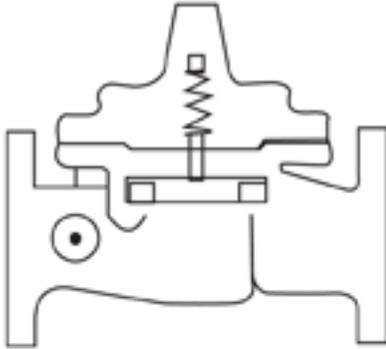


CLA-VAL

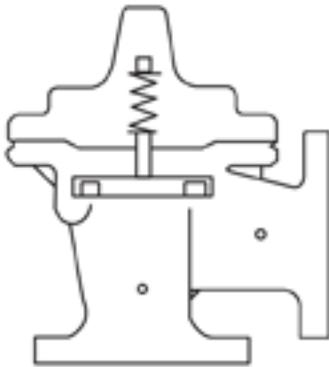
AUTOMATIC CONTROL VALVES

90-21

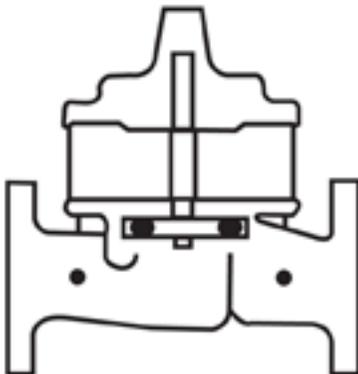
Place this manual with personal responsible
for maintenance of this valve



INSTALLATION



OPERATION



MAINTENANCE



MODEL

90-21 UL

UL Listed Pressure Reducing Valve

The Cla-Val 90-21 Pressure Reducing Valve is a pilot-operated regulator, capable of holding downstream pressure to a predetermined pressure.

1. **Special Note:** For system protection, a pressure relief valve is to be installed downstream (system side) of the 90-21 Pressure Reducing Valve. Adequate drainage of the relief valve discharge must be provided. The relief valve should be set above the “no flow” or “dead end” shutoff pressure which will be 5 to 11 psi higher than the set pressure.

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

3. It is recommended that isolation valves be installed on both ends of the 90-21 valve to facilitate isolating the valve for start-up, testing and preventative maintenance.

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

5. Place the 90-21 valve in the line with flow through the valve in the direction indicated on the inlet nameplate mounted on inlet flange or by arrow on nameplate mounted on side of threaded ends valves. Check all fittings and hardware for proper makeup and that no apparent damage is evident.

6. Cla-Val 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. This makes periodic inspection of internal parts readily accessible.

Start-Up and Adjustment

1. Upon initial start-up and after any valve servicing, it is necessary to follow these steps.

2. Prior to pressurizing the valve make sure the necessary gauges to measure pressure are installed. Gauges should be installed upstream (inlet) and downstream (outlet) of the valve. Unused ports on main valve body can be used for this purpose.

Caution: During start-up and test procedures a large volume of water may be discharged downstream. Check to make sure that the downstream venting is adequate to prevent damage to personnel and equipment.

3. Close upstream and downstream isolation valves.

4. Slowly open the upstream isolation valve enough to allow the valve and pilot control system to fill with liquid.

5. Bleed air from the main valve (1) cover and pilot system by slightly loosening fittings or plugs at all high points until a steady flow of water is observed retighten. It may be necessary to do this more than once.

6. Open fully the upstream isolation valve.

7. Slowly open the downstream isolation valve part way to establish a low flow rate.

There must be liquid flowing through the valve during pressure adjustments. Optimum valve performance occurs when pressure setting is done with flow rate as low as practical.

8. Adjust the CRD Control (3) to desired pressure. To change pressure setting, turn the adjusting screw in (clockwise) to increase delivery pressure. Turn the adjusting screw out (counterclockwise) to decrease delivery pressure. The pressure should change approximately 27 psi per turn. Only slight changes in adjustment should be made to avoid damage to equipment. When the desired setting has been made, tighten jam nut and replace cover.

NOTE: The “no flow” or “dead end” shutoff pressure will be 5 to 11 psi above the set pressure.

9. Open downstream isolation valve fully.

Maintenance

1. The Cla-Val 90-21 Pressure Reducing Valve requires no lubrication or packing and a minimum of maintenance. However, a periodic inspection schedule should be established to determine how the fluid handled is affecting the efficiency of the valve. Minimum of once per year.

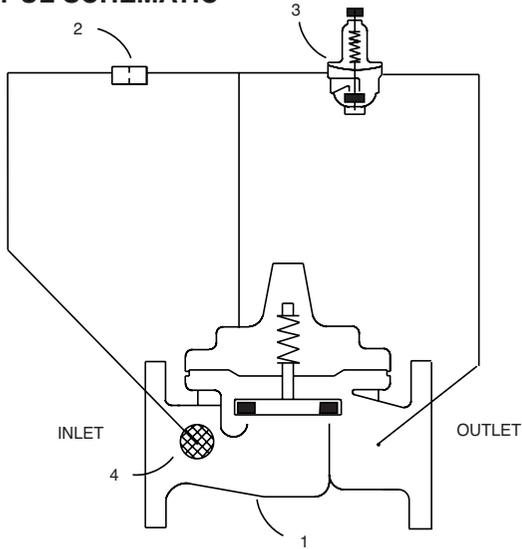
2. When servicing the pilot control system, use care to prevent damage. If it is necessary to remove fittings or components, be sure they are kept clean and replaced exactly as they were.

3. Repair and maintenance procedures of the Cla-Val Hytrol Main Valve and pilot control components are included in a more detailed IOM manual. It can be downloaded from our web site (www.claval.com) or obtained by contacting a Cla-Val Regional Sales Office.

4. When ordering parts always refer to the catalog number and stock number on the valve nameplate.

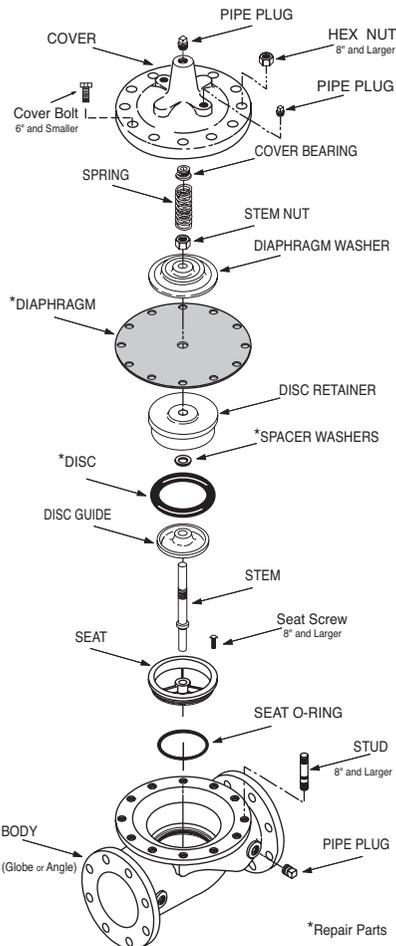
SYMPTOM	PROBABLE CAUSE	REMEDY
Main valve fails to open	No pressure at valve inlet	Check inlet pressure
	Main valve diaphragm assembly inoperative	Disassemble, clean and polish stem, replace defective parts
	Pilot Valve (CRD) not opening: 1. No. spring compression 2. Damaged spring 3. Spring guide not in place 4. Yoke dragging on inlet nozzle	1. Tighten adjusting screw 2. Disassemble and replace 3. Assemble properly. 4. Assemble properly
Main valve fails to close	Foreign matter between disc and seat or worn disc. Scale on stem or Diaphragm ruptured Flow Clean Strainer plugged CK2 (isolation valves) closed	Disassemble main valve, remove matter, clean parts and replace defective parts Remove and clean or replace Open isolation valves
	Pilot Valve (CRD) remain open: 1. Spring compressed solid 2. Mechanical obstruction 3. Worn disc 4. Yoke dragging on inlet nozzle diaphragm nut. Leakage from vent hole in cover 5. Diaphragm damaged or loose diaphragm nut. Leakage from vent hole in cover	1. Back off adjusting screw 2. Disassemble and remove obstruction 3. Disassemble remove and replace disc retainer assembly 4. Assemble properly 5. Disassemble. replace diaphragm and/or tighten nut
Fails to Regulate	Air in main valve cover and/or tubing	Loosen top cover plug and fittings and bleed air
	Pilot Valve (CRD) yoke dragging on inlet nozzle	Assemble properly
	Pilot Valve (CRD) spring not in correct range to control	Check outlet pressure requirements

90-21 UL SCHEMATIC



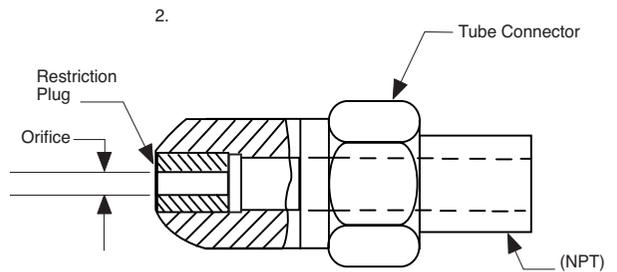
- BASIC COMPONENTS**
 1 100-01 Hytrol (Main Valve)
 2 X58C Restriction Fitting
 3 CRD Pressure Reducing Control
 4 X46A Flow Clean Strainer

1. HYTROL MAIN VALVE

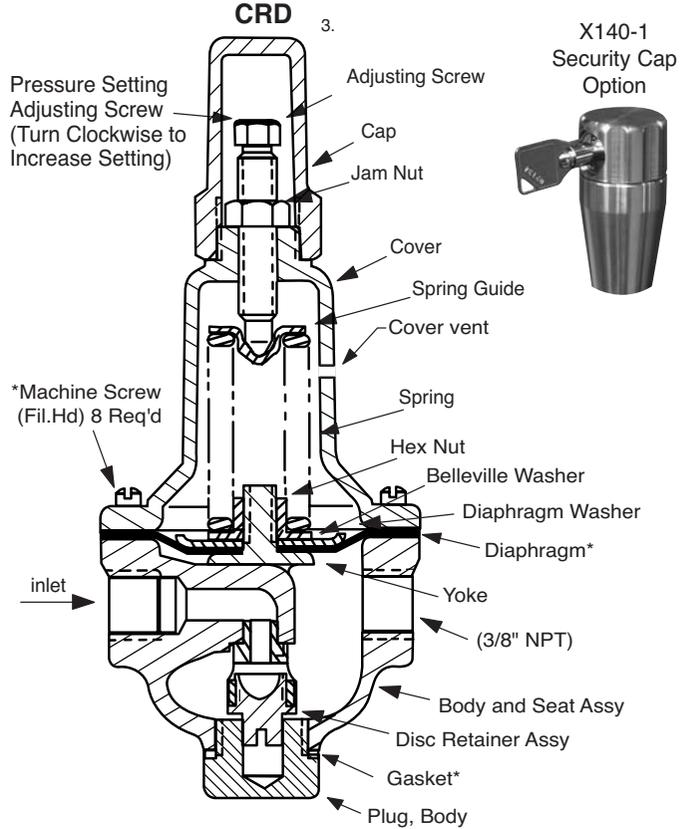


*Repair Parts

X58C



CRD



X140-1 Security Cap Option



Minimum Flow Required When Setting Pressure

Valve Size (inch)	Min. Flow (GPM)
1 1/2	16
2	26
2 1/2	37
3	57
4	100
6	220
8	390
10	620

X58C



X46A



*SUGGESTED REPAIR PARTS

For a more detailed IOM Manual go to www.cla-val.com or contact a Cla-Val Regional Sales Office.

