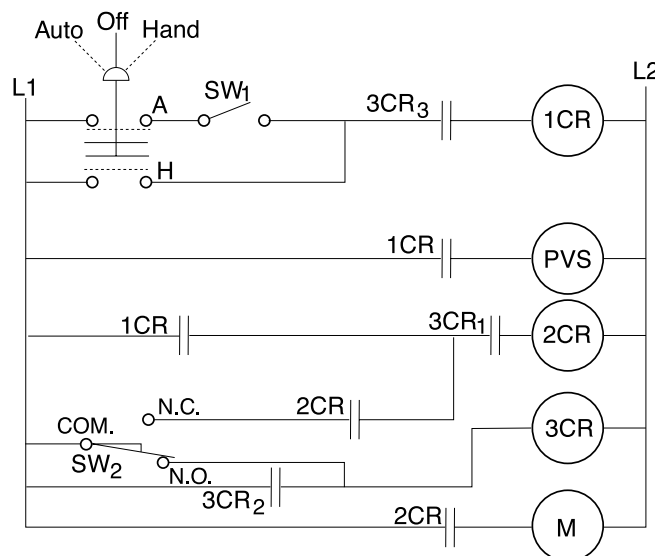
Drain Provisions

Each time the valve opens or closes, water is discharged from the solenoid exhaust port, the amount varying with the valve size. Provisions should be made for the disposal of this water. Exhaust tube must be free of any back pressure. Provide an air gap between the solenoid exhaust tube and drain facility.

Wiring Diagram

Auto-Off-Hand	=	Selector Switch
1CR	=	Relay, DPST Normally Open
2CR	=	Relay, DPST Normally Open
3CR	=	Relay, TPST Normally Open
SW ₁	=	Switch, Remote Start, Automatic
SW ₂	=	Switch, SPDT, Valve Limit Switch Connect to N.C. Terminal
PVS	=	Pilot Valve Solenoid
M	=	Pump Motor Starter

Note: SW₂ and PVS supplied by Cla-Val. All other electrical items supplied by customer. SW₂ is included in the X105L switch assembly which is mounted on the pump control valve cover.



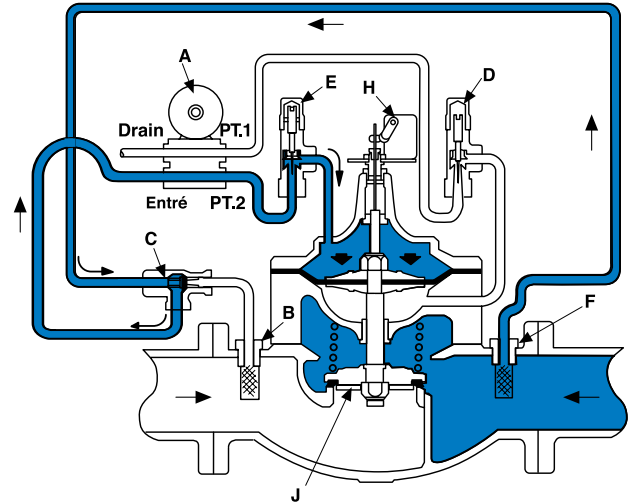
Sequence Of Operation

Pump Off...

With pump off, line pressure exists above the diaphragm holding the main valve closed.

Shuttle valve C always supplies highest pressure to solenoid control A through strainers B and F.

If power failure occurs when valve is open, the built-in check valve J closes immediately to prevent reverse flow.

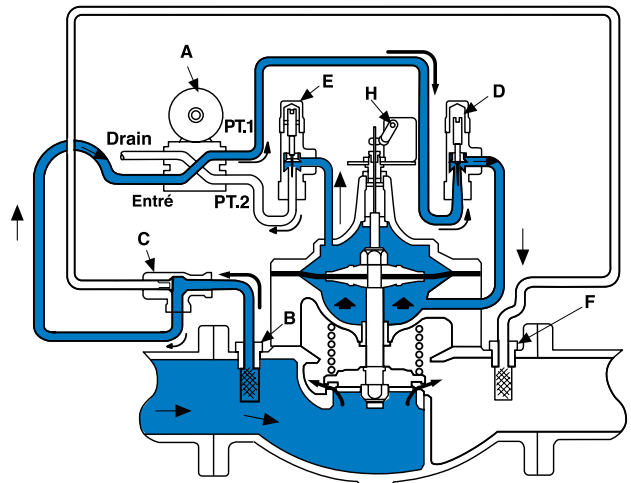


Starting Cycle...

