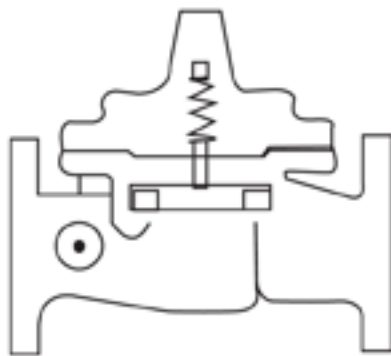


# CLA-VAL

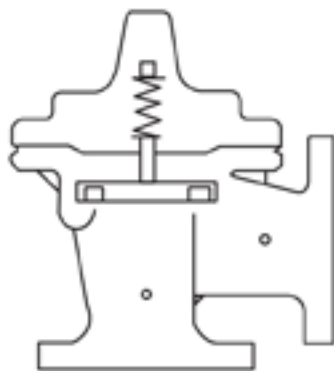
**AUTOMATIC CONTROL VALVES**

834-05

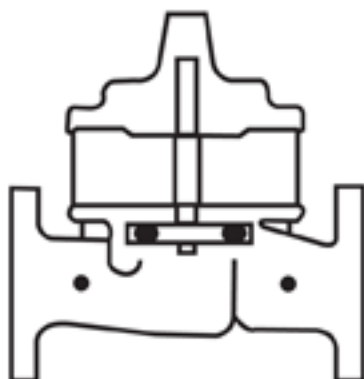
Place this manual with personal responsible  
for maintenance of this valve



## *INSTALLATION*



## *OPERATION*



## *MAINTENANCE*





NEWPORT BEACH, CALIFORNIA

CATALOG NO. 834-05

DRAWING NO. 200681

REV. A

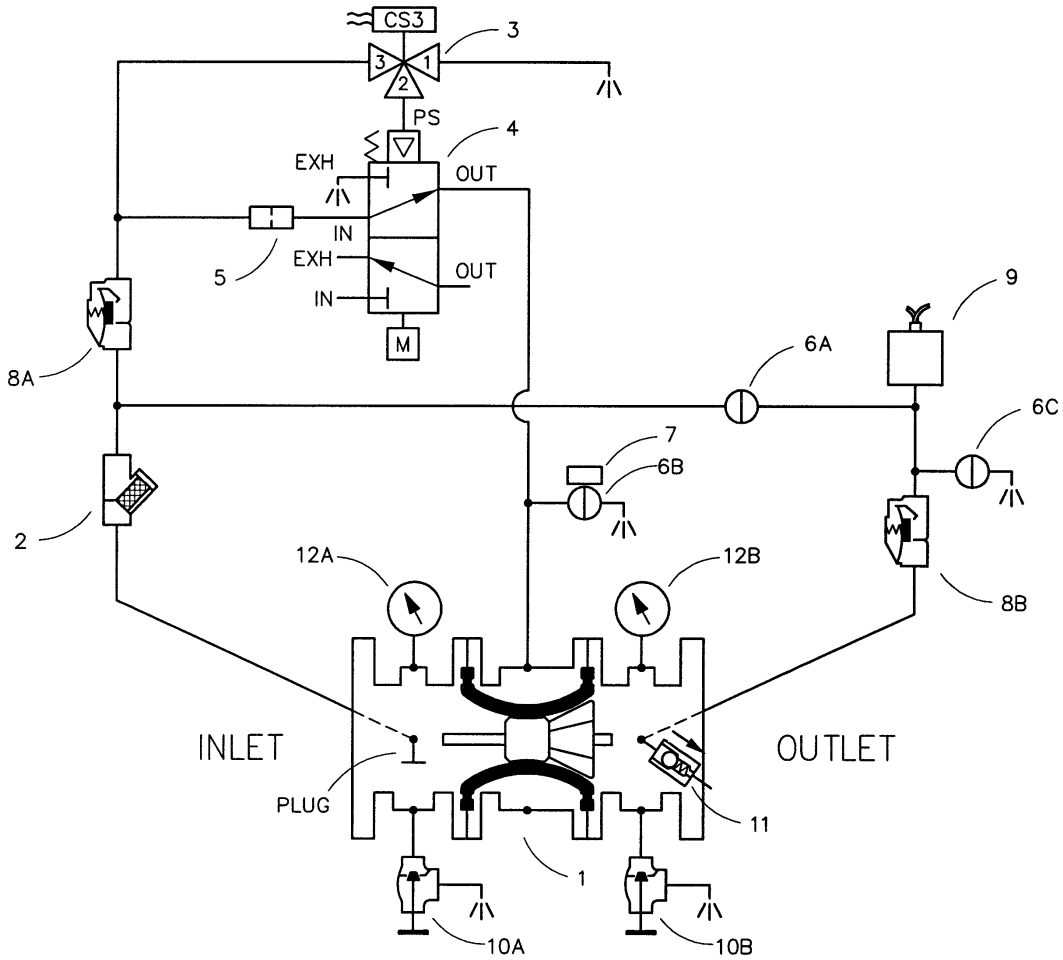
TYPE OF VALVE AND MAIN FEATURES

**SOLENOID CONTROL VALVE WITH MANUAL RESET**  
(FM APPROVED FOR FIRE DELUGE SPRINKLER SYSTEMS)

DESIGN	
DRAWN PHIL CASSADY	1-24-2002
CHK'D VL	2-5-2002
APVD CH	2-5-2002

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

----- OPTIONAL FEATURES



ITEM NO.	BASIC COMPONENTS	QTY
1	800GS TDV MAIN VALVE	1
2	X43 "Y" STRAINER	1
3	CS3 SOLENOID CONTROL	1
4	CMDL LATCHING DELUGE PILOT	1
5	X58C RESTRICTION ASSEMBLY	1
6	CK2 COCK (ISOLATION VALVE)	3
7	NAMEPLATE (OPEN FOR MANUAL OPERATION)	1
8	81-01 CHECK VALVE	2

9	PRESSURE SWITCH	1
10	CGA ANGLE VALVE	2
11	AUTOMATIC DRAIN VALVE	1
12	PRESSURE GAGE	2

OPTIONAL FEATURE SUFFIX ADDED TO CATALOG NUMBER


CAD REVISION RECORD - DO NOT REVISE MANUALLY  
 LTR I A  
 DESCRIPTION  
 BY DATE  
 P.M.C. 1-31-2002  
 P.M.C. 1-31-2002  
 RELEASED FOR PRODUCTION (NED 46729)  
 REVISED TITLE; ADDED PARA III FOR ITEM 9 (NED 46952)

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**CLA-VAL CO.**

NEWPORT BEACH, CALIFORNIA

CATALOG NO.

834-05

DRAWING NO.

200681

REV

A

TYPE OF VALVE AND MAIN FEATURES

SOLENOID CONTROL VALVE WITH MANUAL RESET  
(FM APPROVED FOR FIRE DELUGE SPRINKLER SYSTEMS)

DESIGN

DRAWN PHIL CASSADY

1-24-2002

CHK'D

VL

2-5-2002

APVD

CH

2-5-2002

### OPERATING DATA

#### I. SOLENOID CONTROL FEATURE:

SOLENOID CONTROL (3) IS A DIRECT ACTING 3-WAY SOLENOID CONTROL THAT CHANGES POSITION WHEN THE COIL IS ENERGIZED OR DE-ENERGIZED. THIS APPLIES OR RELIEVES PRESSURE IN THE LATCHING DELUGE PILOT (4) PRESSURE SENSING PORT (PS), PROVIDING THE OPERATION SHOWN IN THE FOLLOWING TABLE:

SOLENOID CONTROL (3)		LATCHING DELUGE PILOT (4) PRESSURE SENSING PORT (PS)	MAIN VALVE (1) POSITION
POSITION	PORTS CONNECTED		
ENERGIZED	2 AND 1	PRESSURE RELIEVED	OPEN
DE-ENERGIZED	3 AND 2	PRESSURE APPLIED	CLOSED

#### II. LATCHING DELUGE PILOT FEATURE:

LATCHING DELUGE PILOT (4) IS A NORMALLY CLOSED, 3-WAY, 2 POSITION PNEUMATIC OR HYDRAULICALLY OPERATED PILOT. LATCHING DELUGE PILOT (4) MUST BE MANUALLY "SET" TO CLOSE THE MAIN VALVE (1). TO ESTABLISH THE "SET" POSITION, A MINIMUM OF 30 PSI MUST BE APPLIED TO THE PILOT SENSING PORT (PS) AND THE KNOB MUST BE PULLED OUT UNTIL LATCHING DELUGE PILOT (4) "SETS". THIS INTERCONNECTS THE "IN" AND "OUT" PORTS OF THE LATCHING DELUGE PILOT (4), CLOSING THE MAIN VALVE (1). WHEN PILOT SENSING PORT (PS) DROPS TO 20 PSI, LATCHING DELUGE PILOT (4) SHIFTS, INTERCONNECTING THE "OUT" AND EXHAUST (EXH) PORTS, OPENING THE MAIN VALVE (1).

NOTE: LATCHING DELUGE PILOT (4) MUST BE RESET TO CLOSE THE MAIN VALVE (1).

#### III. PRESSURE SWITCH FEATURE:

THE PRESSURE SWITCH (9) IS AN ELECTROMECHANICAL DEVICE THAT ACTUATES A SWITCHING ELEMENT ON RISING PRESSURE. WHEN THE PRESSURE SWITCH (9) IS ACTUATED THIS INDICATES THE MAIN VALVE (1) IS OPEN. TO TEST PRESSURE SWITCH (9), OPEN ISOLATION VALVE (6A). PRESSURE SWITCH WILL ACTUATE WHEN PRESSURE SET POINT IS REACHED. TO RESET PRESSURE SWITCH (9), CLOSE ISOLATION VALVE (6A) & OPEN ISOLATION VALVE (6C). AFTER PRESSURE SWITCH (9) IS RESET, CLOSE ISOLATION VALVE (6C). ISOLATION VALVES (6A & 6C) ARE CLOSED DURING NORMAL OPERATION.

CAD REVISION RECORD - DO NOT REVISE MANUALLY

DATE

BY

DESCRIPTION

SEE SHEET 1

LTR

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NEWPORT BEACH, CALIFORNIA

CATALOG NO.  
834-05

DRAWING NO.  
200681

REV  
A

TYPE OF VALVE AND MAIN FEATURES

SOLENOID CONTROL VALVE WITH MANUAL RESET  
(FM APPROVED FOR FIRE DELUGE SPRINKLER SYSTEMS)

DESIGN		
DRAWN PHIL CASSADY		1-24-2002
CHK'D VL		2-5-2002
APVD CH		2-5-2002

OPERATING DATA-CONTINUED

IV. OUTLET AUTOMATIC DRAIN FEATURE:

WHEN OUTLET PRESSURE IS HIGHER THAN THE SET POINT OF DRAIN VALVE (11), FLOW THROUGH THE DRAIN VALVE (11) IS RESTRICTED. WHEN OUTLET PRESSURE IS LOWER THAN THE SET POINT OF THE DRAIN VALVE (11), DRAIN VALVE (11) OPENS FOR FOR FULL FLOW & AUTOMATIC DRAIN OF THE SYSTEM.

V. CHECK LIST FOR PROPER OPERATION:

- ( ) SYSTEM VALVES OPEN UPSTREAM AND DOWNSTREAM.
- ( ) AIR REMOVED FROM MAIN VALVE LOADING CHAMBER AND PILOT SYSTEM AT ALL HIGH POINTS.
- ( ) PERIODIC CLEANING OF STRAINER (2) IS RECOMMENDED.
- ( ) CK2 COCKS (6A), (6B) AND (6C) CLOSED DURING NORMAL OPERATION.
- ( ) CORRECT VOLTAGE TO SOLENOID CONTROL (3).
- ( ) DO NOT USE AN EXTERNAL PRIMING LINE. PRESSURE IN THE TUBE DIAPHRAGM CHAMBER MUST BE LESS THAN OR EQUAL TO INLET PRESSURE TO AVOID POSSIBLE DAMAGE TO THE TUBE DIAPHRAGM OF THE MAIN VALVE (1).

CAD REVISION RECORD - DO NOT REVISE MANUALLY

DATE

BY

DESCRIPTION

SEE SHEET 1

LTR

NO REVISION CHANGES ARE ALLOWED TO THIS SCHEMATIC WITHOUT PRIOR FACTORY MUTUAL (FM) APPROVAL. A COPY OF THE FACTORY MUTUAL APPROVAL LETTER IS TO BE ATTACHED TO THE ECO PRIOR TO RELEASE.

