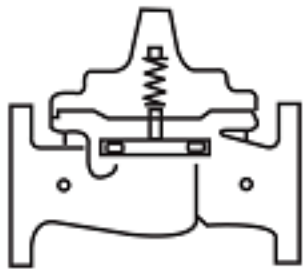
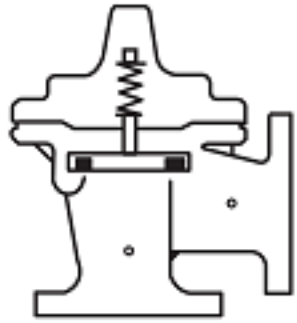
CLA-VAL
AUTOMATIC CONTROL VALVES

98-06/698-06

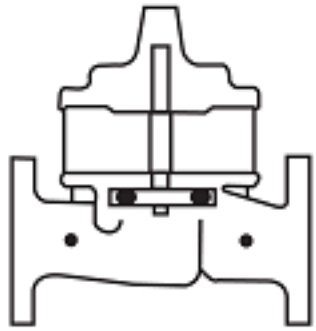
Place this manual with personnel responsible for maintenance of this valve



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
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B	CV FLOW CONTROL WAS 6120 NEEDLE VALVE (ECO 23945)	RP	01-14-14
C	REVISED ADJUSTMENT PROCEDURE IN ENTIRETY, ADDED ITEMS 6C AND 6D (ECO 25255)	BF	07-15-15

CAD REVISION RECORD - DO NOT REVISE MANUALLY

LTR	DESCRIPTION	BY	DATE
–	RELEASED FOR PRODUCTION (NED 65403)	BF	2-03-11
A	ADDED NOTES ON SHEET 1 ONLY (ECO 22266)	AK	04-01-11

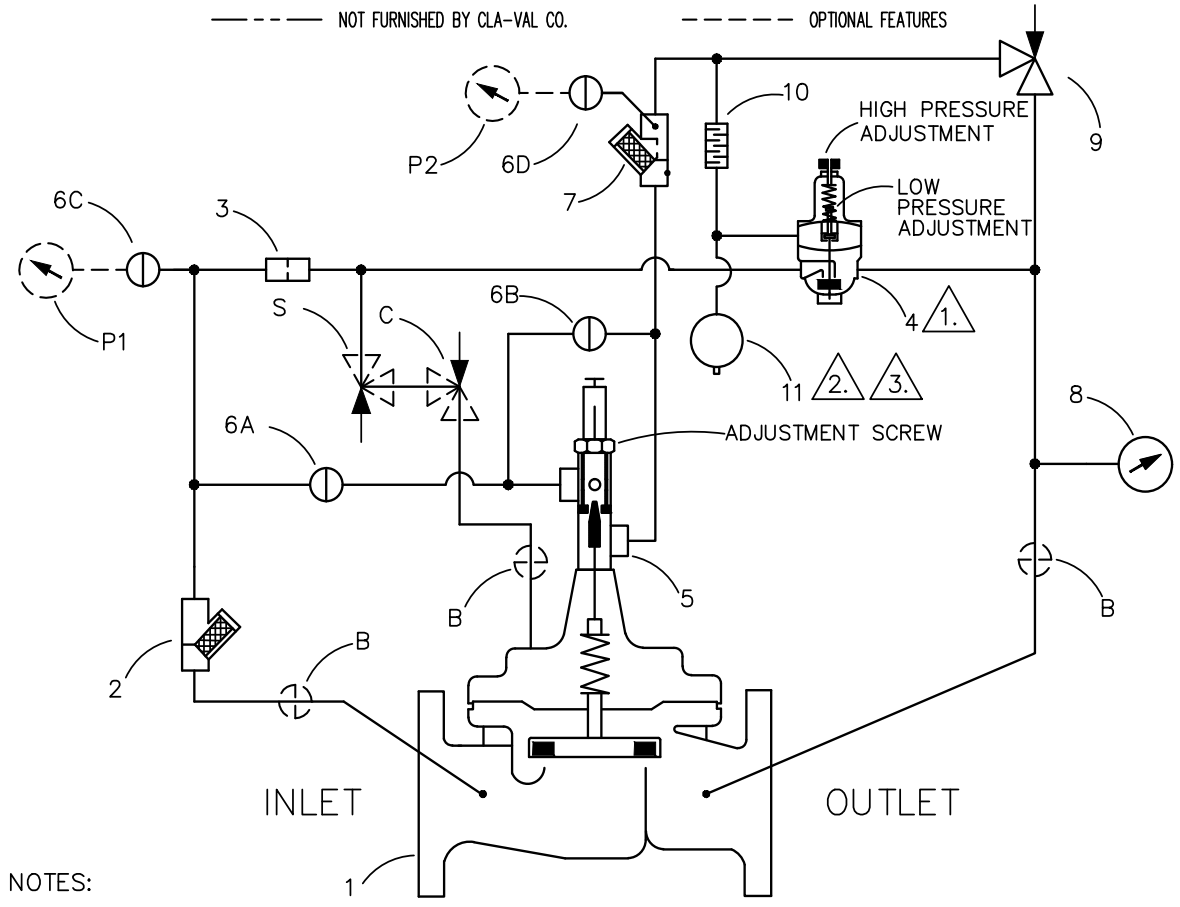
CLA-VAL CO. NEWPORT BEACH, CALIFORNIA

CATALOG NO.	DRAWING NO.	REV
98-06/698-06	208358	C

TYPE OF VALVE AND MAIN FEATURES

PRESSURE MANAGEMENT CONTROL VALVE WITH X58E AND ACCUMULATOR (SIZES 2"–10")

DESIGN		
DRAWN	BF	2-03-11
CHK'D	VL	2-08-11
APV'D	CH	2-08-11



NOTES:

1. CPM–A SHOULD BE MOUNTED HORIZONTALLY, WITH BLEED SCREW FACING UP.
2. ACCUMULATOR SHOULD BE MOUNTED BELOW CPM–A, ORIENTED WITH INLET PIPE WORK FACING UP.
3. ACCUMULATOR IS FACTORY AIR CHARGED TO APPROXIMATELY 51 PSI (3.5 BAR).

ITEM NO.	BASIC COMPONENTS	QTY	ITEM NO.	BASIC COMPONENTS	QTY
1	100–01 HYTROL (98–06) MAIN VALVE 100–20 HYTROL (698–06) MAIN VALVE	1	8	X141 PRESSURE GAUGE ASSEMBLY	1
			9	CV FLOW CONTROL	1
2	X43 "Y" STRAINER	1	10	X58E RESTRICTION ASSEMBLY	1
3	X58C RESTRICTION ASSEMBLY	1	11	ACCUMULATOR (AIR CHARGED)	1
4	CPM–A PRESSURE MANAGEMENT CONTROL	1			
5	X78–4 + X101 ADJUSTABLE ORIFICE ASSEMBLY	1			
6	CK2 COCK (ISOLATION VALVE)	4			
7	X44A STRAINER & ORIFICE ASSEMBLY	1			

OPTIONAL FEATURE SUFFIX	ADDED TO CATALOG NUMBER	QTY
B	CK2 COCK (ISOLATION VALVE)	3
C	CV FLOW CONTROL (CLOSING)	1
P	X141 PRESSURE GAUGE	2
S	CV FLOW CONTROL (OPENING)	1

CLA-VAL CO. NEWPORT BEACH, CALIFORNIA	CATALOG NO.	DRAWING NO.	REV
	98-06/698-06	208358	C

TYPE OF VALVE AND MAIN FEATURES

PRESSURE MANAGEMENT CONTROL VALVE
WITH X58E AND ACCUMULATOR (SIZES 2"-10")

DESIGN		
DRAWN	BF	2-03-11
CHK'D	VL	2-08-11
APV'D	CH	2-08-11

CAD REVISION RECORD - DO NOT REVISE MANUALLY

LTR	DESCRIPTION	BY	DATE
	SEE SHEET 1		

OPERATING DATA

I. PRESSURE MANAGEMENT FEATURE:

CPM-A PRESSURE MANAGEMENT CONTROL (4) IS A NORMALLY OPEN CONTROL THAT RESPONDS TO CHANGE IN DOWNSTREAM DEMAND. DOWNSTREAM PRESSURE IS MANAGED BETWEEN HIGH AND LOW FLOW SYSTEM CONDITIONS. WHEN SYSTEM DEMAND IS NORMAL OR HIGHER THAN NORMAL, THE PRESSURE MANAGEMENT CONTROL (4) MAINTAINS DOWNSTREAM PRESSURE AT THE HIGH PRESSURE SET POINT. AN INCREASE IN OUTLET PRESSURE CLOSES CONTROL (4) AND A DECREASE IN OUTLET PRESSURE OPENS CONTROL (4). THIS CAUSES THE MAIN VALVE (1) COVER PRESSURE TO VARY AND THE MAIN VALVE (1) MODULATES (OPENS AND CLOSES), MAINTAINING THE DOWNSTREAM PRESSURE AT THE HIGH SET POINT.

WHEN SYSTEM DEMAND DECREASES BELOW NORMAL DEMAND, CONTROL (4) RESPONDS BY GRADUALLY LOWERING THE DOWNSTREAM PRESSURE UNTIL IT REACHES THE LOW PRESSURE SET POINT. AS SYSTEM FLOW CHANGES BETWEEN THE LOW AND HIGH PRESSURE SET POINTS, CONTROL (4) CLOSES OR OPENS ACCORDINGLY. THIS CAUSES THE MAIN VALVE (1) COVER PRESSURE TO VARY AND THE MAIN VALVE (1) MODULATES (OPENS AND CLOSES), MAINTAINING THE DOWNSTREAM PRESSURE AT EITHER THE LOW OR HIGH PRESSURE SET POINT.

CPM-A PRESSURE MANAGEMENT CONTROL (4) AND
X78-4 (5) ORIFICE ASSEMBLY ADJUSTMENT STEPS:

FOR ACCURATE ADJUSTMENT OF THE PRESSURE TRANSITION CONDITION A SYSTEM FLOW METER WITH A MEANS TO ADJUST SYSTEM FLOW RATES DURING THE ADJUSTMENT PROCESS IS RECOMMENDED. A GATE VALVE OR EQUIVALENT FLOW CONTROL VALVE DOWNSTREAM OF THE MAIN VALVE ARE ACCEPTABLE METHODS FOR VARYING THE SYSTEM FLOW CONDITIONS. IF A MEANS TO ADJUST FLOW IS NOT AVAILABLE THEN THE PRESSURE TRANSITION CONDITION CAN BE APPROXIMATED USING THE VALVE POSITION TABLE ON SHEET 6. BOTH METHODS OF ADJUSTMENT ARE DESCRIBED IN STEP 10.

1. ISOLATION VALVE (6B) IS CLOSED. ISOLATION VALVE (6A) IS OPEN.
2. ADJUST CV FLOW CONTROL (9) SO THAT IT IS APPROXIMATELY 6 TURNS OUT. FINAL ADJUSTMENT OF CV FLOW CONTROL (9) IS NOTED IN STEP 6.
3. TURN THE X78-4 (5) ADJUSTMENT SCREW COUNTER-CLOCKWISE UNTIL STOPPED.
4. TURN THE CPM-A (4) LOW PRESSURE ADJUSTMENT SCREW CLOCKWISE UNTIL STOPPED (LP = HP).
5. TURN THE CPM-A (4) HIGH PRESSURE ADJUSTMENT SCREW UNTIL THE PRESSURE AT GAUGE (8) IS AT THE DESIRED MAXIMUM SYSTEM (DOWNSTREAM) PRESSURE CONDITION.

CLA-VAL CO. NEWPORT BEACH, CALIFORNIA

CATALOG NO.	DRAWING NO.	REV
98-06/698-06	208358	C

TYPE OF VALVE AND MAIN FEATURES

PRESSURE MANAGEMENT CONTROL VALVE
WITH X58E AND ACCUMULATOR (SIZES 2"-10")

DESIGN		
DRAWN	BF	2-03-11
CHK'D	VL	2-08-11
APV'D	CH	2-08-11

CAD REVISION RECORD - DO NOT REVISE MANUALLY

LTR	DESCRIPTION	BY	DATE
	SEE SHEET 1		

OPERATING DATA-CONTINUED

6. IF P2 GAUGE IS NOT INCLUDED, REMOVE GAUGE 8 & INSTALL IN P2 LOCATION. PRESSURE AT P2 LOCATION SHOULD BE 10-20 PSI HIGHER THAN THE HIGH PRESSURE SET POINT. TO CHANGE P2 PRESSURE ADJUST CV CONTROL (9) UNTIL PRESSURE AT P2 IS 10-20 PSI HIGHER THAN HIGH PRESSURE SET POINT.
7. CLOSE ISOLATION VALVE (6A). RETURN GAUGE (8) TO ORIGINAL PLUMBING LOCATION PER SCHEMATIC DIAGRAM.
8. SLOWLY TURN THE CPM-A (4) LOW PRESSURE ADJUSTMENT SCREW OUT (COUNTER-CLOCKWISE) UNTIL PRESSURE AT GAUGE (8) IS AT THE DESIRED LOW PRESSURE SET POINT.
9. OPEN ISOLATION VALVE (6A) RETURNING TO AUTOMATIC MODE AND OBSERVE GAUGE (8) TO DETERMINE IF DOWNSTREAM PRESSURE REMAINS AT LOW SET POINT OR SHIFTS TO HIGH PRESSURE SET POINT. IF PRESSURE AT GAUGE (8) REMAINS AT LOW PRESSURE SET POINT, INCREASE FLOW ARTIFICIALLY UNTIL DOWNSTREAM PRESSURE CHANGES TO HIGH PRESSURE SET POINT.
10. TO ADJUST X78-4 (5), THE DOWNSTREAM PRESSURE AT GAUGE (8) SHOULD BE AT THE HIGH PRESSURE SET POINT. TURN X78-4 (5) ADJUSTMENT SCREW CLOCKWISE UNTIL PRESSURE AT GAUGE (8) DIPS TO LOW PRESSURE SET POINT CONDITION. THIS ADJUSTMENT POSITION IS WHERE THE VALVE CHANGES BETWEEN LOW AND HIGH PRESSURE SET POINTS. REFER TO THE X78-4 (5) ADJUSTMENT TABLE ON SHEET 6 FOR POSITION CHANGE PER TURN. THIS TABLE CAN BE USED AS A GUIDE TO ADJUST THE X78-4 (5) TO THE DESIRED PRESSURE TRANSITION CONDITION.

IF A FLOW METER IS AVAILABLE, THEN THE X78-4 (5) CAN BE ADJUSTED USING THE FLOW METER. IF USING A FLOW METER AS AN ADJUSTMENT REFERENCE, A DOWNSTREAM GATE VALVE OR EQUIVALENT IS NEEDED TO ADJUST SYSTEM FLOW RATE. USE THE GATE VALVE TO ADJUST THE FLOW RATE TO THE DESIRED PRESSURE TRANSITION CONDITION. NEXT SLOWLY TURN THE X78-4 (5) ADJUSTMENT SCREW CLOCKWISE UNTIL PRESSURE AT GAUGE (8) DIPS TO THE LOW PRESSURE SET POINT. AFTER ADJUSTMENT IS COMPLETE THE GATE VALVE CAN BE USED TO RAISE AND LOWER FLOW RATE TO VERIFY THE PRESSURE TRANSITION SET POINT IS AT THE DESIRED CONDITION.

II. LOW PRESSURE OVERRIDE FEATURE:

OPEN ISOLATION VALVE (6B) TO OVERRIDE LOW PRESSURE SET POINT OF CPM-A CONTROL (4). LOW PRESSURE SET POINT IS DISABLED AND MAIN VALVE (1) REGULATES AT THE HIGH PRESSURE SET POINT AS LONG AS ISOLATION VALVES (6A) AND (6B) REMAIN OPEN. CLOSE ISOLATION VALVE (6B) TO RETURN TO AUTOMATIC CONDITION.