 CLA-VAL CO. NEWPORT BEACH, CALIFORNIA	CATALOG NO.	DRAWING NO.	REV
	90-21	93480	M

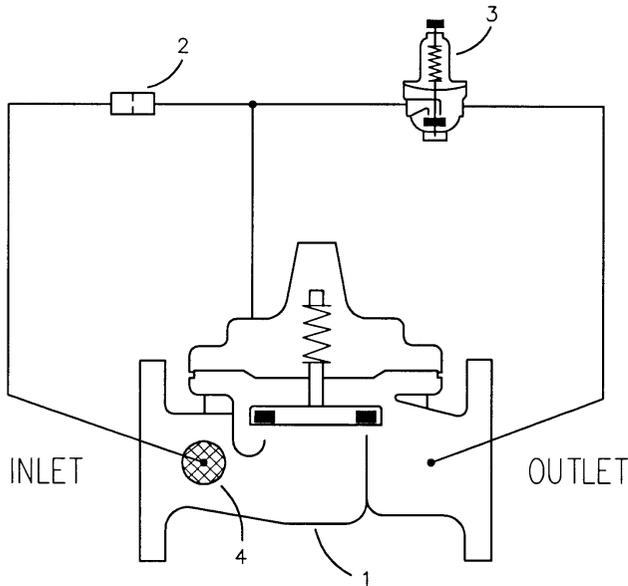
TYPE OF VALVE AND MAIN FEATURES

PRESSURE REDUCING VALVE
 "UNDERWRITERS LABORATORIES LISTED"

DESIGN		
DRAWN	MGR	9-4-79
CHK'D	DP	9-21-79
APVD	HWE	9-24-79

03-05-03
 PC
 07-16-03
 PC
 ADDED GLOBE & ANGLE 300F TO TABLE (FLANGED) (NED 47715)
 ADDED APPROVAL TABLE (300) FOR GROOVED ENDS; ADDED 300F SIZES TO TABLE (FLANGED VALVE); ADDED DUCTILE IRON TO 300S & 300F TABLE; MOVED ALL TABLES TO PG 2 (ECO 19470)
 M

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



NOTE:
 FOR STEEL AND DUCTILE IRON 300 VALVES, USE CRDKX [W/ SPECIAL DIAPHRAGM WASHER, YOKE AND SCREWS (30-165)]

* ALL SIZES, KX = RED PAINT:
 ALSO 300F ONLY KX = HIGH-STRENGTH BOLTS/STUDS & NUTS

ITEM NO.	BASIC COMPONENTS	QTY
1	*100KX HYTROL MAIN VALVE	1
2	X58C RESTRICTION ASSEMBLY	1
3	CRD PRESSURE REDUCING CONTROL (SEE NOTE)	1
4	X46A FLOW CLEAN STRAINER	1

OPTIONAL FEATURE SUFFIX	ADDED TO CATALOG NUMBER

CAD REVISION RECORD - DO NOT REVISE MANUALLY
 DESCRIPTION
 BY
 DATE
 LTR
 A-K SEE REVISION FILE.
 L ADDED NOTE 4 AND TABLE TO SH.1 (ECO 18559)
 AK
 03-07-01

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CLA-VAL CO. NEWPORT BEACH, CALIFORNIA	CATALOG NO. 90-21	DRAWING NO. 93480	REV M
	TYPE OF VALVE AND MAIN FEATURES PRESSURE REDUCING VALVE "UNDERWRITERS LABORATORIES LISTED"		DESIGN DRAWN MGR 9-4-79 CHK'D DP 9-21-79 APVD HWE 9-24-79

OPERATING DATA

- I. PRESSURE REDUCING FEATURE:
 PRESSURE REDUCING CONTROL (3) IS A NORMALLY OPEN CONTROL THAT SENSES MAIN VALVE OUTLET PRESSURE CHANGES. AN INCREASE IN OUTLET PRESSURE TENDS TO CLOSE CONTROL (3) AND A DECREASE IN OUTLET PRESSURE TENDS TO OPEN CONTROL (3). THIS CAUSES MAIN VALVE COVER PRESSURE TO VARY AND THE MAIN VALVE MODULATES (OPENS AND CLOSES) MAINTAINING A RELATIVELY CONSTANT OUTLET PRESSURE. PRESSURE REDUCING CONTROL (3) ADJUSTMENT: TURN THE ADJUSTING SCREW CLOCKWISE TO INCREASE THE SETTING.
- II. 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.

90G-21 AND 90A-21 APPROVALS

UL LISTED

DUCTILE IRON FLANGED VALVE
175 PSI MAX. (CRD 30-165)

PATTERN	SIZE	P/C
GLOBE	1 1/2" - 8"	150F
ANGLE	2" - 8"	150F
GLOBE	1 1/2" - 6"	300F
ANGLE	2" - 6"	300F

CAST STEEL VALVES 300 PSI
MAX. (CRD 30-165)

PATTERN	SIZE	P/C
GLOBE	1 1/2"	300S
GLOBE	2" - 6"	300F
ANGLE	1 1/2"	300S
ANGLE	2" - 6"	300F

UL LISTED

DUCTILE IRON GROOVED VALVE
175 PSI MAX. (CRD 30-165)

PATTERN	SIZE	P/C
GLOBE	1 1/2" - 6"	300
ANGLE	2" - 4"	300

ULC LISTED

DUCTILE IRON VALVE:
CLASS 150: 250 PSI MAX.
CLASS 300: 400 PSI MAX.

PATTERN	SIZE	P/C
GLOBE	1 1/2" - 10"	150A
GLOBE	1 1/2" - 3"	300S
GLOBE	1 1/2" - 10"	300F
ANGLE	1 1/2" - 10"	150A
ANGLE	1 1/2" - 3"	300S
ANGLE	1 1/2" - 10"	300F

CAD REVISION RECORD - DO NOT REVISE MANUALLY

L/R	DESCRIPTION	BY	DATE

SEE SHEET 1

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MODELS

90G-21
90A-21

Fire Protection Pressure Reducing Valve



90-21 UL Listed
Fire Protection Valve



MEA



90-21 UL Listed
Grooved End
Fire Protection Valve



- **U.L. Listed, ULC Listed, MEA Approved**
- **Globe or Angle Pattern**
- **Proven Reliable Design**
- **Available in Cast Bronze, Ductile Iron and Cast Steel**
- **Accurate Pressure Control**
- **In Line Service**
- **Grooved Ends (1 1/2" - 8")**

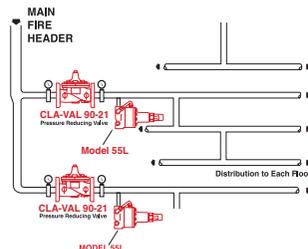
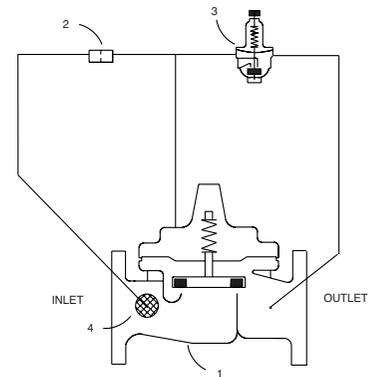
Cla-Val 90G-21 (globe) and 90A-21 (angle) Pressure Reducing Valves are indispensable in any fire protection system. Our diaphragm actuated design is proven highly reliable and easy to maintain. We offer both a globe or angle pattern with a full range of adjustments. These valves are also available in a variety of material options. Epoxy coating is strongly recommended for all fire system valves (excluding bronze valves). The 90G-21 and 90A-21 can be supplied with optional internal and external epoxy coating of the main valve wetted surfaces.

Special System Water Control Valves – Class II
UL Product Category VLMT – File No. Ex 2534

Cla-Val 90G-21 (globe) and 90A-21 (angle) Pressure Reducing Valves automatically reduce a higher inlet pressure to a steady lower outlet pressure regardless of changing flow rate and/or varying inlet pressure. The valves pilot control system is very sensitive to slight downstream pressure fluctuations, and will automatically open or close to maintain the desired pressure setting. The downstream pressure can be set over a wide range by turning the adjustment screw on the CRD pilot control. The adjustment screw is protected by a screw-on cover, which can be sealed to discourage tampering.

Schematic Diagram

- | Item | Description |
|------|--------------------------------------|
| 1 | Model 100-01 Hytrol (Globe or Angle) |
| 2 | X58C Restriction Tube Fitting |
| 3 | CRD Pressure Reducing Control |
| 4 | X46A Flow Clean Strainer |



Typical Application

Underwriters Laboratories requires the installation of pressure gauges upstream and downstream of the Pressure Reducing Valve. Also, a relief valve of not less than 1/2 inch in size must be installed on the downstream side of the pressure control valve. Adequate drainage for the relief valve discharge must be provided.

UL / ULC Listings

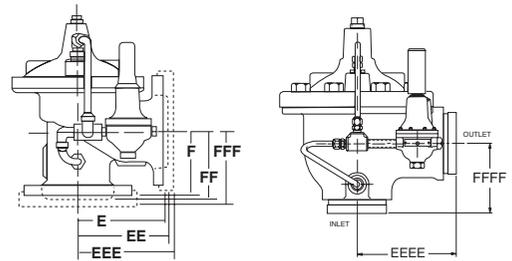
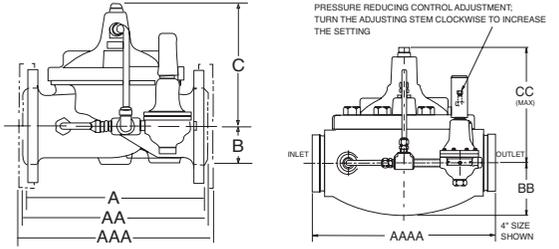
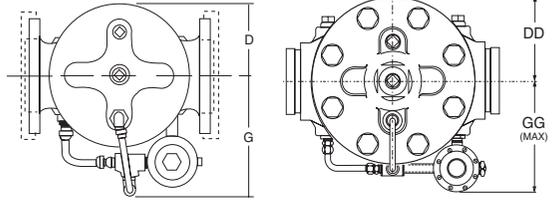
Size	Ductile Iron 150# F	Ductile Iron 300# S	Ductile Iron 300 # F	Bronze 300# Threaded	Bronze 150# F	Bronze 300# F	Cast Steel 300# F	Globe Pattern	Angle Pattern
								Ductile Iron Grooved End	Ductile Iron Grooved End
1 1/2"	UL / ULC	UL / ULC	UL	UL / ULC				UL	
2"	UL / ULC	UL / ULC	UL / ULC	UL / ULC	ULC	ULC	UL	UL	UL
2 1/2"	UL / ULC	ULC	UL / ULC	UL / ULC	ULC	ULC	UL	UL	
3"	UL / ULC	UL / ULC	UL / ULC	UL / ULC	ULC	ULC	UL	UL	UL
4"	UL / ULC		UL / ULC		ULC	ULC	UL	UL	UL
6"	UL / ULC		UL / ULC				UL	UL	
8"	UL / ULC		UL/ULC					UL	
10"	ULC		ULC						



