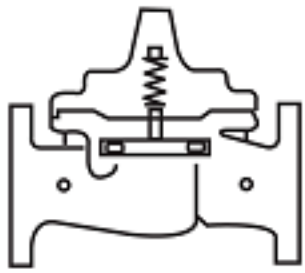
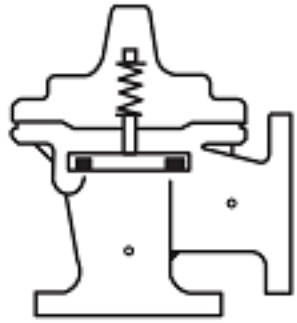
CLA-VAL
AUTOMATIC CONTROL VALVES

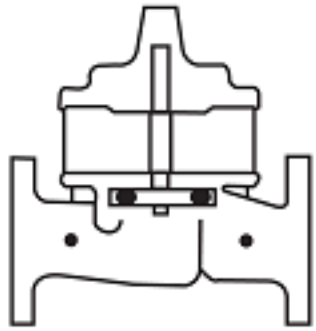
85-09-1
Place this manual with personnel responsible for maintenance of this valve



Installation



Operation



Maintenance

CLA-VAL • 1701 Placentia Avenue • Costa Mesa, CA 92627 • (949) 722-4800 • info@cla-val.com
CLA-VAL CANADA LTD. • 4687 Christie Drive • Beamsville, Ontario, LOR 1B4 Canada • (905) 563-4963
www.cla-val.com • info@cla-val.com

CLA-VAL CO. NEWPORT BEACH, CALIFORNIA

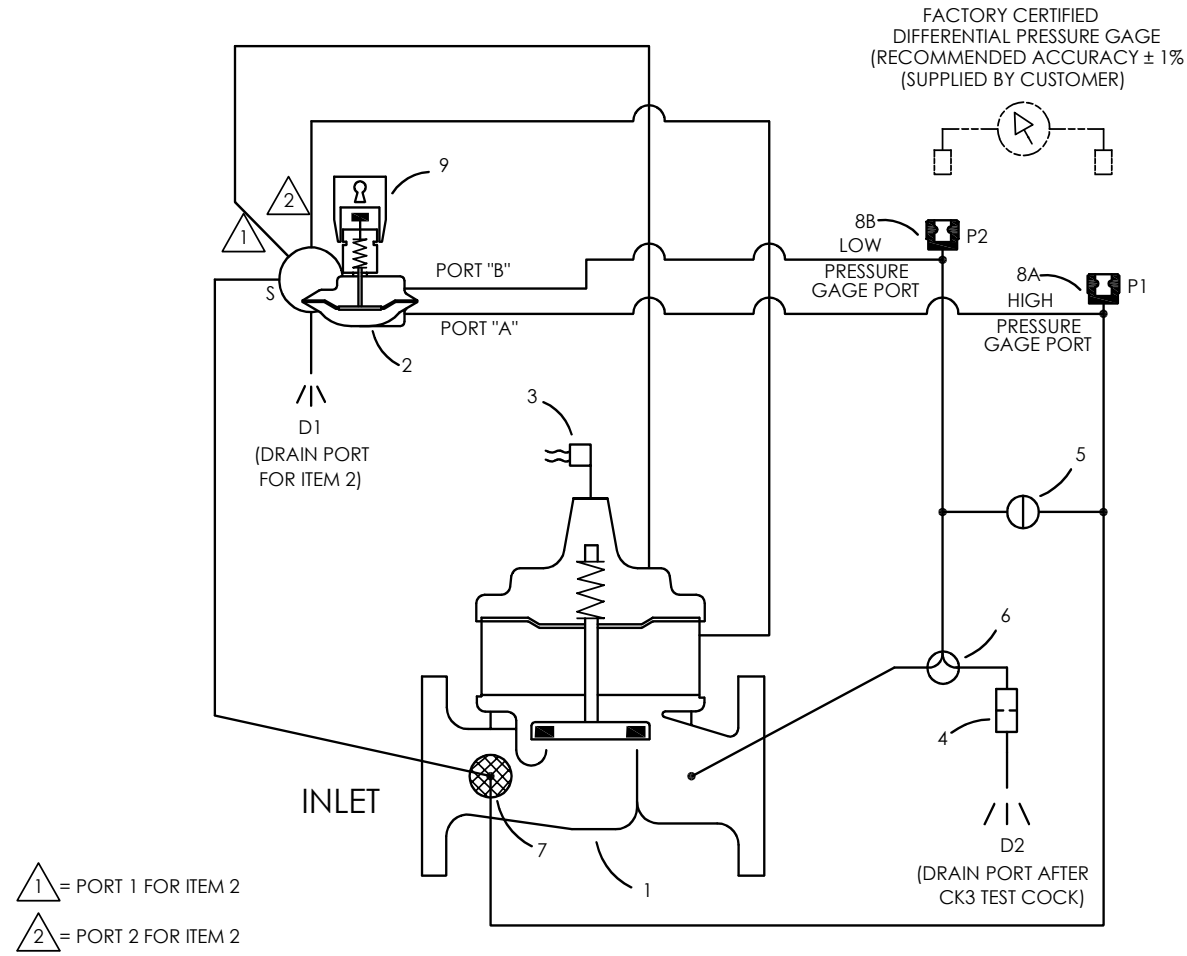
CATALOG NO.	DRAWING NO.	REV.
85-09-1	206762	E

TYPE OF VALVE AND MAIN FEATURES

BREACH VALVE
(WITH POWERTROL MAIN VALVE)

DESIGN		
DRAWN	PC	4-8-2008
CHK'D	VL	4-15-08
APV'D	BF	4-15-08

— — — NOT FURNISHED BY CLA-VAL CO. ——— OPTIONAL FEATURES



ITEM NO.	BASIC COMPONENTS	QTY
1	100-02 POWERTROL (MAIN VALVE)	1
2	CDH4-A3 DIFFERENTIAL CONTROL	1
3	X105 LIMIT SWITCH ASSEMBLY	1
4	X58C RESTRICTION ASSEMBLY	1
5	CK2 COCK (MANUAL RESET)	1
6	CK3 COCK (DP TEST)	1
7	X46A FLOW CLEAN STRAINER	1
8	QD SOCKET, GAGE CONNECTION	2
9	X140 LOCKING SECURITY CAP	1

OPTIONAL FEATURE SUFFIX			ADDED TO CATALOG NUMBER		

CAD REVISION RECORD - DO NOT REVISE MANUALLY

LTR	DESCRIPTION	BY	DATE
A-D	SEE REVISION FILE		
E	CHANGE CLOSING PARAGRAPH FROM INTERCONNECTS PORT "S" WITH PORT "2" TO ....INTERCONNECTS PORT "S" WITH PORT "1" (ECO 21857)	I.C.	3-1-2010

CLA-VAL CO. NEWPORT BEACH, CALIFORNIA

CATALOG NO.	DRAWING NO.	REV.
85-09-1	206762	E

TYPE OF VALVE AND MAIN FEATURES

BREACH VALVE
(WITH POWERTROL MAIN VALVE)

DESIGN		
DRAWN	PC	4-8-2008
CHK'D	VL	4-15-08
APV'D	BF	4-15-08

CAD REVISION RECORD - DO NOT REVISE MANUALLY

LTR	DESCRIPTION	BY	DATE
	SEE SHEET 1.		

OPERATING DATA

I. DIFFERENTIAL CONTROL FEATURE:

PRESSURE DIFFERENTIAL CONTROL (2) IS AN ADJUSTABLE SPRING BIASED, DIAPHRAGM ACTUATED, 2 POSITION PILOT VALVE THAT RESPONDS TO DIFFERENTIAL PRESSURE SENSED BETWEEN PORTS "A" AND "B". DIFFERENTIAL CONTROL (2) APPLIES OR RELIEVES PRESSURE IN THE COVER CHAMBER OF THE MAIN VALVE (1) PROVIDING THE OPERATION DESCRIBED BELOW.
TURN THE ADJUSTING SCREW OF THE PRESSURE DIFFERENTIAL CONTROL (2) CLOCKWISE TO INCREASE THE BREACH FLOW SET POINT.
NOTE: BREACH FLOW IS DEFINED AS THE FLOW RATE WHERE THE MAIN VALVE (1) HAS CLOSED. ADJUSTMENT TO THE PRESSURE DIFFERENTIAL CONTROL (2) IS SET SO THAT THE MAIN VALVE CLOSES TO PREVENT FLOW RATES IN EXCESS OF THE BREACH FLOW VALUE.

VALVE CLOSING

WHEN PRESSURE AT PORT "A" IS SUFFICIENTLY GREATER THAN PRESSURE AT PORT "B", DIFFERENTIAL CONTROL (2) SHIFTS AND INTERCONNECTS PORT "S" WITH PORT "1". THIS ACTION PERMITS INLET PRESSURE TO FLOW INTO THE COVER CHAMBER OF THE MAIN VALVE (1) AND THE MAIN VALVE CLOSES.
NOTE: VALVE NORMALLY REMAINS OPEN UNTIL PRESSURE AT PORT "A" IS SUFFICIENTLY GREATER THAN PRESSURE AT PORT "B". THE PRESSURE DIFFERENTIAL THAT CAUSES THE MAIN VALVE (1) TO CLOSE IS DETERMINED BY THE SPRING FEATURE IN PRESSURE DIFFERENTIAL CONTROL (2).

VALVE OPENING

WHEN PRESSURE AT PORT "B" APPROACHES PRESSURE AT PORT "A", DIFFERENTIAL CONTROL (2) SHIFTS AND INTERCONNECTS PORT "1" WITH PORT "D". THIS ACTION PERMITS THE COVER CHAMBER PRESSURE OF THE MAIN VALVE (1) TO BE VENTED TO ATMOSPHERE AND THE MAIN VALVE (1) OPENS.

II. ON SITE TEST PROCEDURE

TO VERIFY PROPER FUNCTION OF VALVE WITHOUT FLOWING THROUGH THE MAIN VALVE, USE THE FOLLOWING PROCEDURE:

1) CONNECT A DIFFERENTIAL PRESSURE GAGE TO GAGE CONNECTION PORTS P1 AND P2. P1 (8A) IS THE HIGH PRESSURE PORT AND P2 (8B) IS THE LOW PRESSURE PORT. THE DIFFERENTIAL PRESSURE GAGE SHOULD EQUAL ZERO, INDICATING THE MAIN VALVE (1) IS OPEN.

2) OPEN CK3 COCK (6). FLOW CAN BE OBSERVED EXITING FROM THE DRAIN PORT (D2) LOCATED AFTER THE CK3 TEST COCK. TOTAL FLOW VOLUME EXITING FROM THIS LINE WILL BE LESS THAN 1/2 GALLON.

CLA-VAL CO. NEWPORT BEACH, CALIFORNIA

CATALOG NO.	DRAWING NO.	REV.
85-09-1	206762	E

TYPE OF VALVE AND MAIN FEATURES

BREACH VALVE
(WITH POWERTROL MAIN VALVE)

DESIGN		
DRAWN	PC	4-8-2008
CHK'D	VL	4-15-08
APV'D	BF	4-15-08

OPERATING DATA - CONTINUED

AFTER CK3 COCK (6) IS OPENED, OBSERVE DRAIN CONNECTION (D1) ON CDH4-A3 DIFFERENTIAL CONTROL (2). WHEN WATER IS NOTICED DRIPPING FROM THIS PORT, THIS IS AN INDICATION THAT THE MAIN VALVE IS STARTING TO CLOSE. OBSERVE DIFFERENTIAL GAGE PRESSURE WHEN WATER IS FIRST NOTICED DRIPPING FROM THE DRAIN PORT (D1) AND NOTE THE MAXIMUM DIFFERENTIAL PRESSURE BEFORE THE VALVE CLOSES. COMPARE THIS VALUE WITH THE FACTORY SET POINT VALUE. IF THE MAXIMUM NOTED PRESSURE DIFFERENTIAL IS WITHIN +/- .5 PSI OF THE FACTORY SET POINT VALUE THEN THE VALVE MEETS THE NOTED BREACH TRIP POINT FLOW RATE. INFORMATION ON FACTORY SET POINT AND BREACH TRIP POINT FLOW RATE IS INCLUDED WITH PRODUCT DOCUMENTATION. THIS INFORMATION CAN ALSO BE OBTAINED BY CONTACTING THE CLA-VAL FACTORY.