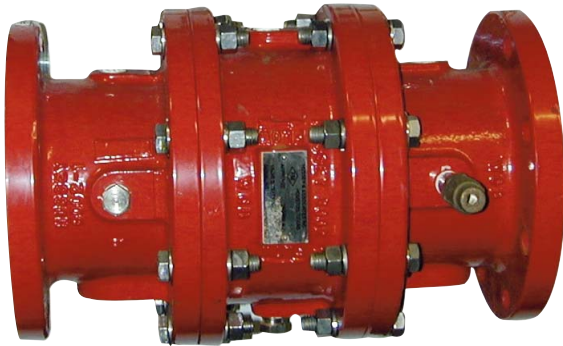
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— MODEL — **800GS**

800 Series (Tubular Diaphragm Valve)

# Deluge Valve



- Low Head Loss
- Cast Steel Construction
- Stainless Steel Pilot and Tubing
- Stainless Steel Solenoid
- Anti-Cavitation Design
- Fusion Coated Epoxy Inside and Out
- Nickel Aluminum Bronze Construction Option (ASTM B148)
- Super Duplex Stainless Steel Construction Option (ASTM A890 GR5A)
- Low Maintenance
- Simple and Reliable Operation
- 1-Year Warranty

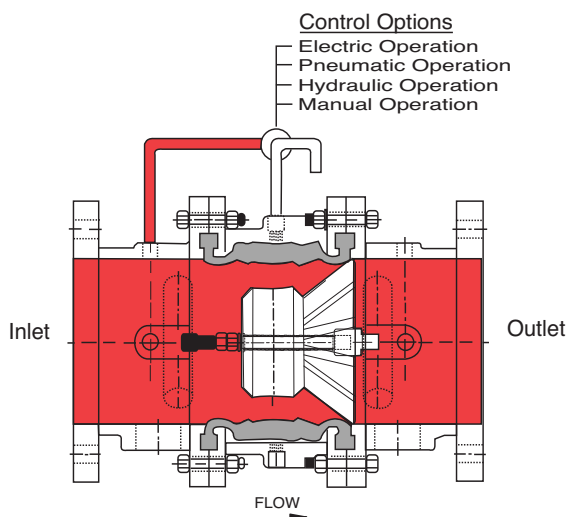
The Cla-Val Model 800GS Deluge Valve is a pressure operated, in-line axial valve. A tube diaphragm actuates the valve, which is comprised of three major components: 1) Tube 2) Barrier and 3) Body. There is only one moving part in the valve - the tube diaphragm. There are no shafts, packing, stem guides or springs.

The tube diaphragm is a one piece, homogeneous nitrile rubber part which is extremely durable. The ends of the tube are thick solid rubber, designed to fit between mating flanges. This design eliminates the possibility of cutting the tube diaphragm due to over tightening or piping misalignment during installation.

The tube forms a drip tight seal around the barrier when the pressure is equalized between the valve inlet and the control chamber. When pressure is removed from the control chamber, the valve is open. The minimum recommended operating pressure is 40 P.S.I. of inlet pressure.

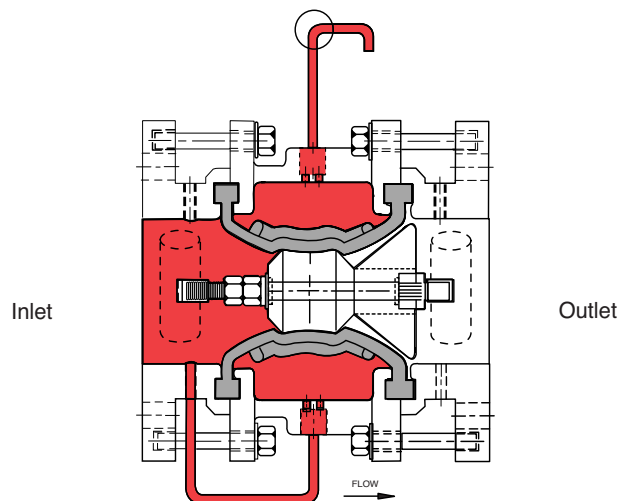
**The 800GS is manufactured in materials suitable for seawater and freshwater service.**

## Principle of Operation



**Full Open Operation**

When pressure in control chamber is relieved, the valve is open.



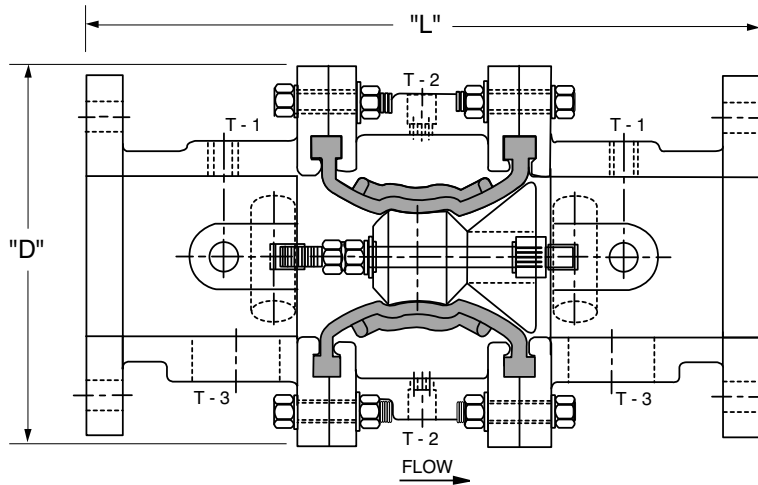
**Tight Closing Operation**

Water pressure from valve inlet is applied to the control chamber. Valve closes bubble tight.



## Dimensions

## Model 800GS



Valve Size (Inches)	4	6	8	10
L	17.25	18.25	20.00	22.00
D	9.5	11.75	14.00	16.00
T-1/T-2 (NPT)	1/2	1/2	1/2	1/2
T-3 (NPT)	2	2	2	2
Approx. Wt. (Lbs.)	151	196	285	330

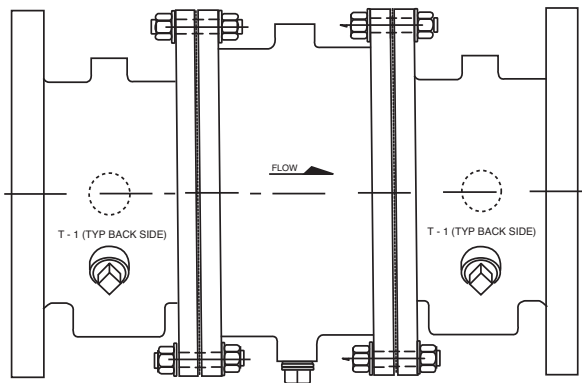
  

Valve Size (mm)	100	150	200	250
L	438	464	508	559
D	241	299	356	406
T-1/T-2 (NPT)	1/2	1/2	1/2	1/2
T-3 (NPT)	2	2	2	2
Approx. Wt. (kgs)	68	89	129	150

4", 6", 8" Factory Mutual Approved  
(with approved Pilot Components)

FLOW FACTORS		
SIZE (IN)	CV (gpm)	KV
4"	340	77.3
6"	885	201
8"	1667	379
*10"	2424	550

\*Calculated



### MAIN VALVE

Ends:	Flanged ANSI B16.5 (150lb Class)
Body:	Cast Steel (ASTM A216 WCB)
Tube Diaphragm:	Nitrile Rubber
Barrier:	Urethane
Bolts:	316 SS
Pressure:	250 psig (17.24 BAR)
Temp. Range:	32° F to 180° F (0° C to 82.2° C)

### MAIN VALVE OPTIONS

Body:	Nickel Aluminum Bronze (ASTM B148) or Super Duplex SS (ASTM A890 GR5A)
-------	--

### PILOT VALVE

All Parts:	316 SS
O-Rings:	Nitrile Rubber
Control Range:	20 to 250 PSIG
Pilot Pressure Range:	20 to 250 PSIG
Operation:	Latches in operated position; manual reset

### PILOT VALVE OPTIONS

All Parts:	Monel (Alloy 400)
Operation:	Non-latching

## When Ordering Please Specify:

- Catalog No. 800GS
- Valve Size
- Fluid Being Handled
- Fluid Temperature Range
- Inlet Pressure Range
- Outlet Pressure Range
- Maximum Differential Pressure
- Minimum Differential Pressure
- Maximum Flow Rate

Cla-Val 800 Series Control Valves operate with maximum efficiency when mounted in horizontal or vertical piping. We recommend isolation valves be installed on inlet and outlet for maintenance. Adequate space above and around the valve for service personnel should be considered essential. A regular maintenance program should be established based on the specific application data. However, we recommend a thorough inspection be done at least once a year. Consult factory for specific recommendations.



## CLA-VAL

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Fax: 949-548-5441 • Web Site: cla-val.com • E-mail: cla-val@cla-val.com

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Kent TN1 2 DH England  
Phone: 44-1892-514-400  
Fax: 44-1892-543-423  
E-Mail: info@cla-val.co.uk

## Represented By:



— MODEL — **100-43**

# Tubular Diaphragm Valve



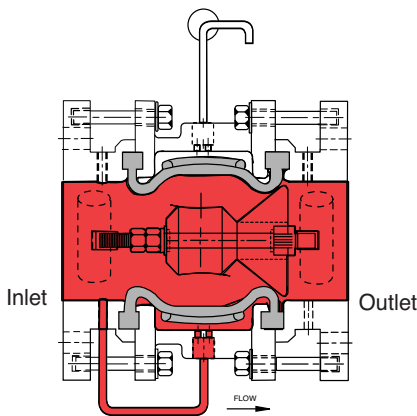
- Low Head Loss
- Cast Steel Construction
- Fusion Coated Epoxy Inside and Out
- Anti-Cavitation Design
- Nickel Aluminum Bronze Construction Option (Alloy C95800)
- Duplex Stainless Steel Construction Option (Alloy 2205)
- Low Maintenance
- Simple and Reliable Operation
- 1-Year Warranty

The Cla-Val Model 100-43 Tubular Diaphragm Valve is a pressure-operated, in-line axial valve. A tube diaphragm actuates the valve, which is comprised of three major components: 1) Tube 2) Barrier and 3) Body. There is only one moving part in the valve — the tube diaphragm. There are no shafts, packing, stem guides or springs.

The tube diaphragm is a one piece, homogeneous nitrile rubber part which is extremely durable. The ends of the tube are thick solid rubber, designed to fit between mating flanges. This design eliminates the possibility of cutting the tube diaphragm due to over tightening or piping misalignment during installation.

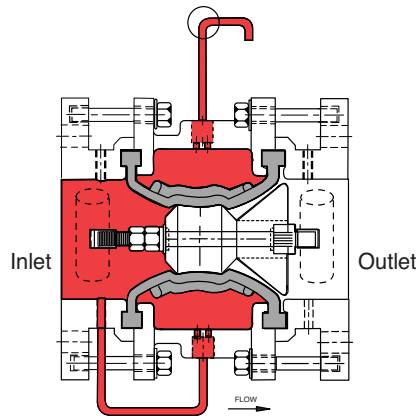
The tube forms a drip tight seal around the barrier when the pressure is equalized between the valve inlet and the control chamber. When pressure is removed from the control chamber, the valve is open. The minimum recommended operating pressure is 40 P.S.I. of inlet pressure.

## Principle of Operation



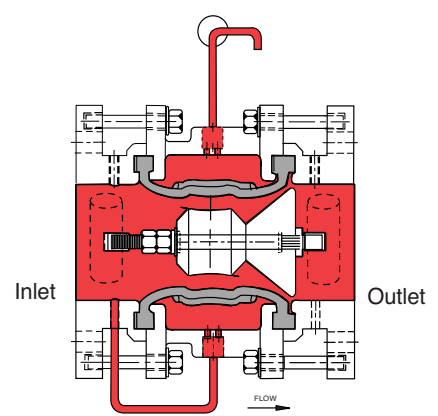
**Full Open Operation**

The valve opens when pilot set pressure is reached and pressure in the control chamber is relieved.



**Tight Closing Operation**

Water pressure (equal to inlet pressure) from valve inlet or from upstream of valve is applied to the control chamber. Valve closes bubble tight.



**Modulating Action**

The valve tube diaphragm holds any intermediate position when a quantity of water is exhausted from the control chamber via the pilot. The quantity of water in the control chamber is established by the "set pressure" of the pilot.

The control chamber is filled or exhausted to atmosphere, maintaining "set pressure."



## MAINTENANCE

The only maintenance normally required is periodic inspection of the control system to insure there is no buildup of solids that might cause poor performance. This is usually accomplished by cleaning the strainer screen. Also, see pilot valve maintenance bulletin.

Established client fire and safety systems test guidelines must be followed. NFPA 25 Standard for the Inspection, Testing and Maintenance of Water-Based Fire Protection Systems must also be followed.

**CAUTION: BEFORE PROCEEDING WITH THE DISASSEMBLY OF ANY CLA-VAL PRODUCT, STRICT COMPLIANCE WITH YOUR FACILITIES ESTABLISHED SAFETY PROCEDURE FOR ISOLATING, TESTING OR EXHAUSTING PRESSURE FROM A CONTROL SYSTEM OR DEVICE IS REQUIRED.**

**MEDIA CONTROL SYSTEMS CONTAIN HIGH LEVELS OF STORED ENERGY. DO NOT ATTEMPT TO CONNECT, DISCONNECT OR REPAIR THESE PRODUCTS WHENEVER A SYSTEM IS PRESSURIZED.**

**NOTE: ALWAYS EXHAUST THE PRESSURE FROM THE SYSTEM BEFORE PERFORMING ANY SERVICE WORK. FAILURE TO DO SO CAN RESULT IN SERIOUS PERSONAL INJURY.**

## TUBE DIAPHRAGM REPLACEMENT

If it becomes necessary to replace the tube diaphragm, use the following procedure:

### A. TOOLS REQUIRED

- 1 - Nylon or rubber hammer
- 2 - 1" dia. x 3' long wooden dowels
- 1 - 5/8" dia. x 3' long wooden dowel (Used to get 1" dowel into position)
- 1 - Replacement tube diaphragm
- 2 - Replacement o-rings

**B. REMOVAL (IMPORTANT: Protect all coated surfaces during this operation.)** (Note: The outlet end of the tube diaphragm is 1/8" thicker than the inlet end.)

1. Follow depressurization and removal permit procedures in effect at the site.
2. Remove valve from line.
3. Remove control tubing connecting end pieces and control chamber. Mark inlet and center for reassembly, i.e. "line-up marks"
4. Remove control chamber assembly bolts.
5. Remove barrier by hitting on inlet end of barrier rod with rubber hammer. Remove barrier, nuts and rod.

Install new O-rings.

