



# MODEL 660-BT Pump Control Valve with High Capacity CSM11-HC



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

The Cla-Val Model 660-BT 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.

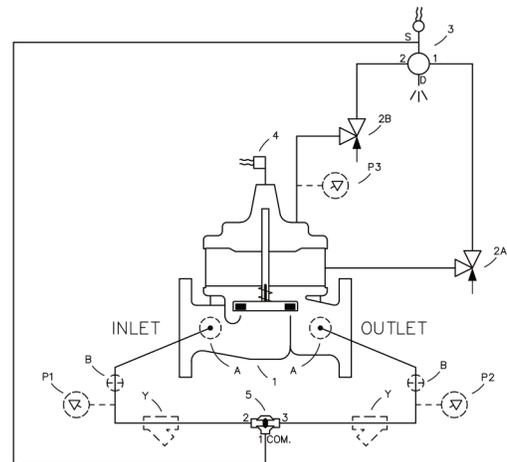
Should a power failure occur, a built-in, lift-type check valve closes the moment flow stops, preventing reverse flow regardless of solenoid or diaphragm assembly position.

## Schematic Diagram

Item	Description
1	Powercheck Model 100-22 Main Valve
2	CV Flow Control
3	CSM11-HC 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
PC	PC-22D Pump Control Panel

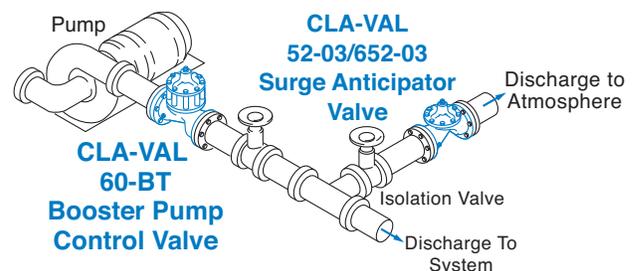


## Typical Installation

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

Use the PC-22D Electronic Pump Control Panel for applications where electronic control and integration with SCADA is desired.

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



## 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
UNS 87850	Bronze	B16.24	225	500	400

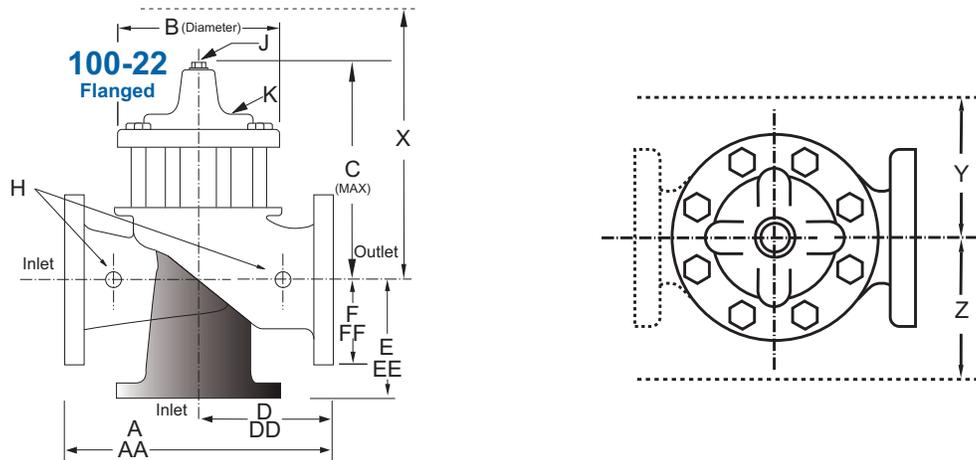
Note: \* ANSI standards are for flange dimensions only.  
 Flanged valves are available faced but not drilled.  
 ‡ End Details machined to ANSI B2.1 specifications.  
**Valves for higher pressure are available; consult factory for details**

## Materials

Component	Standard Material Combinations		
Body & Cover	Ductile Iron	Cast Steel	Bronze
100-22 Available Sizes	100 - 200mm	100 - 200mm	100 - 200mm
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.

