



—MODEL— **CDS7-DO**  
**ALTITUDE CONTROL WITH DELAYED OPENING**

**INTRODUCTION**

The Cla-Val Model CDS7-DO Altitude Control is a spring loaded, 3-way, diaphragm-actuated control that provides high-level shut-off for Cla-Val Altitude Control Valves. It remotely senses pressure in the reservoir or tank. The DO feature provides an integral Delayed Opening function for independently adjusting the distance between the high and low water level.

There are two altitude ranges available, 5 to 40 feet and 10 to 80 feet. The spring adjusting screw can be set to stop flow into the reservoir within these ranges. There is one delayed opening range available: 1 - 16 feet.



**INSTALLATION**

The CDS7-DO Altitude Pilot Control is normally supplied mounted on a Cla-Val 211 Series Altitude Valve which should be installed in a horizontal run of pipe with the main valve cover up. Two line block valves are recommended for valve servicing. If the CDS7-DO is mounted from the main valve by a few feet, then it must be installed with adjustment springs up for ease of adjustment and servicing. Consult factory for recommendations.

After the Cla-Val 211 Series Altitude Valve is installed in the pipeline close to the reservoir, install the required remote sensing line from the CDS7-DO to the reservoir or tank. The sensing line allows the CDS7-DO to sense the static pressure head of the reservoir. The sensing line should not be installed in the flowing line between the valve and the reservoir or into turbulent flow area. These locations do not reflect the true static head of the reservoir.

The remote sensing line should be 3/4" or larger copper tubing or Schedule 40 PVC pipe. Galvanized pipe is not recommended. The sensing line should slope (minimum 2 degrees) upward from the CDS7-DO toward the reservoir to self-purge air out of the line. The sensing line should have no high points to entrap air. A shutoff valve at the reservoir connection is recommended. For above ground reservoirs, the connecting point for the sensing line should be a minimum of 12" to 18" above reservoir bottom (if filling from bottom) or at fill pipe connection (if filling from side). Minimum high-level set-point adjustment is approximately five feet above the remote sensing point of connection.

**Note:** Please make sure to remove the plastic plug from the drain port before putting the valve in service if pilot drains to atmosphere.

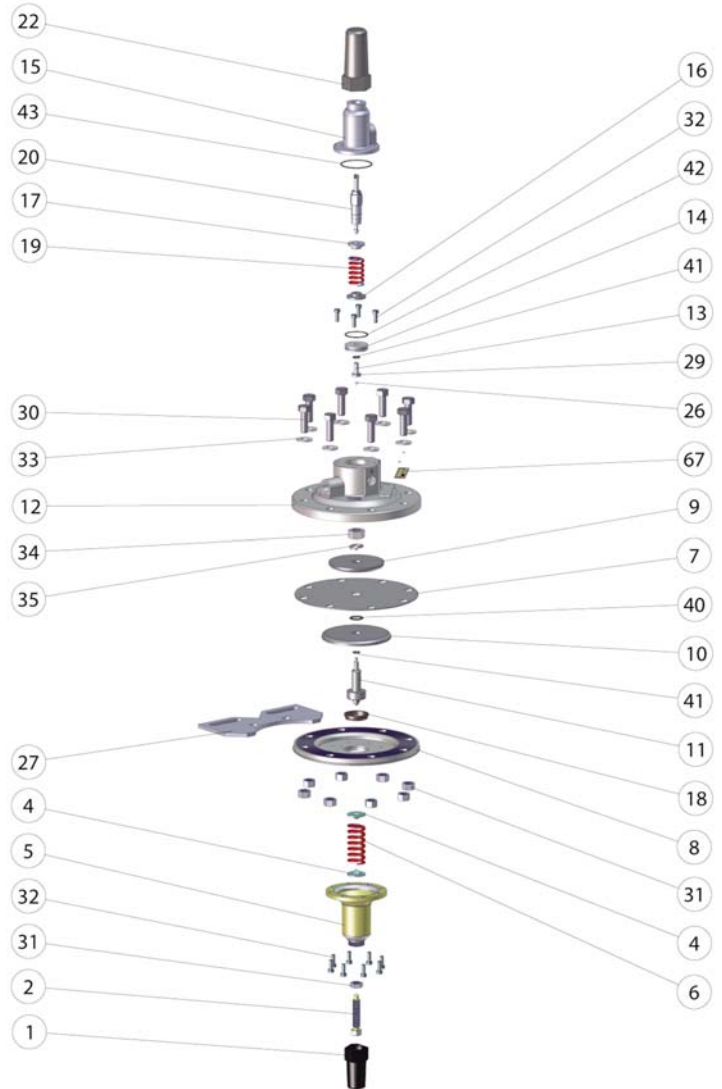
CDS7-DO STOCK NUMBER	ALTITUDE RANGE (FT H.O)	NUMBER OF SPRINGS	ALTITUDE CHANGE PER TURN	DELAYED OPENING RANGE (FT)	CHANGE PER TURN
300105-01	5 - 40	1	5	1 - 16	1

**OPERATION, START-UP AND ADJUSTMENT**

When the reservoir pressure (head) is lower than the setpoint of the spring on the CDS7-DO Altitude Control ports "1" and "D" are interconnected. This relieves the main valve cover pressure to atmosphere. Line pressure then opens the main valve to start filling the reservoir.