6. Remove tube diaphragm from control chamber by forcing inlet end of tube to center of control chamber using 1" dowel.
7. Once inlet end of tube is inside the control chamber, place 1" wooden dowel between tube and control chamber on the inlet end and push it all the way through. After the dowel is protruding from both ends of the control chamber, push down on the tube diaphragm and force it out of the control chamber.

This is best done with the control chamber in a vise. Remember to protect the coated surfaces.

**C. ASSEMBLY (IMPORTANT: Protect all coated surfaces during this operation.)**

1. Place tube diaphragm into control chamber as follows: (Note: The outlet end of the tube diaphragm is 1/8" thicker than the inlet end.)

- a) Grease end of tube and the inside of control chamber. (WD-40 is a satisfactory lubricant).
- b) Fold inlet end of tube and push into control chamber to within 1" of the opposite end.

This operation best done on the floor on top of a corrugated box or piece of plywood.

- c) Place the inlet end up on the floor. (Be sure to protect all coated surfaces.)
- d) Depress tube to center using large or small wooden dowel. Small dowel is used on 3" & 4" tube diaphragms to make space for the large dowel.
- e) Insert wooden dowel between tube diaphragm and control chamber and leave in place.
- f) Force rubber open in another spot and insert another wooden dowel.
- g) Force solid rubber ends over lip of control chamber with wooden dowels. (Similar to removing a tire from a rim).
- h) Place the outlet end up on the floor.

2. Install new O-rings and barrier assembly rod, washers and nuts. Make sure that the barrier is centered over the unthreaded portion of the shaft. (Note: The end of the shaft with the threaded portion is installed on the inlet side of the barrier.)

3. Install barrier into tube diaphragm. (Use grease, WD-40 or soapy water for lubrication). (Note: The thicker end of the tube diaphragm must be on the outlet end (white stripe). The barrier fins must also be on the outlet end).

4. Center the barrier assembly inside of the tube diaphragm.

5. Assemble the end pieces to the control chamber.

6. The control chamber body assembly flange bolts only require 45 foot pounds of torque to seal the tube diaphragm. The flanges are metal to metal externally.

The tube diaphragm is suspended from these flanges internally, providing a seal. The sealing capability of this assembly is very good due to the compression of the thick solid rubber ends of the tube diaphragm.

7. Inlet End - Torque the bolts to maximum 45 foot pounds maintaining an even space all the way around until flanges touch.
8. Outlet End "White Stripe" - Torque the bolts to maximum 45 foot pounds maintaining an even space all the way around until flanges touch. (Note: The outlet end of the tube diaphragm is 1/8" thicker than the inlet end.)

9. Reassemble control tubing.

10. Assembly is complete. Return valve to service.



## TROUBLESHOOTING

If trouble is experienced with the operation of the valve, it usually falls into one of the following categories:

SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
Valve leaks, will not close drip tight. & barrier.	1) Trash caught between tube  2) Tube diaphragm failure. (very unlikely possibility)	Remove valve, clean.  Remove valve, replace tube diaphragm.
Valve will not open, close or operates sluggishly.	1) Strainer plugged  2) Dirt in control system or valve trim orifice.  3) Dirt in pilot valve  4) Dirt in solenoid valve or incorrect voltage	Remove strainer screen and clean.  Remove, clean trim and orifice.  Remove pilot, inspect and clean. See specific pilot instructions.  Remove SOV, inspect and clean. Verify correct voltage to coil.
Pipes move, bang or rattle	1) Water hammer and/or hydraulic surge  2) Valve operating too fast	May require system hydraulic analysis.  Change closing speed orifice in control tubing, or install opening speed orifice in pilot exhaust.

---

## OPERATING DESCRIPTION

### A. EQUIPMENT DESCRIPTION

1. The operation of the basic valve is described above.
2. Reference Data
  - a) Cla-Val Job No.:
  - b) Cla-Val Dwg. No(s).

(Note: Detailed parts list on a Cla-Val dwg)

### B. OPERATION

1. The valve is trimmed and constructed as indicated on the drawing referenced above.

2. The pilot is a Cla-Val 150-300, Manual Reset Deluge pilot.

Opening Speed – The calculated opening speed for an 8" valve is 8 seconds from full closed to full open. Flow starts immediately. If the opening speed proves to be too fast, an orifice can be installed in the pilot exhaust port.

Closing Speed – Controlling closing speed eliminates surges and water hammer caused by closing too rapidly.

The closing speed is approximately 25 seconds. This should eliminate surges. The valve trim is fitted with an orifice nipple in the control tubing. The closing speed orifice bores are:

4" Valve - .0781" dia.

6" Valve - .1250" dia.

8" Valve - .1719" dia.

### C. PILOT OPERATION

1. Electric – A normally de-energized 3-way N.O. solenoid provides water or air pressure to the control port of the deluge pilot. When power is applied to the solenoid coil, inlet to the solenoid valve is blocked and pressure on the deluge pilot control port is exhausted to atmosphere. In turn, water pressure trapped in the control chamber of the main valve is exhausted to atmosphere via the deluge pilot exhaust port causing the main valve to open.

2. Manual Override – Manual operation of the main valve is done with a quarter turn ball valve which exhausts water pressure from the control chamber of the main valve causing it to open.

#### OPERATING DESCRIPTION FOR DELUGE VALVE (con't)

The I.D. of the manual override valve is greater than the closing speed orifice. Therefore, the control chamber empties faster than it is filled.

#### INSTALLATION

All valves are 150 pound flat faced flanged ends. Use normal piping installation practices to install. i.e., good alignment is essential.

The control chamber body assembly flange bolts only require 45 foot pounds of torque to seal the tube diaphragm. The flanges are metal to metal externally. The tube diaphragm is suspended from these flanges internally, providing a seal. The sealing capability of this assembly is very good due to the compression of the thick solid rubber ends of the tube diaphragm.

#### MOUNTING POSITION

The valve can be mounted vertically or horizontally. It is usually preferred to mount so that the adjusting screw or any other accessory controls are easily accessible.

# INSTALLATION AND MAINTENANCE INSTRUCTIONS

## 3-WAY SOLENOID VALVES, NORMALLY OPEN NORMALLY CLOSED AND UNIVERSAL CONSTRUCTION

**BULLETIN  
8320**

ASCO  
FORM NO. V5291R2

### DESCRIPTION

Bulletin 8320 is a small 3-way solenoid operated valve with all three pipe connections located in the body. The bodies are of brass or stainless steel construction. Standard valves have General Purpose, Nema Type 1 Solenoid Enclosures. Valves that are equipped with a solenoid enclosure which is designed to meet Nema Type 4-Water tight, Nema Type 7 (C or D) Hazardous Locations - Class I, Group C or D, and Nema Type 9 (E, F or G) Hazardous Locations - Class II, Group E, F or G are shown on separate sheets of Installation and Maintenance Instructions, Form Numbers V-5391 and V-5381.

### MANUAL OPERATORS (OPTIONAL)

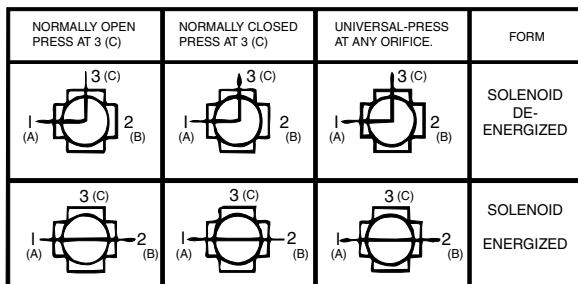
Valves with suffix "MO" or "MS" in catalog number are provided with a Manual Operator which allows manual operation when desired or during an interruption of electrical power.

### OPERATION

**Normally Closed:** Applies pressure when solenoid is energized; exhausts pressure when solenoid is de-energized

**Normally Open:** Applies pressure when solenoid is de-energized; exhausts pressure when solenoid is energized.

**Universal:** For normally closed or normally open operation, selection or diversion of pressure can be applied at port 1 (A), 2 (B), or 3 (C).



**NOTE: Port Markings 1, 2, and 3 correspond directly to A, B and C.**

### INSTALLATION

Check Nameplate for correct Catalog Number, pressure, voltage and service.

### POSITIONING

Valve may be mounted in any position

### PIPING

Connect piping to valve according to markings on valve body. Refer to Flow Diagram provided. Apply pipe compound sparingly to male pipe threads only; if applied to valve threads, it may enter valve and cause operational difficulty. Pipe strain should be avoided by proper support and alignment of piping. When tightening pipe, do not use valve as lever.

**IMPORTANT:** For protection of the solenoid valve, install a strainer or filter suitable for the service involved in the inlet side as close to the valve as possible. Periodic cleaning is required depending on the service conditions.

### WIRING

Wiring must comply with local and National Electrical Codes. For valves equipped with an explosion-proof, watertight solenoid enclosure, the electrical fittings must be approved for use in the approved hazardous locations. Housings for all solenoids are made with connections for 1/2 inch conduit. The general purpose enclosure may be rotated to facilitate wiring by removing the retaining cap.

### NOTE

Alternating Current (A-C) and Direct Current (D-C) solenoids are built differently. To convert from one to other, it is necessary to change the complete solenoid, including the core assembly.

### SOLENOID TEMPERATURE

Standard catalog valves are supplied with coils designed for continuous duty service. When the solenoid is energized for a long period, the solenoid enclosure becomes hot and can be touched with the bare hand for only an instant. This safe operating temperature. Any excessive heating will be indicated by the smoke and odor of burning coil insulation.

### MAINTENANCE

**WARNING:** Turn off electrical power and line pressure to valve before making repairs. It is not necessary to remove valve from pipe line for repairs.

### CLEANING

A periodic cleaning of all valves is desirable. The time between cleanings will vary, depending on the media and service conditions. In general, if the voltage to the coils is correct, sluggish valve operation or excessive leakage will indicate that cleaning is required.

### IMPROPER OPERATION

1. **Faulty Control Circuit:** Check the electrical system by energizing the solenoid. A metallic click signifies the solenoid is operating. Absence of the click indicate loss of power supply. Check for loose or blown-out fuses, open-circuited or grounded coil, broken lead wires or splice.
2. **Burned-out Coil:** Check for open-circuited coil. Replace coil, if necessary.
3. **Low Voltage:** Check voltage across coil leads. Voltage must be at least 85% of nameplate ratings.
4. **Incorrect Pressure:** Check valve pressure. Pressure to valve must be within the range specified on nameplate.
5. **Excessive Leakage:** Disassemble valve and clean all parts. Replace parts that are worn or damaged with a complete Spare Parts Kit for best results.

### COIL REPLACEMENT (REF. FIG. 2)

Turn off electrical power, disconnect coil lead wires and proceed as follows:

1. Remove retaining cap, nameplate and cover.
2. Slip yoke containing coil, sleeves and insulating washers off the solenoid base sub-assembly. Insulating washers are omitted when molded coil is used. In some D.C. Constructions, a single flux plate over the coil replaces yoke, sleeves and insulating washers.
3. Reassemble in reverse order of disassembly.

### VALVE DISASSEMBLY AND REASSEMBLY (REF. FIG. 2)

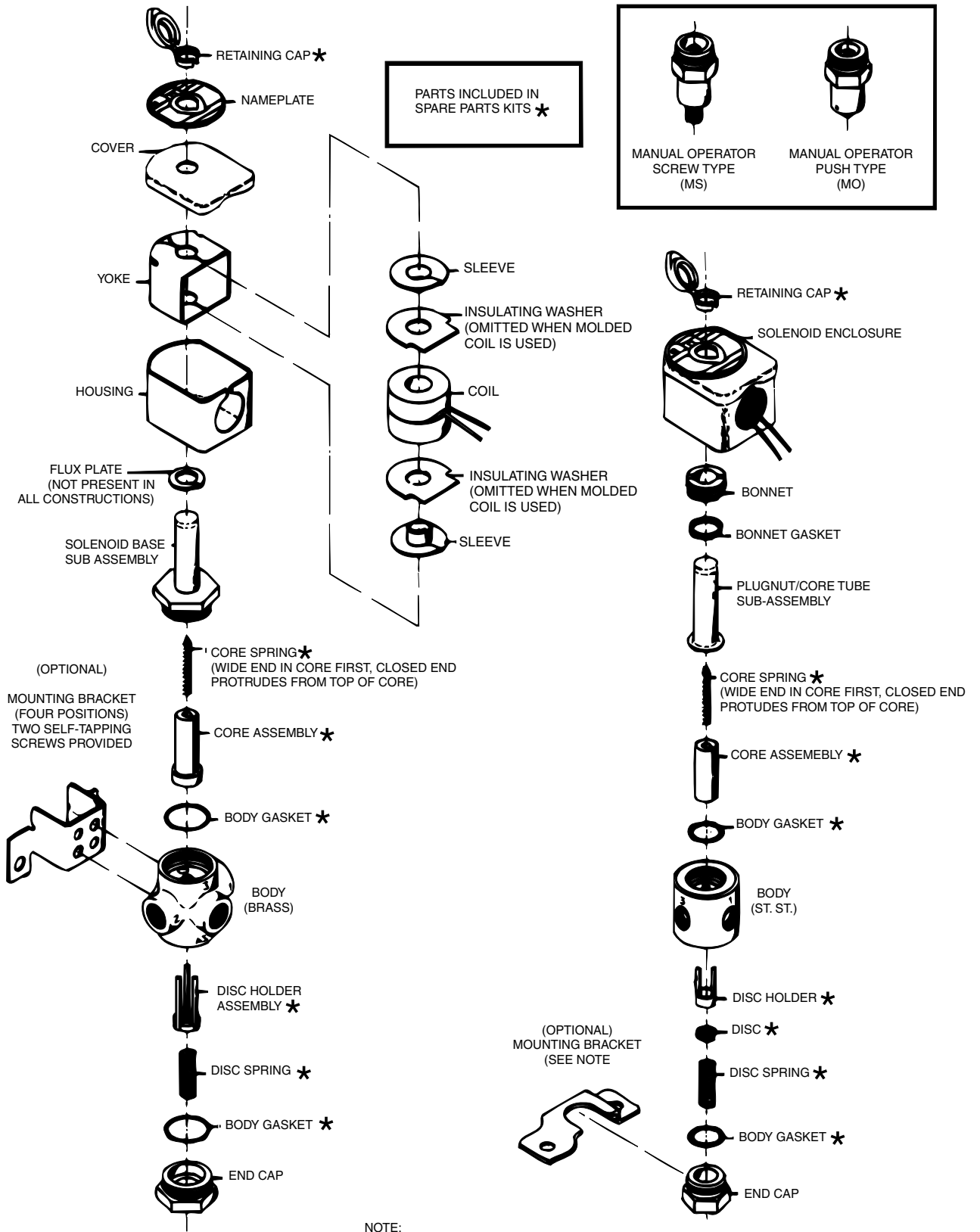
Turn off electrical power supply and de-pressurize valve.

