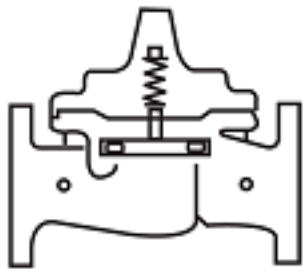
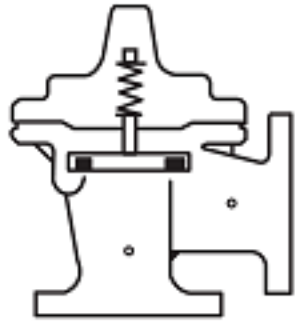
CLA-VAL
AUTOMATIC CONTROL VALVES

60-BT/660-BT

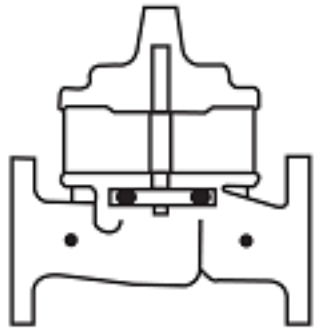
Place this manual with personnel responsible for maintenance of this valve



Installation



Operation



Maintenance

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CLA-VAL®

MODEL 60-BT
Pump Control Valve with High Capacity CSM11-HC

- **Built-in Check Valve**
- **Valve Uses Line Pressure for Operation**
- **Opening and Closing Rates Adjusted Separately**
- **Solenoid Control Can Be Operated Manually**
- **Can be integrated with SCADA when controlled by the PC-22D Electronic Pump Control Panel**

The Cla-Val Model 60-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.

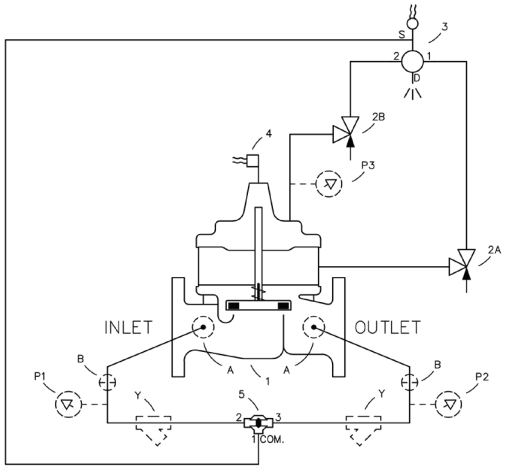
Schematic Diagram

Item	Description
1	100-03 Powercheck 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

see page 2 for approvals

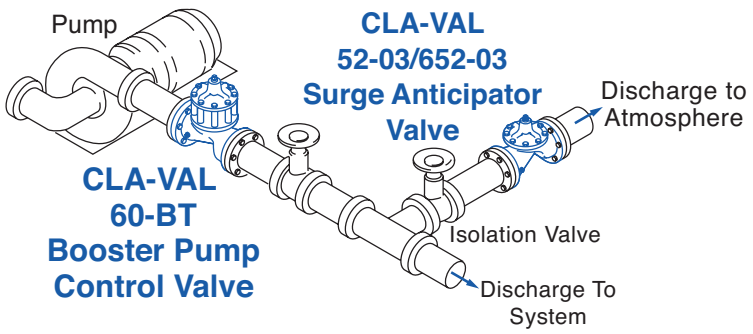


Typical Installation

Install the valve as shown to help prevent pipelines surges during pump starting and stopping. Flexible conduit should be used for electrical connections to the solenoid control and the limit switch. A Cla-Val Model 52-03 Surge Anticipator Valve is recommended for power failure protection or the Model 652-03 if a reduced port valve is required.

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

Note: Installation with valve stem vertical up is recommended. For horizontal stem installation use Cla-Val Model 60-73 or, if a reduced port valve is required, Model 660-73.



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	400	400
ASTM A216-WCB	Cast Steel	B16.5	285	400	400
UNS 87850	Bronze	B16.24	225	400	400

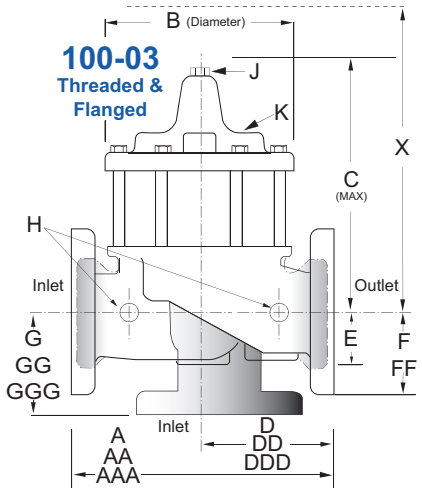
Note: * ANSI standards are for flange dimensions only.
Flanged valves are available faced but not drilled.
‡ End Details machined to ANSI B2.1 specifications.
Valves for higher pressure are available; consult factory for details

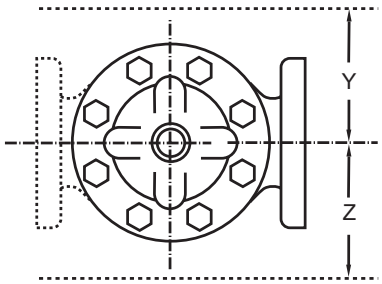
Materials

Component	Standard Material Combinations		
Body & Cover	Ductile Iron	Cast Steel	Bronze
100-03 Available Sizes	10" - 16"	10" - 16"	10" - 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.

Model 60-BT (uses 100-03 Powercheck Main Valve)





Valve & Pilot Approvals

NSF/ANSI 372: National Lead Free Mandate "Reduction of Lead in Drinking Water Act"

Cla-Val fulfills the requirements described in the American Water Works Association's (AWWA) Standard for Pilot-Operated Control Valves: C530:12

60-BT Series Dimensions (In Inches)

Valve Size (Inches)	10	12	14	16
A Threaded	—	—	—	—
AA 150 ANSI	29.75	34.00	39.00	41.38
AAA 300 ANSI	31.12	35.50	40.50	43.50
B Diameter	23.62	28.00	32.75	35.50
C Maximum	23.38	29.31	32.12	35.00
D Threaded	—	—	—	—
DD 150 ANSI	14.88	17.00	19.50	20.69
DDD 300 ANSI	15.56	17.75	20.25	21.75
E	9.25	10.75	12.62	15.50
F 150 ANSI	8.00	9.50	10.50	11.75
FF 300 ANSI	8.75	10.25	11.50	12.75
G Threaded	—	—	—	—
GG 150 ANSI	8.62	13.75	14.88	15.69
GGG 300 ANSI	9.31	14.50	15.62	16.50
H NPT Body Tapping	1.00	1.00	1.00	1.00
J NPT Cover Center Plug	1.00	1.25	1.50	2.00
K NPT Cover Tapping	1.00	1.00	1.00	1.00
Stem Travel	2.80	3.40	4.00	4.50
Approx. Ship Weight (lbs)	940	1675	2460	3100
Approx. **X** Pilot System	30.00	37.00	41.00	43.00
Approx. **Y** Pilot System	20.00	22.00	24.00	26.00
Approx. **Z** Pilot System	20.00	22.00	24.00	26.00

60-BT Valve Selection	100-03 Pattern: Globe (G), Angle (A), End Connections: Threaded (T), Flanged (F) Indicate Available Sizes				
	Inches	10	12	14	16
	mm	250	300	350	400
Main Valve 100-03	Pattern	G, A	G, A	G, A	G, A
	End Detail	F	F	F	F
Suggested Flow (gpm)	Maximum	4900	7000	8400	11000
	Maximum Intermittent	6150	8720	10540	13700
Suggested Flow (Liters/Sec)	Maximum	309	442	530	694
	Maximum Intermittent	387	549	664	863
100-03 Series is the full internal port Powercheck					

CSM11-HC Solenoid Control Power Consumption

Volts	Amperes		Coil Resistance
AC 60 Hz	Holding	Inrush	Ohms
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, Specify:

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

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

Pilot System Specifications

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

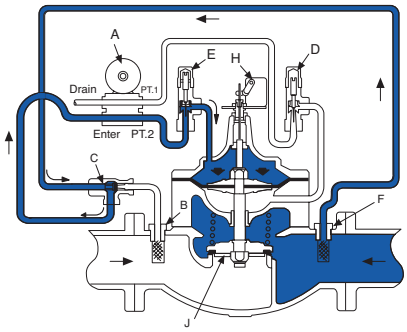
Pilot Systems are available with optional Aluminum, Stainless Steel or Monel materials.

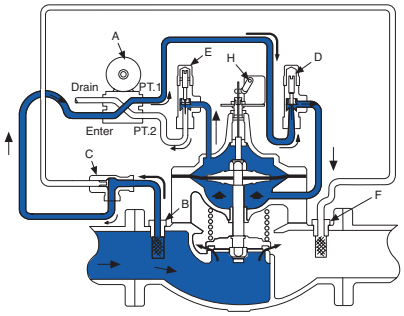
Optional Electronic Control

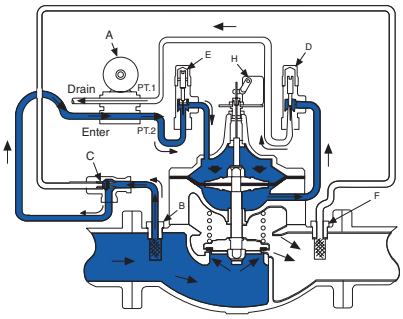
The Cla-Val PC-22D provides control of the pump and pump control valve, preventing surges in the system when the pump starts or stops. It consists of a pre-wired electrical control panel employing a programmable valve controller to sequence the pump and pump control valve during all modes of operation. 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.

Sequence Of Operation





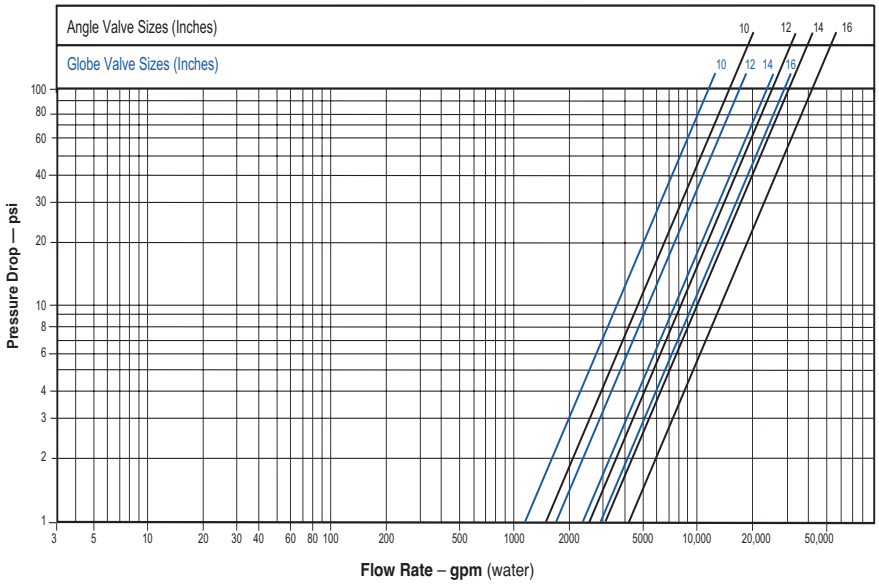


Pump Off
With pump off, line pressure exists above the diaphragm holding the main valve closed. Shuttle valve C always supplies highest pressure to solenoid control A through strainers B and F.
If power failure occurs when valve is open, the built-in check valve J closes immediately to prevent reverse 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-BT Flow Chart (Uses 100-03 Powercheck Main Valve)



*** CONSULT FACTORY IF PRESSURE IS LESS THAN 10 PSI ***

Liquid Volume Displaced from Diaphragm Chamber When Valve Opens or Closes				
Sizes (Inches)	10"	12"	14"	16"
60-BT Displacement (Gallons)	2.51	4.00	6.50	9.57

Valve Sizing

Sizing Model 60-BT 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 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-BT) 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®

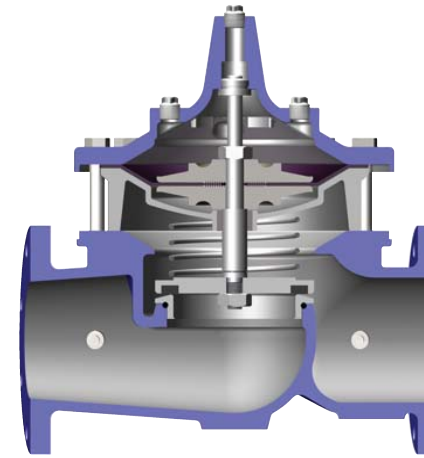
— MODEL — 100-03
Powercheck Valve

DESCRIPTION

This manual contains information for installation, operation and maintenance of the Cla-Val 100-03 Powercheck, an automatic valve designed for use where independent operating pressure is desired,or when line fluid is unsuitable as an operating medium.

This valve is a hydraulically operated, diaphragm type, globe or angle pattern valve. It is single seated and incorporates into its design two operating chambers sealed from one another by a flexible synthetic rubber diaphragm. Pressure applied to the upper chamber closes the valve; when applied to the lower chamber, it opens the valve.

With proper pilot controls, the valve can be held in any intermediate position between fully open and tightly closed unless a static condition or pressure reversal occurs, in which case the valve closes to prevent return flow regardless of the diaphragm position.



INSTALLATION

Allow sufficient room around the valve assembly to make adjustments and for disassembly.

NOTE: BEFORE THE VALVE IS INSTALLED, PIPE LINES SHOULD BE FLUSHED OF ALL CHIPS, SCALE AND FOREIGN MATTER.

It is recommended that gate or block valves be installed on both the upstream and downstream sides of the 100-03 to facilitate isolating the valve for preventative maintenance.

Place the valve in the line with flow through the valve in the direction indicated on the inlet name plate or by flow arrows and with the cover "UP" Other positions are not acceptable due to the check feature.

When a pilot control system is installed on the Powercheck Valve, use care to prevent damage. If it is necessary to remove fittings or components, be sure they are kept clean and replaced in the exact order of removal.

After the valve is installed and the system is first pressurized, vent air from the cover chamber and tubing by loosening fittings at all high points.

TROUBLE SHOOTING

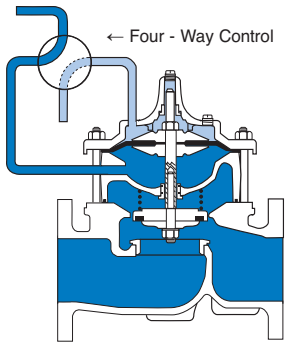
The following trouble shooting information deals strictly with the Powercheck Valve; however some "possible causes" will refer to components that may exist in the variety of control systems available for the valve. All trouble shooting is possible without removing the valve from the line.

SERVICE SUGGESTIONS

(Service Suggestions Chart)

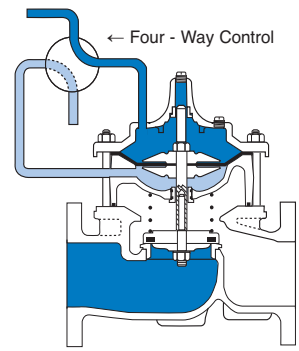
CAUTION: Extreme care should be taken when servicing the valve. Gate or line block valves must be closed upstream and downstream of the valve before starting disassembly. When there are no block or gate valves to isolate the Powercheck Valve it should be realized that the valve cannot be serviced under pressure. Steps must be taken to remedy this situation before proceeding.

Principle of Operation



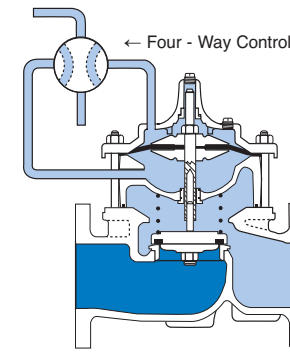
Full Open Operation

When operating pressure below the diaphragm is applied and pressure is relieved from the cover chamber, the valve is held open allowing full flow.



Tight Closing Operation

When pressure below the diaphragm is relieved and operating pressure is applied to the cover chamber, the valve closes drip-tight.



Check Action

When a static condition or pressure reversal occurs, the split stem design allows the valve to instantly check closed. Return flow is prevented regardless of the diaphragm's position.

Note: For optimum operation of built-in check feature, installation with stem vertically up is recommended.

MAINTENANCE
Preventative Maintenance

The Cla Val Powercheck Valves require no lubrication or packing and a minimum of maintenance. However. a periodic inspection schedule should be established to determine how the fluid velocity as well as the substances occurring in natural waters are effecting the valve. These substances can be dissolved minerals, colloidal and suspended particles. Effect of these actions or substances must be determined by inspection.

DISASSEMBLY
First mark the side of the valve cover, power unit body an valve body so that reassembly of these parts will be exact) as removed.

The Powercheck Valve inspection or maintenance can be accomplished without removal of the valve body from the line. Shut off pressure to the valve, both inlet, outlet and independent operating pressure when used.

WARNING: Maintenance personnel can be injured and equip ment and property damaged if disassembly is attempted with pressure in the system.

After pressure has been released from the valve control system and operating chambers of the valve, remove the controls and tubing. Obtain a schematic of the assembly or note and sketch position of tubing and controls for reassembly. Replacing tubing into the control ports exactly as removed is necessary. Failure to reassemble properly will cause the valve to malfunction and possibly cause serious damage.