CLA-VAL CO. NEWPORT BEACH, CALIFORNIA	CATALOG NO.	DRAWING NO.	REV
	98-06/698-06	208358	C

TYPE OF VALVE AND MAIN FEATURES

PRESSURE MANAGEMENT CONTROL VALVE
WITH X58E AND ACCUMULATOR (SIZES 2"-10")

DESIGN		
DRAWN	BF	2-03-11
CHK'D	VL	2-08-11
APV'D	CH	2-08-11

OPERATING DATA-CONTINUED

III. ADJUSTABLE ORIFICE FEATURE:

X78-4 + X101 ADJUSTABLE ORIFICE ASSEMBLY (5) IS AN ADJUSTABLE ORIFICE WITH AN X101 POSITION INDICATOR. THE X78-4 ADJUSTABLE ORIFICE ASSEMBLY (5) IS USED TO INCREASE THE TRANSITION POINT (% OPEN) BETWEEN THE LOW AND HIGH PRESSURE SET POINTS OF THE CPM-A (4). PRIOR TO ADJUSTING X78-4 (5) FEATURE, LOOSEN SET SCREW ON SIDE OF X78-4 (5) HOUSING APPROXIMATELY 1/2 TURN. SET SCREW IS LOCATED NEAR THE TOP OF THE X78-4 (5) HOUSING. TO LOWER THE DOWNSTREAM PRESSURE AT THE CURRENT (OR KNOWN) FLOW RATE, TURN THE X78-4 (5) ADJUSTMENT SCREW CLOCKWISE UNTIL THE PRESSURE READING AT GAUGE (8) DROPS TO THE LOW PRESSURE SET POINT OF THE CPM-A (4). THE X78-4 (5) ADJUSTMENT SCREW CAN BE TURNED BY HAND OR WITH AN OPEN END WRENCH.

NOTE: ADJUSTING X78-4 (5) SHIFTS THE FLOW POINT WHERE THE PRESSURE CONDITION STARTS TO TRANSITION BETWEEN THE LOW AND HIGH PRESSURE SET POINTS. BY TURNING THE ADJUSTMENT SCREW COUNTER-CLOCKWISE ON THE X78-4 (5), THE TRANSITION BETWEEN THE LOW AND HIGH PRESSURE SET POINTS OCCURS AT A LOWER FLOW RATE. AS AN EXAMPLE, WHEN THE X78-4 (5) ADJUSTMENT SCREW IS TURNED COUNTER-CLOCKWISE UNTIL BOTTOMED, THE TRANSITION BETWEEN LOW AND HIGH PRESSURE STARTS AT THE LOWEST POSSIBLE FLOW RATE. TURNING THE X78-4 (5) ADJUSTMENT SCREW CLOCKWISE CHANGES THE TRANSITION POINT TO A HIGHER FLOW RATE. THE X78-4 (5) ADJUSTMENT TABLE NOTED ON SHEET 7 CAN BE USED AS A GUIDELINE TO DETERMINE VALVE POSITION CHANGE (% OPEN) PER TURN OF X78-4 (5) ADJUSTMENT SCREW.

IV. ACCUMULATOR FEATURE:

ACCUMULATOR (11) FUNCTIONS AS A PRESSURE TRANSITION DAMPENING FEATURE THAT ALLOWS FOR A RELATIVELY SMOOTH TRANSITION BETWEEN LOW AND HIGH PRESSURE SET POINTS OF THE 98-06/698-06 PRESSURE MANAGEMENT VALVE. THIS FEATURE IS FACTORY AIR CHARGED TO APPROXIMATELY 51 PSI (3.5 BAR). THIS PRE-CHARGE CONDITION IS SATISFACTORY FOR MOST 98-06/698-06 PRESSURE MANAGEMENT APPLICATIONS AND NO FIELD CHARGING IS REQUIRED. IF THE LOW PRESSURE SET POINT CONDITION IS GREATER THAN 80 PSI (5.5 BAR), THEN A SLIGHTLY HIGHER ACCUMULATOR (11) AIR CHARGE PRESSURE MAY BE DESIRED. THE ACCUMULATOR (11) HAS A STEM VALVE THAT IS THE SAME AS THE STEM VALVE USED ON BICYCLE OR VEHICLE TIRES. AIR CHARGE PRESSURE CAN BE CHANGED BY USING A HAND TIRE PUMP OR AN AIR PRESSURE SOURCE FROM A GAS STATION.

CAD REVISION RECORD - DO NOT REVISE MANUALLY

LTR	DESCRIPTION	BY	DATE
	SEE SHEET 1		

CLA-VAL CO. NEWPORT BEACH, CALIFORNIA

CATALOG NO.	DRAWING NO.	REV
98-06/698-06	208358	C

TYPE OF VALVE AND MAIN FEATURES

PRESSURE MANAGEMENT CONTROL VALVE
WITH X58E AND ACCUMULATOR (SIZES 2"-10")

DESIGN		
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APV'D	CH	2-08-11

OPERATING DATA-CONTINUED

V. CV FLOW CONTROL FEATURE:

CV FLOW CONTROL (9) IS USED TO REGULATE OR BALANCE THE PRESSURE INTO AND OUT OF THE SENSING CHAMBER OF THE CPM-A PRESSURE MANAGEMENT CONTROL (4). FOR NORMAL OPERATION, THE CV FLOW CONTROL (9) IS ADJUSTED SO PRESSURE AT GAUGE P2 IS 10-20 PSI HIGHER THAN HIGH PRESSURE SET POINT. TURN CV FLOW CONTROL COUNTER-CLOCKWISE TO LOWER THE PRESSURE AT P2.

VI. OPTIONAL FEATURE OPERATING DATA:

SUFFIX B (ISOLATION VALVES):

CK2 COCKS (B) ARE USED TO ISOLATE THE PILOT SYSTEM FROM MAIN LINE PRESSURE. THESE VALVES MUST BE OPEN DURING NORMAL OPERATION.

SUFFIX C (CLOSING SPEED CONTROL):

FLOW CONTROL (C) CONTROLS THE CLOSING SPEED OF THE MAIN VALVE. TURN THE ADJUSTING STEM CLOCKWISE TO MAKE THE MAIN VALVE CLOSE SLOWER.

SUFFIX P (PRESSURE GAUGE):

PRESSURE GAUGES (P1) AND (P2) PROVIDE PRESSURE READING IN THE INLET AND COVER CONNECTIONS.

SUFFIX S (OPENING SPEED CONTROL):

FLOW CONTROL (S) CONTROLS THE OPENING SPEED OF THE MAIN VALVE. TURN THE ADJUSTING STEM CLOCKWISE TO MAKE THE MAIN VALVE OPEN SLOWER.

CAD REVISION RECORD - DO NOT REVISE MANUALLY

LTR	DESCRIPTION	BY	DATE
	SEE SHEET 1		

CLA-VAL CO. NEWPORT BEACH, CALIFORNIA

CATALOG NO.	DRAWING NO.	REV
98-06/698-06	208358	C

TYPE OF VALVE AND MAIN FEATURES

PRESSURE MANAGEMENT CONTROL VALVE
WITH X58E AND ACCUMULATOR (SIZES 2"-10")

DESIGN		
DRAWN	BF	2-03-11
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LTR	DESCRIPTION	BY	DATE
	SEE SHEET 1		

OPERATING DATA-CONTINUED

VII. CHECK LIST FOR PROPER OPERATION:

( ) SYSTEM VALVES OPEN UPSTREAM AND DOWNSTREAM.
( ) AIR REMOVED FROM THE MAIN VALVE COVER AND PILOT SYSTEM AT ALL HIGH POINTS. X78-4 + X101 (5) HAS AN AIR BLEED SCREW LOCATED ON THE TOP OF THE X101 POSITION INDICATOR. CPM-A (4) HAS AN AIR BLEED SCREW IN A FITTING LOCATED ON THE SENSING CHAMBER OF THE CPM-A (4).
( ) PERIODIC CLEANING OF STRAINERS (2) AND (7) IS RECOMMENDED.
( ) CV FLOW CONTROL (9) IS OPEN APPROXIMATELY 5.5 TURNS OUT.
( ) CV FLOW CONTROLS (C) AND (S) ARE FULL OPEN (ADJUSTING STEM BACKED ALL THE WAY OUT) AT INITIAL START-UP. AFTER START-UP, SYSTEM CONDITIONS SHOULD BE MONITORED WHEN MAKING CV FLOW CONTROLS (C) AND (S) ADJUSTMENT (OPTIONAL FEATURE).
( ) CK2 COCKS (6A) OPEN AND (6B) CLOSED DURING NORMAL OPERATION.
( ) CK2 COCKS (6C) AND (6D) CLOSED EXCEPT FOR GAUGE USE.
( ) CK2 COCKS (B) OPEN (OPTIONAL FEATURE).

REFERENCE TABLE FOR X78-4 (5) ADJUSTMENT SCREW

VALVE SIZE	X78-4 (5) TOTAL TRAVEL	% POSITION CHANGE PER TURN
2" 100-01 3" 100-20	.40" (10MM)	9.9%
2 1/2" 100-01	.40" (10MM)	8.2%
3" 100-01 4" 100-20	.40" (10MM)	7.0%
4" 100-01 6" 100-20	.80" (20MM)	5.3%
6" 100-01 8" 100-20	.80" (20MM)	3.7%
8" 100-01 10" 100-20	1.40" (35MM)	2.6%
10" 100-01 12" 100-20	1.40" (35MM)	1.8%

% POSITION CHANGE IS THE % CHANGE IN MAIN VALVE (1) OPENING PER TURN OF THE X78-4 (5) ADJUSTMENT SCREW

Recommended Inspections

Cla-Val recommends that an inspection be performed on our products annually. The inspection should include both a visual and functional test of the main valve/component and the pilot system. The inspection ensures that no damage or premature wear occurred due to velocity, pressure, or foreign matter within the fluid that may have exceeded the valve's design. Please consult the maintenance manual for specific information on the model. Manuals are available for download at Cla-Val.com, as well as contact information for a company representative.

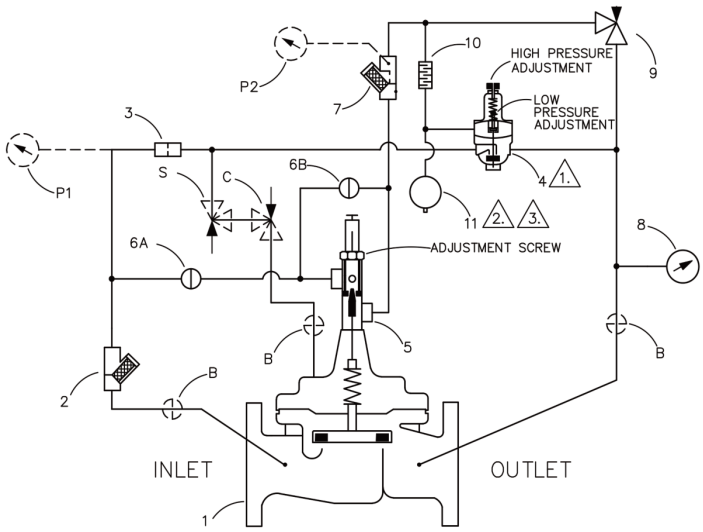
Accurate record-keeping is a best practice for any preventative maintenance program, and Cla-Val strongly recommends this action through an asset management program. Cla-Val provides a free asset management tool, Link2Valves Link2Valves - Cla-Val (cla-val.com), to assist in preventative maintenance record-keeping and scheduling.

CLA-VAL®

— MODEL – **98-06**

Hydraulic Pressure Management/ Water Savings Valve with Dual Setpoints

- **Simple means to achieve measurable water savings**
- **Helps reduce consumption**
- **100% hydraulic control**
- **Two adjustable downstream set points for high and low pressure**
- **Smooth transition between set point pressures**
- **Simple set-up**
- **Retrofits to existing valve without removal from pipeline**



Schematic Diagram

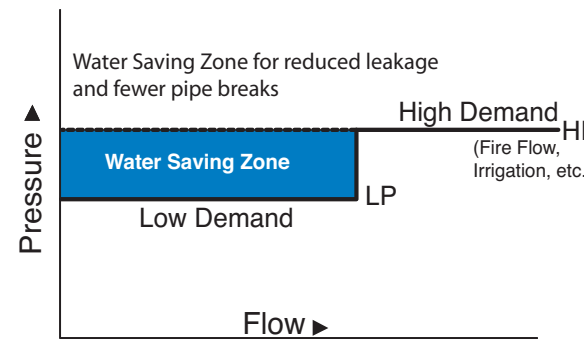
Item	Description
1	100-01 Hytrol Main Valve
2	X43 “Y” Strainer
3	X58C Restriction Assembly
4	CPM-A Pressure Management Control
5	X78-4 Stem Assembly + X101 Valve Position Indicator Assembly
6	CK2 Isolation Valve
7	X44A Strainer Orifice Assembly
8	X141 Gage Assembly
9	CV Speed Control
10	X58E Restriction Assembly
11	Accumulator (Air Charged)

Optional Features

Item	Description
B	CK2 Isolation Valve
C	CV Flow Control (Closing)
P	X141 Gage Assembly
S	CV Flow Control (Opening)

Typical Performance

A dual system pressure with reduced system pressure during low demand periods is illustrated in the chart. At low flows, a minimum pressure is maintained and as flow increases to the switch point, delivery pressure increases to the maximum pressure set point for switch. The point between low pressure and high pressure setpoints is adjustable to fine-tune the valve to system requirements. The “water saving zone” below maximum pressure line represents valve effectiveness in reducing water losses and frequency of pipe breaks in a system.

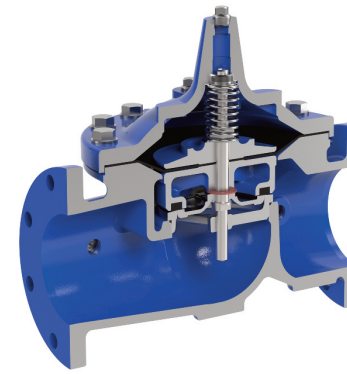


Model 98-06 (Uses 100-01 Hytrol Main Valve)

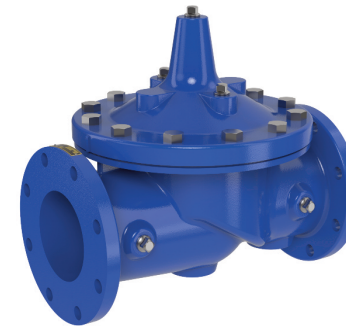
Pressure Ratings (Recommended Maximum Pressure - psi)

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
UNS 87850	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



Model 100-01 Full Port Hytrol Main Valve

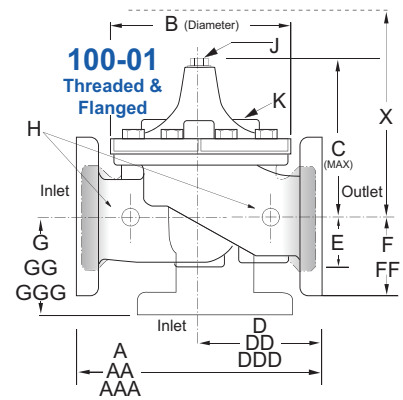


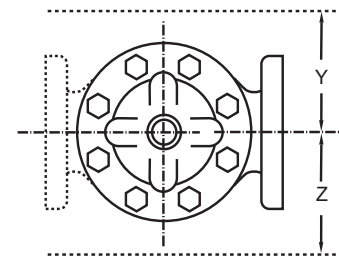
Materials

Component	Standard Material Combinations		
Body & Cover	Ductile Iron	Cast Steel	Bronze
Available Sizes	2" - 10" 50 - 250mm	2" - 10" 50 - 250mm	2" - 10" 50 - 250mm
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 98-06 Dimensions (In Inches)

Valve Size (Inches)	2	2½	3	4	6	8	10
A Threaded	9.38	11.00	12.50	—	—	—	—
AA 150 ANSI	9.38	11.00	12.00	15.00	20.00	25.38	29.75
AAA 300 ANSI	10.00	11.62	13.25	15.62	21.00	26.38	31.12
AAAA Grooved End	9.00	11.00	12.50	15.00	20.00	25.38	—
B Diameter	6.62	8.00	9.12	11.50	15.75	20.00	23.62
C Maximum	6.50	7.56	8.19	10.62	13.38	16.00	17.12
CC Maximum Grooved End	5.75	6.88	7.25	9.31	12.12	14.62	—
D Threaded	4.75	5.50	6.25	—	—	—	—
DD 150 ANSI	4.75	5.50	6.00	7.50	10.00	12.69	14.88
DDD 300 ANSI	5.00	5.88	6.38	7.88	10.50	13.25	15.56
DDDD Grooved End	4.75	—	6.00	7.50	—	—	—
E	1.50	1.69	2.06	3.19	4.31	5.31	9.25
EE Grooved End	2.50	2.88	3.12	4.25	6.00	7.56	—
F 150 ANSI	3.00	3.50	3.75	4.50	5.50	6.75	8.00
FF 300 ANSI	3.25	3.75	4.13	5.00	6.25	7.50	8.75
G Threaded	3.25	4.00	4.50	—	—	—	—
GG 150 ANSI	3.25	4.00	4.00	5.00	6.00	8.00	8.62
GGG 300 ANSI	3.50	4.31	4.38	5.31	6.50	8.50	9.31
GGGG Grooved End	3.25	—	4.25	5.00	—	—	—
H NPT Body Tapping	0.375	0.50	0.50	0.75	0.75	1.00	1.00
J NPT Cover Center Plug	0.50	0.50	0.50	0.75	0.75	1.00	1.00
K NPT Cover Tapping	0.375	0.50	0.50	0.75	0.75	1.00	1.00
Stem Travel	0.60	0.70	0.80	1.10	1.70	2.30	2.80
Approx. Ship Weight (lbs)	35	50	70	140	285	500	780
Approx. **X** Pilot System	13	14	15	17	29	31	33
Approx. **Y** Pilot System	9	10	11	12	20	2	—
Approx. **Z** Pilot System	9	10	11	12	20	2	—

