

# 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.

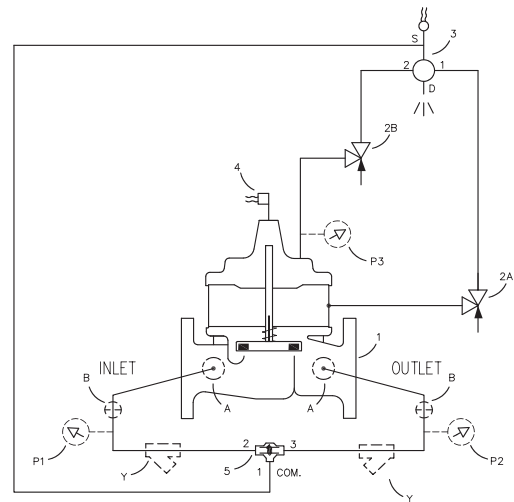
Should a power failure occur, a built-in lift-type check valve closes the moment flow stops, preventing reverse flow regardless of solenoid or diaphragm assembly position.

## Schematic Diagram

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

## Optional Features

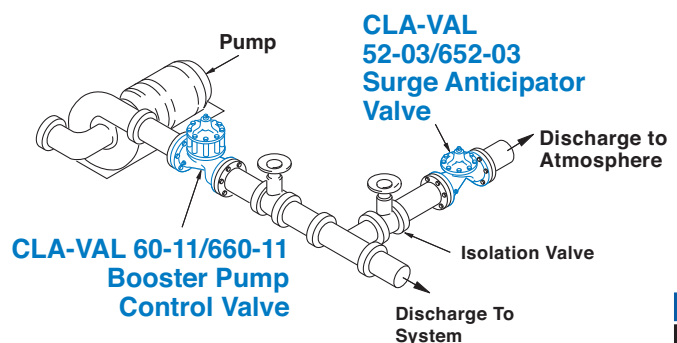
Item	Description
A	X46A Flow Clean Strainer
B	CK2 (Isolation Valve)
P	X141 Pressure Gauge
Y	X43 "Y" Strainer



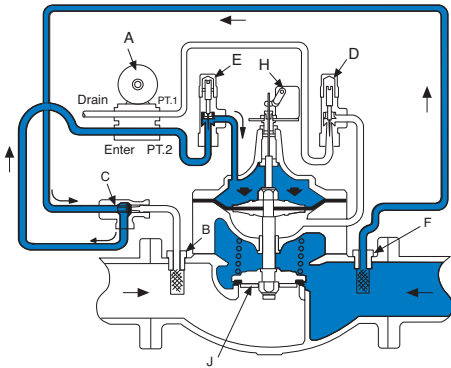
## Typical Installation

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.



## Sequence Of Operation

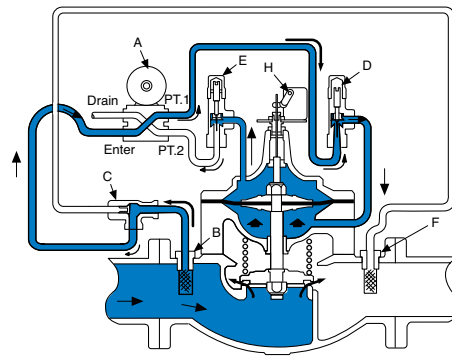


### Pump Off...

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.

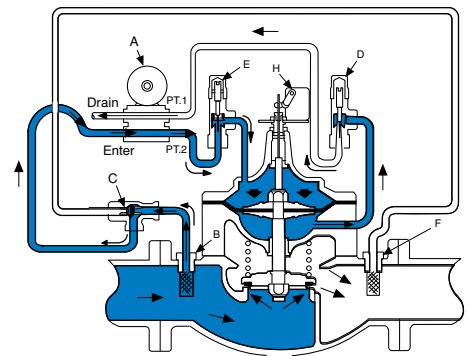


### Starting Cycle...

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.