Remove cover nuts and cover. If the valve has been in service for any length of time' chances are the cover will have to be loosened by driving upward along the edge of the cover with a dull cold chisel. See Figure 1.

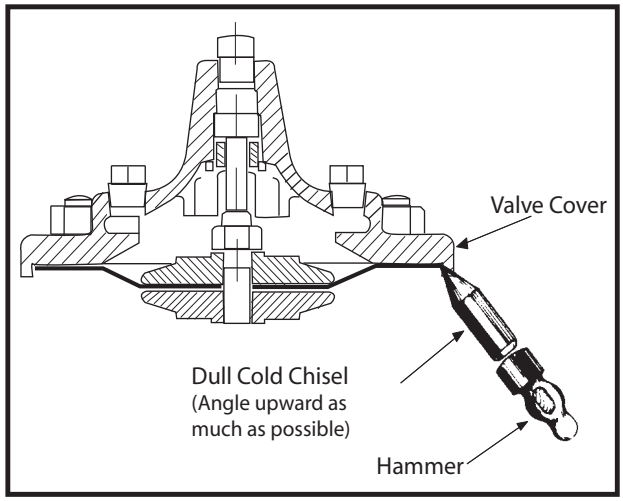


FIGURE 1.

NOTE:
When block and tackle or a power hoist is to be used to lift the valve cover insert a proper size eye bolt in place of the center cover plug. Pull cover straight up to keep from damaging the power unit stem bearing and upper stem.

Power unit body can now be lifted from the valve body. The stem with diaphragm will be removed with the power unit body. The disc retainer assembly with lower stem will separate (check feature) from the upper stem and power unit body.

CAUTION: During service performed on the stem assembly. the stem surfaces must not be damaged. If a vice or other holding device is used to grip the stem. soft jaws of brass or copper must be used to protect the precision ground surface of the stainless steel stem. If the stem is marred no amount of careful dressing can restore the stem to its original condition.

Inspect the threads on the stem. Mineral deposits that prevent the nuts from turning must be cleaned from the threads.

A 5% solution of muriatic acid will soften mineral or scale deposits to assist in removal of nuts and the general cleaning of parts. Flush the parts thoroughly with water immediately after cleaning. Care must always be exercised when handling acid. Read the warning label on the acid container to be sure of correct method of use and disposal after use.

Hold the stem in a vice with soft jaws (see above) when removing the stem nut. Slide off the assembly leaving a completely disassembled upper stem assembly. Remove the disc and disc retainer from the lower stem. Refer to the sectional view of the valve size being serviced. This will assist in the disassembly procedure outlined above. Reassembly instructions outline proper procedure and quantity of spacer washers. This is especially important if the disc is replaced.

Check the upper and lower stems for scale and freedom of movement. Insert the lower stem into the stem (upper). The insertion fully of these parts must be free from binding or resistance. Clean and polish the telescoping parts. Restricted movement of these parts could cause the check feature to fail to function.

Inspection Of Parts

Returning to the valve body in the line. the seat should now b inspected for damage. If the seat requires removal use the following tools. Seats in valve sizes1/2" and 3/4" can be remove with a hex socket wrench. Seats in valve sizes 1" through 6" should be removed with accessory X-109 Seat Removing Too available from the factory. Seats in valve sizes 8" through 16" may be removed with a screw driver. If upon removal of the screws the seat cannot be lifted out, it will be necessary to use a hard rubber mallet and tap the seat loose.

Any buildup of mineral or scale should be cleaned from the valve body at this time. Inspection of the cover and power unit body surfaces that contact the diaphragm is important. Clean and smooth. with wet or dry emery paper. any roughness that could damage the diaphragm. Inspect and recondition the surface on the upper and lower diaphragm washers The perimeter if the diaphragm washers is the most likely area to cause diaphragm wear if the surface is not smooth. Take extra care to make this a smooth finish

Inspect the power unit body bearing insert O-ring that is in contact with the stem If it is worn. nicked or cut. replace it.

The cover bearing should also be checked for excessive wear, using the upper end of the stem to check for excessive lateral movement. A special tool for each size valve is available from the factory to remove the cover bearing. Cover bearing replacement is seldom necessary.

Inspect the diaphragm for cracks or chafing. Replace the diaphragm if damaged

Inspect the disc and replace if the surface is damaged or worn If a new disc is not available. the existing disc can be turned over, exposing the unused surface for contact with the seat.

The disc guide should be checked and cleaned of scales and mineral deposits. Due to the close tolerance between the outer periphery of the disc guide and the inner area of the valve seat, no scale or mineral deposits should be overlooked.

REASSEMBLY
To reassemble, reverse the order of disassembly

If the disc has been removed, it is important that correct pressure be on the disc from the disc guide when the lower stem nut is tight. Use sufficient spacer washers to obtain slight pressure (by visual indention) on the disc. Indention should be slight. Refer to seat and disc detail drawings for location of spacer washers for various valve sizes.

NOTE: New discs will usually require a different number of spacer washers to obtain the right amount of "grip" on the disc.

Place the lower stem assembly onto the seat with the disc in contact with the valve seat. If a large spring (4", 6", 8" only) was removed upon disassembly, replace on top of the disc retainer.

The power unit body with gasket, (body to power unit) or O-ring, can be installed on the body. Be sure the power unit section is replaced exactly in the same position as removed. The end of the lower stem will be visible in the center of the power unit bearing. Care must be taken so the power unit bearing or lower stem is not damaged during this assembly. A hoist may be necessary for larger valve sizes.

NOTE: Valves 4" thru 16" use an O-ring body to power unit seal. During placement onto the body apply a light weight grease into the power unit groove to hold the O-ring in place when installing on the body.

Install on the upper stem the lower diaphragm washer, the diaphragm, the upper diaphragm washer, then screw the stem nut and tighten securely so the upper and lower diaphragm washer cannot be turned on the stem. During the tightening of the upper stem nut, the stem should be held in a vice with soft brass jaws. The upper stem and diaphragm assembly can now be lowered into the power unit bearing, the hollow end of the stem sliding on to the end of the lower stem. Move the upper stem and diaphragm assembly up and down to check freedom of movement of the lower and upper stem.

CAUTION: Do not lubricate or grease the hollow end of upper stem or upper end of the lower stem. This could cause the check feature to become inoperative.

Replace cover chamber spring on the upper diaphragm washer.

NOTE: Some valves may not have a cover chamber spring.

Place the cover on the power unit body aligning the index marks. Secure the cover with 8 stud nuts Tighten the nuts firmly with a cross-over pattern until all nuts are tight:

NOTE: Valve sizes 1" thru 3" are bolted with 8 nuts (power unit body to valve body) and 8 nuts (cover to power unit body). Tighten stud nuts firmly with cross-over pattern until all nuts are tight.

When the stem is removed from the valve a tool can be fabricated to check for unrestricted stem movement after reassembly, and also check for correct stem travel. Valves size 1 1/4" thru 24/2" are threaded 10-32 UNF (internal threads) on the top of the stem. Valve sizes 3" and 4" are threaded ,1/4 -28 UNF. Valve sizes 6" thru 14" are threaded 34-24 UNF. The 16" valves are threaded,1/2-20 UNF.

A length of rod threaded on one end can be threaded into the stem through the plug hole in the center of the cover. It is possible with this rod to move the diaphragm assembly up from the seat freely, returning to the seat by its own weight. Larger valve sizes may require a tee handle to assist lifting heavier assemblies. The stroke of the stem should correspond closely with the chart.

Reinstall the control system and tubing exactly as it was before disassembly.

The Powercheck Valve can be tested for tight closure as well as the tightness of the seal across the diaphragm. inlet line pressure, or independent operating pressure can also be used to check the freeness and travel of the diaphragm assembly. Refer to the operation paragraph and principle of operation sectional views for opening and closing operation.

The downstream or outlet shutoff valve remains closed.

If the control system has a pilot or control that can position the valve to a closed position, put the control in a position to close the Powercheck. Lacking a control, inlet pressure must be connected to the cover of the Powercheck Valve.

Open upstream gate or line block valve just enough to allow flow.

Have the power unit body, center section, open to atmosphere. The power unit body will be atmospheric if the control is being used.

Partially disconnect a fitting on the discharge side of the valve. Do not remove fully unless there is no pressure.

After the valve is in the closed position for a few minutes, all draining of the power unit body should stop. This will indicate a good seal across the valve seat and the diaphragm.

USEFUL INFORMATION OR HINTS

1.The approximate volume of liquid discharged from the chamber above the diaphragm when the valve moves from the fully closed position to fully open is as follows:

VALVE SIZE	DISPLACEMENT	
1/2"	0.340 Fl. Oz.	.01 Liters
3/4"	0.340 Fl. Oz.	.01 Liters
1"	0.700 Fl. Oz.	.02 Liters
1 1/4"	0.020 Gal.	.10 Liters
1 1/2"	0.020 Gal.	.10 Liters
2"	0.032 Gal.	.10 Liters
2 1/2"	0.043 Gal.	.20 Liters
3"	0.080 Gal.	.30 Liters
4"	0 169 Gal	.60 Liters
6"	0.531 Gal.	2.00 Liters
8"	1.260 Gal.	4.75 Liters
10"	2.510 Gal.	9.50 Liters
12"	4.000 Gal.	15.14 Liters
14"	6.500 Gal.	24.60 Liters
16"	9.570 Gal.	36.20 Liters

SERVICE SUGGESTIONS

SYMPTOM	POSSIBLE CAUSE	TEST PROCEDURE	REMEDY
Valve fails to close.	Stem stuck in open position.	Vent power unit chamber. Apply pressure to cover chamber. Valve should close.	Disassemble,examine all internal parts for cause of the sticking condition and clean off scale deposits.
	Worn diaphragm or loose upper stem nut.	Apply pressure in power unit chamber and vent cover. Continuous flow from cover indicates this trouble.	Disassemble and replace diaphragm or tighten the valve stem nut.
	Foreign object on valve seat.	Valve opens okay, but only closes part way.	Try operating valve a few times. This might dislodge the object. If this fails, disassemble and remove the obstruction.
	Pressure not being released from power unit chamber.	Make sure pressure is being released by opening a fitting into the chamber. It valve then closes, refer to remedy.	Check control system. Tube line or nipple might be plugged up.
	Operating pressure not getting into valve cover.	Use pressure gauge or loosen cover plug to check for pressure.	Clean tubing or pipe fittings into cover chamber. Open CK2 Isolation Valve in control lines.
	Insufficient line pressure.	Check line pressure.	Establish line pressure.
Valve fails to open.	Stem stuck in Closed or semiopen position.	Vent cover. Apply pressure to power unit chamber.	Disassemble, examine all internal parts for cause of the sticking problem, and clean off scale deposits.
	Worn diaphragm or loose upper stem nut.	Apply pressure in power unit chamber and vent cover. Continuous flow from cover indicates this problem.	Disassemble and replace diaphragm or tighten valve stem nut.
	Foreign object on top of disc retainer.	Valve closed okay but won't open all the way.	Try operating valve a few times. This might dislodge the object It this tails, disassemble and remove the obstruction.
	Pressure not being released from cover chamber.	Open a fitting or remove a plug from cover chamber. It cover chamber vents and valve opens, see remedy.	Check control system. Check lines or pipe fittings. Clean out any plugged lines.
	Operating pressure not applied into power unit chamber.	Loosen a fitting in this chamber to check for pressure at this point.	Clean tubing or pipe fittings into power unit chamber.
Valve closes but leakage occurs.	Worn disc or seat.	The best procedure here is to disassemble the valve and inspect these parts.	Replace worn parts.
O-Ring failure.	Mineral deposits on stem cause abrasion on O-ring.	Remove pressure from both cover and power unit chambers and apply line pressure to valve. Open line from power unit chamber and observe continuos flow.	Disassemble and replace O-ring.

FREEDOM OF MOVEMENT

The following procedures can be used to determine if the valve opens and closes fully. During this test the diaphragm can be checked for damage.

The Powercheck Valve will have a control to open and close the valve. Position the control so that pressure is applied to the cover chamber (above the valve diaphragm). This will close the Powercheck Valve. Check the drain from the control that discharges to atmosphere.

Once the liquid from the lower diaphragm chamber is drained the discharge should stop. If the discharge continues after the normal time it takes to drain then the diaphragm is damaged, or the stem nut is loose, or the stem o~ring is leaking If the discharge is continuous from both chambers then there is a possibility that the diaphragm or the pilot control is damaged.

If the valve is equipped with a "Dry Drain" (control drain piped to downstream end of the valve) then same procedure is followed except the CK2 Shutoff Cock on the downstream end of the valve must be closed and the drain line disconnected and drained to atmosphere. It can then be checked as above.

Measurement of the vertical travel of the stem (diaphragm assembly) will make it possible to determine if the travel, or stroke is restricted. The following chart provides this measurement. It is necessary to have either the X101 Valve Position Indicator or X105 Limit Switch Assembly installed on the valve to visually check the travel.

Mark the position of the stem on the X101 or X105 when the valve is closed. Reposition the control so that pressure is apt plied below the diaphragm and the cover chamber is drained. Determine the extent of the stem travel. Check this movement with the stem travel chart. If the stroke is different than listed (5% to 10%) then there is good reason to believe something is mechanically restricting the stroke of the valve at one end of its travel. If it is determined that f low does not stop through the valve when in the indicated "closed" position, the obstruction probably is between the disc and the seat, or in the power unit chamber below the diaphragm. If the flow stops, the obstruct tion is likely in the cover chamber above the diaphragm or possibly above the disc retainer. Refer to the sectional view under Principle of Operation.

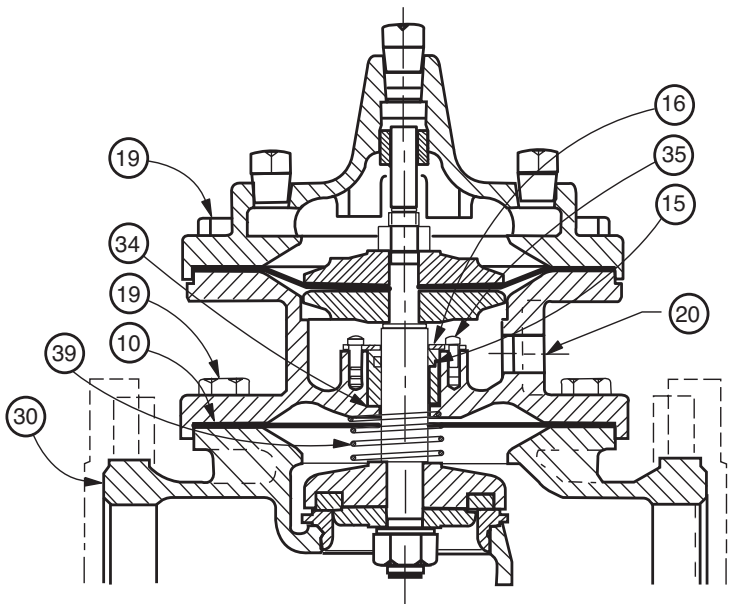
If operation of the valve a few times does not dislodge the foreign object obstructing the diaphragm assembly (stem) movement then the valve must be disassembled and the problem located and corrected. See disassembly instructions.

