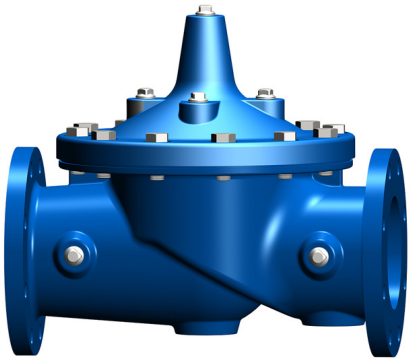
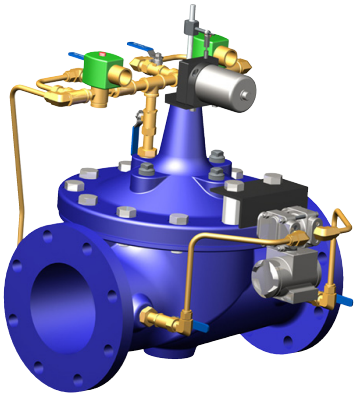
Cla-Val

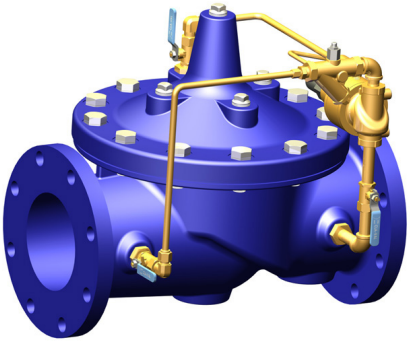
Service Training Manual

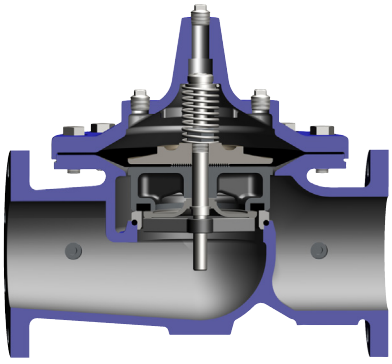
Section # 5

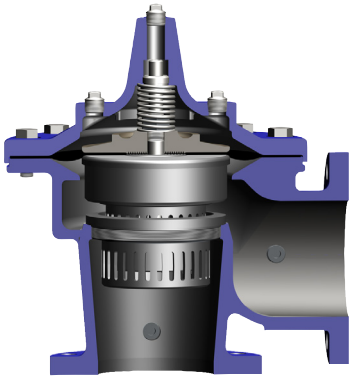
Trouble Shooting and Service

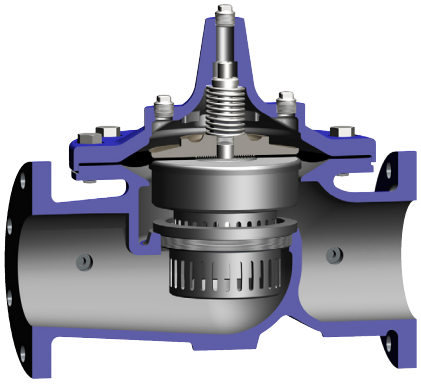












"Simple solutions plus learning with a purpose"

Section 5

Section
5-1 General Information

How do I identify the valve I have?

When asking about one of our valves that is already in your system and is working or not working the first thing you need to do is to identify the valve you have. The following suggestions will help.

Cla-Val control valves consist of two basic elements: the main valve and its pilot control system. We identify the valve assembly by the catalog number information stamped on a small brass nametag. You will find the nametag on the top of the inlet flange of 4" and larger valves and on the side of the main valve on 3" and smaller valves. The pilot controls often have their own nametag, and if they don't, they are identified as a part of the complete valve nametag information. We use raised cast-in letters on the main valve body to identify it alone without any pilot system.