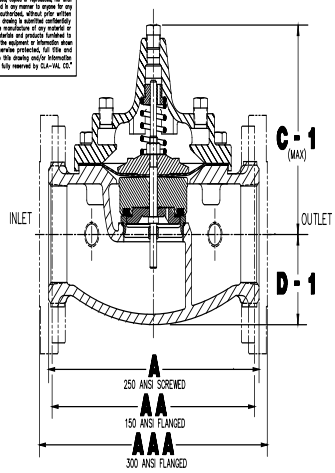
3) VALVE CLOSURE IS CONFIRMED WHEN THE X105 LIMIT SWITCH ASSEMBLY (3) HAS TRIPPED AND FLOW HAS STOPPED THRU THE DRAIN PORT (D1) OF THE CDH4-A3 DIFFERENTIAL CONTROL (2).

4) CLOSE CK3 COCK (6) AND OPEN CK2 COCK (5). THIS ACTION RETURNS THE MAIN VALVE (1) TO THE FULL OPEN POSITION. FLOW CAN BE OBSERVED FROM THE DRAIN CONNECTION (D1) OF THE CDH4-A3 DIFFERENTIAL CONTROL (2), INDICATING THE MAIN VALVE (1) IS RETURNING TO THE FULL OPEN POSITION. WHEN FLOW STOPS FROM THE DRAIN CONNECTION (D1) THE MAIN VALVE (1) IS FULL OPEN.

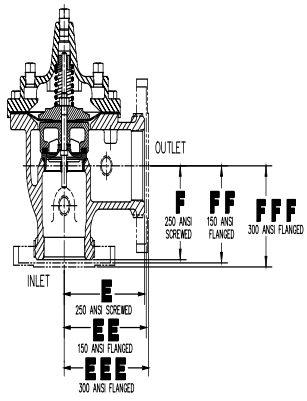
5) TESTING IS COMPLETE. CLOSE CK2 COCK (5). THE DIFFERENTIAL PRESSURE GAGE SHOULD REMAIN AT ZERO, INDICATING THE MAIN VALVE (1) IS OPEN.

CAD REVISION RECORD - DO NOT REVISE MANUALLY

LTR	DESCRIPTION	BY	DATE
	SEE SHEET 1.		

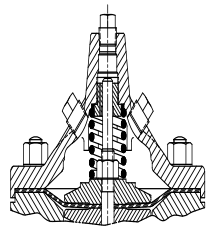


(3" SIZE SHOWN)

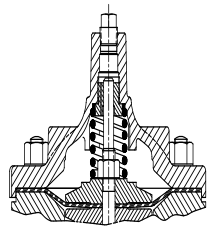


(2" SIZE SHOWN)

OLD STYLE BODY CONFIGURATIONS

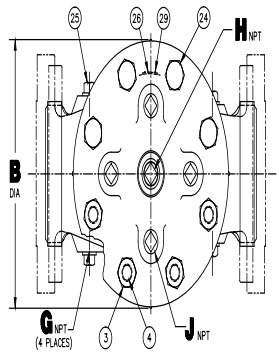


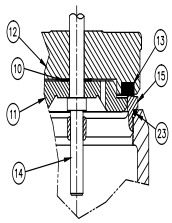
NO CORE COVER
1" THRU 3" SIZES
NTS



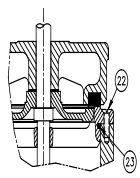
4" SIZE NO CORE COVER
NTS

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
A-D	SEE REVISION FILE		
E	REVISED & REDRAWN ON CAD; ADDED DIM 4.00 & 4.25 ON VALVE SIZE 1 1/2" (ECO 16999)	03-19-98	AK
F	ADDED 1" SIZE SCREWED CONFIGURATION TO THE DWG (ECO 21634)	02-18-10	AK
G	DELETED 16" SIZE VALVE FROM DIMENSION TABLE, PARTS LIST, AND RELATED "COVER BEARING DETAIL" VIEW (ECO 21974)	6-16-10	PC
H	ADDED SHEET 2 (ECO 22323)	05-26-11	AK
J	ADDED WASHERS & REVISED STUD LENGTH ON 100-01 VALVES (ECO 23135)	07-18-12	MS
K	SH 2: ADDED VIEW OF BEARING HOUSING ASSY FOR 36", ADDED VIEW OF BOLT ON BEARING ON SEAT FOR 36"; UPDATED TABLE FOR 326" SIZE PER DRAWING 209808 (ECO 25201)	3-25-15	MS
L	ADDED 30" TO 36" HOUSING ASSEMBLY DETAIL; ADDED DIAPHRAGM WASHER SEAL DETAIL (ECO 25304)	08-19-15	RP
M	SHEET 1: SIZES FOR ITEM NO.'S 3 & 4 (STUD AND NUT) WAS 6" THRU 14" ONLY; SIZES FOR ITEM NO. 24 (BOLT) WAS 1" THRU 4" ONLY. (ECO 26536)	01-11-18	VL





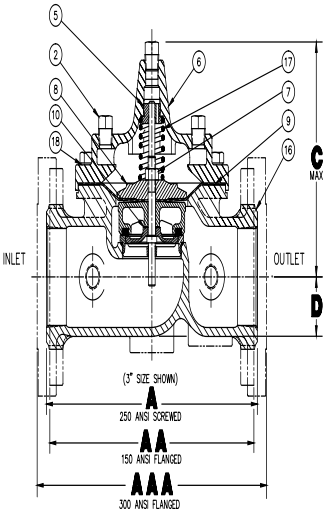
SEAT AND DISC DETAIL
1" THRU 6" ONLY
NTS



SEAT AND DISC DETAIL
8" THRU 14" ONLY
NTS

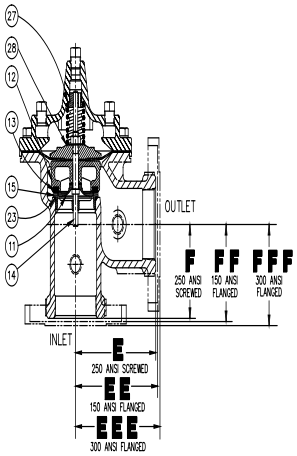
DIMENSION TABLE												
VALVE SIZES	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	4"	6"	8"	10"	12"	14"
A	7.25	7.25	7.25	9.38	11.00	12.50	–	–	–	–	–	–
AA	–	–	8.50	9.38	11.00	12.00	15.00	20.00	25.38	29.75	34.00	39.00
AAA	–	–	9.00	10.00	11.62	13.25	15.62	21.00	26.38	31.12	35.50	40.50
B DIA	5.62	5.62	5.62	6.62	8.00	9.12	11.50	15.75	20.00	23.62	28.00	32.75
C MAX	5.50	5.50	5.50	6.50	7.56	8.19	10.62	13.38	16.00	–	–	–
C-1 MAX	–	4.75	4.75	5.75	6.88	7.25	9.31	12.12	14.62	17.12	20.88	24.19
D	1.12	1.12	1.12	1.50	1.69	2.06	3.19	4.31	5.31	–	–	–
D-1	–	2.00	2.00	2.50	2.88	3.12	4.25	6.00	7.56	9.25	10.75	12.62
E	3.25	3.25	3.25	4.75	5.50	6.25	–	–	–	–	–	–
EE	–	–	4.00	4.75	5.50	6.00	7.50	10.00	12.69	14.88	17.00	19.50
EEE	–	–	4.25	5.00	5.88	6.38	7.88	10.50	13.25	15.56	17.75	20.25
F	1.88	1.88	1.88	3.25	4.00	4.50	–	–	–	–	–	–
FF	–	–	4.00	3.25	4.00	4.00	5.00	6.00	8.00	8.62	13.75	14.88
FFF	–	–	4.25	3.50	4.31	4.38	5.31	6.50	8.50	9.31	14.50	15.62
G NPT	3/8"	3/8"	3/8"	3/8"	1/2"	1/2"	3/4"	3/4"	1"	1"	1"	1"
H NPT	1/4"	1/4"	1/4"	1/2"	1/2"	1/2"	3/4"	3/4"	1"	1"	1-1/4"	1-1/2"
J NPT	1/4"*	1/4"*	1/4"*	3/8"	1/2"	1/2"	3/4"	3/4"	1"	1"	1"	1"

* 3/8" NPT FOR NO CORE COVER



(3" SIZE SHOWN)

100-01 HYTROL
(GLOBE)



(2" SIZE SHOWN)

2100 HYTROL
(ANGLE)

** USE ON PAINTED OR EPOXY-COATED VALVES ONLY
* RECOMMENDED SPARE PARTS

ITEM NO.	DESCRIPTION	QTY
29	SCREW, DRIVE	2
28	WASHER, SPRING, LOWER **	1
27	WASHER, SPRING, UPPER **	1
26	NAMEPLATE	1
25	PLUG, PIPE, BODY	A/R
24	BOLT, HEX HD. (1" THRU 6" ONLY)	A/R
* 23	O-RING, SEAT	1
22	SCREW, FLAT HD. (8" THRU 14" ONLY)	A/R
21		
20		
19		
18	WASHER, FLAT	A/R
17	SPRING	1
16	BODY	1
15	SEAT	1
14	STEM	1
* 13	DISC	1
12	RETAINER, DISC	1
11	GUIDE, DISC	1
10	WASHER, SPACER	2
* 9	DIAPHRAGM	1
8	WASHER, DIAPHRAGM	1
7	NUT, STEM	1
6	COVER	1
5	BEARING, COVER	1
4	STUD (8" THRU 14" ONLY)	A/R
3	NUT, HEX (8" THRU 14" ONLY)	A/R
2	PLUG, PIPE, COVER	A/R
1	PLUG, PIPE, CENTER COVER	1

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ARE:
FRACTIONS DECIMALS ANGULAR
± 1/32 .XXX ±.02 ± 5°
.XXX ±.010
MAX = +.00 -.09
MIN = +.09 -.00
SURFACE FINISH 125 BREAK CORNERS .010 MAX. FILLET RADIUS .031
---DO NOT SCALE DRAWING---

CONTRACT NO. ------

APPROVALS	DATE
DRAWN WEP	11-9-82
CHECKED KD	11-22-82
APPROVED CH	12-21-82
ENGR	

CLA-VAL CO. NEWPORT BEACH, CALIFORNIA

TITLE
1" THRU 14"
100-01 & 2100 HYTROL

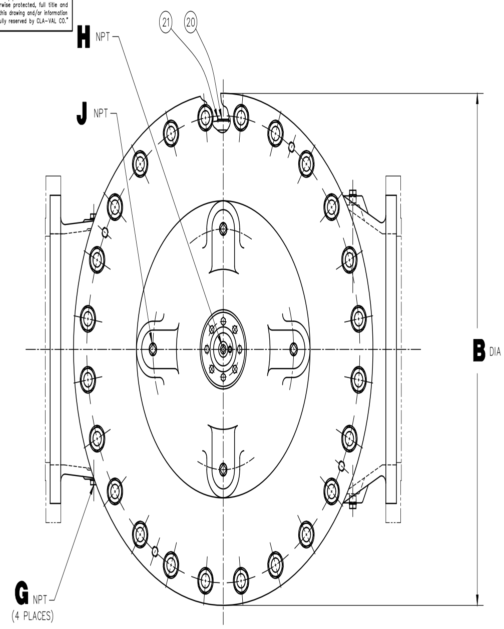
SIZE	FSCM/CAGE CODE	DWG NO.	REV
E	86184	90842	M