Dimensions

VALVE SIZE (inches)	1½"	2"	2½"	3"	4"	6"	8"	10"
A THREADED	7.25	9.38	11.00	12.50	—	—	—	—
AA 150 ANSI	8.50	9.38	11.00	12.00	15.00	20.00	25.38	29.75
AAA 300 ANSI	9.00	10.00	11.62	13.25	15.62	21.00	26.38	31.12
AAAA GROOVED	8.50	9.00	11.00	12.50	15.00	20.00	25.38	—
B	1.12	1.50	1.69	2.56	3.19	4.31	5.31	9.25
BB GROOVED	1.94	2.13	2.50	6.00	4.13	6.00	7.25	—
C (MAX)	5.50	6.50	7.56	8.19	10.62	13.38	16.00	17.12
CC (MAX) GROOVED	4.10	5.00	6.88	6.50	8.80	11.10	14.50	—
D	2.81	3.31	4.00	4.56	5.75	7.88	10.00	11.81
DD GROOVED	2.81	3.31	4.00	4.56	5.75	7.88	10.00	—
E THREADED	3.25	4.75	5.50	6.25	—	—	—	—
EE 150 ANSI	4.00	4.75	5.50	6.00	7.50	10.00	12.75	14.88
EEE 300 ANSI	4.25	5.00	5.88	6.38	7.88	10.50	13.25	15.56
EEEE GROOVED	—	4.75	—	6.00	7.50	—	—	—
F THREADED	1.88	3.25	4.00	4.50	—	—	—	—
FF 150 ANSI	4.00	3.25	4.00	4.00	5.00	6.00	8.00	8.62
FFF 300 ANSI	4.25	3.50	4.31	4.38	5.31	6.50	8.50	9.31
FFFF GROOVED	—	3.25	—	4.50	5.00	—	—	—
G (MAX)	7.50	7.75	7.75	8.00	9.00	9.50	10.50	11.50
GG (MAX)	8.10	8.00	—	8.13	9.31	10.50	11.50	—

VALVE SIZE (mm)	40	50	65	80	100	150	200	250
A THREADED	184	238	279	318	—	—	—	—
AA 150 ANSI	216	238	279	305	381	508	645	756
AAA 300 ANSI	229	254	295	337	397	533	670	790
AAAA GROOVED	216	228	279	318	381	508	645	—
B	28	38	43	65	81	109	135	235
BB GROOVED	52	54	73	6.00	4.13	6.00	184	—
C (MAX)	140	161	192	208	270	340	406	435
CC (MAX) GROOVED	104	127	175	165	223	281	369	—
D	71	84	102	116	146	200	254	300
DD GROOVED	71	84	102	116	146	200	254	—
E THREADED	83	121	140	159	—	—	—	—
EE 150 ANSI	102	121	140	152	191	254	324	378
EEE 300 ANSI	108	127	149	162	200	267	349	395
EEEE GROOVED	—	121	—	152	191	—	—	—
F THREADED	48	83	102	114	—	—	—	—
FF 150 ANSI	102	83	102	102	127	152	203	219
FFF 300 ANSI	108	89	109	111	135	165	216	236
FFFF GROOVED	—	121	—	114	127	—	—	—
G (MAX)	191	197	197	203	228	241	267	292
GG (MAX)	206	203	—	207	236	267	292	—



Size: 175 lb. Class 1 1/2" - 8" (Globe)
 2" - 6" (Angle)
 300 lb. Class 1 1/2" - 8" (Globe)
 2" - 6" (Angle)

Materials
Main valve body & cover:
 Ductile Iron - ASTM A536

End Details:

150 ANSI B16.42 (Ductile Iron)
 (Bronze)
 300# (Ductile Iron)
 300# (Cast Steel).
 300# (Ductile Grooved End).

Main valve internal trim:
 Bronze ASTM B61
Pilot control system—
Pilot control valve:
 Bronze ASTM B62 with
 Stainless Steel 303 internal trim

Pressure Differential: 10 PSI Min.

Pressure Adjustment Range:

175 lb. Class 30 - 165 psi

300 lb. Class 30 - 165 psi

Copper tubing with brass fittings

Main valve and pilot valve
diaphragm and disc:
 Buna-N® synthetic rubber

Temperature Range: Water to 180°F Max.

SPECIAL NOTE: THE MODEL 90-21 CAN BE SUPPLIED WITH INTERNAL EPOXY COATING OF THE MAIN VALVE. THIS OPTION IS U.L. FILE NO. EX2855, C.C. NO. HNFV EPOXY COATING IS STRONGLY RECOMMENDED FOR ALL CAST VALVES.

Flow Capacity Table

Valve Size	Maximum Flow Rate (GPM of Water)
1½"	160
2"	262
2½"	373
3"	576
4"	992
6"	2251
8"	3900
10"	6150

When Ordering Please Specify

1. Model Number 90-21
2. Size
3. Globe or Angle Pattern
4. Main Valve Body and Cover Material
5. Threaded, Flanged or Grooved
6. Pressure Class
7. Optional Epoxy Coating (specify with suffix "KC")

Represented By:



E-90G-21 (R-7/08)

Distributed By:
 M&M Control Service, Inc.
 Phone: 800-876-0036
 Fax: 847-356-0747
 Email: sales@mmcontrol.com



MODEL **100-01 UL**
Hytrol Valve

For Model 90-21 UL Listed Pressure Reducing Valve

Description

The Model 100-01 Hytrol Valve is the main valve for the Cla-Val Model 90-21 Pressure Reducing Control Valve. 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.



Troubleshooting

The following trouble shooting information deals strictly with the "Hytrol Valve." This assumes that everything but the main valve itself has been completely isolated, i.e., each part of the control system is hydraulically blocked from the Hydro valve. All troubleshooting is possible without removing the valve from the line or removing the cover.

The Hydro 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.

SERVICE SUGGESTIONS

SYMPTOM	PROBABLE CAUSE	REMEDY
Fails to close	Lack of cover chamber pressure	Check upstream pressure, X46 or tubing for obstruction.
	Diaphragm damaged. (See Diaphragm Check, Steps 1-3)	Replace diaphragm
	Corrosion or excessive scale build up on valve stem. (See Freedom of Movement Check, Step 4.)	Clean and polish stem Inspect and replace any damaged or badly eroded part.
Fails to open	Mechanical obstruction. Object lodged in valve. (See Freedom of Movement Check, Step 4.)	Remove obstruction.
	Worn Disc (See Tight Seating Check, Step 4.)	Replace disc.
	Closed upstream and/or downstream isolation valves in main line.	Open Valves
Fails to open	Insufficient line pressure.	Check pressure.
	Corrosion or excessive scale build up on valve stem. (See Freedom of Movement Check Step 4)	Clean and polish stem Inspect and replace damaged or badly eroded part.

Diaphragm Check (#1)

1. Shut off pressure to the 90-21 valve by slowly closing upstream and downstream isolation valves.

CAUTION: The valve cannot be serviced under pressure. Where there are no isolation valves, it will be necessary to deactivate the system.

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 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

Freedom of Movement Check (#2)

4. Determining the Valve's freedom of movement can be done after all pressure is removed from the valve.

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. 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.)

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 the 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.)

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

Freedom of Movement Check (#2)

5. Test for seat leakage by applying inlet pressure to the cover of the valve, wait until it closes, and then close the isolation valve downstream of the Hytrol valve. Install a pressure gauge between the two closed valves. Watch the pressure gauge. If the pressure begins to climb, then either the isolation valve is permitting pressure to creep back, or the Hytrol valve is allowing pressure to go through it. Usually the pressure at the Hytrol valve 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 valve is leaking. If it goes up to the pressure on the isolation valve discharge, the Hytrol valve is holding tight, and it was just the isolation valve leaking.

Preventative Maintenance

Cla-Val Hytrol valves require 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 effecting 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.

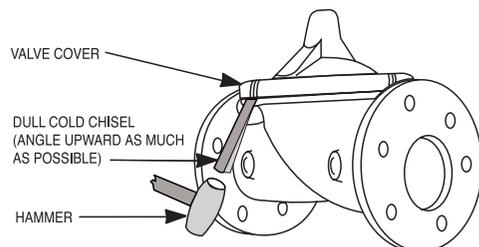
1. Close upstream and downstream isolation valves to shut off all pressure to the valve.

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

2. Loosen tube fittings to remove pressure from the valve body and cover chamber. After pressure had been released from the

valve use care to remove the controls and tubing. Note and sketch position of tubing and controls for reassembly. The schematic on the E-90-21 sheet 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.



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When block and tackle or a power hoist is to be used to lift valve cover, insert proper size eye bolt in place of the center cover plug. On 8" valves only, there are 4 holds 3/8" - 11 size where jacking screws may be inserted to break cover loose from the body and then 4 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"	1"

4. Remove the diaphragm and disc assembly from the valve body. With smaller valves this can be accomplished by hand, **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.

5. The next item to remove is the stem nut. Examine the stem

VALVE STEM THREAD SIZE

Valve Size	Thread Size (UNF Internal)
1 1/4"—2 1/2"	10—32
3"—4"	1/4—28
6"—8"	3/8—24

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.

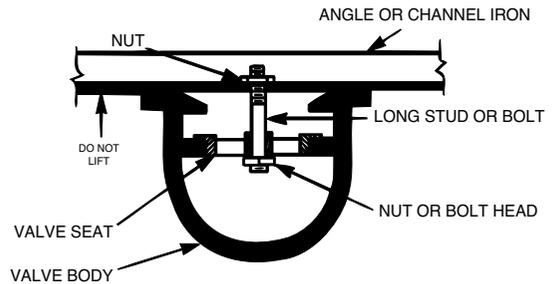
The use of a pipe wrench or a vise without soft brass jaws scars the fine finish on the stem. No amount of careful dressing can restore the stem to its original condition. Damage to the finish of the stem can cause the stem to bind in the bearings and the valve will not open or close.

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 is to dip it 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, the a fine grit (400) wet or dry paper 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 conditions. Usually, it is a good idea to replace the rubber parts (diaphragm and disc) unless they are free of signs of wear. Any other parts which appear doubtful should be replaced.