Reservoir sensing pressure increases as the liquid level rises in the reservoir. When the sensing pressure increases to the set point of the CDS7-DO control spring, the control shifts interconnecting port "S" and port "1". This pressurizes the main valve cover chamber and the main valve closes.

By turning the lower adjusting screw of the CDS7-DO pilot, the liquid level shutoff point will be changed. Turn the adjusting screw clockwise to raise the liquid level shutoff point; counterclockwise to lower the liquid level shutoff point. Follow the general operation and start-up instructions regarding purging air from the valve control system.



ID #	Description	Qty
01	Cap	1
02	Adjustment Screw	1
03	Hexnut	1
04	Spring Guide	2
05	Cover	1
06	Spring	1
07	Diaphragm *	1
08	Body, Lower	1
09	Diaphragm Washer, Upper	1
10	Diaphragm Washer, Lower	1
11	Stem Assembly	1
12	Body	1
13	Poppet Assembly *	1
14	Sleeve	1
15	Cover, Upper	1
16	Spring Guide, Lower	1
17	Spring Guide	1
18	Sleeve, Lower Body	1
19	Spring	1
20	Adjustment Stem Assembly	1
22	Cap	1
26	Ball	1
27	Mounting Bracket	1
30	Bolt	8
31	Hexnut	8
32	Screw	12
33	Washer	8
34	Hexnut	1
35	Lock Washer	1
40	O-Ring *	1
41	O-Ring *	2
42	O-Ring *	1
43	O-Ring *	1
67	Nameplate	1

\* Suggested Repair Parts - Repair Kit

## INSPECTION

Under normal operating conditions the CDS7-DO Altitude Control will be trouble free. Visually inspect and check pilot loop for leaks; check for any continuous leaks from control tube(s), from the vent hole in the lower cover or side drain port ("D") on the CDS7-DO pilot.

The volume of drained water from the side drain port ("D") of the CDS7-DO pilot will vary according to the valve size. Continuous draining after main valve has fully opened will indicate a problem. Refer to the service suggestions to check for probable causes and remedies.

## DISASSEMBLY

During preventive maintenance or service to the CDS7-DO Altitude Control, all pressure to the control must be shutoff. The CK2 isolation valve in the main valve control lines should be closed before starting disassembly. Main valves 4" and larger have CK2 isolation valves installed, however main valves smaller than 4" normally do not, therefore requiring closure of shutoff valves in the main line at the valve inlet and outlet. The isolation valve in the sensing line to the reservoir must also be closed.

**WARNING:** Failure to shutoff and release pressure prior to any disassembly can result in serious damage to equipment or injury to personnel.

1. Disconnect and remove all control tubing's from the CDS7-DO.
2. Remove two of the eight hex nuts (31) washers (33) and bolts (30) that hold CDS7-DO to the mounting bracket (27).
3. Remove CDS7-DO Altitude Control from main valve to work on a bench or clean area. Parts must be kept clean.

## DISASSEMBLY OF LOWER SPRING SECTION

1. Remove cap (1), loosen hex nut (31) and unscrew adjusting screw (2) counter clockwise from lower cover (5).

**NOTE:** Count the number of turns required to remove the adjusting screw (2) counter clockwise; record this information for future reference when reassembling. This will allow the CDS7-DO Altitude Control to be reset back to approximately the same reservoir liquid level shut-off point, after being reassembled.

2. Loosen and remove the eight cover screws (32).
3. Remove cover (5), two spring guides (4) and spring (19).

## DISASSEMBLY OF UPPER SPRING SECTION

1. Remove (22).

**NOTE:** Count the number of turns currently on the Adjustment Stem Assembly (20) before removing; record this information for future reference when reassembling. This will allow the CDS7-DO to be reset back to approximately the same set-point, after being reassembled.

2. Loosen and remove the four cover screws (32).
3. Remove cover (15), o-ring (43), upper spring guide (17), spring (19) and lower spring guide (16).
4. Remove poppet assembly (13), center sleeve (14), o-rings (43) & (41).

**NOTE:** Use caution when using wrenches on poppet assembly (13); be careful not to damage special carbon coated surfaces.

5. Remove Delrin ball (26).

**CAUTION:** Use care not to misplace this small part (it is important that it be re-installed when re-assembling).

## DISASSEMBLY OF BODY ASSEMBLY SECTION

**NOTE:** Before disassembly, apply a witness mark (a punch mark or scratch) across upper body (12) and lower body (8). The mark is made on each half of the assembly so that upon re-assembly the marks can be later lined up in the correct position.

1. Loosen and remove the remaining six hex nuts (31), washers (33) and bolts (30).
2. Separate the lower body (8) from upper body (12).
3. Remove the stem and diaphragm assembly that includes the stem (11), lower diaphragm washer (10), diaphragm (7), O-ring (41), upper diaphragm washer (9), lock washer (35) and hex nut (34).

