

Plating can be accomplished with the use of small or large beakers that can be obtained in the glass storage are in 432°C or checked out from the Microlab office. Otherwise the plating sink contains everything necessary to carry out electroplating.

Appropriate safety attire should be worn when using the sink (including chemical safety gloves, face shield, and apron).

A light switch is located on the lower left of the sink and controls the lights within the sink. Please turn off the light when you are finished.

9.2 Hotplate

Some electroplating setups may require the use of a hotplate or magnetic stirrer. The hotplate located at the sink is a combination hotplate with magnetic stirrer. To turn on first flip the switch located on the right-hand side of the unit. Before applying heat, set the temperature set point to the desired value by pressing the heat dial once and turning the heat dial. A temperature probe to monitor the solution temperature is provided. When the temperature probe is unplugged the hot plate monitors its surface temperature. To apply heat and temperature control press and hold the heat dial for 3 seconds. The actual temperature will be digitally displayed once temperature control begins. Agitation is tuned by adjusting the stir dial to the desired rate. The stir rate is also digitally displayed in revolutions per minute (rpm).

9.3 Power Supplies and Multimeters

There are currently two power supplies available at the station. One supply (Small HP unit) is for lower current requirements (up to 120 mA), while the second supply (Sorenson model) can be used for processes that require high currents (up to 12 amps). Please refer to the [Appendix](#) of this manual for instructions on how to set up and use the Sorenson 55-55 Model Power Supply.

Multimeters to monitor the current flow or voltage in electroplating setups are also available in this cabinet.

Two breakout boxes are available for use to connect the power supplies to the electroplating setup. The first is located on the outside wall of the plating sink between the sink and the cabinet with the power supplies. One may connect the power supply to the banana inputs on this break out box. The second break out box to be used with sinkplate2, is located on the right hand wall of the sink and may be used to connect to the electroplating setup. These two panels of banana connectors are matched so that the banana connectors of each are connected. One should use these panels to electrically connect the power supply to any apparatus in the sink. Do not directly connect the power supply to your electroplating setup as this can result in a dangerous condition should liquid drip onto the floor or the power supply.

9.4 Cables

Cables with banana connectors and alligator clips can be found on the wall to the right of the sink. Please replace cables when you are through using them. Do not leave them dangling in the sink.

9.5 Water and Aspirator

9.5.1 The deck hose supplies DI water.

9.5.2 The aspirator is located at the back of the sink. It can be turned on by the valve located on the outside of the sink, just below the top deck of the sink, on the left. It can be turned on by the red handle. The plenum flush is done automatically once the knob has been turned and the aspirator is on.

9.5.3 N2 gas is located under the aspirator valve.

9.6 Storage

Please store your solutions in a safe manner. HF should be stored in the large white cabinet next to sink 432C. Other plating solutions may be stored underneath the sink provided there is room. Please store any solutions in safe closed containers.

9.7 Miscellaneous

There is an electrical receptacle located next to the light switch on the lower left side of the sink. A power strip is usually plugged into the receptacle and supplies power to the power supplies and multimeters. Should the receptacle trip, reset it by pushing the reset button.

The sash should be lowered to the level marked on the side of the sink window to allow for sufficient exhaust velocity. Note that this enhanced exhaust velocity causes plating solutions to evaporate faster.

9.8 Cleanup

Please, leave the sink as you would like to find it (dry and clean).
Remove glassware and other plating setup items once you are done.

10.0 Troubleshooting Guidelines

11.0 Figures and Schematics

12.0 Appendix

Sorensen 55-55 Power Supply Operational Manual

*Adapted from Sorensen DCS-E Series 3kW Power Supply Manual
Chi Nguyen – 11/23/04

This short manual is written to highlight main operation needs of this unit in the UC Berkeley ERL-Microfabrication Lab. For full-length manual, see:

http://www.elgar.com/products/DCS/downloads/DCS-E_3kW_Operation_Manual_M36229501_RevB.pdf

Notes regarding work area:

The Sorensen 55-55 power supply unit is set up next to a hooded work area. The unit's output terminals are mounted, for convenience, on a panel on the left side of the work area, and are clearly labeled **Positive Sorensen** for the positive terminal, and **Negative Sorensen** for the negative terminal. There are also two extension panels on either side of the work area for extension of load lines.