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 it firmly.
2. Make sure the stem nut is made up 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 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

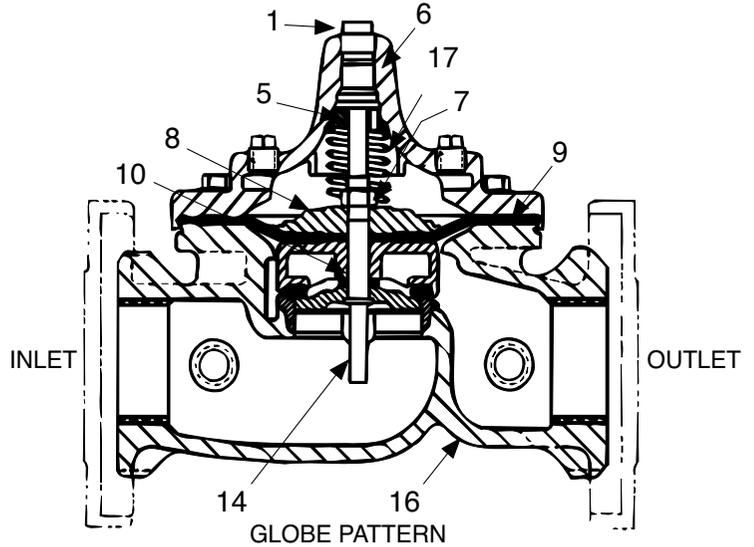
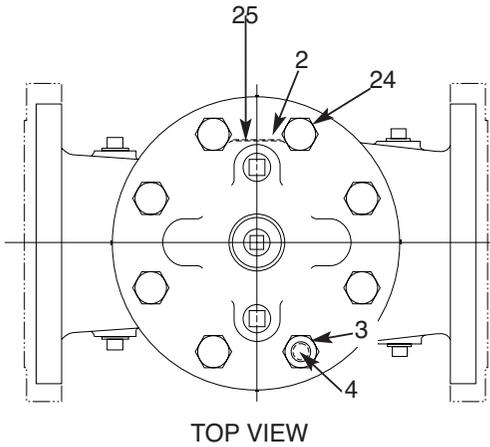
to hold the diaphragm assembly up while stretching the diaphragm over the studs.

4. Put spring in place and replace cover. Make sure diaphragm is laying smooth under cover.
5. Tighten cover nuts firmly using a cross-over pattern until all nuts are tight.

Test Procedure After Valve Assembly

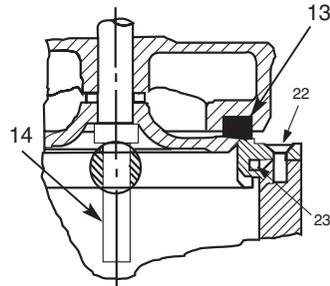
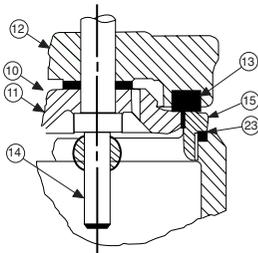
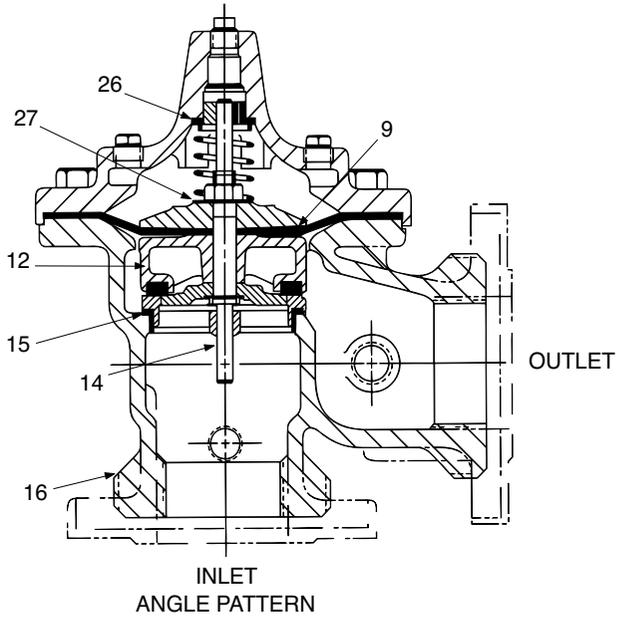
1. Check the diaphragm assembly for freedom of movement by inserting a rod into the threaded hole in the top of the valve stem and lifting the diaphragm assembly manually. The diaphragm assembly should move freely without any signs of sticking or grabbing. (See "Freedom of Movement Check" section.)
2. Re-install the pilot system and tubing exactly as it was prior to removal.
3. Follow steps under "Start-Up and Adjustment" Section in N-90-21 UL Sheet.

100-01 UL



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)



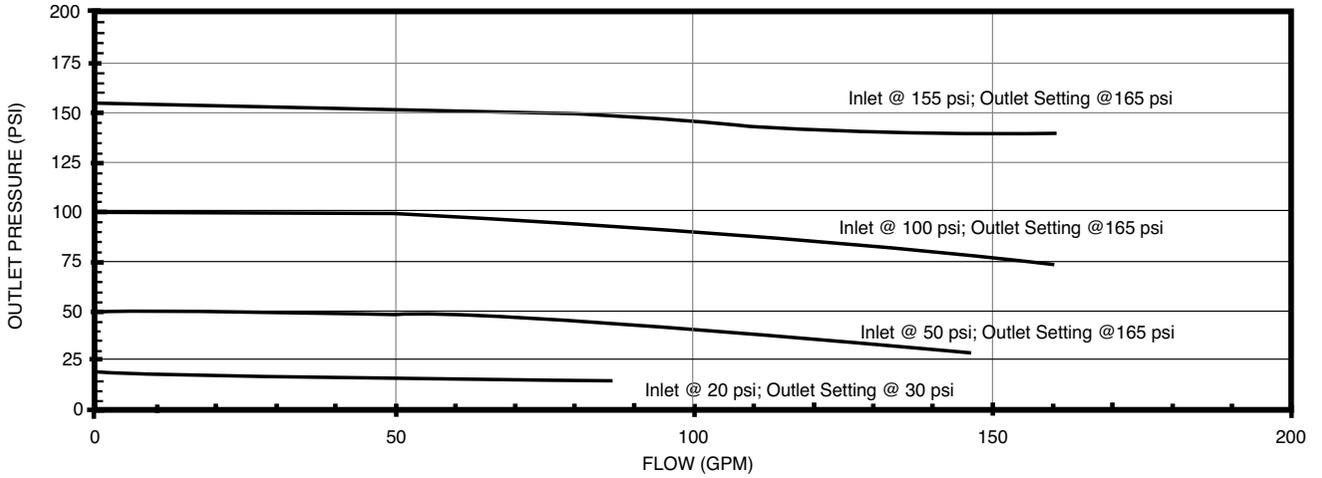
When ordering please specify: All nameplate data, Description, Item number



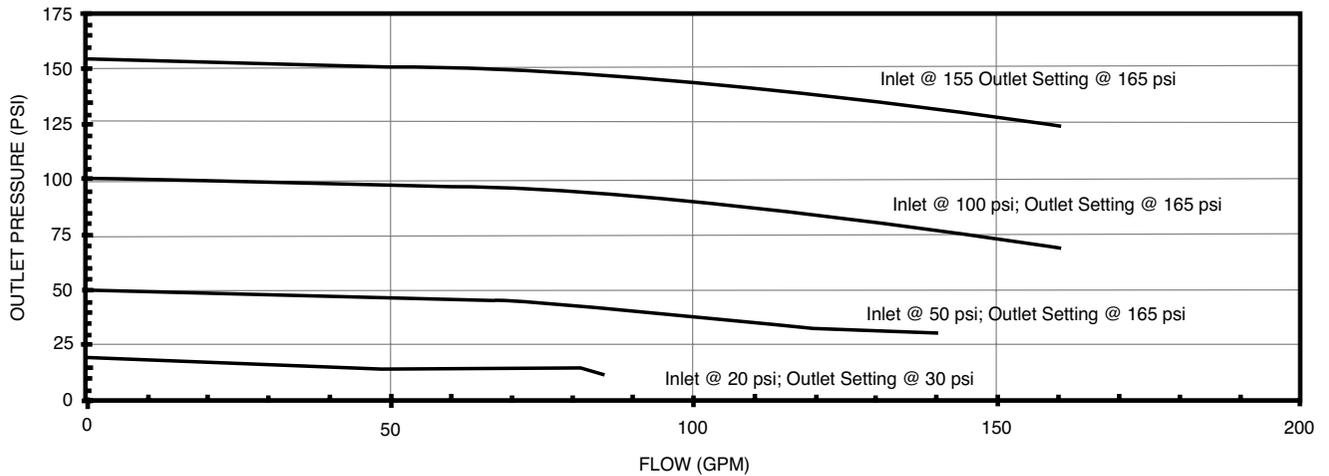
— MODEL — **90-21/690-21 UL**
Performance Characteristics of UL listed
90-21 Pressure Reducing Valves

VALVE SIZE	TEST DESCRIPTION	UL TEST RESULTS
1-1/2" GLOBE	DEAD-END SHUT-OFF CHARACTERISTICS; RECORD OUTLET PRESSURE AT ZERO FLOW WHEN FLOW STARTS AT 80 GPM & IS REDUCED UNTIL FLOW IS ZERO	WITH OUTLET PRESSURE CONTROL SETPOINT AT 30 PSI & INLET PRESSURES FROM 75 TO 300 PSI, THE RECORDED OUTLET PRESSURE AT ZERO FLOW RANGED BETWEEN 40 TO 45 PSI WITH OUTLET PRESSURE CONTROL SETPOINT AT 165 PSI & INLET PRESSURE AT 300 PSI, THE RECORDED OUTLET PRESSURE AT ZERO FLOW WAS 175 PSI
1-1/2" GLOBE	DEAD-END SHUT-OFF CHARACTERISTICS; RECORD OUTLET PRESSURE AT ZERO FLOW WHEN FLOW STARTS AT 80 GPM & IS REDUCED UNTIL FLOW IS ZERO	WITH OUTLET PRESSURE CONTROL SETPOINT AT 30 PSI & INLET PRESSURES FROM 75 TO 300 PSI, THE RECORDED OUTLET PRESSURE AT ZERO FLOW RANGED BETWEEN 38 TO 41 PSI WITH OUTLET PRESSURE CONTROL SETPOINT AT 165 PSI & INLET PRESSURE AT 300 PSI, THE RECORDED OUTLET PRESSURE AT ZERO FLOW WAS 175 PSI
2" GLOBE	DEAD-END SHUT-OFF CHARACTERISTICS RECORD OUTLET PRESSURE AT ZERO FLOW WHEN FLOW STARTS AT 125 GPM & IS REDUCED UNTIL FLOW IS ZERO	WITH OUTLET PRESSURE CONTROL SETPOINT AT 30 PSI & INLET PRESSURES FROM 75 TO 300 PSI, THE RECORDED OUTLET PRESSURE AT ZERO FLOW RANGED BETWEEN 40 TO 45 PSI WITH OUTLET PRESSURE CONTROL SETPOINT AT 165 PSI & INLET PRESSURE AT 300 PSI, THE RECORDED OUTLET PRESSURE AT ZERO FLOW WAS 175 PSI
3" GLOBE	DEAD-END SHUT-OFF CHARACTERISTICS RECORD OUTLET PRESSURE AT ZERO FLOW WHEN FLOW STARTS AT 275 GPM & IS REDUCED UNTIL FLOW IS ZERO	WITH OUTLET PRESSURE CONTROL SETPOINT AT 30 PSI & INLET PRESSURES FROM 75 TO 300 PSI, THE RECORDED OUTLET PRESSURE AT ZERO FLOW RANGED BETWEEN 35 TO 38 PSI WITH OUTLET PRESSURE CONTROL SETPOINT AT 165 PSI & INLET PRESSURE AT 300 PSI, THE RECORDED OUTLET PRESSURE AT ZERO FLOW WAS 175 PSI
4" GLOBE	DEAD-END SHUT-OFF CHARACTERISTICS; RECORD OUTLET PRESSURE AT ZERO FLOW WHEN FLOW STARTS AT 500 GPM & IS REDUCED UNTIL FLOW IS ZERO	WITH OUTLET PRESSURE CONTROL SETPOINT AT 30 PSI & INLET PRESSURES FROM 75 TO 300 PSI, THE RECORDED OUTLET PRESSURE AT ZERO FLOW RANGED BETWEEN 37 TO 42 PSI WITH OUTLET PRESSURE CONTROL SETPOINT AT 165 PSI & INLET PRESSURE AT 300 PSI, THE RECORDED OUTLET PRESSURE AT ZERO FLOW WAS 172 PSI
6" GLOBE	DEAD-END SHUT-OFF CHARACTERISTICS; RECORD OUTLET PRESSURE AT ZERO FLOW WHEN FLOW STARTS AT 700 GPM & IS REDUCED UNTIL FLOW IS ZERO	WITH OUTLET PRESSURE CONTROL SETPOINT AT 30 PSI & INLET PRESSURES FROM 75 TO 300 PSI, THE RECORDED OUTLET PRESSURE AT ZERO FLOW RANGED BETWEEN 35 TO 40 PSI WITH OUTLET PRESSURE CONTROL SETPOINT AT 165 PSI & INLET PRESSURE AT 300 PSI, THE RECORDED OUTLET PRESSURE AT ZERO FLOW WAS 170 PSI
8" GLOBE	DEAD-END SHUT-OFF CHARACTERISTICS; RECORD OUTLET PRESSURE AT ZERO FLOW WHEN FLOW STARTS AT 700 GPM & IS REDUCED UNTIL FLOW IS ZERO	WITH OUTLET PRESSURE CONTROL SETPOINT AT 29 PSI & INLET PRESSURES FROM 75 TO 300 PSI, THE RECORDED OUTLET PRESSURE IS EQUAL TO AN ACCEPTABLE PLUS OR MINUS 10% WITH OUTLET PRESSURE CONTROL SETPOINT AT 165 PSI & INLET PRESSURE AT 300 PSI, THE RECORDED OUTLET PRESSURE AT ZERO FLOW IS EQUAL TO AN ACCEPTABLE PLUS OR MINUS 10%