To help you identify your valve accurately, we should have all of the nameplate data, including: 1.) Valve size, 2.) Valve catalog number, 3.) Valve part number, and 4.) Valve Date Code (two letters). To see what our nameplates look like, click our website, "cla-val.com", then click on "Electronic Catalog", then "More about Cla-Val automatic control valves", then "Valve Identification".

When the nameplate is not readable, then get as close an approximation as possible. Sometimes buffing the brass nameplate with steel wool and using a flashlight across the stampings can help make them readable. If the nameplate is missing, then we can help you identify the valve by other means. Is it possible to send photos (close-ups of the valve and controls)? Any descriptive information you can supply (measurements, poems, etc) to help us identify your valve would be useful. A complete description of the valve's function in the system with flow and pressure information often can help.

You may need a copy of the Installation-Operation-Maintenance Manual for your valve. It contains operating data, repair kit part numbers and maintenance information on all valve components. The manual is based on the valve catalog number from the valve nameplate. Visit our web site, "www.cla-val.com" to obtain our standard Technical Manuals or to locate the nearest regional sales office. If you are not located in the domestic U.S., then our export sales department at the home office can help you.

SERVICE SUGGESTIONS

SYMPTOM	POSSIBLE CAUSE	SOLUTIONS
Main valve won't open	Orifice plate assembly and/or orifice sensing line clogged	Remove sensing line and clean orifice port Clean or replace line
	Adjustment below desired set point	Readjust control
	Control line shutoff valve to cover or main outlet closed	Open shutoff valve
	Pilot valve stuck closed Mineral deposits or foreign matter under disc retainer assembly	Remove bottom plug and disc retainer assembly clean or replace
	Main valve stuck closed Mineral buildup on stem Stem damaged	Disassemble main valve clean parts and/or replace damaged parts
Main valve won't close	Pilot adjustment above desired set point	Readjust control
	Pilot control diaphragm nut loose or diaphragm leaks (damaged)	Disassemble tighten nut or replace diaphragm
	Clogged restriction assembly	Remove and clean or replace
	Control line shutoff valve from inlet to restriction closed	Open shutoff valve and readjust
	CV Flow control closed or clogged	Disassembled and clean
	Pilot control disc worn or nicked	Remove disc retainer assembly and replace
	Clogged Flow Clean Strainer	Remove and clean
	Worn Diaphragm	Remove and replace

SERVICE SUGGESTIONS

SYMPTOM	PROBABLE CAUSE	REMEDY
Main valve won't open	Inlet pressure below setting of pilot valve	Reset pilot valve. If change in setting is from tampering, seal cap with wire and lead seal
	Pilot valve stuck closed Mineral deposit or foreign material between disc retainer and power unit body	Disassemble control and clean
	Pilot valve diaphragm ruptured or diaphragm nut loose. Water coming out of the vent hole in cover	Disassemble and replace diaphragm Tighten nut
clean	Main valve stuck closed Mineral buildup on stem Stem damaged	Disassemble main valve, parts and/or replace damaged part. Check downstream and cover CK2 isolation valves are open
Main valve won't close	Inlet pressure above setting of pilot valve	Reset pilot valve
	Clogged needle valve or strainer	Disassemble and clean
	Pilot valve stuck open. Mineral deposit or foreign material under disc retainer or under diaphragm assembly	Disassemble and clean
	Main valve stuck open. Mineral buildup on stem. Foreign material between seat and disc assembly	Disassemble and clean
	Worn diaphragm	Remove and replace
Valve leaks Continuously	Pilot valve disc worn out	Disassemble and replace
	Main valve disc worn or small pin hole in main valve diaphragm	Disassemble and replace
	Set point too close to inlet pressure	Reset CRL Pilot

