



## Using a P-97 manual with a P80-PC Puller

The P80-PC puller is no longer in production and the original P80-PC manuals have been universally banished to the upper shelves of most laboratories! Sutter currently produces two newer models of the puller, the P-87 and P-97 that have improved documentation. We can supply the P-97 manual to P80-PC users along with the following two-page addendum that documents the major differences. If you find other portions of the manual that do not apply, please contact Technical Support for further information.

### Cooling Air Delivery

The cooling air delivery system in the P80-PC consists of a Nitrogen Tank, a pressure gage and regulator, a micrometer-controlled orifice to adjust airflow, and finally a microprocessor controlled solenoid to determine air pulse delivery timing (TIME). In the P-97, there is an air compressor, reservoir tank and solenoid. Air pressure and solenoid timing are under microprocessor control.

The major functional difference in the two systems is how air delivery is controlled. In the P80-PC, one controls filament/glass cooling directly by controlling airflow with the airflow micrometer and air timing with the program parameter TIME.

There is a difference, and therefore possible confusion, in the use of the terms TIME and DELAY in the two pullers.

In the **P80-PC**, one uses the **TIME mode to control the delay** between the heating filament turning off/start of cooling air and when the hard pull is initiated. Because the cooling air pulse is initiated at the same time the heating filament turns off, the length of the delay, controlled by the TIME setting in the P80-PC, allows a degree of control over how much cooling has occurred (how viscous the glass is) before the hard pull is begun. On the P80-PC, the length of the air pulse is fixed at 300ms.

The P-97 air timing can be controlled in two different ways, DELAY or TIME. The first is identical to the method used in the P80-PC where the user controls the delay between the end of filament heat/cooling air start and the start of the hard pull. Unfortunately this parameter is called **DELAY** on the P-97, where it was previously referred to as the **TIME** on the P80-PC. In the alternative method of cooling in the P-97, one uses the **TIME** mode to control the duration of the air pulse. This type of TIME mode does not exist on the P80-PC and the P80-PC TIME works like a P-97 in Delay Mode.

In other words! The P-97 has two cooling methods, TIME (duration of air) and Delay (pause between heat OFF and pull ON, during which period the glass is being cooled). The P80-PC has one cooling method, the TIME mode. The TIME mode of the P80-PC equals the DELAY mode of the P-97.

The two pullers use different rates of current increase during the ramp test. P-97 ramp test increments current more slowly than the P80-PC ramp test. In effect this means that the values given by the ramp test for the same piece of glass and filament will be larger for the P80-PC than for the P-97. Thus, when using the ramp value for the starting reference for the HEAT value in a program, it should be less (with respect to the ramp value) for the P80-PC than for the P-97.



## Specifics Changes

The above differences translate into the following specific changes in the P-97 manual for P80-PC users:

1. Any references to changing air pressure on the P-97 should be interpreted as changes in airflow (Adjusting the airflow micrometer) on the P80-PC.
2. The P80-PC cooling mode TIME is identical to the Delay Mode on the P-97. Ignore references in the P97 manual to adjusting the parameter TIME and the "Time Mode" of cooling air delivery.
3. With regards to the ramp test value: Where the P-97 manual says to use the Ramp Value + 15 units for a trough filament, use the Ramp Value for the heat setting on the P80-PC. Where the P-97 manual says to use the Ramp Value for a box filament, use the Ramp Value - 5 units for the P80-PC.

The following differences also exist, but are of less consequence in pulling pipettes:

1. The P-97 manual refers to 8 "Software Control Functions". Only 2 of these, the Ramp Test and the Memory Test exist on the P80-PC. Ignore references to the remainder of the functions: "Change Air Pressure", "Air Mode", "Air Time at Start of Pull", "Air Time at End of Pull", "Reset Time and Date", "Write-Protect the Program". None of these functions exist on the P80-PC
2. The P80-PC does not have a "Humidity controlled chamber surrounding the heating filament" (see page 1). Thus any references to the chamber can be ignored.
3. The P80-PC does not record or display the "Time of the pull". If you wish to know how long the heating filament was on, it can be accurately timed with a hand held stopwatch.
4. The P80-PC is only capable of storing 10 programs, not the 100 stated for the P-97.
5. Write Protection of programs is not available on the P80-PC.
6. The P80-PC does not record or display the time/date of the last program edit.

## Specific P80-PC Concerns & Settings

1. Nitrogen Tank should have at least 700psi indicated on pressure gage. Once the tank pressure drops below 700psi, one can experience variability with cooling. Contact local welding shops and/or gas companies for refills or contact Sutter Instrument Company for replacement tanks. The pressurized tanks are considered biohazardous and the associated shipping rates exceed \$150. Therefore, it is much more economical to refill the tank (the tank is rated for up to 2,000psi) or rent a tank from a local gas company.
2. The outgoing pressure regulator should be set at 50psi. You may have to run through a few pulling cycles to accurately adjust the outgoing pressure.
3. The airflow micrometer behind the left puller bar should be set somewhere between the 1 and 1.25.
4. The gas jet should be adjusted 2mm below the base of the filament.
5. The TIME mode (which is the same as DELAY mode on the P-97) should be set somewhere within the range of 50 and 150.

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