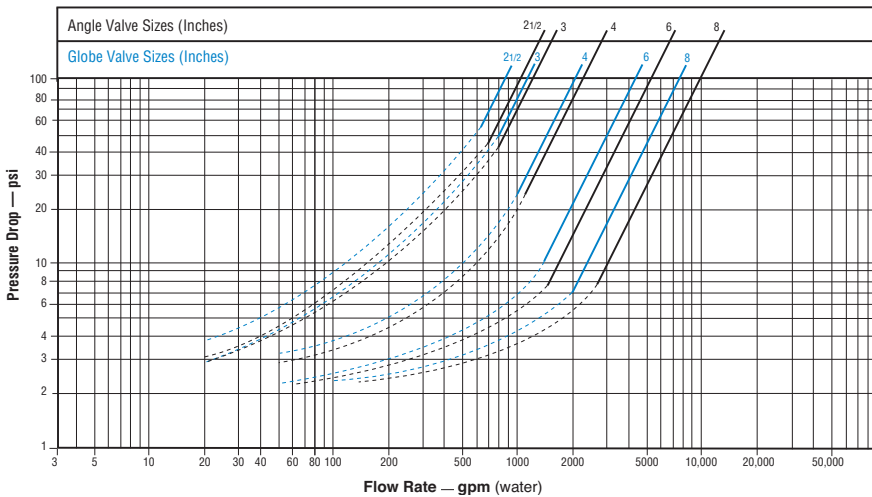
### Stopping Cycle...

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.

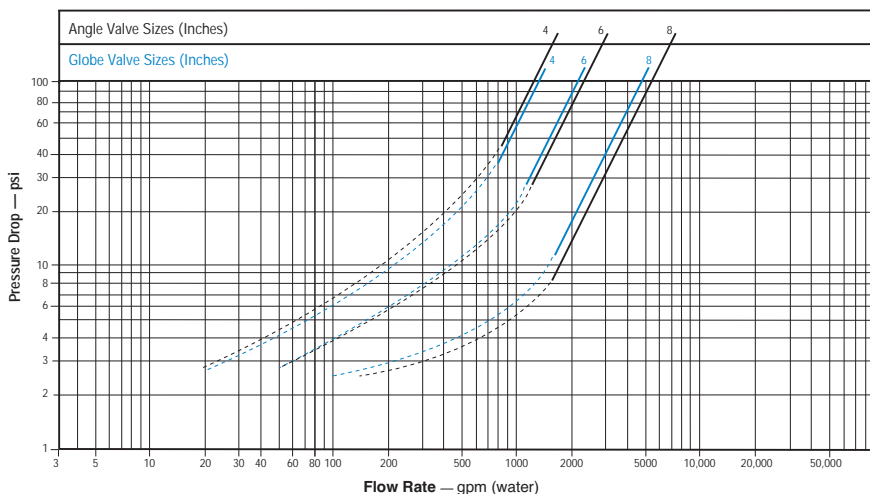
Valve closes slowly as fluid below diaphragm chamber is gradually released to atmosphere through closing rate flow control D and solenoid control A.

## Model 60-11 Flow Chart Uses Basic Valve Model 100-03)



Liquid Volume Displaced from Diaphragm Chamber When Valve Opens or Closes					
Sizes (Inches)	2 1/2"	3"	4"	6"	8"
60-11 Displacement	.043 gal	.080 gal	.169 gal	.531 gal	1.26 gal
660-11 Displacement	---	---	.080 gal	.169 gal	.531 gal

## Model 660-11 Flow Chart Uses Basic Valve Model 100-22)



## 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. Flow characteristics are shown on flow charts (over leaf) for these valve.

### Example:

A booster pump with a rated output of 700 gpm and 4 psi is an acceptable head loss for the application. The flow chart for the 100-03 (60-11) indicates that a 8" globe valve has less than 4 psi pressure drop at 700 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.

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.

