

30D Continuous Flow Systems

Overview

This technical bulletin describes the basic setup, initial controller programming, and comparison of valve specifications for the Teledyne ISCO 30D syringe pump.

30D pumps can be configured for continuous delivery of fluid at either a constant flow rate or constant pressure.

The 30D pump is different from all of our other D series pumps in that it requires a dedicated controller to operate it. Due to the high pressures these pumps can operate at it is not possible with the 30D to mix different pumps together and run them from the same controller.

A complete system consists of:

- 2 each D-Series model 30D syringe pumps
- 1 each valve assembly
- 1 each D-Series syringe pump controller

one automated dual valve package which can be either electric valves* or air valves.

Valve Types

Two different valve systems are available for the 30D pump utilizing electric or air operated valves:

- **Air valves** are faster in switching than the electric valves and have a larger internal fluid flow path.
- **Electric valves** are less expensive than air, do not require a source of compressed air, and have less pressure fluctuations at switch over. They can only be used as pumps A and B in a continuous flow system.

30D Electrically Operated Valve System

The electrically operated valve assembly (62-1247-113) consists of a valve module that connects between the two pump modules and a circuit board that is mounted inside the controller (Figure 1). The valves are a stem pressing a ball into a seat construction so they also function as a check valve and only allow flow in one direction. The valves in Figure 2 are marked to show the direction of flow.

**the electric valves require a special controller and if they are installed the controller can only operate 2 pumps*



Figure 1: 30D system with electric valves

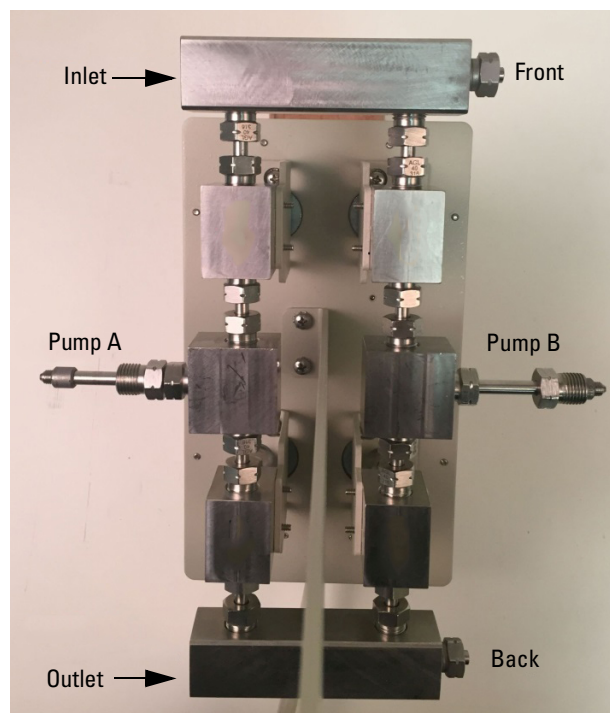


Figure 2: Flow path with electric valves

Note

Installation works best with two people.

1. Remove the upper tower cover screws on the right side of pump A and the left side of pump B.
2. Place the two pumps about 1.3 cm apart.
3. Loosely attach the two tubing lengths from the sides of the valve assembly to the pumps.
4. Install the 3 screws on each pump tower to hold the valve bracket.
5. Tighten the tubing to the pumps.
6. Install the inlet tubing assembly from the inlet marked connection on the valve assembly to the supply reservoir.
7. Connect the outlet port tubing to the outlet connection block near the back of the valve assembly to your apparatus.
8. Connect the control cable from the valve box to the connector marked “electric valves” on the rear of the controller.

Note

Connectors are F250C fittings consisting of a gland nut (part number 209-0164-02) and collar (part number 209-0164-03).

9. Select the valve type by pressing the following key sequence followed by the 3 to select the electric valves. The number 3 will then be flashing.

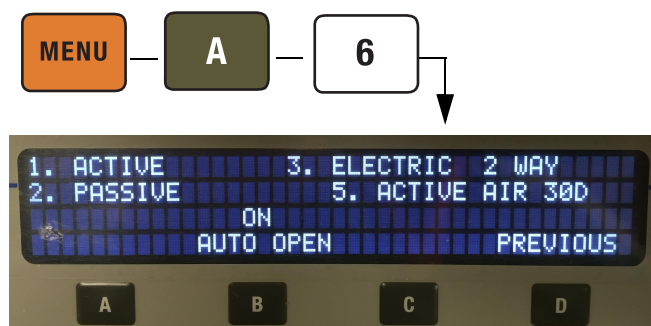


Figure 3: Selecting electric valves from the valve menu

10. Then press the D soft key 3 times to return to the run screen.

Programming for continuous constant flow or continuous constant pressure is entered in the same manner as the other D-series pump types and is described in Section 5.6 of the D-Series Pumps Installation and Operations Guide.