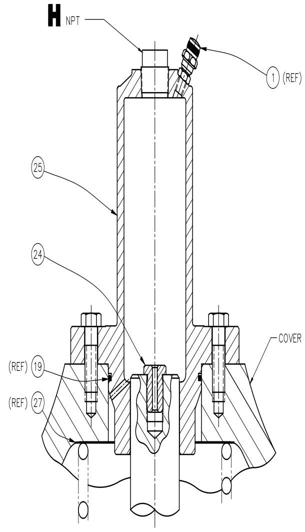
SCALE 1/2 & NOTED UNITS/PC SHEET 1 OF 2

VL 01-11-18

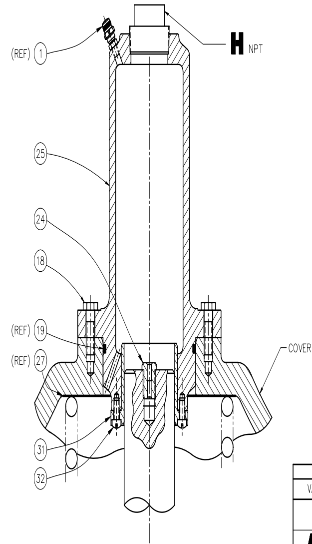
90842 rev M
Sht 1
Sht 2

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
	SEE SHEET 1		

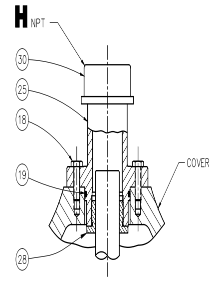




HOUSING ASSEMBLY DETAIL
18", 20", & 24" SIZES ONLY
24" SIZE SHOWN
SCALE: NONE

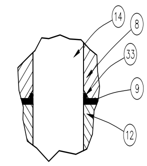


HOUSING ASSEMBLY DETAIL
30" AND 36" SIZES ONLY
36" SIZE SHOWN
SCALE: 1/2

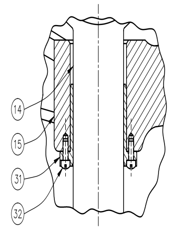


COVER BEARING/HOUSING DETAIL
16" SIZE ONLY
SCALE: NONE

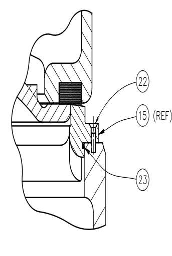
DIMENSION TABLE						
VALVE SIZES	16"	18"	20"	24"	30"	36"
A	41.38	46.00	52.00	61.50	63.00	72.75
AA	43.50	47.64	53.62	63.25	64.50	–
B DIA	35.50	41.50	45.00	53.16	56.00	66.00
C MAX	25.00	39.06	42.21	45.00	54.60	59.00
D	15.50	12.95	15.00	17.75	21.31	24.50
E	20.81	–	–	30.75	–	–
EE	21.62	–	–	31.62	–	–
F	15.69	–	–	22.06	–	–
FF	16.50	–	–	22.90	–	–
G NPT	1"	1"	1"	1"	2"	2"
H NPT	2"	1"	1"	1"	2"	2"
J NPT	1"	1"	1"	1"	2"	2"
K	–	15.00	16.50	19.25	22.50	28.50



DIAPHRAGM WASHER SEAL DETAIL
30" SIZE ONLY
SCALE: 1/2



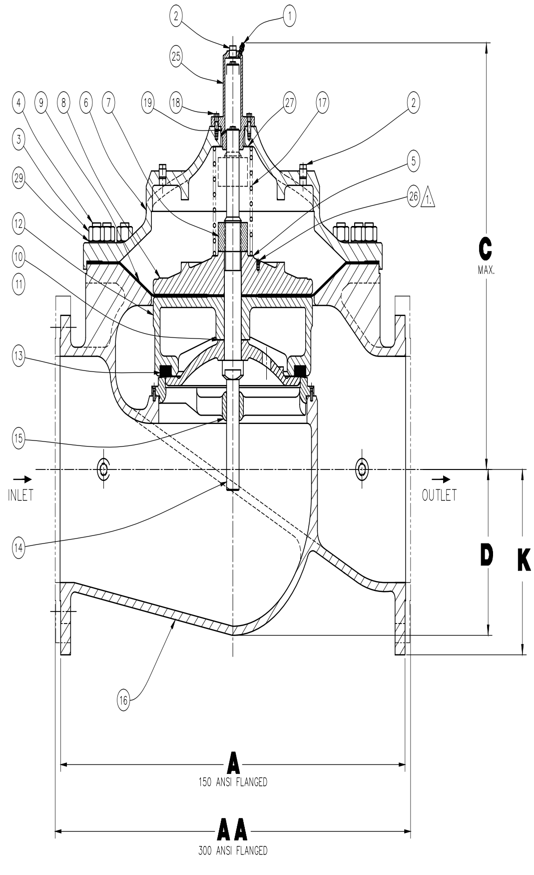
SEAT DETAIL
36" SIZE ONLY
SCALE: 1/2



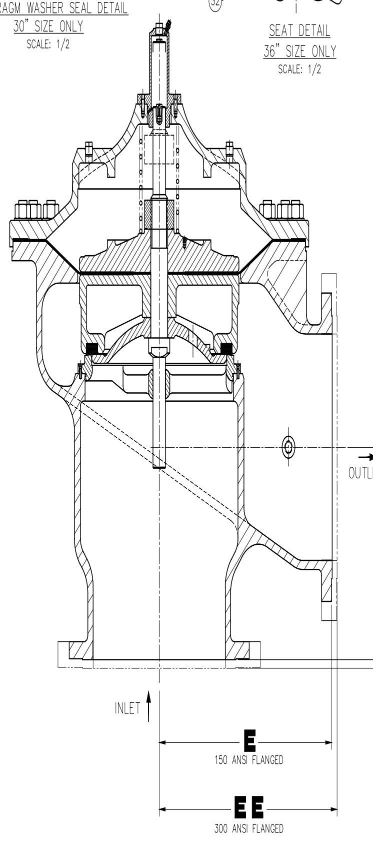
SEAT AND DISC DETAIL
SCALE: NONE

NOTES: UNLESS OTHERWISE SPECIFIED.

1. (triangle) PLUG ITEM NO. 26 SCREW INTO ITEM NO. 8 DIAPHRAGM WASHER TO PRESERVE THREAD'S FOR FIELD SERVICE HANDLING.



(24" SIZE SHOWN)
100-01 HYTROL
(GLOBE)



(24" SIZE SHOWN)
2100-01 HYTROL
(ANGLE)

** USE ON PAINTED OR EPOXY-COATED VALVES ONLY
* RECOMMENDED SPARE PARTS

	ITEM NO.	DESCRIPTION	QTY
*	33	O-RING (30" ONLY)	1
	32	SCREW, FIL HD. (30" AND 36" ONLY)	A/R
	31	INSERT, COVER BEARING (30" AND 36" ONLY)	A/R
	30	CAP, PIPE (16" ONLY)	1
	29	WASHER, FLAT	A/R
	28	BEARING, COVER (16" ONLY)	1
	27	WASHER, SPRING, UPPER **	1
1. (triangle)	26	SCREW, SOCKET CUP POINT	3
	25	HOUSING	1
	24	BUSHING, ADAPTER	1
*	23	O-RING, SEAT	1
	22	SCREW, FLAT HD.	A/R
	21	SCREW, DRIVE	2
	20	NAMEPLATE	1
*	19	O-RING	1
	18	BOLT, HEX HD.	8
	17	SPRING	1
	16	BODY	1
	15	SEAT	1
	14	STEM	1
*	13	DISC	1
	12	RETAINER, DISC	1
	11	GUIDE, DISC	1
	10	WASHER, SPACER	2
*	9	DIAPHRAGM	1
	8	WASHER, DIAPHRAGM	1
	7	NUT, STEM	1
	6	COVER	1
	5	WASHER, SPRING, LOWER **	1
	4	STUD	A/R
	3	NUT, HEX	A/R
	2	PLUG, PIPE	A/R
	1	VALVE, PURGE (18" – 36" ONLY)	1

DWG NO. 90842 SH 2 REV M

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ARE:
FRACTIONS ± 1/32 DECIMALS .XX± .03 .XXX± .010 ANGULAR ± .5°
MAX = +.00 –.09
MIN = +.09 –.00
SURFACE FINISH 125√
BREAK CORNERS .010 MAX
FILLET RADIUS .031
--DO NOT SCALE DRAWING--

CONTRACT NO. ------

APPROVALS		DATE
DRAWN	WEP	11-9-82
CHECKED	KD	11-22-82
APPROVED	CH	10-21-83
ENGR		

CLA-VAL CO. NEWPORT BEACH, CALIFORNIA

TITLE
16" THRU 36"
100-01 & 2100 HYTROL

SIZE E | CAGE CODE 86184 | DWG NO. 90842 | REV M
SCALE 1/6 & NOTED | UNITS/PC | SHEET 2 OF 2

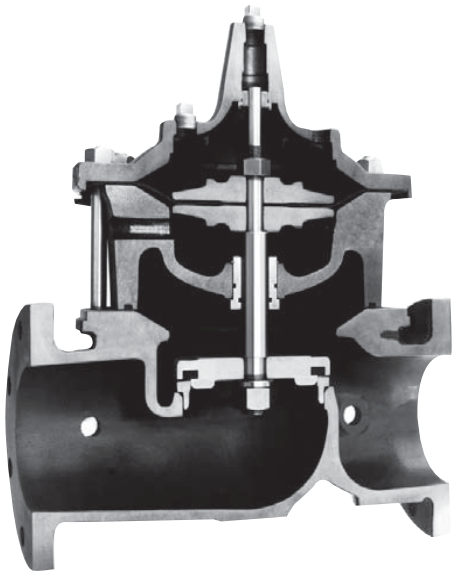
VL 01-11-18

CLA-VAL®

— MODEL — 100-02

(Full Internal Port)

Powertrol Valve



TROUBLE SHOOTING

The following trouble shooting information deals strictly with the Powertrol Valve; however some 'impossible 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.

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 Powertrol Valve it should be realized that the valve cannot be serviced under pressure. Steps must be taken to remedy this situation before proceeding.

DESCRIPTION

This manual contains information for installation, operation and maintenance of the Cla-Val Co. 100-02 Powertrol, 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.

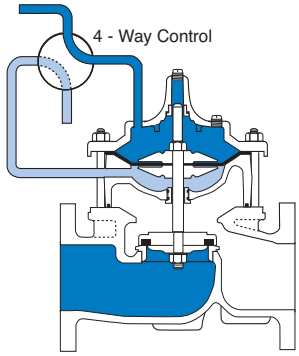
INSTALLATION

1. 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.

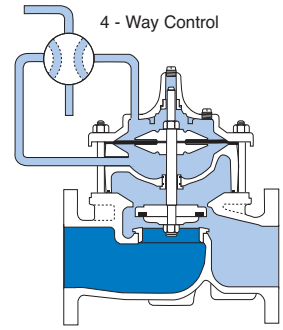
2. It is recommended that gate or block valves be installed on both the upstream and downstream sides of the 100-02 to facilitate isolating the valve for preventative maintenance.
3. Place the valve in the line with flow through the valve in the direction indicated on the inlet name plate or by flow arrows.
4. Cla-Val Powertrol Valves operate with maximum efficiency when mounted in horizontal piping with cover "UP,' however, other positions are acceptable. Due to the size and weight of the cover and internal assembly of 4" and larger valves, installation with the cover "UP" is advisable. This makes periodic inspection of internal parts readily accessible.
5. When a pilot control system is installed on the Powertrol 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.
6. After the valve is installed and the system is first pressurized, vent air from the cover chamber and tubing by loosening fit" sings at all high points.

Principle of Operation



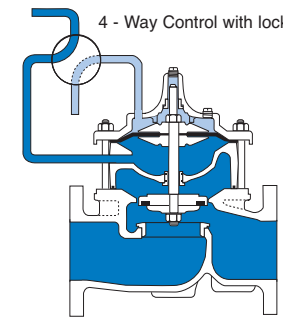
Full Open Operation

When operating pressure below the diaphragm is applied and operating, 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.



Modulating Action

The valve holds any intermediate position when operating pressure is equal above and below the diaphragm. A Cla-Val four-way pilot control with "lock" position can maintain this balance by stopping flow in the pilot control system.