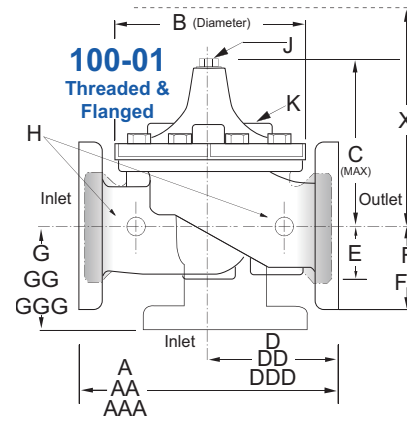


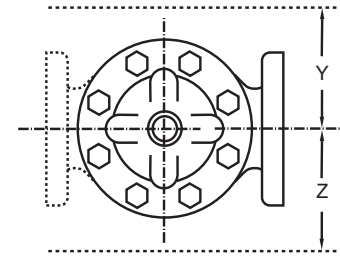


Model 98-06 Metric Dimensions (Uses 100-01 Hytrol Main Valve)

Dimensions (In mm)

Valve Size (mm)	50	65	80	100	150	200	250
A Threaded	238	279	318	—	—	—	—
AA 150 ANSI	238	279	305	381	508	645	756
AAA 300 ANSI	254	295	337	397	533	670	790
AAAA Grooved End	228	279	318	381	508	645	—
B Diameter	168	203	232	292	400	508	600
C Maximum	165	192	208	270	340	406	435
CC Maximum Grooved End	146	175	184	236	308	371	—
D Threaded	121	140	159	—	—	—	—
DD 150 ANSI	121	140	152	191	254	322	378
DDD 300 ANSI	127	149	162	200	267	337	395
DDDD Grooved End	121	—	152	191	—	—	—
E	38	43	52	81	110	135	235
EE Grooved End	64	73	79	108	152	192	—
F 150 ANSI	76	89	95	114	140	171	203
FF 300 ANSI	83	95	105	127	159	191	222
G Threaded	83	102	114	—	—	—	—
GG 150 ANSI	83	102	102	127	152	203	219
GGG 300 ANSI	89	110	111	135	165	216	236
GGGG Grooved End	83	—	108	127	—	—	—
H NPT Body Tapping	0.375	0.50	0.50	0.75	0.75	1.00	1.00
J NPT Cover Center Plug	0.50	0.50	0.50	0.75	0.75	1.00	1.00
K NPT Cover Tapping	0.375	0.50	0.50	0.75	0.75	1.00	1.00
Stem Travel	15	18	20	28	43	58	71
Approx. Ship Weight (kgs)	16	23	32	64	129	227	354
Approx. **X** Pilot System	331	356	381	432	737	788	839
Approx. **Y** Pilot System	229	254	280	305	508	559	610
Approx. **Z** Pilot System	229	254	280	305	508	559	610

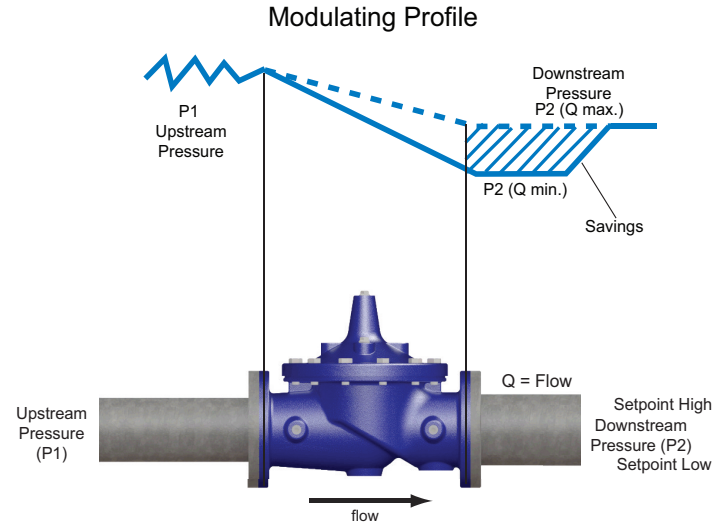




How It Works

The Cla-Val Model 98-06 Water Saving Valve is a pressure reducing valve that uses two downstream set points to achieve optimum system pressure; i.e. the capability delivering only the pressure that is needed to meet current demand.

A high pressure set point is selected for high flow demand and a low pressure set point is selected for low demand. This dual set point arrangement allows for reduction in water consumption as well as unintentional water loss by keeping system piping from being over-pressurized during periods of low demand. It does this without inhibiting adequate pressure during high or fire demand. The design is 100% hydraulic and, in addition, to the dual pressure set points, the transition point at which the pressure changes based on the flow is also adjustable. The patented design of the valve allows for smooth transition from one set point to the other, providing optimum performance and measurable water savings by reducing consumption, minimizing leaks and lessening the potential for pipe breaks.



98-06 Valve Selection	100-01 Pattern: Globe (G), Angle (A), End Connections: Threaded (T), Grooved (GR), Flanged (F) Indicate Available Sizes							
	Inches	2	2½	3	4	6	8	10
	mm	50	65	80	100	150	200	250
Main Valve 100-01	Pattern	G, A	G, A	G, A	G, A	G, A	G, A	G, A
	End Detail	T, F, Gr	T, F, Gr*	T, F, Gr	F, Gr	F, Gr*	F, Gr*	F
Suggested Flow (gpm)	Maximum	210	300	460	800	1800	3100	4900
	Maximum Intermittent	260	370	580	990	2250	3900	6150
	Minimum	1	2	2	4	10	15	35
Suggested Flow (Liters/Sec)	Maximum	13	19	29	50	113	195	309
	Maximum Intermittent	16	23	37	62	142	246	387
	Minimum	.06	.09	0.13	0.25	0.63	0.95	2.2

100-01 Series is the full internal port Hytrol. **For Lower Flows Consult Factory** *Globe Grooved Only

Many factors should be considered in sizing pressure reducing valves including inlet pressure, outlet pressure and flow rates. For sizing questions or cavitation analysis, consult Cla-Val with system details.

Not Recommended for Dead-end Service

Pilot System Specifications

Temperature Range

Water: to 180°F

Materials

Standard Pilot System Materials

Pilot Control: Stainles Steel & Low Lead Bronze
Trim: Stainless Steel Type 303
Rubber: Buna-N® Synthetic Rubber

Go to www.cla-val.com for Purchase Specification

When Ordering, Specify:

1. Catalog No. 98-06
2. Valve Size
3. Pattern - Globe or Angle
4. Pressure Class
5. Threaded or Flanged
6. Trim Material
7. Desired Options
8. When Vertically Installed

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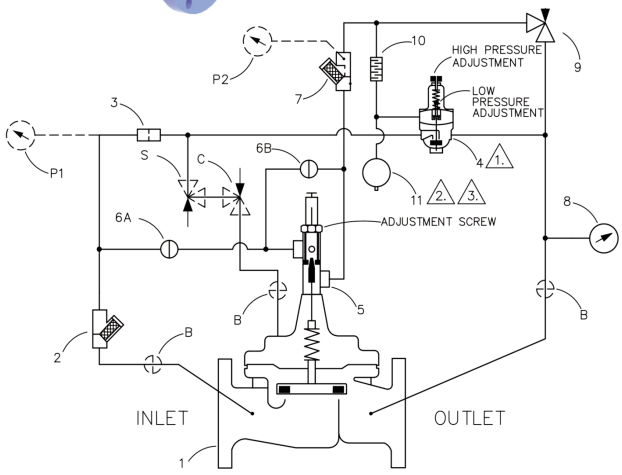
CLA-VAL™

—MODEL— **98-06**

PRESSURE MANAGEMENT VALVE

The Model Cla-Val 98-06 is an Automatic Pressure Management Control Valve designed to respond to changes in downstream demand. Downstream pressure is managed between high and low flow system conditions.



Note: The items shown above and listed below will be referred to throughout the following instructions

Item	Basic Components
1	100-01 Hytrol (98-06) Main Valve - Full Port
	100-20 Hytrol (698-06) Main Valve - Reduced Port
2	X43 "Y" Strainer
3	X58C Restriction Assembly
4	CPM-A Pressure Management Control
5	X78-4 + X101 Adjustable Orifice Assembly
6	CK2 Isolation Valve - Size = 1/8"
7	X44A Strainer Orifice Assembly
8	X141 Gauge Assembly
9	CV Speed Control
10	X58E Restrictor Assembly
11	Accumulator (Air Charged)

INSTALLATION

1. Allow sufficient room around the valve assembly to make adjustments and for servicing.
2. It is recommended that gate or line block valves be installed on both ends of the 98-06 valve assembly, at a minimum of one pipe diameter apart to facilitate isolating the valve for maintenance.

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

INSTALLATION (continued)

3. Place the valve assembly in the line with flow through the valve in the direction indicated on the inlet plate or by flow arrows. Check all fittings and hardware for proper makeup and that no apparent damage is evident. Be sure Main Valve cover nuts/bolts are tight. As pressure in some applications can be very high, thorough inspection for proper installation and makeup is strongly recommended.
4. Cla-Val Automatic Control Valves operate with maximum efficiency when mounted in horizontal piping with the cover UP, however, other positions are acceptable. Due to size and weight of cover and internal components of six-inch and larger valves, installation with the cover up is advisable and provides greater accessibility to internal parts for periodic inspection.

OPERATION AND START-UP

CAUTION: During start-up and test procedures, a large volume of water may be discharged downstream. Check that the downstream venting is adequate to prevent damage to personnel and equipment. **All adjustments in pressure should be made slowly while under flowing conditions.** If the Main Valve closes too fast, it may cause surging in upstream piping.

1. Prior to pressurizing the valve assembly, ensure that the necessary gauges to measure pressure in the system are installed as required by the system engineer.

2. If isolation valves (B) are installed in pilot system, open these valves (see schematic).

3. Cla-Val CV Flow Controls (C or S) provide adjustable regulation of flow in and out of the Main Valve chamber to minimize pulsations that sometime occur at very low flow rates. If CV Controls are installed, loosen jam nut and turn adjustment screw counter-clockwise from closed position all the way out for an initial setting.

4. Open the upstream gate or block valve just slightly to allow the main valve assembly and pilot system to fill with liquid.

5. Carefully loosen tube fittings at highest points and bleed air from pilot control system. Carefully loosen the plug at top of Main Valve cover to bleed air from cover. If an indicator is installed, carefully loosen the air bleed screw at top of indicator. Tighten tube fittings. See 2 & 4 above.

6. Open the upstream gate or block valve fully.

7. Slowly open the downstream gate or block valve. Flow should occur and pressure should remain constant.

8. Adjust the pilot control system to desired pressure as described in Adjustment Methods I and II.

   There must be liquid flowing through the valve during pressure adjustments.

9. To check the operation of the valve, open and close the downstream gate valve. The downstream pressure should remain constant.

You will need a 3/16" X 4" slim head screwdriver to set low pressure.

CHECKLIST FOR PROPER OPERATION

Perform the following steps prior to start-up:

√	Open upstream and downstream System Valves.
√	- Remove air from Main Valve Cover and Pilot System at all high points: - The Variable Orifice Assembly (5) has an air bleed screw located on the top of the X101 Valve Position Indicator and one on the bottom of the X78-4 (see photos at right). - The CPM-A (4) has an air bleed screw in the fitting located on the sensing chamber of the control.
√	Pilot System Isolation Valve (6A) should be open and Pilot System Isolation Valve (6B) should be close during normal operation.
√	Open optional CK2 Isolation Valve (Suffix B) during normal operation.
√	CV Speed Controls (C and S) should be full open (adjusting stem backed all the way out) at initial start-up. After start-up, monitor system conditions when making adjustments to optional CV Speed Controls (C and S)
√	Periodically clean X43 and X44A Strainers (2 and 7)

I. PRESSURE MANAGEMENT CONTROL FEATURE

The CPM-A Pressure Management Control (4) is a normally open control that responds to change in downstream demand. Downstream pressure is managed between high and low flow system conditions. When system demand is normal or higher than normal, the CPM-A Pressure Management Control maintains downstream pressure at the high pressure set point. An increase in outlet pressure closes the control and a decrease is outlet pressure closes the control. This causes the Main Valve Cover pressure to vary and the Main Valve modulates (opens and closes), maintaining the downstream pressure at the high set point.

When system demand decreases below normal demand, the CPM-A Control responds by gradually lowering the downstream pressure until it reaches the low pressure set point. As system flow changes between the low and high pressure set points, the CPM-A Control closes or opens accordingly. This causes the Main Valve Cover pressure to vary and the Main Valve modulates (opens and closes), maintaining the downstream pressure at either the low or high pressure set point.

CPM-A STANDARD ADJUSTMENT PROCEDURE:

Two methods of adjustment are possible for the CPM-A Pressure Management Control. Method I is the most accurate adjustment method and requires the ability to have a means to adjust system flow rates during the adjustment process. A gate valve downstream of the Main Valve is an acceptable device for approximating the low flow condition.

Method II is intended for use if an approximation of the pressure span adjustment (low pressure set point) is acceptable and there is not a practical means to vary system flow during the adjustment procedure.

METHOD I

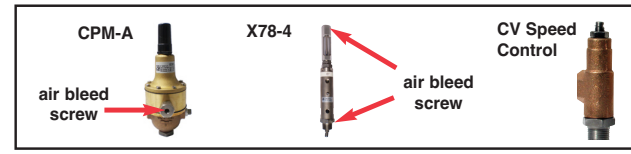
System flow should be equal to or slightly greater than the normal expected system flow at the start of the adjustment procedure.

1) Isolation Valve (6B) is closed. Isolation Valve (6A) is open
2) Adjust CV Flow Control 2 turns out from the fully closed position
3) Turn the X78-4 (5) adjustment screw counter-clockwise until stopped.
4) Turn the CPM-A (4) low pressure adjustment screw clockwise until stopped (LP = HP). Low pressure adjustment screw is inside the cover chamber. There is an access hole through the HP adjustment screw and thee screw has a screwdriver slot
5) Turn the CPM-A (4) high pressure adjustment screw until the pressure at the gauge (8) is at the desired maximum system downstream pressure condition
6) Close Isolation Valve (6A)
7) Slowly turn the CPM-A (4) low pressure adjustment screw out, counter-clockwise, until pressure at gauge (8) starts to dip. Continue to adjust until pressure at gauge (8) is at the desired low pressure set point
8) Open Isolation Valve (6A)

METHOD I (continued)

9) To adjust the X78-4 (5) when system flow is at or near normal demand status, turn the X178-4 adjustment screw clockwise until pressure at gauge (8) dips to low pressure set point condition.

   Next turn the X78-4 (5) adjustment screw counter-clockwise one turn. At this adjustment position, the system pressure remains at the high pressure set point until valve position decreases to the adjusted point position of the X78-4 (5). Refer to the X78-4 Adjustment Table for position per turn. Per the X78-4 (5) Adjustment Table on page 3, at 1 clockwise turn, a 4-inch valve will transition to the low pressure set point when valve position decreases approximately 5.3%. Further adjustment may be necessary to achieve the desired transition point between high and low pressure set points.



METHOD II

System flow should be approximately equal to the expected low flow condition for the system at the start of the adjustment procedure.

