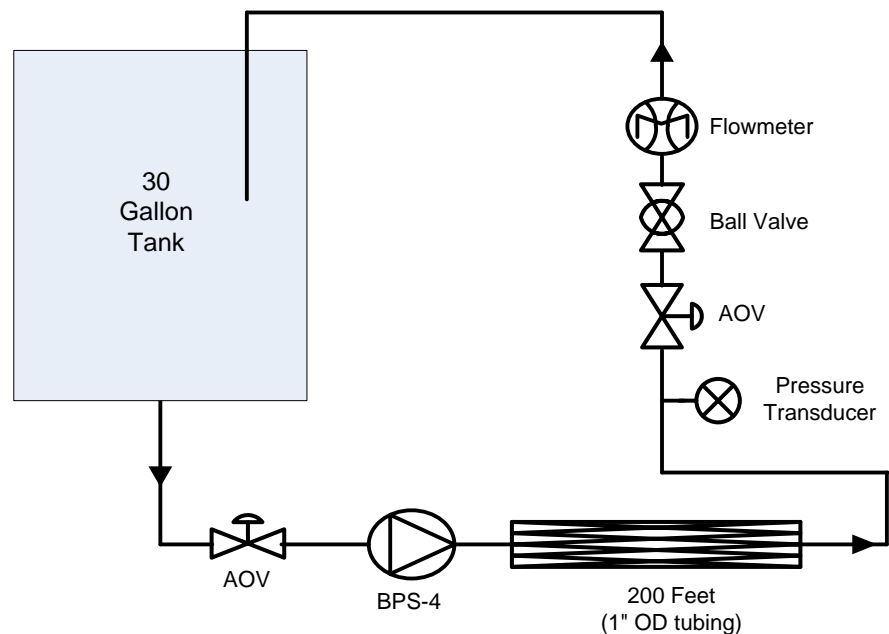


## Introduction

The goal of these series of tests is to simulate the start-up time to achieve a target PO pressure of 20PSI when the pump system is initiated from an idle condition. The hydraulic set-up was designed to simulate a typical single pass (dead-end) transfer system for state-of-the-art chemical supply lines in Microelectronic FABs.

## Hardware Setup/System

- **Pump:** Levitronix System BPS-4 (w/ LC325 Controller)
- **Pressure Transducer:** Kolbold 0-100 PSI (PDA-153N4P065)
- **Flowmeter:** Blue-White Industries 0-70LPM (F-2000)
- **Air Operated Valve-2X:** Fluoroware 1" Pinch Valve
- **Ball Valve:** Standard Adjustable to adjust backpressure
- **Tubing:** 1"OD/0.875"ID Tubing – 200 ft in length



**Figure 1:**



**Figure 2: Hydraulic Set-Up**



**Figure 2: Kolbold Pressure Transducer**

## Start-Up Operation

In order to ensure the start-up of the system accurately simulates a real system, an electrical switch was installed. When activated, this switch energized the following simultaneously:

- **ENABLE Input to LC325 Controller (this allows the pump to energize the levitation of the impeller)**
- **PROCESS Input to the LC325 Controller (this allows the pump to initiate the closed loop control to the set-point of 20 PSI)**
- **Power to solenoid valves to activate /open 2X AOV valves**

## Test Procedure

The following tests were performed:

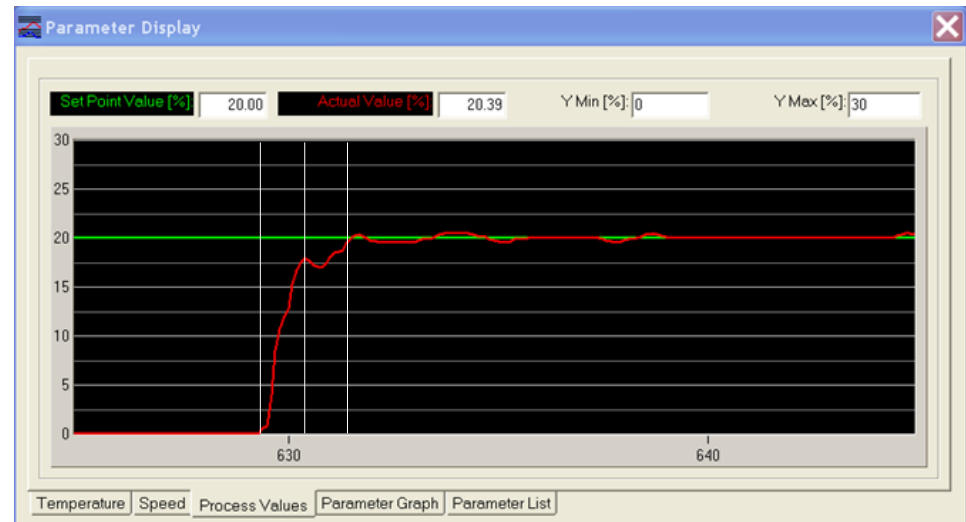
- **20PSI @ 1 LPM**
- **20PSI @ 10 LPM**
- **20PSI @ 10 LPM (Inlet AOV Valve was left open)**
- **20PSI @ 30 LPM**

The following screen shots from the Levitronix Service SW program display each test. The vertical axis represents the set-point percentage or pressure in PSI. In all the tests, the pressure set-point (green line) is 20PSI. The red-line is the actual feedback from the pressure transducer.