Starting switch closes, pump starts, solenoid control energizes.

Upstream fluid flows to chamber below main valve diaphragm through strainer B, shuttle valve C, solenoid control A, and closing rate flow control D.

Valve opens slowly as fluid from diaphragm chamber is gradually released to atmosphere through opening rate flow control E and solenoid control A.

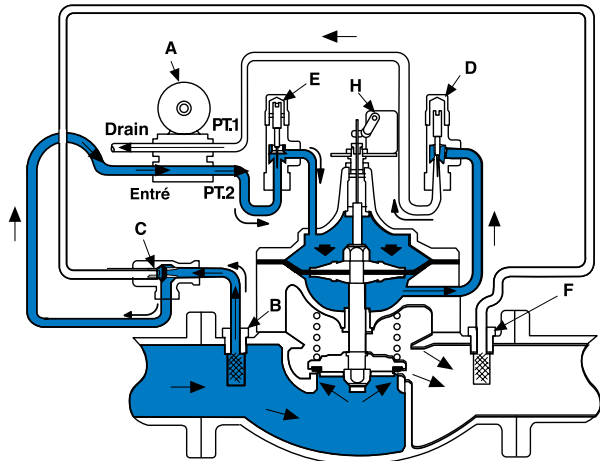


Stopping Cycle...

Starting switch opens, solenoid control de-energizes.

Upstream fluid flows to valve diagram through strainer B, shuttle valve C, solenoid control A and opening rate Flow Control E.

Valve closes slowly as fluid below diaphragm chamber is gradually released to atmosphere through closing rate flow control D and solenoid control A.



Model 60-11 (Uses Basic Valve Model 100-03)

Specifications

Available Sizes

Pattern	Screwed	Flanged
Globe	2 1/2" - 3"	2 1/2" - 8"
Angle	2 1/2" - 3"	2 1/2" - 8"

Operating Temp. Range

Fluids
-40° to 180° F

Cover Capacity

Liquid Volume Displaced from Diaphragm Chamber When Valve Opens			
Valve Size	Displacement	Valve Size	Displacement
2 1/2"	.043 gal	6"	.531 gal
3"	.080 gal	8"	1.26 gal
4"	.169 gal		

Pressure Ratings (Recommended Maximum Pressure - psi)

Valve Body & Cover		Pressure Class			
		Flanged			Screwed
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
ASTM A743	Stainless Steel	B16.5	285	400	400
356-T6	Aluminum	B16.1	275	—	—

Note: *Ansi Standards are for flanged dimensions only. Flanged valves are available but not drilled. **End details to ANSI B2.1 specifications.



