Installation

Operation

Maintenance
Solenoid Control Valve with Manual Reset
(FM Approved for Fire Deluge Sprinkler Systems)

NOT FURNISHED BY CLA-VAL CO.

Optional Features

**Basic Components**

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Description</th>
<th>QTY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>800GS TDV Main Valve</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>X43 &quot;Y&quot; Strainer</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>CS3 Solenoid Control</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>CMDL Latching Deluge Pilot</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>X58C Restriction Assembly</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>CK2 Cock (Isolation Valve)</td>
<td>3</td>
</tr>
<tr>
<td>7</td>
<td>Nameplate (Open for Manual Operation)</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>81-01 Check Valve</td>
<td>2</td>
</tr>
<tr>
<td>9</td>
<td>Pressure Switch</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>CGA Angle Valve</td>
<td>2</td>
</tr>
<tr>
<td>11</td>
<td>Automatic Drain Valve</td>
<td>1</td>
</tr>
<tr>
<td>12</td>
<td>Pressure Gage</td>
<td>2</td>
</tr>
</tbody>
</table>

**Optional Feature Suffix**

Added to Catalog Number

---

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Solenoid Control Valve with Manual Reset
(FM Approved for Fire Deluge Sprinkler Systems)

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:

<table>
<thead>
<tr>
<th>Solenoid Control (3)</th>
<th>Latching Deluge Pilot (4) Pressure Sensing Port (PS)</th>
<th>Main Valve (1) Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energized</td>
<td>2 and 1</td>
<td>Pressure Relieved</td>
</tr>
<tr>
<td>De-energized</td>
<td>3 and 2</td>
<td>Pressure Applied</td>
</tr>
</tbody>
</table>

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.
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 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).

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 COO PRIOR TO RELEASE.
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.
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.

FLOW FACTORS

<table>
<thead>
<tr>
<th>SIZE (IN)</th>
<th>CV (gpm)</th>
<th>KV</th>
</tr>
</thead>
<tbody>
<tr>
<td>4&quot;</td>
<td>340</td>
<td>77.3</td>
</tr>
<tr>
<td>6&quot;</td>
<td>885</td>
<td>201</td>
</tr>
<tr>
<td>8&quot;</td>
<td>1667</td>
<td>379</td>
</tr>
<tr>
<td>&quot;10&quot;</td>
<td>2424</td>
<td>550</td>
</tr>
</tbody>
</table>

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When Ordering Please Specify:
1. Catalog No. 800GS  
2. Valve Size  
3. Fluid Being Handled  
4. Fluid Temperature Range  
5. Inlet Pressure Range  
6. Outlet Pressure Range  
7. Maximum Differential Pressure  
8. Minimum Differential Pressure  
9. Maximum Flow Rate
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.
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:

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

<table>
<thead>
<tr>
<th>NORMALLY OPEN PRESS AT 3 (C)</th>
<th>NORMALLY CLOSED PRESS AT 3 (C)</th>
<th>UNIVERSAL-PRESS AT ANY ORIFICE</th>
<th>FORM</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Image" /></td>
<td><img src="image2.png" alt="Image" /></td>
<td><img src="image3.png" alt="Image" /></td>
<td></td>
</tr>
</tbody>
</table>

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.

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.
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.
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-Explosionproof 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 0.250-28 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-resetable 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-explosionproof enclosures (types 7&9).

IMPORTANT: To protect the solenoid valve or operator, install a strain-er 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

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, this unique feature is a standard feature in solenoids with black explosionproof/dust-explosionproof enclosures (types 7&9).

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 (1,0 ± 1,2 Nm). (See Figure 6).
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 ± 1 in-lbs (0.6 ± 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**

**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 5132” 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**

<table>
<thead>
<tr>
<th>Part Name</th>
<th>Torque Value in inch-Pounds</th>
<th>Torque Value in Newton-Meters</th>
</tr>
</thead>
<tbody>
<tr>
<td>solenoid base sub-assembly</td>
<td>175 ± 25</td>
<td>19.8 ± 2.8</td>
</tr>
<tr>
<td>valve bonnet (3/4&quot; bonnet constructions)</td>
<td>90 ± 10</td>
<td>10.2 ± 1.1</td>
</tr>
<tr>
<td>bonnet screw (3/8&quot; or 1/2&quot; NPT pipe size)</td>
<td>25</td>
<td>2.8</td>
</tr>
<tr>
<td>bonnet screw (3/4&quot; NPT pipe size)</td>
<td>40</td>
<td>4.5</td>
</tr>
</tbody>
</table>