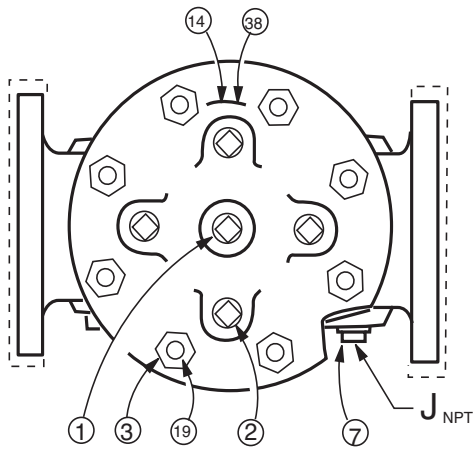
STEM TRAVEL

(fully open tp fully closed)

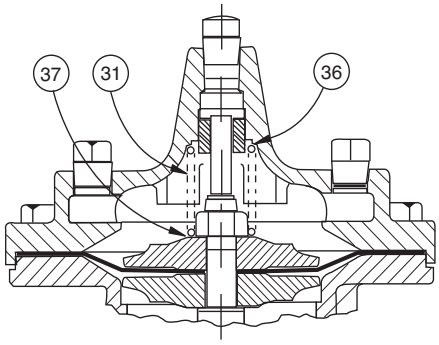
VALVE SIZE		TRAVEL	
INCHES	MM	INCHES	MM
1	25	0.3	8
1 1/4	32	0.4	10
1 1/2	40	0.4	10
2	50	0.6	15
2 1/2	65	0.7	18
3	80	0.8	20
4	100	1.1	23
6	150	1.7	43
8	200	2.3	58
10	250	2.8	71
12	300	3.4	86
14	350	3.9	99
16	400	4.5	114

100-03 Powercheck Valve 1" - 3" Sizes

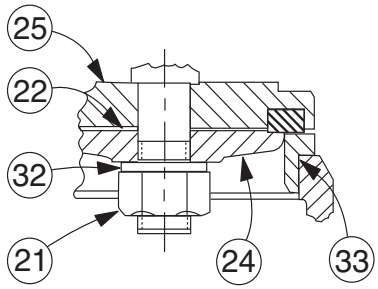




Cover View



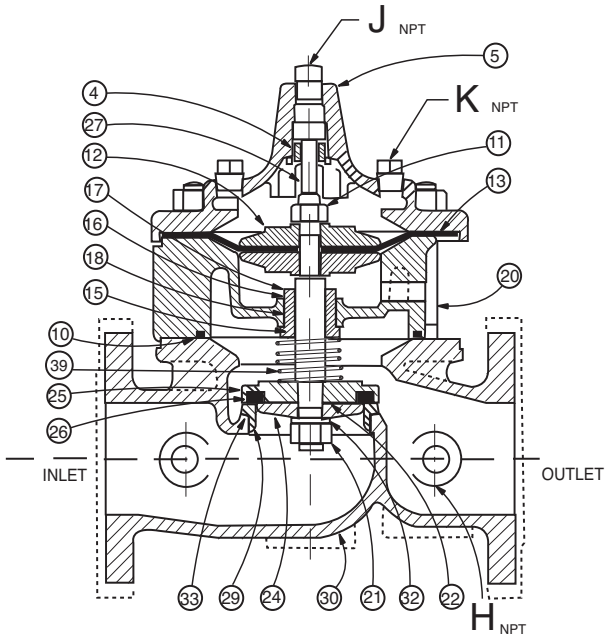
Model 100-03KH

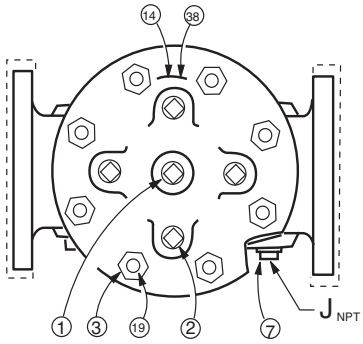


1" - 3"
Seat & Disc Details

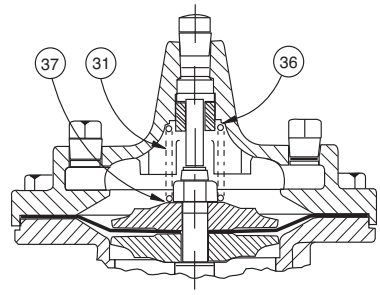
ITEM NO.	PART DESCRIPTION	Qty
1	Center Cover Plug	1
2	Cover Plug	A/R
3	Hex Nut (4"-16" only)	A/R
4	Cover Bearing	1
5	Cover	1
6	Pipe Cap (16" only)	1
7	Body Plug	A/R
8	Hex Bolt (16" only)	8
9*	O-Ring (16" only)	1
10*	Gasket (1" - 3" only)	1
11	Upper Stem Nut	1
12	Diaphragm Washer	2
13*	Diaphragm	1
14	Nameplate	1
15*	Stem O-Ring	1
16	Bearing Retainer (1" -3" only)	1
	Bearing Ring Retainer (4" - 16" only)	1
17	Powerunit Body	1
18*	Bearing O-Ring (4" - 16" only)	1
19	Hex Bolt (1" - 3" only)	A/R
	Stud (4" - 16" only)	A/R
20	Powerunit Body	1
21	Lower Stem Nut	1
22	Spacer Washer	A/R
23	Screw, Flat Hd (6" - 16" Only)	A/R
24	Disc Guide	1
25	Disc Retainer	1
26*	Disc	1
27	Upper Stem	1
28	Screw, Flat Hd (8" - 16" only)	A/R
29	Seat	1
30	Body	1
31	Spring (100PCKH / 100CAKH only)	1
32	Lockwasher	1
33*	Seat O-Ring	1
34*	Gasket, Bearing (1" - 3" only)	1
35	Screw FIL. Hd (1"-2 1/2" Bolt HX Hd (3")	4
36	Upper Spring Washer (100PCKCH / 100PCAKCH)	1
37	Lower Spring Washer (100PCKCH / 100PCAKCH)	1
38	Drive Screw	2
39	Lower Spring (1" - 10" only)	1
40	Lower Stem	1
41	Cover Bearing Housing (16" only)	1
*Recommended Spare Parts		

100-03 Powercheck Valve 4” - 16” Sizes

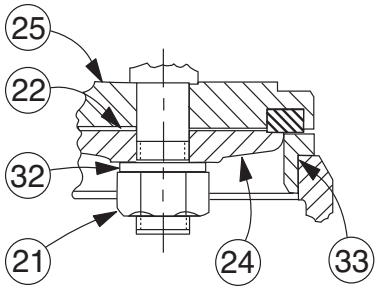




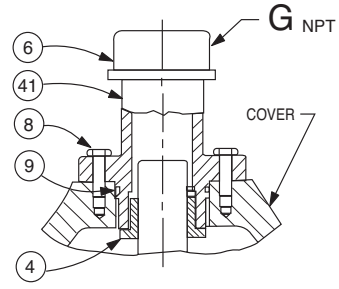
Cover View



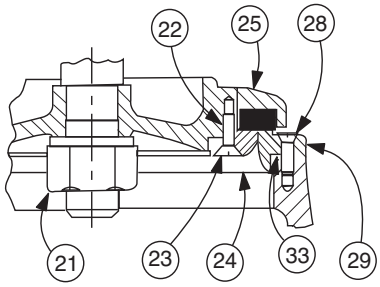
1 1/4” - 4” Sizes (No-Core Cover)



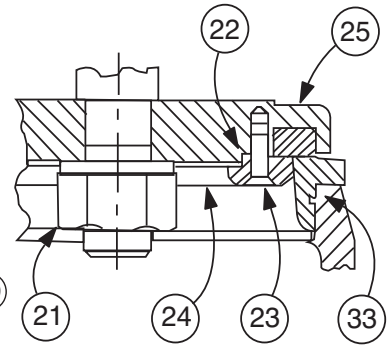
1”-4” Sizes (Seat and Disc Detail)



16” Cover Bearing Housing Detail



8”-16” Sizes (Seat and Disc Detail)



6” Sizes (Seat and Disc Detail)

ITEM NO.	PART DESCRIPTION	Qty
1	Center Cover Plug	1
2	Cover Plug	A/R
3	Hex Nut (4”-16” only)	A/R
4	Cover Bearing	1
5	Cover	1
6	Pipe Cap (16” only)	1
7	Body Plug	A/R
8	Hex Bolt (16” only)	8
9*	O-Ring (16” only)	1
10*	Gasket (1” - 3” only)	1
11	Upper Stem Nut	1
12	Diaphragm Washer	2
13*	Diaphragm	1
14	Nameplate	1
15*	Stem O-Ring	1
16	Bearing Retainer (1” -3” only)	1
	Bearing Ring Retainer (4” - 16” only)	1
17	Powerunit Body	1
18*	Bearing O-Ring (4” - 16” only)	1
19	Hex Bolt (1” - 3” only)	A/R
	Stud (4” - 16” only)	A/R
20	Powerunit Body	1
21	Lower Stem Nut	1
22	Spacer Washer	A/R
23	Screw, Flat Hd (6” - 16” Only)	A/R
24	Disc Guide	1
25	Disc Retainer	1
26*	Disc	1
27	Upper Stem	1
28	Screw, Flat Hd (8” - 16” only)	A/R
29	Seat	1
30	Body	1
31	Spring (100PCKH / 100CAKH only)	1
32	Lockwasher	1
33*	Seat O-Ring	1
34*	Gasket, Bearing (1” - 3” only)	1
35	Screw FIL. Hd (1”-2 1/2” Bolt HX Hd (3”)	4
36	Upper Spring Washer (100PCKCH / 100PCAKCH)	1
37	Lower Spring Washer (100PCKCH / 100PCAKCH)	1
38	Drive Screw	2
39	Lower Spring (1” - 10” only)	1
40	Lower Stem	1
41	Cover Bearing Housing (16” only)	1

*Recommended Spare Parts

Functional Data

Model 100-03

Valve Size		Inches	2½	3	4	6	8	10	12	14	16
		mm.	65	80	100	150	200	250	300	350	400
C_V Factor	**Globe Pattern**	Gal./Min. (gpm.)	85	115	200	440	770	1245	1725	2300	2940
		Litres/Sec. (l/s.)	20	28	48	106	185	299	414	552	706
	Angle Pattern	Gal./Min. (gpm.)	101	139	240	541	990	1575	2500*	3060*	4200*
		Litres/Sec. (l/s.)	24	33	58	130	238	378	600	734	1008
Equivalent Length of Pipe	**Globe Pattern**	Feet (ft.)	53	85	116	211	291	347	467	422	503
		Meters (m.)	16	26	35	64	89	106	142	129	154
	Angle Pattern	Feet (ft.)	37	58	80	139	176	217	222*	238*	247*
		Meters (m.)	12	18	25	43	54	66	68	73	75
K Factor	**Globe Pattern**		4.6	6.0	5.9	6.2	6.1	5.8	6.1	5.0	5.2
	Angle Pattern		3.3	4.1	4.1	4.1	3.7	3.6	2.9	2.8	2.6
Liquid Displaced from Cover Chamber When Valve Opens		Fl. Oz	—	—	—	—	—	—	—	—	—
		U.S. Gal.	.04	.08	.17	.53	1.26	2.51	4.0	6.5	9.6
		ml	163	303	643	—	—	—	—	—	—
		Litres	—	—	—	2.0	4.8	9.5	15.1	24.6	36.2

*Estimated

C_V Factor

Formulas for computing C_V Factor, Flow (Q) and Pressure Drop (▲P):

$$C_V = \frac{Q}{\sqrt{\triangle P}} \qquad Q = C_V \sqrt{\triangle P} \qquad \triangle P = \left(\frac{Q}{C_V}\right)^2$$

K Factor (Resistance Coefficient)
The Value of K is calculated from the formula: $K = \frac{894 d^4}{C_V^2}$
(U.S. system units)

Equivalent Length of Pipe
Equivalent lengths of pipe (L) are determined from the formula: $L = \frac{K d}{12 f}$
(U.S. system units)

Fluid Velocity
Fluid velocity can be calculated from the following formula: $V = \frac{.4085\ Q}{d^2}$
(U.S. system units)

Where:

C_V = U.S. (gpm) @ 1 psi differential at 60° F water
or
= (l/s) @ 1 bar (14.5 PSIG) differential at 15° C water

d = inside pipe diameter of Schedule 40 Steel Pipe (inches)

f = friction factor for clean, new Schedule 40 pipe (dimensionless) (from Cameron Hydraulic Data, 18th Edition, P 3-119)

K = Resistance Coefficient (calculated)

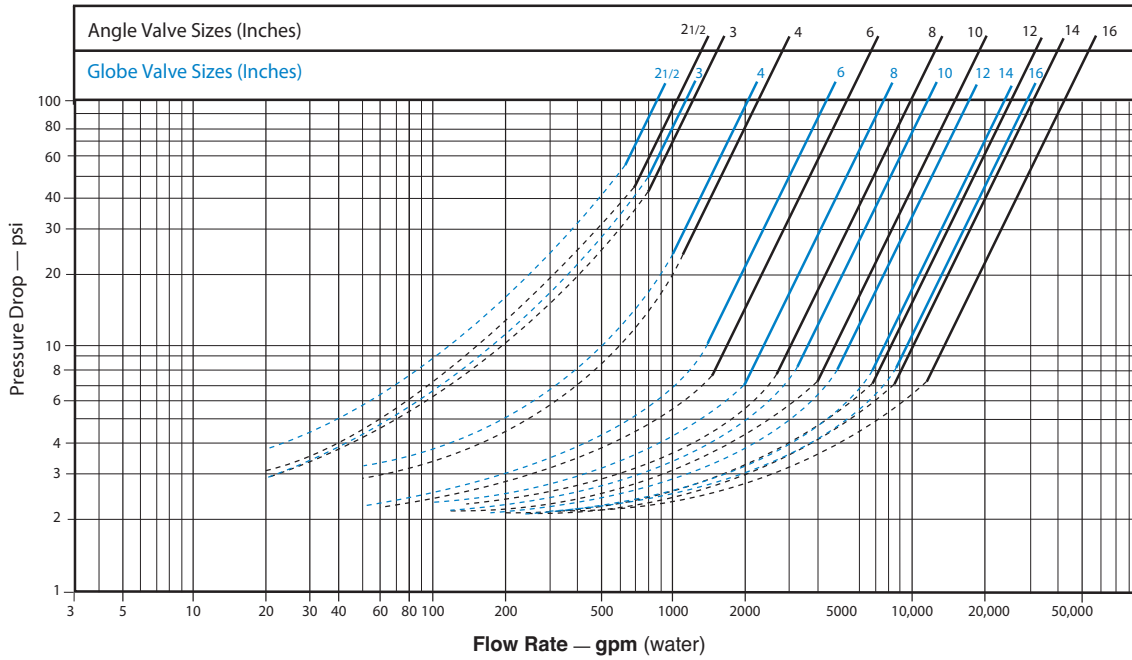
L = Equivalent Length of Pipe (feet)

Q = Flow Rate in U.S. (gpm) or (l/s)

V = Fluid Velocity (feet per second) or (meters per second)

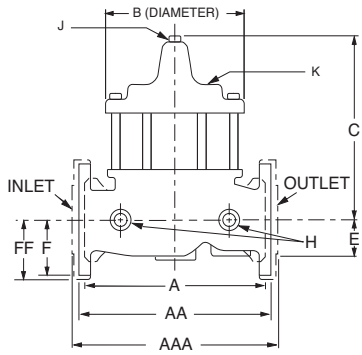
$\triangle P$ = Pressure Drop in (psi) or (bar)

Model 100-03 Flow Chart (Based on normal flow through a wide open valve)

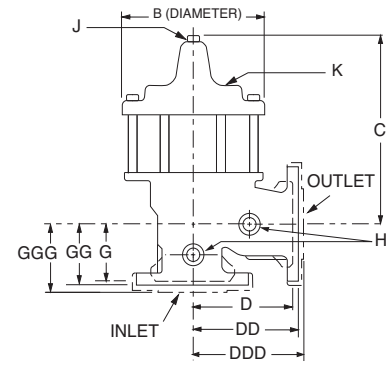


Dimensions

Model 100-03



100-03 (Globe)



100-03 (Angle)

Valve Size (Inches)	**2 ½**	**3**	**4**	**6**	**8**	**10**	**12**	**14**	**16**
A Threaded	11.00	12.50	—	—	—	—	—	—	—
AA 150 ANSI	11.00	12.00	15.00	20.00	25.38	29.75	34.00	39.00	41.38
AAA 300 ANSI	11.62	13.25	15.62	21.00	26.38	31.12	35.50	40.50	43.50
B Dia.	8.00	9.12	11.50	15.75	20.00	23.62	28.00	32.75	35.50
C Max.	10.31	11.19	14.25	18.44	21.81	23.38	29.31	32.12	35.00
D Threaded	5.50	6.25	—	—	—	—	—	—	—
DD 150 ANSI	5.50	6.00	7.50	10.00	12.69	14.88	17.00	19.50	20.69
DDD 300 ANSI	5.81	6.63	7.81	10.50	13.19	15.56	17.75	20.25	21.75
E	1.69	2.06	3.19	4.31	5.31	9.25	10.75	12.62	15.50
F 150 ANSI	3.50	3.75	4.50	5.50	6.75	8.00	9.50	10.50	11.75
FF 300 ANSI	3.75	4.13	5.00	6.25	7.50	8.75	10.25	11.50	12.75
G Threaded	4.00	4.50	—	—	—	—	—	—	—
GG 150 ANSI	4.00	4.00	5.00	6.00	8.00	8.62	13.75	14.88	15.69
GGG 300 ANSI	4.31	4.38	5.31	6.50	8.50	9.31	14.50	15.62	16.50
H NPT Body Tapping	½	½	¾	¾	1	1	1	1	1
J NPT Cover Center Plug	½	½	¾	¾	1	1	1¼	1½	2
K NPT Cover Tapping	½	½	¾	¾	1	1	1	1	1
Valve Stem Internal Thread UNF	10-32	¼-28	¼-28	⅜-24	⅜-24	⅜-24	⅜-24	⅜-24	½-20
Stem Travel	0.7	0.8	1.1	1.7	2.3	2.8	3.4	4.0	4.5
Approx. Ship Wt. Lbs.	65	95	190	320	650	940	1675	2460	3100

Valve Size (mm)	**65**	**80**	**100**	**150**	**200**	**250**	**300**	**350**	**400**
A Threaded	279	318	—	—	—	—	—	—	—
AA 150 ANSI	279	305	381	508	645	756	864	991	1051
AAA 300 ANSI	295	337	397	533	670	790	902	1029	1105
B Dia.	203	232	292	400	508	600	711	832	902
C Max.	262	284	362	468	554	594	744	816	889
D Threaded	140	159	—	—	—	—	—	—	—
DD 150 ANSI	140	152	191	254	322	378	432	495	526
DDD 300 ANSI	148	168	198	267	335	395	451	514	552
E	43	52	81	109	135	235	273	321	394
F 150 ANSI	89	95	114	140	171	203	241	267	298
FF 300 ANSI	95	105	127	159	191	222	260	292	324
G Threaded	102	114	—	—	—	—	—	—	—
GG 150 ANSI	102	102	127	152	203	219	349	378	399
GGG 300 ANSI	110	111	135	165	216	236	368	397	419
H NPT Body Tapping	½	½	¾	¾	1	1	1	1	1
J NPT Cover Center Plug	½	½	¾	¾	1	1	1¼	1½	2
K NPT Cover Tapping	½	½	¾	¾	1	1	1	1	1
Valve Stem Internal Thread UNF	10-32	¼-28	¼-28	⅜-24	⅜-24	⅜-24	⅜-24	⅜-24	½-20
Stem Travel	18	20	28	43	58	71	86	102	114
Approx. Ship Wt. Kgs.	30	43	86	145	295	426	760	1116	1406

Cla-Val Control Valves operate with maximum efficiency when mounted in horizontal piping with the main valve cover UP, however, other positions are acceptable. Due to component size and weight of 8 inch and larger valves, installation with cover UP is advisable. We recommend isolation valves be installed on inlet and outlet for maintenance. Adequate space above and around the valve for service personnel should be considered essential. A regular maintenance program should be established based on the specific application data. However, we recommend a thorough inspection be done at least once a year. Consult factory for specific recommendations.