2 1/2" Globe, Screwed



4" Globe, Flanged

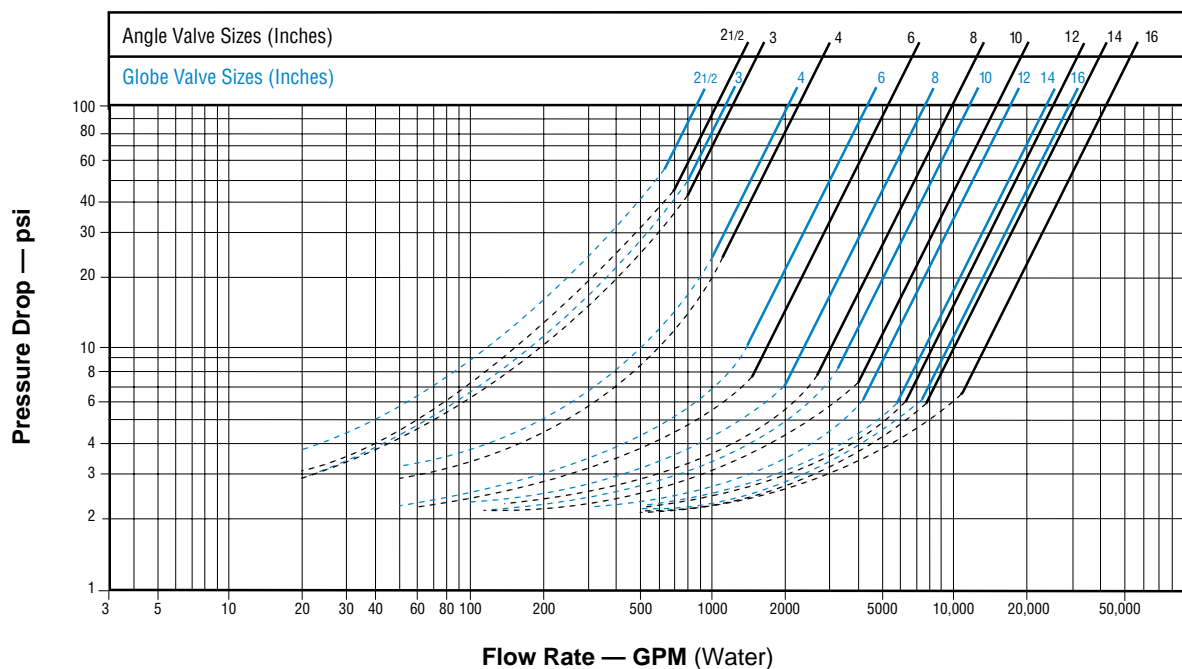


4" Angle, Flanged

Materials

Component	Material Options						
Body & Cover & Power Unit Body	Ductile Iron	Cast Steel	Bronze	Stainless Steel	Aluminum		
Available Sizes	2 ½" - 8"	2 ½" - 8"	2 ½" - 8"	2 ½" - 8"	2 ½" - 8"		
Disc Retainer & Diaphragm Washer	Cast Iron	Cast Steel	Bronze	Stainless Steel	Aluminum		
Trim: Disc Guide, Seat, Cover Bearing & Stem Bearing	Bronze is standard. Stainless Steel is optional.			Stainless Steel is standard.			
Disc	Buna-N® Rubber						
Diaphragm	Nylon Reinforced Buna-N® Rubber						
Stem, Nut & Spring	Stainless Steel						

Model 60-11 Flow Chart - Normal Flow (Based on flow through a wide open valve.)



Model 660-11 (Uses Basic Valve Model 100-22)

Specifications

Available Sizes

Pattern	Flanged
Globe	4" -8"
Angle	4" - 8"

Operating Temp. Range

Fluids
-40° to 180° F

Cover Capacity

Liquid Volume Displaced from Diaphragm Chamber When Valve Opens	
Valve Size	Displacement
4"	.080 gal
6"	.169 gal
8"	.531 gal

Pressure Ratings (Recommended Maximum Pressure - psi)

Valve Body & Cover		Pressure Class		
		Flanged		
Grade	Material	ANSI Standards*	150 lb.	300 lb.
ASTM A536	Ductile Iron	B16.42	250	400
ASTM A216-WCB	Cast Steel	B16.5	285	400
ASTM B62	Bronze	B16.24	225	400
ASTM A743	Stainless Steel	B16.5	285	400
356-T6	Aluminum	B16.1	275	—
Note: *ANSI standards are for flange dimensions only. Flanged valves are available faced but not drilled.				