30D Air Operated Valve System

The 30D air valves assembly (part number 60-1247-182) and a complete system is shown in Figures 4 and 5. The outlet is located in the ‘tee’ at the top of the valve assembly and the inlet is located in the middle on the rear side of the valve assembly.



Figure 4: Air valve system

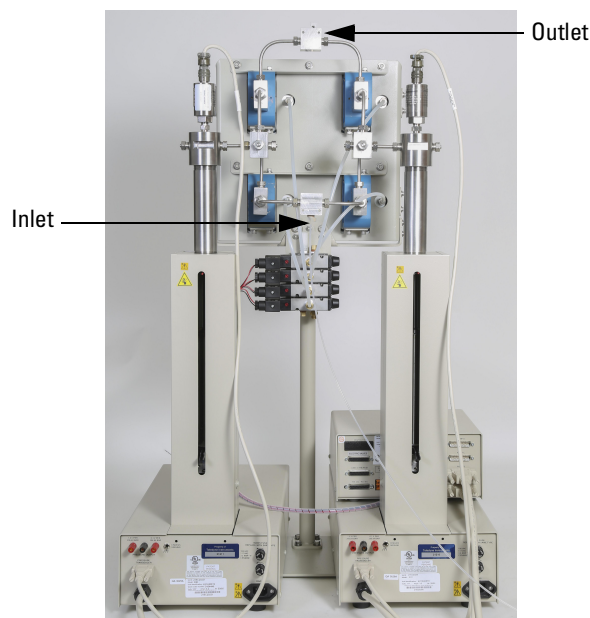


Figure 5: Air valve system rear view

The air valve system consists of a mounting plate, post, and valve assembly.

1. Initial assembly requires attaching the valve assembly, and base to the post using the included washers and nuts using parts shown in Figure 6.

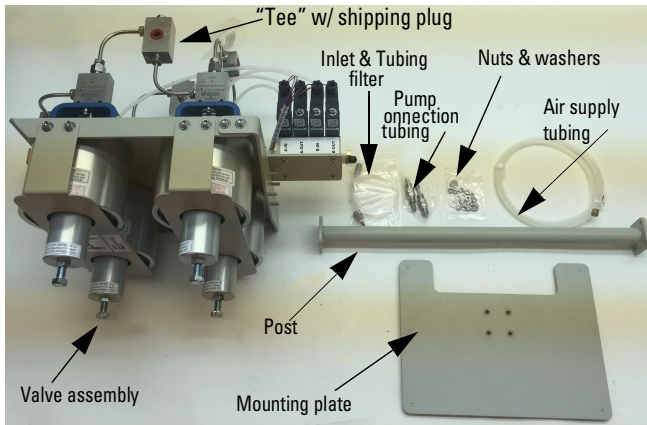


Figure 6: Air valve system as shipped

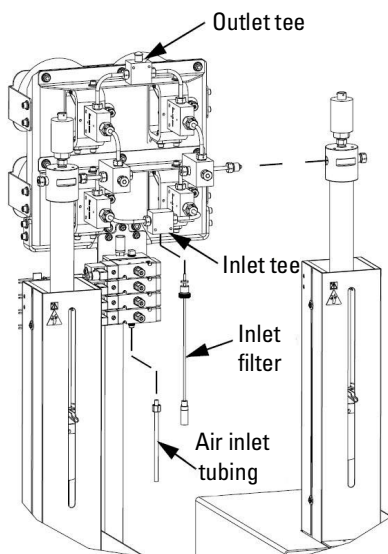


Figure 7: Assembly of air valve system

Note

Installation works best with two people.

2. Carefully stand the assembly on the mounting plate and place pumps on mounting plate to provide support.
3. After removing the shipping plug use the pump connection tubing to connect from each pump to the 'tee' fittings on the valve assembly (Figure 7).
4. Connect the inlet tubing with filter to the inlet 'tee' and place filter in your reservoir.
5. The outlet should be connected to your apparatus using tubing rated for 30,000 psi. Connectors are F250C fittings consisting of a gland nut (part number 209-0164-02) and collar (part number 209-0164-03).
6. Connect the air supply tubing to a regulated source of 80-115psi compressed air or nitrogen.

7. Connect the wires from the valve assembly to the terminal strip on the rear of the controller as shown in Figure 8.

Note

All red wires are connected to +15. The black wires are connected to A1, A2, B3, and B4 as shown in Figure 8.

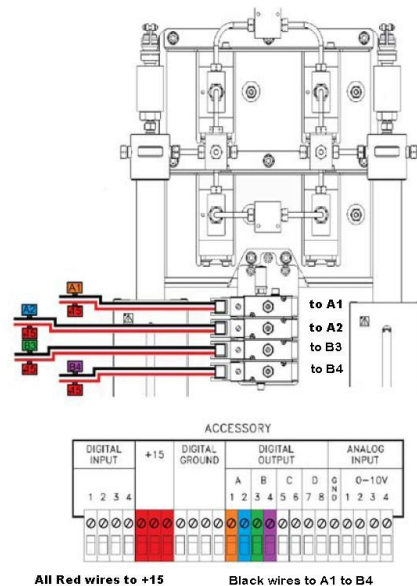


Figure 8: Connecting air valve system to controller

Valves can be tested for proper operation by using the ACC CTRL key on the front of the controller as shown in Figure 9.