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. If 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 semi-open 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. if this fails disassemble and remove the obstruction.
	Pressure not being released from cover chamber.	Open a fitting or remove a plug from cover chamber if 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 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.

*Assuming control system is functioning properly.

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.

1.The Powertrol 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 Powertrol 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 applied 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 flow 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 obstruction 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 to fully closed)

VALVE SIZE		VALVE SIZE	
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

MAINTENANCE

Preventative Maintenance

The Cla-Val Co Powertrol 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 affecting the valve These substances can be dissolved minerals. colloidal and suspended particles. Effect of these actions or substances must be determined by inspection.

DISASSEMBLY

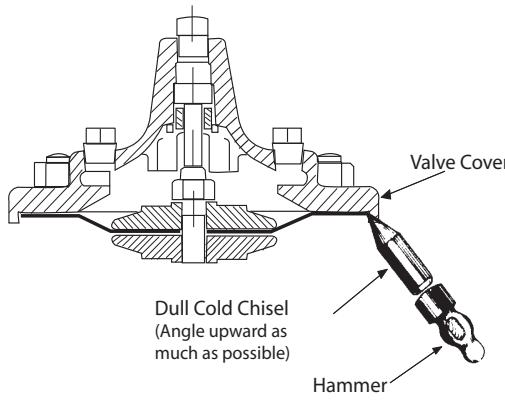
1. First mark the side of the valve cover, power unit body and valve body so that reassembly of these parts will be exactly as removed.

2. The Powertrol 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 equipment and property damaged if disassembly is attempted with pressure in the system.

3. 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.

4. 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.



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.

On valves 1" and larger remove the power unit retaining nuts. The power unit body can now be lifted from the valve body. The stem with diaphragm assembly and disc retainer assembly will be removed with the 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.

6. Inspect the threads on the stem. Mineral deposits that prevent the nuts from turning must be cleaned from the threads A 5C.h solution of muriatic acid will soften mineral or scale deposits to assist in removal of nuts and 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.

7. Remove the upper stem nut, upper diaphragm washer, diaphragm and lower diaphragm washer. The stem with the disc retainer assembly can now be removed from the power unit body

8. Hold the stem in a vice with soft jaws and remove the lower stem nut. Remove the lock washer, disc retainer, space washer(s) and disc Refer to the sectional view of the valve size being serviced. This will assist in the disassembly procedure outlined above. The reassembly instructions outlining proper procedure and quantity of space washers. This is especially important if the disc is replaced.

Inspection of Parts

1. Returning to the valve body in the line, the seat should now be inspected for damage. if the seat requires removal use the following tools. Seats in valve sizes 1/2" and 3/4" can be removed with a hex socket wrench. Seats in valve sizes 1" through 6" should be removed with accessory X-109 Seat Removing Tool available from the factory. Seats in valve sizes 3" 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.

2. 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 of 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.

3. 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.

4. 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.

6. 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.

1. 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 indentation) on the disc. This applies to 1" through 16" valves. 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 (slight indentation) on the disc.

1. 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 and no looseness evident. This adjustment applies to 1 " through 16". 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.

2. The stem, with the disc assembly, can now be inserted through the power unit body. Note sectional view for correct position of the power unit body and stem assembly

3. Install on the cover end of the stem the lower diaphragm washer,the diaphragm, the upper diaphragm washer, then screw on the upper stem nut.

4. Tighten the upper stem nut securely so the diaphragm and upper and lower diaphragm washer cannot be turned on the stem. During the tightening of the upper stem nut the lower stem nut can be held in a vice, or with a second wrench.

5. Replace the gasket on the body. If an o-ring seal is used as a gasket, valve size 4" through 16", a light coating of grease can be applied to the power unit body groove to hold the o-ring in place while installing on the body. The power unit body must be replaced so that the index marks applied in Disassembly Step 1 align. The control tubing will then be able to be reassembled without difficulty.

6. Replace cover chamber spring on the upper diaphragm washer. NOTE: Some valves may not have a cover chamber spring.

7. 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:

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

ITEM NO.	DESCRIPTION
1	HEX NUT 10-32 (8)
2	COVER
3	POWER UNIT BODY
4	HEX NUT 1/4-28-NF-2 A.S.F. JAM
5	DIAPHRAGM WASHER (UPPER)
6	DIAPHRAGM
7	DIAPHRAGM WASHER (LOWER)
8	STEM
9	DISC GUIDE
10	DISC RETAINER ASSEMBLY
11	"O" RING
12	BODY TO BODY GASKET
13	STUD 10-32 (8)
14	PIPE PLUG 1/8 NPT
15	BODY
16	SPRING (USED ON 100-02KHR & 100-02 KHX
17	"O" RING
18	SEAT
19	NAMEPLATE

9.The Powertrol Valve can be tested for tight closure as well as the tightness of the seal across the diaphragm.

a.The downstream or outlet shutoff valve remains closed

b. 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 Powertrol. Lacking a control, inlet pressure must be tubed to the Powertrol cover.

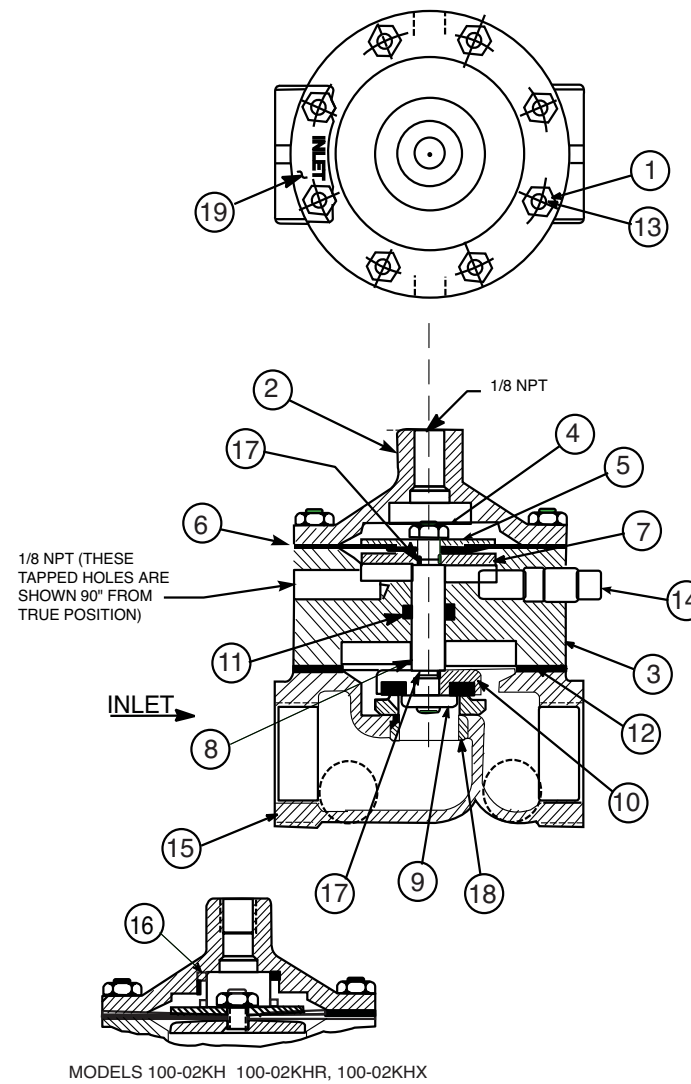
c. Open upstream gate or line block valve just enough to allow flow.

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

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

f. 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.

100-02 POWERTROL
VALVE SIZES 1/2" & 3/4"



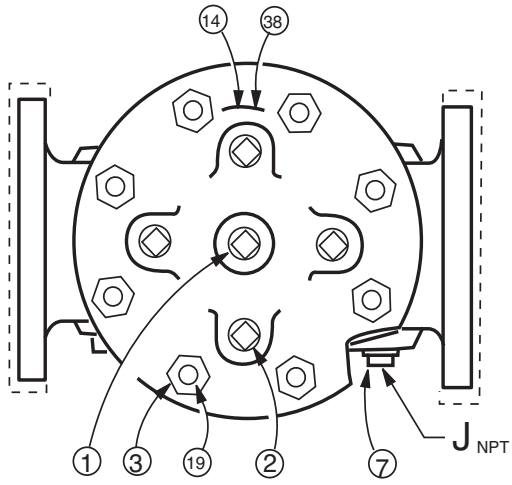
MODELS 100-02KH 100-02KHR, 100-02KHX

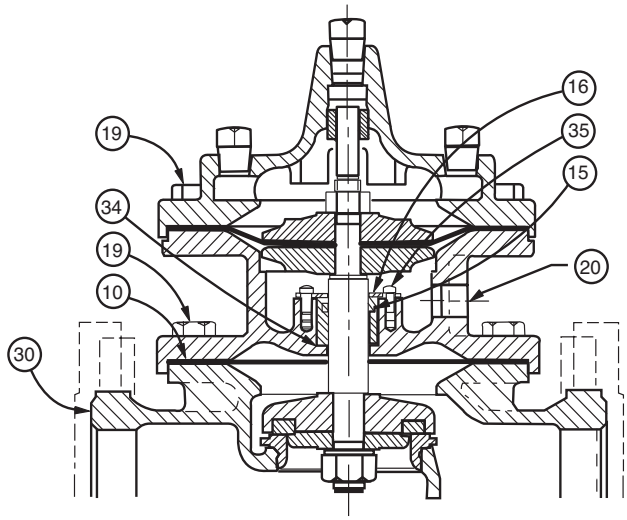
USEFUL INFORMATION OR HINTS

1. The approximate volume of liquid discharged from the chamber above the diaphragm when the valve moves from the fully closed positions to the 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

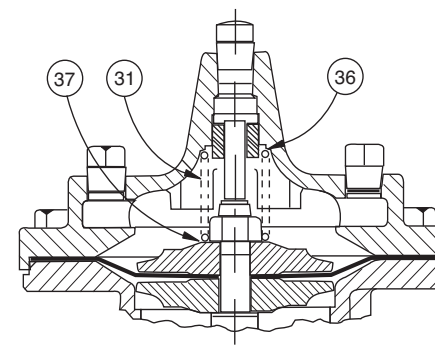
100-02 POWERTROL
VALVE SIZES 1" - 3"



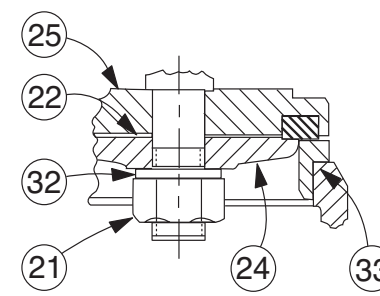


ITEM NO.	PART DESCRIPTION
1	CENTER COVER PLUG
2	COVER PLUG
3	STUD NUT
7	PLUG, PIPE, BODY
10 *	GASKET "O" RING
14	NAMEPLATE
15 *	O-RING, STEM
16	RETAINER BEARING (1"-3" ONLY)
19	BOLT, HEX HD. (1"-3" ONLY)
20	POWER UNIT BODY
21	LOWER STEM NUT
22	SPACER WASHER
24	DISC GUIDE
25	DISC RETAINER
30	BODY
31	SPRING (100-02KH/100PAKH ONLY)
32	LOCK WASHER - SPRING
33 *	SEAT O-RING
34 *	GASKET BEARING GASKET (1"-3" ONLY)
35	Screw Fil. HD. (1'-2 ½") / BOLT HEX. (3")
36	UPPER WASHER SPRING (100PKCH)
37	LOWER WASHER SPRING (100PAKCH)
38	DRIVE SCREW