1) Isolation Valves (6A and 6B) are open
2) Adjust CV Flow Control 2 turns out from the fully closed position
3) Turn the X78-4 (5) adjustment screw counter-clockwise until stopped.
4) Turn the CPM-A (4) low pressure adjustment screw clockwise until stopped
5) Turn the CPM-A (4) high pressure adjustment screw until the pressure at the gauge (8) is at the desired maximum system downstream pressure condition
6) Close Isolation Valves (6A and 6B)
7) Slowly turn the CPM-A (4) low pressure adjustment screw out, counter-clockwise, until pressure at gauge (8) starts to dip. Continue to adjust until pressure at gauge (8) is at the desired low pressure set point
8) Open Isolation Valve (6A)

9) To adjust the X78-4 (5) when system flow is at or near normal demand status, turn the X178-4 adjustment screw clockwise two turns. At this adjustment position, the system pressure remains at the low pressure set point until valve position increases to a position change according to the X78-4 Adjustment Table - pg.3.

   When valve position increases to the adjustment setting of the X78-4 (5), system pressure increases to the CPM-A (4) high pressure set point, indicating system demand has increased. Per the X78-4 Adjustment Table, at two clockwise turns, a 4-inch valve will transition to the high pressure set point when a valve position increases approximately 10.6% (2 X 5.3%). Further adjustment may be necessary to achieve desired transition point between high and low pressure set points.

Note: Adjustment Methods I & II are intended only to approximate the low and high pressure set point conditions if there is no means to independently control system flow or establish a desired pressure transition flow condition. The X78-4 Adjustable Orifice Assembly (5) may require slight re-adjustment during actual low flow conditions in order to establish the desired pressure transition condition. Cla-Val recommends recording pressure and flow data as a means of evaluating daily or periodic pressure and flow trends in the system. This data can be utilized to make additional adjustments to the Pressure Management Control Valve and optimize the pressure management conditions within the system. Consult factory for Cla-Val data logging products (such as the X142FPT Flow and Pressure Tracker and the X144 e-FlowMeter) which can be used with this valve to achieve optimum performance.

II. LOW PRESSURE OVERRIDE FEATURE

To override an established low pressure set point of the CPM-A (4), open Isolation Valve (6B). Low pressure set point is disabled and Main Valve (1) regulates at the high pressure set point as long as the Isolation Valve (6B) remains open. To restore the low pressure set point condition, close Isolation Valve (6B).

III. X78-4 ADJUSTABLE ORIFICE ASSEMBLY FEATURE

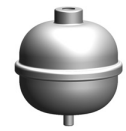
The Adjustable Orifice Assembly is comprised of the X78-4 Adjustable Orifice + the X101 Valve Position Indicator.

The X78-4 Adjustable Orifice Assembly (5) is used to increase the transition point (% open) between low and high pressure set points of the CPM-A (4).

Prior to adjusting the X78-4 (5) feature, loosen the set screw on the side of the X78-4 housing approximately 1/2 turn. The set screw is located near the top of the X78-4 housing. To lower downstream pressure at the current (or known) flow rate, turn the X78-4 adjustment screw clockwise until the pressure reading at the gauge (8) drops to the low pressure set point of the CPM-A (4). The X78-4 adjustment screw can be turned by hand or with an open end wrench.

Note:
Adjusting the X78-4 shifts the flow point where the pressure conditions starts to transition between low and high pressure set points. By turning the adjustment screw counter-clockwise on the X78-4, the transition between the low and high pressure set points occurs at a lower flow rate. As an example: When the X78-4 adjustment screw is turned counter-clockwise until bottomed, the transition between low and high pressure set points starts at the lowest possible flow rate. Turning the X78-4 adjustment screw clockwise changes the transition point to a higher flow rate. The X78-4 Adjustment Table can be used as a guideline to determine valve position change (% open) per turn of the X78-4 adjustment screw.

IV. ACCUMULATOR FEATURE



The Accumulator (11) functions as a pressure transition dampening device that allows for a relatively smooth transition between low and high pressure set points of the Model 98-06/698-06 Pressure Management Valve.

The Accumulator is factory air charged to approximately 51 psi (3.5 bar). This pre-charge condition is satisfactory for most Model 98-06/698-06 applications and no additional field charging is required.

If the low pressure set point condition is greater than 80 psi (5.5 bar), then a slightly higher accumulator air charge pressure may be desirable. The accumulator is equipped with a stem valve, similar to a stem valve used on bicycle or vehicle tires. Air charge pressure can be changed using a hand tire pump or an air pressure source from a gas station.

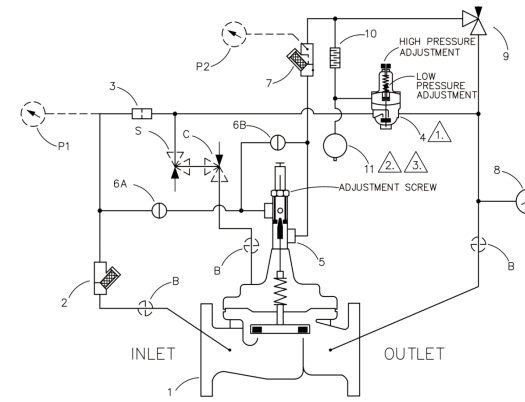
V. CV SPEED CONTROL VALVE FEATURE

The CV Flow Control (9) is used to regulate or balance pressure into and out of the sensing chamber of the CPM-A Pressure Management Control.

For normal operation, the CV Speed Control is adjusted approximately two turns out. When he CV Speed Control is turned all the way in, the Main Valve will only regulate at the high pressure set point of the CPM-A.

When the CV Speed Control is adjusted more than five turns out, the Main Valve will only regulate at the low pressure setpoint of the CPM-A.

VI. OPTIONAL FEATURE OPERATING DATA



Model # Suffix	Item	Quantity
B	CK2 Isolation Valve	3
C	CV Flow Control (Closing)	1
P	X141 Gauge Assembly	2
S	CV Flow Control (Opening)	1

Suffix B- Isolation Valve
CK2 Isolation Valves (B) are used to isolate the pilot system from the main line pressure. These valves must be open during normal operation.

Suffix C - Closing Speed Control
The CV Flow Control (C) controls the closing speed of the Main valve. Turn the adjusting stem clockwise to make the Main Valve close slower.

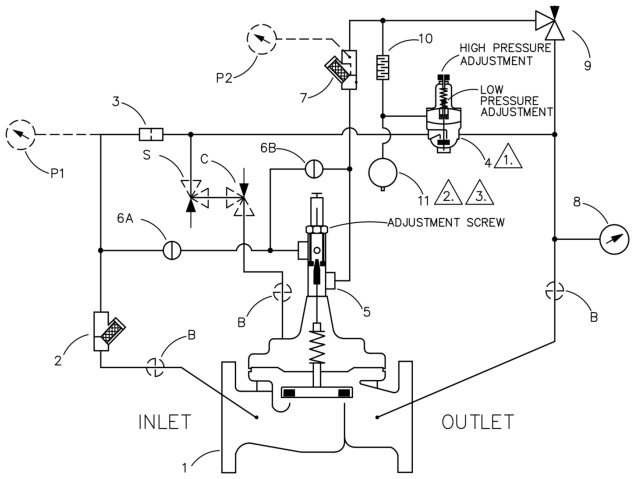
Suffix S - Opening Speed Control
The CV Flow Control (S) controls the opening speed of the Main Valve. Turn the adjusting stem clockwise to make the Main Valve open slower.

X78-4 Adjustment Table

Valve Size	X78-4 (5) Total Travel	% Position Change Per Turn
2” 100-01 3” 100-20	.40” (10 mm)	9.9%
2-1/2” 100-01	.40” (10 mm)	8.2%
3” 100-01 4” 100-20	.40” (10 mm)	7.0%
4” 100-01 6” 100-20	.80” (20 mm)	5.3%
6” 100-01 8”100-20	.80” (20 mm)	3.7%
8”100-01 10” 101-20	1.40” (35 mm)	2.6%
10” 100-01 12” 100-20	1.40” (35 mm)	1.8%

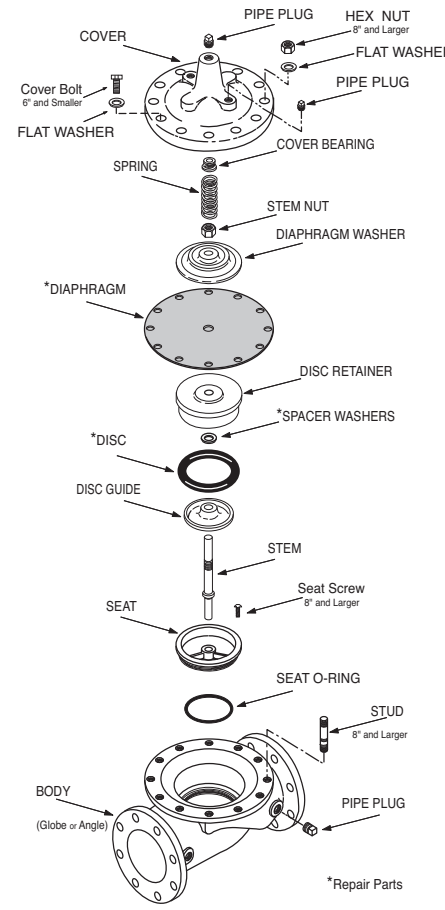
% Position change is the % change in Main Valve opening per turn of the X78-4 Adjustment Screw.

98-06 SCHEMATIC



Item	Basic Components
1	100-01 Hytrol (98-06) Main Valve - Full Port
	100-20 Hytrol (698-06) Main Valve - Reduced Port
2	X43 "Y" Strainer
3	X58C Restriction Assembly
4	CPM-A Pressure Management Control
5	X78-4 + X101 Adjustable Orifice Assembly
6	CK2 Isolation Valve - Size = 1/8"
7	X44A Strainer Orifice Assembly
8	X141 Gauge Assembly
9	CV Speed Control Needle Valve
10	X58E Restrictor Assembly
11	Accumulator (Air Charged)

(1) HYTROL MAIN VALVE



(4) CPM-A PRESSURE MANAGEMENT CONTROL

(5) X78-4 + X101 VARIABLE ORIFICE ASSEMBLY

(11) Accumulator

(2) X43

(3) X58C

(6A & 6B) CK2

(7) X44A

(8) X141

(9) CV Speed Control

(10) X58E

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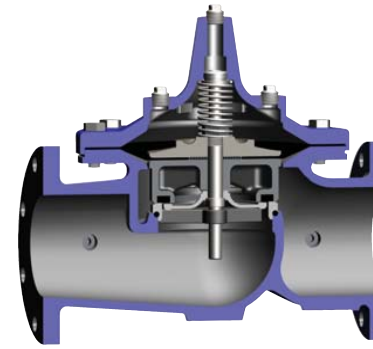
CLA-VAL

—MODEL— 100-01 Hytrol Valve

Description

The Cla-Val Model 100-01 Hytrol Valve is a main valve for Cla-Val Automatic Control Valves. It is a hydraulically operated, diaphragm-actuated, globe or angle pattern valve.

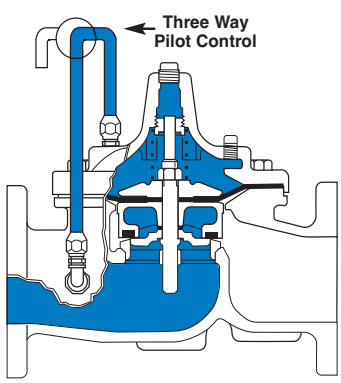
This valve consists of three major components; body, diaphragm assembly, and cover. The diaphragm assembly is the only moving part. The diaphragm assembly uses a diaphragm of nylon fabric bonded with synthetic rubber. A synthetic rubber disc, contained on three and one half sides by a disc retainer and disc guide, forms a seal with the valve seat when pressure is applied above the diaphragm. The diaphragm assembly forms a sealed chamber in the upper portion of the valve, separating operating pressure from line pressure.



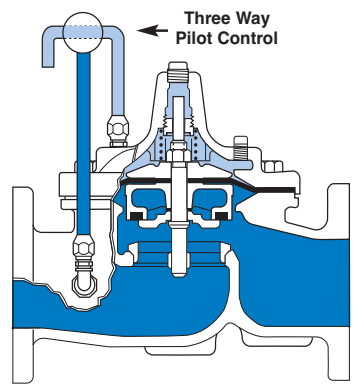
Installation

1. Before valve is installed, pipe lines should be flushed of all chips, scale and foreign matter.
2. It is recommended that either gate or block valves be installed on both ends of the 100-01 Hytrol Valve to facilitate isolating the valve for preventive maintenance and repairs.
3. Place the valve in the line with flow through the valve in the direction indicated on the inlet nameplate. (See “Flow Direction” Section) **Note: Valve can be installed in the vertical or horizontal position.**
4. Allow sufficient room around valve to make adjustments and for disassembly.
5. Cla-Val 100-01 Hytrol Valves operate with maximum efficiency when mounted in horizontal piping with the cover UP, however, other positions are acceptable. Due to size and weight of the cover and internal components of 8 inch and larger valves, installation with the cover UP is advisable. This makes internal parts readily accessible for periodic inspection.
6. Caution must be taken in the installation of this valve to insure that galvanic and/or electrolytic action does not take place. The proper use of dielectric fittings and gaskets are required in all systems using dissimilar metals.
7. If a pilot control system is installed on the 100-01 Hytrol Valve, use care to prevent damage. If it is necessary to remove fittings or components, be sure they are kept clean and replaced exactly as they were.
8. After the valve is installed and the system is first pressurized, vent air from the cover chamber and pilot system tubing by loosening fittings at all high points.

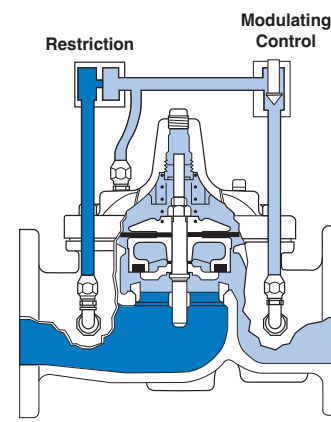
Principles of Operation



Tight Closing Operation
When pressure from the valve inlet (or an equivalent independent operating pressure) is applied to the diaphragm chamber the valve closes drip-tight.



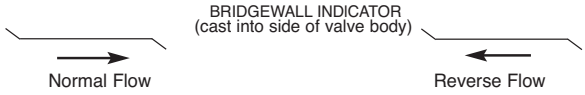
Full Open Operation
When pressure in diaphragm chamber is relieved to a zone of lower pressure (usually atmosphere) the line pressure (5 psi Min.) at the valve inlet opens the valve.



Modulating Action
Valve modulates when diaphragm pressure is held at an intermediate point between inlet and discharge pressure. With the use of a Cla-Val. "modulating control," which reacts to line pressure changes, the pressure above the diaphragm is varied, allowing the valve to throttle and compensate for the change.

Flow Direction

The flow through the 100-01 Hytrol Valve can be in one of two directions. When flow is “up-and-over the seat,” it is in “normal” flow and the valve will fail in the open position. When flow is “over-the seat-and down,” it is in “reverse” flow and the valve will fail in the closed position. There are no permanent flow arrow markings. **The valve must be installed according to nameplate data.**



Recommended Tools

1. Three pressure gauges with ranges suitable to the installation to be put at Hytrol inlet, outlet and cover connections.

2. Cla-Val Model X101 Valve Position Indicator. This provides visual indication of valve position without disassembly of valve.

3. Other items are: suitable hand tools such as screwdrivers, wrenches, etc. soft jawed (brass or aluminum) vise, 400 grit wet or dry sandpaper and water for cleaning.

Troubleshooting

The following troubleshooting information deals strictly with the Model 100-01 Hytrol Valve. This assumes that all other components of the pilot control system have been checked out and are in proper working condition. (See appropriate sections in Technical Manual for complete valve).

All trouble shooting is possible without removing the valve from the line or removing the cover. It is highly recommended to permanently install a Model X101 Valve Position Indicator and three gauges in unused Hytrol inlet, outlet and cover connections.

SYMPTOM	PROBABLE CAUSE	REMEDY
Fails to Close	Closed isolation valves in control system, or in main line.	Open Isolation valves.
	Lack of cover chamber pressure.	Check upstream pressure, pilot system, strainer, tubing, valves, or needle valves for obstruction.
	Diaphragm damaged. (See Diaphragm Check.)	Replace diaphragm.
	Diaphragm assembly inoperative. Corrosion or excessive scale build up on valve stem. (See Freedom of Movement Check)	Clean and polish stem. Inspect and replace any damaged or badly eroded part.
	Mechanical obstruction. Object lodged in valve. (See Freedom of Movement Check)	Remove obstruction.
	Worn disc. (See Tight Sealing Check)	Replace disc.
	Badly scored seat. (See Tight Sealing Check)	Replace seat.
Fails to Open	Closed upstream and/or downstream isolation valves in main line.	Open isolation valves.
	Insufficient line pressure.	Check upstream pressure. (Minimum 5 psi flowing line pressure differential.)
	Diaphragm assembly inoperative. Corrosion or excessive buildup on valve stem. (See Freedom of Movement Check)	Clean and polish stem. Inspect and replace any damaged or badly eroded part.
	Diaphragm damaged. (For valves in "reverse flow" only)	Replace diaphragm.