## 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	640	400
ASTM A216-WCB	Cast Steel	B16.5	285	720	400
ASTM B62	Bronze	B16.24	225	500	400

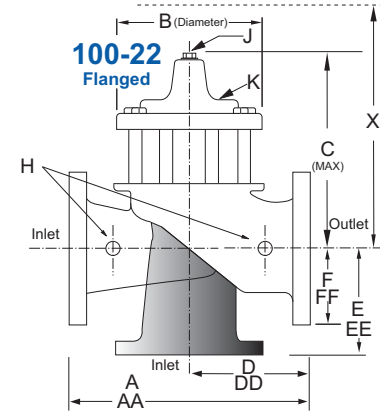
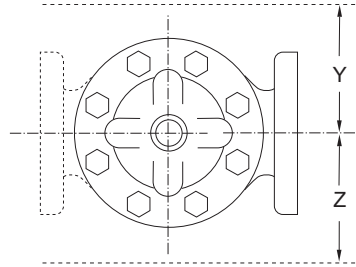
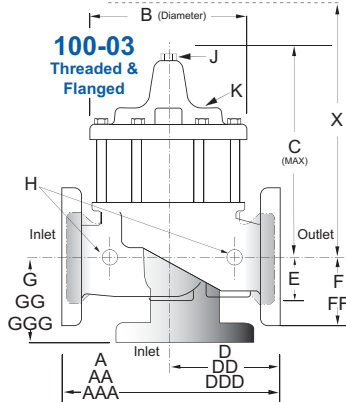
Note: \* ANSI standards are for flange dimensions only.  
 Flanged valves are available faced but not drilled.  
 † End Details machined to ANSI B2.1 specifications.

**Valves for higher pressure are available; consult factory for details**

## Materials

Component	Standard Material Combinations		
Body & Cover	Ductile Iron	Cast Steel	Bronze
100-03 Available Sizes	2-1/2" - 8"	2-1/2" - 8"	2-1/2" - 8"
100-22 Available Sizes	4" - 8"	4" - 8"	4" - 8"
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.



## 60-11 Series Dimensions (Full Internal Port) (In Inches)

Valve Size (Inches)	2 ½	3	4	6	8	10
A Threaded	11.00	12.50	—	—	—	—
AA 150 ANSI	11.00	12.00	15.00	20.00	25.38	29.75
AAA 300 ANSI	11.62	13.25	15.62	21.00	26.38	31.12
B Dia.	8.00	9.12	11.50	15.75	20.00	23.62
C Max.	10.31	11.19	14.25	18.44	21.81	23.38
D Threaded	5.50	6.25	—	—	—	—
DD 150 ANSI	5.50	6.00	7.50	10.00	12.69	14.88
DDD 300 ANSI	5.81	6.63	7.81	10.50	13.19	15.56
E	1.69	2.06	3.19	4.31	5.31	9.25
F 150 ANSI	3.50	3.75	4.50	5.50	6.75	8.00
FF 300 ANSI	3.75	4.13	5.00	6.25	7.50	8.75
G Threaded	4.00	4.50	—	—	—	—
GG 150 ANSI	4.00	4.00	5.00	6.00	8.00	8.62
GGG 300 ANSI	4.31	4.38	5.31	6.50	8.50	9.31
H NPT Body Tapping	.50	.50	.75	.75	1	1
J NPT Cover Center Plug	.50	.50	.75	.75	1	1
K NPT Cover Tapping	.50	.50	.75	.75	1	1
Stem Travel	0.7	0.8	1.1	1.7	2.3	2.8
Approx. Ship Wt. Lbs.	65	95	190	320	650	940
X Pilot System	18.00	19.00	21.00	22.00	26.00	28.00
Y Pilot System	9.00	9.00	10.00	11.00	12.00	13.00
Z Pilot System	9.00	9.00	10.00	11.00	12.00	13.00

## 660-11 Series Dimensions (Reduced Internal Port) (In Inches)

Valve Size (Inches)	4	6	8	10
A 150 ANSI	13.88	17.75	21.38	26.00
AA 300 ANSI	14.50	18.62	22.38	27.38
B Dia.	9.12	11.50	15.75	20.00
C Max.	11.75	15.25	20.25	23.75
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	4.50	5.50	6.75	8.00
FF 300 ANSI	5.00	6.25	7.50	8.75
H NPT Body Tapping	.50	.75	.75	1
J NPT Cover Center Plug	.50	.75	.75	1
K NPT Cover Tapping	.50	.75	.75	1
Stem Travel	0.8	1.1	1.7	2.3
Approx. Ship Wt. Lbs.	135	230	480	785
X Pilot System	19.00	21.00	31.00	—
Y Pilot System	10.00	11.00	18.00	—
Z Pilot System	10.00	11.00	18.00	—