CLA-VAL P.O. Box 1325 • Newport Beach, CA 92659-0325 • Phone: 949-722-4800 • Fax: 949-548-5441 • E-mail: claval@cla-val.com • Website cla-val.com

CLA-VAL™

— MODEL —

100-22

600 Series
Powercheck Valve

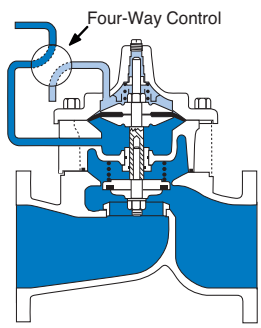
- **Built-in Automatic Check Valve**
- **Reduced Cavitation Design**
- **Service Without Removal From Line**
- **Packless Construction**
- **Drip-Tight and Positive Seating**

The Cla-Val Model 100-22 Powercheck Valve is a hydraulically operated diaphragm valve with a built-in check feature to prevent return flow. Available in globe or angle pattern, it consists of four major components: the body, intermediate chamber, diaphragm assembly and cover. The diaphragm assembly is the only moving part.

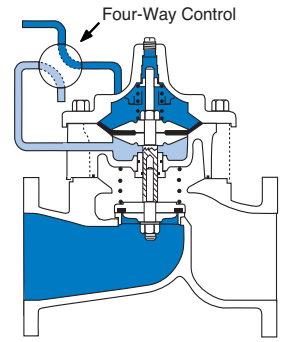
The diaphragm assembly which is guided top, center and bottom by a precision machined stem utilizes an FDA approved non-wicking diaphragm of nylon fabric bonded with synthetic rubber. A synthetic rubber disc retained on three and one-half sides forms a drip-tight seal with the renewable seat when pressure is applied above the diaphragm. When pressure above the diaphragm is relieved, the valve opens wide. The rate of closing or opening can be controlled by modulating the flow into or out of the cover chamber. When a pressure reversal occurs the valve will immediately close, preventing reverse flow through the valve. The split stem will allow the disc retainer assembly to check closed **regardless of the position of the diaphragm.**

The Model 100-22 Powercheck Valve is recommended on system applications where a positive check feature is necessary to prevent reverse flow.

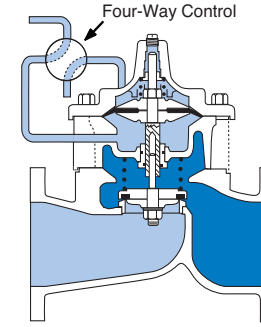
Principle of Operation



Full Open Operation
When operating pressure below the diaphragm is greater than the pressure in the cover chamber, the valve is held open, allowing full flow.



Tight Closing Operation
When pressure below the diaphragm is relieved and operating pressure is applied to the cover chamber, the valve closes drip-tight.



Check Action
When a static condition or pressure reversal occurs, the split stem design allows the valve to instantly check closed. Return flow is prevented regardless of the diaphragm's position.

Note: For optimum operation of built-in check feature, installation with stem vertically up is recommended.

Cla-Val 100-22 Powercheck Main Valve Specifications

Available Sizes

Pattern	Flanged
Globe (inches)	4" - 24"
Globe (mm)	100 - 600 mm
Angle (inches)	4", 6", 8"
Angle (mm)	100, 150 and 200 mm

Operating Temp. Range

Fluids
-40° to 180° F -40° to 82° C

Pressure Ratings (Recommended Maximum Pressure - psi)

Valve Body & Cover		Pressure Class		
		Flanged		
Grade	Material	ANSI Standards*	150 Class	300 Class
ASTM A536	Ductile Iron	B16.42	250	400
ASTM A216-WCB	Cast Steel	B16.5	285	400
UNS 87850	Bronze	B16.24	225	400

Note: * ANSI standards are for flange dimensions only.
Flanged valves are available faced but not drilled.
Valves for higher pressure are available; consult factory for details

Materials

Component	Standard Material Combinations		
Body & Cover	Ductile Iron	Cast Steel	Bronze
Available Sizes (inches)	4" - 24"	4" - 16"	4" - 16"
Available Sizes (mm)	100 - 600 mm	100 - 400 mm	100 - 400 mm
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.			

Options

Epoxy Coating - suffix KC
An FDA approved fusion bonded epoxy coating for use with cast iron, ductile iron or steel valves. This coating is resistant to various water conditions, certain acids, chemicals, solvents and alkalies. Epoxy coatings are applied in accordance with AWWA coating specifications C116-03. Do not use with temperatures above 175°F/ 80° C.

Viton® Rubber Parts - suffix KB
Optional diaphragm, disc and o-ring fabricated with Viton® synthetic rubber. Viton® is well suited for use with mineral acids, salt solutions, chlorinated hydrocarbons, and petroleum oils; and is primarily used in high temperature applications up to 250° F/120°C. Do not use with epoxy coating above 175°F/80° C.

For assistance in selecting appropriate valve options or valves manufactured with special design requirements, please contact our Regional Sales Office or Factory.

4" Globe, Flanged

6" Globe, Flanged

6" Angle, Flanged

Functional Data

Model 100-22

Valve Size		Inches	4	6	8	10	12	14	16	18	20	24
		mm.	100	150	200	250	300	350	400	460	500	600
C_V Factor	**Globe Pattern**	Gal./Min. (gpm.)	136	229	480	930	1458	1725	2110	2940	3400*	4020
		Litres/Sec. (l/s.)	32.5	55	115	223	350	414	506	705	816	965
	Angle Pattern	Gal./Min. (gpm.)	135	233	545	—	—	—	—	—	—	—
		Litres/Sec. (l/s.)	32	56	132	—	—	—	—	—	—	—
Equivalent Length of Pipe	**Globe Pattern**	Feet (ft.)	251	777	748	621	654	750	977	983	1125	3005
		Meters (m.)	76.4	237.1	228.1	189.5	199.4	228.7	298.1	299.9	343.2	916.6
	Angle Pattern	Feet (ft.)	254	751	580	—	—	—	—	—	—	—
		Meters (m.)	77.6	229	176.9	—	—	—	—	—	—	—
K Factor		**Globe Pattern**	12.7	23.1	15.7	10.4	8.5	8.9	10.2	8.4	8.8	19.1
		Angle Pattern	12.9	22.3	12.2	—	—	—	—	—	—	—
Liquid Displaced from Cover Chamber When Valve Opens		Fl. Oz	—	—	—	—	—	—	—	—	—	—
		U.S. Gal.	.08	.17	.53	1.26	2.51	4.0	4.0	9.6	9.6	9.6
		ml	—	—	—	—	—	—	—	—	—	—
		Litres	.30	.64	2.0	4.8	9.5	15.1	15.1	36.2	36.2	36.2

*Estimated

C_V Factor

Formulas for computing C_V Factor, Flow (Q) and Pressure Drop (▲P):

$$C_V = \frac{Q}{\sqrt{\triangle P}} \qquad Q = C_V \sqrt{\triangle P} \qquad \triangle P = \left(\frac{Q}{C_V}\right)^2$$

K Factor (Resistance Coefficient)
The Value of K is calculated from the formula: $K = \frac{894 d^4}{C_V^2}$
(U.S. system units)

Equivalent Length of Pipe
Equivalent lengths of pipe (L) are determined from the formula: $L = \frac{K d}{12 f}$
(U.S. system units)

Fluid Velocity
Fluid velocity can be calculated from the following formula: $V = \frac{.4085\ Q}{d^2}$
(U.S. system units)

Where:

C_V = U.S. (gpm) @ 1 psi differential at 60° F water
or
= (l/s) @ 1 bar (14.5 PSIG) differential at 15° C water

d = inside pipe diameter of Schedule 40 Steel Pipe (inches)

f = friction factor for clean, new Schedule 40 pipe (dimensionless) (from Cameron Hydraulic Data, 18th Edition, P 3-119)

K = Resistance Coefficient (calculated)

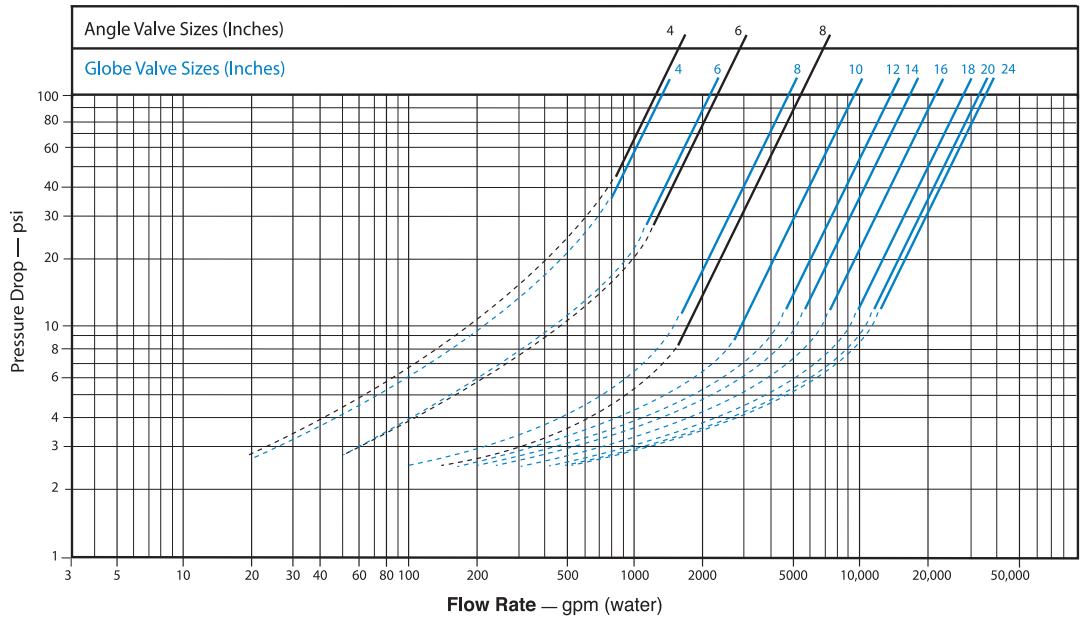
L = Equivalent Length of Pipe (feet)

Q = Flow Rate in U.S. (gpm) or (l/s)

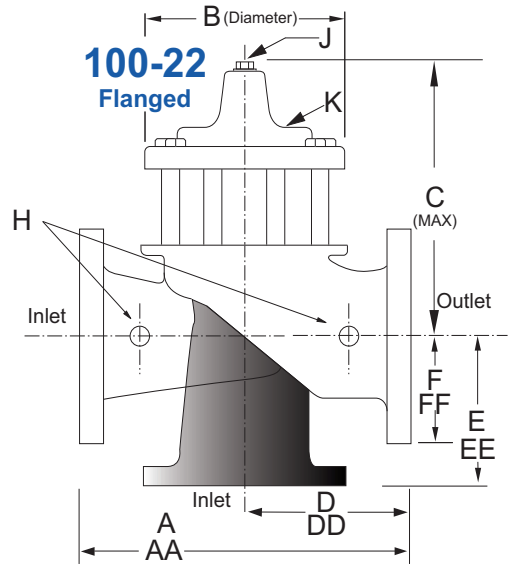
V = Fluid Velocity (feet per second) or (meters per second)

$\triangle P$ = Pressure Drop in (psi) or (bar)

Model 100-22 Flow Chart (Based on normal flow through a wide open valve)



Cla-Val 100-22 Powercheck Main Valve Dimensions



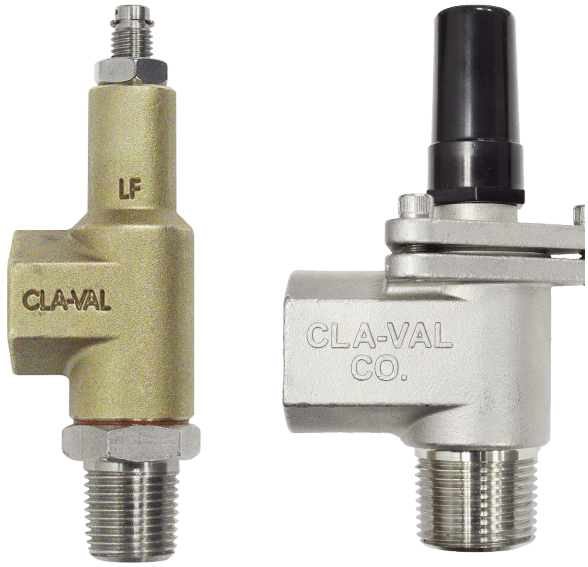
Valve Size (Inches)	**4**	**6**	**8**	**10**	**12**	**14**	**16**	**18**	**20**	**24**
A 150 ANSI	13.88	17.75	21.38	26.00	30.00	34.25	35.00	42.12	48.00	48.00
AA 300 ANSI	14.50	18.62	22.38	27.38	31.50	35.75	36.62	43.62	49.62	49.75
B Diameter	9.12	11.50	15.75	20.00	23.62	28.00	28.00	35.44	35.44	35.44
C Maximum	11.75	15.25	20.25	23.75	27.25	29.31	34.12	35.00	40.25	40.25
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	9.50	11.00	11.75	15.88	14.56	17.00
FF 300 ANSI	5.00	6.25	7.50	8.75	10.25	—	12.75	15.88	16.06	19.00
H NPT Body Tapping	0.50	0.75	0.75	1.00	1.00	1.00	1.00	1.00	1.00	1.00
J NPT Cover Center Plug	0.50	0.75	0.75	1.00	1.00	1.25	1.25	2.00	2.00	2.00
K NPT Cover Tapping	0.50	0.75	0.75	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Stem Travel	0.80	1.10	1.70	2.30	2.80	3.40	3.40	4.50	4.50	4.5
Approx. Ship Weight (lbs)	135	230	480	785	1410	2215	2215	2300	3400	3600

Valve Size (mm)	**100**	**150**	**200**	**250**	**300**	**350**	**400**	**450**	**500**	**600**
A 150 ANSI	353	451	543	660	762	870	889	1070	1219	1219
AA 300 ANSI	368	473	568	695	800	—	930	1108	1260	1263
B Diameter	232	292	400	508	600	711	711	900	900	900
C Maximum	298	387	514	603	692	744	867	889	1022	1022
D 150 ANSI	176	226	272	—	—	—	—	—	—	—
DD 300 ANSI	184	238	284	—	—	—	—	—	—	—
E 150 ANSI	140	171	184	—	—	—	—	—	—	—
EE 300 ANSI	148	184	197	—	—	—	—	—	—	—
F 150 ANSI	114	140	171	203	241	279	298	403	370	432
FF 300 ANSI	127	159	191	222	260	—	324	403	408	483
H NPT Body Tapping	0.50	0.75	0.75	1.00	1.00	1.00	1.00	1.00	1.00	1.00
J NPT Cover Center Plug	0.50	0.75	0.75	1.00	1.00	1.25	1.25	2.00	2.00	2.00
K NPT Cover Tapping	0.50	0.75	0.75	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Stem Travel	20	28	43	58	71	86	86	86	114	114
Approx. Ship Weight (kgs)	61	104	218	356	640	1006	1006	1044	1544	1634

Cla-Val Control Valves operate with maximum efficiency when mounted in horizontal piping with the main valve cover UP but other positions are acceptable. Due to component size and weight of 10 inch and larger valves, installation with cover UP is advisable. We recommend isolation valves be installed on inlet and outlet for maintenance. Adequate space above and around the valve for service personnel should be considered essential. A regular maintenance program should be established based on the specific application data. We do, however, recommend a thorough inspection be done at least once a year. Consult factory for specific recommendations.

CLA-VAL

—MODEL— CV
Flow Control



DESCRIPTION
The CV Control is an adjustable restriction which acts as a needle valve when flow is in the direction of the stem. When flow is in the reverse direction, the port area opens fully to allow unrestricted flow. When installed in the control system of a Cla-Val automatic valve, it can be arranged to function as either an opening or closing speed control.

OPERATION
The CV Flow Control permits full flow from port A to B, and restricted flow in the reverse direction. Flow from port A to B lifts the disc from seat, permitting full flow. Flow in the reverse direction seats the disc, causing fluid to pass through the clearance between the stem and the disc. This clearance can be increased, thereby increasing the restricted flow, by screwing the stem out, or counter-clockwise. Turning the stem in, or clockwise reduces the clearance between the stem and the disc, thereby reducing the restricted flow.'