1. Remove retaining cap and slip entire solenoid off solenoid base subassembly or plugnut/core tube sub-assembly.
2. Unscrew bonnet or solenoid base sub-assembly. Remove core assembly, core spring and body gasket.
3. Remove end cap, body gasket, disc spring, disc holder, disc or disc holder assembly.
4. All parts are now accessible for cleaning or replacement. Replace worn or damaged parts with a complete Spare Parts Kit for best results.
5. Reassemble in reverse order of disassembly paying careful attention to exploded view provided.

### ORDERING INFORMATION FOR SPARE PARTS KITS

When Ordering Spare Parts Kits or Coils  
Specify Valve Catalog Number,  
Serial Number and Voltage

Spare Parts Kits and Coils are available for ASCO valves. Parts marked with



**NOTE:**  
 1. FOR MOUNTING, A FLAT SURFACE MUST BE PROVIDED ACROSS THE ENTIRE LENGTH OF THE BRACKET. THE VALVE BODY BECOMES SECURE TO BRACKET, WHEN BRACKET IS TIGHTENED IN TO POSITION. IF THE VALVE HAS A MANUAL OPERATOR, A HOLE MUST BE MADE THROUGH THE MOUNTING SURFACE FOR THE OPERATOR STEM.

# INSTALLATION AND MAINTENANCE INSTRUCTIONS

## OPEN-FLAME, GENERAL PURPOSE, WATERTIGHT/EXPLOSIONPROOF SOLENOIDS

**BULLETIN  
8016G**

ASCO  
FORM NO. V6583R5

### -SERVICE NOTICE-

ASCO® solenoid valves with design change letter "G" in the catalog number (example: 8210G 1) have an epoxy encapsulated ASCO® Red Hat II. solenoid. This solenoid replaces some of the solenoids with metal enclosures and open-frame constructions. Follow these installation and maintenance instructions if your valve or operator uses this solenoid.

### DESCRIPTION

Catalog numbers 8016G1 and 8016G2 are epoxy encapsulated pull-type solenoids. The green solenoid with lead wires and 1/2" conduit connection is designed to meet Enclosure Type 1 -General Purpose, Type 2-Dripproof, Types 3 and 3S-Raintight, and Types 4 and 4X-Watertight. The black solenoid on catalog numbers prefixed "EF" is designed to meet Enclosure Types 3 and 3S-Raintight, Types 4 and 4X-Watertight, Types 6 and 6P-Submersible, type 7 (A, B, C, & D) Explosionproof Class 1, Division 1, Groups A, B, C, & D and Type 9 (E, F, & G)-Dust-Ignitionproof Class 11, Division 1, Groups E, F, & G. The Class 11, Groups F & G Dust Locations designation is not applicable for solenoids or solenoid valves used for steam service or when a class "H" solenoid is used. See Temperature Limitations section for solenoid identification and nameplate/retainer for service. When installed just as a solenoid and not attached to an ASCO valve, the core has a .250-28 UNF-2B tapped hole, 0.38 minimum full thread.

#### Series 8016G solenoids are available in:

- **Open-Frame Construction**  
The green solenoid may be supplied with 1/4" spade, screw, or DIN terminals (Refer to Figure 4).
- **Panel Mounted Construction**  
These solenoids are specifically designed to be panel mounted by the customer through a panel having a .062 to .093 maximum wall thickness. (Refer to Figure 3 and section on Installation of Panel Mounted Solenoid).

#### Optional Features For Type 1—General Purpose Construction Only

- **Junction Box**  
This junction box construction meets Enclosure Types 2,3,3S,4, and 4X. Only solenoids with 1/4" spade or screw terminals may have a junction box. The junction box provides a 1/2" conduit connection, grounding and spade or screw terminal Connections within the junction box (See Figure 5).
- **DIN Plug Connector Kit No. K236 - 034**  
Use this kit only for solenoids with DIN terminals. The DIN plug connector kit provides a two pole with grounding contact DIN Type 43650 construction (See Figure 6).

### OPERATION

When the solenoid is energized, the core is drawn into the solenoid base sub-assembly. **IMPORTANT:** When the solenoid is de-energized, the initial return force for the core, Whether developed by spring, pressure, or weight, must exert a minimum force to overcome residual magnetism created by the solenoid. Minimum return force for AC construction is 11 ounces, and 4 ounces for DC construction.

### INSTALLATION

Check nameplate for correct catalog number, service, and wattage. Check front of solenoid for voltage and frequency.

**WARNING: To prevent the possibility of electrical shock from the accessibility of live parts, install the open-frame solenoid in an enclosure.**

### FOR BLACK ENCLOSURE TYPES 7 AND 9 ONLY

**CAUTION:** To prevent fire or explosion, do not install solenoid and/or valve where ignition temperature is less than 165° C. On valves used for steam service or when a class "H" solenoid is used, do not install in hazardous atmosphere where ignition temperature is less than 180° C. See nameplate/retainer for service. **NOTE:** These solenoids have an internal non-resettable thermal fuse to limit solenoid temperature in the event that extraordinary conditions occur which could cause excessive temperatures. These conditions include high input voltage, a jammed core, excessive ambient temperature or shorted solenoid, etc. This unique feature is a standard feature only in solenoids with black explosionproof/dust-ignitionproof enclosures (types 7&9).

**IMPORTANT:** To protect the solenoid valve or operator, install a strainer or filter, suitable for the service involved in the inlet side as close to the valve or operator as possible. Clean periodically depending on service condition & See ASCO Series 8600, 8601, and 8602 for strainers.

#### Temperature Limitations

For maximum valve ambient temperatures, refer to chart. The temperature limitations listed, only indicate maximum application temperatures for field wiring rated at 90°C. Check catalog number prefix and watt rating on nameplate to determine maximum ambient temperature. See valve installation and maintenance instructions for maximum fluid temperature. **NOTE:** For steam service, refer to Wiring section, Junction Box for temperature rating of supply wires.

Temperature Limitations For Series 8016G Solenoids for use Valves Rated at 6.1, 8.1,9.1,10.6 or 11.1 Watts			
Watts Rating	Catalog Number Coil prefix	Class of Insulation	Maximum ambient Temp. °F
6.1, 8.1, 9.1, & 11.1	None, FB, KF, KP, SF, SP, SC, & SD	F	125
6.1, 8.1, 9.1, & 11.1	HB, HT, KB, KH, SS, ST, SU, & ST	H	140
10.6	None, KF, SF, & SC	F	104
10.6	HT, KH, SU, & ST	H	104

Minimum ambient temperature -40° F (-40° C); Positioning

#### Positioning

This solenoid is designed to perform properly when mounted in any position. However, for optimum life and performance, the solenoid should be mounted vertically and upright to reduce the possibility of foreign matter accumulating in the solenoid base sub-assembly area.

#### Wiring

Wiring must comply with local codes and the National Electrical Code. All solenoids supplied with lead wires are provided with a grounding wire which is green or green with yellow stripes and a 1/2" conduit connection. To facilitate wiring, the solenoid may be rotated 360°. For the watertight and explosionproof solenoid, electrical fittings must be approved for use in the approved hazardous locations.

#### Additional Wiring Instructions For Optional Features:

- **Open-Frame solenoid with 1/4" spade terminals**  
For solenoids supplied with screw terminal connections use #12-18 AWG stranded copper wire rated at 90°C or greater. Torque terminal block screws to 10 ± 2 in-lbs (1.0 + 1.2 Nm). A tapped hole is provided in the solenoid for grounding, use a #Y10-32 machine screw. Torque grounding screw to 15 -20

in-lbs (1,7 - 2,3 Nm). On solenoids with screw terminals, the socket head screw holding the terminal block to the solenoid is the grounding screw. Torque the screw to 15 - 20 in-lbs (1,7 - 2,3 Nm). with a 5/32" hex key wrench.

#### • Junction Box

The junction box is used with spade or screw terminal solenoids only and is provided with a grounding screw and a 1/2" conduit connection. Connect #12-18AWG standard copper wire only to the screw terminals. Within the junction box use field wire that is rated 90°C or greater for connections. For steam service use 105°C rated wire up to 50 psi or use 125°C rated wire above 50 psi. After electrical hookup, replace cover gasket, cover, and screws. Tighten screws evenly in a crisscross manner.

#### • DIN Plug Connector Kit No. KC236-034

1. The open—frame solenoid is provided with DIN terminals to accommodate the DIN plug connector kit.
2. Remove center screw from plug connector. Using a small screwdriver, pry terminal block from connector cover.
3. Use #12-18 AWG stranded copper wire rated at 90°C or greater for connections. Strip wire leads back approximately 1/4" for installation in socket terminals. The use of wire-end sleeves is also recommended for these socket terminals. Maximum length of wire-end sleeves to be approximately 1/4". Tinning of the ends of the lead wires is not recommended.
4. Thread wire through gland nut, gland gasket, washer, and connector cover.

**NOTE:** Connector cover may be rotated in 90° increments from position shown for alternate positioning of cable entry.

5. Check DIN connector terminal block for electrical markings. Then make electrical hookup to terminal block according to markings on it. Snap terminal block into connector cover and install center screw.
6. Position connector gasket on solenoid and install plug connector. Torque center screw to  $5 \pm 1$  in-lbs ( $0,6 \pm 1,1$  Nm).

**NOTE:** Alternating current (AC) and direct current (DC) solenoids are built differently. To convert from one to the other, it may be necessary to change the complete solenoid including the core and solenoid base sub-assembly, not just the solenoid. Consult ASCO.

### Installation of Solenoid

Solenoids may be assembled as a complete unit. Tightening is accomplished by means of a hex flange at the base of the solenoid. The 3/4" bonnet construction (Figure 1) must be disassembled for installation and installed with a special wrench adapter.

### Installation of Panel Mounted Solenoid (See Figure 3)

Disassemble solenoid following instruction under Solenoid Replacement then proceed

#### 3/4" Valve Bonnet Construction

1. Install retainer(convex side to solenoid) in 1.312 diameter mounting hole in customer panel.
2. Then position spring washer over plugnut/core tube sub-assembly.
3. Install plugnut/core tube sub-assembly through retainer in customer panel. Then replace solenoid, nameplate/retainer and red cap.

#### 15/16" Valve Bonnet Construction

1. Install solenoid base sub-assembly through 0.69 diameter mounting hole in customer panel.
2. Position spring washer on opposite side of panel over solenoid base sub-assembly then replace.

### Solenoid Temperature

Standard solenoids are designed for continuous duty service. When the solenoid is energized for a long period, the solenoid becomes hot and can be touched by hand only for an instant. This is a safe operating temperature.

## MAINTENANCE

**WARNING: To prevent the possibility of personal injury or property damage, turn off electrical power, depressurize solenoid operator and/or valve, and vent fluid to a safe area before servicing.**

### Cleaning

All solenoid operators and valves should be cleaned periodically. The time between cleaning will vary depending on medium and service conditions. In general, if the voltage to the solenoid is correct, sluggish valve operation, excessive noise or leakage will indicate that cleaning is required. Clean strainer or filter when cleaning the valve,

### Preventive Maintenance

- Keep the medium flowing through the solenoid operator or valve as free from dirt and foreign material as possible.
- While in service, the solenoid operator or valve should be operated at least once a month to insure proper opening and closing.
- Depending on the medium and service conditions, periodic inspection of internal valve parts for damage or excessive wear is recommended. Thoroughly clean all parts. Replace any worn or damaged parts.

### Causes of Improper Operation

- **Faulty Control Circuit:** Check the electrical system by energizing the solenoid. A metallic click signifies that the solenoid is operating. Absence of the click indicates loss of power supply. Check for loose or blown fuses, open-circuited or grounded solenoid, broken lead wires or splice connections.

- **Burned-Out Solenoid:** Check for open-circuited solenoid. Replace if necessary. Check supply voltage; it must be the same as specified on nameplate/retainer and marked on the solenoid. Check ambient temperature and check that the core is not jammed.

- **Low Voltage:** Check voltage across the solenoid leads. Voltage must be at least 85% of rated voltage.

### Solenoid Replacement

1. On solenoids with lead wires disconnect conduit, coil leads, and grounding wire.

**NOTE:** Any optional parts attached to the old solenoid must be reinstalled on the new solenoid.

2. Disassemble solenoids with optional features as follows:

#### • Spade or Screw Terminals

Remove terminal connections, grounding screw, grounding wire, and terminal block (screw terminal type only).

**NOTE:** For screw terminals, the socket head screw holding the terminal block serves as a grounding screw.

#### • Junction Box

Remove conduit and socket head screw (use 5/32" hex key wrench) from center of junction box. Disconnect junction box from solenoid.