After checking out probable causes and remedies, the following three checks can be used to diagnose the nature of the problem before maintenance is started. They must be done in the order shown.

Three Checks

The 100-01 Hytrol Valve has only one moving part (the diaphragm and disc assembly). So, there are only three major types of problems to be considered.

First: Valve is stuck - that is, the diaphragm assembly is not free to move through a full stroke either from open to close or vice versa.

Second: Valve is free to move and can’t close because of a worn out diaphragm.

Third: Valve leaks even though it is free to move and the diaphragm isn’t leaking.

CAUTION:
Care should be taken when doing the troubleshooting checks on the 100-01 Hytrol Valve. These checks do require the valve to open fully. This will either allow a high flow rate through the valve, or the downstream pressure will quickly increase to the inlet pressure. In some cases, this can be very harmful. Where this is the case, and there are no block valves in the system to protect the downstream piping, it should be realized that ***the valve cannot be serviced under pressure.*** *Steps should be taken to remedy this situation before proceeding any further.*

Diaphragm Check (#1)

1. Shut off pressure to the Hytrol Valve by slowly closing upstream and downstream isolation valves. **SEE CAUTION**.

2. Disconnect or close all pilot control lines to the valve cover and leave only one fitting in highest point of cover open to atmosphere.

3.With the cover vented to atmosphere, slowly open upstream isolation valve to allow some pressure into the Hytrol Valve body. Observe the open cover tapping for signs of continuous flow. It is not necessary to fully open isolating valve. Volume in cover chamber capacity chart will be displaced as valve moves to open position. Allow sufficient time for diaphragm assembly to shift positions. If there is no continuous flow, you can be quite certain the diaphragm is sound and the diaphragm assembly is tight. If the fluid appears to flow continuously this is a good reason to believe the diaphragm is either damaged or it is loose on the stem. In either case, this is sufficient cause to remove the valve cover and investigate the leakage. (See "Maintenance" Section for procedure.)

COVER CHAMBER CAPACITY
(Liquid Volume displaced when valve opens)

Valve size (inches)	Displacement	
	Gallons	Liters
1 1/4	.020	.07
1 1/2	.020	.07
2	.032	.12
2 1/2	.043	.16
3	.080	.30
4	.169	.64
6	.531	2.0
8	1.26	4.8
10	2.51	9.5
12	4.00	15.1
14	6.50	24.6
16	9.57	36.2
20	12.00	45.4
24	29.00	109.8
30	42.00	197.0
36	90.00	340.0

Freedom of Movement Check (#2)

4. Determining the Hytrol Valve's freedom of movement can be done by one of two methods.

5. For most valves it can be done after completing Diaphragm Check (Steps 1, 2, and 3). **SEE CAUTION**. At the end of step 3 the valve should be fully open.

6. If the valve has a Cla-Val X101 Position Indicator, observe the indicator to see that the valve opens wide. Mark the point of maximum opening.

7. Re-connect enough of the control system to permit the application of inlet pressure to the cover. Open pilot system cock so pressure flows from the inlet into the cover.

8. While pressure is building up in the cover, the valve should close smoothly. There is a hesitation in every Hytrol Valve closure, which can be mistaken for a mechanical bind. The stem will appear to stop moving very briefly before going to the closed position. This slight pause is caused by the diaphragm flexing at a particular point in the valve's travel and is not caused by a mechanical bind.

9. When closed, a mark should be made on the X101 Valve position indicator corresponding to the "closed" position. The distance between the two marks should be approximately the stem travel shown in chart.

STEM TRAVEL
(Fully Open to Fully Closed)

Valve Size (inches)		Travel (inches)	
Inches	MM	Inches	MM
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	28
6	150	1.7	43
8	200	2.3	58
10	250	2.8	71
12	300	3.4	86
14	350	4.0	100
16	400	4.5	114
20	500	5.6	143
24	600	6.7	165
30	800	7.5	190
36	900	8.5	216

10. If the stroke is different than that shown in stem travel chart this is a good reason to believe something is mechanically restricting the stroke of the valve at one end of its travel. If the flow does not stop through the valve when in the indicated "closed" position, the obstruction probably is between the disc and the seat. If the flow does stop, then the obstruction is more likely in the cover. In either case, the cover must be removed, and the obstruction located and removed. The stem should also be checked for scale build-up. (See "Maintenance, section for procedure.)

11. For valves 6" and smaller, the Hytrol Valve's freedom of movement check can also be done after all pressure is removed from the valve. **SEE CAUTION**. After closing inlet and outlet isolation valves and bleeding pressure from the valve, check that the cover chamber and the body are temporarily vented to atmosphere. Insert fabricated tool into threaded hole in top of valve stem, and lift the diaphragm assembly manually. Note any roughness. The diaphragm assembly should move smoothly throughout entire valve stroke. The tool is fabricated from rod that is threaded on one end to fit valve stem and has a "T" bar handle of some kind on the other end for easy gripping. (See chart in Step 4 of "Disassembly" Section.)

12. Place marks on this diaphragm assembly lifting tool when the valve is closed and when manually positioned open. The distance between the two marks should be approximately the stem travel shown in stem travel chart. If the stroke is different than that shown, there is a good reason to believe something is mechanically restricting the stroke of the valve. The cover must be removed, and the obstruction located and removed. The stem should also be checked for scale build-up. (See "Maintenance" Section for procedure.)

Tight Sealing Check (#3)

13. Test for seat leakage after completing checks #1 & #2 (Steps 1 to 12). **SEE CAUTION.** Close the isolation valve downstream of the Hytrol Valve. Apply inlet pressure to the cover of the valve, wait until it closes. Install a pressure gauge between the two closed valves using one of the two ports in the outlet side of the Hytrol. Watch the pressure gauge. If the pressure begins to climb, then either the downstream isolation valve is permitting pressure to creep back, or the Hytrol is allowing pressure to go through it. Usually the pressure at the Hytrol inlet will be higher than on the isolation valve discharge, so if the pressure goes up to the inlet pressure, you can be sure the Hytrol is leaking. Install another gauge downstream of isolating valve. If the pressure between the valves only goes up to the pressure on the isolation valve discharge, the Hytrol Valve is holding tight, and it was just the isolation valve leaking.

Maintenance

Preventative Maintenance

The Cla-Val Co. Model 100-01 Hytrol Valve requires no lubrication or packing and a minimum of maintenance. However, a periodic inspection schedule should be established to determine how the operating conditions of the system are affecting the valve. The effect of these actions must be determined by inspection.

Disassembly

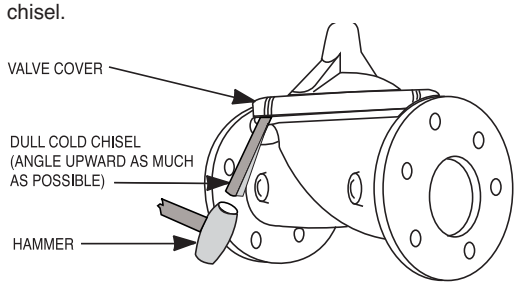
Inspection or maintenance can be accomplished without removing the valve from the line. Repair kits with new diaphragm and disc are recommended to be on hand before work begins.

WARNING: Maintenance personnel can be injured and equipment damaged if disassembly is attempted with pressure in the valve. **SEE CAUTION.**

1. Close upstream and downstream isolation valves **and independent operating pressure when used** to shut off all pressure to the valve.

2. Loosen tube fittings in the pilot system to remove pressure from valve body and cover chamber. After pressure has been released from the valve, use care to remove the controls and tubing. Note and sketch position of tubing and controls for re-assembly. The schematic in front of the Technical Manual can be used as a guide when reassembling pilot system.

3. Remove cover nuts and remove 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.



On 6” and smaller valves block and tackle or a power hoist can be used to lift valve cover by inserting proper size eye bolt in place of the center cover plug. on 8” and larger valves there are 4 holes (5/8” — 11 size) where jacking screws and/or eye bolts may be inserted for lifting purposes. **Pull cover straight up** to keep from damaging the integral seat bearing and stem.

COVER CENTER PLUG SIZE

Valve Size	Thread Size (NPT)
1 1/4"—1 1/2"	1/4"
2"—3"	1/2"
4"—6"	3/4"
8"—10"	1"
12"	1 1/4"
14"	1 1/2"
16"	2"
20” & 24"	2"
30” & 36”	2”

4. Remove the diaphragm and disc assembly from the valve body. With smaller valves this can be accomplished by hand by **pulling straight up on the stem so as not to damage the seat bearing.** On large valves, an eye bolt of proper size can be installed in the stem and the diaphragm assembly can be then lifted with a block and tackle or power hoist. Take care not to damage the stem or bearings. The valve won't work if these are damaged.

VALVE STEM THREAD SIZE

Valve Size	Thread Size (UNF Internal)
1 1/4"—2 1/2"	10—32
3"—4"	1/4—28
6"—14"	3/8—24
16"	1/2—20
20	3/4-16
24"	3/4-16
30”	3/4-16
36”	3/4-16

5. The next item to remove is the stem nut. Examine the stem threads above the nut for signs of mineral deposits or corrosion. If the threads are not clean, use a wire brush to remove as much of the residue as possible. Attach a good fitting wrench to the nut and give it a sharp “rap” rather than a steady pull. Usually several blows are sufficient to loosen the nut for further removal. On the smaller valves, the entire diaphragm assembly can be held by the stem in a vise **equipped with soft brass jaws** before removing the stem nut.

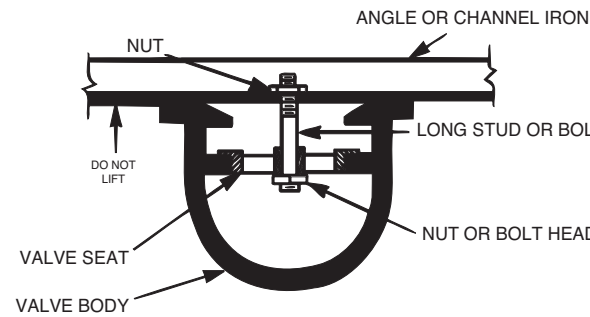
The use of a pipe wrench or a vise without soft brass jaws scars the fine finish on the stem. No amount of careful dressing can restore the stem to its original condition. Damage to the finish of the stem can cause the stem to bind in the bearings and the valve will not open or close.

6. After the stem nut has been removed, the diaphragm assembly breaks down into its component parts. Removal of the disc from the disc retainer can be a problem if the valve has been in service for a long time. Using two screwdrivers inserted along the outside edge of the disc usually will accomplish its removal. Care should be taken to preserve the spacer washers in water, particularly if no new ones are available for re-assembly.

7. The only part left in the valve body is the seat which ordinarily does not require removal. Careful cleaning and polishing of inside and outside surfaces with 400 wet/dry sandpaper will usually restore the seat’s sharp edge. If, however, it is badly worn and replacement is necessary, it can be easily removed.

Seats in valve sizes 1 1/4” through 6” are threaded into the valve body. They can be removed with accessory X109 Seat Removing Tool available from the factory. On 8” and larger valves, the seat is held in place by flat head machine screws. Use a tight-fitting, long shank screwdriver to prevent damage to seat screws. If upon removal of the screws the seat cannot be lifted out, it will be necessary to use a piece of angle or channel iron with a hole drilled in the center. Place it across the body so a long stud can be inserted through the center hole in the seat and the hole in the angle iron. By tightening the nut a uniform upward force is exerted on the seat for removal.

NOTE: Do not lift up on the end of the angle iron as this may force the integral bearing out of alignment, causing the stem to bind.



Lime Deposits

One of the easiest ways to remove lime deposits from the valve stem or other metal parts is to dip them in a 5-percent muriatic acid solution just long enough for the deposit to dissolve. This will remove most of the common types of deposits. **CAUTION: USE EXTREME CARE WHEN HANDLING ACID.** Rinse parts in water before handling. If the deposit is not removed by acid, then a fine grit (400) wet or dry sandpaper can be used with water.

Inspection of Parts

After the valve has been disassembled, each part should be examined carefully for signs of wear, corrosion, or any other abnormal condition. Usually, it is a good idea to replace the rubber parts (diaphragm and disc) unless they are free of signs of wear. These are available in a repair kit. Any other parts which appear doubtful should be replaced. WHEN ORDERING PARTS, BE SURE TO GIVE COMPLETE NAMEPLATE DATA, ITEM NUMBER AND DESCRIPTION.

NOTE: If a new disc isn't available, the existing disc can be turned over, exposing the unused surface for contact with the seat. The disc should be replaced as soon as practical.

Reassembly

1. Reassembly is the reverse of the disassembly procedure. If a new disc has been installed, it may require a different number of spacer washers to obtain the right amount of "grip" on the disc. When the diaphragm assembly has been tightened to a point where the diaphragm cannot be twisted, the disc should be compressed very slightly by the disc guide. Excessive compression should be avoided. Use just enough spacer washers to hold the disc firmly without noticeable compression.

2. MAKE SURE THE STEM NUT IS VERY TIGHT. Attach a good fitting wrench to the nut and give it a sharp "rap" rather than a steady pull. Usually several blows are sufficient to tighten the stem nut for final tightening. Failure to do so could allow the diaphragm to pull loose and tear when subjected to pressure.

3. Carefully install the diaphragm assembly by lowering the stem through the seat bearing. Take care not to damage the stem or bearing. Line up the diaphragm holes with the stud or bolt holes on the body. on larger valves with studs, it may be necessary to hold the diaphragm assembly up part way while putting the diaphragm over the studs.

4. Put spring in place and replace cover. Make sure diaphragm is lying smooth under the cover.

5. Tighten cover nuts firmly using a cross-over pattern until all nuts are tight.

6. Test Hytrol Valve before re-installing pilot valve system.

Test Procedure After Valve Assembly

There are a few simple tests which can be made in the field to make sure the Hytrol Valve has been assembled properly. Do these before installing pilot system and returning valve to service. These are similar to the three troubleshooting tests.

1. Check the diaphragm assembly for freedom of movement after all pressure is removed from the valve. **SEE CAUTION.** Insert fabricated tool into threaded hole in top of valve stem, and lift the diaphragm assembly manually. Note any roughness, sticking or grabbing. The diaphragm assembly should move smoothly throughout entire valve stroke. The tool is fabricated from rod that is threaded on one end to fit valve stem (See chart in Step 4 of "Disassembly" section.) and has a "T" Bar handle of some kind on the other end for easy gripping.

Place marks on this diaphragm assembly lifting tool when the valve is closed and when manually positioned open. The distance between the two marks should be approximately the stem travel shown in stem travel chart. (See "Freedom of Movement Check" section.) If the stroke is different than that shown, there is a good reason to believe something is mechanically restricting the stroke of the valve. The cover must be removed, the obstruction located and removed. (See "Maintenance" Section for procedure.)

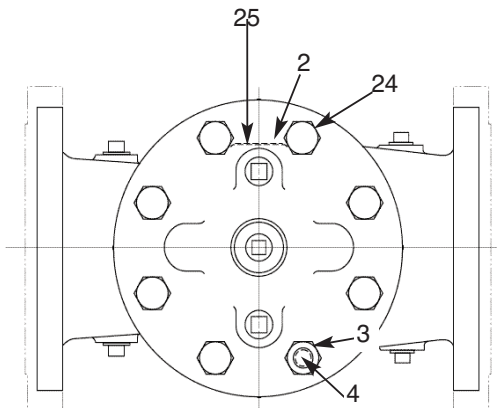
Due to the weight of the diaphragm assembly this procedure is not possible on valves 8" and larger. on these valves, the same determination can be made by carefully introducing a low pressure-less than five psi) into the valve body with the cover vented. **SEE CAUTION**. Looking in cover center hole see the diaphragm assembly lift easily without hesitation, and then settle back easily when the pressure is removed.

2. To check the valve for drip-tight closure, a line should be connected from the inlet to the cover, and pressure applied at the inlet of the valve. If properly assembled, the valve should hold tight with as low as ten PSI at the inlet. See "Tight Sealing Check" section.)