SERVICE SUGGESTIONS

SYMPTOM	POSSIBLE CAUSE	TEST PROCEDURE	REMEDY
Valve fails to close.	Stem stuck in open position.	Vent power unit chamber. Apply pressure to cover chamber. Valve should close.	Disassemble,examine all internal parts for cause of the sticking condition and clean off scale deposits.
	Worn diaphragm or loose upper stem nut.	Apply pressure in power unit chamber and vent cover. Continuous flow from cover indicates this trouble.	Disassemble and replace diaphragm or tighten the valve stem nut.
	Foreign object on valve seat.	Valve opens okay, but only closes part way.	Try operating valve a few times. This might dislodge the object. If this fails, disassemble and remove the obstruction.
	Pressure not being released from power unit chamber.	Make sure pressure is being released by opening a fitting into the chamber. It valve then closes, refer to remedy.	Check control system. Tube line or nipple might be plugged up.
	Operating pressure not getting into valve cover.	Use pressure gauge or loosen cover plug to check for pressure.	Clean tubing or pipe fittings into cover chamber. Open CK2 Isolation valves in control lines.
Valve fails to open.	Insufficient line pressure. Stem stuck in Closed or semi-open position.	Check line pressure. Vent cover. Apply pressure to power unit chamber.	Establish line pressure. Disassemble, examine all internal parts for cause of the sticking problem, and clean off scale deposits.
Valve closes but leakage occurs.	Worn diaphragm or loose upper stem nut.	Apply pressure in power unit chamber and vent cover. Continuous flow from cover indicates this problem.	Disassemble and replace diaphragm or tighten valve stem nut.
	Foreign object on top of disc retainer.	Valve closed okay but won't open all the way.	Try operating valve a few times. This might dislodge the object It this tails, disassemble and remove the obstruction.
	Pressure not being released from cover chamber.	Open a fitting or remove a plug from cover chamber. It cover chamber vents and valve opens, see remedy.	Check control system. Check lines or pipe fittings. Clean out any plugged lines.
	Operating pressure not applied into power unit chamber.	Loosen a fitting in this chamber to check for pressure at this point.	Clean tubing or pipe fittings into power unit chamber.
	Worn disc or seat.	The best procedure here is to disassemble the valve and inspect these parts.	Replace worn parts.
O-Ring failure.	Mineral deposits on stem cause abrasion on O-Ring.	Remove pressure from both cover and power unit chambers and apply line pressure to valve. Open line from power unit chamber and observe continuos flow.	Disassemble and replace O-ring.

Note:
Please refer to Cla-Val. drawing #69548, the Product Data Catalog and the Installation, Operation, & Maintenance Manual shipped with the Control Valve.

Start Up Procedure

The limit switch (SW2) on the valve should be adjusted before the pump control valve is placed in service. The stop collar on the limit switch stem should be adjusted to strike the switch arm roller as the valve travels closed to the 95% (approx.) closed position. The N.O. contacts on the SW2 limit switch will close when the adjustable collar strikes the limit switch roller and moves the switch arm.

Please read the operating instructions carefully. Make all adjustments (opening speed control, closing speed con - trol and limit switch) before starting the booster pump or turning on the electrical control power.

After the above adjustments have been made the H-O-A switch should be placed in the “off" position and the electrical control power should be turned on. The 60 Series control valve should then be permitted to close (please see manual) and allow the limit switch (SW2) stop collar to contact the SW2 switch roller. This action closes the N.O. contacts on SW2 and energizes the coil on relay 3CR.

The H-O-A switch can now be placed in the “automatic" position and the following operation should result:

Pump Starting - Pump Running Cycle

There are two ways in which the pump motor (M) starting cycle may be “called" on:

1 - The pump motor may be “called" on by manually placing the H-O-A switch in the hand position. This action bypasses the automatic remote switch (SW1) and calls the pump on.

2 - The pump motor may be “called" on by manually placing the H-O-A switch in the “automatic" position provided that the automatic switch (SW1) contacts close. This action places the pump motor under the command of SW1 and the associated safety controls. The pump motor (M) can not be called on, under any conditions, if the H-O-A switch is manually placed in the “off" position.

