Sink7 (VLSI)

(sink7)

1.0 Title

Sink7 in the VLSI area

2.0 Purpose

This document has specific information about wet sink7, a MOS and Non-MOS 6" sink in the Microlab.

3.0 Scope

Wet Sink7 provides a Big Batch silicon etch bath, a hot phosphoric acid bath, and two tanks as well as two DI water rinse followed by a quick dump. Each chemical bath and/or tank is clearly labeled.

4.0 Applicable Documents

Revision History

4.1 Heated Phosphoric Acid Etching of Silicon Nitride - Concentration and Temperature Control

4.2 Chapter 2.1 of the lab manual, which explains wafer boxes, tweezers, and other tool cleaning prior to using VLSI sink.

5.0 Definitions & Process Terminology

5.1 **Full Plenum Lockout Alarm:** Early warning alarm indicating sink drain failure.

5.2 **Quick dump rinse (QDR):** DI water fills the sink followed by a quick dump to get ride of excess acid and/or contaminants.

5.3 **Spin Rinse Dryer (SRD):** DI rinse followed by dry cycle.

6.0 Safety

Never touch any surface while wearing chemical-resistant gloves that other lab members may come into contact with, such as the table tops, door handles, computer keyboards, face shields, aprons, etc. If you need to step away from the sink at any time, rinse off gloves at the glove wash, dry with techni-cloths, and put away in your drawer until you are ready to resume your work at the sink.

Follow general safety guidelines for the lab safety rules outlined in Chapter 2.3 and the following:

6.1 This sink contains a Big Batch silicon etch bath, a hot phosphoric acid bath, and two HF tanks; therefore appropriate safety attire should be worn while working at this station. This means that chemically resistant gloves on top of the surgical gloves, face shield, and apron have to be worn while working at or around sink7. Do not use metal tweezers at this sink.

6.2 Do not adjust the heater controllers as they have been preset to produce proper bath temperatures.

6.3 Only use chemically resistant cassettes provided at the station (Teflon type). Failure to do so can cause damage to the station and/or compromise the operator's safety.

6.4 **Dwyer Photohelic Exhaust Flow Meter** (Figure 5): Monitors the sink exhaust flow and will shut down all electricity and water to the sink if there is too much or too little flow. An alarm will sound; press the red SILENCE button (Figure 4) and promptly report on FAULTS.

6.5 **MPC-901 Emergency Alarm** (Figure 4): Cuts power to the sink in emergencies. Push the big red STOP button (Figure 4) to cut the power to this sink. Report promptly on FAULTS.

6.6 **Glove Wash:** Located in the front center of this sink; water spray is sensor activated.

7.0 Statistical/Process Data

N/A

8.0 Available Processes, Gases, Process

Big Batch silicon etch bath, hot phosphoric acid bath, and two drainable HF tanks are available at this sink as well as two quick dump rinsers to properly clean the wafers prior to going into the 6" spin rinse dryer (top SRD on the rack.)

Bath	Chemical	Temperature
Left-Heated Bath	Big Batch Silicon Etch	60ºC
Right-Heated Bath	Hot Phosphoric Acid	160ºC
Left Non-Heated Tank	Non-MOS clean HF	N/A
Right Non-Heated Tank	MOS-clean HF	N/A

9.0 Equipment Operation

The sink operation is relatively easy. The main difference between the old and new style VLSI sinks is that at the new sinks members invoke the dump rinse cycle from a keypad mounted on the face of the station (one for each quick dump rinse tank).

9.1 Control Key Description

There are six control/displays at this station, see Section 11.0 (Figures & Schematics). The two MPC-100 (Figure 3) control panels are for the heated baths: the one on the left is for the Big Batch silicon etch, the one on the right for the hot phosphoric bath. The two **MICROKLEEN RINSE** (Figure 1) control panels are for the two quick dump rinse (QDR) stations. Each QDR is currently set up for four dump rinse cycles. Wafers are initially showered with DI water followed by four DI fill-dump cycles. These cycles end with wafers submerged in the water for operator to extract and place them in SRD. See Section 11.0 (Figure & Schematics) for more details. The station performs an automatic self-cleaning, every 60 minutes by one QDR cycle. The **MICROTIMER** (Figure 2) control panel timers for the HF baths are preset to 15 minutes.

POWER Turns on the control panel.

START Begins a process cycle at any of the control/display panels.

