

MicroFab Technologies, Inc.

Pneumatics / Thermal Control

Operating Guide

Pneumatics / Temperature Controller

Overview

This document, in draft format, provided information necessary for installing and operating the pneumatics / temperature controller unit.

Pressure Control

Reservoir pressure is important since it directly controls the meniscus location at the orifice. The MicroFab pneumatics control panel allows adjustment of this pressure in both the positive and negative direction. Depending on the fluid under test, the orifice can be seen to either pull the meniscus, and eventually air, into the orifice, or to continuously leak fluid. Proper adjustment is part of the device set-up.

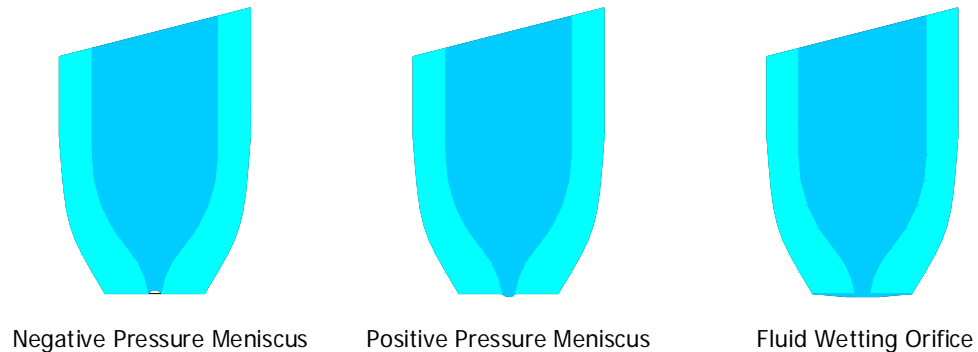


Figure 1 - Meniscus control

Set-up

Thermal / Pneumatic Connections

The pneumatic connection is typically made at the top of the reservoir. The pneumatics control is provided in two separate stages: 1) coarse, and 2) fine. In the coarse mode, pressure is applied to the reservoir at ~10-15 PSIG in order to purge or fill the jetting device. In the fine mode, pressure is adjusted to control the location of the observed meniscus, as shown in the earlier figure.

The temperature controllers operate independently. Rated output of the for the heating load is 1 amp @ 110 VAC. The controllers can be configured for use with a variety of thermocouples (see Appendix).

MicroFab offers a control box which houses the necessary pneumatic and thermal controls. Depending on the relative location of this control box and the print head, auxiliary cables may be required to span the distance. Control locations are shown in Figure 2 and described in the set-up sections below.

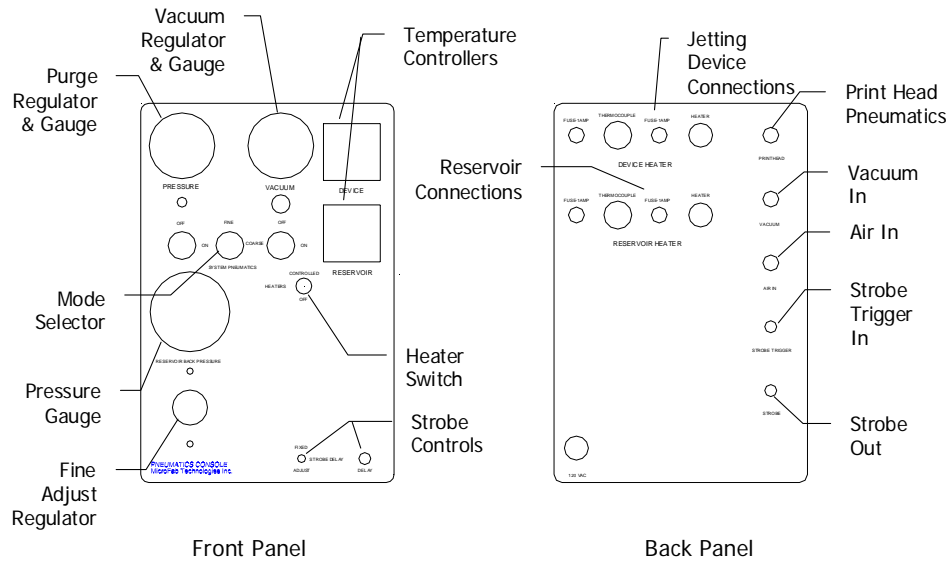


Figure 1 - MicroFab Pneumatics Panel; Control Locations

Start-up

Verify Pneumatics / Electrical Power

Verify that the gauges on the pneumatic panel are set to the expected values and that the heater enable switch is turned to the ON position. The purge pressure gauge should be set to ~10 PSIG, and the vacuum gauge should be set to -20 in. The primary pressure gauge should be set to 0 PSIG. Both the purge and vacuum knobs should be turned to OFF.

Initial Jetting Parameters

Reservoir back pressure

The following description of the back pressure assumes that the MicroFab Pneumatics Control panel is used.

Much of the set-up procedure depends on the characteristics of the fluid in use. As a normal starting point, however, the following settings should be used.

- Purge pressure = 10-15 PSIG; switched to OFF
- Vacuum = 20 in. Hg; switched to OFF
- Back pressure = 0 PSIG

- Purge switch = OFF
- Vacuum switch = OFF
- Mode Control switch = FINE

As a baseline setting, the values of the drive voltages at the user interface should be set to the values described in the jet operation manual.

Establishing an Operating Window

The following describes the procedure used by MicroFab to establish an operating window for a jetting device. This procedure assumes that there is no prior knowledge of the jetting behavior.

1. Verify that the location of the jet tip is known or visible on the video monitor.
2. Switch the Mode Control to COARSE. Turn the Purge switch to ON.
3. A straight, continuous, stream of fluid should be observed during the purge cycle. Continue to purge for a few seconds, and then switch Purge to OFF. The device should now be filled and the meniscus held with 0 PSIG.
4. Switch the Mode Control to FINE. If the observed meniscus is 'oozing' across the face of the orifice, reduce the back pressure until the flow stops. At this point, there is adequate pneumatic pressure to hold the fluid meniscus at the tip of the jet without forcing material from the device. If there is no flow from the orifice, or there is concern that air is drawn into the device, increase the pressure until the fluid does 'ooze' from the tip, and then back off a little.
 - It should now be possible to switch to purge mode and turn the purge on, and then return to the FINE mode, and have the meniscus held statically at the orifice.
5. With a stable meniscus, and the pneumatics in the FINE mode, turn stimulation (voltage) on at the PC user interface. The jet will probably appear as an oversized droplet with a long tail. If vacuum is being used and no drops are visible, slowly decrease the vacuum until jetting occurs.

Return to jetting manual



Appendix

The following connector mates with the connector supplied at the back of the pneumatics panel:

AMP 206429-1, Connector

AMP 206062-3, Shell

AMP 1-66103-7, Pin

Pin-out:

Pin 1 – 120 VAC

Pin 2 – Not used

Pin 3 – Neutral

Pin 4 – Ground

The operating guide for the Eurotherm controller is included on the following pages.