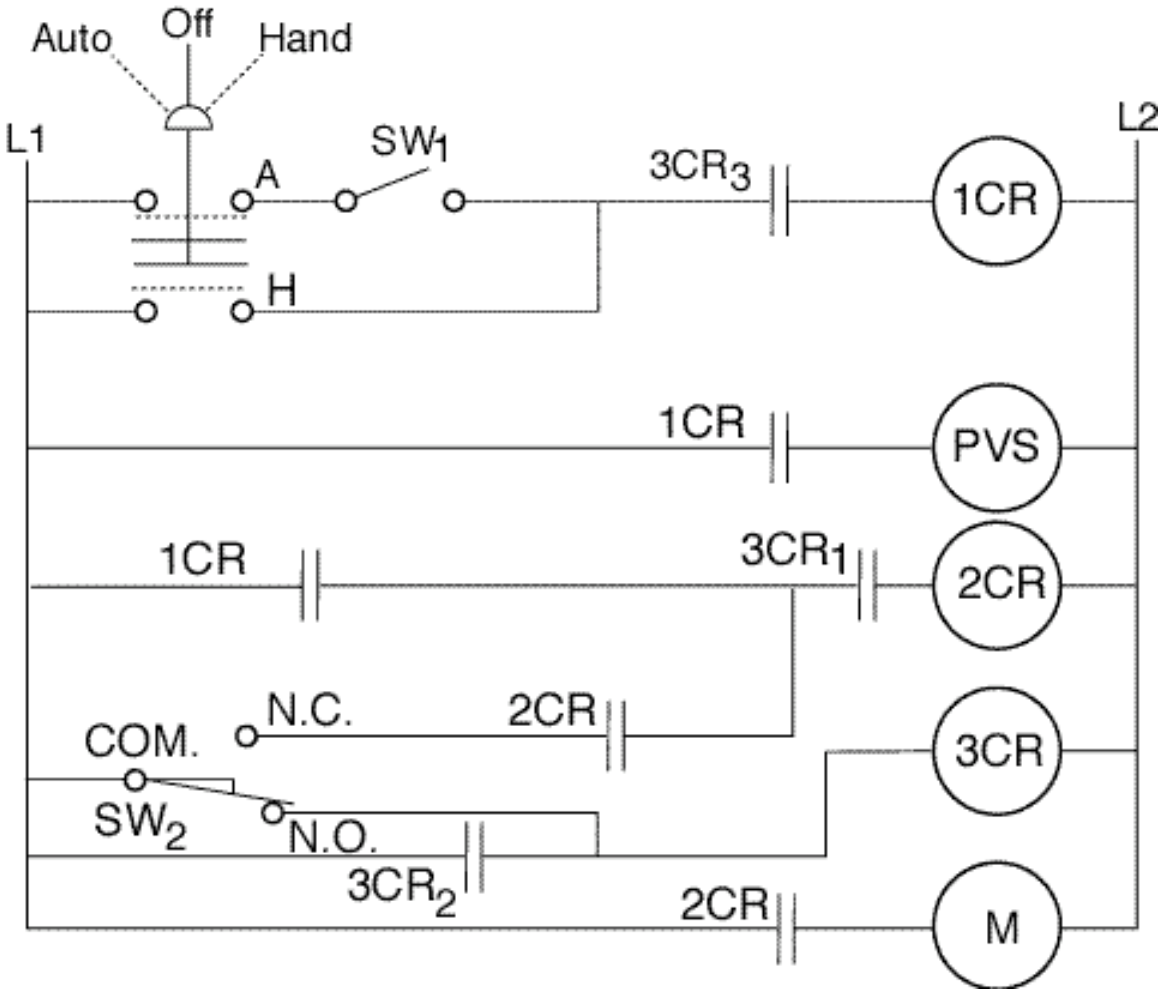
When SW1 contacts close (assuming that 3CR coil is energized—see start up procedure above) coil 1CR is energized, both contacts 1CR close to energize pilot valve solenoid (PVS) and relay coil 2CR. Both contacts 2CR close and the pump motor (M) starts immediately as the valve begins to open. As the limit switch SW2 stem collar lifts off the roller, SW2 contacts N.C., close. The pump is now locked on the line by SW2 and the valve slowly continues to go completely open, directing all liquid flow to the pipeline.