Materials

Component	Material Options				
Body, Cover & Powerunit Body	Ductile	Cast Iron	Bronze Steel	Stainless	Aluminum Steel
Available Sizes	4" - 8"	4" - 8"	4" - 8"	4" - 8"	4" - 8"
Disc Retainer & Diaphragm Washers	Cast Iron	Cast Steel	Bronze	Stainless Steel	Aluminum
Trim: Disc Guide, Seat, Cover Bearing & Stem Bearing	Bronze is standard. Stainless Steel is optional.			Stainless Steel is standard.	
Disc	Buna-N® Rubber				
Diaphragm	Nylon Reinforced Buna-N® Rubber				
Stem, Nut & Spring	Stainless Steel				

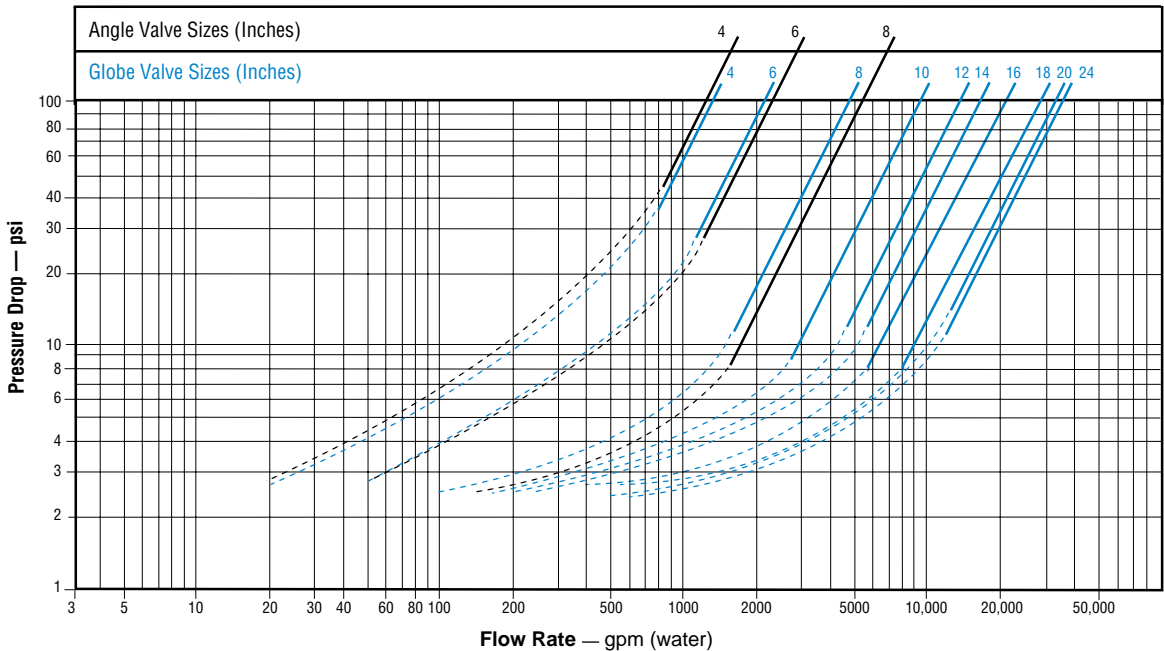


4" Globe, Flanged



6" Globe, Flanged

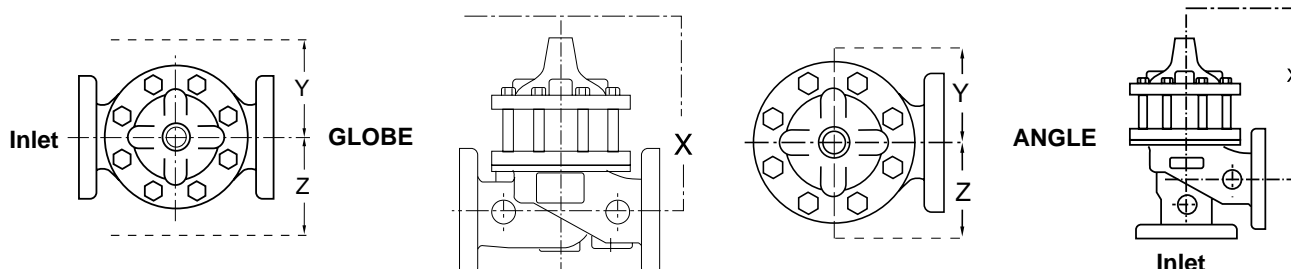
Model 660-11 Flow chart-normal flow (Based on flow through a wide open valve.)



