

MicroFab Technologies, Inc.

Pneumatics Control Panel

Operating Guide

Pneumatics Control Panel

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

All connections to the four channel control box are made in the rear of the unit. An overview of the connections is shown in Figure 2.

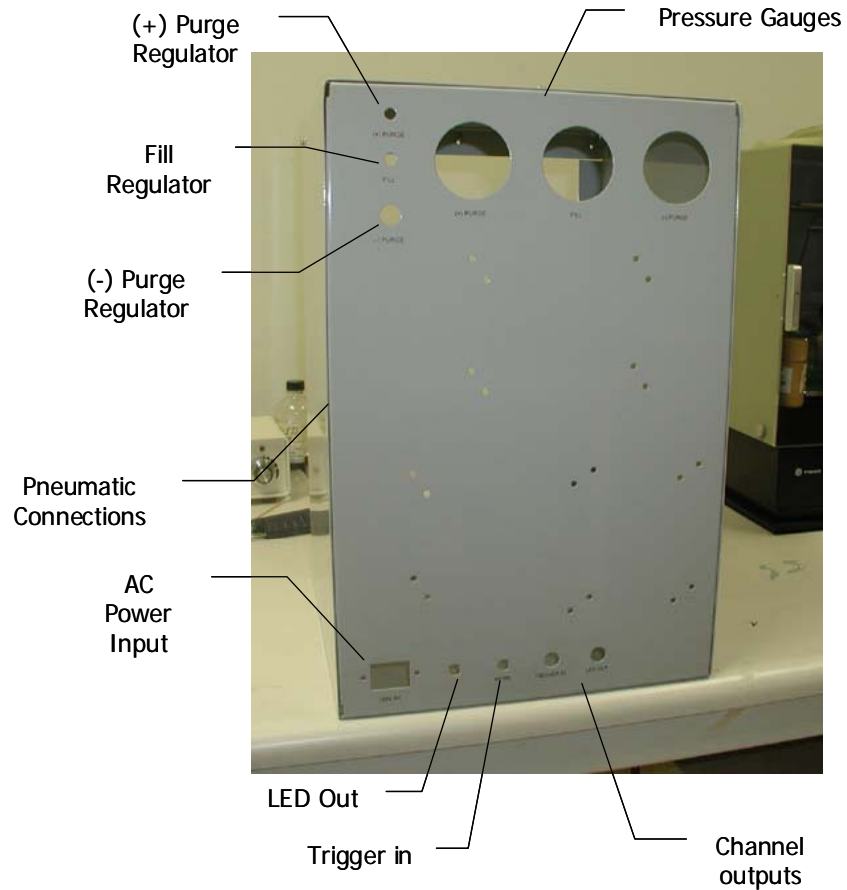


Figure 2 - Back Panel Connections

The control box will be installed by a MicroFab engineer during the jetlab installation, however some general notes about the connections:

Pneumatic connections – The location of pressure and vacuum connections to the box.

Purge and Fill regulators – These regulators and their gauges adjust the output pressure for the three functions described later. They may be adjusted at a later time, but the initial values should provide normal operation.

Front Panel Controls

The controls are accessible from the front. The controls are separated for each of the four channels as shown in Figure 3. Each channel has four controls and a pressure gauge. Each control will be described.

(+) PURGE – When this pushbutton is depressed, the pressure supplied to the fluid reservoir is raised to ~15 PSIG, or the value set at the back of the box. If the device is operating normally, a continuous fluid stream should discharge from the device.

FILL – Depressing this button pressurizes the reservoir to ~3 PSIG, or the value set at the back of the box. At this pressure, the fluid from the reservoir should force the fluid slowly into the device capillary. This feature is useful for fluids which are limited in supply.

(-) PURGE – When this button is depressed, vacuum is supplied to the reservoir at ~20 in. Hg, or the value set at the back of the box, and the fluid is drawn from the device back to the reservoir. This feature is useful if the device tip has been broken. It can also be used to draw contaminants away from the orifice, although that usually only delays the reappearance of these particles.