STOP/RESET Stops or interrupts a process cycle at any time.

SAVE/SIL Silences the acid bath alarm.

HOLD Stops heating the Big Batch silicon etch or hot phosphoric acid bath corresponding to the control/ display panels. Press **HOLD** again or **RETURN** to reactivate the heater.

DRAIN Press twice to empty the baths/tanks. Make sure chemicals baths are sufficiently cooled down before draining. To only drain a small amount, press the **DRAIN** button twice, then once again when you want to stop the draining.

9.2 Quick Dump Rinse Operation

9.2.1 Place wafers in the tank; tank initially should be full of DI water.

9.2.2 Press **START** button to activate the dump rinse cycle (Figure 1). It will cycle down from 4 to 1 then show 0 in the display window. At the end of the two cycles a beeping alarm will

sound. Press **STOP/RESET** to silence the alarm. Upon completion of four rinse cycles remove wafers and place in **SRD**.

9.2.3 **Note:** Dump the QDR water by pressing the **OPEN** button. This will open the gate at the bottom of the sink to drain the water. Press **STOP/RESET** to close the gate after the water is drained. Leave the QDR with no water in it and with closed lid before leaving the station.

9.3 Room Temperature HF Controllers (Microtimer Operation)

9.3.1 Place your wafers in the desired HF acid bath (left bath is designated non-MOS clean, right bath is designated MOS-clean).

9.3.2 Press the **START** button if you wish to use the 15-minute preset timer; use of this is optional (Figure 2).

9.3.3 Press **STOP/RESET** button to end or interrupt the cycle.

9.3.4 To reset the timer at end of cycle, press **STOP/RESET** once again.

9.3.5 Remove wafers and rinse in either of the quick dump rinsers.

9.4 Hot Bath Controller for Big Batch Silicon or Hot Phosphoric Bath (MPC-100)

9.4.1 Place your wafers in desired bath, either the Big Batch silicon etch (staff use only) or the hot phosphoric bath.

9.4.2 Press time/start button to start the etch process cycle with the preset time and temperature (Figure 3).

9.4.3 When your etch is completed after the preset time, hit the TIME STOP/RESET button to reset the timer.

9.4.4 Remove your wafers and rinse in quick dump rinse #1 for the Big Batch silicon etch or quick dump rinse #2 for the hot phosphoric.

9.5 Changing Acid(s) in Sink7

9.5.1 Big Batch Silicon Etch (Figure 3):

9.5.1.1 Press the **HOLD** button once on the MPC-100 temperature controller panel so that the bath temperature will cool down to 60ºC. **Note:** LED light next to **Heat**, under status column, goes off.

9.5.1.2 Next, press the **DRAIN** button twice to empty the bath. Rinse bath with DI water after completely drained. The timer is set for 10 minutes. Do not put solution in bath before this time has elapsed.

9.5.1.3 Press **DRAIN** button again to close the gate on the bottom of the tank. Fill the bath with new Big Batch silicon etch.

9.5.1.4 Press **HOLD** button to restart the heater. LED adjacent to **Heat**, under status column, turns on.

9.5.2 Room Temperature HF Baths (Figure 2):

9.5.2.1 Press the **AMBIENT TANK #1/#2 DRAIN** green button.

9.5.2.2 Rinse the bath with DI water once the tank is empty.

9.5.2.3 Press the **AMBIENT TANK #1/#2 DRAIN** green button again.

9.5.2.4 Fill the non-MOS clean or MOS clean HF in the appropriate acid tank accordingly.

9.5.3 Hot Phosphoric Acid Bath (Figure 3):

9.5.3.1 Press the **HOLD** button on the MPC-100 temperature controller panel so that the bath temperature will cool down to 74.5ºC.

9.5.3.2 Next press the **DRAIN** button twice to empty the bath. Rinse bath with DI water after completely drained. The drain timer is set for 10 minutes.

9.5.3.3 Press **DRAIN** button again to close the gate on the bottom of the tank. Fill the bath with new phosphoric acid.

9.5.3.4 Press **HOLD** button to restart the heater.

9.6 Control Panel Programs are shown in the Appendix

9.6.1 The parameter codes for the programs on the MPC-100 temperature controllers and Microkleen Rinse are listed on Tables 1 and 2 in the Appendix. The parameter codes are not to be altered by the Microlab members. Please use them as your reference check only.