**Figure 1. Series 8016G solenoids**

**Figure 2. Series 8016G solenoid**

**Figure 3. Series 8016G panel mounted solenoids**
**Torque Chart**

<table>
<thead>
<tr>
<th>Part Name</th>
<th>Torque Value in inch-Pounds</th>
<th>Torque Value in Newton-Meters</th>
</tr>
</thead>
<tbody>
<tr>
<td>terminal block screws</td>
<td>10 ± 2</td>
<td>1,1 ± 0,2</td>
</tr>
<tr>
<td>socket head screw</td>
<td>15 - 20</td>
<td>1,7 - 2,3</td>
</tr>
<tr>
<td>center screw</td>
<td>5 ± 1</td>
<td>0,6 ± 0,1</td>
</tr>
</tbody>
</table>

---

Open Frame Solenoid with 1/4" Spade Terminals

- tapped hole for #10-32 grounding screw (not included)

Open-Frame Solenoid with Screw Terminals.

- socket head grounding screw (5/32" hex key wrench)

Open-Frame Solenoid with DIN Terminals.

- socket head screw (5/32" hex key wrench)

---

**Figure 4. Open - frame solenoids**

---

**Figure 5. Open - frame solenoids**

---

Open-Frame Solenoid with DIN Terminal Plug Connector

- socket head screw (5/32" hex key wrench)

---

Notes:

1. Connector cover may be rotated in 90° increments from position shown for alternate position of cable entry.
2. Refer to markings on DIN connector for proper electrical connections.

* Indicates that these parts are included in DIN plug connector Kit No. K236-034
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.
MAINTENANCE/SPARE PARTS LIST

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

<table>
<thead>
<tr>
<th>PART NAME</th>
<th>MATERIAL</th>
<th>QTY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retainer Ring</td>
<td>316 SS</td>
<td>1</td>
</tr>
<tr>
<td>O-Ring Buna-N®</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>O-Ring Buna-N®</td>
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<tr>
<td>O-Ring Buna-N®</td>
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<td></td>
</tr>
<tr>
<td>O-Ring Buna-N®</td>
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<td></td>
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<tr>
<td>Spring 302 SS</td>
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</tr>
<tr>
<td>Spacer Urethane</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

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
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 outward once pilot supply pressure is applied to maintain the operating position.
X58C RESTRICTION ASSEMBLIES

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.
# X58C Restriction Assemblies

<table>
<thead>
<tr>
<th><strong>X58C STOCK NO.</strong></th>
<th><strong>TUBE CONNECTOR</strong></th>
<th><strong>RESTRICTION PLUG</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>37° FLARE</strong></td>
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<td></td>
</tr>
<tr>
<td><strong>44734C</strong></td>
<td>3/8 X 3/8-18 NPT</td>
<td>Aluminum (.125 (1/8)</td>
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<tr>
<td><strong>45° FLARE</strong></td>
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<td></td>
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<tr>
<td><strong>37814B</strong></td>
<td>1/4 X 1/8-27 NPT</td>
<td>Brass (.031 (1/32)</td>
</tr>
<tr>
<td><strong>80500C</strong></td>
<td>1/4 X 1/8-27 NPT</td>
<td>Brass (.062 (1/16)</td>
</tr>
<tr>
<td><strong>67739D</strong></td>
<td>3/8 X 1/8-27 NPT</td>
<td>Brass (.040</td>
</tr>
<tr>
<td><strong>64672K</strong></td>
<td>3/8 X 3/8-18 NPT</td>
<td>Brass (.062 (1/16)</td>
</tr>
<tr>
<td><strong>99329-01D</strong></td>
<td>3/8 X 3/8-18 NPT</td>
<td>Brass (.094 (3/32)</td>
</tr>
<tr>
<td><strong>79730J</strong></td>
<td>1/2 X 1/2-14 NPT</td>
<td>Brass (.125 (1/8)</td>
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<tr>
<td><strong>48834-05F</strong></td>
<td>3/8 X 3/8-18 NPT</td>
<td>Brass (.125 (1/8)</td>
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<tr>
<td><strong>85484E</strong></td>
<td>1/4 X 1/8-27 NPT</td>
<td>Brass (.031 (1/32)</td>
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<tr>
<td><strong>85486K</strong></td>
<td>1/4 X 1/8-27 NPT</td>
<td>Brass (.040</td>
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<tr>
<td><strong>48834-03A</strong></td>
<td>1/4 X 1/8-27 NPT</td>
<td>Brass (.125 (1/8)</td>
</tr>
<tr>
<td><strong>48834-04J</strong></td>
<td>1/4 X 1/8-27 NPT</td>
<td>Brass (.093</td>
</tr>
<tr>
<td><strong>88409-01G</strong></td>
<td>3/8 X 1/8-27 NPT</td>
<td>Brass (.031 (1/32)</td>
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<td><strong>88409J</strong></td>
<td>3/8 X 1/8-27 NPT</td>
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<td><strong>42346H</strong></td>
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<td>Brass (.125 (1/8)</td>
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<td><strong>42775H</strong></td>
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<td>Brass (.062 (1/16)</td>
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<td><strong>63604D</strong></td>
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<td>Brass (.031 (1/32)</td>
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<td><strong>46946A</strong></td>
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<td><strong>64673H</strong></td>
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<td>Brass (.125 (1/8)</td>
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<tr>
<td><strong>68565B</strong></td>
<td>3/8 X 3/8-18 NPT</td>
<td>Brass (.094 (3/32)</td>
</tr>
<tr>
<td><strong>43302K</strong></td>
<td>3/8 X 3/8-18 NPT</td>
<td>Brass (.188 (3/16)</td>
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<tr>
<td><strong>12900H</strong></td>
<td>1/2 X 1/2-14 NPT</td>
<td>Brass (.125 (1/8)</td>
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<tr>
<td><strong>48834-02C</strong></td>
<td>1/2 X 1/2-14 NPT</td>
<td>Brass (.188 (3/16)</td>
</tr>
<tr>
<td><strong>48834-06D</strong></td>
<td>1/2 X 1/2-14 NPT</td>
<td>Brass (.250 (1/4)</td>
</tr>
</tbody>
</table>
CK2 COCK/BALL VALVE