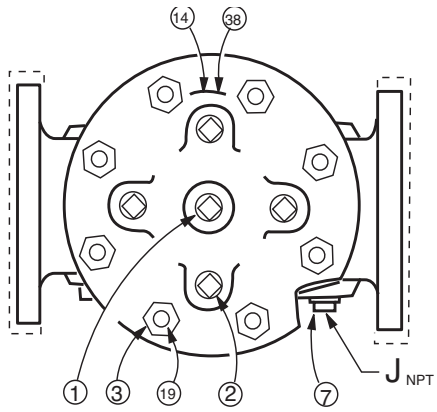
* RECOMMENDED SPARE PARTS

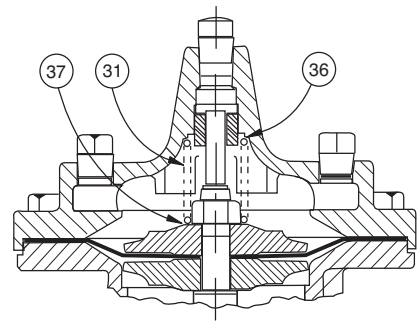


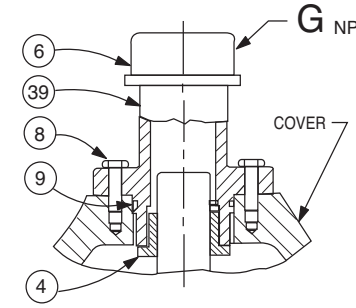
Model 100-02KH

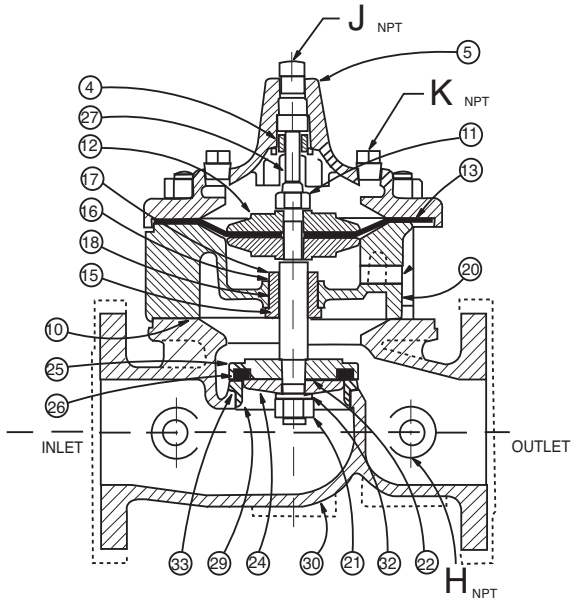


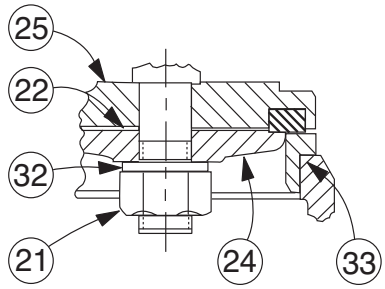
Seat & Disc Details

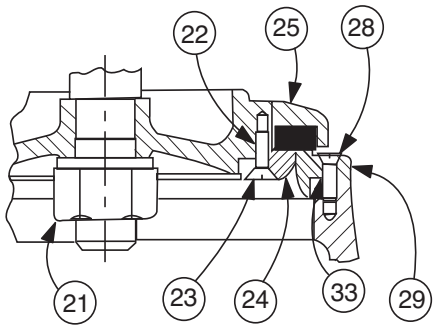


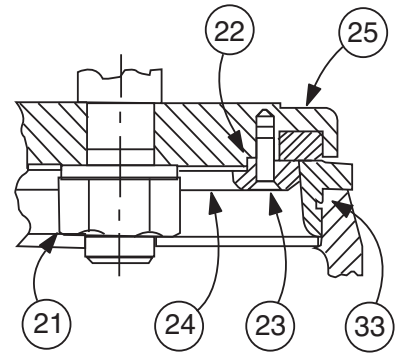












ITEM NO.	PART DESCRIPTION
1	CENTER COVER PLUG
2	COVER PLUG
3	STUD NUT
4	COVER BEARING
5	COVER
6	PIPE CAP (16" ONLY)
7	PLUG, PIPE, BODY
8	BOLT HEX HD (16" ONLY)
9 *	O-RING (16" ONLY)
10 *	GASKET "O" RING
11	UPPER STEM NUT
12	UPPER DIAPHRAGM WASHER
13 *	DIAPHRAGM
14	NAMEPLATE
15 *	O-RING, STEM
16	RETAINER BEARING (1”-3” ONLY)
	RING RETAINER BEARING (4”-16” ONLY)
17	POWER UNIT BEARING
18 *	O-RING BEARING (4”-16” ONLY)
19	BOLT, HEX HD. (1”-3” ONLY)
	STUD (4”-16” ONLY
20	POWER UNIT BODY
21	LOWER STEM NUT
22	SPACER WASHER
23	DISC GUIDE SCREW (6" - 16" ONLY)
24	DISC GUIDE
25	DISC RETAINER
26 *	DISC
27	STEM
28	SEAT SCREW (8”-16” ONLY)
29	SEAT
30	BODY
31	SPRING (100-02KH/100PAKH ONLY)
32	LOCK WASHER - SPRING
33 *	SEAT O-RING
34 *	GASKET BEARING GASKET (1”-3" ONLY)
35	Screw Fil. HD. (1’-2 ½”) / BOLT HEX. (3”)
36	UPPER WASHER SPRING (100PKCH)
37	LOWER WASHER SPRING (100PAKCH)
38	DRIVE SCREW
39	COVER BEARING HOUSING (16" ONLY)

* RECOMMENDED SPARE PARTS

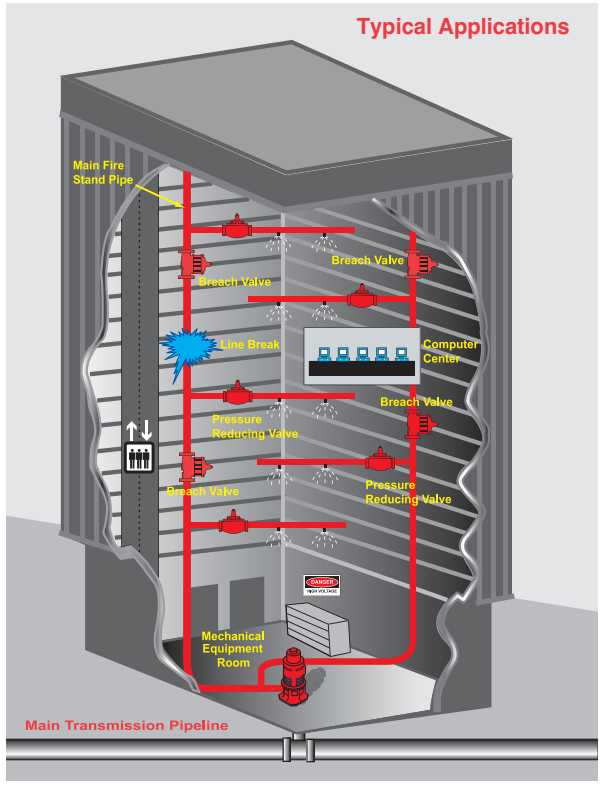
CLA-VAL®

MODEL

85-09-1
(Full Internal Port)

685-09-1
(Reduced Internal Port)

AUTOMATIC BREACH CONTAINMENT VALVE



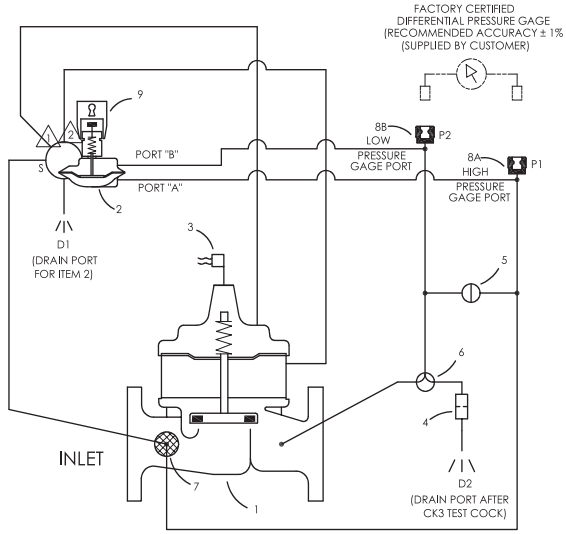
- **Simple Proven Design**
- **Non-Surge Operation**
- **Drip-Tight Shut-Off**
- **No Packing Glands or Stuffing Boxes**
- **Static System Operational Testing**
- **Available in a Variety of Materials**

The Cla-Val Model 85-09-1/685-09-1 Automatic Breach Containment Valve (ABCV) will isolate portions of distribution piping when catastrophic downstream breach occurs. The ABCV is designed for protecting commercial building water distribution systems, such as fire protection, potable water service, or chill water circulation. Strategically located to isolate portions of water systems, the ABCV prevents significant water losses and resultant damage, and allows limited continued service when distribution systems are damaged or out of service.

During normal conditions the ABCV is fully open allowing normal water flows. When excessive flows occur due to pipe damage or breach, the ABCV closes drip-tight, isolating the breached downstream portion of system. When the ABCV is closed, normal water flow occurs through remaining upstream distribution piping. Once closed, the ABCV will automatically re-open when downstream pressure is restored.

The Cla-Val Model 85-09-1/685-09-1 Automatic Breach Containment Valve is a pilot controlled, hydraulically-operated, diaphragm-actuated, globe pattern valve. The valve consists of a Powertrol main valve and a pre-installed pilot control system. Using line fluid as operating medium, the ABCV is completely self-contained, requiring no additional power to operate. The Powertrol can be supplied with optional fusion bonded epoxy coating for longer service life and lower maintenance costs.

The custom pilot control senses pressure differential across valve, and is factory-preset to shift at differential corresponding to specified breach flow. The control smoothly closes Powertrol hydraulically. The pilot control has locking cap to protect calibrated settings. Supplied valve position electric switch assembly provides remote confirmation or alarm signal that ABCV is fully closed. Two quick-connect ports allow verification of differential pressure setting and conducting operational ABCV testing when water system is static. Test Kit consisting of differential gauge and hose connections is available option. The ABCV operates most efficiently when installed in horizontal pipe with Powertrol cover and internal-stem oriented vertically up.



Schematic Diagram

Item	Description
1	100-02 Powertrol (Main Valve)
2	CDH4-A3 Differential Control
3	X105L Limit Switch
4	X58C Restriction
5	CK2 (Isolation Valve) Manual Reset
6	CK3 (Isolation Valve) DP Test
7	X46A Flow Clean Strainer
8	QD Socket, Gage Connection
9	X140 Locking Security Cap

CLA-VAL®

Model 85-09-1 (Uses Basic Valve Model 100-02)

Pressure Ratings (Recommended Maximum Pressure - psi)

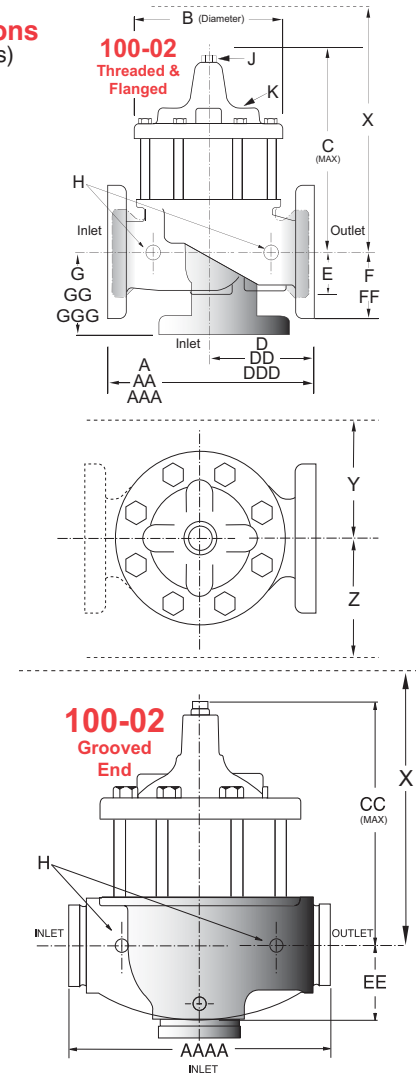
Valve Body & Cover		Pressure Class				
		Flanged			Grooved	Threaded
Grade	Material	ANSI Standards*	150 Class	300 Class	300 Class	End‡ Details
ASTM A536	Ductile Iron	B16.42	250	400	400	400
ASTM A216-WCB	Cast Steel	B16.5	285	400	400	400
ASTM B62	Bronze	B16.24	225	400	400	400

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

Materials

Component	Standard Material Combinations		
Body & Cover	Ductile Iron	Cast Steel	Bronze
Available Sizes	2-1/2" - 8"	2-1/2" - 8"	2-1/2" - 8"
Disc Retainer & Diaphragm Washer	Cast Iron	Cast Steel	Bronze
Trim: Disc Guide, Seat & Cover Bearing	Bronze is Standard Stainless Steel is Optional		
Disc	Buna-N® Rubber		
Diaphragm	Nylon Reinforced Buna-N® Rubber		
Stem, Nut & Spring	Stainless Steel		
For material options not listed, consult factory. Cla-Val manufactures valves in more than 50 different alloys.			