Figure 9: Using accessory control menu to test valves for proper connection

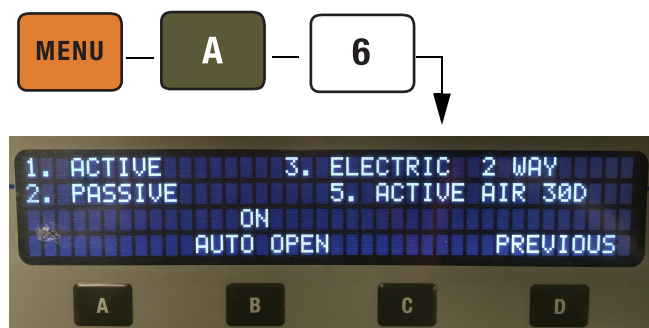


Figure 10: Selecting air valves from valve menu

8. Next select active air valves from the valve menu using the key sequence shown in Figure 10.
9. Press the 5 numeric key. The number 5 should be flashing.
10. Press the D soft key 3 times to return to the main menu.

The air valves do not function like a check valve so also turn on the special no check valve function (NCV) by using the key sequence shown in Figure 11. The no check valve feature causes the inlet valves to delay opening until a programmed low pressure is reached or the programmed time has elapsed. The defaults are 50 psi and 5 seconds. This prevents rapid release of fluid at a high pressure back into your reservoir.

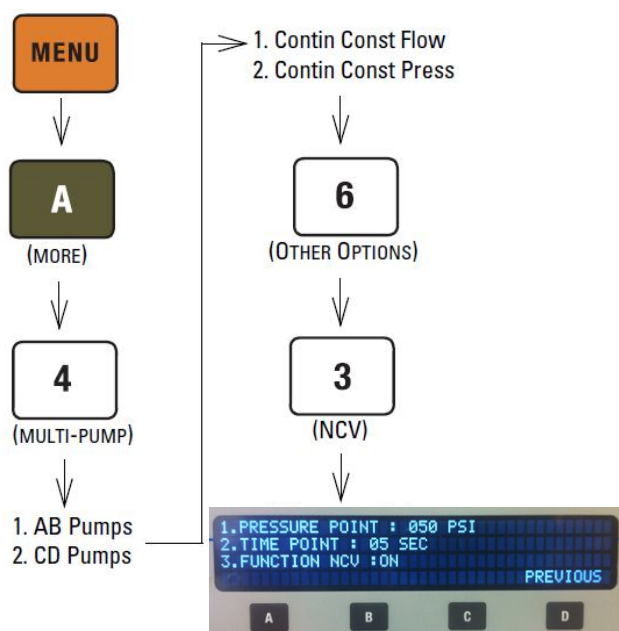


Figure 11: No check valve key sequence

Note

Programming for continuous constant flow or continuous constant pressure is entered in the same manner as the other D-Series pump types and is described in section 5.6 of the D-Series Pumps Installation and Operation Guide.

Comparison of Valve Systems

A comparison of specifications for the electric and air valves system is shown in the Table 1. Air valves are faster in switching than the electric valves and have a larger internal fluid flow path. Electric valves are less expensive than air, are electrically powered by the controller, but can only be used as pumps A and B in a continuous flow system.

Table 1: Comparison of 30D Valve Systems

| | Electric Valves | Air Valves |
|--|--|---|
| Pressure fluctuation at switchover | 50 psi (3.44 bar), at system backpressure from 100 psi (6.9 bar) to single pump maximum. Higher fluctuations occurs at pressures below 6.9 bar | 500 psi (34.5 bar) at system backpressures from 500 psi (34.5 bar) to the single pump maximum |
| Minimum system back pressure | 50.76 psi (3.5 bar) | 50.76 psi (3.5 bar) |
| Maximum system back pressure | 30,000 psi (2068.4 bar) | 30,000 psi (2068.4 bar) |
| Air Supply source pressure | None needed | 80 to 115 psi (5.5 to 7.9 bar) |
| Maximum continuous flow rate – low compressibility liquids | 14.3 ml/min (65% of maximum for single pump) | 14.3 ml/min (65% of maximum for single pump) |
| Liquefied gases | 9.9 ml/min (45% of maximum for single pump) | 9.9 ml/min (45% of maximum for single pump) |
| Temperature Range | 5 to 40 C | 0 to 40 C |
| Wetted materials – Valves | Hastelloy, Inconel, Vespel, and Silicon Nitride. | Hastelloy, PEEK, and PTFE |
| Wetted materials – Tubing and fittings | SS316, gold | SS316, gold |

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