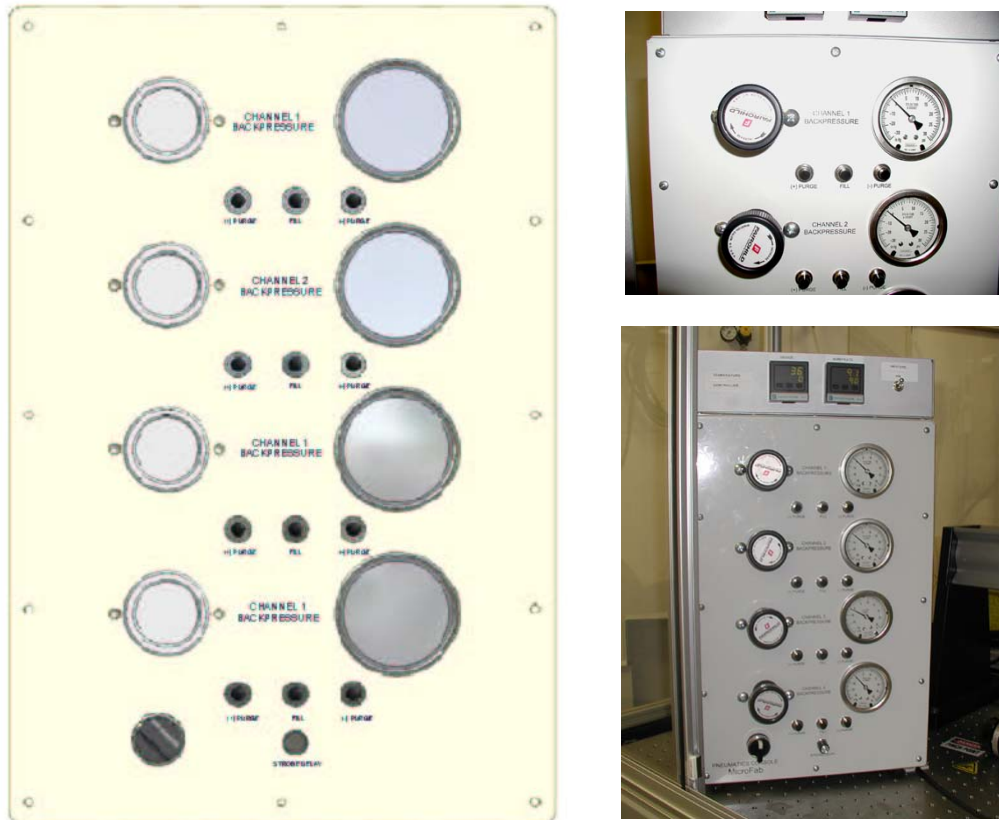


Figure 2 - Front panel controls

Control Regulator and Gauge – The control regulator adjusts the pressure in the reservoir to compensate for reservoir height and the wetting of the fluid to the glass. The regulator works above and below ambient pressure, and the gauge also reads both positive and negative pressures.

There are two additional controls mounted on the front panel. A two position switch is provided to turn the vacuum to the substrate control either On or Off. The knob should be in the Off position except during times when holding a substrate in place is desired.

Secondly, a potentiometer knob is mounted below the controls for channel 4. This controls the delay for the strobe pulse used to observe the drop in flight. By adjusting this knob, drops can be seen at various times after the initiation of the

Operation

Many of the operating recommendations made in the jetting manuals assume that the operator is using the single channel pneumatics panel. Below, the procedures are modified to recognize the use of the four channel box.

Verify Pneumatics / Electrical Power

Verify that the gauges on the back of the pneumatics panel are set to the expected values. The purge pressure gauge should be set to ~15 PSIG, and the vacuum gauge should be set to -20 in Hg. The control regulator / gauge should be set to 0 PSIG.

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
- Vacuum = 20 in. Hg
- Fill = 3 PSIG
- Control pressure = 0 PSIG

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. Turn the jet on to begin the strobe LED for observation.
2. Press the Purge pushbutton.
3. A straight, continuous, stream of fluid should be observed during the purge cycle. Continue to purge for a few seconds, and then release the Purge button. The device should now be filled and the meniscus held with 0 PSIG.

4. 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 depress the purge button to turn the purge on, and release the button, and have the meniscus held statically at the orifice.
5. With a stable meniscus, 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.