INSTALLATION
Install the CV Flow Control as shown in the valve schematic All connections must be tight to prevent leakage.

DISASSEMBLY
Follow the sequence of the item numbers assigned to the parts in the cross sectional illustration for recommended order of disassembly.

Use a scriber, or similar sharp-pointed tool to remove O-ring from the stem.

INSPECTION
Inspect all threads for damage or evidence of cross-threading. Check mating surface of seat and valve disc for excessive scoring or embedded foreign particles. Check spring for visible distortion, cracks and breaks. Inspect all parts for damage, corrosion and cleanliness.

CLEANING
After disassembly and inspection, cleaning of the parts can begin. Water service usually will produce mineral or lime deposits on metal parts in contact with water. These deposits can be cleaned by dipping the parts in a 5-percent muriatic acid solution just long enough for deposits to dissolve. This will remove most of the common types of deposits. **Caution: use extreme care when handling acid.** If the deposit is not removed by acid, then a fine grit (400) wet or dry sandpaper can be used with water. Rinse parts in water before handling. An appropriate solvent can clean parts used in fueling service. Dry with compressed air or a clean, lint-free cloth. Protect from damage and dust until reassembled.

REPAIR AND REPLACEMENT
Minor nicks and scratches may be polished out using a fine grade of emery or crocus cloth; replace parts if scratches cannot be removed.

Replace O-ring packing and gasket each time CV Flow Control is overhauled.

Replace all parts which are defective. Replace any parts which create the slightest doubt that they will not afford completely satisfactory operation. Use Inspection steps as a guide.

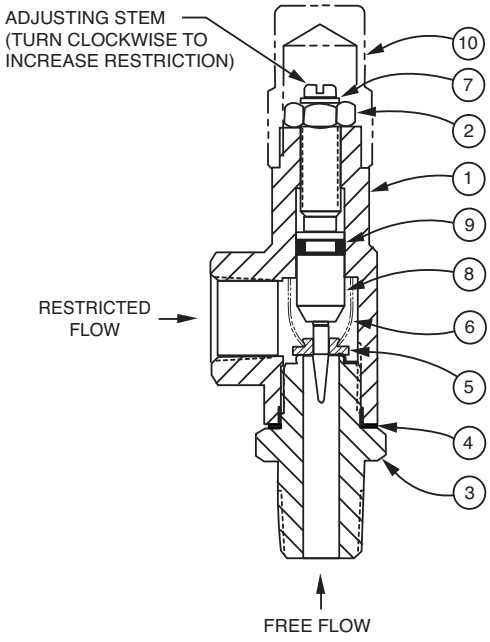
REASSEMBLY
Reassembly is the reverse of disassembly; no special tools are required.

TEST PROCEDURE
No testing of the flow Control is required prior to reassembly to the pilot control system on Cla-Val Main Valve.

CLA-VAL

CV
Flow Control

3/8" CV Flow Control

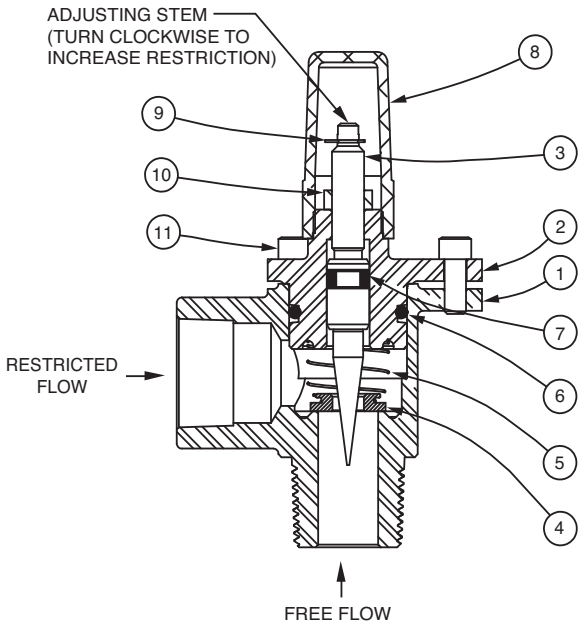


ITEM	DESCRIPTION	QTY
1	Housing	1
2	Nut, Jam	1
3	Seat	1
4	Gasket	1
5	Disc	1
6	Spring	1
7	Ring, Retaining	1
8	Stem	1
9	O-Ring	1
10	Cap (SS only)	1

When ordering parts, please specify:

- Number Stamped on Side
- Description (CV Flow Control)
- Part Description
- Material

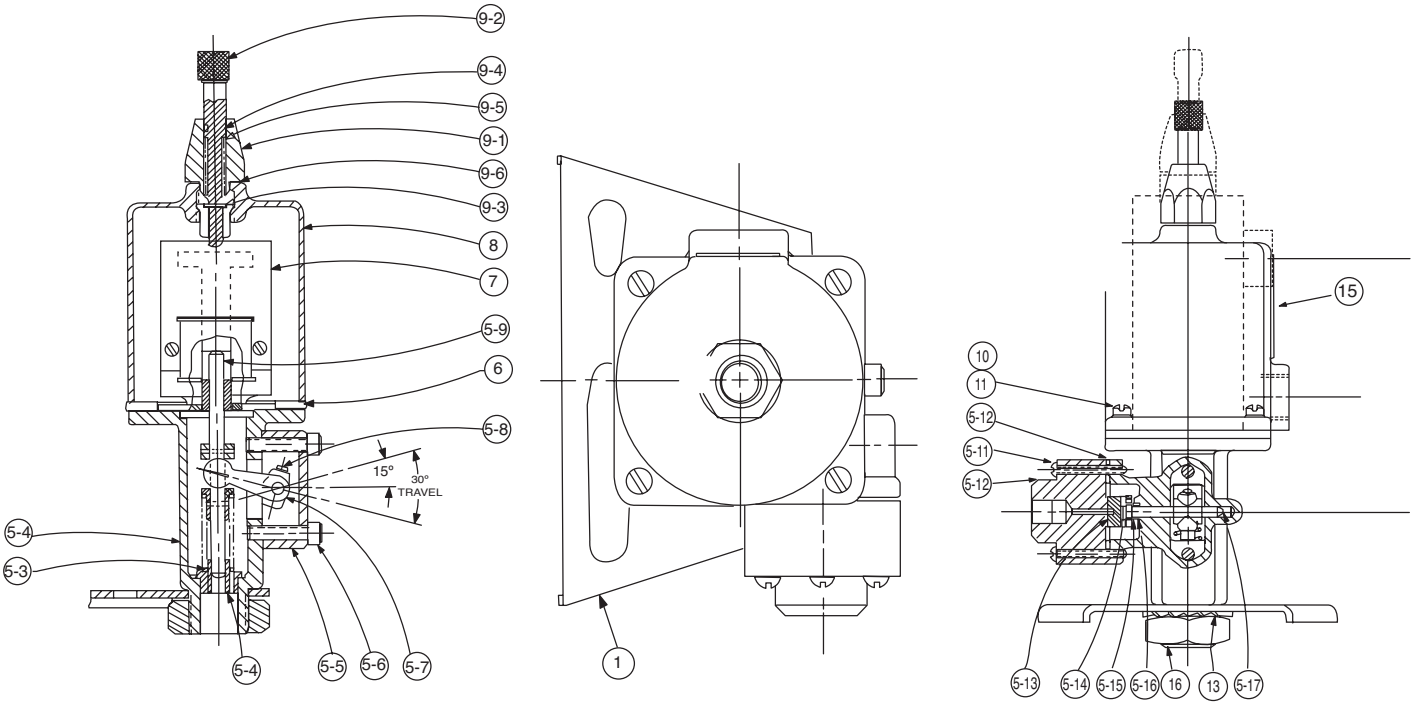
1/2", 3/4", 1" CV Flow Control



ITEM	DESCRIPTION	QTY
1	Body	1
2	Cover	1
3	Stem	1
4	Disc	1
5	Spring	1
6	O-Ring	1
7	O-Ring	1
8	Cap	1
9	Ring, Retaining	1
10	Nut, Jam	1
11	Socket Head Cap Screw	3

CSM-11/CSM11-HC

Solenoid Control



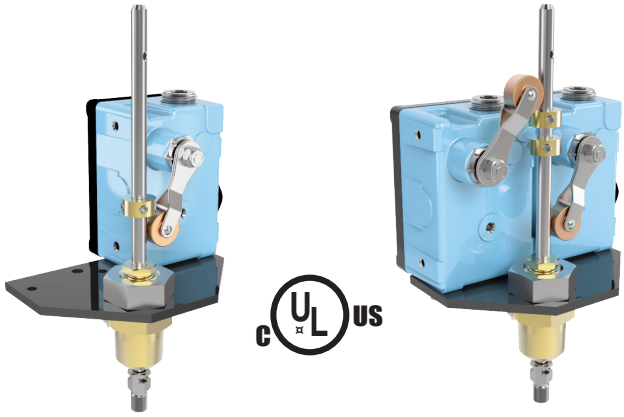
Item	Description	Item	Description
1	Mounting Bracket	7	Solenoid Assy.
5	Mechanical Parts Assy.	8	Cover
5-2	Housing	9	Manual Operator Assy.
5-3	Spring	9-1	Housing, Manual Operator
5-4	Guide	9-2	Plunger
5-5	Side Housing	9-3	Pin, groove-3/8”
5-6	Cap Screw 1/4’	9-4	“O”- Ring
5-7	Lever Arm	9-5	Spring, Manual Operator
5-8	Lever Screw	9-6	Gasket, Manual Operator
5-9	Stem Assy. (Solenoid)	10	Machine Screw Fil. Hd. 10/32 x 5/8 (4 reqd)
5-10	Distributor Gasket	11	Lockwasher
5-11	Machine Screw, RDH (6/32 x 1 1/4 - 6 reqd.)	12	Machine Screw Fil. Hd.
5-12	Distributor	13	Lockwasher
5-13	Disc Assy.	14	Coil only
5-14	Spring	15	Nameplate
5-15	Thrust Washer	16	Hex Nut, Jam 1-14 UNS
5-16	“O”- Ring		
5-17	Stem Assy. (Pilot)		
6	Spacer Gasket		

CLA-VAL®

MODELS

X105L
X105L2

Limit Switch Assemblies

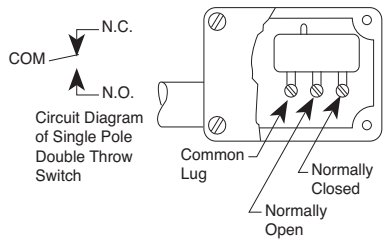


- **UL/ULC Listed**
- **Positive Action**
- **Rugged and Dependable**
- **Weather Proof or Explosion Proof**
- **Easy To Adjust**

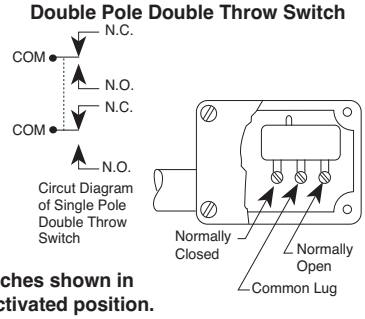
The Cla-Val Model X105L/X105L2 Limit Switch Assembly is a rugged, dependable and positive acting switch assembly actuated by the opening or closing of a Cla-Val control valve on which it is mounted. The single pole, double throw micro switch can be connected either to open or to close an electrical circuit when actuated. By loosening the allen screw on the actuating collar and raising or lowering the collar on the stem, the X105L is easily adjusted to signal that the valve has fully reached the desired position (open or closed).

Installation

Single Pole Double Throw Switch

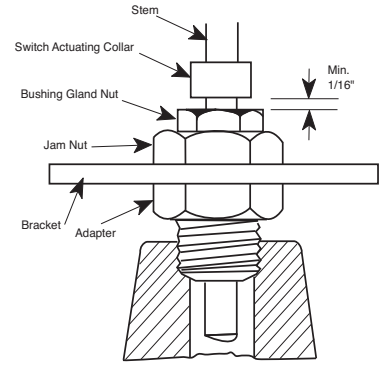


Double Pole Double Throw Switch



Switches shown in unactivated position.

1. Remove plug in top of valve cover.
2. Screw actuating stem into main valve stem.
3. Slip adapter down over stem and screw into place on valve cover.
4. Attach micro switch housing and bracket to adapter with jam nut.
5. Bring electrical supply circuit into unit through the 1/2" tapping in micro switch housing.
6. Adjust switch collars. (Set collar to trip switch after valve is positioned fully open or fully closed)



Actuating Collar Adjustment Minimum Setting

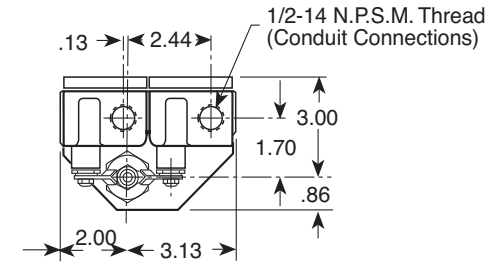
When adjusting actuating collar for proper switch action, a clearance of at least 1/16" (1/8" for 48" valve) must be provided between the collar and the bushing gland nut when valve is in the fully closed position.

Purchase Specifications

The assembly shall be bracket-mounted to exterior of an adapter attached to the center of the main valve cover. A stainless steel actuating stem with a swivel adapter shall be fastened directly to the main valve stem and move vertically through an adapter and gland with two O-ring seals as the valve moves. An adjustable collar located on the actuating stem shall actuate the sensor arm of a switch when valve has fully reached the open or closed (specify) position. The rotary-type position sensor arm shall actuate SPDT or DPDT type (specify) micro-switches mounted inside protective housing either weather-tight or explosion-proof NEMA rated (specify).

Provisions shall be made for bleeding air from valve cover through a small bleed screw and washer located on one wrench flat of adapter. All assemblies shall be capable of accommodating up to three switches. Standard materials in contact with operating fluid are brass, stainless steel, Monel and Buna-N.

A conduit hub opening in the switch enclosure shall be provided for attaching protective weatherproof conduit for the electrical switch wires (wiring and conduit supplied by others). A sealing plug shall be provided to protect conduit opening during shipping or storage.



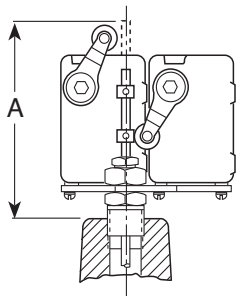


Fig. 1
Valve Size
1 1/4" Thru 8"
X105L2W
X105L2X

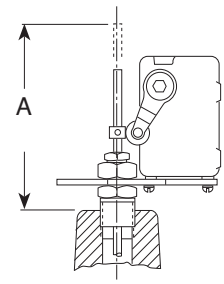


Fig. 2
Valve Size
1 1/4" Thru 14"
X105LCW
X105LCX

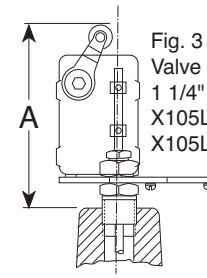


Fig. 3
Valve Size
1 1/4" Thru 8"
X105LOW
X105LOX

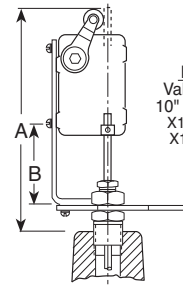


Fig. 4
Valve Size
10" Thru 14"
X105LOW
X105LOX

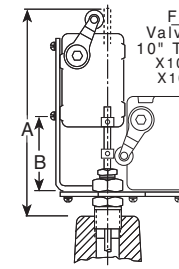
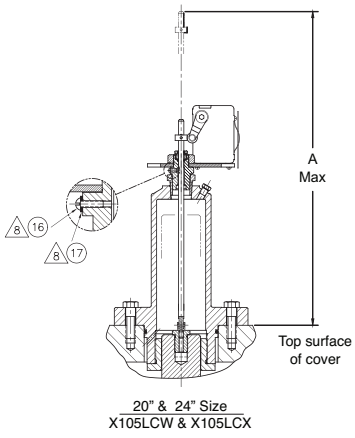
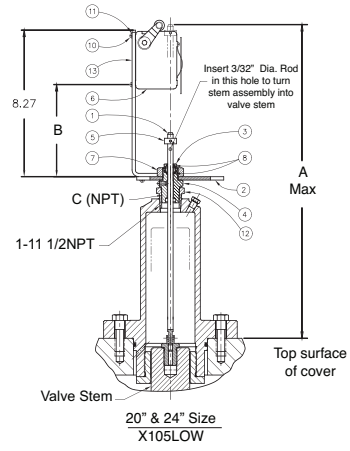