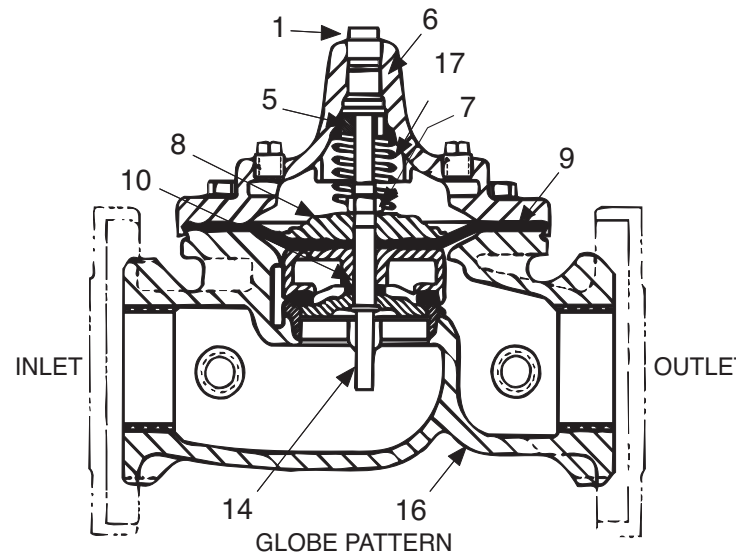
3. With the line connected from the inlet to the cover, apply full working pressure to the inlet. Check all around the cover for any leaks. Re-tighten cover nuts if necessary to stop leaks past the diaphragm.

4. Remove pressure, then re-install the pilot system and tubing exactly as it was prior to removal. **Bleed air from all high points.**

5. Follow steps under "Start-Up and Adjustment" Section in Technical Manual for returning complete valve back to service.



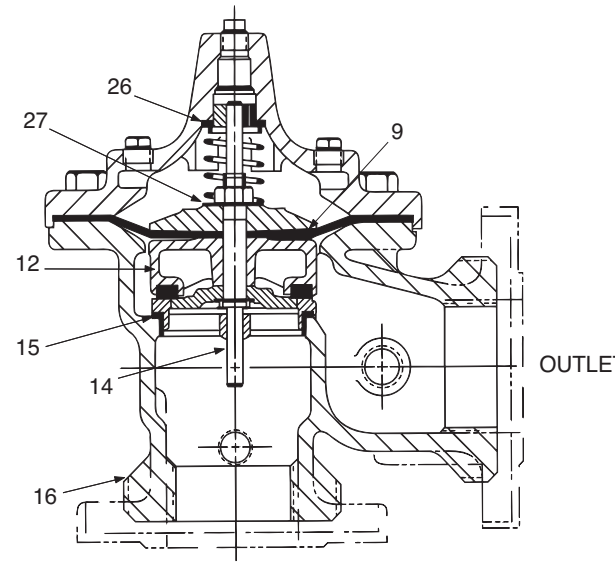
TOP VIEW



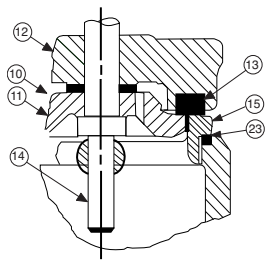
GLOBE PATTERN

PARTS LIST

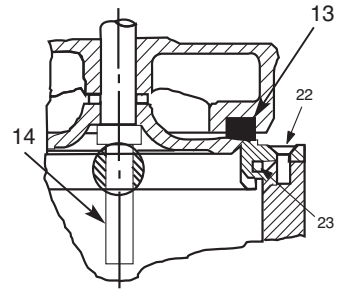
Item	Description
1.	Pipe Plug
2.	Drive Screws (for nameplate)
3.	Hex Nut (8” and larger)
4.	Stud (8” and larger)
5.	Cover Bearing
6.	Cover
7.	Stem Nut
8.	Diaphragm Washer
9.	Diaphragm
10.	Spacer Washers
11.	Disc Guide
12.	Disc Retainer
13.	Disc
14.	Stem
15.	Seat
16.	Body
17.	Spring
22.	Flat Head Screws (8” and larger)
23.	Seat O-Ring
24.	Hex head Bolt (1 1/4” thru 4”)
25.	Nameplate
26.	Upper Spring Washer (Epoxy coated valves only)
27.	Lower Spring Washer (Epoxy coated valves only)
28.	Cover Bearing Housing (16” only)
29.	Cover O-Ring (16’” only)
30.	Hex Bolt (16” only)
31.	Pipe Cap (16” only)



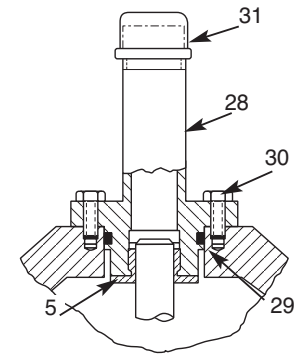
INLET
ANGLE PATTERN



1 1/4" - 6" SEAT DETAIL



8" - 24" SEAT DETAIL



16" COVER DETAIL

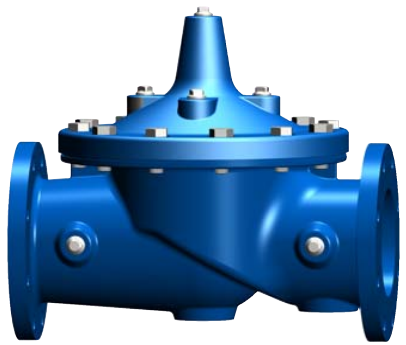
CLA-VAL

—MODEL— 100-01
Hytrol Valve Service Data

Description 100-01 Hytrol Valve

The Cla-Val Model 100-01 Hytrol Valve is a main valve for Cla-Val Automatic Control Valves. It is a hydraulically operated, diaphragm-actuated, globe or angle pattern valve.

This valve consists of three major components; body, diaphragm assembly, and cover. The diaphragm assembly is the only moving part. The diaphragm assembly uses a diaphragm of nylon fabric bonded with synthetic rubber. A synthetic rubber disc, contained on three and one half sides by a disc retainer and disc guide, forms a seal with the valve seat when pressure is applied above the diaphragm. The diaphragm assembly forms a sealed chamber in the upper portion of the valve, separating operating pressure from line pressure.



Description 100-20 600 Series Hytrol Valve

The Cla-Val Model 100-20 Hytrol Valve (600 Series main valve) have only one part -the body- that is different from standard 100 Series Cla-Val main valve parts. The remaining parts of the 600 series main valve are standard Cla-Val main valve parts. All service and maintenance information for the standard 100 Series main valves also apply to the 600 series main valves.
The most important thing to remember when ordering main valve repair kits and replacement parts, except for the body, all other parts are going to be for a smaller size main valve. Cla-Val identifies main valve parts with the flange size of the standard 100 Series main valve. Refer to the "Main Valve Sizes" chart below.

HYTROL Service Data

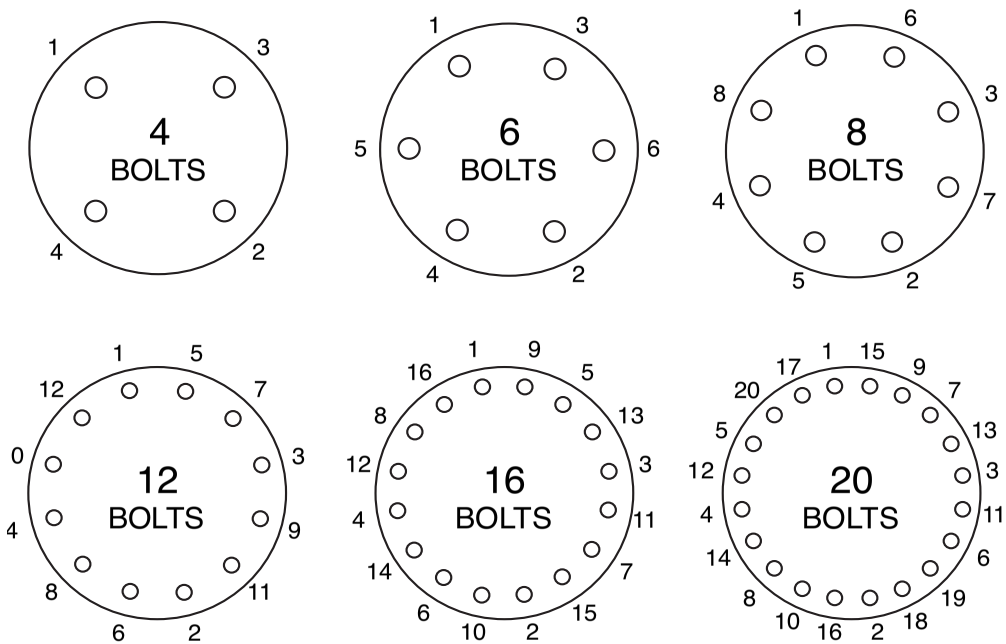
HYTROL SIZE				Stem Travel		Cover Capacity Displacement		Valve Stem Thread UNF-Internal	Cover Center Plug NPT	Cover Nut or Bolt			Cover Lifting Holes UNC	Cover Plug		Cover Torque		Stem Nut**		Stem Nut Torque (ft. Lbs.)	
100-01		100-20								Thread (Bolt)	Socket	Qty		Thread	Socket	ft. Lbs.	in. Lbs.	Thread	Socket (Long)	Lubed	DRY
inches	mm	inches	mm	inches	mm	Gallons	Liters														
1"	25			0.3	8				1/4"	1/4" - 20 (B)	7/16"	8				4	48	3/8" - 24		4	6
1 1/4"	32			0.4	10	0.020	0.07	10 - 32	1/4"	5/16" - 18 (B)	1/2"	8				8	96	7/16" -20		6	10
1 1/2"	40			0.4	10	0.020	0.07	10 - 32	1/4"	5/16" - 18 (B)	1/2"	8				8	96	7/16" -20		6	10
2"	50			0.6	15	0.032	0.12	10 - 32	1/2"	3/8" - 16 (B)	9/16"	8		3/8"	7/16"	12		1/2" - 20	3/4"	10	15
2 1/2"	65			0.7	18	0.043	0.16	10 - 32	1/2"	7/16" - 14 (B)	5/8"	8		1/2"	9/16"	20		5/8" - 18	15/16"	21	30
3"	80	4"	100	0.8	20	0.080	0.30	1/4 - 28	1/2"	1/2" - 13 (B)	3/4"	8		1/2"	9/16"	30		5/8" - 18	15/16"	21	30
4"	100	6"	150	1.1	23	0.169	0.64	1/4 - 28	3/4"	3/4" - 10 (B)	1 1/8"	8		3/4"	5/8"	110		3/4" - 16	1 1/16"	40	60
6"	150	8"	200	1.7	43	0.531	2.00	3/8 - 24	3/4"	3/4" - 10 (B)	1 1/8"	12		3/4"	5/8"	110		7/8" - 14	1 5/16"	85	125
8"	200	10"	250	2.3	58	1.26	4.80	3/8 - 24	1"	3/4" - 10	1 1/4"	16	5/8" - 11	1"	13/16"	110		1 1/8" -12	1 13/16"	125	185
10"	250	12"	300	2.8	71	2.51	9.50	3/8 - 24	1"	7/8" - 9	1 7/16"	20	3/4" - 10	1"	13/16"	160		1 1/2" -12	1 7/8"	252	375
12"	300	16"	400	3.4	86	4.0	15.10	3/8 - 24	1 1/4"	1 1/8" - 7	1 13/16"	20	3/4" - 10	1"	13/16"	390		1 1/2" -12	2 1/2"	270	400
14"	350			3.9	99	6.5	24.60	3/8 - 24	1 1/2"	1 1/4" - 7	2"	20	1" - 8	1"	13/16"	545		1 1/2" -12	2 1/2"	280	420
16"	400	20", 24"	600	4.5	114	9.6	36.20	1/2 - 20	2"	1 1/4" - 7	2"	20	1" - 8	1"	13/16"	545		2" - 16	3"	500	750
20"	500			5.63	143	12	45.40	3/4 - 16	1 1/2"	1 3/8" - 6	2 1/8"	24	1" - 8	1"	13/16"	670		2 1/4" - 16	3 1/2"	930	N/R
24"	600	30"	800	6.75	165	29.0	108.80	3/4 - 16*	3/4"	1 1/2" - 12	2 3/8"	24	1 1/8"- 7	1"	13/16"	800		3" - 12	Special	1350	N/R

* Adapter p/n 2594101E inside 1/4" - 28"

Grade 5 Bolts "Heavy" Grade Nuts Tighten cover nuts in a "star" cross-over pattern

** Must Use ONLY Cla-Val Supplied part

BOLT/NUT TORQUING PROCEDURES ON VALVE COVERS



Follow this procedure when reassembling MAIN Valve:

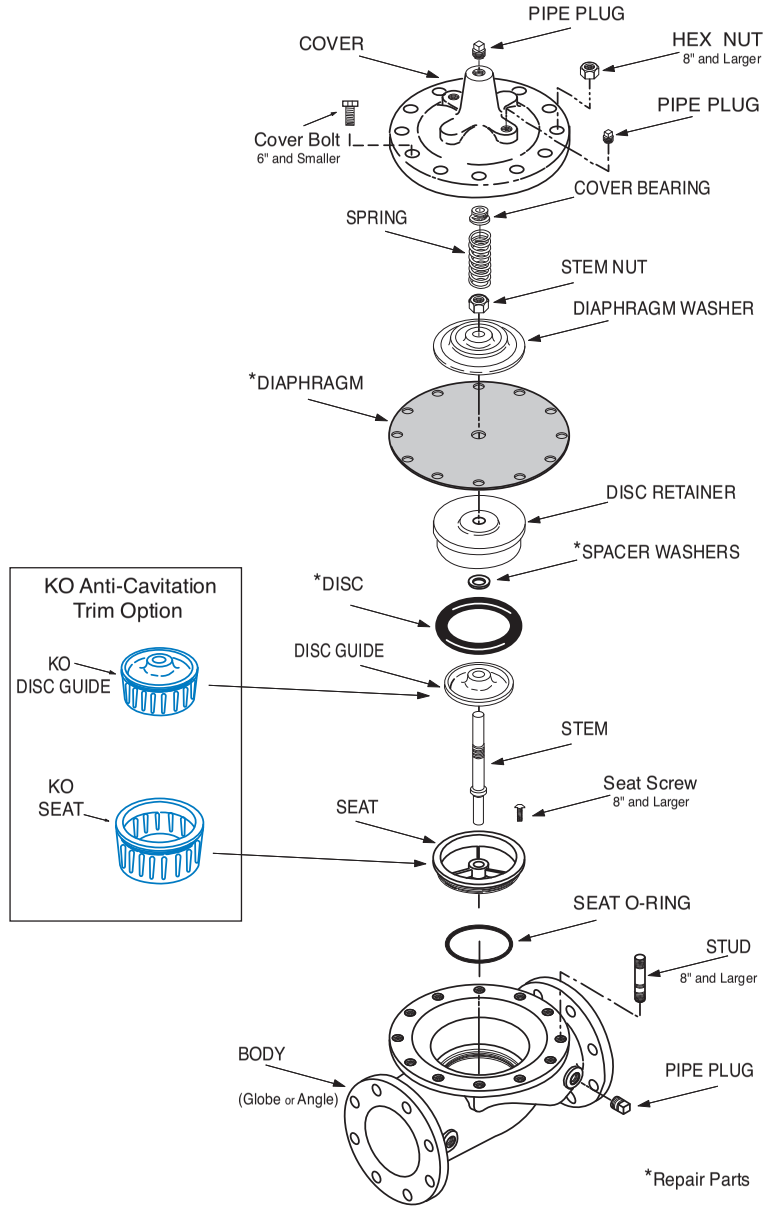
1. Tightens bolts/nuts in a “Star” or “Cross-Over” pattern following the numbers shown above to insure that cover seats evenly on the diaphragm material and body.

2. Torque the bolt/nuts in three stages with a "Star" or "Cross-Over" pattern for each stage:

   A. To approximately 10% of final torque.
   B. To approximately 75% of final torque.
   C. To final required torque.

3. Valves that are to be tested to 375 PSI or higher should be retorqued after 24 hours.

100-01 Hytrol Main Valve Assembly



CLA-VAL

— MODEL — 100-20
(Reduced Internal Port)

600 Series Hytrol Valve

SERVICE AND MAINTENANCE OF 600 SERIES VALVES

The 600 series main valves have only one part -the body- that is different from standard 100 Series Cla-Val main valve parts. The remaining parts of the 600 series main valve are standard Cla-Val main valve parts. All service and maintenance information for the standard 100 Series main valves in this manual also apply to the 600 series main valves.