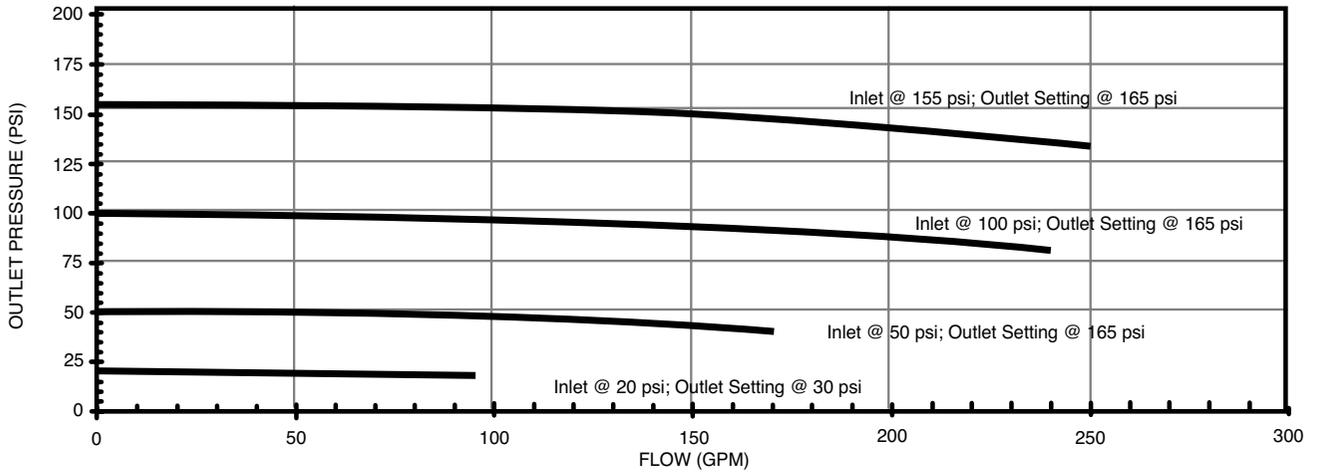
1-1/2" 90G-21
OBSERVED FLOW RATE WHEN INLET PRESSURE
DROPS BELOW OUTLET PRESSURE SET POINT



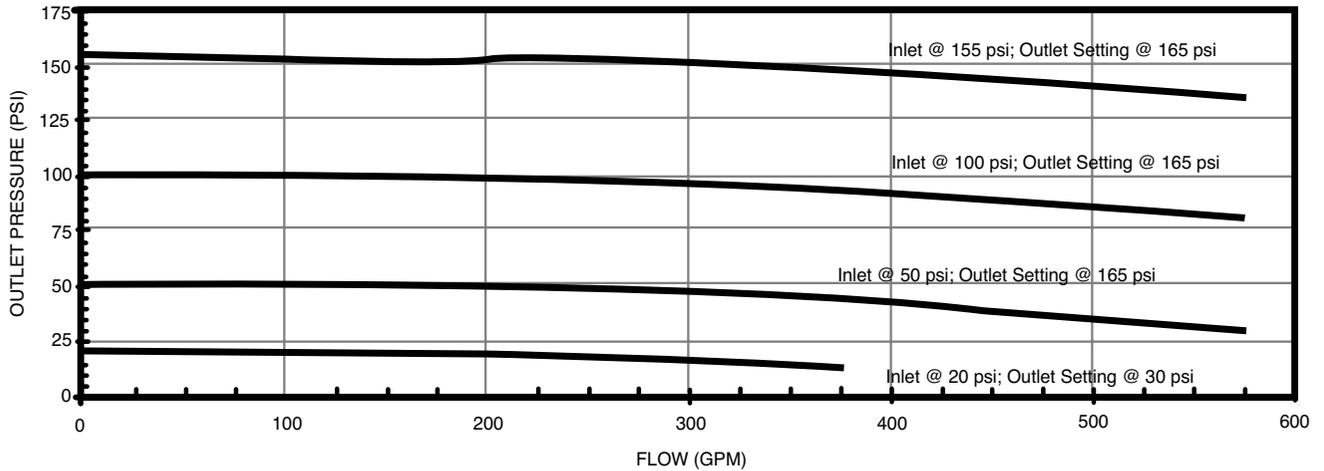
1-1/2" 90A-21



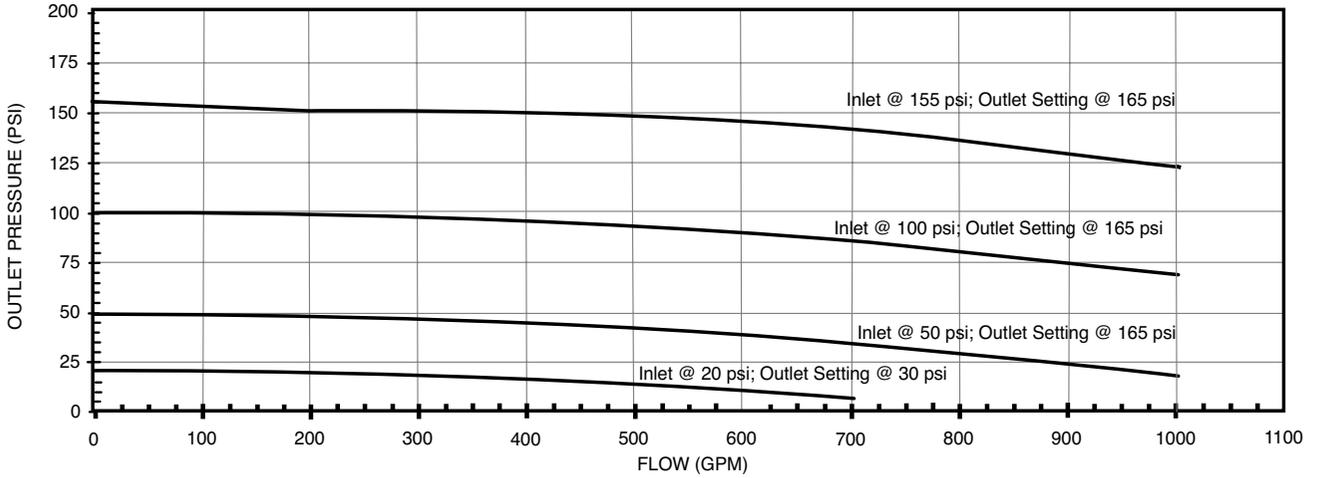
2" 90G-21
OBSERVED FLOW RATE WHEN INLET PRESSURE
DROPS BELOW OUTLET PRESSURE SET POINT