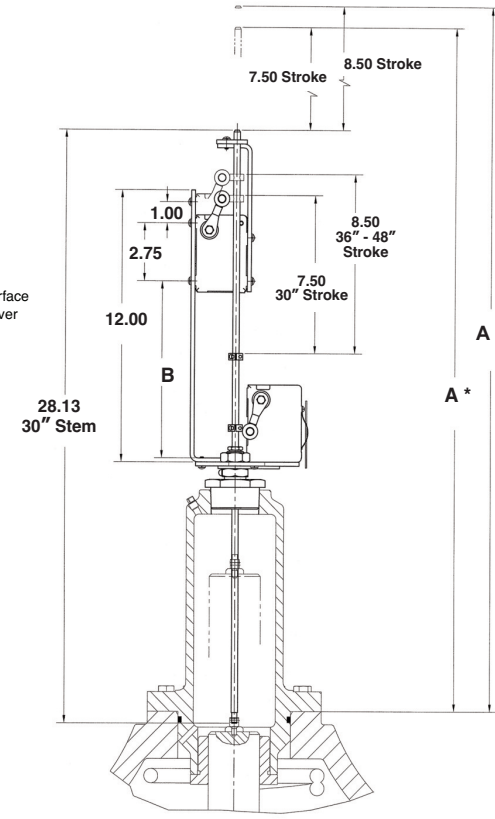
Fig. 5
Valve Size
10" Thru 14"
X105L2W
X105L2X



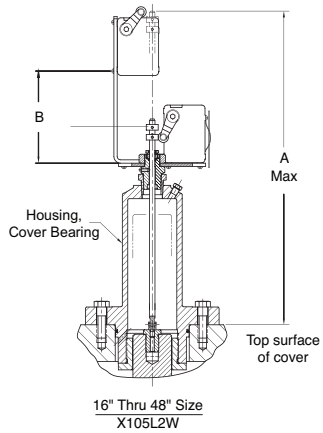
20" & 24" Size
X105LCW & X105LCX



20" & 24" Size
X105LOW



A* - 30" • A** - 36", 42" & 48" Size



16" Thru 48" Size
X105L2W

X105 Series Dimensions (In Inches)

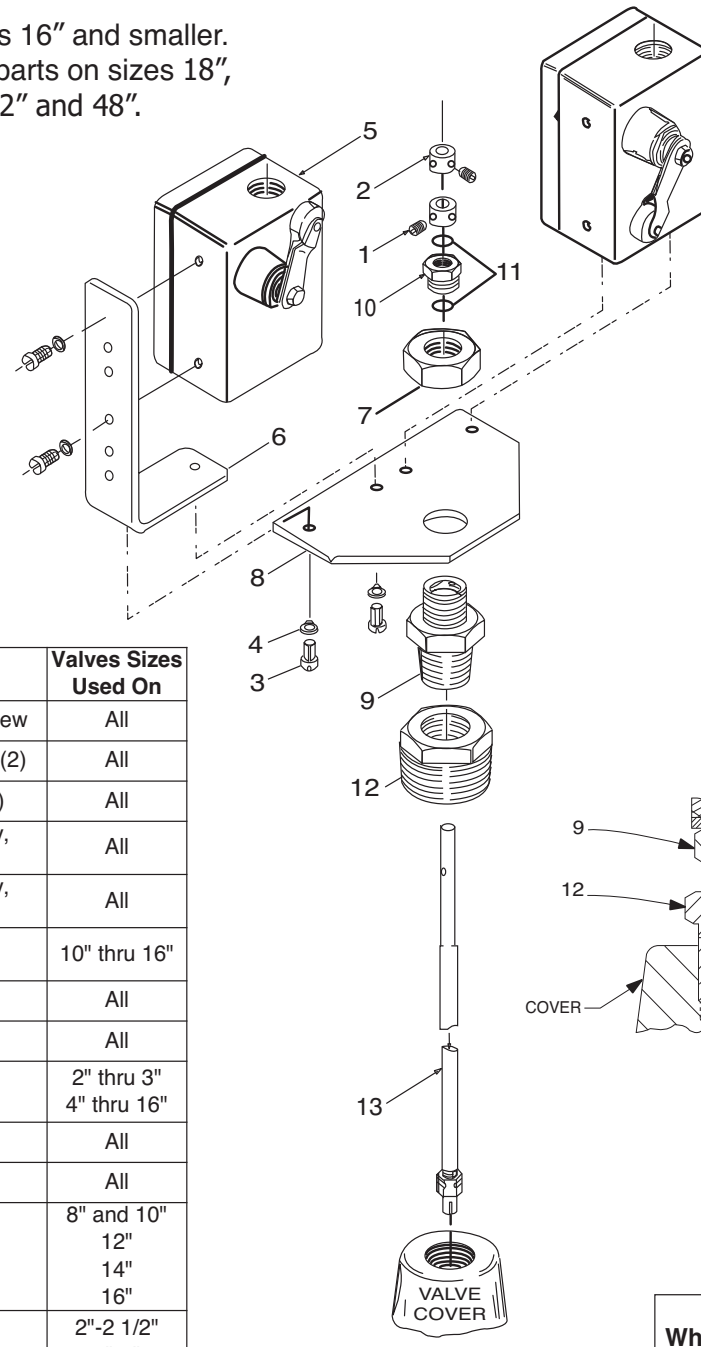
BasicValve 100-01	1 1/4	1 1/2	2	2 1/2	3	4	6	8	10	12	14	16	18	20	24	30	36*	42*	48*
Dimension "A"	10.19	10.19	7.16	7.16	7.34	7.00	6.69	6.91	9.88	9.59	9.16	10.78	10.78	18.23	19.10	35.07	36.07	36.07	36.07
Dimension "B"							1.69	1.69	2.44	2.94	2.94	2.94	2.94	4.32	5.19	8.40	8.40	8.40	8.40
C (NPT)	1/4	1/4	1/2	1/2	1/2	3/4	3/4	1	1	1 1/4	1 1/2	2	2	3/4	3/4	2	2	2	2
BasicValve 100-20					3	4	6	8	10	12	14	16	18	20	24	30	36*	42*	48*
Dimension "A"					7.16	7.34	7.00	6.69	6.91	9.88	9.59	9.59	10.78	10.78	10.78	11.30	35.07	36.07	36.07
Dimension "B"								1.69	1.69	2.44	2.94	2.94	2.94	2.94	2.94	5.19	8.40	8.40	8.40
C (NPT)					1/2	1/2	3/4	3/4	1	1	1 1/4	1 1/4	2	2	2	1	2	2	2

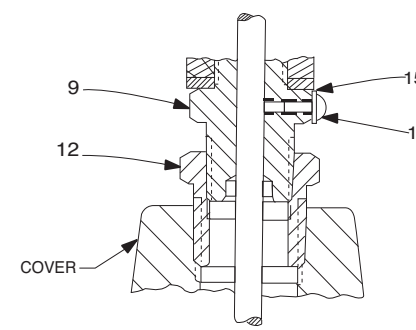
CLA-VAL

X105L

Limit Switch Assembly

Parts list shown is for sizes 16″ and smaller.
Please consult factory for parts on sizes 18″, 20″, 24″, 30″, 36″, 42″ and 48″.



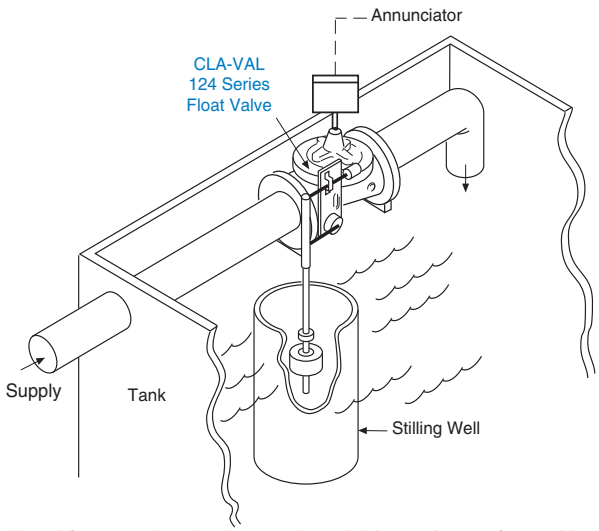


Item	Part Number	Description	Valves Sizes Used On
1-2	20441701E	Collar W/Set Screw	All
3	67578-21B	Screw, Machine (2)	All
4	67584-23F	Washer, Lock (2)	All
5	34637K	Switch Assembly, Weather Proof	All
	34633J	Switch Assembly, Explosion Proof	All
6	64310G	Bracket Switch Mounting	10" thru 16"
7	67815-06J	Nut, Jam	All
8	63674G	Plate, Mounting	All
9	2838201J 2838202G	Adapter Adapter	2" thru 3" 4" thru 16"
10	63398C	Bushing, Gland	All
11	00951E	O-Ring (2)	All
12	6764417K 6764418H 6764419F 6764491J	Bushing Bushing Bushing Bell Reducer	8" and 10" 12" 14" 16"
13	8970101F 8970102D 8970103B 8970104K 8970105G	Stem, Actuating Stem, Actuating Stem, Actuating Stem, Actuating Stem, Actuating	2"-2 1/2" 3"-4" 6"-8" 10"-12"-14" 16"
15	6551201H	Fiber Washer	All
16	6824421K	Screw 8-32 x 3/8	All

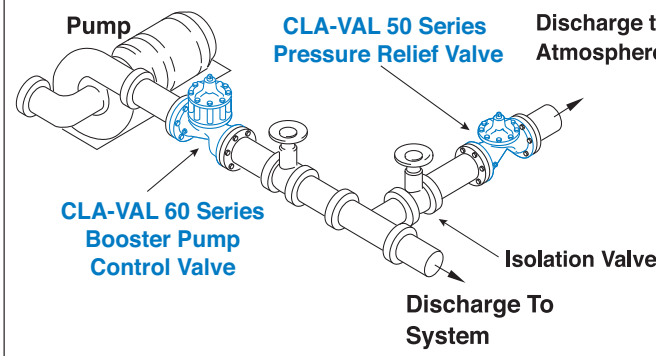
When ordering parts, please specify:

- Item Number
- Description
- Part Number

Typical Applications



Used for any electrical operation which can be performed by either opening or closing a switch; such as alarm systems, process control, pump control, motor starting or stopping, etc. Readily attached to most Cla-Val Valves.



The X105L Series Limit Switch Assembly is used on Cla-Val 60 Series Booster Pump Control Valves. Flexible conduit is used for electrical connections to the solenoid control and the limit switch.

Specifications

Materials:	Aluminum switch housing Steel bracket and brass adapter Stainless steel stem
Electrical:	1/2" Conduit connection
Switch Type:	SPDT UL, File No. E12252, CSA Certified, File No. LR57325 Weather proof NEMA 1,3,4, and13
Switch Rating:	UL/CSA rating: L96 15 amp. 125, 250, or 480 volts AC 1/2 amp. 125 volts DC 1/4 amp. 250 volts DC
Switch Options:	DPDT switches available on request UL/CSA Rating: L59, 10 amps Explosion proof micro switches are NEMA 1,7, and 9 UL Listed, File No. E14274 and CSA Certified, File No. LR57324: Class I, Group C and D and Class II, Group E, F and G.

When Ordering, Please Specify

1. Valve Size and Basic Valve Model Number
2. Catalog Number from Table Below
3. All Valve Name Plate Data
4. Select Single or Double Pole Switch
5. Explosion Proof or Weather Proof Type Enclosure
6. Amperes and Voltage, AC or DC
7. Actuating Position (Valve Open or Closed)

CATALOG NO.	ACTUATION POSITION	SWITCH ENCLOSURE
X105LCW	Valve Closed	Weather Proof
X105LCX	Valve Closed	Explosion Proof
X105LOW	Valve Open	Weather Proof
X105LOX	Valve Open	Explosion Proof
X105L2W	Dual	Weather Proof
X105L2X	Dual	Explosion Proof

CLA-VAL

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E-mail sales@cla-val.ca

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Lausanne, Switzerland
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ZAC du Champ du Périer
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E-mail: cla-val@cla-val.fr

CLA-VAL PACIFIC
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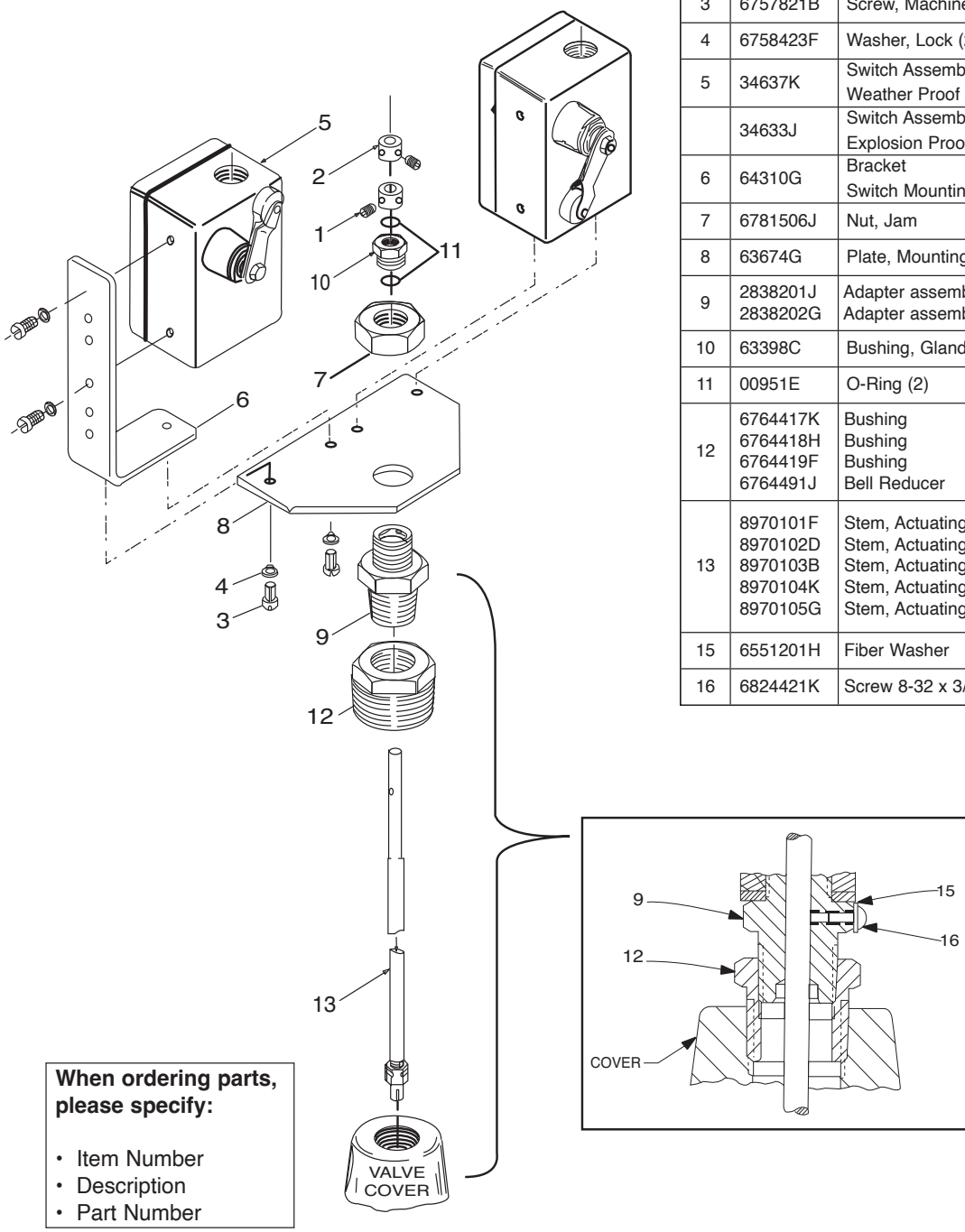
Phone: 64-39644860
www.cla-valpacific.com
E-mail: info@cla-valpacific.com

visit www.cla-val-latinamerica.com for Spanish literature

X105L

Limit Switch Assembly

Item	Part Number	Description	Valves Sizes Used On
1-2	20441701E	Collar W/Set Screw	All
3	6757821B	Screw, Machine (2)	All
4	6758423F	Washer, Lock (2)	All
5	34637K	Switch Assembly, Weather Proof	All
	34633J	Switch Assembly, Explosion Proof	All
6	64310G	Bracket Switch Mounting	10" thru 16"
7	6781506J	Nut, Jam	All
8	63674G	Plate, Mounting	All
9	2838201J 2838202G	Adapter assembly (incl: 15 & 16) Adapter assembly (incl: 15 & 16)	2" thru 3" 4" thru 16"
10	63398C	Bushing, Gland	All
11	00951E	O-Ring (2)	All
12	6764417K 6764418H 6764419F 6764491J	Bushing Bushing Bushing Bell Reducer	8" and 10" 12" 14" 16"
13	8970101F 8970102D 8970103B 8970104K 8970105G	Stem, Actuating Stem, Actuating Stem, Actuating Stem, Actuating Stem, Actuating	2"-2 1/2" 3"-4" 6"-8" 10"-12"-14" 16"
15	6551201H	Fiber Washer	All
16	6824421K	Screw 8-32 x 3/8	All



When ordering parts, please specify:

- Item Number
- Description
- Part Number

CVS-1
SHUTTLE VALVE

Features

- **No Lubrication**
- **Corrosion Resistant**
- **One Moving Part**
- **Replaceable Teflon Coated Seal**
- **Fast Acting**
- **Simplified design - low maintenance**
- **Non-Sticking**
- **Drip tight sealing**
- **Easy Maintenance**

DESCRIPTION

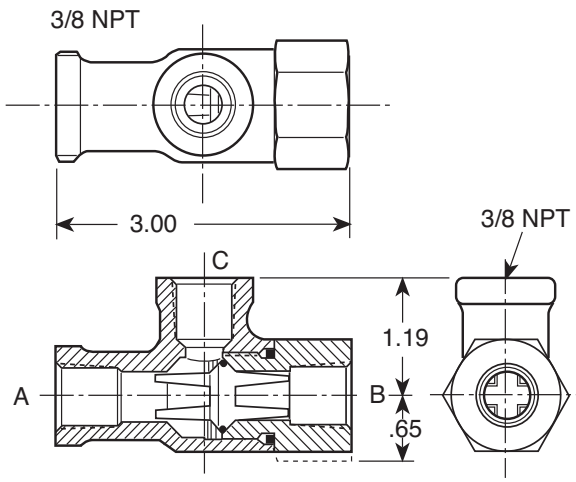
The Cla-Val Model CVS-1 Shuttle Valve is precision engineered for lasting dependable service. The CVS-1 combines instantaneous action with one moving part designed for smooth positive operation with minimum wear. The flow pattern interconnects the highest pressure from two separate pressure zones (ports "A" or "B") to a common port "C". The two pressure zones, ports A or B can never flow to one another.

