**Purpose of this Instrument:** To provide a 4” uniform beam of 365 nm UV light for photolithography processing.

**Location:** ESB G75C2 Cleanroom

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The Shared Research Facilities are operated for the benefit of all researchers. If you encounter any problems with this piece of equipment, please contact the staff member listed above immediately. There is never a penalty for asking questions. If the equipment is not behaving exactly the way it should, contact a Shared Research Facilities staff member.

**WARNING:** The Flood Exposure emits UV light. Exposure of UV light on unprotected skin can cause severe burns. Looking directly into the UV light source can cause temporary or permanent blindness.

**WARNING:** If at any time during operation, there is a sound of shattering glass and the voltage meter drops to zero turn off the lamp controller, pull the fan power cord from the wall socket, evacuate all users from the room, and notify a Shared Research Facilities staff member. **Do not attempt to open the system or inspect the arc lamp!** Mercury vapor may be released if the arc lamp breaks. Opening the lamp housing will expose you to this vapor.

**WARNING:** Do not attempt to open the flood exposure unit for any reason! Do not try to defeat safety interlocks. Please contact a Shared Research Facilities staff member if the system needs to be opened or serviced. Any person who attempts to service this machine without following safety procedures may receive any of the following injuries: severe electrical shock, severe UV burns, mercury poisoning or blindness.

**ATTENTION:** Users are required to wear UV protective glasses when operating the flood exposure system. These glasses are located next to the system. Additional UV protective glasses may be found on top of the mask aligner located in the same room.
UV LAMP START UP

1. Log in on the FOM and sign into the logbook.

2. Before turning on the power, make sure that the Illumination Controller is set for these initial settings:
   a. The Current/Volt Meter selection switch (on left) is in the “Volts” position.
   b. The Intensity/Power Meter selection switch (on right) is in the “Power” position.
   c. The Mode Control selection switch is in the “CP” (Constant Power) position.
   d. The Channel selection switch is in the “CH B” position.

3. Power up the controller by turning on the power switch.

4. Start the arc lamp by pressing, and holding for a few seconds, the rocker switch labeled “START”. Both meter needles should move. If the meter needles stay at zero, the lamp did not ignite. Repeat this process. If the lamp will not ignite after three attempts, please contact a Shared Research Facilities staff member.

5. Wait 15 minutes for the lamp to warm up. When the lamp is at full power, the volt meter should read around 46 V, and the power meter should read 275 Watts.

   **Note:** If the power does not read 275 W **do not proceed.** Contact a Shared Research Facilities staff member immediately. If a staff member cannot be found, turn off the system.

   **WARNING:** If the power meter is reading above 350 W when the selection switch is in the “Power” position, turn OFF the controller immediately. Operating the Arc lamp above 350 W for...
an extended period of time will damage the lamp and may cause it to crack, releasing mercury vapor.

6. The lamp should be set in constant intensity mode when operating. Constant intensity ensures that the lamp output is stable and will give the best patterning results. To operate the lamp in constant intensity mode make sure that the Illumination Controller is set to the following process settings:
   a. The Intensity/Power Meter selection switch is in the “Intensity” position.
   b. The Mode Control selection switch is in the “CI” (Constant intensity) position.
   c. The Channel selection switch is in the “CH B” position.

MEASURING THE UV INTENSITY

1. The output UV intensity should be measured and recorded in the log book when the lamp has been turned on. Make sure that the lamp has warmed up before taking the UV measurement by waiting 15 minutes.

   Figure 2: Karl Suss UV intensity Meter Model 1000 with Probe

2. Measure the output UV intensity with the Karl Suss 1000 UV intensity meter and probe (Fig. 2). The probe should have a label on the side marking it as a 365 nm probe. There are two probes in the cleanroom; if the probe is labeled 320 nm, you have the one associated with the mask aligner.

3. Turn on the UV meter, and place the correct probe under the flood exposure lens as close to the center of the beam as possible, with the silver disc up. The UV intensity meter should not be in the beam path.

4. WARNING: Make sure the shutter is closed when working under the UV flood exposure lens. Placing your hands directly in the UV beam path may result in a UV burn.

   Open the shutter by pressing the “LAMP TEST” button on the exposure timer. As shown in Figure 3, there is one timer setting and five buttons on the Exposure Timer. If the exposure timer is not responding when the “EXPOSE” button or “LAMP TEST” button is pressed, please
check that the power is ON. The power switch is located on the back of the exposure timer next to the power cord.

Figure 3: Top panel of Exposure Timer.

5. Record the UV meter value. Units are in mW/cm$^2$.

6. Close the shutter by pressing the “RESET” button on the exposure timer. You can remove the probe and turn off the UV meter.

This process may be repeated with your photomask placed over the 365 nm UV probe for experimental calculations. Make sure that the silver disc is not covered by any darkened area of the mask. If any part of the mask covers the silver disc area, the measured value will be lower than the actual UV intensity.

**OPERATING THE EXPOSURE TIMER**

1. Select your exposure time by turning the thumbwheels on the timer setting to your desired time on the exposure timer. The exposure timer (Figure 3) works in two modes:
   a. The “1000 SEC” mode can be selected by pressing this button. The right hand LED on the timer setting will light up to indicate that the decimal point is at the far right of the timer selector. You may input any time between 1 second to 999 seconds in this mode.
   b. The “100 SEC” mode can be selected by pressing this button. The left hand LED on the timer setting will light up indicating that the tens of seconds value has been created. You may input any time between 00.1 second to 99.9 seconds in this mode.

2. To open the shutter, press the “EXPOSE” button. The shutter will remain open for the set time, and then will automatically close. The shutter can be closed at any time by pressing the “RESET” button.

3. The “LAMP TEST” will open the shutter indefinitely. The “RESET” button must be pressed to close the shutter.
TURNING OFF THE SYSTEM

1. Turn off the system by turning off the power switch on the lamp controller. The exposure timer does not have to be turned off.

2. After turning off the power, make sure that the Illumination Controller is reset for these initial settings:
   a. The Current/Volt Meter selection switch is in the “Volts” position.
   b. The Intensity/Power Meter selection switch is in the “Power” position.
   c. The Mode Control selection switch is in the “CP” (Constant Power) position.
   d. The Channel selection switch is in the “CH B” position.

EMERGENCY PROCEDURES

If no one is available and the machine is not acting as expected, the user should do the following:

• Turn OFF the lamp power
• Send an email through the FOM by selecting PROBLEM REPORT and entering details of the issue in the COMMENTS section

Do not leave the machine running in an abnormal state. If the machine cannot be placed in STANDBY MODE, immediately contact:

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If it becomes necessary to leave the instrument then the user should leave a large, legible note on the Flood Exposure Tool stating the tool is DOWN. The user should also add a comment as to tool status when logging out of the FOM software.

If a dangerous situation is evident (smoke, fire, sparks, etc.), the user should turn off the lamp controller or unplug the tool, ONLY if it is safe to do so. The user should notify all other cleanroom persons within the cleanroom to evacuate and leave the cleanroom immediately. The user should then contact proper emergency personnel from a safe place. The contact numbers can be found posted outside of the cleanroom.