#### • DIN Plug Connector

Remove center screw from DIN plug connector. Disconnect DIN plug connector from adapter. Remove socket head screw (use 5/32" hex key wrench), DIN terminal adapter, and gasket from solenoid.

3. Snap off red cap from top of solenoid base sub-assembly.
4. Push down on solenoid. Then using a suitable screwdriver, insert blade in slot provided between solenoid and nameplate/retainer. Pry up slightly and push to remove. Then remove solenoid from solenoid base sub-assembly.
5. Reassemble using exploded views for parts identification and placement

### Disassembly and Reassembly of Solenoids

1. Remove solenoid, see Solenoid Replacement.
2. Remove finger washer or spring washer from solenoid base sub-assembly.
3. Unscrew solenoid base sub-assembly.

**NOTE:** Some solenoid constructions have a plugnut/core tube sub-assembly, bonnet gasket and bonnet in place of the solenoid base sub-assembly. To remove bonnet use special wrench adapter supplied in ASCO Rebuild Kit. For wrench adapter only, order ASCO Wrench Kit No.K218 - 948.

4. The core is now accessible for cleaning or replacement.
5. If the solenoid is part of a valve, refer to basic valve installation and maintenance instructions for further disassembly.
6. Reassemble using exploded views for identification and placement of parts.

### ORDERING INFORMATION FOR ASCO SOLENOIDS

When Ordering Solenoids for ASCO Solenoid Operators or Valves, order the number stamped on the solenoid. Also specify voltage and frequency.

## Torque Chart

Part Name	Torque Value in inch-Pounds	Torque Value in Newton-Meters
solenoid base sub-assembly	175 ± 25	19.8 ± 2.8
valve bonnet (3/4" bonnet constructions)	90 ± 10	10.2 ± 1.1
bonnet screw (3/8" or 1/2" NPT pipe size)	25	2.8
bonnet screw (3/4" NPT pipe size)	40	4.5

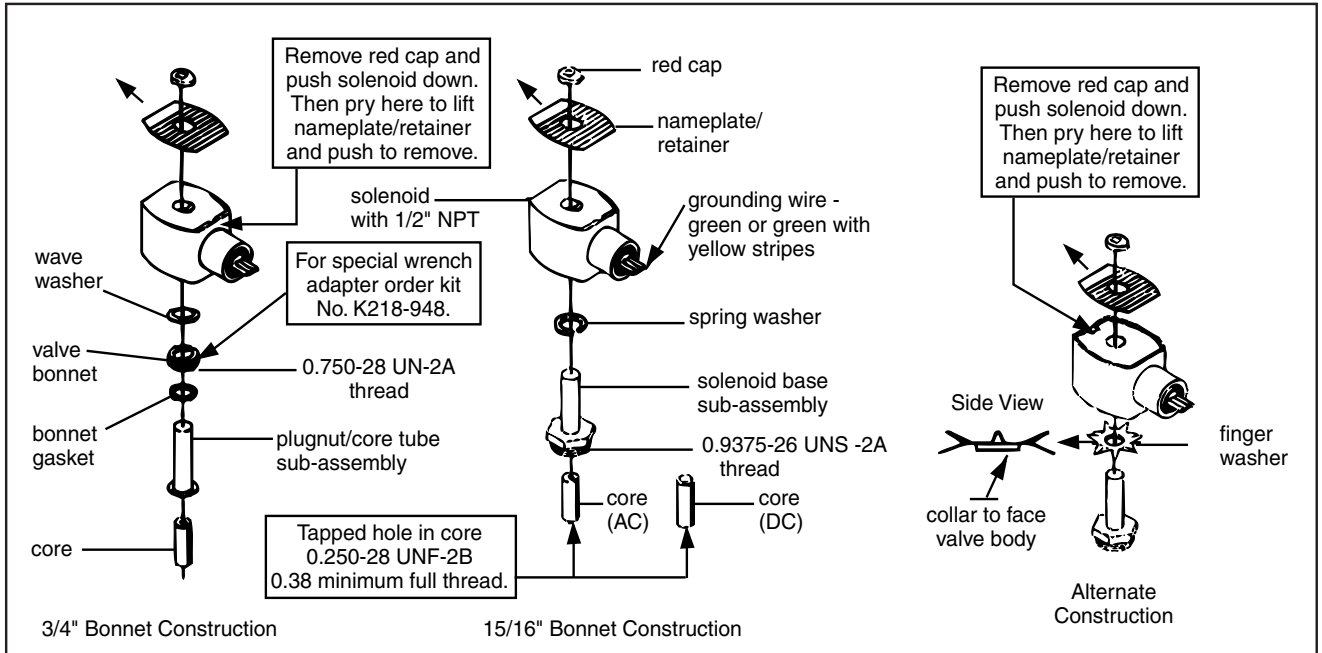


Figure 1. Series 8016G solenoids

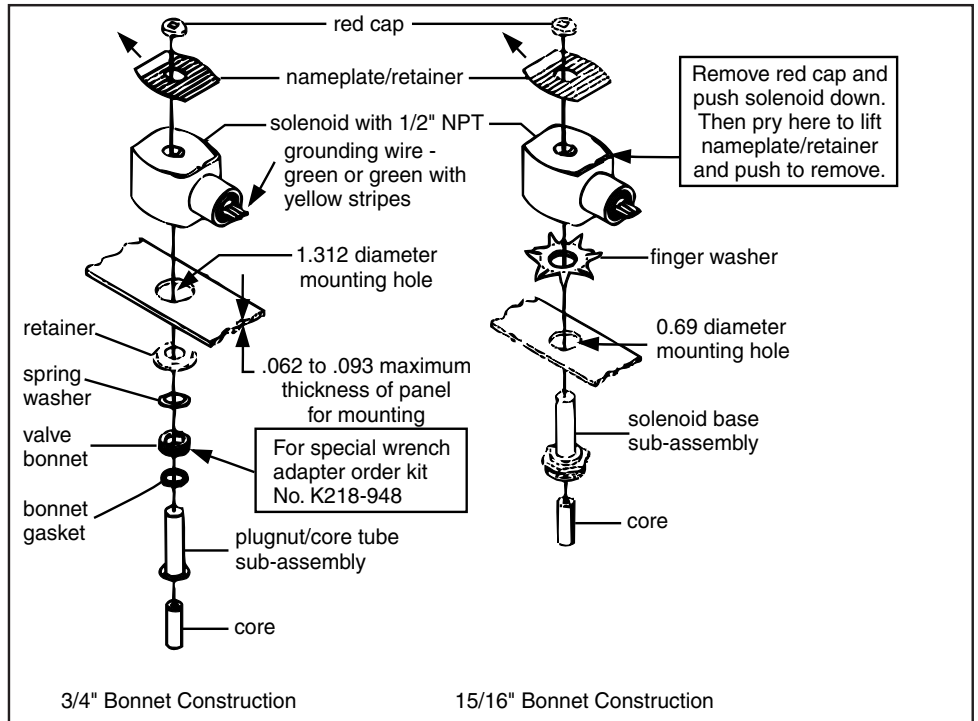
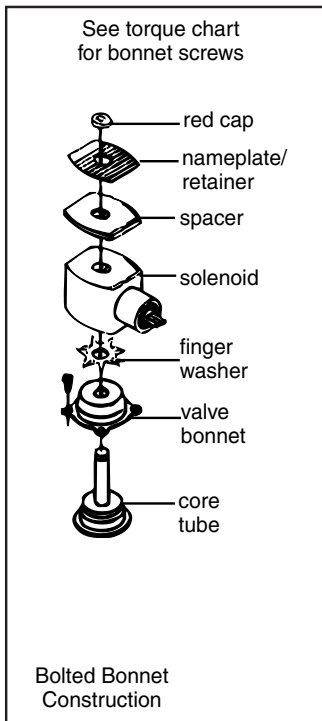


Figure 2. Series 8016G solenoid

Figure 3. Series 8016G panel mounted solenoids

## Torque Chart

Part Name	Torque Value in inch-Pounds	Torque Value in Newton-Meters
terminal block screws	10 ± 2	1,1 ± 0,2
socket head screw	15 - 20	1,7 - 2,3
center screw	5 ± 1	0,6 ± 0,1

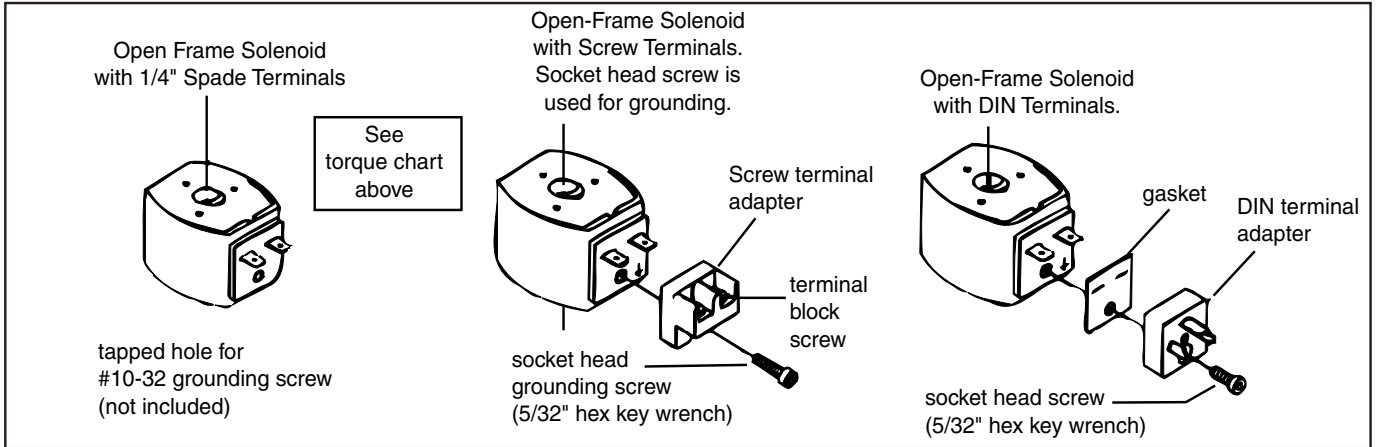


Figure 4. Open - frame solenoids

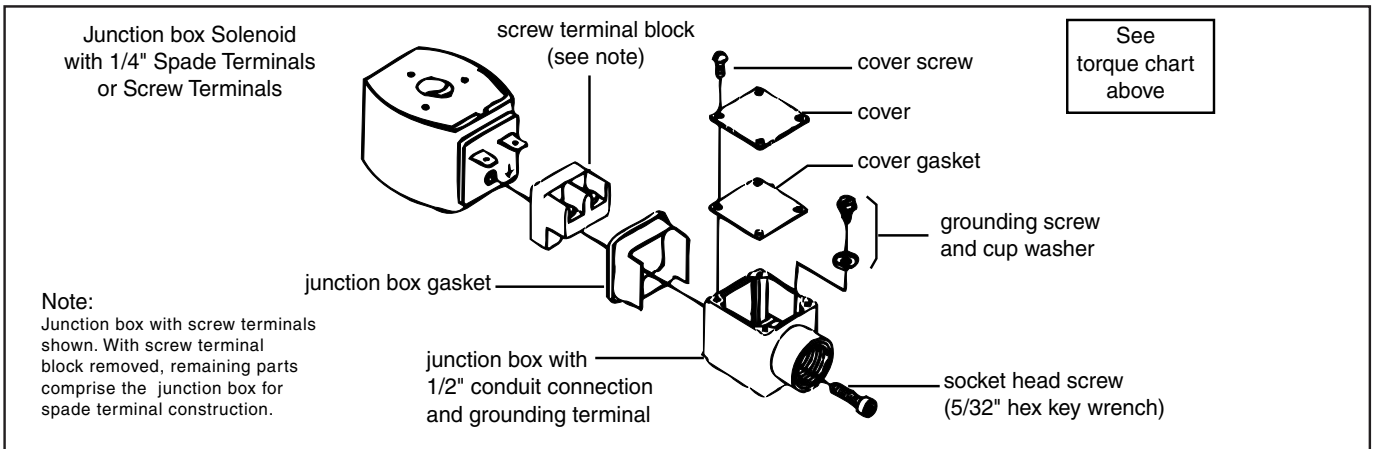
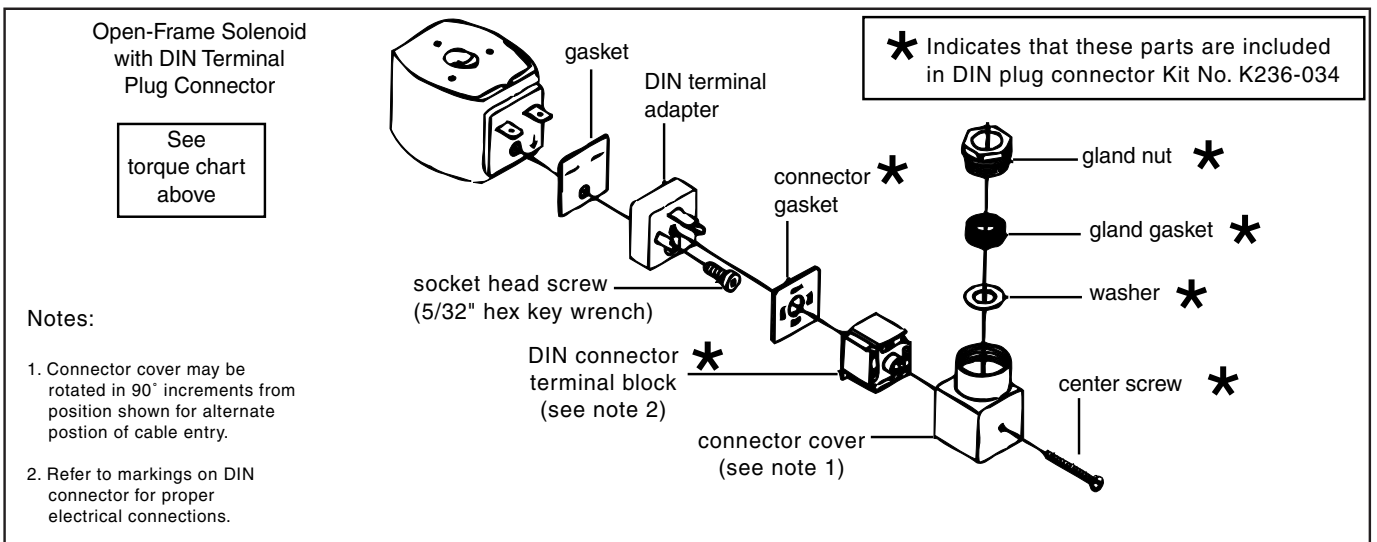