The horizontal axis represents time. The vertical white lines represents 2 seconds.

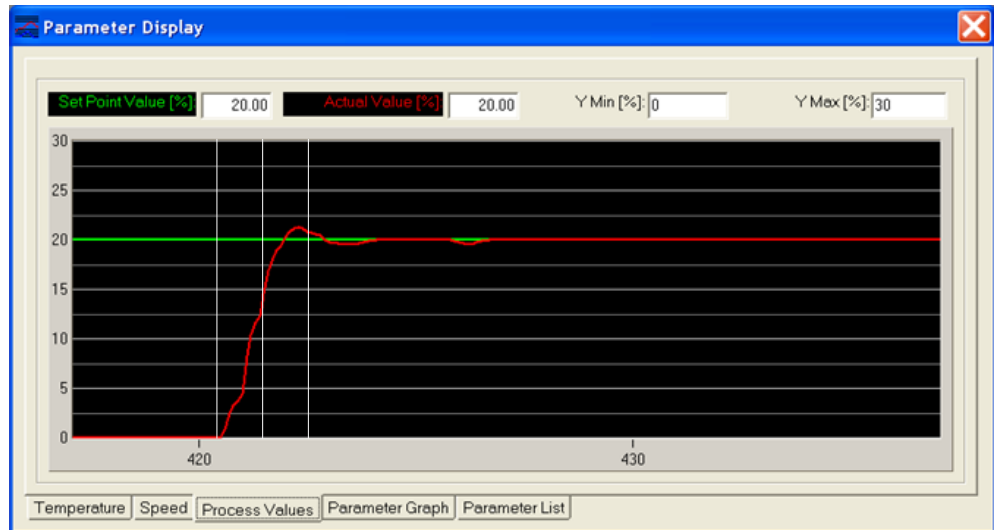
## Test Results

### 20PSI @ 1LPM



**Figure 1: Forward Incline (left) / Turned Pump (right)**

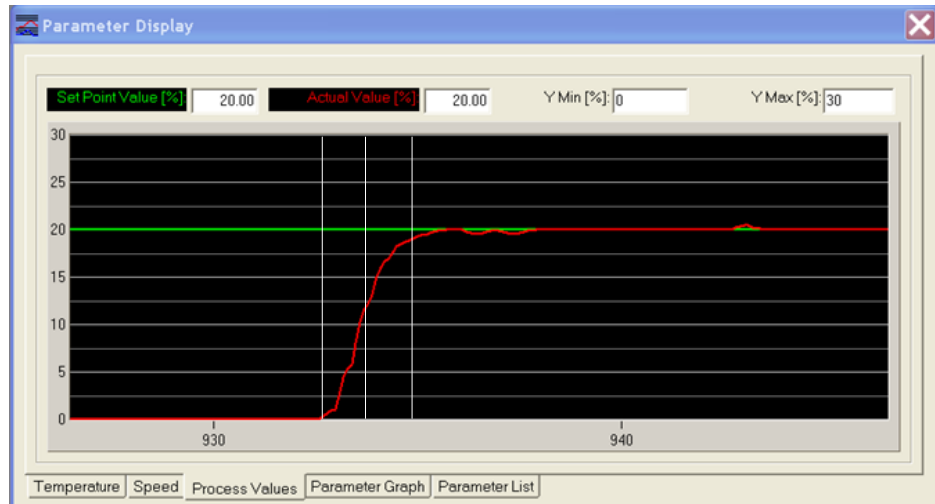
**20PSI @ 10LPM**



**20PSI @ 10LPM (No Inlet Valve)**



**20PSI @ 30LPM**



### Conclusions:

These tests have accurately simulated a single pass (dead end) transfer path in a real world scenario. The start-up time is defined by when the signal is commanded for the Bulk Chemical Distribution (BCD) controller to the time set point pressure is achieved. As the screen shots have shown in all cases, the start-up time to set point pressure is approx. 2 seconds.

**To summarize, the results have proven that the Levitronix closed loop pressure control system has met the start-up requirements for BCD systems, not only for recirculation loops but also single pass (dead end) transfer paths.**

### Technical Support

For troubleshooting, support and detailed technical information contact *Levitronix<sup>®</sup> Technical Service Department*.

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