The most important thing to remember when ordering main valve repair kits and replacement parts, except for the body, all other parts are going to be for a smaller size main valve. Cla-Val identifies main valve parts with the flange size of the standard 100 Series main valve. Refer to the "Main Valve Sizes Comparison" chart. For example, if you are servicing a 6" 100-20 Hytrol and needed a repair kit, you would order a repair kit for a 4" 100-01 Hytrol. This kit is also suitable for a 6" 100-20 Hytrol. Complete Technical Manuals include a repair kit data sheet N-RK that shows this relationship.

When you order repair parts, it is a good idea to include valve nameplate data (size, catalog number, and part number) and description of the parts desired. Do this to be sure parts will fit the valve you are working on and not be too big for it. Pilot controls and repair kits maintenance information remain the same for 100 or 600 Series valves.

UNDERSTANDING THE 600 SERIES VALVES

In 1987, Cla-Val introduced the Model 100-20 Hytrol as the basic main valve for the 600 Series of automatic control valves. To identify all new valves using the 100-20 Hytrol, an existing catalog number is modified. Making a 600 Series catalog number is simply done by using a "6" in front of the two digit catalog numbers or replacing the "2" with a "6" in three digit catalog numbers. Current schematics reflect both catalog numbers together separated by a slash (i.e. - 90-01/690-01, 58-02/658-02, 210-01/610-01, etc). Since these two valves 'share' the same catalog number and schematic, they provide the same function in a system. The only difference between the two valves is the relative capacity of the two main valve series.

The 100-01 Hytrol is the basic main valve for Cla-Val automatic control valves. This valve is the current version of the Clayton Hytrol valve design originated in 1936. The 100-01 Hytrol is designed as a full flow area valve. This means that the inlet, seat and outlet openings are the same size. Thus, the pressure drop is kept to a minimum for this globe style design.

The 100-20 Hytrol valve has all of the basic features and advantages of the original 100-01 Hytrol. Only one part has been changed - the body. It is designed with different size inlet, seat and outlet openings. The 100-20 Hytrol has inlet and outlet flanges one valve size larger than the seat opening size. This results in what is sometimes called a "reduced port' main valve. For example, a 4" 100-20 valve has a 3" seat. Note: valve size is always determined by the flange size. The following chart compares the 100-01 and the 100-20 main valves.

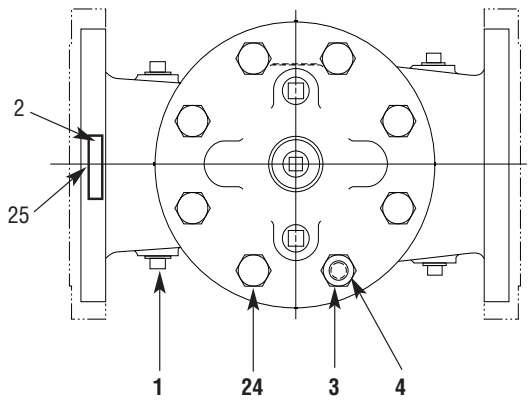
Basic Main Valve Size Comparison		
Globe Pattern Valves		
Flange Size (inch)	Seat Size	
	100-01 (100 Series)	100-20 (600 Series)
3	3	2
4	4	3
6	6	4
8	8	6
10	10	8
12	12	10
14	14	----
16	16	12
18	----	16
20	20	16
24	24	16
30	30	24
36	36	30
42	----	36
48	----	36
Angle Pattern Valves		
Flange Size (inch)	Seat Size	
	100-01 (100 Series)	100-20 (600 Series)
4	4	3
6	6	4
8	8	6

The 100-20 Hytrol is available only in ductile iron, 150 and 300 pressure class, and Bronze trim standard. Available extra cost main valve options include stainless steel trim, epoxy coating, Dura-Kleen stem, Delrin sleeved stem, and high temperature rubber parts. All four basic main valves have a 600 Series version available with all of the same benefits and size relationships. The following chart shows the relationship of Cla-Val main valve catalog numbers.

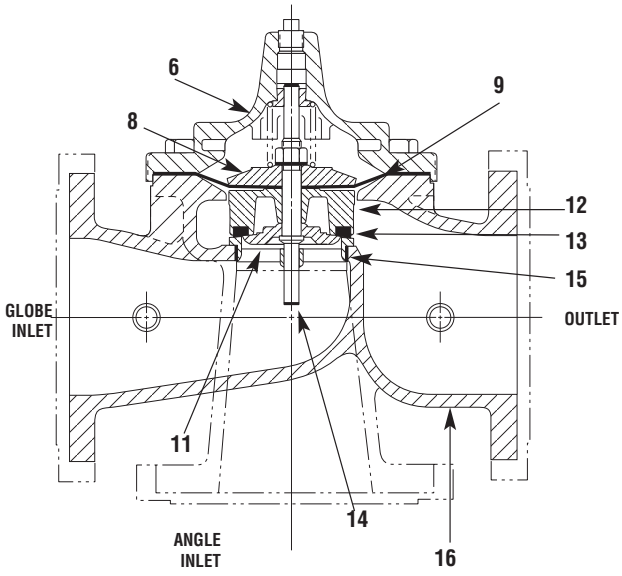
Cla-Val Main Valves

	Catalog Number		
Catalog Name	Circa 1936	100-Series	600 Series
Hytrol	100 (Angle =2100)	100-01	100-20
Powertrol	100P & 100PA	100-02	100-21
Powercheck	100PC & 100PCA	100-03	100-22
Hycheck	181	100-04	100-23

100-20

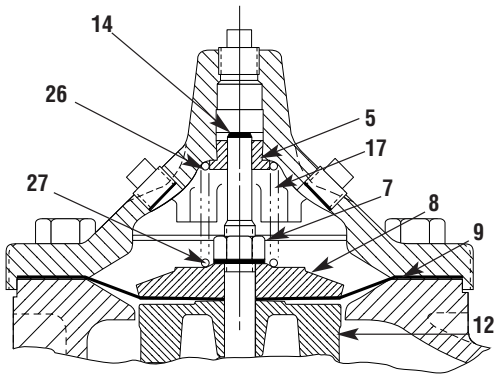


TOP VIEW

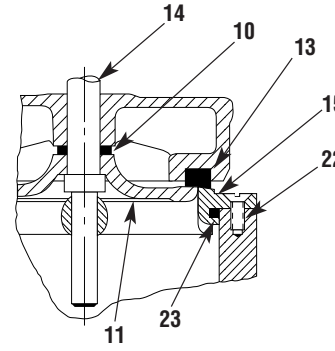


PARTS LIST	
NO.	**DESCRIPTION**
1	Pipe Plug
2	Drive Screws (for nameplate)
3	Hex Nut (8" and larger)
4	Stud (8" and larger)
5	Cover Bearing
6	Cover
7	Stem Nut
8	Diaphragm Washer
9	Diaphragm
10	Spacer Washers
11	Disc Guide
12	Disc Retainer
13	Disc
14	Stem
15	Seat
16	Body
17	Spring
22	Flat Head Screws (10" and larger)
23	Seat O-Ring
24	Hex Bolt (3 " Thru 6")
25	Nameplate (Mounted on inlet flange)
26	Upper Spring Washer (Epoxy coated valves only)
27	Lower Spring Washer (Epoxy coated valves only)
28	Cover Bearing Housing (20" & 24" & 30")
29	Cover Bearing Housing O-Ring (20"& 24" & 30")
30	Hex Bolt (20" & 24")
31	Pipe Cap (20" & 24 & 30"")

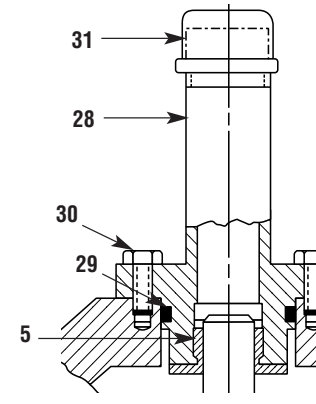
WHEN ORDERING PARTS, BE SURE TO GIVE COMPLETE NAMEPLATE DATA, ITEM NUMBER AND DESCRIPTION.



3" — 6" COVER DETAIL



10" — 24" SEAT DETAIL



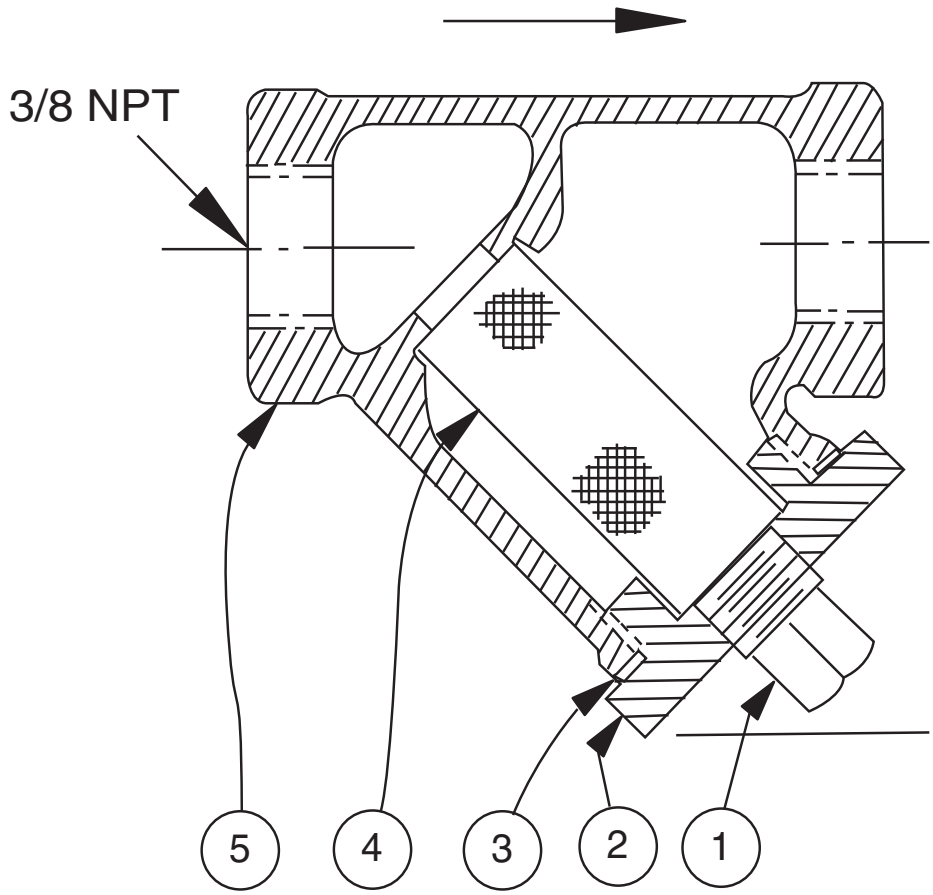
20" — 24" COVER DETAIL

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 CO. NEWPORT BEACH, CALIFORNIA

CATALOG NO.	DRAWING NO.	REV
X58C	48834	AP

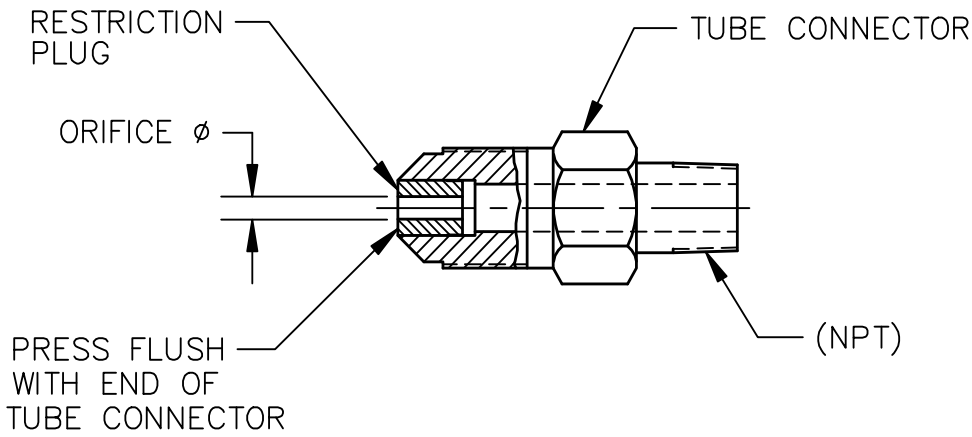
TYPE OF VALVE AND MAIN FEATURES

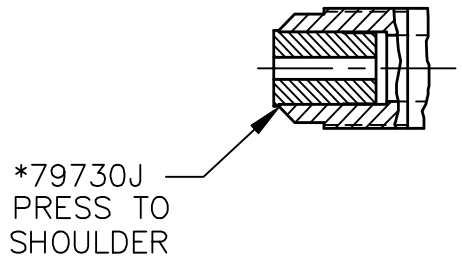
X58C RESTRICTION ASSEMBLIES

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

LTR	DESCRIPTION	BY	DATE
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
A-AK	SEE REVISION FILE		
AL	REDRAWN ON CAD (ECO 14229)	EK	11-18-93

CAD REVISION RECORD - DO NOT REVISE MANUALLY





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.

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

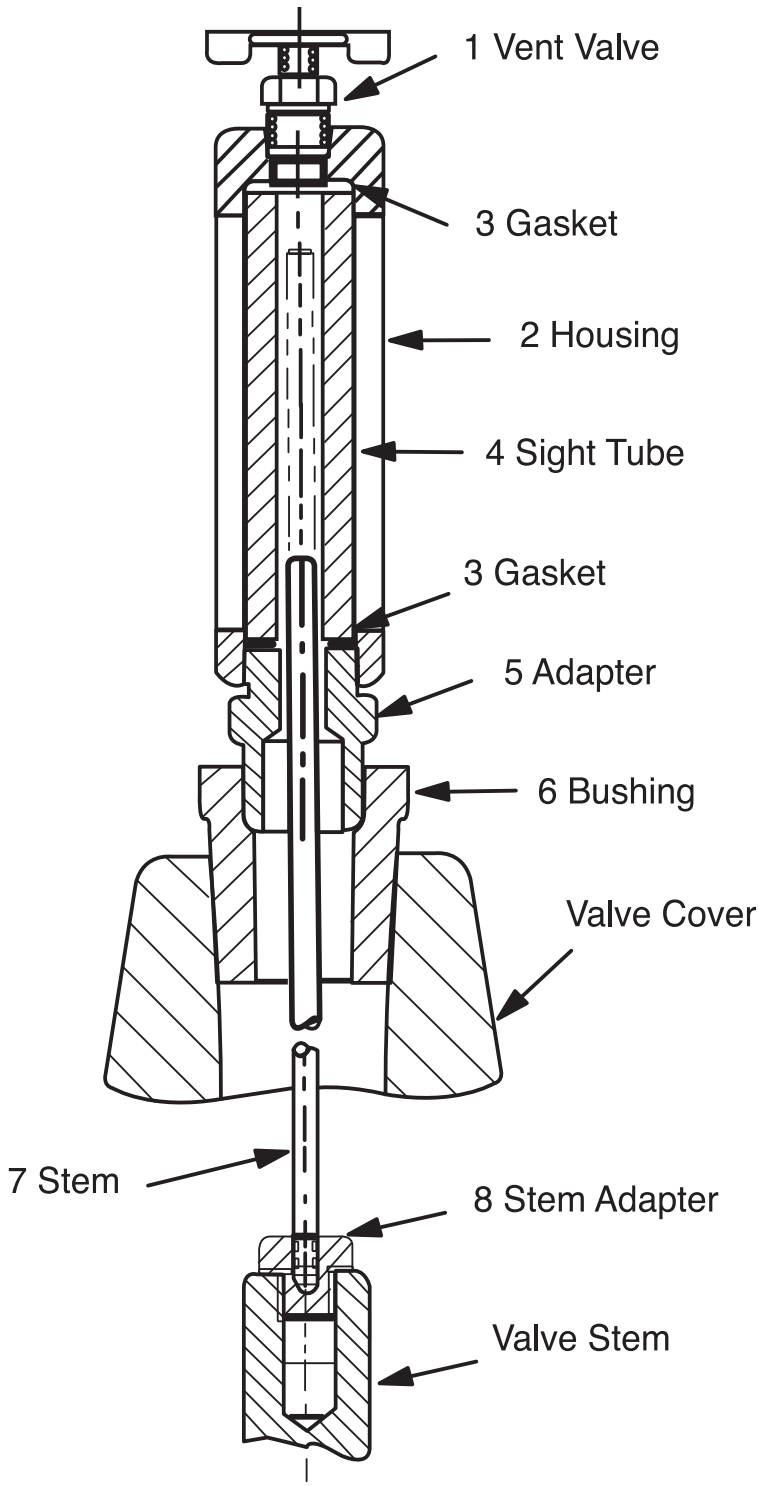
CAD REVISION RECORD - DO NOT REVISE MANUALLY

LTR	DESCRIPTION	BY	DATE
	SEE SHEET 1		

CLA-VAL

X101

Valve Position Indicator



COMPLETE X101	
Size	**Stock No.**
1 1/4 - 1 1/2	C2812A
2	C8972G
2 1/2	C2607E
3	C2609A
4	9710001A
6	9710002J
8	C8581F
10	C9187A
12	31420D
14	30256C
16	30251D

ITEM	DESCRIPTION	MATERIAL
1	Vent Valve	Brass
2	Housing	Brass
3	*Gasket (2 Required)	Buna-N®
4	*Sight Tube	Pyrex
5	Adapter	Brass
6	Busing	Brass
7	Stem	Brass
8	Stem Adapter	Brass

When ordering parts, please specify:
- All Nameplate data
- Item Number
- Description
- Material
- Part Number

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.