10.0 Troubleshooting Guidelines

10.1 Rinse cycle stopped in the middle QDR cycles: press open to dump the water out. Press stop/reset key followed by restart the dump rinse cycle from the start.

10.2 No Power To Sink: Several issues can shut the system down.

10.2.1 Power To System Off (Fig.4): Press power ON if no issues have been reported on the Wand or if the system is not under technician's control.

10.2.2 Photohelic Differential Pressure Reading (Fig. 5) is outside limits (two red bars): Consult with staff to check house exhaust pressure.

10.2.3 Plenum Full: The plenum on this system is directly connected to fabwide (sink6). Full plenum in sink6 will also stop sink7 operation

11.0 Figures & Schematics

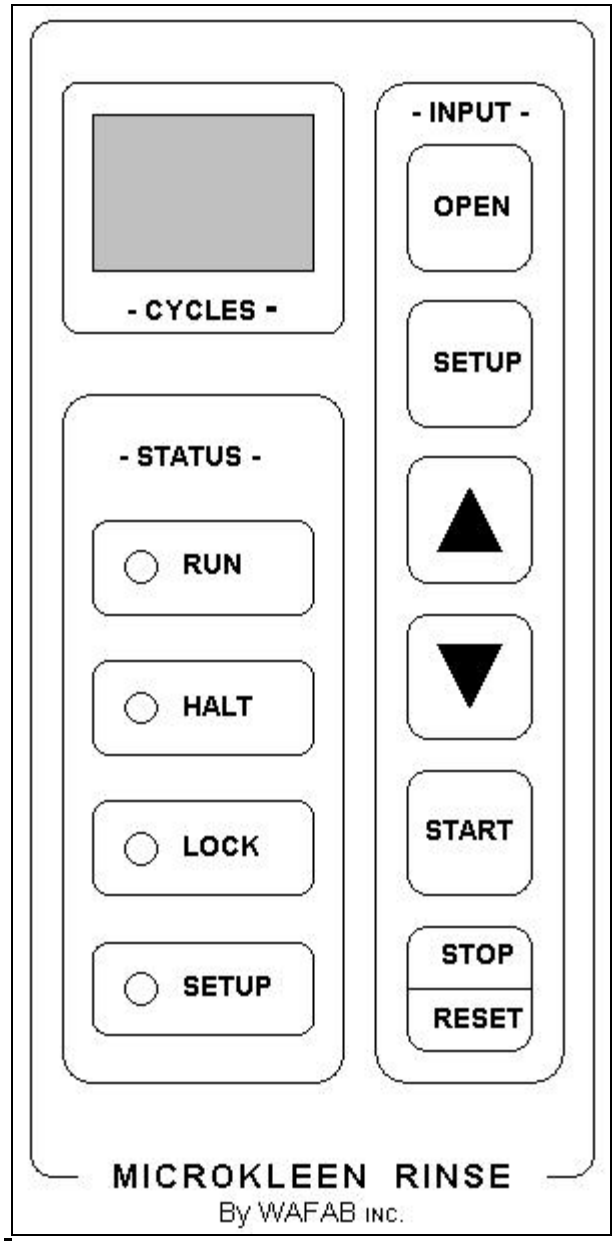

Figure 1 – Quick Dump Rinse (QDR)