Power Failure (While Pump Is Running) Conditions

If a momentary power failure should occur while the pump is running, relay coil 3CR would be de-energized and contacts $3CR_1$, $3CR_2$, and $3CR_3$ would open. This action would completely lock the pump motor out from restarting and keep the valve solenoid PVS de-energized until the diaphragm assembly lowers to the setpoint of SW2 limit switch. The Cla-Val 60 Series valve is equipped with an integral “drop" check that will close immediately when the pump motor stops and prevent backflow. However, a time period of several seconds is required for the diaphragm assembly to travel to the down position to hold the valve closed when the pump restarts. Thus, even though the power is restored immediately following the power failure the pump cannot restart until the system is “ready", hydraulically, for a new start up.

Pump Stopping - Pump Off Conditions

When SW1 contacts are opened, or the H-O-A switch is manually placed in the off position, coil 1CR contacts open and the PVS coil is de-energized. Since the SW2 contacts are in the normally closed position the pump motor (M) continues to run as the pump control valve slowly closes. When the SW2 stop collar reaches the roller arm, the SW2 N.C. contacts will open, 2CR coil will be de-energized, both 2CR contacts will open and the pump motor (M) will stop. The pump motor will remain off under these conditions. Coil 3 CR will remain energized and contacts $3CR_1$, $3CR_2$, and $3CR_3$ will remain closed. The Cla-Val 60 Series will remain closed under these conditions.



Wiring Diagram

Auto-Off-Hand	=	Selector Switch
1CR	=	Relay, DPST Normally Open
2CR	=	Relay, DPST Normally Open
3CR	=	Relay, TPST Normally Open
SW_1	=	Switch, Remote Start,Automatic
SW_2	=	Switch, SPDT, Valve Limit Switch Connect to N.C. Terminal
PVS	=	Pilot Valve Solenoid
M	=	Pump Motor Starter

Note: SW_2 and PVS supplied by Cla-Val. All other electrical items supplied by customer. SW_2 is included in the X105L switch assembly which is mounted on the pump control valve cover.

Note:
Please refer to Cla-Val drawing #69548, the Product Data Catalog and the Installation, Operation, & Maintenance Manual shipped with the Control Valve.

Start Up Procedure

The limit switch (SW2) on the valve should be adjusted before the pump control valve is placed in service. The stop collar on the limit switch stem should be adjusted to strike the switch arm roller as the valve travels open to the 95% (approx.) closed position. The N.O. contacts on the SW2 limit switch will close when the adjustable collar strikes the limit switch roller and moves the switch arm.

Please read the operating instructions carefully. Make all adjustments (opening speed control, closing speed control and limit switch) before starting the well pump or turning on the electrical control power.

After the above adjustments have been made the H-O-A switch should be placed in the “off" position and the electrical control power should be turned on. The 61 Series control valve should then be permitted to open (please see manual) and allow the limit switch (SW2) stop collar to contact the SW2 switch roller. This action closes the N.O. contacts on SW2 and energizes the coil on relay 3CR.

The H-O-A switch can now be placed in the “automatic" position and the following operation should result:

Pump Starting - Pump Running Cycle

There are two ways in which the pump motor (M) starting cycle may be “called" on:

1 - The pump motor may be “called" on by manually placing the H-O-A switch in the hand position. This action bypasses the automatic remote switch (SW1) and calls the pump on.

2 - The pump motor may be “called" on by manually placing the H-O-A switch in the “automatic" position provided that the automatic switch (SW1) contacts close. This action places the pump motor under the command of SW1 and the associated safety controls. The pump motor (M) can not be called on, under any conditions, if the H-O-A switch is manually placed in the “off" position.