Figure 5. Open - frame solenoids







# Latching Deluge Pilot

## INTRODUCTION

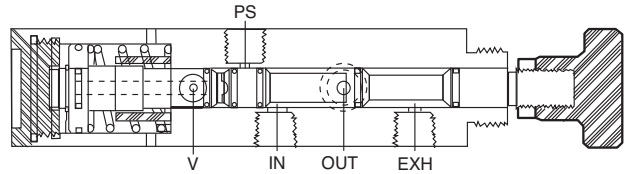
The Cla-Val Model Latching Deluge Pilot is a three (3) way, two (2) position, pneumatic or hydraulically operated, Normally Closed, pilot valve. Manual Reset Deluge Pilots will not be reset or positioned by application of pilot supply pressure alone. The pilot must be manually held (knob pulled out), while pilot supply is present to establish the "set position". These valves can employ relatively low pressure applied at the Pilot Supply (PS) port to enable higher pressure to be relayed through the Inlet (IN) and Outlet (OUT) ports. It is designed to block the inlet supply pressure and exhaust accumulated outlet pressure whenever the pilot supply pressure falls to 20 psi or if the stem is pushed inward. Connections on the Latching Deluge Pilot and their functions are shown as follows:

### Connection - Function

- Inlet (IN) - Supply Inlet (Pressure Applied 20-250 PSI)
- Outlet (OUT) - To pressurize deluge valve control port.
- Exhaust (EXH) - To bleed pressure from Deluge valve control port. (Outlet to Exhaust).
- Pilot Supply (PS) - Application of pressure (30-250 PSI) for normal in-service operation (Deluge valve "set-up").
- Minimum pilot supply pressure is 30 psi.
- Pilot trips at 20 psi.

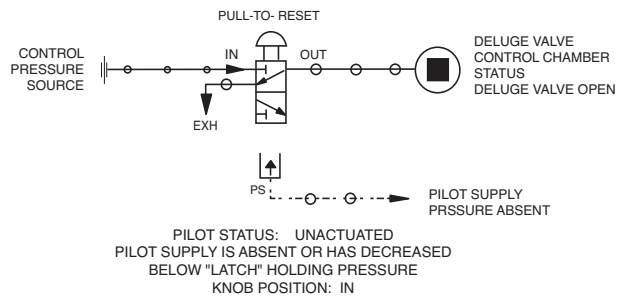
## SHELF (UNACTUATED) POSITION

Supply pressure can not enter the flow control section of the valve body since the assembly is configured for Normally Closed service. Pilot supply pressure at the (PS) port is also prevented from direct entry into the piston chamber. Additionally, an internal bore within the stem is aligned with an exhaust vent hole to insure its complete depressurization. A flow path exists between the Outlet (OUT) and Exhaust (EXH) ports.



O-Ring seals engage the valve wall providing the necessary pressure isolation. The large internal spring is fully decompressed to maintain the position shown. A shelf position is also denoted by the stems placement in its inner most location.

The schematic following, further illustrates the flow paths established for the unactuated or a shelf position.

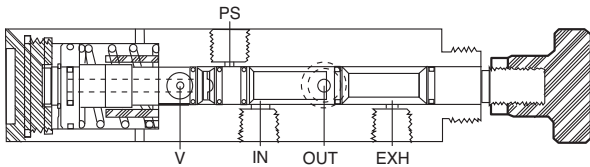


As shown, an internal flow path exists between the Outlet (OUT) and Exhaust (EXH) ports. The control circuit downstream of the Outlet (OUT) port is fully depressurized.

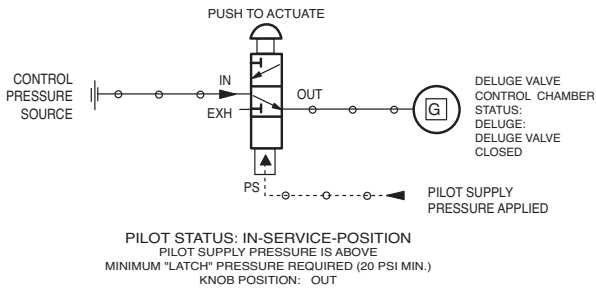
## MANUAL OPERATION

The Cla-Val Latching Deluge Pilot employ the "Pull-To-Reset" concept for manual, in-service position placement. Pulling outward on the knob will position the assembly to admit pilot supply pressure into the piston chamber. An internal bore within the stem becomes aligned with the Pilot Supply (PS) port to admit pressure into the piston chamber.

The following assembly drawing shows the assembly positioned in a normal, in-service (actuated) set position.



As shown, the internal components are held in position by pressure within the piston chamber. The flow path established between the Inlet (IN) and Outlet (OUT) connection is maintained. A schematic to depict the established flow path is provided.



Loss of pilot supply pressure or manually pushing inward on the knob will shift the stems position. Whenever the pilot pressure decreases sufficiently or becomes absent, the large internal spring will force the stem assembly inward. Pressure previously accumulated downstream of the Outlet (OUT) connection will backbleed or exhaust through the Exhaust (EXH) port. The Inlet (IN) will become isolated or blocked to flow. A return to the shelf or unactuated position is denoted by the control circuits depressurization.

## INSTALLATION

**WARNING:** The user of Cla-Val products must conform to all applicable Mechanical, Piping, NFPA and other established National Codes in the installation and operation of control valves. Do not attempt to install or operate these devices without proper training in the technique of working on pneumatic, fluid power controls, systems and other devices.

Prior to the installation of the Cla-Val 150-300 Latching Deluge Pilot, it is recommended that the 1/4" NPT male threads of the tubing connections be carefully Teflon taped. It is also recommended that a light coat of \*Swak® (Anaerobic Pipe Thread Sealant with TFE) be applied on the pipe threads whenever one stainless steel component is screwed into another. The Teflon tape and special thread sealant will prevent "galling" or seizure and provide an excellent pressure seal.

## MAINTENANCE

The only maintenance normally required is periodic inspection of the control system to insure there is no buildup of solids that might cause poor performance. This is usually accomplished by cleaning the strainer screen. Also, see pilot valve maintenance bulletin. Scheduled maintenance is dependent upon the severity, frequency of use and cleanliness of the control (media) source.

Established client fire and safety systems test guidelines must be followed. NFPA 25 Standard for the Inspection, Testing and Maintenance of Water-Based Fire Protection Systems must also be followed.

Once the control system is properly isolated and depressurized, the Latching Deluge Pilot can be disassembled. The piston assembly and internal bores should be thoroughly cleaned. All seals and spring should be replaced, whenever the control is disassembled for the 5 yr. maintenance program & or as needed. See maintenance bulletin.

A lubricant such as \*\*Dow Corning Molykote 33 or \*\*\*Parker Super O Lube 884-2 is recommended for maximum efficiency. Care should be taken to lubricate the Seals and internal bores lightly. Re-assemble the valve and function test according to facility procedures and requirements.

**CAUTION:** BEFORE PROCEEDING WITH THE DISASSEMBLY OF ANY CLA-VAL PRODUCT, STRICT COMPLIANCE WITH YOUR FACILITIES ESTABLISHED SAFETY PROCEDURE FOR ISOLATING, TESTING OR EXHAUSTING PRESSURE FROM A CONTROL SYSTEM OR DEVICE IS REQUIRED.

MEDIA CONTROL SYSTEMS CONTAIN HIGH LEVELS OF STORED ENERGY. DO NOT ATTEMPT TO CONNECT, DISCONNECT OR REPAIR THESE PRODUCTS WHENEVER A SYSTEM IS PRESSURIZED.

**NOTE:** ALWAYS EXHAUST THE PRESSURE FROM THE SYSTEM BEFORE PERFORMING ANY SERVICE WORK. FAILURE TO DO SO CAN RESULT IN SERIOUS PERSONAL INJURY.

SWAK® is a registered trademark of Swagelok Company.  
SWAK® is available from the independent distributors of Swagelok, and can be purchased online at [www.swagelok.com](http://www.swagelok.com)

— MODEL — **CMDL**

# Latching Deluge Pilot

## MAINTENANCE/SPARE PARTS LIST

Please order parts as a kit, from Cla-Val Kit.  
Kit consists of the items below.

PART NAME	MATERIAL	QTY
Retainer Ring	316SS	1
O-Ring	Buna-N®	1
O-Ring	Buna-N®	1
O-Ring	Buna-N®	1
O-Ring	Buna-N®	5
Spring	302 SS	1
Spacer	Urethane	1

Note: All O-rings are manufactured by Parker O-ring.  
Lubricant & Sealant Suppliers

\*Swak® Anaerobic Pipe Thread Sealant with TFE available from:  
Swak® is a registered trademark of Swagelok Company.  
Swak® is available from the independent distributors of  
Swagelok, and can be purchased online at [www.swagelok.com](http://www.swagelok.com)  
Part Number: MS-PTS-50

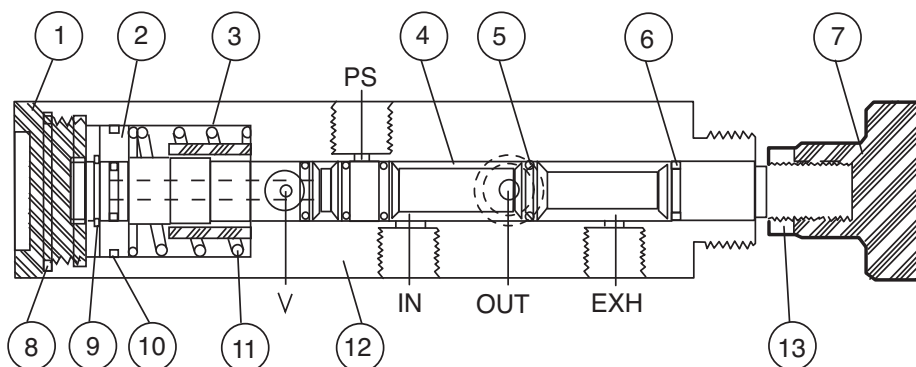
\*\*Molykote 33 available from:  
Dow Corning  
Midland, MI 48686-0994

\*\*\*Parker S-Lube 884-2 is available from:  
Parker Seal  
Lexington, Kentucky

The above may be purchased from Cla-Val

The Cla-Val Model is a pilot operated, three (3) way, two (2) position,  
Normally closed, high flow capacity, manual reset flow control valve.  
Manual Reset Relays require a physical position change of the knob/stem  
assembly to achieve the in-service status. The knob must be pulled out-  
ward once pilot supply pressure is applied to maintain the operating posi-  
tion.

BILL OF MATERIAL		
ITEM	PART NAME	MATERIAL
1.	Retainer	316 SS
2.	Piston	316 SS
3.	Spacer	Urethane
4.	Stem	316 SS
5.	O-Ring (1)	Buna-N®
6.	O-Ring (5)	Buna-N®
7.	Knob	Urethane
8.	O-Ring	Buna-N®
9.	Retainer Ring	316 SS
10.	O-Ring	Buna-N®
11.	Spring	302 SS
12.	Body	316 SS





NEWPORT BEACH, CALIFORNIA

CATALOG NO.  
X58C

DRAWING NO.  
48834

REV  
AP

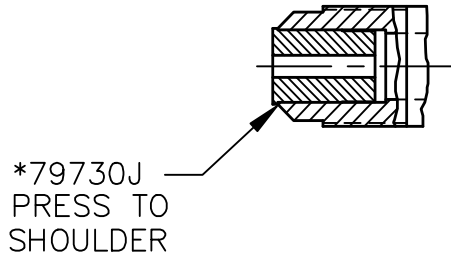
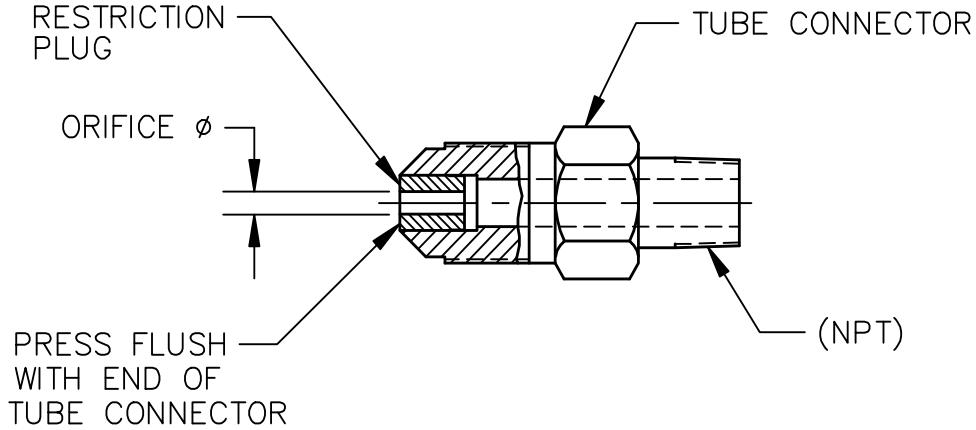
TYPE OF VALVE AND MAIN FEATURES

X58C RESTRICTION ASSEMBLIES

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


TLC	10-18-94
AK	09-15-98
EK	9-29-11
AM	REINSTATED PN 68565B & 64673H (ECO 15043)
AN	ADDED PN 48834-05F (NED 43663)
AP	ADDED PN 48834-06D (NED 75779)

CAD REVISION RECORD - DO NOT REVISE MANUALLY	
DESCRIPTION	DATE
BY	
EK	11-18-93
AL REDRAWN ON CAD (ECO 14229)	
LTR	
A-AK	SEE REVISION FILE



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.