Dimensions (In inches)



Model 85-09-1 Dimensions (In Inches)

Valve Size (Inches)	**2½**	**3**	**4**	**6**	**8**
A Threaded	11.00	12.50	—	—	—
AA 150 ANSI	11.00	12.00	15.00	20.00	25.38
AAA 300 ANSI	11.62	13.25	15.62	21.00	26.38
AAAA Grooved End	11.00	12.50	15.00	20.00	25.38
B Dia.	8.00	9.12	11.50	15.75	20.00
C Max.	10.31	11.19	14.25	18.44	21.81
CC Max. Grooved End	9.63	10.25	13.50	17.18	20.43
D Threaded	5.50	6.25	—	—	—
DD 150 ANSI	5.50	6.00	7.50	10.00	12.69
DDD 300 ANSI	5.88	6.38	7.88	10.50	13.25
DDDD Grooved End	—	6.00	7.50	—	—
E	1.69	2.06	3.19	4.31	5.31
EE Grooved End	2.88	3.12	4.25	6.00	7.56
F 150 ANSI	3.50	3.75	4.50	5.50	6.75
FF 300 ANSI	3.75	4.13	5.00	6.25	7.50
G Threaded	4.00	4.50	—	—	—
GG 150 ANSI	4.00	4.00	5.00	6.00	8.00
GGG 300 ANSI	4.31	4.38	5.31	6.50	8.50
GGGG Grooved End	—	4.25	5.00	—	—
H NPT Body Tapping	.50	.50	.75	.75	1
J NPT Cover Center Plug	.50	.50	.75	.75	1
K NPT Cover Tapping	.50	.50	.75	.75	1
Stem Travel	0.7	0.8	1.1	1.7	2.3
Approx. Ship Wt. Lbs.	65	95	190	320	650

Model 685-09-1 (Uses Basic Valve Model 100-21)

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
ASTM B62	Bronze	B16.24	225	400

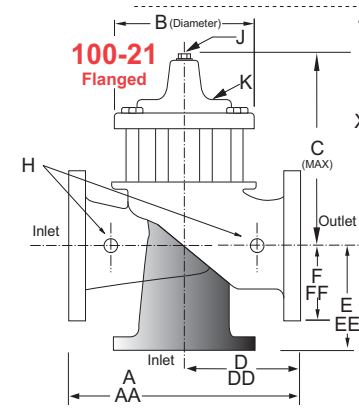
Note: * ANSI standards are for flange dimensions only.
Flanged valves are available faced but not drilled.
Valves for higher pressure are available; consult factory for details

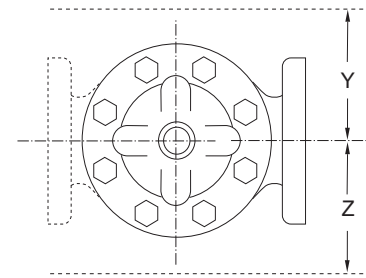
Materials

Component	Standard Material Combinations		
Body & Cover	Ductile Iron	Cast Steel	Bronze
Available Sizes	3" - 8"	3" - 8"	3" - 8"
Disc Retainer & Diaphragm Washer	Cast Iron	Cast Steel	Bronze
Trim: Disc Guide, Seat & Cover Bearing	Bronze is Standard Stainless Steel is Optional		
Disc	Buna-N® Rubber		
Diaphragm	Nylon Reinforced Buna-N® Rubber		
Stem, Nut & Spring	Stainless Steel		

For material options not listed, consult factory.
Cla-Val manufactures valves in more than 50 different alloys.

Dimensions
(In inches)





Model 685-09-1 Dimensions (In Inches)

Valve Size (Inches)	**3**	**4**	**6**	**8**
A 150 ANSI	10.25	13.88	17.75	21.38
AA 300 ANSI	11.00	14.50	18.62	22.38
B Dia.	6.62	9.12	11.50	15.75
C Max.	9.25	11.75	15.25	20.25
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	3.25	4.50	5.50	6.75
FF 300 ANSI	4.12	5.00	6.25	7.50
H NPT Body Tapping	.375	.50	.75	.75
J NPT Cover Center Plug	.50	.50	.75	.75
K NPT Cover Tapping	375	.50	.75	.75
Stem Travel	0.6	0.8	1.1	1.7
Approx. Ship Wt. Lbs.	70	135	230	480

85-09-1 Valve Selection	100-02 Pattern: Globe (G), Angle (A), End Connections: Threaded (T), Grooved (GR), Flanged (F) Indicate Available Sizes					
	Inches	2½	3	4	6	8
	mm	65	80	100	150	200
Basic Valve 100-02	Pattern	G, A	G, A	G, A	G, A	G, A
	End Detail	T ,F, Gr*	T, F, Gr	F, Gr	F, Gr*	F, Gr*
Suggested Flow (gpm)	Maximum	300	460	800	1800	3100
	Max. Intermittent	670	1000	1800	4000	7000
Suggested Flow (Liters/Sec)	Maximum	19	29	50	113	195
	Max. Intermittent	42	63	113	252	441

100-02 Series is the full internal port Powertrol. *Globe Grooved Only

685-09-1 Valve Selection	100-21 Pattern: Globe (G), Angle (A), End Connections: Threaded (T), Grooved (GR), Flanged (F) Indicate Available Sizes				
	Inches	3	4	6	8
	mm	80	100	150	200
Basic Valve 100-21	Pattern	G	G, A	G, A	G, A
	End Detail	F	F	F	F
Suggested Flow (gpm)	Maximum	260	580	1025	2300
Suggested Flow (Liters/Sec)	Maximum	16	37	65	145

100-21 Series is the reduced internal port size version of the 100-02.

We recommend providing adequate space around valve for maintenance work

Pilot System Specifications

Temperature Range

Water to 180°F Max

Materials

Standard Pilot System Materials

Pilot Control: Bronze ASTM B62
Trim: Stainless Steel Type 303
Rubber: Buna-N® Synthetic Rubber

Optional Pilot System Materials

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

When Ordering, Please Specify

1. Catalog No. 85-09-1 or No. 685-09-1
2. Valve Size
3. Pattern - Globe or Angle
4. Pressure Class
5. Threaded, Flanged or Grooved End
6. Trim Material
7. Desired Options
8. When Vertically Installed

Note: For main valve option descriptions, refer to 100-02 (61-02) or 100-21 (661-02) Technical Data Sheets.

CLA-VAL®

E-85-09-1/685-09-1 (R-12/2011)

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Fax: 41-21-643-15-50

www.cla-val.com

Represented By:

CLA-VAL™

MODELS

X105L
X105L2

Limit Switch Assemblies

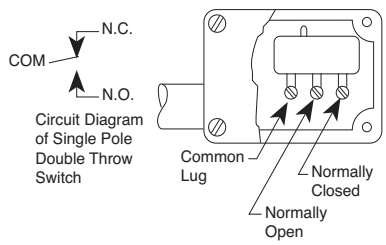
Switch only

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

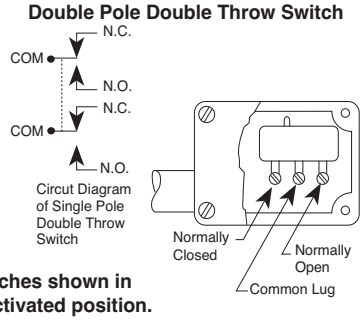
The Cla-Val Model X105L/X105L2 Limit Switch Assembly is a rugged, dependable and positive acting switch assembly actuated by the opening or closing of a Cla-Val control valve on which it is mounted. The single pole, double throw micro switch can be connected either to open or to close an electrical circuit 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

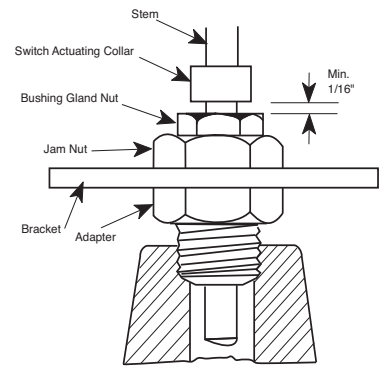


Double Pole Double Throw Switch



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

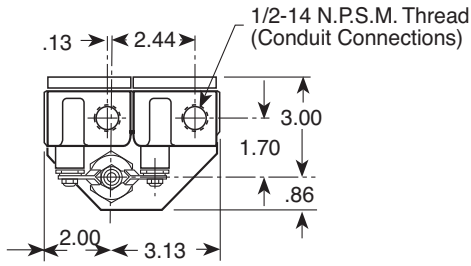
When adjusting actuating collar for proper switch action, a clearance of at least 1/16" (1/8" for 48" valve) must be provided between the collar and the bushing gland nut when valve is in the fully closed position.

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.



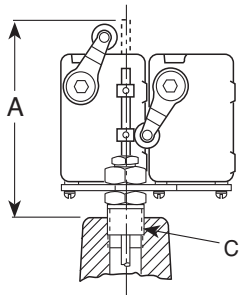


Fig. 1
Valve Size
1 1/4" Thru 8"
X105L2W
X105L2X

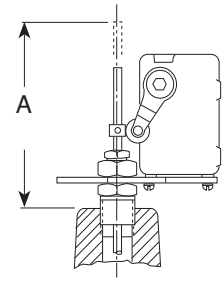


Fig. 2
Valve Size
1 1/4" Thru 24"
X105LCW
X105LCX

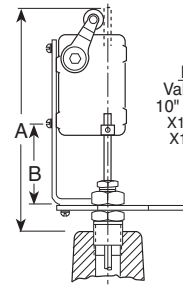


Fig. 4
Valve Size
10" Thru 24"
X105LOW
X105LOX

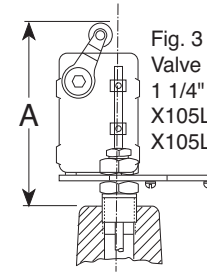


Fig. 3
Valve Size
1 1/4" Thru 8"
X105LOW
X105LOX

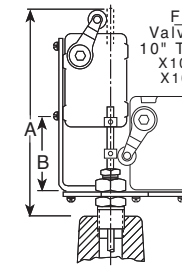
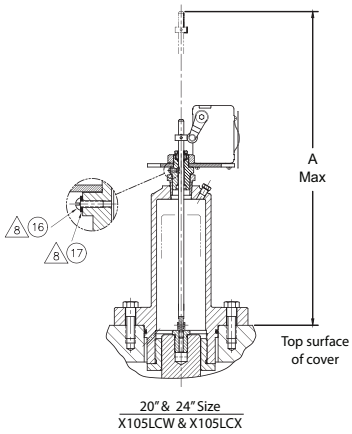
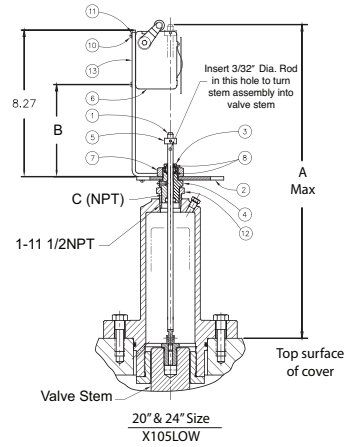