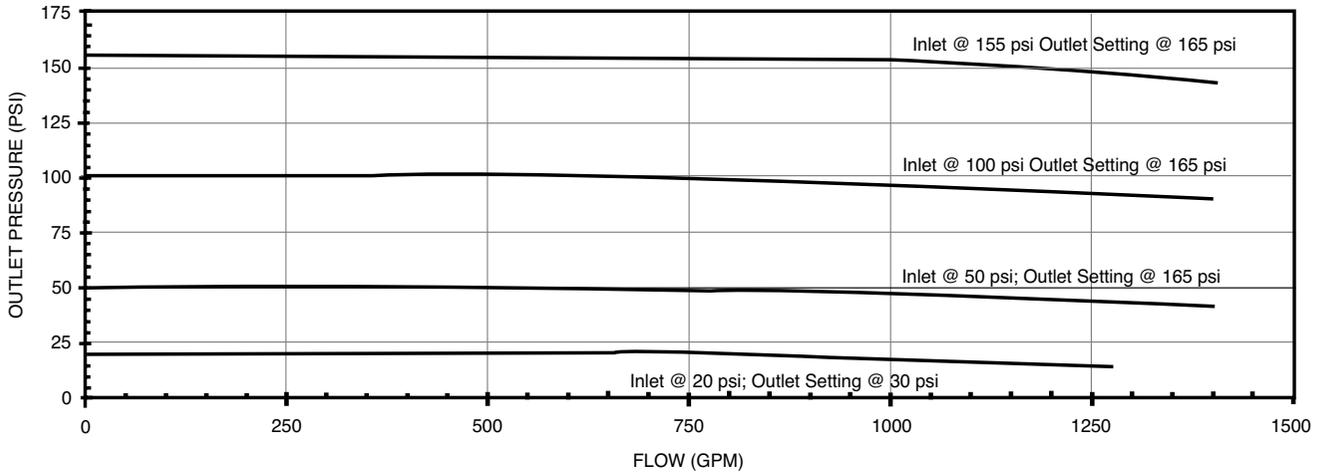
3" 90G-21



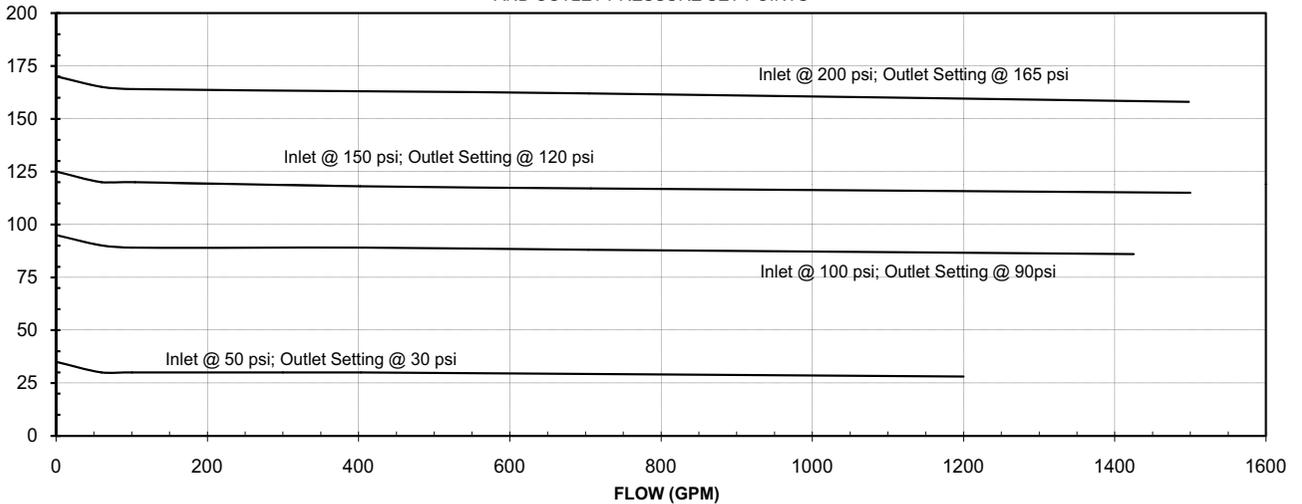
4" 90G-21
OBSERVED FLOW RATE WHEN INLET PRESSURE
DROPS BELOW OUTLET PRESSURE SET POINT



6" 90G-21



8" 90G-21
OBSERVED FLOW RATE AT VARIOUS INLET PRESSURES
AND OUTLET PRESSURE SET POINTS



CLA-VAL CO.

NEWPORT BEACH, CALIFORNIA

CATALOG NO.
X58C

DRAWING NO.
48834

REV
AN

TYPE OF VALVE AND MAIN FEATURES

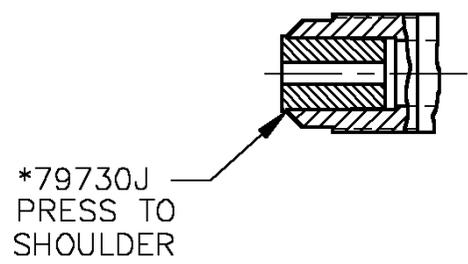
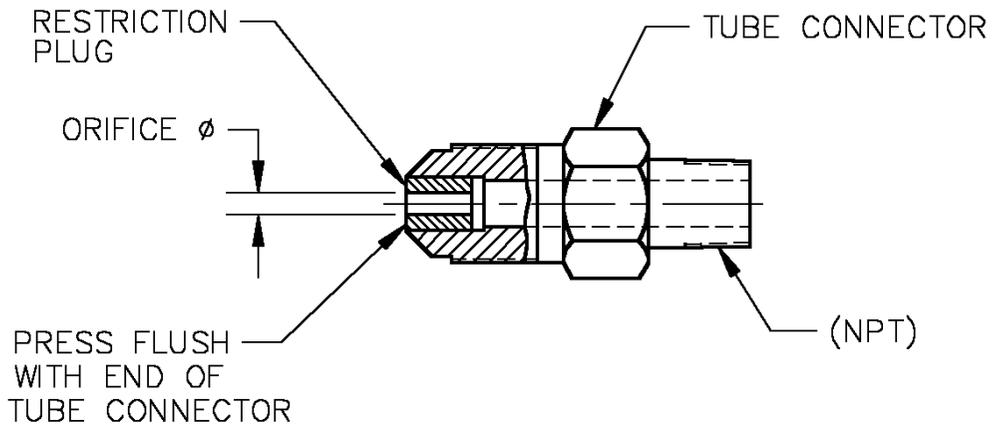
X58C RESTRICTION ASSEMBLIES

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

AM REINSTATED PN 68565B & 64673H (ECO 15043)
AN ADDED PN 48834-05F (NED 43663)

CAD REVISION RECORD - DO NOT REVISE MANUALLY

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



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.

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— MODEL — **CRD**

Pressure Reducing Control



DESCRIPTION

The Cla-Val Model CRD Pressure Reducing Control automatically reduces a higher inlet pressure to a lower outlet pressure. It is a direct acting, spring loaded, diaphragm type control that operates hydraulically or pneumatically. It may be used as a self-contained valve or as a pilot control for a Cla-Val main valve. It will hold a constant downstream pressure within very close pressure limits.

OPERATION

The CRD Pressure Reducing Control is normally held open by the force of the compression spring above the diaphragm; and delivery pressure acts on the underside of the diaphragm. Flow through the valve responds to changes in downstream demand to maintain a pressure.

INSTALLATION

The CRD Pressure Reducing Control may be installed in any position. There is one inlet port and two outlets, for either straight or angle installation. The second outlet port can be used for a gage connection. A flow arrow is marked on the body casting.

ADJUSTMENT PROCEDURE

The CRD Pressure Reducing Control can be adjusted to provide a delivery pressure range as specified on the nameplate.

Pressure adjustment is made by turning the adjustment screw to vary the spring pressure on the diaphragm. The greater the compression on the spring the higher the pressure setting.

1. Turn the adjustment screw in (clockwise) to increase delivery pressure.
2. Turn the adjustment screw out (counter-clockwise) to decrease the delivery pressure.
3. When pressure adjustment is completed tighten jam nut on adjusting screw and replace protective cap.
4. When this control is used, as a pilot control on a Cla-Val main valve, the adjustment should be made under flowing conditions. The flow rate is not critical, but generally should be somewhat lower than normal in order to provide an inlet pressure several psi higher than the desired setting

The approximate minimum flow rates given in the table are for the main valve on which the CRD is installed.

Valve Size	1 1/4" -3"	4"-8"	10"-16"
Minimum Flow GPM	15-30	50-200	300-650

SYMPTOM	PROBABLE CAUSE	REMEDY
Fails to open when deliver pressure lowers	No spring compression	Tighten adjusting screw
	Damaged spring	Disassemble and replace
	Spring guide (8) is not in place	Assemble properly
Fails to close when delivery pressure rises	Yoke dragging on inlet nozzle	Disassemble and reassemble properly (refer to Reassembly)
	Spring compressed solid	Back off adjusting screw
	Mechanical obstruction	Disassemble and reassemble properly (refer to Reassembly)
	Worn disc	Disassemble remove and replace disc retainer assembly
Leakage from cover vent hole	Yoke dragging on inlet nozzle	Disassemble and reassemble properly (refer to Reassembly)
	Damaged diaphragm	Disassemble and replace
	Loose diaphragm nut	Remove cover and tighten nut

MAINTENANCE

Disassembly

To disassemble follow the sequence of the item numbers assigned to parts in the sectional illustration.

Reassembly

Reassembly is the reverse of disassembly. Caution must be taken to avoid having the yoke (17) drag on the inlet nozzle of the body (18). Follow this procedure:

1. Place yoke (17) in body and screw the disc retainer assembly (16) until it bottoms.
2. Install gasket (14) and spring (19) for 2-30 and 2-6.5 psi range onto plug (13) and fasten into body. Disc retainer must enter guide hole in plug as it is assembled. Screw the plug in by hand. Use wrench to tighten only.
3. Place diaphragm (12) diaphragm washer (11) and Belleville washer (20) on yoke. Screw on hex nut (10).
4. Hold the diaphragm so that the screw holes in the diaphragm and body align. Tighten diaphragm nut with a wrench. At the final tightening release the diaphragm and permit it to rotate 5° to 10°. The diaphragm holes should now be properly aligned with the body holes.

To check for proper alignment proceed as follows:

Rotate diaphragm clockwise and counterclockwise as far as possible. Diaphragm screw holes should rotate equal distance on either side of body screw holes ±1/8".

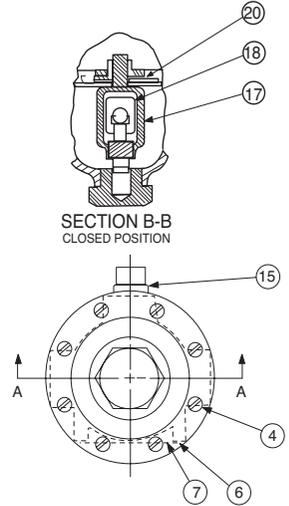
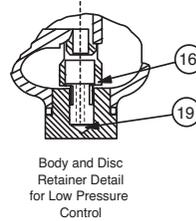
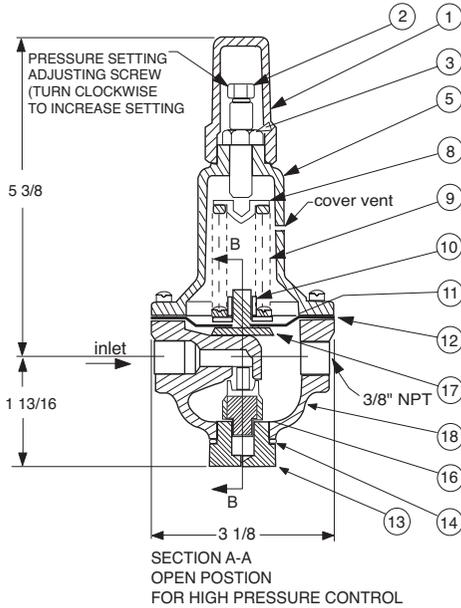
Repeat assembly procedure until diaphragm and yoke are properly aligned. There must be no contact between yoke and body nozzle during its normal movement. To simulate this movement hold body and diaphragm holes aligned. Move yoke to open and closed positions. There must be no evidence of contact or dragging.

5. Install spring (9) with spring guide (8).
6. Install cover (5), adjusting screw (2) and nut (3), then cap (1).



CRD

Pressure Reducing Control



Size (inch)	Stock Number	Adjustment Range	
		psi	Ft of Water
3/8	71943-07A	2 - 6.5	4.5 - 15
3/8	71943-08J	2 - 30	4.5 - 69
3/8	71943-03K	15 - 75	35 - 173
3/8	71943-11C	20 - 105	46 - 242
3/8	71943-04H	30 - 300	69 - 692
Factory Set Pressure		PSI per Turn*	
	2 - 6.5 set @ 3.5 psi	.61	
	2 - 30 set @ 10 psi	3.0	
	15 - 75 set @ 20 psi	9.0	
	20 - 105 set @ 60 psi	12.0	
	30 - 300 set @ 60 psi	27.0	

*Approximate-Final Adjustment should be with a pressure gauge and with flow.