## Model 660-BT (uses 100-22 Powercheck Main Valve)



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

Valve Size (mm)	250	300	350	400	450	500	600
A 150 ANSI	660	762	870	889	1070	1219	1219
AA 300 ANSI	695	800	—	930	1108	1260	1263
B Diameter	508	600	711	711	900	900	900
C Maximum	603	692	744	867	889	1022	1022
D 150 ANSI	—	—	—	—	—	—	—
DD 300 ANSI	—	—	—	—	—	—	—
E 150 ANSI	—	—	—	—	—	—	—
EE 300 ANSI	—	—	—	—	—	—	—
F 150 ANSI	203	241	279	298	403	370	432
FF 300 ANSI	222	260	—	324	403	408	483
H NPT Body Tapping	1.00	1.00	1.00	1.00	1.00	1.00	1.00
J NPT Cover Center Plug	1.00	1.00	1.25	1.25	2.00	2.00	2.00
K NPT Cover Tapping	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Stem Travel	58	71	86	86	86	114	114
Approx. Ship Weight (kgs)	356	640	1006	1006	1044	1544	1634
Approx. X Pilot System	914	991	1092	1143	1270	1270	1397
Approx. Y Pilot System	508	559	610	660	660	762	762
Approx. Z Pilot System	508	559	610	660	660	762	762

660-BT Valve Selection	100-22 Pattern: Globe (G), Angle (A), End Connections: Flanged (F) Indicate Available Sizes							
	Inches	10	12	14	16	18	20	24
	mm	250	300	350	400	450	500	600
Main Valve 100-22	Pattern	G	G	G	G	G	G	G
	End Detail	F	F	F	F	F	F	F
Suggested Flow (gpm)	Maximum	4100	6400	9230	9230	16500	16500	16500
Suggested Flow (Liters/Sec)	Maximum	258	403	581	581	1040	1040	1040

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

### CSM11-HC Solenoid Control Power Consumption

Volts	Amperes		Coil Resistance
	Holding	Inrush	Ohms
AC 60 Hz			
24	2.88	25.4	0.5
120	.575	5.1	14.1
208	.330	2.93	40
240	.288	2.54	58
440	.156	1.38	174
440	.143	1.27	233
Volts	Amperes		Coil Resistance
(AC 50 Hz)	Holding	Inrush	Ohms
110	.48	4.6	15.7
220	.24	2.3	66
240	.22	2.1	88

### How to Order

#### When Ordering, Please Specify:

1. Catalog No. 660-BT
2. Valve Size
3. Pattern - Globe
4. Pressure Class
5. Trim Material
6. Electrical Selection
7. Desired Options
8. Epoxy Coating

### CSM11-HC Specifications



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.

Coil Insulation Class A (molded)

AC voltage 15.4 watts

#### Temperature Range

Water to 180°F Max

#### Materials

Standard Pilot System Materials

Pilot Control: Low Lead Bronze

Trim: Stainless Steel Type 303

Rubber: Buna-N® Synthetic Rubber

Optional Pilot System Materials

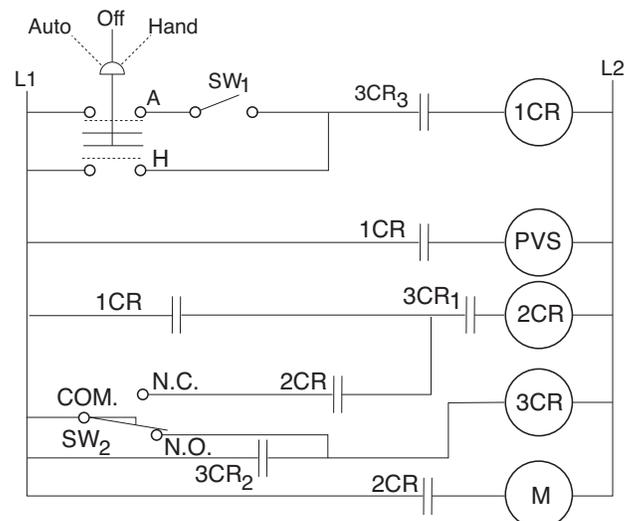
Pilot Systems are available with optional Aluminum, Stainless Steel or Monel materials.