<b>60-11 Valve Selection</b>	100-03 Pattern: Globe (G), Angle (A), End Connections: Threaded (T), Flanged (F) Indicate Available Sizes					
	Inches	2½	3	4	6	8
	mm	65	80	100	150	200
Basic Valve 100-03	Pattern	G, A	G, A	G, A	G, A	G, A
	End Detail	T, F	T, F	F	F	F
Suggested Flow (gpm)	Maximum	300	460	800	1800	3100
	Maximum Intermittent	370	580	990	2250	3900
Suggested Flow (Liters/Sec)	Maximum	19	29	50	113	195
	Maximum Intermittent	23	37	62	142	246

**100-03 Series is the full internal port Powercheck**

<b>660-11 Valve Selection</b>	100-22 Pattern: Globe (G), Angle (A), End Connections: Flanged (F) Indicate Available Sizes			
	Inches	4	6	8
	mm	100	150	200
Basic Valve 100-22	Pattern	G, A	G, A	G, A
	End Detail	F	F	F
Suggested Flow (gpm)	Maximum	580	1025	2300
Suggested Flow (Liters/Sec)	Maximum	37	65	145

**100-22 Series is the reduced internal port size version of the 100-03 Series.**

### Pilot System Specifications

#### Temperature Range

Water to 180°F Max

#### 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.

### CSM11 Solenoid Control Power Consumption & Specifications

Volts	Amperes		Volts	Amperes		Coil Resistance Ohms
	DC Holding	Pull In		AC 60 Hz Holding	Inrush	
24	.603	24	24	2.88	25.4	0.5
28	.629	120	120	.575	5.1	14.1
32	.500	208	208	.330	2.93	40
48	.293	240	240	.288	2.54	58
115	.122	440	440	.156	1.38	174
125	.119	480	440	.143	1.27	233
252	.072	2.45				

Volts	Amperes		Coil Resistance Ohms
	(AC 50 Hz) Holding	Inrush	
110	.48	4.6	15.7
220	.24	2.3	66
240	.22	2.1	88

Enclosure General purpose NEMA Type 3; Aluminum  
Note: For other enclosures and NEMA Types, consult factory

Housing Body — Aluminum  
Trim — Stainless Steel

Operating Pressure: Maximum pressure 300 psi, for higher pressure consult factory. AC or DC

Coil Insulation Class A (molded)

AC voltage 15.4 watts

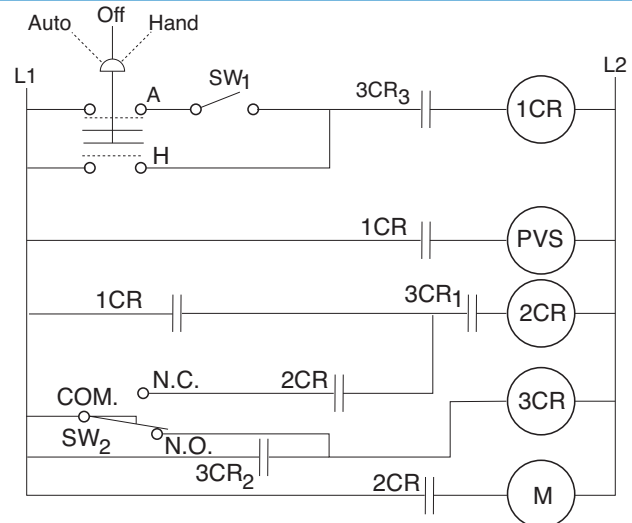
DC voltage 16.8 watts

### Wiring Diagram

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

Note: SW<sub>2</sub> and PVS supplied by Cla-Val. All other electrical items supplied by customer. SW<sub>2</sub> is included in the X105L switch assembly which is mounted on the pump control valve cover.

Shown In Pump Off Position



### When Ordering, Please Specify:

- Catalog No. 60-11/660-11
- Valve Size
- Pattern -Globe or Angle
- Pressure Class
- Trim Material
- Electrical Selection
- Desired Options
- When Vertically Installed (Flow Direction)

**CLA-VAL**

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