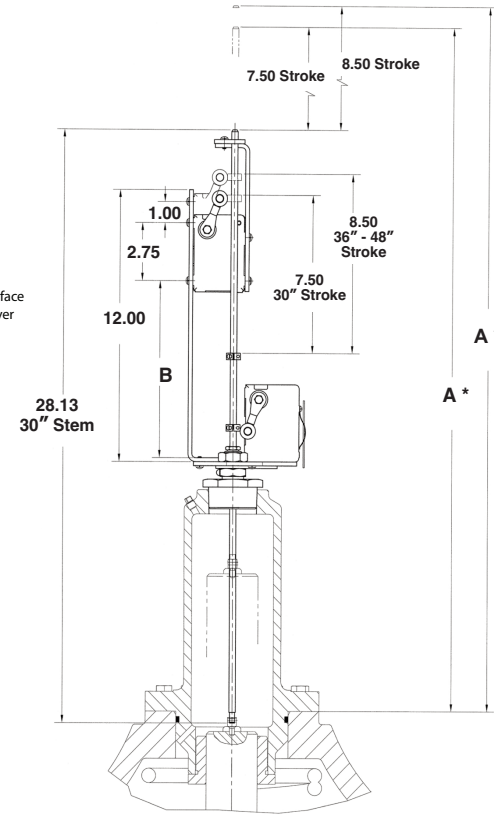
Fig. 5
Valve Size
10" Thru 24"
X105L2W
X105L2X



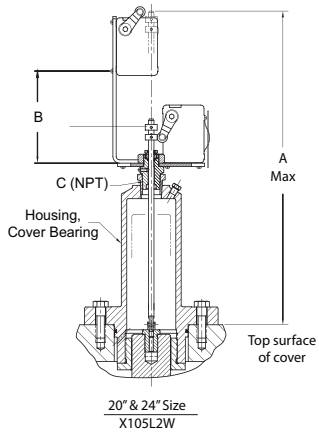
20" & 24" Size
X105LCW & X105LCX



20" & 24" Size
X105LOW



A* - 30" • A** - 36", 42" & 48" Size



20" & 24" Size
X105L2W

X105 Series Dimensions (In Inches)

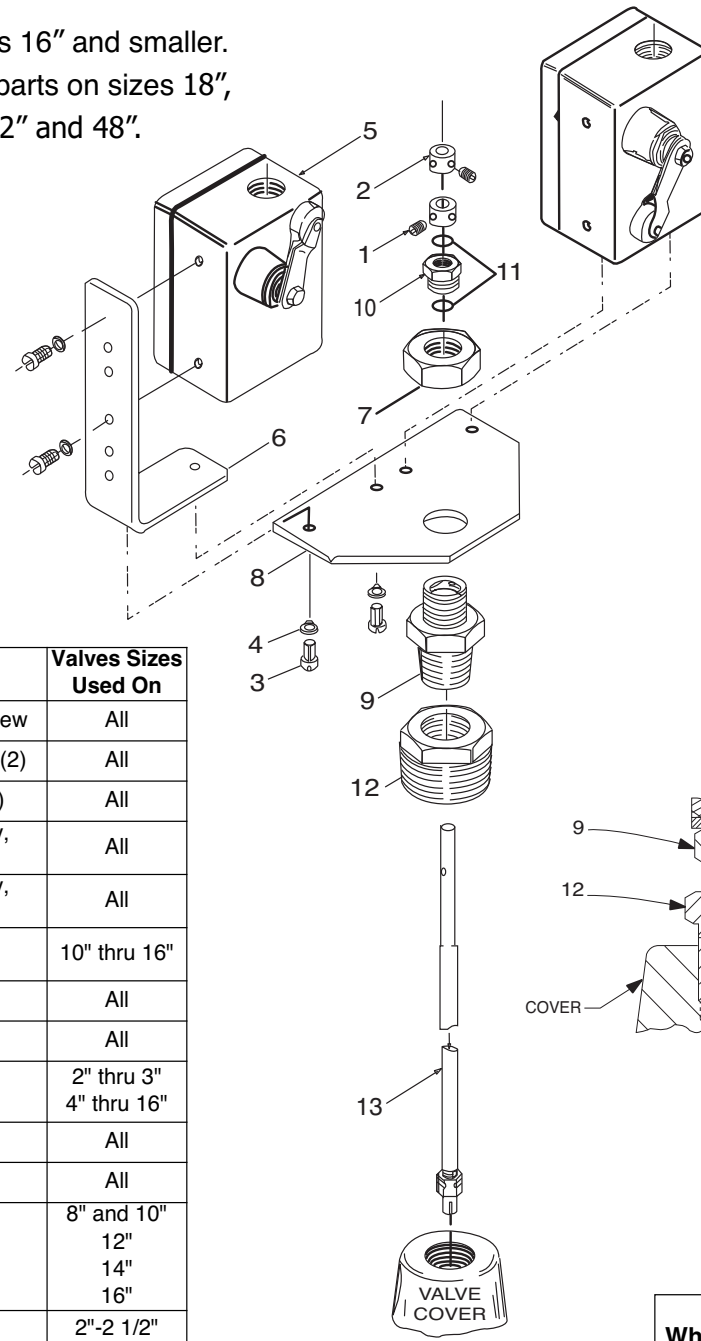
BasicValve 100-01	1 1/4	1 1/2	2	2 1/2	3	4	6	8	10	12	14	16	18	20	24	30	36*	42*	48*
Dimension "A"	10.19	10.19	7.16	7.16	7.34	7.00	6.69	6.91	9.88	9.59	9.16	10.78	10.78	18.23	19.10	35.07	36.07	36.07	36.07
Dimension "B"							1.69	1.69	2.44	2.94	2.94	2.94	2.94	4.32	5.19	8.40	8.40	8.40	8.40
C (NPT)	1/4	1/4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

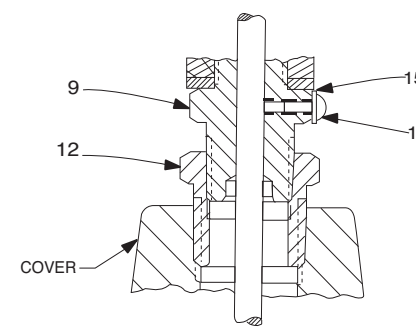
CLA-VAL

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″.



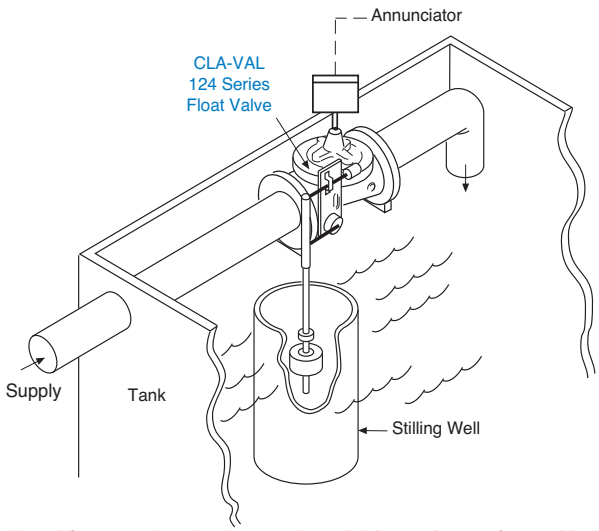


Item	Part Number	Description	Valves Sizes Used On
1-2	20441701E	Collar W/Set Screw	All
3	67578-21B	Screw, Machine (2)	All
4	67584-23F	Washer, Lock (2)	All
5	34637K	Switch Assembly, Weather Proof	All
	34633J	Switch Assembly, Explosion Proof	All
6	64310G	Bracket Switch Mounting	10" thru 16"
7	67815-06J	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

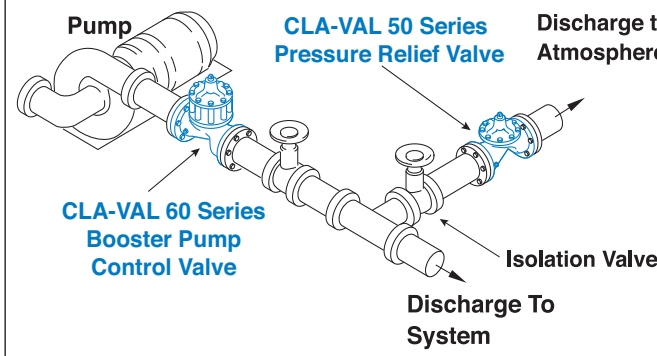
When ordering parts, please specify:

- 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™

E-X105L/X105L2 (R-11/2015)

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www.cla-val.com

Represented By:

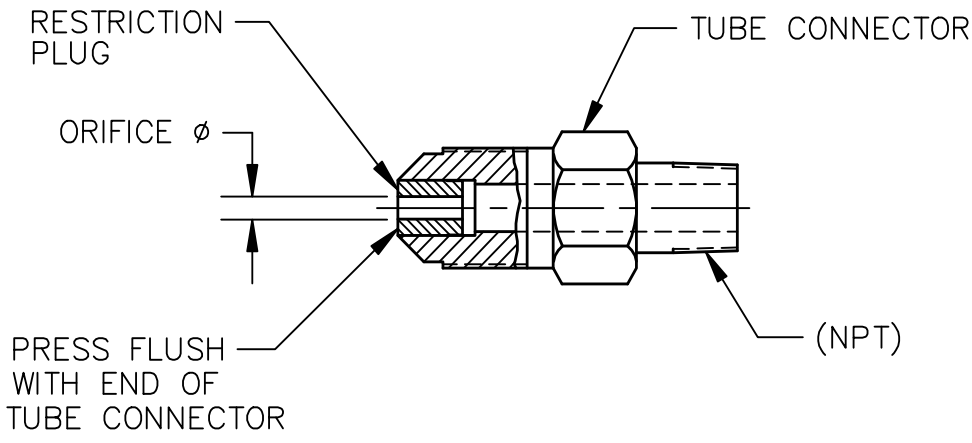
CLA-VAL CO. NEWPORT BEACH, CALIFORNIA

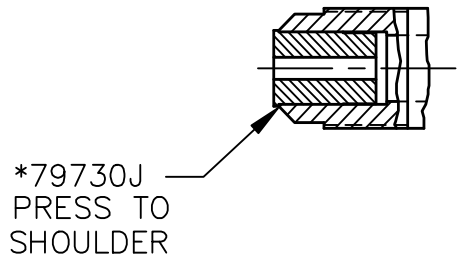
CATALOG NO.	DRAWING NO.	REV
X58C	48834	AP

TYPE OF VALVE AND MAIN FEATURES

X58C RESTRICTION ASSEMBLIES

DESIGN		
DRAWN	JC	12-3-85
CHK'D	JC	12-4-85
APV'D	CH	12-11-85





NOTES:

1. *FOR IDENTIFICATION, THESE STOCK NO'S ARE TO BE STAINED BLUE WITH 74234-03.
2. **FOR IDENTIFICATION, THESE STOCK NO'S ARE TO BE STAINED RED WITH 74234-05.
3. SEE DWG 76740 FOR STAINLESS STEEL X58C.
4. SEE SHEETS 3 & 4 FOR UL APPROVED DRAWING.