When SW1 contacts close (assuming that 3CR coil is energized—see start up procedure above) coil 1CR is energized, both contacts 1CR close to energize pilot valve solenoid (PVS) and relay coil 2CR. Both contacts 2CR close and the pump motor (M) starts immediately as the valve begins to close. As the limit switch SW2 stem collar drops off the roller, SW2 contacts N.C., close. The pump is now locked on the line by SW2 and the valve slowly continues to go completely closed, directing all liquid flow to the pipeline.

Power Failure (While Pump Is Running) Conditions

If a momentary power failure should occur while the pump is running, relay coil 3CR would be de-energized and contacts $3CR_1$, $3CR_2$, and $3CR_3$ would open. This action would completely lock the pump motor out from restarting and keep the valve solenoid PVS de-energized until the valve opens to the set point of SW2 limit switch. Thus, even though the power is restored immediately following the power failure the pump cannot restart until the system is “ready" , hydraulically, for a new start up.

Pump Stopping - Pump Off Conditions

When SW1 contacts are opened, or the H-O-A switch is manually placed in the off position, coil 1CR contacts open and the PVS coil is de-energized. Since the SW2 contacts are in the normally closed position the pump motor (M) continues to run as the pump control valve slowly opens. When the SW2 stop collar reaches the roller arm, the SW2 N.C. contacts will open, 2CR coil will be de-energized, both 2CR contacts will open and the pump motor (M) will stop. The pump motor will remain off under these conditions. Coil 3CR will remain energized and contacts $3CR_1$, $3CR_2$, and $3CR_3$ will remain closed. The Cla-Val 61 Series will remain open under these conditions.

SERVICE SUGGESTIONS

SYMPTOM	PROBABLE CAUSE	REMEDY
Main valve fails to open	No pressure at valve inlet	Check inlet pressure
	Main valve diaphragm assembly inoperative	Disassemble, clean and polish stem, replace detective parts
	Pilot Valve (CRD) not opening: No spring compression	 Tighten adjusting screw
	Damaged spring	Disassemble and replace
	Spring guide not in place	Assemble properly
	Yoke dragging on inlet nozzle	Assemble properly
	Flow Control (CV) disc inoperative. corrosion or excessive scale buildup on stem	Disassemble, clean and polish stem. Replace worn parts
Main valve fails to close	Foreign matter between disc and seat or worn disc. Scale on stem or worn Diaphragm Flow Clean Strainer plugged CK2 (isolation valves) closed	Disassemble main valve, remove matter, clean parts and replace defective parts Remove and clean or replace Open isolation valves
	Pilot Valve (CRD) remain open: Spring compressed solid Mechanical obstruction	 Back off adjusting screw Disassemble and remove obstruction
	Worn disc	Disassemble remove and replace disc retainer assembly
	Yoke dragging on inlet nozzle diaphragm nut	Assemble properly
	Worn Diaphragm	Disassemble. replace diaphragm and/or tighten nut
	Clogged Flow Clean Strainer	Remove and clean
Fails to regulate	Air in main valve cover and/or tubing	Loosen top cover plug and fittings and bleed air
	Pilot Valve (CRD) yoke dragging on inlet nozzle Pilot Valve (CRD) spring not in correct range to control	Assemble properly Check outlet pressure requirements and compare existing spring with Spring Chart