The design incorporates precision sealing required for low pressure or high pressure operation. The seal is teflon coated to prevent sticking under the most adverse conditions of exposure or prolonged actuation in one position. The Cla-Val Model CVS-1 Shuttle Valve incorporates all the required features for lasting dependable service.

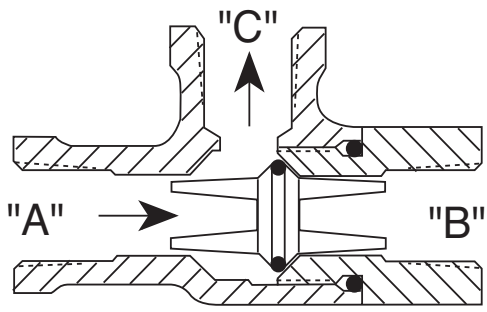
Specifications

Size	3/8" NPT
End Detail	300 ANSI B2.1
Pressure Rating	400 psi Max.
Shifting Differential	10" Water Column Differential
CV Factor	A" to "C" 3.5 "B" to "C" 3.1
Temperature Range	Water to 140°F
Materials	**Body** Cast Bronze ASTM B-62
	Internal Trim Delrin (Dupont 500)
	Rubber Parts Static Seal - Buna N® Synthetic Rubber Shuttle Seal - Buna N® Synthetic Rubber Teflon Coated

Dimensions

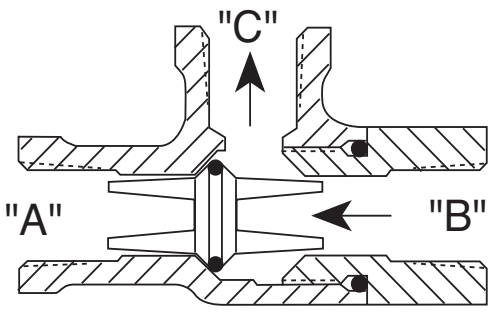


Principle of Operation



Flow Direction "A" to "C"

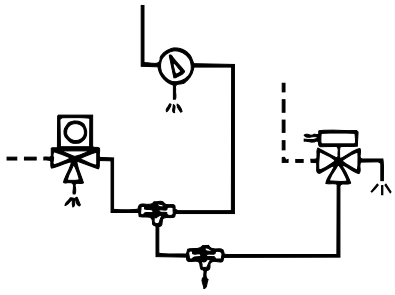
When pressure at port "A" is greater than port "B", the shuttle shifts allowing flow from port "A" to "C",



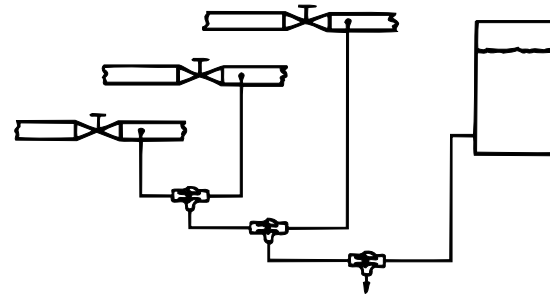
Flow Direction "B" to "C"

When pressure at port "B" is greater than port "A", the shuttle shifts allowing flow from port "B" to "C",

APPLICATIONS

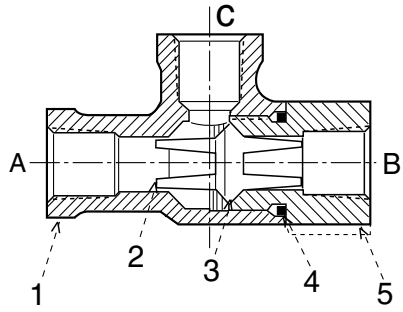


Sending remote pressure signals form several locations.



Receiving pressure signals form the highest pressure available.

PARTS LIST



Item No.	Description	Qty
1	Body-Shuttle Valve	1
2	Poppet	1
3	O-Ring	1
4.	O-Ring	1
5.	Seat-Shuttle Valve	1

PURCHASE SPECIFICATIONS

The valve shall be a threw-way type equipped with on moving part and a replaceable teflon coated seal. The seal shall be drip tight throughout the entire pressure range. The minimum shifting differential for the valve shall be 10 inches of water column differential. The valve shall be a Model CVS-1 as manufactured by Cla-Val, Newport Beach, California 92659

When Ordering, Please Specify

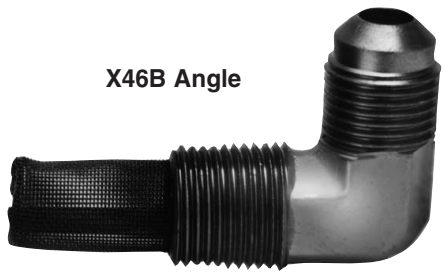
1. Catalog Number
2. Size
3. Fluid to be handled
4. Temperature
5. Materials

CLA-VAL™

— MODEL — X46

Flow Clean Strainer

X46A Straight



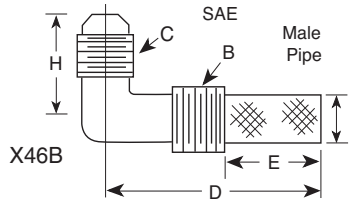
X46B Angle

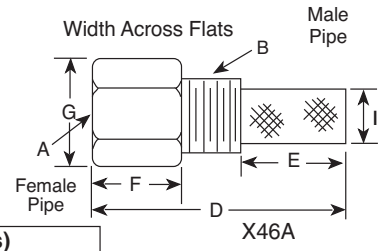
- **Self Scrubbing Cleaning Action**
- **Straight Type or Angle Type**

The Cla-Val Model X46 Strainer is designed to prevent passage of foreign particles larger than .015". It is especially effective against such contaminant as algae, mud, scale, wood pulp, moss, and root fibers. There is a model for every Cla-Val. valve.

The X46 Flow Clean strainer operates on a velocity principle utilizing the circular "air foil" section to make it self cleaning. Impingement of particles is on the "leading edge" only. The low pressure area on the downstream side of the screen prevents foreign particles from clogging the screen. There is also a scouring action, due to eddy currents, which keeps most of the screen area clean.

Dimensions (In Inches)





X46 Angle Type B (In Inches)

B(NPT)	C(SAE)	D	E	H	I
1/8	1/4	1-3/8	5/8	7/8	1/4
1/4	1/4	1-3/4	3/4	1	3/8
3/8	1/4	2	7/8	1	1/2
3/8	3/8	1-7/8	7/8	1	1/2
1/2	3/8	2-3/8	1	1-1/4	5/8

X46A Straight Type A (In Inches)

A (NPT)	B (NPT)	D	E	F	G	I
1/8	1/8	1-3/4	3/4	1/2	1/2	1/4
1/4	1/4	2-1/4	1	3/4	3/4	3/8
3/8	3/8	2-1/2	1	7/8	7/8	1/2
3/8	1/2	2-1/2	1-1/4	1/2	7/8	3/4
1/2	1/2	3	1-1/4	1	1-1/8	3/4
3/8	3/4	3-3/8	2	1/2	1	7/8
3/4	3/4	4	2	1	1-1/2	7/8
3/8	1	4-1/4	2-3/4	1/2	1-3/8	7/8
1	1	4-1/2	2-3/4	1-1/4	1-3/4	7/8
1/2	1	4-1/4	2-3/4	1/2	1-3/8	7/8

When Ordering, Please Specify:

- Catalog Number X46
- Straight Type or Angle Type
- Size Inserted Into and Size Connection
- Materials

INSTALLATION

The strainer is designed for use in conjunction with a Cla-Val Main Valve, but can be installed in any piping system where there is a moving fluid stream to keep it clean. When it is used with the Cla-Val Valve, it is threaded into the upstream body port provided for it on the side of the valve. It projects through the side of the Main Valve into the flow stream. All liquid shunted to the pilot control system and to the cover chamber of the Main Valve passes through the X46 Flow Clean Strainer.

INSPECTION

Inspect internal and external threads for damage or evidence of cross-threading. Check inner and outer screens for clogging, embedded foreign particles, breaks, cracks, corrosion, fatigue, and other signs of damage.

DISASSEMBLY

Do not attempt to remove the screens from the strainer housing.

CLEANING

After inspection, cleaning of the X46 can begin. Water service usually will produce mineral or lime deposits on metal parts in contact with water. These deposits can be cleaned by dipping X46 in a 5-percent muriatic acid solution just long enough for deposit to dissolve. This will remove most of the common types of deposits. **Caution: use extreme care when handling acid.** If the deposit is not removed by acid, then a fine grit (400) wet or dry sandpaper can be used with water. Rinse parts in water before handling. An appropriate solvent can clean parts used in fueling service. Dry with compressed air or a clean, lint-free cloth. Protect from damage and dust until reassembled.

REPLACEMENT

If there is any sign of damage, or if there is the slightest doubt that the Model X46 Flow Clean Strainer may not afford completely satisfactory operation, replace it. Use Inspection steps as a guide. Neither inner screen, outer screen, nor housing is furnished as a replacement part. Replace Model X46 Flow Clean Strainer as a complete unit.

When ordering replacement Flow-Clean Strainers, it is important to determine pipe size of the tapped hole into which the strainer will be inserted (refer to column A or F), and the size of the external connection (refer to column B or G).

CLA-VAL P.O. Box 1325 • Newport Beach, CA 92659-0325 • Phone: 949-722-4800 • Fax: 949-548-5441 • E-mail: claval@cla-val.com • Website cla-val.com

BB	ADDED PN'S 67783-62B (NED 62200)	AK 07-10-08
BC	ADDED PN'S 67783-63K (NED 62218)	AK 08-14-08
BD	ADDED PN 67783-64H (NED 62446)	PC 10-1-2008

CAD REVISION RECORD - DO NOT REVISE MANUALLY

LTR	DESCRIPTION	BY	DATE
A-AY	SEE REVISION FILE		
BA	ADDED PN'S 67783-59H, 67783-60F & 67783-61D (ECO 20434)	AK	03-14-06

CLA-VAL CO. NEWPORT BEACH, CALIFORNIA

CATALOG NO.

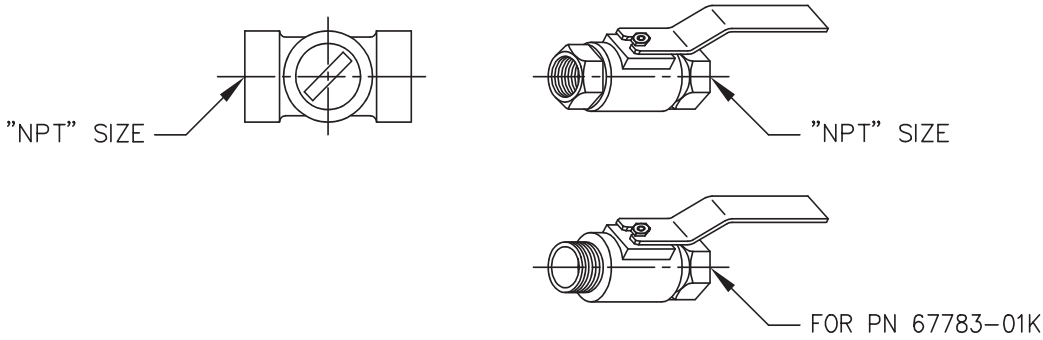
DRAWING NO. 67783 REV BD

TYPE OF VALVE AND MAIN FEATURES

CK2 COCK/BALL VALVE

DESIGN		
DRAWN	MGR	4-02-80
CHK'D	KD	4-03-80
APV'D	CH	4-07-80

SCALE: NONE



CLA-VAL PART NO. AND MATERIAL

BRONZE WITH HANDLE	STEEL WITH HANDLE	IRON WITH HANDLE	316 SST WITH HANDLE	316 SST W/ LOCKING HANDLE	BRONZE WITH HANDLE	MONEL WITH HANDLE	MONEL W/ LOCKING HANDLE	SIZE "NPT"
67783-01K*	-09C	-17F	-25J SUPSD BY-26G		-41F SUPSD BY-01K			1/8"
-02H	-10A	-18D	-26G	-51E SUPSD BY-26G -52C	-42D SUPSD BY-02H	-55F		1/4"
-03F* -59H***	-11J	-19B	-27E	-46E SUPSD BY-27E -53A	-45G -57B**	-48A SUPSD BY-49J	-63K	3/8"
-04D -60F ***	-12G	-20K	-28C	-54J	-43B SUPSD BY-04D	-49J	-62B	1/2"
-05A -61D ***	-13E	-21H	-29A	-64H	-44K SUPSD BY-05A	-56D		3/4"
-06J	-14C	-22F	-30J			-58K		1"
-07G	-15K	-23D	-31G					1 1/4"
-08E	-16H	-24B	-32E					1 1/2"
-50G			-47C					2"

* SEE ENGINEERING APPROVED VENDORS TABLE (SHEET 2 OF 2).

** HAMMOND VALVE 8501 ONLY.

*** WILKINS CK2 (SEE SHEET 2 OF 2)

CLA-VAL™

— MODEL — **X141**

Cla-Val Gauge Option

Model X141
4" Pressure Gauge

- **Liquid-Filled**
- **Dual Scale (PSI / BAR)**
- **Long Life Stainless Steel Construction**
- **Tamper-Resistant Design**
- **2 ½" and 4" Diameter Sizes**
- **Isolation Valve Included**

The Cla-Val Model X141 Pressure Gauge Option consists of glycerin-filled pressure gauges with the Cla-Val Logo and ¼" CK2 Bronze Isolation Valves on the main valve inlet and outlet. Cla-Val gauges are waterproof, shock resistant, and fully enclosed with a stainless steel case and bronze wetted parts. Ambient temperature ratings are -4 Degrees F to +140 Degrees F (-20 Degrees C to +60 Degrees C).

All gauges have dual scale (PSI/BAR) and are supplied with a 1/4" NPT bottom connection. Model X141 gauges are available installed on new valves and must be specified on the customer Purchase Order. Consult factory for other available materials.

Available Pressure Ranges

X141 Gauge Assembly (2 1/2" Diameter Dial)

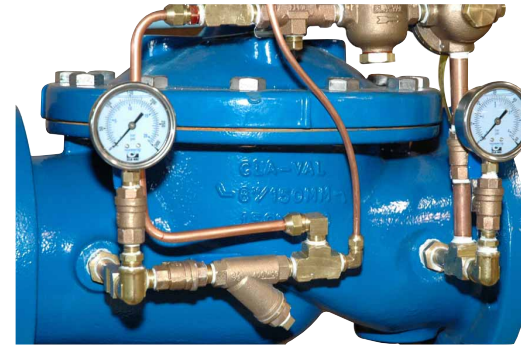
Pressure Range*	Part Number
0 - 60 psi	20534301A
0 - 100 psi	20534302K
0 - 200 psi	20534303J
0 - 300 psi	20534304H
0 - 400 psi	20534305G

X141 Gauge Assembly (4" Diameter Dial)

Pressure Range*	Part Number
0 - 60 psi	20534306F
0 - 100 psi	20534307E
0 - 200 psi	20534308D
0 - 300 psi	20534309C
0 - 400 psi	20534310K

Typical X141 Installation

Typical Installation with two X141 Gauges



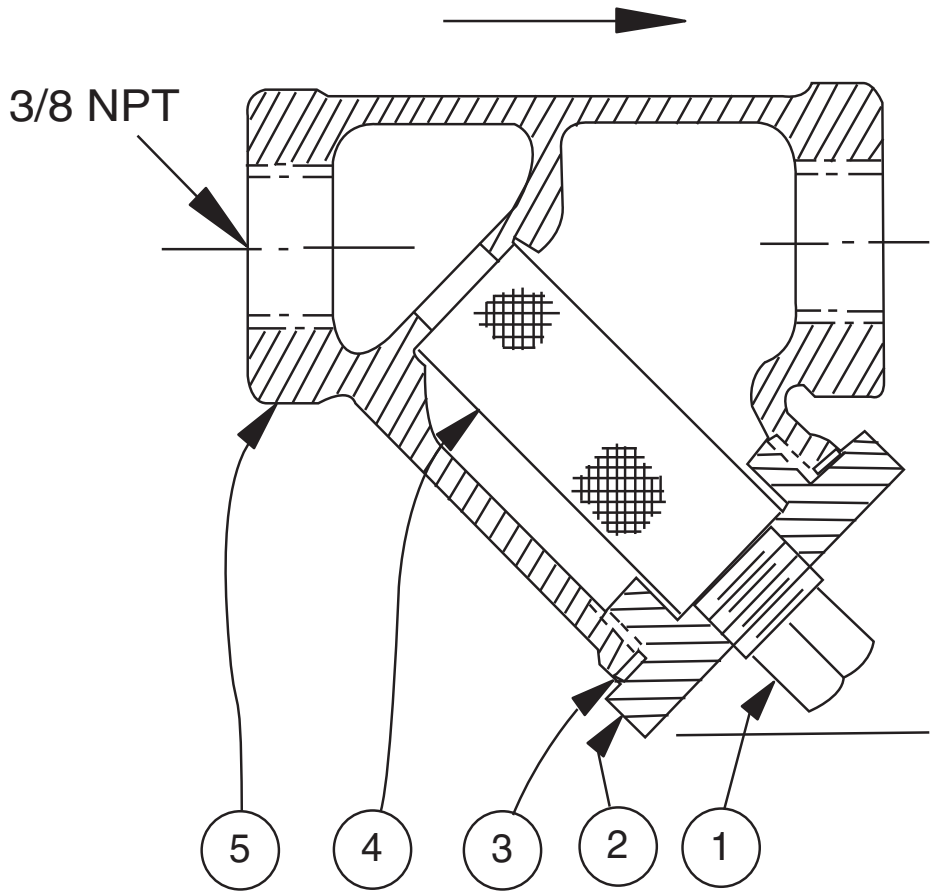
*Specify desired pressure range and valve location (inlet or outlet) on order.