Pilot System Dimensions (In Inches)

We recommend providing adequate space around valve for maintenance work

VALVE SIZE		2½"	3"	4"	6"	8"
X	Max.	16.75	17.75	20.00	23.75	26.75
Z	Max.	9.50	10.00	11.00	13.00	15.00
Y	Max.	4.50	5.00	6.00	8.00	10.25



Pilot System Specifications

Materials

Standard Pilot System Materials

Pilot Control: Bronze ASTM B62

Trim: Stainless Steel Type 303

Rubber: Buna-N® Synthetic Rubber

Optional Pilot System Materials

Pilot Systems are available with optional Aluminum, Stainless Steel or Monel materials at extra cost.

Temperature Range

Water: to 180°F Max

Solenoid Control Specifications

Voltages - See Chart (specify one)

Enclosure	General purpose NEMA Type 3; Aluminum Note: For other enclosures and NEMA Types, consult factory
Housing	Body — Aluminum Trim — Stainless Steel
Operating Pressure	300 psi AC or DC
Coil Insulation	Class A (molded)
AC Voltage	15.4 watts
DC Voltage	16.8 watts

Power Consumption

Volts (DC)	Amperes		Volts (AC 60 Hz)	Amperes		Coil Resistance (ohms)
	Holding	Pull In		Holding	Inrush	
24	.603	24	24	2.88	25.4	0.5
28	.629	15.6	120	.575	5.1	14.1
32	.500	18.6	208	.330	2.93	40
48	.293	10.8	240	.288	2.54	58
115	.122	4.42	440	.156	1.38	174
125	.119	4.44	480	.143	1.27	233
250	.072	2.45				
			Volts (AC 50 Hz)	Amperes		Coil Resistance (ohms)
				Holding	Inrush	
			110	.48	4.6	15.7
			220	.24	2.3	66
			240	.22	2.1	88

Please Specify, When Ordering

1. Catalog No. 60-11 or 660-11
2. Valve Size
3. Pattern- Globe or Angle
4. Pressure Class
5. Screwed or Flanged
6. Trim Material
7. Electrical Selection
8. Desired Options
9. When Vertically Installed

Note: For Main Valve Option Descriptions, refer to 100-03 (60-11) or 100-22 (660-11) Technical Data Sheet



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Booster Pump Control Valves Have Many Applications

Cla-Val offers the most complete line of automatic control valves for virtually any type of pump control system available.

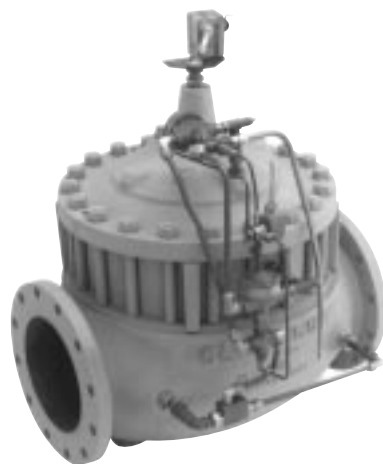
Model 60-11/660-11

Available in sizes 2 1/2" through 8" The Model 60-11/660-11 will provide control of pump starting and stopping surges with field adjustable rate of valve opening and closing. It is intended for installations where flow through the valve is oriented horizontally and valve stem is vertically up.



Model 60-19/660-19

Available in sizes 8" through 24" The Model 60-19/660-19 will provide control of pump starting and stopping surges and has a high capacity pilot system designed for creating desired field adjustment rate of valve opening and closing with larger sized pumps. It must be installed where flow through the valve is oriented horizontally and valve stem is vertically up.



Model 60-73/660-73

Available in sizes 2 1/2" through 8" The Model 60-73/660-73 will provide control of pump starting and stopping surges with field adjustable rate of valve opening and closing. Similar to the Cla-Val Model 60-11/660-11. This valve has a lower head loss and is intended for installations where flow through the valve is oriented vertically and valve stem is horizontal.



Please call your Cla-Val regional office or sales agent for complete design assistance. Our goal is to provide the best automatic control valve solution for each application.