**NOTE:** Use the wrench flats on stem (11) to hold when loosening hex nut (34) to disassemble.

**NOTE:** Use caution when using wrenches to disassemble the stem and diaphragm assembly; careful not to damage special carbon coated surfaces on the stem (11).

4. Inspect all parts for damage, wear and mineral deposits, clean thoroughly.
5. Inspect and clean the diaphragm (7); check for wear or cracks; replace if required.
6. Check O-ring's (40) and (42) for wear; replace if required. Inspect and remove any deposits found in O-ring groove areas.

**NOTE:** Clean all metal parts thoroughly and replace damaged parts as necessary. If, upon disassembly, sand and silt are found in the CDS7-DO Altitude Control, every effort must be made to eliminate this problem. Filters, or relocating the reservoir sensing line may be required if deposits are found in the sensing chamber of the control.

## REASSEMBLY

1. Reassembly is in general, the reverse of disassembly.

## REASSEMBLY OF BODY ASSEMBLY SECTION

1. Use the wrench flats on stem (11) to hold when tightening hex nut (34).  
**NOTE:** Use caution when using wrenches to tighten the stem and diaphragm assembly; careful not to damage special carbon coated surfaces on stem (11). A light coating of Dow Corning 33 grease, or equivalent, should be applied to stem (11) before reassembly.
2. Clean and replace the Delrin ball (26) if necessary.  
**CAUTION:** Do not overlook replacing this step; this small part plays a critical role in proper operation of pilot.
3. Lubricate and replace both o-ring's (41) and o-ring (40); clean and replace poppet assembly (13) and center sleeve (14); firmly pressing until fitted flush into upper body (12).
4. Clean surfaces of lower body (8); place on bench with serrations facing up.
5. Install lower body sleeve (18) into lower body (8).
6. Re-assemble the stem and diaphragm assembly that includes the stem (11), lower diaphragm washer (10), diaphragm (7), o-rings (40 & 41), upper diaphragm washer (9), lock washer (35) and hex nut (34).  
**NOTE:** Use wrench flats on stem (11) to hold when tightening hex nut (34).
7. Install stem and diaphragm assembly into lower body (8).
8. Install upper body (12).  
**NOTE:** Using the witness marks made in the dis-assembly procedures; to correctly align the upper body (12) and lower body (8).
9. Install six of the eight bolts (30), six washers (33) and six hex nuts (31); tightening securely. The remaining two eight bolts (30), two washers (33) and two hex nuts will be installed later when re-installing the CDS7-DO back onto the mounting bracket (27).

## REASSEMBLY OF UPPER SPRING SECTION

1. Replace spring (19), lower guide (16) and upper guide (17).
2. Inspect, clean & reinstall adjustment stem assembly (20) into cover (15).
3. Clean O-Ring groove of cover (15).
4. Clean, lubricate and install O-Ring (43) into groove of cover (15).
5. Install cover (15) and four screws (32); tightening securely.  
**NOTE:** Re-adjust the adjusting stem assembly (20) clockwise the same number of turns as recorded in the disassembly instructions above. The CDS7-DO Altitude Control Delayed Opening will now be reset to the approximate set point as it was prior to disassembly.

## REASSEMBLY OF LOWER SPRING SECTION

1. Install the two spring guides (4); one on each side of spring (19); placing on top of exposed portion of stem (11).
2. Install cover (5) over spring & guides, installing eight screws (32); tightening securely.  
**NOTE:** Re-adjust the adjusting screw (2) clockwise the same number of turns as recorded in the disassembly instructions above. The CDS7-DO Altitude Control will now be reset approximately for the same reservoir liquid level shut-off point as it was prior to disassembly.

## COMPLETING ASSEMBLY

1. Re-install CDS7-DO Altitude Control assembly back onto main valve; using remaining two remaining bolts (30), two washers (33) and two hex nuts (3); securely tightening onto bracket (27).
2. Replace previously removed control tube lines & fittings; securely tighten.

## SERVICE SUGGESTIONS

Symptom	Probable Cause	Remedy
Leak from vent hole in Lower Cover (5)	Diaphragm (7) damaged	Replace Diaphragm
	Hex Nut (34) loose.	Tighten Hex Nut
	O-Ring (42) or Lower O-Ring (41) damaged.	Replace O-Rings (41) and/or (42)
Flow from Supply Port (S) to Cover Port (1) restricted.	Silt (foreign matter) in upper cover.	Clear blockage. Clean Poppet Assy (13), and Center Sleeve (14).
Continuous leak from Vent Port (D). Main Valve closed.	Silt (foreign matter) in upper cover, between Poppet Assy (13) and seating surface of upper cover (12).	Clean area. Remove foreign matter.
	Upper O-Ring (41) and O-Ring (43) damaged.	Replace Upper O-Ring (41) and O-Ring (43)
Continuous leak from Vent Port (D). Main Valve open.	Hytrol Main Valve Diaphragm is damaged or Main Valve Stem Nut loose.	Service Hytrol Main Valve. Replace Main Valve Diaphragm or tighten nut. *

\*NOTE: Refer to 100-01 Hytrol IOM for detailed main valve disassembly/ reassembly instructions