 <b>CLA-VAL CO.</b> NEWPORT BEACH, CALIFORNIA	CATALOG NO. <b>X58C</b>	DRAWING NO. <b>48834</b>	REV <b>AP</b>
	TYPE OF VALVE AND MAIN FEATURES <p style="text-align: center;">X58C RESTRICTION ASSEMBLIES</p>		DESIGN DRAWN JC 12-3-85 CHK'D JC 12-4-85 APV'D CH 12-11-85

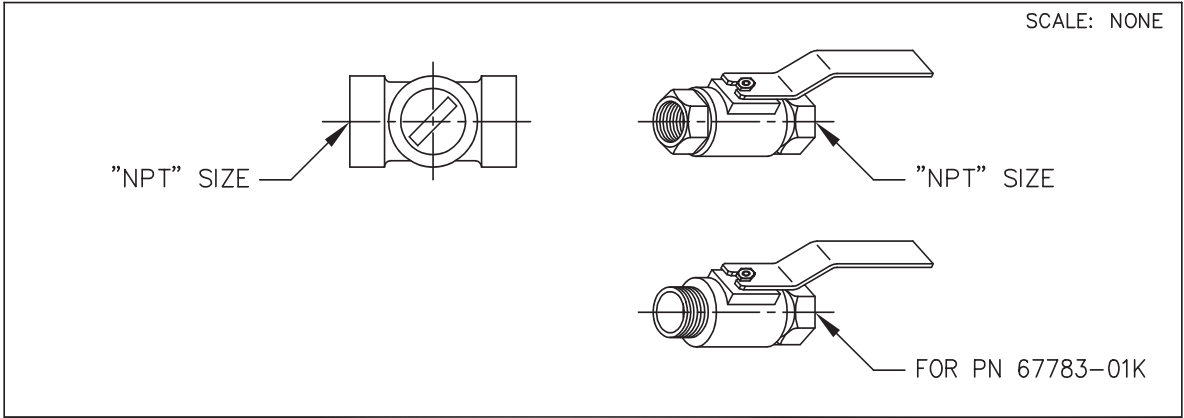
X58C STOCK NO.	TUBE CONNECTOR		RESTRICTION PLUG	
	SIZE TUBE X NPT	MATERIAL	ORIFICE DIA	MATERIAL
**44734C	3/8 X 3/8-18 NPT	ALUMINUM	.125 (1/8)	S. STEEL
	<u>37° FLARE</u>			
*37814B	1/4 X 1/8-27 NPT	BRASS	.031 (1/32)	S. STEEL
*80500C	1/4 X 1/8-27 NPT	BRASS	.062 (1/16)	S. STEEL
*67739D	3/8 X 1/8-27 NPT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

CAD REVISION RECORD - DO NOT REVISE MANUALLY  
 DATE  
 BY  
 DESCRIPTION  
 SEE SHEET 1  
 LTR

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AK	07-10-08	BB	ADDED PN'S 67783-62B (NED 62200)
AK	08-14-08	BC	ADDED PN'S 67783-63K (NED 62218)
PC	10-1-2008	BD	ADDED PN 67783-64H (NED 62446)
CAD REVISION RECORD - DO NOT REVISE MANUALLY		BY	DATE
LTR	DESCRIPTION		
A-AY	SEE REVISION FILE		
BA	ADDED PN'S 67783-59H, 67783-60F & 67783-61D (ECO 20434)	AK	03-14-06

 <b>CLA-VAL CO.</b> NEWPORT BEACH, CALIFORNIA	CATALOG NO.	DRAWING NO.	REV
		67783	BD
TYPE OF VALVE AND MAIN FEATURES		DESIGN	
<p style="text-align: center; font-size: 24pt;">CK2 COCK/BALL VALVE</p>		DRAWN	MGR 4-02-80
		CHK'D	KD 4-03-80
		APV'D	CH 4-07-80



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"

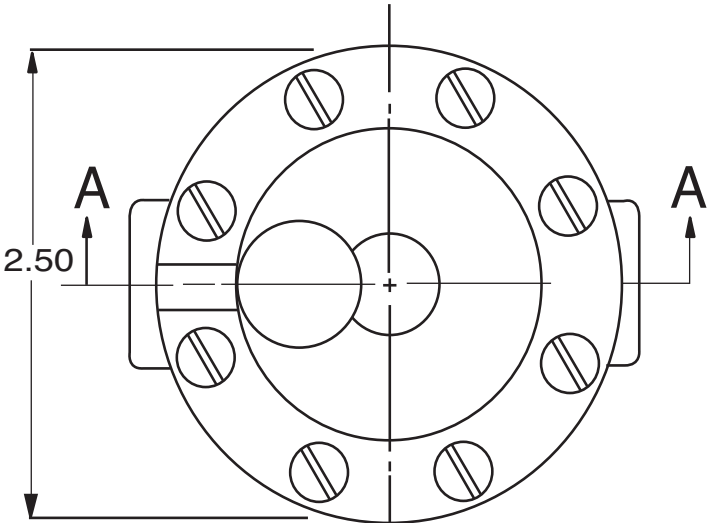
- \* SEE ENGINEERING APPROVED VENDORS TABLE (SHEET 2 OF 2).
- \*\* HAMMOND VALVE 8501 ONLY.
- \*\*\* WILKINS CK2 (SEE SHEET 2 OF 2)

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# 81-01

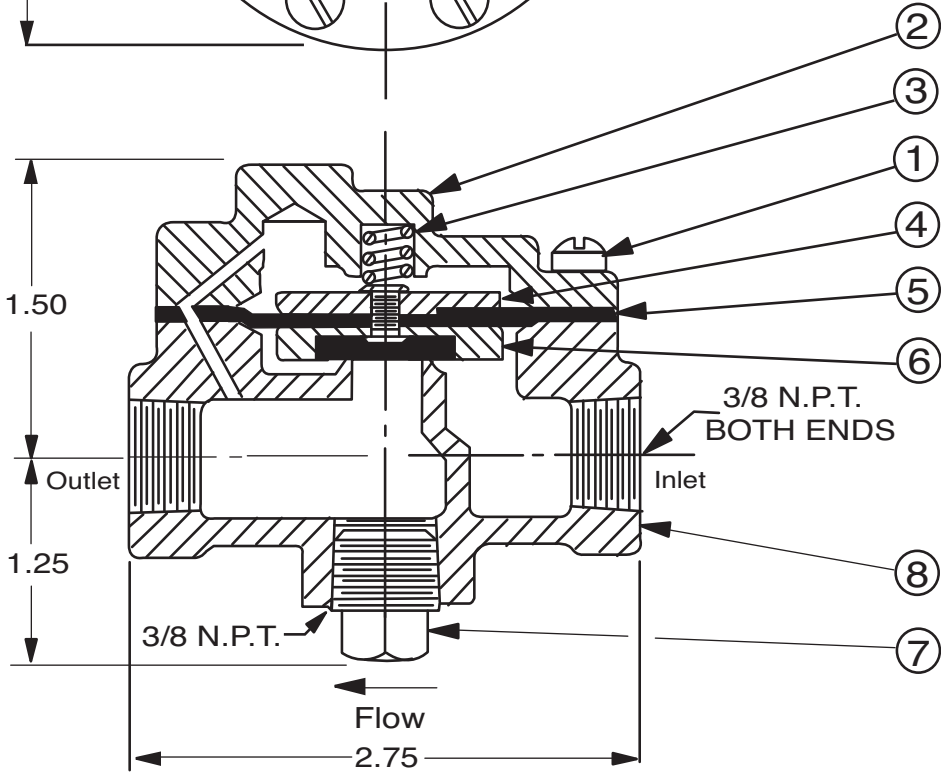
## 3/8" Check Valve



ITEM DESCRIPTION

1.	Cover Screw (8 Required)
2.	Cover
*3.	Spring
4.	Diaphragm Washer
*5.	Diaphragm
*6.	Disc Retainer Assembly
7.	Body Plug (3/8 NPT)
8.	Body (Threaded)

\*Recommended Spare Parts



SECTION AA

**When ordering parts, please specify:**

- All nameplate data
- Description
- Part Number
- Item Number
- Material



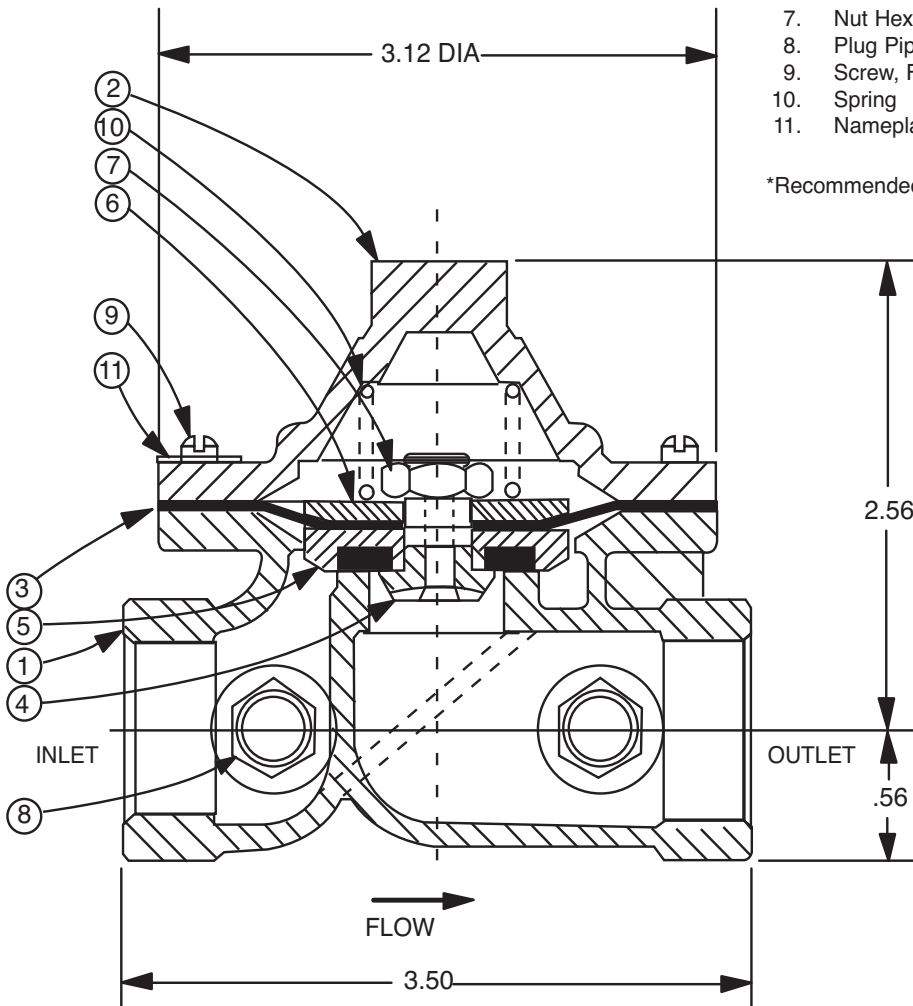
# 81-01

## 1/2" & 3/4 Check Valve

### ITEM DESCRIPTION

1.	Body	1
2.	Cover	1
*3.	Diaphragm	1
4.	Guide Disc	1
*5.	Disc Retainer Assembly	1
7.	Nut Hex 3/8 - 24UNF 28	1
8.	Plug Pipe Hex NPT	2
9.	Screw, Fil HD 10 32UNF 2 x 2LG	8
10.	Spring	1
11.	Nameplate	1

\*Recommended Spare Parts



### When ordering parts, please specify:

- All nameplate data
- Description
- Part Number
- Item Number
- Material





— MODEL — **Pressure Switch**  
**Adjustable Sub-Mini-Hermet**

Adjustable Sub-Mini-Hermit Pressure Switches can be externally adjusted without disconnecting electrical service. These field mounted instruments are suited for compact areas and hostile environments, A UL Listed and CSA Certified hermetically sealed explosion proof switch capsule is provided in a rugged cast housing. The housing and switch capsule are standard 316SS. See specifications.

**How to Order**

Select model number for intended set point. Adjustable range is expressed for increasing pressure; **the set point must be within the adjustable range**, Dead Band values are expressed as typical expected at mid-range. Metric bar values are conservative. They are practical equivalents of the reference English values; not exact mathematical conversion.



Model Number	Electrical Contact Form	Range		Typical Dead Band		Overrange		Proof	
		psi	bar	psi	bar	psi	bar	psi	bar
9013-001	SPDT			3	0.2				
9013-002	DPDT	8 - 30	0.55 - 2.0	6	0.4	1500	100	1500	170
9013-003	SPDT			5	.35				
9013-004	DPDT	15 - 60	1.0 - 4.1	10	.7				
9013-005	SPDT			25	1.7				
9013-006	DPDT	40 - 200	2.8 - 13.8	50	3.4	2500	170	2500	414

**Overrange**

The maximum input pressure that can be continuously applied to the pressure switch without causing permanent change of set point, leakage or material failure.