Item	Description	Material	Part Number	List Price
1	Cap	PL	67628J	
2	Adjusting Screw	BRS	7188201D	
3	Jam Nut (3/8-16)	SS	6780106J	
4*	Machine Screw (Fil.Hd.) 8 Req'd	303	6757821B	
5	Cover	BRS	C2544K	
6	Nameplate Screw	SS	67999D	
7	Nameplate	BRS	C0022001G	
8	Spring Guide	302	71881H	
	Spring Guide (20 - 105 psi)	303	205620F	
9	Spring (15-75 psi)	CHR/VAN	71884B	
	Spring (2 - 6.5 psi)	SS	82575C	
	Spring (2 - 30 psi)	SS	81594E	
	Spring (20 - 105 psi)	316	20632101E	
	Spring (30 - 300 psi)	CHR/VAN	71885J	
10	Hex Nut	303	71883D	
11	Diaphragm Washer	302	71891G	
12*	Diaphragm	NBR	C6936D	
13	Plug, Body	BRS	V5653A	
14*	Gasket	Fiber	40174F	
15	Plug	BRS	6766003F	
16*	Disc Retainer Assy. (15 - 75 psi)	BZ/Rub	C5256H	
	Disc Retainer Assy. (2 - 30 psi)	BZ/Rub	C5255K	
	Disc Retainer Assy. (20 - 105 psi)	BZ/Rub	C5256H	
	Disc Retainer Assy. (30 - 300 psi)	BZ/Rub	C5256H	
17	Yoke	VBZ	V6951H	
18	Body & 1/4" Seat Assy	BR/SS	8339702G	
19*	Bucking Spring (2 - 6.5 psi)(2 - 30psi)	302	V0558G	
20	Belleville Washer	STL	7055007E	
*	Repair Kit (No Bucking Spring)	Buna®-N	9170003K	
*	Repair Kit (with Bucking Spring)	Buna®-N	9170002B	

*SUGGESTED REPAIR PARTS

When ordering parts specify:

- All nameplate data
- Item Description
- Item number



Regulator Spring Color Coding Chart

Dwg#47117

*THESE FIGURES ARE ONLY APPROXIMATE. FINAL ADJUSTMENTS SHOULD BE MADE WITH A PRESSURE GAGE.

WIRE SIZE	SPRING NUMBER	COLOR	WIRE MATERIAL	CATALOG NUMBER	PSI RANGE	*PSI PER TURN
.080 DIA.	C0492D	BLUE	S.S.	CDB-7	0-7	.75
				CRL-5A	0-7	.75
.018 DIA.	82575C	--	S.S.	CRD	1.9-6.5	.61
				CRD-10A	1.9-6.5	.49
.116 DIA.	81594E	--	S.S.	CRD	2-30	3.0
				CRD-10A	2-30	2.4
.120 DIA.	V5654J	GREEN	CHR VAN	CRL-5A	5-25	4.0
				CRD	10-40	4.0
.162 DIA.	32447F	NATURAL	S.S.	CDB-7	10-60	12.0
				CRL-5A	10-60	12.0
				CRL-13	10-60	12.0
.162 DIA.	V5695B	YELLOW	MUSIC WIRE	CDB-7	20-80	14.5
				CRL-5A	20-80	14.5
				CRL-13	20-80	14.5
.207 DIA.	C1124B	CAD PLT	MUSIC WIRE	CDB-7	50-150	29.5
				CRL-13	50-150	29.5
				CRL-5A	50-150	29.5
.225 DIA.	V6515A	RED	MUSIC WIRE	CDB-7	65-180	44.0
				CRL-13	65-180	44.0
				CRL-5A	65-180	44.0
.115 X .218	71884B	RED	CHR VAN	CRL	0-75	8.5
				CRD	15-75	9.0
				CRD-10A	15-75	7.2
.118 X .225	71885J	GREEN	CHR VAN	CRL	20-200	28.0
				CRD	30-300	27.0
				CRD-10A	30-300	22.4
.225 X .295	1630201A	CAD PLT	CHR VAN	CRL	100-300	18.00
				CRL-5A	100-300	18.00
.440 X .219	48211H	CAD PLT	STEEL	CRA-18	200-450	17.0
				CRD-22	200-450	17.0
				CRL-4A	100-450	17.0
.187	20632101E	BLACK	316 SST	CRD	20-105	13.0
				CRL	20-105	13.0
WIRE SIZE	SPRING NUMBER	COLOR	WIRE MATERIAL	CATALOG NUMBER	PSI RANGE	*FEET PER TURN
.080 DIA.	C0492D	BLUE	S.S.	CRA	4.5-15	.82
				CRD-2	4.5-15	.82
.375 DIA.	87719B	EPOXY COATED	CHROME SILICON	CDS-5	5-40	1.0
	1 SPRING			30-80	2.0	
	2 SPRING			70-120	3.0	
	3 SPRING			110-120	4.0	
	4 SPRING			150-200	5.0	
.072 DIA.	V5097A	--	302SS	CVC	1-17	.7
.375 DIA.	2933502H	EPOXY COATED	CHROME SILICON	CDS-6A	5-40	.75
	1 SPRING			30-80	1.50	
	2 SPRING			70-120	2.20	
	3 SPRING			110-160	3.00	
	4 SPRING			150-200	3.70	

THE FOLLOWING CONTROL & SPRING P/N'S WERE REMOVED, 32656B, 31554K, 44591G, V65695B, & V5695B. ADDED CRL-13, CRL-5A, CRA, CRA-10A, CHANGED SPRING RANGES TO MATCH CURRENT CONTROLS.

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— MODEL — **X46**

Flow Clean Strainer



X46A Straight

- Self Scrubbing Cleaning Action
- Straight Type or Angle Type

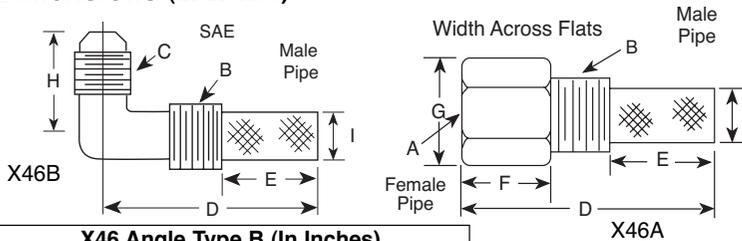
The Cla-Val Model X46 Strainer is designed to prevent passage of foreign particles larger than .015". It is especially effective against such contaminant as algae, mud, scale, wood pulp, moss, and root fibers. There is a model for every Cla-Val. valve.

X46B Angle



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

Dimensions (In Inches)



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

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

When Ordering, Please Specify:

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

INSTALLATION

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

INSPECTION

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

DISASSEMBLY

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

CLEANING

After inspection, cleaning of the X46 can begin. Water service usually will produce mineral or lime deposits on metal parts in contact with water. These deposits can be cleaned by dipping X46 in a 5-percent muriatic acid solution just long enough for deposit to dissolve. This will remove most of the common types of deposits.

Caution: use extreme care when handling acid. If the deposit is not removed by acid, then a fine grit (400) wet or dry sandpaper can be used with water. Rinse parts in water before handling. An appropriate solvent can clean parts used in fueling service. Dry with compressed air or a clean, lint-free cloth. Protect from damage and dust until reassembled.

REPLACEMENT

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

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

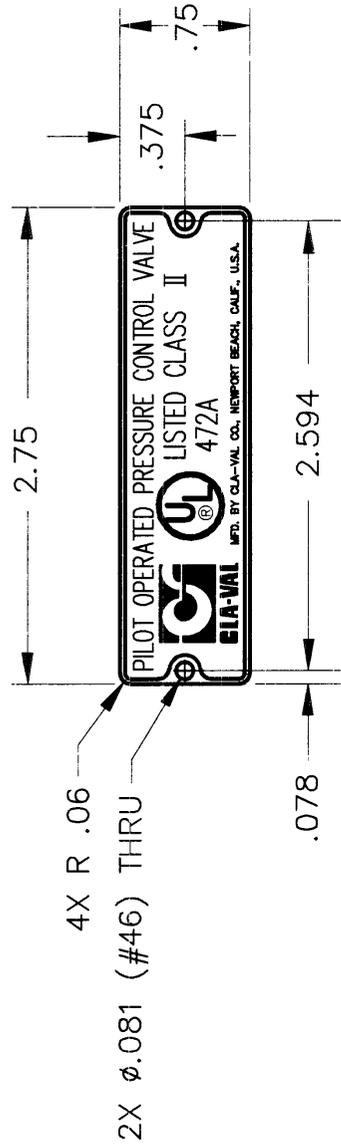
DWG NO. 79068 SH 1 REV F

REVISIONS

REV	DESCRIPTION	DATE	APPROVED
A-C	SEE REVISION FILE.		
D	REDRAWN ON CAD WITH NEW LOGO. (ECO 15424)	5-1-95	VL
E	"PILOT OPERATED PRESSURE CONTROL VALVE" WAS "SPECIAL SYSTEM WATER CONTROL VALVE"; DELETED UNDER WRITERS LAB. NOTE (ECO 19677)	5-1-95	PC
F	ADDED SHEET 2 (ECO 20176)	5-3-05	AK

NOTES:

1. BACKGROUND BLACK ETCH .003 DEEP.
2. LETTERING, LOGO, AND BORDER CLEAR POLISH.



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

79068D	BRASS	ASTM B16
PART NO.	MATERIAL	MATERIAL SPECIFICATION

PARTS LIST

		NEWPORT BEACH, CALIFORNIA	
TITLE			
NAMEPLATE—U.L. LISTED			
CONTRACT NO.	APPROVALS	DATE	
---	DRAWN DP	6-23-70	
	CHECKED JM	1-7-71	
	ENGR HWE	1-8-71	
SIZE	CAGE CODE	DWG NO.	REV.
A	86184	79068	F
SCALE	1/1	SIZE #25 GA (.020)	SHEET 1 OF 2

DIST. CODE 025

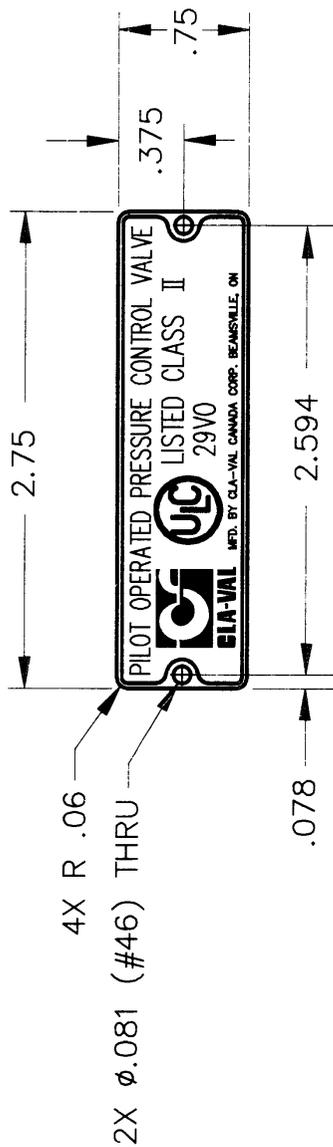
DWG NO. 79068 SH 2 REV F

REVISIONS

REV	DESCRIPTION	DATE	APPROVED
A-E	SEE REVISION FILE.		
F	CREATED SHEET 2 FOR CLA-VAL CANADA, SKIPPED REV. A-E FOR EASY CROSS TRACKING PURPOSE (ECO 20176)	5-3-05	AK