X43
Strainer

ITEM	DESCRIPTION	MATERIAL
1	Pipe Plug	Stainless Steel
2	Strainer Plug	Stainless Steel
3	Gasket	Fiber
4	Screen	Stainless Steel
5	Body	Stainless Steel
No parts available. Replacement assembly only.		

Standard 60 mesh pilot system strainer for fluid service.

Size	Stock Number
3/8 x 3/8	8850604D



Cla-Val Product Identification

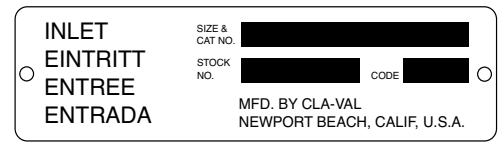
How to Order

Proper Identification

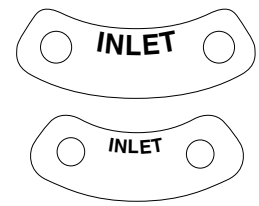
For ordering repair kits, replacement parts, or for inquiries concerning valve operation, it is important to properly identify Cla-Val products already in service by including all nameplate data with your inquiry. Pertinent product data includes valve function, size, material, pressure rating, end details, type of pilot controls used and control adjustment ranges.

Identification Plates

For product identification, cast-in body markings are supplemented by identification plates as illustrated on this page. The plates, depending on type and size of product, are mounted in the most practical position. **It is extremely important that these identification plates are not painted over, removed, or in any other way rendered illegible.**

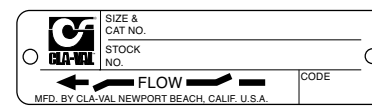


This brass plate appears on valves sized $2^1/_2$" and larger and is located on the top of the inlet flange.

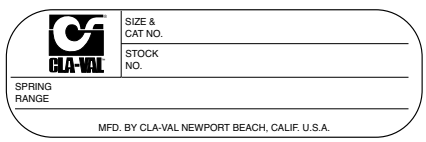


These two brass plates appear on $^3/_8$", $^1/_2$", and $^3/_4$" size valves and are located on the valve cover.

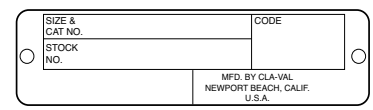
This brass plate appears on altitude valves only and is found on top of the outlet flange.



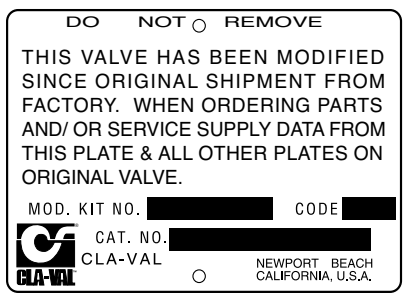
These two brass plates appear on threaded valves 1" through 3" size or flanged valves 1" through 2". It is located on only one side of the valve body.



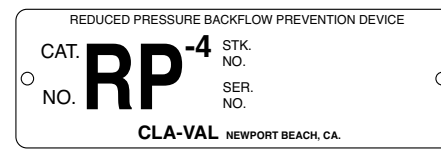
This tag is affixed to the cover of the pilot control valve. The adjustment range appears in the spring range section.



This brass plate is used to identify pilot control valves. The adjustment range is stamped into the plate.



This aluminum plate is included in pilot system modification kits and is to be wired to the new pilot control system after installation.



This brass plate is used on our backflow prevention assemblies. It is located on the side of the Number Two check (2" through 10"). The serial number of the assembly is also stamped on the top of the inlet flange of the Number One check.

HOW TO ORDER

Because of the vast number of possible configurations and combinations available, many valves and controls are not shown in published product and price lists. For ordering information, price and availability on product that are not listed, please contact your local Cla-Val office or our factory office located at:

P. O. Box 1325
Newport Beach, California 92659-0325
(949) 722-4800
FAX (949) 548-5441

SPECIFY WHEN ORDERING

- Model Number
- Globe or Angle Pattern
- Adjustment Range (As Applicable)
- Valve Size
- Threaded or Flanged
- Body and Trim Materials
- Optional Features
- Pressure Class

UNLESS OTHERWISE SPECIFIED

- Globe or angle pattern are the same price
- Ductile iron body and bronze trim are standard
- X46 Flow Clean Strainer or X43 "Y" Strainer are included
- CK2 Isolation Valves are included in price on 4" and larger valve sizes (6" and larger on 600 Series)

LIMITED WARRANTY

Automatic valves and controls as manufactured by Cla-Val are warranted for three years from date of shipment against manufacturing defects in material and workmanship that develop in the service for which they are designed, provided the products are installed and used in accordance with all applicable instructions and limitations issued by Cla-Val. Electronic components manufactured by Cla-Val are warranted for one year from the date of shipment.

We will repair or replace defective material, free of charge, that is returned to our factory, transportation charges prepaid, if upon inspection, the material is found to have been defective at time of original shipment. This warranty is expressly conditioned on the purchaser's providing written notification to Cla-Val immediate upon discovery of the defect.

Components used by Cla-Val but manufactured by others, are warranted only to the extent of that manufacturer's guarantee.

This warranty shall not apply if the product has been altered or repaired by others, Cla-Val shall make no allowance or credit for such repairs or alterations unless authorized in writing by Cla-Val.

DISCLAIMER OF WARRANTIES AND LIMITATIONS OF LIABILITY

The foregoing warranty is exclusive and in lieu of all other warranties and representations, whether expressed, implied, oral or written, including but not limited to any implied warranties or merchantability or fitness for a particular purpose. All such other warranties and representations are hereby cancelled.

Cla-Val shall not be liable for any incidental or consequential loss, damage or expense arising directly or indirectly from the use of the product. Cla-Val shall not be liable for any damages or charges for labor or expense in making repairs or adjustments to the product. Cla-Val shall not be liable for any damages or charges sustained in the adaptation or use of its engineering data and services. No representative of Cla-Val may change any of the foregoing or assume any additional liability or responsibility in connection with the product. The liability of Cla-Val is limited to material replacements F.O.B. Newport Beach, California.

TERMS OF SALE

ACCEPTANCE OF ORDERS

All orders are subject to acceptance by our main office at Newport Beach, California.

CREDIT TERMS

Credit terms are net thirty (30) days from date of invoice.

PURCHASE ORDER FORMS

Orders submitted on customer's own purchase order forms will be accepted only with the express understanding that no statements, clauses, or conditions contained in said order form will be binding on the Seller if they in any way modify the Seller's own terms and conditions of sales.

PRODUCT CHANGES

The right is reserved to make changes in pattern, design or materials when deemed necessary, without prior notice.

PRICES

All prices are F.O.B. Newport Beach, California unless expressly stated otherwise on our acknowledgement of the order. Prices are subject to change without notice. The prices at which any order is accepted are subject to adjustment to the Seller's price in effect at the time of shipment. Prices do not include sales, excise, municipal, state or any other Government taxes. Minimum order charge $100.00.

RESPONSIBILITY

We will not be responsible for delays resulting from strikes, accidents, negligence of carriers, or other causes beyond our control. Also, we will not be liable for any unauthorized product alterations or charges accruing there from.

RISK

All goods are shipped at the risk of the purchaser after they have been delivered by us to the carrier. Claims for error, shortages, etc., must be made upon receipt of goods.

EXPORT SHIPMENTS

Export shipments are subject to an additional charge for export packing.

RETURNED GOODS

1. Customers must obtain written approval from Cla-Val prior to returning any material.
2. Cla-Val reserves the right to refuse the return of any products.
3. Products more than six (6) months old cannot be returned for credit.
4. Specially produced, non-standard models cannot be returned for credit.
5. Rubber goods such as diaphragms, discs, o-rings, etc., cannot be returned for credit, unless as part of an unopened vacuum sealed repair kit which is less than six months old.
6. Goods authorized for return are subject to a 35% ($100 minimum) restocking charge and a service charge for inspection, reconditioning, replacement of rubber parts, retesting, repainting and repackaging as required.
7. Authorized returned goods must be packaged and shipped prepaid to Cla-Val, 1701 Placentia Avenue, Costa Mesa, California 92627.

CLA-VAL®

E-Product I.D. (R-3/2011)

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CH-1032 Romanel/
Lausanne, Switzerland
Phone: 41-21-643-15-55
Fax: 41-21-643-15-50

www.cla-val.com

Represented By:

CLA-VAL

—MODEL— REPAIR KITS

Model 100-01 Hytrol Main Valve

BUNA-N MATERIAL				
	RUBBER KIT STOCK #	REPAIR KIT STOCK #	REBUILD ASSEMBLY STOCK #	STUD & NUT KIT STOCK #
3/8”	9169801K		21176614B	21176633J
1/2”	9169802H	21176602F	21176615A	21176634H
3/4”	9169802H	21176602F	21176615A	21176634H
1” Non-Guided	9169803F	21176601G	21176616K	21176636F
1”	9169804D	21176603E	21176617J	21176636F
1 1/4”	9169804D	21176603E	21176617J	21176636F
1 1/2”	9169804D	21176603E	21176617J	21176636F
2”	9169805A	21176608K	21176618H	21176637E
2 1/2”	9169811J	21176609J	21176619G	21176638D
3”	9169812G	21176604D	21176620D	21176639C
4”	9169813E	21176605C	21176621C	21176640K
6”	9169815K	21176606B	21176622B	21176641J
8”	9817901D	21176607A	21176623A	21176642H
10”	9817902B	21176610F	21176654C	21176643G
12”	9817903K	21176611E	21176625J	21176644F
14”	9817904H	21176612D	21176626H	21176645E
16”	9817905E	21176613C	21176627G	21176645E

Model 100-20 Hytrol Main Valve

BUNA-N MATERIAL				
	RUBBER KIT STOCK #	REPAIR KIT STOCK #	REBUILD ASSEMBLY STOCK #	STUD & NUT KIT STOCK #
3”	9169805A	21176608K	21176618H	21176637E
4”	9169812G	21176604D	21176620D	21176639C
6”	9169813E	21176605C	21176621C	21176640K
8”	9169815K	21176606B	21176622B	21176641J
10”	9817901D	21176607A	21176623A	21176642H
12”	9817902B	21176610F	21176624K	21176643G
14”	9817903K	21176611E	21176625J	21176644F
16”	9817903K	21176611E	21176625J	21176644F

Model 100-30 Hytrol Main Valve

BUNA-N MATERIAL		
	RUBBER KIT STOCK #	REBUILD ASSEMBLY STOCK #
2 1/2”	21112704H	21235401C
3”	21112702K	21235402B
4”	21112703J	21235403A
6”	27496886J	21235404K
8”	21112701A	21235405J
10”	CF	21235406H

Rubber Kit Includes: Diaphragm, Disc, Spacer Washers. **Model 100-30 also includes:** Stem O-Ring, Seal, Bearing O-Ring.

Repair Kit Includes: Diaphragm, Disc, Spacer Washers, Epoxy Coated Disc Retainer, Epoxy Coated Diaphragm Washer, Protective Washer

Rebuild Assembly Includes: Diaphragm, Disc, Spacer Washers, Epoxy Coated Disc Retainer, Epoxy Coated Diaphragm Washer, Protective Washer, Stainless Steel Bolts & Washers (6" & Below), Stainless Steel Studs, Nuts, & Washers (8" & Above), Stem, Stem Nut, Disc Guide, Standard Cover Spring, Cover Washer. **Model 100-30 also includes:** Upper and Lower Stem and Stem Nut, Stem O-Ring, Seal, Lower Spring, PU Bearing, Bearing O-Ring, Bearing Retainer Ring.

Stud & Nut Kit Includes: Stainless Steel Bolts & Washers (6" & Below), Stainless Steel Studs, Nuts, & Washers (8" & Above)

Consult factory for larger sizes

Repair Kits for 100-02/100-21 Powertrol and 100-03/100-22 Powercheck Main Valves

For: Powertrol and Powercheck Main Valves—**150 Pressure Class Only**

Includes: Diaphragm, Disc (or Disc Assembly) and O-rings and full set of spare Spacer Washers.

Valve Size	Kit Stock Number 100-02	Valve Size	Kit Stock Number	
			100-02 & 100-03	100-21 & 100-22
⅜"	9169901H	2½"	9169910J	N/A
½" & ¾"	9169902F	3"	9169911G	9169905J
1"	9169903D	4"	9169912E	9169911G
1¼" & 1½"	9169904B	6"	9169913C	9169912E
2"	9169905J	8"	9169950E	9169913C
		10"	9169939H	9169950E
		12"	9169937B	9169939H

Larger Sizes: Consult Factory.

Repair Kits for 100-04/100-23 Hy-Check Main Valves

For: Hy-Check Main Valves—**150 Pressure Class Only**

Includes: Diaphragm, Disc and O-Rings and full set of spare Spacer Washers.

Valve Size	Kit Stock Number		Valve Size	Kit Stock Number	
	100-04	100-23		100-04	100-23
4"	20210901B	N/A	12"	20210905H	20210904J
6"	20210902A	20210901B	14"	20210906G	N/A
8"	20210903K	20210902A	16"	20210907F	20210905H
10"	20210904J	20210903K	20"	N/A	20210907F
			24"	N/A	20210907F

Larger Sizes: Consult Factory.

Repair Kits for Pilot Control Valves (In Standard Materials Only)

Includes: Diaphragm, Disc (or Disc Assembly), O-Rings, Gaskets or spare Screws as appropriate.

BUNA-N® (Standard Material)				**VITON** (For KB Controls)	
Pilot Control	Kit Stock Number	Pilot Control	Kit Stock Number	Pilot Control	Kit Stock Number
CDB	9170006C	CFM-7A	1263901K	CDB-KB	9170012A
CDB-30	9170023H	CFM-9	12223E	CRA-KB	N/A
CDB-31	9170024F	CRA (w/bucking spring)	9170001D	CRD-KB (w/bucking spring)	9170008J
CDB-7	9170017K	CRD (w/bucking spring)	9170002B	CRL-KB	9170013J
CDH-2	18225D	CRD (no bucking spring)	9170003K	CDHS-2BKB	9170010E
CDHS-2	44607A	CRD-18	20275401K	CDHS-2FKB	9170011C
CDHS-2B	9170004H	CRD-22	98923G	CDHS-18KB (no bucking spring)	9170009G
CDHS-2F	9170005E	CRL (55F, 55L)	9170007A	102C-KB	1726202D
CDHS-3C-A2	24657K	CRL60/55L-60	9170033G		
CDHS-8A	2666901A	CRL60/55L60 1"	9170042H		
CDHS-18	9170003K	CRL-4A	43413E		
CDS-4	9170014G	CRL-5 (55B)	65755B		
CDS-5	14200A	CRL-5A (55G)	20666E		
CDS-6	20119301A	CRL-18	20309801C		
CDS-6A	20349401C	Universal CRL	9170041K		
CDS-7	20349402B	CV	9170019F		
CDS-7DO	20349403A	X105L (O-ring)	00951E	Buna-N®	
CFCM-M1	1222301C	102B-1	1502201F		
CFM-2	12223E	102C-2	1726201F	CRD Disc Ret. (Solid)	C5256H
CFM-7	1263901K	102C-3	1726201F	CRD Disc Ret. (Spring)	C5255K

Repair Assemblies (In Standard Materials Only)

Control	Description	Stock Number
CF1-C1	Pilot Assembly Only	89541H
CF1-CI	Complete Float Control less Ball and Rod	89016A
CFC2-C1	Disc, Distributor and Seals	2674701E
CSM 11-A2-2	Mechanical Parts Assembly	97544B
CSM 11-A2-2	Pilot Assembly Only	18053K
33A 1"	Complete Internal Assembly and Seal	2036030B
33A 2"	Complete Internal Assembly and Seal	2040830J

When ordering, please give complete nameplate data of the valve and/or control being repaired. MINIMUM ORDER CHARGE APPLIES