**Proof Pressure**

The maximum input pressure that can be continuously applied to the pressure switch without causing leakage or catastrophic material failure. Permanent change of set points may occur, or the device may be rendered inoperative.

**DPDT Switching Element**

Double-Pole, Double-Throw (DPDT) is two SPDT switching elements operated by a common lever assemble so simultaneous actuation/de-actuation occurs at both the increasing and the decreasing set points. Two independent electrical circuits can be switched, i.e. one AC and one DC.

**Housing**

Type Contains explosion proof hermetically sealed switching element. See electrical Service.

Class 1, Groups A,B,C,D Class 11 Groups E, F, G:

Divisions 1&2

.....Weathertight NEMA 4 , 4X, IP65

Material .....316SS

**Wetted Materials**

Primary diaphragm .....316SS

O-ring .....Viton

Pressure Port .....1/4 NPT (F) 316SS

**Temperature Limits**

Process .....32 to 400°F (0 to 204°C)

Ambient .....-40 to 167°F (-40 to 75°C)

**Electrical Connection**

1/2 NPT (M): 18" stranded wire leads, 180AWG color-coded and marked

**Electrical Rating**

250 VAC	30 VDC	125 VDC
5 amp	5 amp	.5 amp

**Shipping Weight** .....Approximate 1 lb (0.5 kg)

**Notes**

1. Other wetted materials and pressure port sizes are available. Consult the factory or the SOR representative in your area for more information.

2. DC electrical ratings are for resistive loads. DC ratings are not agency approved or listed but have been verified by testing or experience.

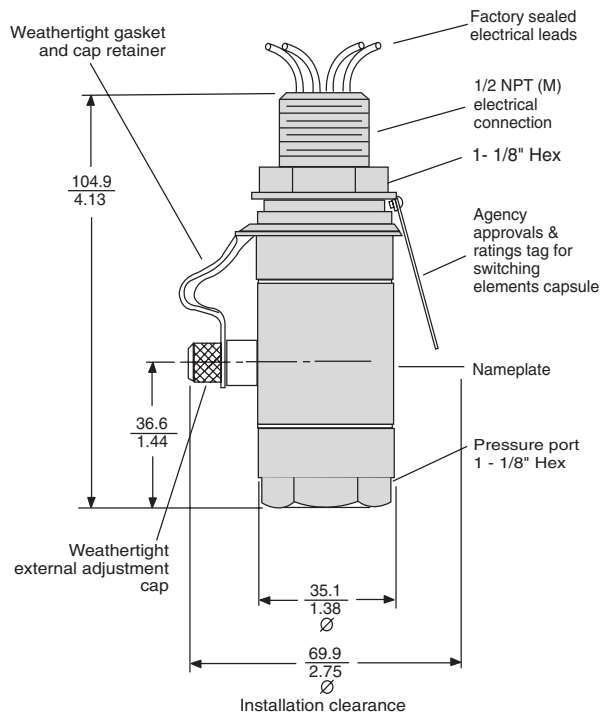
3. The hermetically sealed switching element capsule is UL Listed, CSA Certified and SAA Approved as an explosion proof snap switch

Agency	Hazardous Location Conditions
UL Listed	Class 1, Group A,B,C and D Class 11, Group E, F & G;
CSA Certified	Division 1 & 2
SAA Approved	Ex s IIC T6 for class 1, Zone 1 DIP Type B 80°C Class II, Div. 1&2

Design and specification subject to change without notice.

**Dimensions**

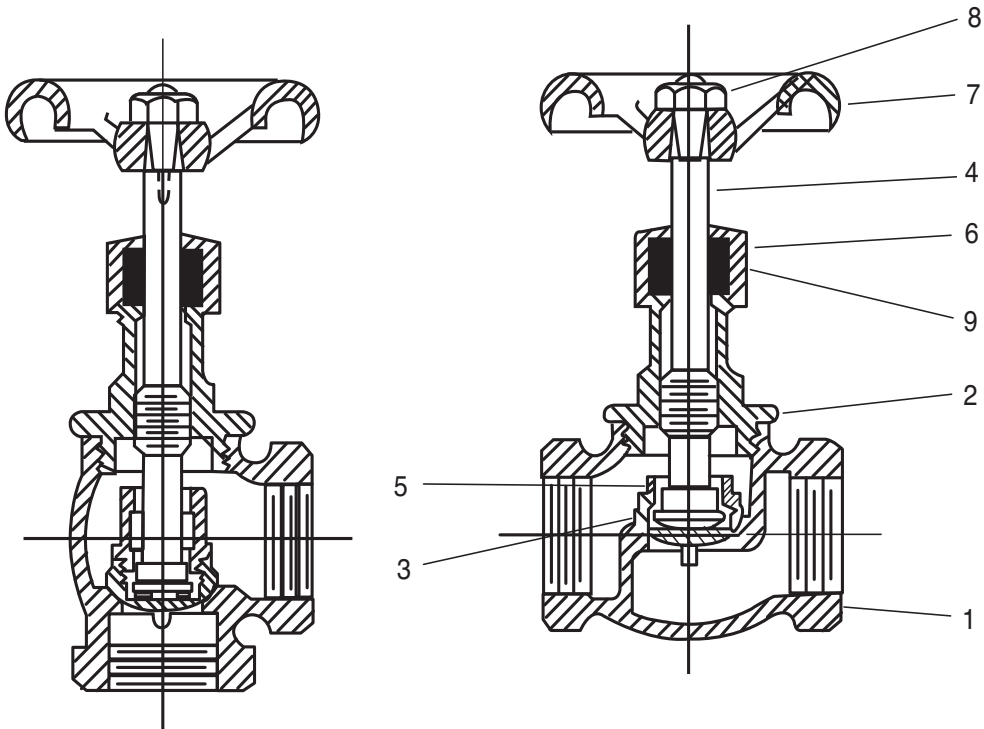
Linear =  $\frac{\text{mm}}{\text{in.}}$  Dimensions are for reference only. Contact the factory for certified drawings for a particular model number.





# CG Series

## Globe and Angle Valves CG Series



CAT. NO. CGA  
ANGLE

CAT. NO. CG8  
GLOBE

PARTS LIST FOR ILLUSTRATION ONLY.  
VALVE SOLD ONLY AS A COMPLETE UNIT.

**When ordering parts, please specify:**  
All Nameplate Data or Numbers  
Stamped on Assembly

Item	Description
1.	Body
2.	Bonnet
3.	Disc
4.	Stem
5.	Gland
6.	Nut
7.	Handwheel
8.	Nut
9.	Packing



# X43

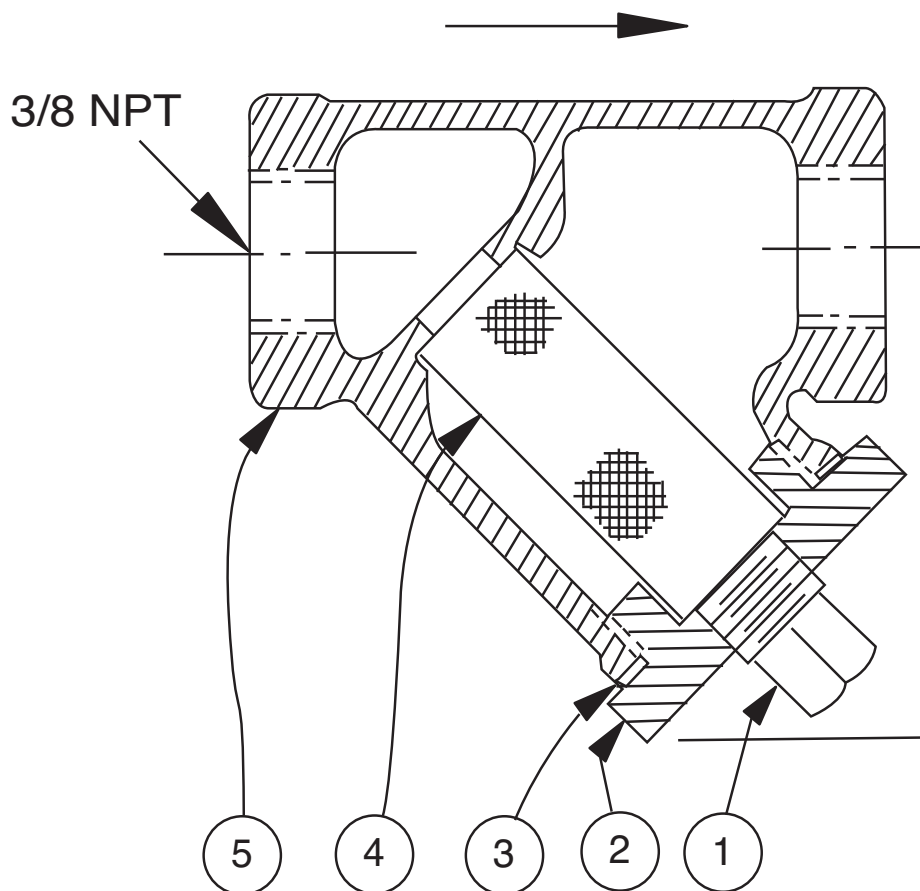
## Strainer

ITEM	DESCRIPTION	MATERIAL
1	Pipe Plug	Steel
2	Strainer Plug	Brass
3	Gasket	Copper
4	Screen	SST
5	Body	Brass

No parts available. Replacement assembly only.

Standard 60 mesh pilot system strainer for fluid service.

Size	Stock Number
3/8 x 3/8	33450J

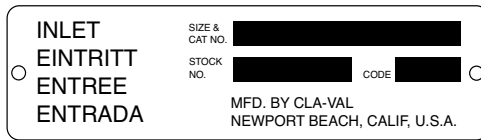


### Proper Identification

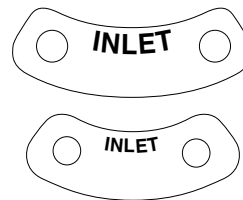
For ordering repair kits, replacement parts, or for inquiries concerning valve operation, it is important to properly identify Cla-Val products already in service by including all nameplate data with your inquiry. Pertinent product data includes valve function, size, material, pressure rating, end details,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



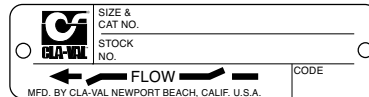
This brass plate appears on valves sized 2 1/2" and is located on the top of the inlet flange.



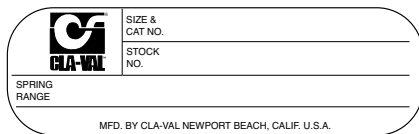
These two brass plates appear on 3/8", 1/2", and 3/4" size valves and are located on the valve cover.



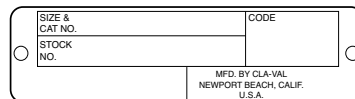
This brass plate appears on altitude valves only and is found on top of the outlet flange.



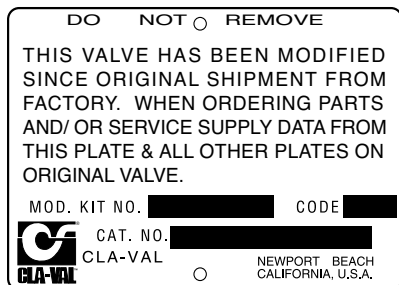
These two brass plates appear on threaded valves 1" through 3" size or flanged valves 1" through 2". It is located on only one side of the valve body.



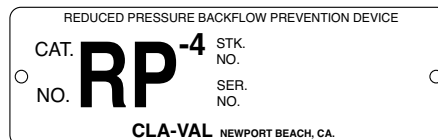
This tag is affixed to the cover of the pilot control valve. The adjustment range appears in the spring range section.



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 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.



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

### CLA-VAL CANADA

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

### CLA-VAL EUROPE

Chemin des Mesanges 1  
CH-1032 Romanel/  
Lausanne, Switzerland  
Phone: 41-21-643-15-55  
Fax: 41-21-643-15-50

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[www.cla-val.com](http://www.cla-val.com)

Represented By:



—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			
	100-01	100-20		100-01	100-20		
3/8" (Also 81-01 )	9169801K	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" 9169803F	N/A		1" 9169808E	N/A			
1 1/4" - 1 1/2" 9169804D	N/A		1 1/4" - 1 1/2" 9169809C	N/A			
2" 9169805A	N/A		2" 9169810A	N/A			
2 1/2" 9169811J	N/A		2 1/2" 9169817F	N/A			
3" 9169812G	9169805A		3" 9169818D	9169810A			
4" 9169813E	9169812G		4" 9169819B	9169818D			
6" 9169815K	9169813E		6" 9169820K	9169819B			
8" 9817901D	9169815K		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
	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	CFM-7	1263901K	CDB-KB	9170012A
CDB-30	9170023H	CFM-7A	1263901K	CRA-KB	N/A
CDB-31	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/55L-60	9170033G		
CDHS-18	9170003K	CRL-4A	43413E		
CDS-4	9170014G	CRL-5 (55B)	65755B		
CDS-5	14200A	CRL-5A (55G)	20666E		
CDS-6	20119301A	CRL-18	20309801C		
CDS-6A	20349401C	CV	9170019F		
		X105L (O-ring)	00951E	Buna-N®	
CFCM-M1	1222301C	102B-1	1502201F	CRD Disc Ret. (Solid)	C5256H
CFM-2	12223E	102C-2	1726201F	CRD Disc Ret. (Spring)	C5255K
		102C-3	1726201F		

### 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