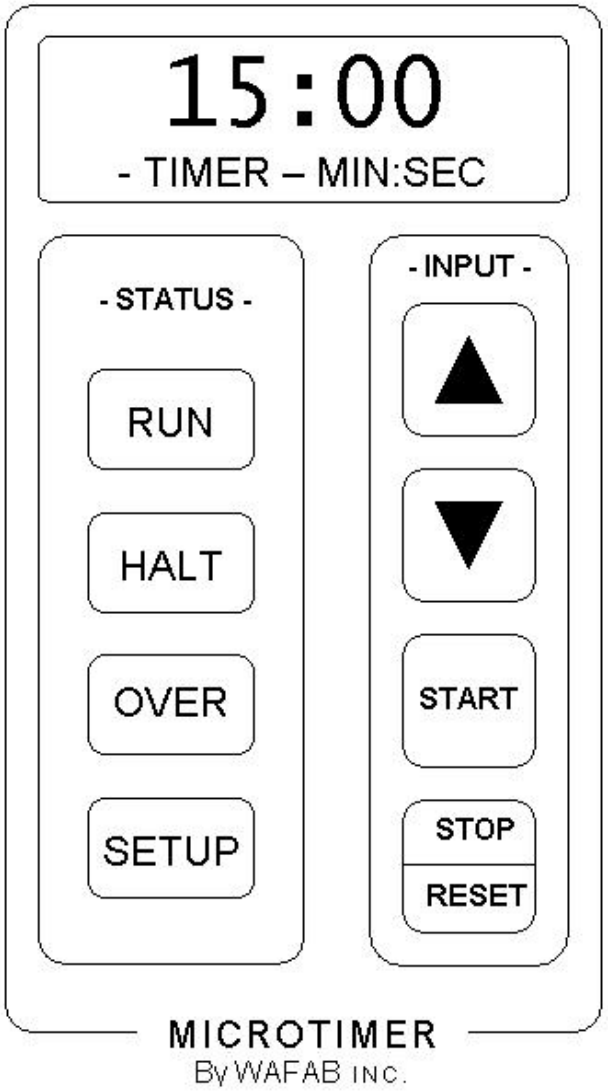

Figure 2 – Room Temperature Bath Timer Controller

AMBIENT
TANK #1
DRAIN

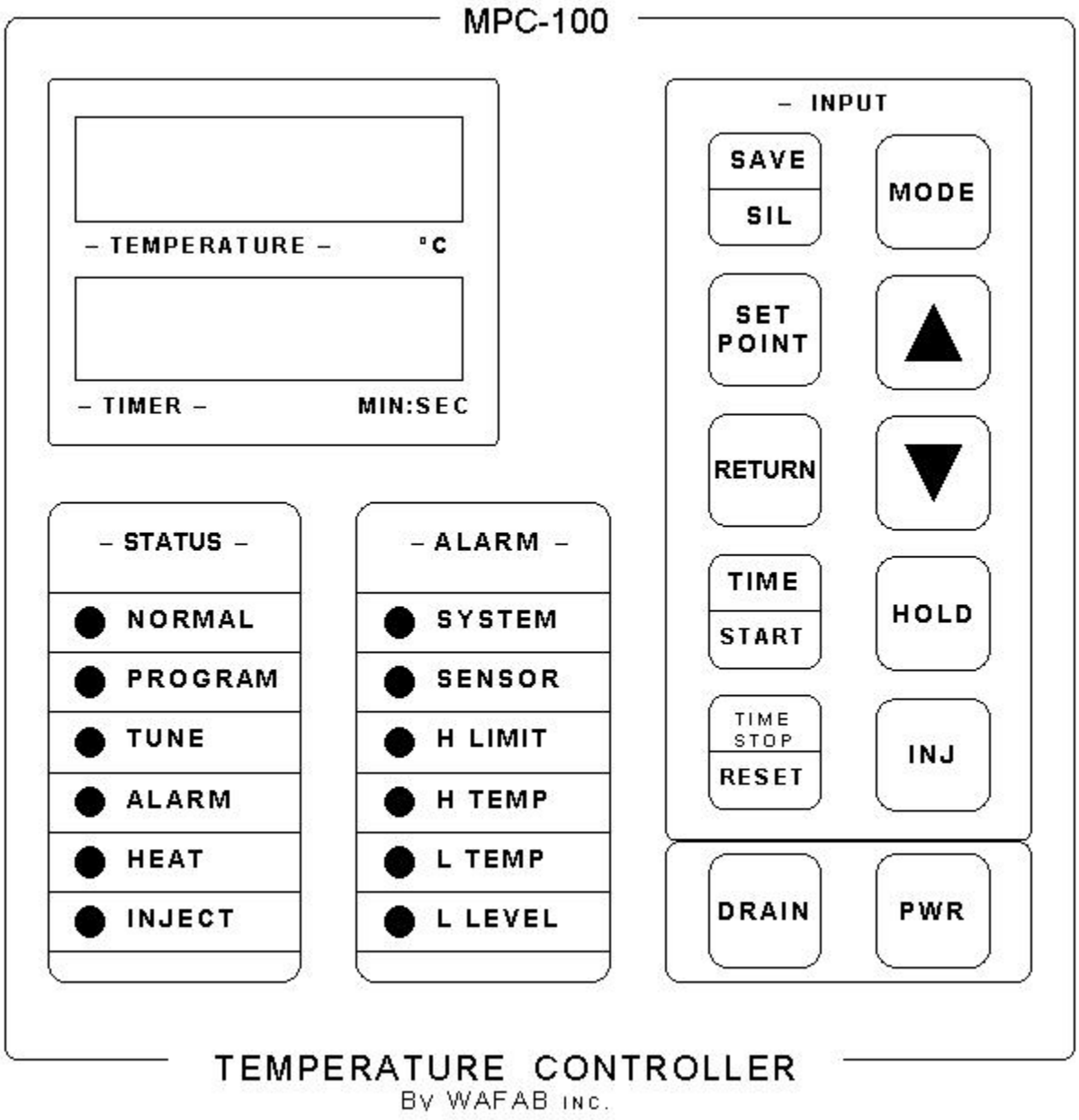

Figure 3 – Hot Bath Temperature Controller

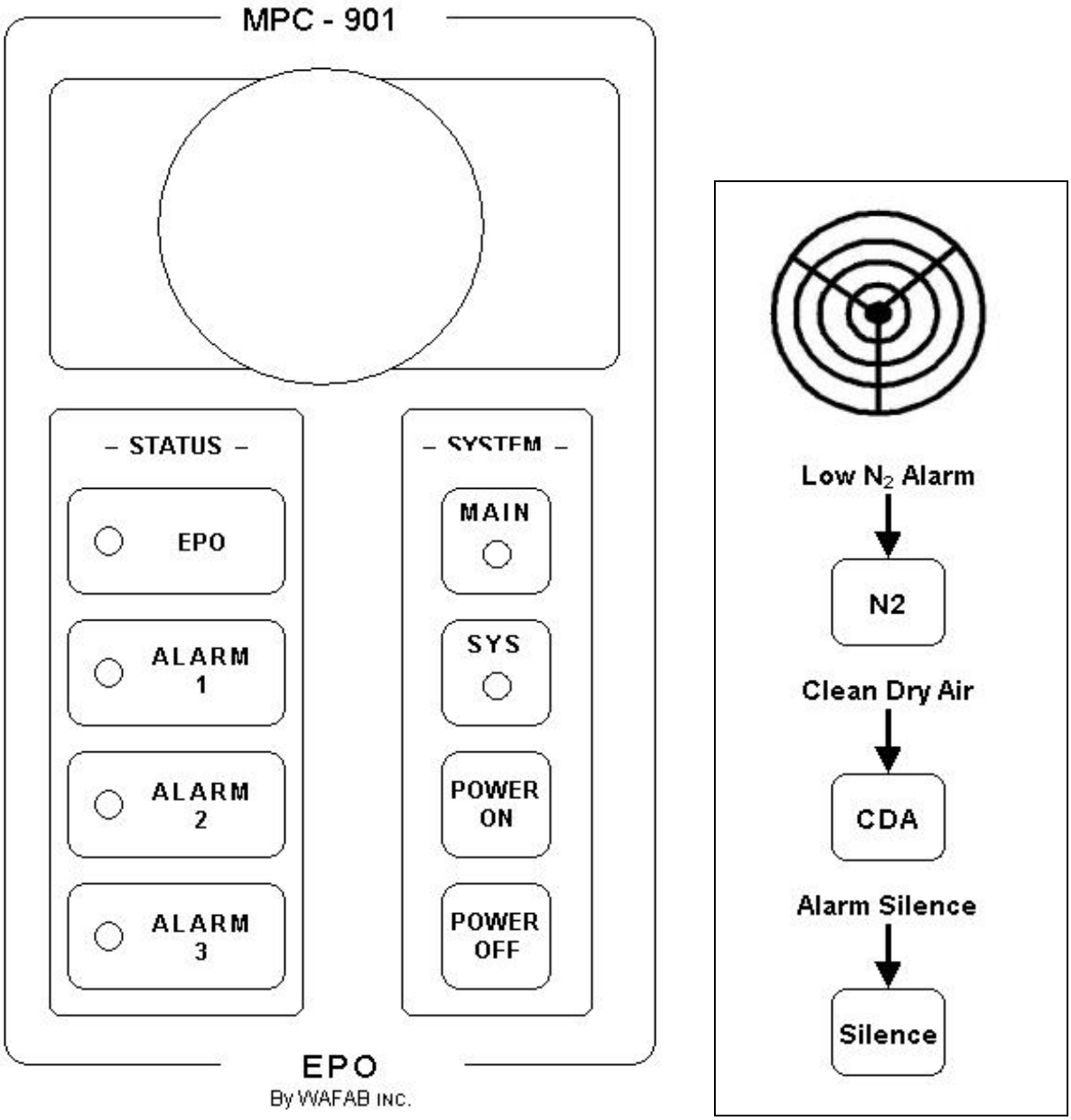

Figure 4 – Main System Power/Alarm Controller

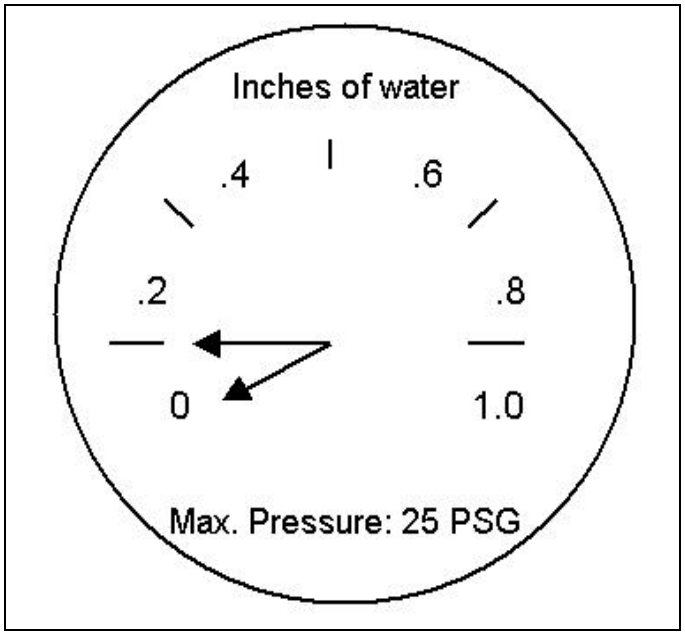

Figure 5 – Photohelic Differential Pressure Gauge

12.0 Appendix

Sink 7	
MPC-100 Temperature Controller Codes	
Timer	**Temperature (ºC)**
LED Displays	
Cr	11
Pb	1.0
rE	1.0
rA	0.0
OF	0.0
AC1	00
AC2	00
PS	Left bath: 60.0 Right bath: 160.0
dr	Left bath: 60.0 Right bath: 74.5

Temperature (ºC)	Timer
LED Displays	
dp	10:00

Timer	Temperature (ºC)
LED Displays	
HI	5.0
LO	5.0

Temperature (ºC)	Timer
LED Displays	
CS	15:00
PA	:10
IP	:00
Cd	d1

Table 1 - MPC-100 Hot Bath Temperature Controller Codes

Sink 7	