"NPT" SIZE

FOR PN 67783-01K

CLA-VAL PART NO. AND MATERIAL

<table>
<thead>
<tr>
<th>BRONZE WITH HANDLE</th>
<th>STEEL WITH HANDLE</th>
<th>IRON WITH HANDLE</th>
<th>316 SST WITH HANDLE</th>
<th>316 SST W/ LOCKING HANDLE</th>
<th>BRONZE WITH HANDLE</th>
<th>MONEL WITH HANDLE</th>
<th>MONEL W/ LOCKING HANDLE</th>
<th>SIZE &quot;NPT&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>67783-01K*</td>
<td>09C</td>
<td>-17F</td>
<td>-25J SUPSD BY-26G</td>
<td>-41F SUPSD BY-01K</td>
<td>-42F</td>
<td>-55F</td>
<td>-63K</td>
<td>1/8&quot;</td>
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<tr>
<td>-02H</td>
<td>-10A</td>
<td>-18D</td>
<td>-26G</td>
<td>-51E SUPSD BY-26G</td>
<td>-42D</td>
<td>-55F</td>
<td>-63B</td>
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<tr>
<td>-04D</td>
<td>-12G</td>
<td>-20K</td>
<td>-25J</td>
<td>-43F SUPSD BY-04B</td>
<td>-49J</td>
<td>-57B**</td>
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<td>-15K</td>
<td>-23D</td>
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<td>2&quot;</td>
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* SEE ENGINEERING APPROVED VENDORS TABLE (SHEET 2 OF 2).

** HAMMOND VALVE 8501 ONLY.

*** WILKINS CK2 (SEE SHEET 2 OF 2)
### PARTS LIST

**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

When ordering parts, please specify:
- All nameplate data
- Description
- Part Number
- Item Number
- Material
ITEM    DESCRIPTION
1.   Body            1
2.   Cover           1
3.   Diaphragm       1
4.   Guide Disc      1
5.   Disc Retainer Assembly 1
6.   Nut Hex 3/8 - 24UNF 28 1
7.   Plug Pipe Hex NPT 2
8.   Screw, Fil HD 10 32UNF 2 x 2LG 8
9.   Spring          1
10.  Nameplate       1

*Recommended Spare Parts

When ordering parts, please specify:
• All nameplate data
• Description
• Part Number
• Item Number
• Material
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.