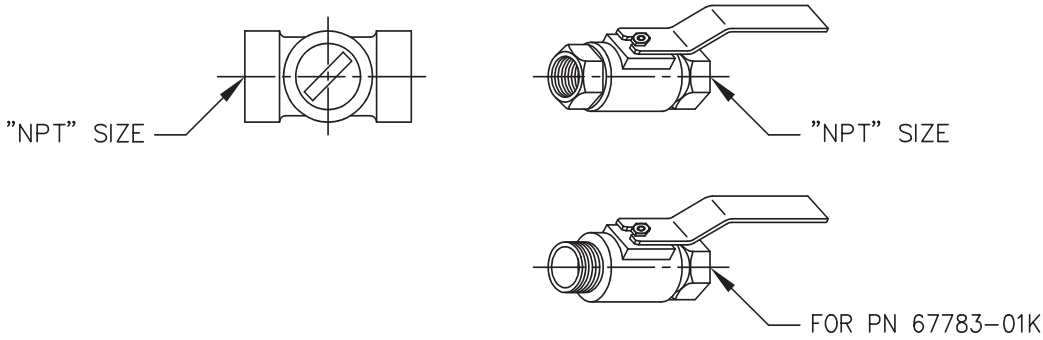
DRAWING NO. 67783 REV BD

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)

X44A

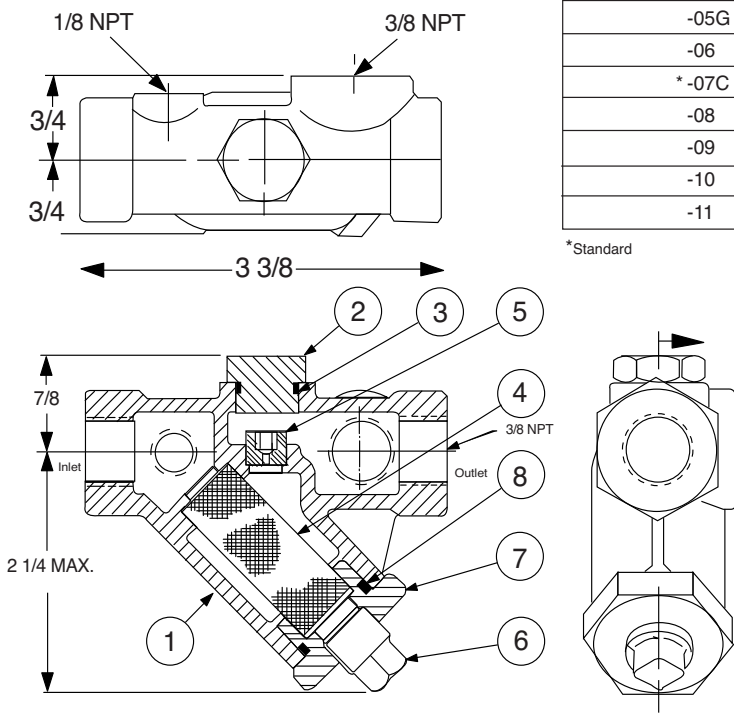
Strainer and Orifice Assembly

BRONZE BODY — DELRIN ORIFICE

3/8" x 3/8"

X44A STOCK NO.	ORIFICE DIA.	ORIFICE PLUG PART # (ITEM 5)
71310-01F	.031	94132-01
-02	.046	-02E
-03B	.062	-03C
-04K	.078	-04A
-05G	.093	-05H
-06	.109	-06
* -07C	.125	-07D
-08	.140	-08
-09	.156	-09
-10	.187	-10H
-11	.172	-11F

*Standard



When ordering parts, please specify:

- All Nameplate Data
- Item Number
- Description
- Recommended Spare Parts

ITEM	DESCRIPTION	MATERIAL	QTY.
1	Body	Red Brs.	1
2	Plug, Top	Brass	1
3	"O" Ring, Plug Top	Syn. Rub.	1
4	Screen	Monel	1
5	Orifice Plug	Delrin	1
6	Plug, Pipe	Brass	1
7	Strainer Plug	S.S.	1
8	"O" Ring, Strainer Plug	Syn. Rub.	1

X141

Cla-Val 2 ½" & 4" 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 liquid-filled pressure gauges with Cla-Val Logo installed with ¼" CK2 Bronze Isolation Valves on main valve inlet and outlet. Gauges are waterproof, shock resistant, and fully enclosed with Stainless Steel case and Bronze wetted parts. All gauges have dual scale (PSI/BAR) and 1.5% F.S. accuracy with 1/4" NPT bottom connection. 2 ½" Diameter Dial supplied with 6" and smaller valves. 4" Diameter Dial supplied with 8" and larger valves. Available installed on new valves and must be specified on customer Purchase Order. Other materials available consult factory.

Available Pressure Ranges

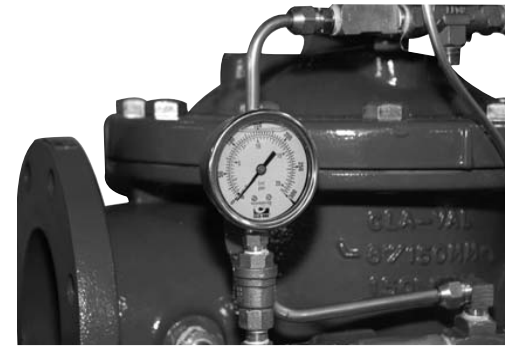
X141 Gauge Assembly for 6" and smaller valves (2 1/2" Diameter Dial)

Pressure Range*	Part Number
0 - 60 psi	20534301 A
0 - 100 psi	20534302K
0 - 160 psi	20534311J
0 - 200 psi	20534303J
0 - 300 psi	20534304H
0 - 400 psi	20534305G

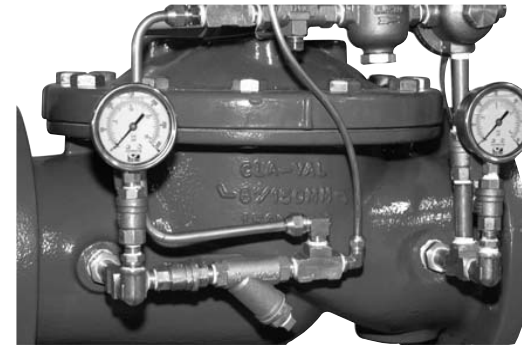
X141 Gauge Assembly for 8" and larger valves (4" Diameter Dial)

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 Installation of X141



Typical Installation of X141 Both Gauges Installed



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

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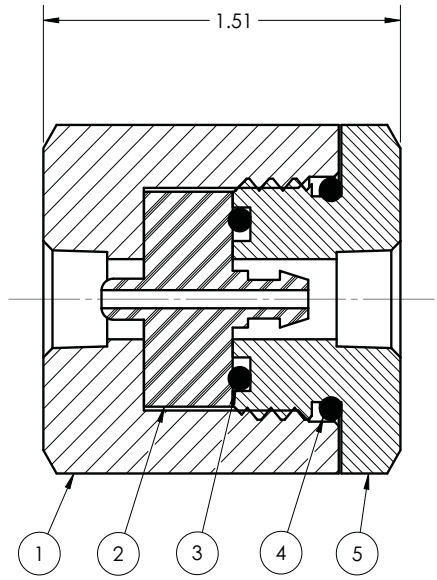
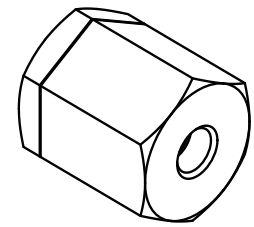
CLA-VAL

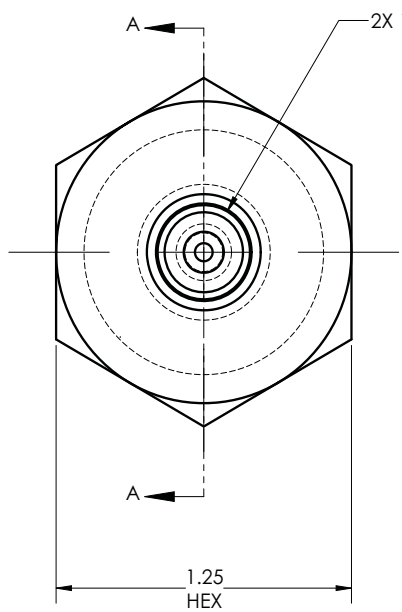
X58E

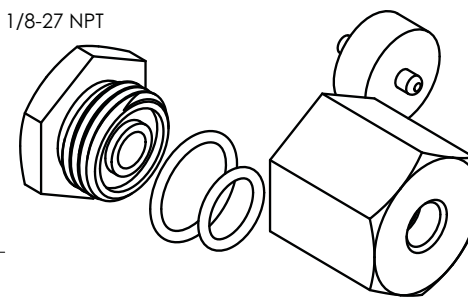
RESTRICTOR



SECTION A-A



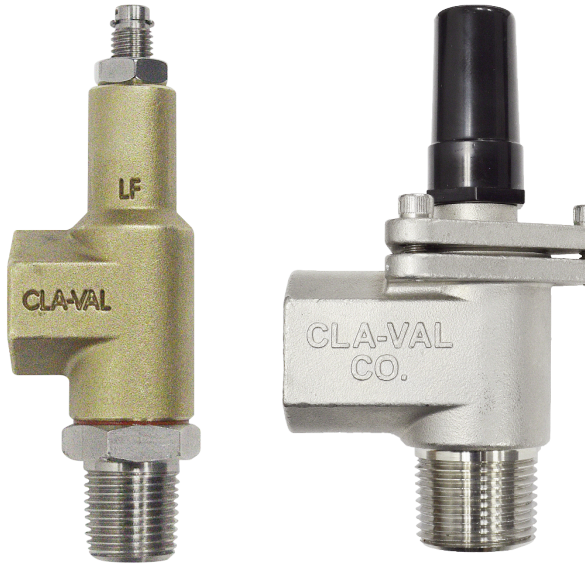




Item No.	Part No.	Description	Qty.
1	208330-01K	Housing	1
2	90284-177J	O-Ring (Size 2-117)	1
3	00749C	O-Ring (Size 2-113)	1
4	00753E	Restrictor	1
5	208329-01C	Cap	1

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.

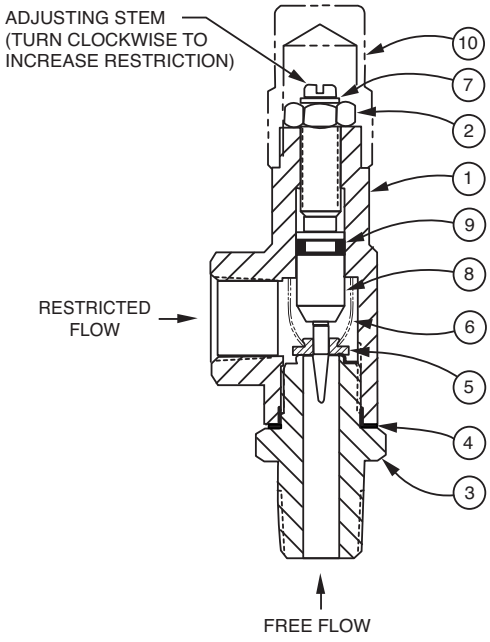
REASSEMBLY
Reassembly is the reverse of disassembly; no special tools are required.

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

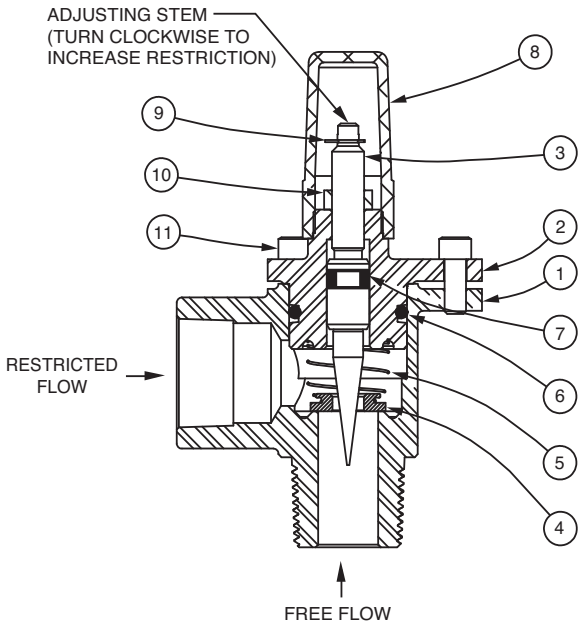


ITEM	DESCRIPTION	QTY
1	Housing	1
2	Nut, Jam	1
3	Seat	1
4	Gasket	1
5	Disc	1
6	Spring	1
7	Ring, Retaining	1
8	Stem	1
9	O-Ring	1
10	Cap (SS only)	1

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

Cla-Val Product Identification

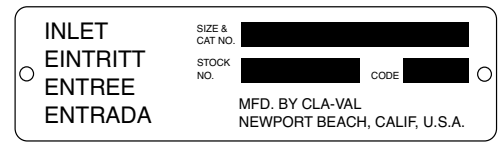
How to Order

Proper Identification

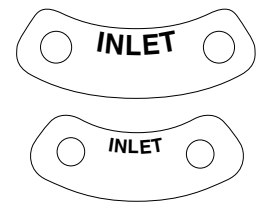
For ordering repair kits, replacement parts, or for inquiries concerning valve operation, it is important to properly identify Cla-Val products already in service by including all nameplate data with your inquiry. Pertinent product data includes valve function, size, material, pressure rating, end details,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

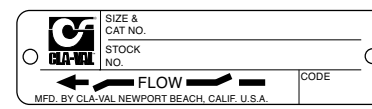


This brass plate appears on valves sized $2^1/_2$" and larger and is located on the top of the inlet flange.

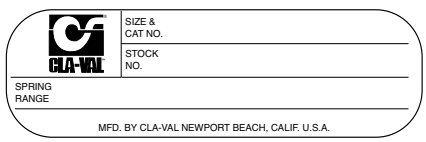


These two brass plates appear on $^3/_8$", $^1/_2$", and $^3/_4$" size valves and are located on the valve cover.

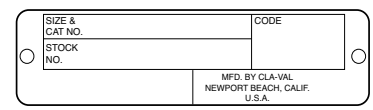
This brass plate appears on altitude valves only and is found on top of the outlet flange.



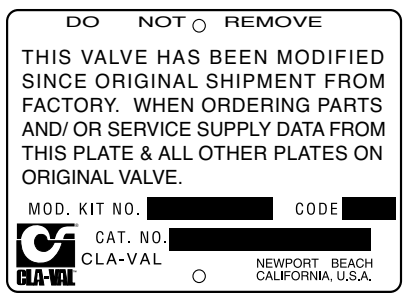
These two brass plates appear on threaded valves 1" through 3" size or flanged valves 1" through 2". It is located on only one side of the valve body.



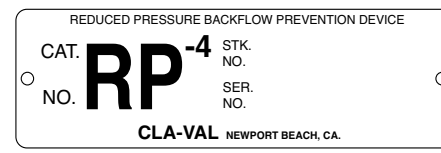
This tag is affixed to the cover of the pilot control valve. The adjustment range appears in the spring range section.



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
Phone: 949-722-4800 • Fax: 949-548-5441

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4687 Christie Drive
Beamsville, Ontario
Canada L0R 1B4
Phone: 905-563-4963
Fax: 905-563-4040

CLA-VAL EUROPE
Chemin dés Mesanges 1
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	REPAIR KIT	REBUILD ASSEMBLY	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 ASSEMBLY	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 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

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