NOTES:

1. BACKGROUND BLACK ETCH .003 DEEP.
2. LETTERING, LOGO, AND BORDER CLEAR POLISH.



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

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79068-01B	BRASS	ASTM B16
PART NO.		MATERIAL
PARTS LIST		

CLA-VAL CO. NEWPORT BEACH, CALIFORNIA

NAMEPLATE-U.L.C. LISTED

TITLE

APPROVALS

APPROVALS	DATE
DRAWN AK	5-03-05
CHECKED VL	5-10-05
ENGR EK	5-10-05

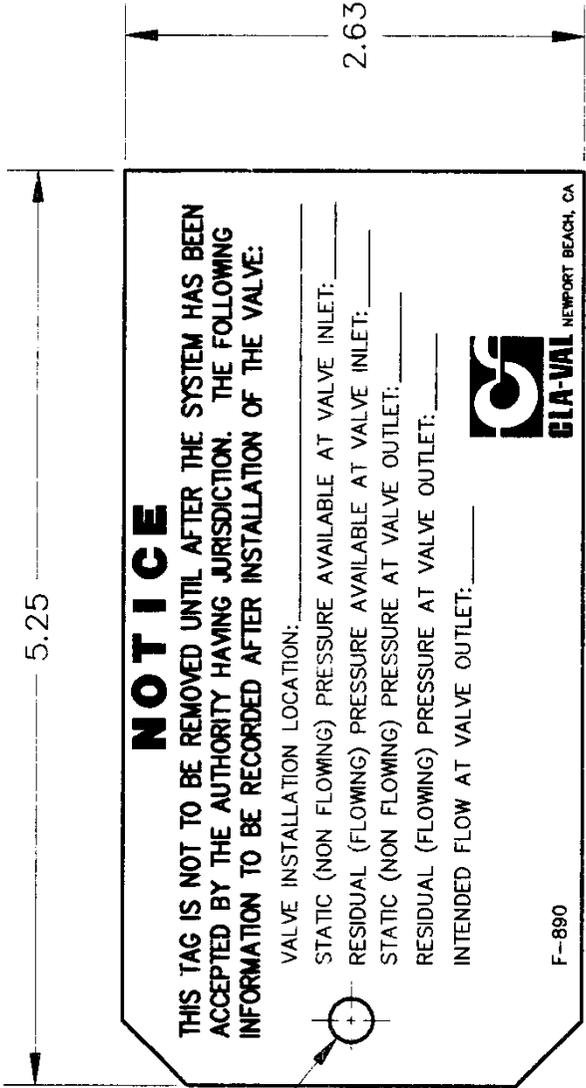
CAGE CODE DWG NO. 79068 REV. F

SIZE A 86184

SCALE 1/1 SIZE #25 GA (.020) SHEET 2 OF 2

DIST. CODE 025

DWG NO.	201184	SH	1	REV	—
REVISIONS					
REV	DESCRIPTION	DATE	APPROVED		
—	RELEASED FOR PROD. (ECO 17808)	7-13-99	VL		



NOTICE

THIS TAG IS NOT TO BE REMOVED UNTIL AFTER THE SYSTEM HAS BEEN ACCEPTED BY THE AUTHORITY HAVING JURISDICTION. THE FOLLOWING INFORMATION TO BE RECORDED AFTER INSTALLATION OF THE VALVE:

VALVE INSTALLATION LOCATION: _____

STATIC (NON FLOWING) PRESSURE AVAILABLE AT VALVE INLET: _____

RESIDUAL (FLOWING) PRESSURE AVAILABLE AT VALVE INLET: _____

STATIC (NON FLOWING) PRESSURE AT VALVE OUTLET: _____

RESIDUAL (FLOWING) PRESSURE AT VALVE OUTLET: _____

INTENDED FLOW AT VALVE OUTLET: _____

GLA-VAL NEWPORT BEACH, CA

F-890

0.25 THRU

201184C	.014 THK YELLOW PAPER	COMMERCIAL
PART NO.	MATERIAL	MATERIAL SPECIFICATION
PARTS LIST		
U.L. LISTED 90-21 PRESSURE REDUCING VALVE INSTALLATION TAG		
CONTRACT NO.	NEWPORT BEACH, CALIFORNIA	
APPROVALS	DATE	TITLE
DRAWN VL	7-13-99	
CHECKED EK	7-13-99	
APPROVED CA	7-13-99	
ENGR		
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES		
FRACTIONS DECIMALS ANGULAR		
±1/32 .XX± .03 .XXX± .010		
SURFACE FINISH 125/		
BREAK CORNERS 010 MAX		
---DO NOT SCALE DRAWING---		
SIZE	CAGE CODE	DWG NO.
A	86184	201184
SCALE	1/1	UNITS/PC
		SHEET 1 OF 1

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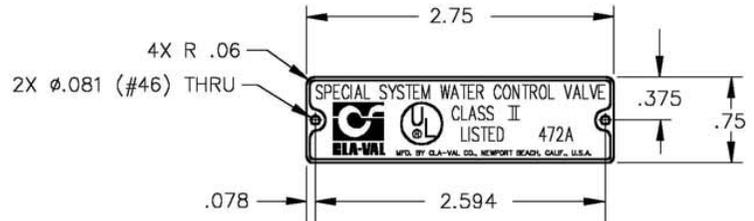
90-21 UL Product Identification How to Order

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. Include 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 Plate

For product identification, cast in body markings are supplemented by the identification plate illustrated on this page. The plate is mounted in the most practical position. **It is extremely important that this identification plate is not painted over, removed, or in any other way rendered illegible.**



Specify when Ordering

- Model Number
- Adjustment Range (As Applicable)
- Valve Size
- Optional Features
- Pressure Class

How To Order

There are many valves and controls manufactured by Cla-Val that are not listed due to the sheer volume. For information not listed, please contact your local Cla-Val representative.

Unless Otherwise Specified

- X43 "Y" Strainer is included.
- CK2 Isolation Valves is included in price on 6" and larger valve sizes.

Distributed By:
M&M Control Service, Inc.
Phone: 800-876-0036
Fax: 847-356-0747
Email: sales@mmcontrol.com



— MODEL — **REPAIR KITS**

Complete Replacement Diaphragm Assemblies for 100-01 and 100-20 Hytrol Main Valves
For: Hytrol Main Valves with Ductile Iron, Bronze Trim Materials—**125/150 Pressure Class Only.**
FACTORY ASSEMBLED

Includes: Stem, Disc Guide, Disc, Disc Retainer, Spacer Washers, Diaphragm, Diaphragm Washer and Stem Nut.

Valve Size	Diaphragm Assembly Stock Number		Valve Size	Diaphragm Assembly Stock Number	
	100-01	100-20		100-01	100-20
3/8" (Also 81-01)	49097K	N/A	6"	40456G	33273E
1/2" - 3/4" (Also 81-01)	C2518D	N/A	8"	45276D	40456G
1"	C2520K	N/A	10"	81752J	45276D
1 1/4"-1 1/2"	C2522 F	N/A	12"	85533J	81752J
2"	C2524B	N/A	14"	89067D	N/A
2 1/2"	C2523D	N/A	16"	89068B	85533J
3"	C2525J	C2524B	20"	N/A	89068B
4"	33273E	C2525J	24"	N/A	89068B

Repair Kits for 100-01/100-20 Hytrol Valves

For: Hytrol Main Valves—**125/150 Pressure Class Only.**

Includes: Diaphragm, Disc (or Disc Assembly) and spare Spacer Washers.

Buna-N® Standard Material				Viton (For KB Valves)				
Valve Size	Repair Kit Stock Number		Valve Size	Repair Kit Stock Number		Valve Size	Repair Kit Stock Number	
	100-01	100-20		100-01	100-20		100-01	100-20
3/8" (Also 81-01)	9169801K	N/A	3/8" (Also 81-01)	9169806J	N/A	3/8" (Also 81-01)	9169806J	N/A
1/2" - 3/4" (Also 81-01)	9169802H	N/A	1/2" - 3/4" (Also 81-01)	9169807G	N/A	1/2" - 3/4" (Also 81-01)	9169807G	N/A
1"	9169803F	N/A	1"	9169808E	N/A	1"	9169808E	N/A
1 1/4" - 1 1/2"	9169804D	N/A	1 1/4" - 1 1/2"	9169809C	N/A	1 1/4" - 1 1/2"	9169809C	N/A
2"	9169805A	N/A	2"	9169810A	N/A	2"	9169810A	N/A
2 1/2"	9169811J	N/A	2 1/2"	9169817F	N/A	2 1/2"	9169817F	N/A
3"	9169812G	9169805A	3"	9169818D	9169810A	3"	9169818D	9169810A
4"	9169813E	9169812G	4"	9169819B	9169818D	4"	9169819B	9169818D
6"	9169815K	9169813E	6"	9169820K	9169819B	6"	9169820K	9169819B
8"	9817901D	9169815K	8"	9169834A	9169820K	8"	9169834A	9169820K
10"	9817902B	9817901D						
12"	9817903K	9817902B						
14"	9817904H	N/A						
16"	9817905E	9817903K						
20"	N/A	9817905E						
24"	9817906C	9817905E						

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

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

For: Powertrol and Powercheck Main Valves—125/150 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
3/8"	9169901H	2 1/2"	9169910J	N/A
1/2" & 3/4"	9169902F	3"	9169911G	9169905J
1"	9169903D	4"	9169912E	9169911G
1 1/4" & 1 1/2"	9169904B	6"	9169913C	9169912E
2"	9169905J	8"	99116G	9169913C
		10"	9169939H	99116G
		12"	9169937B	9169939H

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

Larger Sizes: Consult Factory.

For: Hy-Check Main Valves—125/150 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

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

Larger Sizes: Consult Factory.

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	CRM-7	1263901K	CDB-KB	9170012A
CDB-3D	9170023H	CFM-7A	1263901K	CRA-KB	N/A
CDB-3I	9170024F	CFM-9	12223E	CRD-KB (w/bucking spring)	9170008J
CDB-7	9170017K	CRA (w/bucking spring)	9170001D	CRL-KB	9170013J
CDH-2	18225D	CRD (w/bucking spring)	9170002B	CDHS-2BKB	9170010E
CDHS-2	44607A	CRD (no bucking spring)	9170003K	CDHS-2FKB	9170011C
CDHS-2B	9170004H	CRD-18	20275401K	CDHS-18KB (no bucking spring)	9170009G
CDHS-2F	9170005E	CRD-22	98923G	102C-KB	1726202D
CDHS-3C-A2	24657K	CRL (55F, 55L)	9170007A		
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	CV	9170019F		
CDS-6A	20349401C	X105L (O-ring)	00951E	Buna-N®	
CFCM-M1	1222301C	102B-1	1502201F	CRD Disc Ret. (Solid)	C5256H
CFM-2	12223E	102C-2	172601F	CRD Disc Ret. (Spring)	C5255K
		102C-3	172601F		

Repair Assemblies (In Standard Materials Only)

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

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