<table>
<thead>
<tr>
<th>Model Number</th>
<th>Electrical Contact Form</th>
<th>Range</th>
<th>Typical Dead Band</th>
<th>Overrange</th>
<th>Proof</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>psi</td>
<td>psi</td>
<td>psi</td>
<td>psi</td>
</tr>
<tr>
<td>9013-001</td>
<td>SPDT</td>
<td>8 - 30</td>
<td>0.55 - 2.0</td>
<td>1500</td>
<td>1500</td>
</tr>
<tr>
<td>9013-002</td>
<td>DPDT</td>
<td>15 - 60</td>
<td>1.0 - 4.1</td>
<td>100</td>
<td>170</td>
</tr>
<tr>
<td>9013-003</td>
<td>SPDT</td>
<td>40 - 200</td>
<td>2.8 - 13.8</td>
<td>200</td>
<td>414</td>
</tr>
<tr>
<td>9013-004</td>
<td>DPDT</td>
<td></td>
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</tr>
<tr>
<td>9013-005</td>
<td>SPDT</td>
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<tr>
<td>9013-006</td>
<td>DPDT</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**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)

**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.

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

**Electrical Rating**

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Current</th>
</tr>
</thead>
<tbody>
<tr>
<td>250 VAC</td>
<td>5 amp</td>
</tr>
<tr>
<td>30 VDC</td>
<td>5 amp</td>
</tr>
<tr>
<td>125 VDC</td>
<td>.5 amp</td>
</tr>
</tbody>
</table>

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

**Dimensions**
Linear = mm in.

Dimensions are for reference only. Contact the factory for certified drawings for a particular model number.
When ordering parts, please specify:
All Nameplate Data or Numbers
Stamped on Assembly

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Body</td>
</tr>
<tr>
<td>2.</td>
<td>Bonnet</td>
</tr>
<tr>
<td>3.</td>
<td>Disc</td>
</tr>
<tr>
<td>4.</td>
<td>Stem</td>
</tr>
<tr>
<td>5.</td>
<td>Gland</td>
</tr>
<tr>
<td>6.</td>
<td>Nut</td>
</tr>
<tr>
<td>7.</td>
<td>Handwheel</td>
</tr>
<tr>
<td>8.</td>
<td>Nut</td>
</tr>
<tr>
<td>9.</td>
<td>Packing</td>
</tr>
</tbody>
</table>

Globe and Angle Valves CG Series

PARTS LIST FOR ILLUSTRATION ONLY.
VALVE SOLD ONLY AS A COMPLETE UNIT.
# X43 Strainer

Standard 60 mesh pilot system strainer for fluid service.

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION</th>
<th>MATERIAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Pipe Plug</td>
<td>Steel</td>
</tr>
<tr>
<td>2</td>
<td>Strainer Plug</td>
<td>Brass</td>
</tr>
<tr>
<td>3</td>
<td>Gasket</td>
<td>Copper</td>
</tr>
<tr>
<td>4</td>
<td>Screen</td>
<td>SST</td>
</tr>
<tr>
<td>5</td>
<td>Body</td>
<td>Brass</td>
</tr>
</tbody>
</table>

No parts available. Replacement assembly only.

<table>
<thead>
<tr>
<th>Size</th>
<th>Stock Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/8 x 3/8</td>
<td>33450J</td>
</tr>
</tbody>
</table>
**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.

**Identification Plate Illustration**

- **Inlet**
  - This brass plate appears on valves sized 2½" and larger and is located on the top of the inlet flange.

- **Inlet**
  - These two brass plates appear on ⅝", ¾", and ¾" size valves and are located on the valve cover.

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

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

- **Reduced Pressure Backflow Prevention Device**
  - 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**

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.
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

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.

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.

SPECIFY WHEN ORDERING
- Model Number
- Valve Size
- Globe or Angle Pattern
- Body and Trim Materials
- Optional Features
- Pressure Class
- Adjustment Range
- Threaded or Flanged
- 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)

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 of 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.

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.
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