LTR	DESCRIPTION	BY	DATE
A-AK	SEE REVISION FILE		
AL	REDRAWN ON CAD (ECO 14229)	EK	11-18-93
AM	REINSTATED PN 68565B & 64673H (ECO 15043)	TLC	10-18-94
AN	ADDED PN 48834-05F (NED 43663)	AK	09-15-98
AP	ADDED PN 48834-06D (NED 75779)	EK	9-29-11

CAD REVISION RECORD - DO NOT REVISE MANUALLY

CLA-VAL CO. NEWPORT BEACH, CALIFORNIA

CATALOG NO.	DRAWING NO.	REV
X58C	48834	AP

TYPE OF VALVE AND MAIN FEATURES

X58C RESTRICTION ASSEMBLIES

DESIGN		
DRAWN	JC	12-3-85
CHK'D	JC	12-4-85
APV'D	CH	12-11-85

X58C STOCK NO.	TUBE CONNECTOR SIZE TUBE X NPT	TUBE CONNECTOR MATERIAL	RESTRICTION PLUG ORIFICE DIA	RESTRICTION PLUG MATERIAL
	37° FLARE			
**44734C	3/8 X 3/8-18 NPT	ALUMINUM	.125 (1/8)	S. STEEL
	45° FLARE			
*37814B	1/4 X 1/8-27 NPT	BRASS	.031 (1/32)	S. STEEL
*80500C	1/4 X 1/8-27 NPT	BRASS	.062 (1/16)	S. STEEL
*67739D	3/8 X 1/8-27 NPT	BRASS	.040	S. STEEL
*64672K	3/8 X 3/8-18 NPT	BRASS	.062 (1/16)	S. STEEL
*99329-01D	3/8 X 3/8-18 NPT	BRASS	.094 (3/32)	S. STEEL
**79730J	1/2 X 1/2-14 NPT	BRASS	.125 (1/8)	S. STEEL
**48834-05F	3/8 X 3/8-18 NPT	BRASS	.125 (1/8)	S. STEEL
*85484E	1/4 X 1/8-27 NPT	BRASS	.031 (1/32)	DELRIN
*85486K	1/4 X 1/8-27 NPT	BRASS	.040	DELRIN
**48834-03A	1/4 X 1/8-27 NPT	BRASS	.125 (1/8)	DELRIN
*48834-04J	1/4 X 1/8-27 NPT	BRASS	.093	DELRIN
*88409-01G	3/8 X 1/8-27 NPT	BRASS	.031 (1/32)	DELRIN
*88409J	3/8 X 1/8-27 NPT	BRASS	.052	DELRIN
*42346H	3/8 X 1/8-27 NPT	BRASS	.062 (1/16)	DELRIN
**48834-01E	3/8 X 1/8-27 NPT	BRASS	.125 (1/8)	DELRIN
*42775H	3/8 X 1/4-18 NPT	BRASS	.062 (1/16)	DELRIN
**63604D	3/8 X 1/4-18 NPT	BRASS	.156 (5/32)	DELRIN
*10253D	3/8 X 3/8-18 NPT	BRASS	.031 (1/32)	DELRIN
*46946A	3/8 X 3/8-18 NPT	BRASS	.062 (1/16)	DELRIN
**64673H	3/8 X 3/8-18 NPT	BRASS	.125 (1/8)	DELRIN
*68565B	3/8 X 3/8-18 NPT	BRASS	.094 (3/32)	DELRIN
**43302K	3/8 X 3/8-18 NPT	BRASS	.188 (3/16)	DELRIN
**12900H	1/2 X 1/2-14 NPT	BRASS	.125 (1/8)	DELRIN
**48834-02C	1/2 X 1/2-14 NPT	BRASS	.188 (3/16)	DELRIN
**48834-06D	1/2 X 1/2-14 NPT	BRASS	.250 (1/4)	DELRIN

CAD REVISION RECORD - DO NOT REVISE MANUALLY

LTR	DESCRIPTION	BY	DATE
	SEE SHEET 1		

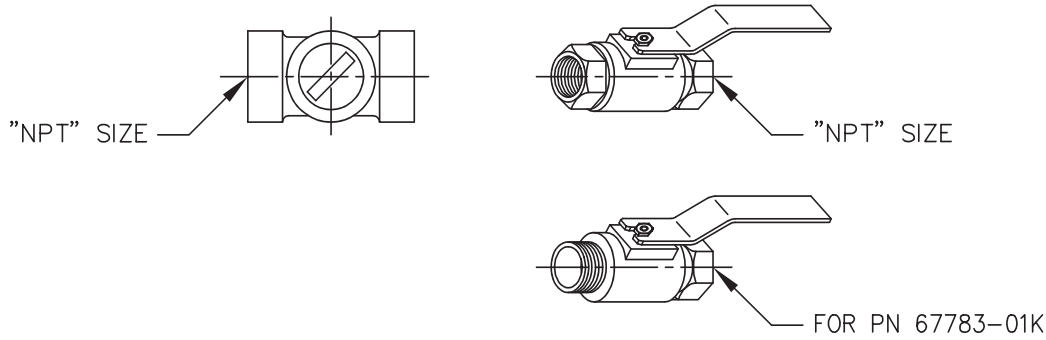
CLA-VAL CO. NEWPORT BEACH, CALIFORNIA	CATALOG NO.	DRAWING NO. 67783	REV BD

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)

CAD REVISION RECORD - DO NOT REVISE MANUALLY

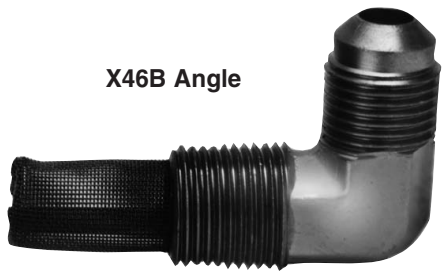
LTR	DESCRIPTION	BY	DATE
A-AY	SEE REVISION FILE		
BA	ADDED PN'S 67783-59H, 67783-60F & 67783-61D (ECO 20434)	AK	03-14-06
BB	ADDED PN'S 67783-62B (NED 62200)	AK	07-10-08
BC	ADDED PN'S 67783-63K (NED 62218)	AK	08-14-08
BD	ADDED PN 67783-64H (NED 62446)	PC	10-1-2008

CLA-VAL™

— MODEL — X46

Flow Clean Strainer

X46A Straight



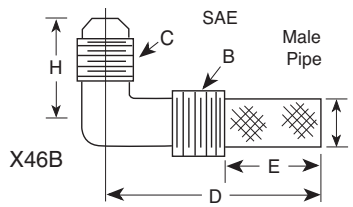
X46B Angle

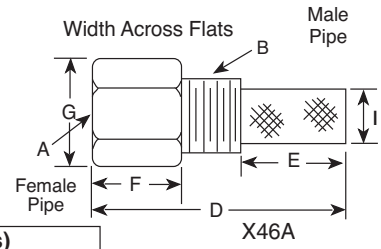
- **Self Scrubbing Cleaning Action**
- **Straight Type or Angle Type**

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

CLA-VAL™

— MODEL — **X140-1**

Locking Security Cap

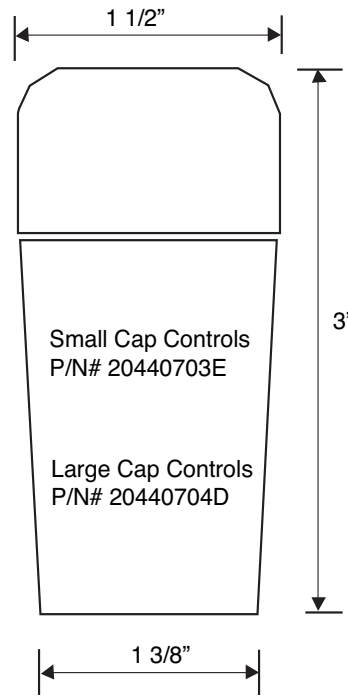
X140-1
Locking
Security Cap

- **Controlled Security for Pilot Control Adjustment**
- **Long Life Stainless Steel Construction**
- **Tamper-Resistant Design**
- **X140-1 Key and Six Pin Cylinder Lock Supplied**

The Cla-Val Model X140-1 Locking Security Cap is designed to completely encapsulate the pilot control adjustment screw with Stainless Steel. Even in the harshest environment, the X140-1 offers an extra level of protection, security and peace of mind for the system operator that pilot control settings will not change until appropriate personnel are present.

The X140-1 Locking Security Cap is available in three sizes for attaching to Cla-Val pilot controls in place of the standard plastic cap.

Dimensions (In Inches)



Specify on order complete pilot-control nameplate data to ensure proper selection of the X140-1.

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 Product Identification

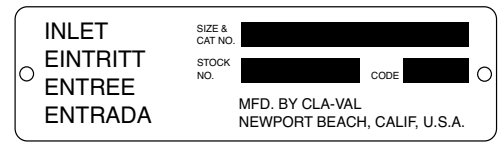
How to Order

Proper Identification

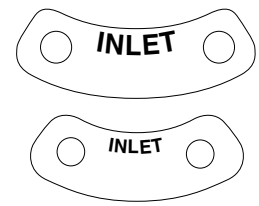
For ordering repair kits, replacement parts, or for inquiries concerning valve operation, it is important to properly identify Cla-Val products already in service by including all nameplate data with your inquiry. Pertinent product data includes valve function, size, material, pressure rating, end details,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

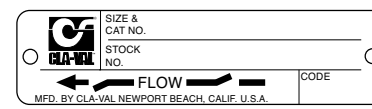


This brass plate appears on valves sized 2 1/2" and larger and is located on the top of the inlet flange.

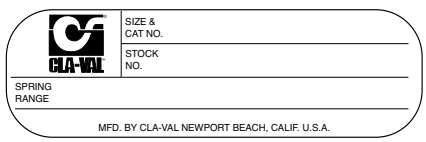


These two brass plates appear on 3/8", 1/2", and 3/4" size valves and are located on the valve cover.

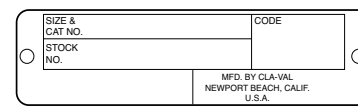
This brass plate appears on altitude valves only and is found on top of the outlet flange.



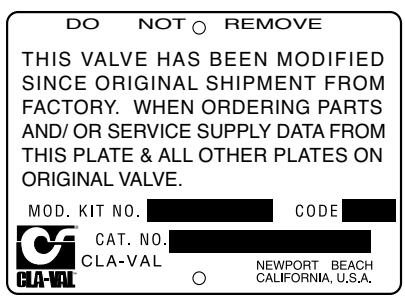
These two brass plates appear on threaded valves 1" through 3" size or flanged valves 1" through 2". It is located on only one side of the valve body.



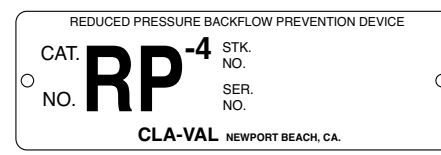
This tag is affixed to the cover of the pilot control valve. The adjustment range appears in the spring range section.



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)

CLA-VAL
PO Box 1325 Newport Beach CA 92659-0325
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Lausanne, Switzerland
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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	REPAIR KIT	REBUILD KIT	STUD & NUT KIT
	STOCK NO.	STOCK NO.	STOCK NO.	STOCK NO.
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	21176624K	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	REPAIR KIT	REBUILD KIT	STUD & NUT KIT
	STOCK NO.	STOCK NO.	STOCK NO.	STOCK NO.
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

Consult factory for larger sizes

Rubber Kit Includes: Diaphragm, Disc, Spacer Washers

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

Rebuild Kit 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

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

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"	99116G	9169913C
		10"	9169939H	99116G
		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-9	12223E	CDB-KB	9170012A
CDB-30	9170023H	CRA (w/bucking spring)	9170001D	CRA-KB	N/A
CDB-31	9170024F	CRD (w/bucking spring)	9170002B	CRD-KB (w/bucking spring)	9170008J
CDB-7	9170017K	CRD (no bucking spring)	9170003K	CRL-KB	9170013J
CDH-2	18225D	CRD-18	20275401K	CDHS-2BKB	9170010E
CDHS-2	44607A	CRD-22	98923G	CDHS-2FKB	9170011C
CDHS-2B	9170004H	CRL (55F, 55L)	9170007A	CDHS-18KB (no bucking spring)	9170009G
CDHS-2F	9170005E	CRL60/55L-60	9170033G	102C-KB	1726202D
CDHS-3C-A2	24657K	CRL60/55L60 1"	9170042H		
CDHS-8A	2666901A	CRL-4A	43413E		
CDHS-18	9170003K	CRL-5 (55B)	65755B		
CDS-4	9170014G	CRL-5A (55G)	20666E		
CDS-5	14200A	CRL-18	20309801C		
CDS-6	20119301A	Universal CRL	9170041K		
CDS-6A	20349401C	CV	9170019F		
CFCM-M1	1222301C	X105L (O-ring)	00951E	Buna-N®	
CFM-2	12223E	102B-1	1502201F		
CFM-7	1263901K	102C-2	1726201F	CRD Disc Ret. (Solid)	C5256H
CFM-7A	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-Cl	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