MICROKLEEN Rinse Codes	
Cycles	**Cycles**
LED Displays	
CY	2
FP	45
dP	5
Sd	2
Ad	0
n2	n
Ac	0
PC	5
Pn	1
nb	0
SL	1

Table 2 - Quick Dump Rinse Codes

Note: Do not change the recipes. The factory set up codes will be impacted.

DECK HOSE Instructions

The de-ionized (DI) water deck hose for the sinks is **ALWAYS** available for emergencies; it provides a good safety backup in the event of exposure to chemicals.

If this hose (the black curly cord) develops a leak, please observe the following procedure:

1) Locate the self-closing, stainless steel "quick connect" fitting at the end of the black curly cord.

   Caution! This hose is under pressure, so be sure to wear the following safety apparel before proceeding further:

   - **Face shield**
   - **Lab apron**
   - **Chemical resistant gloves**

   (as the water will spurt a bit)

2) Depress the "quick connect" locking mechanism. The fitting should snap apart quickly, thereby disconnecting the deck hose from its base.
3) Report as a problem on FAULTS.
4) Set the deck hose at the rear of the sink deck for replacement.

Sink7 Study Guide

Be sure to know….

1. What size wafers sink7 handles.
2. Left vs. Right stations.
3. What full plenum lockout means; what to do.
4. Protection for hands and body.
5. Tweezers allowed in the sink.
6. Adjusting heater controls.
7. A complete dump rinse cycle.
8. What to do if it stops in the middle of a quick dump cycle.
9. Easy-to-make mistakes that would contaminate sink station.
10. Activating the glove wash.
11. Loading 6” cassettes into the SRD.
12. Dealing with a leaking deck hose.
13. Disposing of empty chemical bottles.
14. How to cut power to the sinks in an emergency.