<table>
<thead>
<tr>
<th>Valve Size</th>
<th>Diaphragm Assembly Stock Number</th>
<th>Valve Size</th>
<th>Diaphragm Assembly Stock Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/8&quot; (Also 81-01)</td>
<td>49097K N/A</td>
<td>6&quot;</td>
<td>40456G 33273E</td>
</tr>
<tr>
<td>1/2&quot; - 3/4&quot; (Also 81-01)</td>
<td>C2518D N/A</td>
<td>8&quot;</td>
<td>45276D 40456G</td>
</tr>
<tr>
<td>1&quot;</td>
<td>C2520K N/A</td>
<td>10&quot;</td>
<td>81752J 45276D</td>
</tr>
<tr>
<td>1 1/4&quot; - 1 1/2&quot;</td>
<td>C2522 F N/A</td>
<td>12&quot;</td>
<td>85533J 81752J</td>
</tr>
<tr>
<td>2&quot;</td>
<td>C2524B N/A</td>
<td>14&quot;</td>
<td>89067D N/A</td>
</tr>
<tr>
<td>2 1/2&quot;</td>
<td>C2523 D N/A</td>
<td>16&quot;</td>
<td>89068B 85533J</td>
</tr>
<tr>
<td>3&quot;</td>
<td>C2525J C2524B</td>
<td>20&quot;</td>
<td>N/A 89068B</td>
</tr>
<tr>
<td>4&quot;</td>
<td>33273E C2525J</td>
<td>24&quot;</td>
<td>N/A 89068B</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Valve Size</th>
<th>Repair Kit Stock Number</th>
<th>Valve Size</th>
<th>Repair Kit Stock Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/8&quot; (Also 81-01)</td>
<td>9169801K N/A</td>
<td>3/8&quot; (Also 81-01)</td>
<td>9169806J N/A</td>
</tr>
<tr>
<td>1/2&quot; - 3/4&quot; (Also 81-01)</td>
<td>9169802H N/A</td>
<td>1/2&quot; - 3/4&quot; (Also 81-01)</td>
<td>9169807G N/A</td>
</tr>
<tr>
<td>1&quot;</td>
<td>9169803F N/A</td>
<td>1&quot;</td>
<td>9169808E N/A</td>
</tr>
<tr>
<td>1 1/4&quot; - 1 1/2&quot;</td>
<td>9169804D N/A</td>
<td>1 1/4&quot; - 1 1/2&quot;</td>
<td>9169809C N/A</td>
</tr>
<tr>
<td>2&quot;</td>
<td>9169805A N/A</td>
<td>2&quot;</td>
<td>9169810A N/A</td>
</tr>
<tr>
<td>2 1/2&quot;</td>
<td>9169811J N/A</td>
<td>2 1/2&quot;</td>
<td>9169817F N/A</td>
</tr>
<tr>
<td>3&quot;</td>
<td>9169812G 9169805A</td>
<td>3&quot;</td>
<td>9169818D 9169810A</td>
</tr>
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<td>4&quot;</td>
<td>9169813E 9169812G</td>
<td>4&quot;</td>
<td>9169819B 9169818D</td>
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<tr>
<td>6&quot;</td>
<td>9169815K 9169813E</td>
<td>6&quot;</td>
<td>9169820K 9169819B</td>
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<td>8&quot;</td>
<td>9817901D 9169815K</td>
<td>8&quot;</td>
<td>9169834A 9169820K</td>
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<td>10&quot;</td>
<td>9817902B 9817901D</td>
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<td>9817903K 9817902B</td>
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<td>20&quot;</td>
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<tr>
<td>24&quot;</td>
<td>9817906C 9817905E</td>
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</table>

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.

<table>
<thead>
<tr>
<th>Valve Size</th>
<th>Kit Stock Number</th>
<th>Valve Size</th>
<th>Kit Stock Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>100-02</td>
<td>9169901H</td>
<td>100-21</td>
<td>N/A</td>
</tr>
<tr>
<td>100-03</td>
<td>9169910G</td>
<td>100-22</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Larger Sizes: Consult Factory.

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

For: Hy-Check Main Valves—125/150 Pressure Class Only
Includes: Diaphragm, Disc and O-Rings and full set of spare Spacer Washers.

<table>
<thead>
<tr>
<th>Valve Size</th>
<th>Kit Stock Number</th>
<th>Valve Size</th>
<th>Kit Stock Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>100-04</td>
<td>20210901B</td>
<td>100-23</td>
<td>N/A</td>
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<tr>
<td>100-23</td>
<td>20210901B</td>
<td>100-04</td>
<td>20210901B</td>
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<tr>
<td>100-03</td>
<td>20210902A</td>
<td>100-22</td>
<td>N/A</td>
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<tr>
<td>100-21</td>
<td>20210902A</td>
<td>100-03</td>
<td>20210902A</td>
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</tbody>
</table>

Larger Sizes: Consult Factory.