### Wiring Diagram

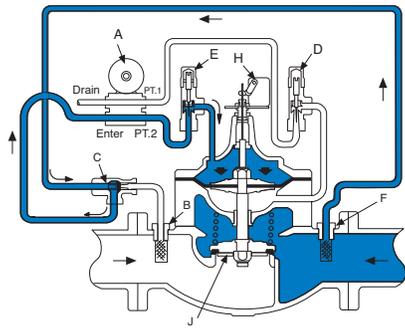
Auto-Off-Hand	= Selector Switch
1CR	= Relay, DPST Normally Open
2CR	= Relay, DPST Normally Open
3CR	= Relay, TPST Normally Open
SW <sub>1</sub>	= Switch, Remote Start, Automatic
SW <sub>2</sub>	= Switch, SPDT, Valve Limit Switch Connect to N.C. Terminal
PVS	= Pilot Valve Solenoid
M	= Pump Motor Starter

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



## Sequence Of Operation

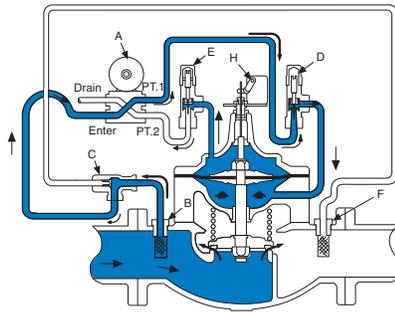


### Pump Off...

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.

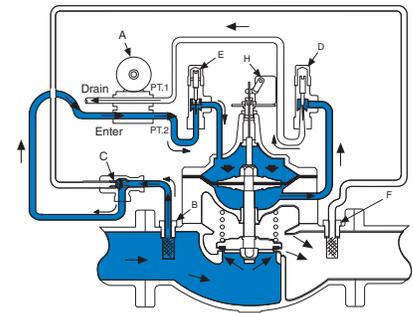
If power failure occurs when valve is open, the built-in check valve J closes immediately to prevent reverse flow.



### Starting Cycle...

Starting switch closes, pump starts, solenoid control energizes.

Upstream fluid flows 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.



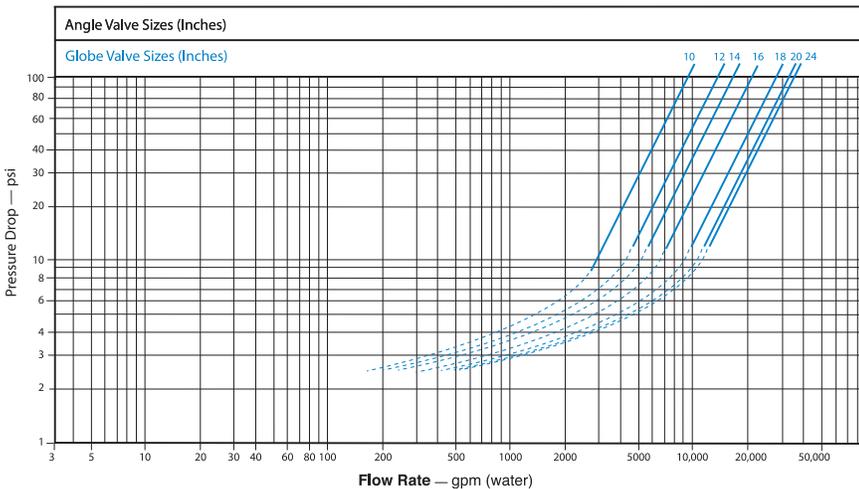
### Stopping Cycle...

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 660-BT Flow Chart (Uses Main Valve Model 100-22)



Liquid Volume Displaced from Diaphragm Chamber When Valve Opens or Closes

Sizes (Inches)	10"	12"	14"	16"	18"	20"	24"
60-BT Displacement (Liters)	9.50	15.14	24.61	36.23	41.64	45.42	109.78l

## Optional Electronic Control



The Cla-Val PC-22D provides control of the pump and pump control valve, preventing surges in the system when the pump starts or stops. It consists of a pre-wired electrical control panel employing a programmable valve controller to sequence the pump and pump control valve during all modes of operation. Provides added protection to the pumping system from damage caused by mechanical, hydraulic or power failure.

The PC-22D offers all the control features found in the recommended wiring diagrams for Cla-Val pump control valves, plus alarms, automatic shutdown and adjustable timers.

## Valve Sizing

Sizing Model 660-BT 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 this valve, see the 100-22 technical data sheet.

### Example:

A booster pump station with a rated output of 1000 GPM and 5 psi is an acceptable head loss for the application.

### 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.