Functional Tests: Use these quick tests to verify that the power supply is working properly.

Voltage Mode Operation Check: Use this test to check that the unit's internal voltmeter is functioning accurately.

- ▶ Turn both VOLTAGE and CURRENT control knobs all the way to zero (counterclockwise).
- ▶ Connect a digital voltmeter (DVM) to the unit's output terminals, w/ the correct polarity. Select **voltage reading** on the attached DVM.
- ▶ Press and hold V&I CHECK switch for remainder of the procedure.
- ▶ Turn CURRENT control knob ½-turn clockwise to increase current. Now turn VOLTAGE control knob clockwise to increase voltage. The readings on the attached DVM and the voltmeter display on the right side of the control panel should change.
- ▶ Compare the attached DVM readings to the unit's voltmeter readings to verify that the internal voltmeter is functioning correctly.

- ▶ Release V&I CHECK switch, disconnect DVM.

Current Mode Operation Check: Use this test to check that the unit is reading current accurately.

- ▶ Turn both VOLTAGE and CURRENT control knobs all the way to zero (counterclockwise).
- ▶ Connect a digital voltmeter (DVM) to the unit's output terminals, w/ the correct polarity. Select **AC current reading** on the attached DVM.
- ▶ Press and hold V&I CHECK switch for remainder of the procedure.
- ▶ Turn VOLTAGE control knob 1 or 2 turns clockwise to increase voltage. Now turn CURRENT control knob clockwise slowly to increase current. The readings on the attached DVM and the ammeter display on the right side of the control panel should change.
- ▶ Compare the attached DVM readings to the unit's ammeter readings to verify that the internal ammeter is functioning correctly.
- ▶ Release V&I CHECK switch, disconnect DVM.

Basic Operation

Max Voltage and Current Settings

Before applying power to the load, you need to set two values: maximum voltage and maximum current (V_{set} and I_{set}). The power supply will then operate only within the range of $V < V_{set}$ and $I < I_{set}$ for your application, alternating between constant voltage mode and constant current mode.

To Set V_{set} and I_{set}

- ▶ Turn both VOLTAGE and CURRENT control knobs all the way to zero (counterclockwise).
- ▶ Turn power supply on.
- ▶ Press STANDBY switch to activate standby mode.
- ▶ Press and hold V&I CHECK button. The voltage and current settings should show on the voltmeter and ammeter displays on the right side of the control panel.
- ▶ While still holding down the V&I CHECK button, turn the VOLTAGE control knob clockwise until your desired voltage limit is reached. Turn the CURRENT control knob clockwise to obtain your desired current limit setting.
- ▶ Release V&I CHECK button
- ▶ Press STANDBY switch to get out of standby mode.
- ▶ The unit will now apply power to the load, w/ the constraint of your limit settings.

Over-Voltage Protection Setting

The Over Voltage Protection circuit is an extra safety measure that protects the load in the event of a programming error, an incorrect voltage control adjustment, or a power supply failure. The protection circuit monitors the output voltage and will reduce the output current and voltage to zero whenever a preset voltage limit is exceeded. The preset voltage limit is also called the set point or trip level.

To Set the OVP Set Point

- ▶ Turn the VOLTAGE control knob all the way to zero (counterclockwise).
- ▶ Press and hold the OVP CHECK switch. The current OVP setting should be displayed on the voltmeter displays on the right side of the control panel.
- ▶ Using a small flathead screwdriver, turn the OVP SET potentiometer above the OVP switch until the desired OVP set point is reached.

- ▶ Release the OVP CHECK switch.

To reset the OVP circuit after it has been activated:

- ▶ Reduce unit's output voltage setting to below OVP set point using Vset setting procedure mentioned above.
- ▶ Press STANDBY switch in, then press it again, OR turn unit power off, then on again to resume normal operation

Applying Power To Load

- ▶ Press STANDBY switch.
- ▶ Connect the load to the unit using load lines of appropriate gauge and length.
 - Connect the unit's positive output terminal to the positive load terminal, and the unit's negative output terminal to the negative load terminal. Use the extension panels on the left and right side of the hooded work area if necessary.
- ▶ Press and hold V&I CHECK to make sure Vset and Iset are appropriate for your application. If they are not, change them to the correct settings.
- ▶ Press STANDBY switch again to apply power to the load.