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

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

<table>
<thead>
<tr>
<th>Pilot Control</th>
<th>Kit Stock Number</th>
<th>Pilot Control</th>
<th>Kit Stock Number</th>
<th>Pilot Control</th>
<th>Kit Stock Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>CDB</td>
<td>9170006C</td>
<td>CFM-7</td>
<td>1263901K</td>
<td>CDB-KB</td>
<td>9170012A</td>
</tr>
<tr>
<td>CDB-30</td>
<td>9170023H</td>
<td>CFM-7A</td>
<td>1263901K</td>
<td>CRA-KB</td>
<td>N/A</td>
</tr>
<tr>
<td>CDB-31</td>
<td>9170024F</td>
<td>CFM-9</td>
<td>12223E</td>
<td>CRD-KB (w/bucking spring)</td>
<td>9170008J</td>
</tr>
<tr>
<td>CDB-7</td>
<td>9170017K</td>
<td>CRA (w/bucking spring)</td>
<td>9170001D</td>
<td>CRL-KB</td>
<td>9170013J</td>
</tr>
<tr>
<td>CDH-2</td>
<td>18225D</td>
<td>CRD (w/bucking spring)</td>
<td>9170002B</td>
<td>CDHS-2KB</td>
<td>9170010E</td>
</tr>
<tr>
<td>CDHS-2</td>
<td>44607A</td>
<td>CRD (no bucking spring)</td>
<td>9170003K</td>
<td>CDHS-2FKB</td>
<td>9170011C</td>
</tr>
<tr>
<td>CDHS-2B</td>
<td>9170004H</td>
<td>CRD-18</td>
<td>20275401K</td>
<td>CDHS-18KB (no bucking spring)</td>
<td>9170009G</td>
</tr>
<tr>
<td>CDHS-2F</td>
<td>9170005E</td>
<td>CRD-22</td>
<td>98923G</td>
<td>102C-KB</td>
<td>1726202D</td>
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<tr>
<td>CDHS-3C-A2</td>
<td>24657K</td>
<td>CRL (55F, 55L)</td>
<td>9170007A</td>
<td>CRL-55B</td>
<td>9170033G</td>
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<tr>
<td>CDHS-8A</td>
<td>2666901A</td>
<td>CRL55L-60</td>
<td>9170033G</td>
<td>CRL-4A</td>
<td>43413E</td>
</tr>
<tr>
<td>CDHS-18</td>
<td>9170003K</td>
<td>CRL-5A (55G)</td>
<td>65755B</td>
<td>20666E</td>
<td></td>
</tr>
<tr>
<td>CDS-4</td>
<td>9170014G</td>
<td>CRL-5 (55B)</td>
<td>65755B</td>
<td>20309801C</td>
<td></td>
</tr>
<tr>
<td>CDS-5</td>
<td>14200A</td>
<td>CRL-5A (55G)</td>
<td>20666E</td>
<td>CDS-6A</td>
<td>20349401C</td>
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<tr>
<td>CDS-6</td>
<td>20119301A</td>
<td>CRL-18</td>
<td>20309801C</td>
<td>CV</td>
<td>9170019F</td>
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<tr>
<td>CDS-6A</td>
<td>20349401C</td>
<td>X105L (O-ring)</td>
<td>00951E</td>
<td>Buna-N®</td>
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</tr>
<tr>
<td>CFCM-M1</td>
<td>1222301C</td>
<td>102B-1</td>
<td>1502201F</td>
<td>CRD Disc Ret. (Solid)</td>
<td>C5256H</td>
</tr>
<tr>
<td>CFM-2</td>
<td>12223E</td>
<td>102C-2</td>
<td>1726201F</td>
<td>CRD Disc Ret. (Spring)</td>
<td>C5255K</td>
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<tr>
<td></td>
<td></td>
<td>102C-3</td>
<td>1726201F</td>
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</table>

Repair Assemblies (In Standard Materials Only)

<table>
<thead>
<tr>
<th>Control</th>
<th>Description</th>
<th>Stock Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>CF1-C1</td>
<td>Pilot Assembly Only</td>
<td>89541H</td>
</tr>
<tr>
<td>CF1-Cl</td>
<td>Complete Float Control less Ball and Rod</td>
<td>89016A</td>
</tr>
<tr>
<td>CFCC2-C1</td>
<td>Disc, Distributor and Seals</td>
<td>2674701E</td>
</tr>
<tr>
<td>CSM 11-A2-2</td>
<td>Mechanical Parts Assembly</td>
<td>97544B</td>
</tr>
<tr>
<td>CSM 11-A2-2</td>
<td>Pilot Assembly Only</td>
<td>18053K</td>
</tr>
<tr>
<td>33A 1&quot;</td>
<td>Complete Internal Assembly and Seal</td>
<td>2036030B</td>
</tr>
<tr>
<td>33A 2&quot;</td>
<td>Complete Internal Assembly and Seal</td>
<td>2040830J</td>
</tr>
</tbody>
</table>

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