SERVICE SUGGESTIONS

SYMPTOM	PROBABLE CAUSE	REMEDY
Continuous flow from float pilot system discharge port	Damaged valve diaphragm	Replace diaphragm
	Loose main valve (1) stem nut	Tighten stem nut
	Damaged float pilot control (2)	Replace pilot valve assembly (See P-CFI-CI)
Main Valve fails to close	Differential pressure too low across main valve (Need 5 psid Min)	Restrict valve opening with Cla-Val X102A flow limiting under flowing conditions) assembly (Contact Cla-Val)
	Isolation valve in control tubing closed or clogged X46 strainer	Open isolation valve. clean strainer
	Float and float rod fails to move with liquid level change (stays in down position)	Free float mechanism
	Clogged Flow Clean Strainer	Remove and clean
	Worn Diaphragm	Remove and replace
Main Valve fails to open	Float and float rod fails to move with liquid level change (stays in up position)	Free float mechanism
	Inlet gate or block valve closed Check Restriction	Open valve
Main Valve Vibrates when closing	Air in cover	Bleed all air with float in the up position by loosening the top four cover bolts if valve is on its side or installed vertically

SERVICE SUGGESTIONS

SYMPTOMS	PROBABLE CAUSE	REMEDY
Main valve Fails to Close	To low pressure differential across valve (Need 5 psi d Min under flowing conditions)	Restrict valve opening with Cla-Val X102A flow limiting assembly. (Contact Cla-Val)
	Closed isolation valves in pilot system, or in main line	Open valves
	Lack of cover chamber pressure	Check upstream pressure, tubing, needle valves for restriction
	Worn Diaphragm	Remove and replace
	Mechanical obstruction Object lodged in valve Worn disc	Remove obstruction Replace disc
	Badly scored seat	Replace seat
	CNA needle valve closed	Open this speed control to allow pressure to cover
	Clogged Flow Clean Strainer	Remove and clean
Main valve Fails to Open	Closed isolation valves in pilot system, or in main line Insufficient line pressure Diaphragm assembly inoperative	Open valves Check pressure Clean & polish stem
Main Valve Vibrates when closing	Worn stem or cover bearing Air in cover	Replace any defective or damaged parts Bleed all air from valve

CDS6/CDS6A Pilot

SERVICE SUGGESTIONS **UPPER (SPRING) SECTION**

SYMPTOM	PROBABLE CAUSE	REMEDY
Vent leaks in lower cover (17)	Diaphragm (14) damaged	Replace diaphragm
	Diaphragm nut (12) loose	Tighten nut (12)
	O-ring (20) damaged	Replace O-ring (20)
Leakage past stem stem (5)	O-ring (10) damaged	Replace O-ring
Stem (5) movement restricted or erratic	*Sand or silt in sensing chamber above diaphragm	Remove foreign matter from sensing chamber
	Sensing line clogged	Clean line
	Sensing line valve closed	Open valve fully
	Sensing line sagging or bent collecting sediment	Straighten and support sensing line to reservoir
	Sensing line has high point trapping air in the line	Straighten sensing line. Must slope upward from altitude control to the reservoir

*NOTE: if this problem occurs, a sand trap should be installed in the sensing line, or the line moved to a point on the reservoir where sand or silt cannot enter this line.

SERVICE SUGGESTIONS **LOWER (PILOT VALVE) SECTION**

SYMPTOM	PROBABLE CAUSE	REMEDY
Vent in lower cover (17) leaks	O-ring (20) worn or damaged. See Upper Spring Section service suggestion	Replace O-ring (20)
Flow from supply port tovalve cover port restricted	Clogged strainer screen(25)	Remove screen and clean
	Silt packed in seat (24) and lower stem (21)	Clear area of blockage
Continuous drain leak. Main valve closed	Seat (24) damaged	Inspect and replace
	Disc in poppet assembly (22) damaged	Inspect and replace poppet assembly (22)
	Foreign object between disc and seat (24)	Remove object
	O-ring (20) in poppet guide (28) damaged	Replace O-ring
Continuous drain leak. Main valve open	Main valve diaphragm worn or stem nut loose	Service main valve. Replace diaphragm or tighten stem nut

100-01 HYTROL
SERVICE SUGGESTIONS

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

For Troubleshooting Instructions for Pilot Controls & Accessories See Section 2