

Startup procedure

- 1. Check that the power supplies in the laser diode room (for the diode boxes and the TECs) are switched on and the fibers are connected.
- 2. If the Beckhoff computer lost power, press the LRA reset button at the back of the control box located in the PSL rack outside the enclosure and wait at least 60 seconds to let the DC stage initialize. Go to the Beckhoff screen, press STAT, and hit the RESET button.
- 3. If power was lost, turn on the Kepco HV power supply in the power supply rack outside the enclosure. Set VSET to 375 V, ISET to 400 mA, and turn output ON.
- 4. Press the CHIL> button at the laser control screen to navigate to the chiller menu. Turn on the diode and crystal chillers by pressing the buttons labeled Diode chiller and Xtal chiller. The flows should be as follows (if one of the set values is out of specification, the water flow watchdog will be triggered after 10 seconds):
 - DCHIL > 22.5 lpm
 - XTALCHIL > 13 lpm
 - LASERHEADS all > 0.4 lpm
 - PWRMTR > 1.3 lpm
 - FRONTEND > 1.3 lpm
- 5. Press LOCK> to go to the injection locking screen. If the LRA was reset it is important to first go to the STAT screen and press RESET, otherwise the system may not know the LRA has been reset. Set the LRA to its nominal position (4500 μ m) by pressing the ref point button.
- 6. Press the STAT button on the main screen and then press the RESET button. The fields remaining red need your attention. Note that Warnings (e.g. *OSC lid violation error* when in Service mode) will not prevent you from turning the system on.
- 7. If you want to start the system in **low power mode only**, close the HPO internal shutter and skip to step 14. Once this is completed, activate the frontend power watchdog. The system is now running in low power mode. If you want to start the system in high power mode, ignore this step and proceed to the next step.
- 8. If the frontend was already running (“low power mode”), disable the frontend power watchdog and close the frontend shutter. If the watchdog is not disabled when the shutter is closed, it will trip and shut off the laser. Otherwise, proceed to step 9.

- 9. Open the HPO internal shutter. The shutter will turn its color from yellow to green (the HPO external shutter upstream from the OC mirror and the frontend shutter are operated in the same fashion).
- 10. Close the HPO external shutter.
- 11. Check the set currents of the diodes against those posted in the aLOG. The set values are displayed next to the laser head schemes. To change these values, click directly on the current value field to open a number pad.
- 12. Press ON in the lower left corner of the screen to power on the HPO. The pump currents will ramp to their nominal values. The fields will become green, if these values are reached. The schematics of the homogenizers will become green as soon as the diode temperatures reach their set values.
- 13. The output power of the free-running HPO can be checked by pressing the PWR button. The sum should read about 140W. We recommend waiting for a couple of minutes for the oscillator to warm up. Ensure that laser light is emitted by the HPO (otherwise the LRA might sit at a wrong position). If the oscillator does not start check the STAT screen for error messages.
- 14. Starting the frontend
 - a. **Frontend OFF:** Open the frontend shutter, and press ON next to the frontend schematic to power on the frontend.
 - b. **Frontend ON (shutter closed):** Decrease the current of one diode box on the HPO by one half, and then open the shutter between NPRO and amplifier. Once this is done, reset the diode current to its previous value. This prevents a Q-switch pulse which could damage the laser.

Note: the amplifier beam should be injected to the oscillator **ONLY IF** all pump heads are operated at their nominal values, and the LRA is at reference position. The exception is if the HPO was off and the frontend was on. In this case, follow step b.
- 15. Go to the injection locking screen by pressing the LOCK> button. Turn on the PZT ramp by pressing the RAMP button.
- 16. Press LOCK to injection lock the HPO. The border of the button should become green now, indicating that the laser is locked. If the laser is not locking, see T0900641, section 7.3.2.
- 17. Let the system warm up for about 60 minutes. Then, press LRA to activate the long range actuator.
- 18. Activate the power watchdogs by pressing the WATCH buttons next to the frontend and oscillator schematics on the main screen.

Shutdown procedure

- 1. Turn off the power watchdogs by pressing the WATCH buttons next to the frontend and oscillator schematics on the main screen.
- 2. Press the OFF button on the frontend schematic.
- 3. Press LOCK> to go to the locking screen, and press the LOCK and RAMP buttons to turn off the PZT ramp and locking.
- 4. Press the LRA button to turn off the LRA.
- 5. Press the OFF button in the lower left corner to turn off the oscillator.
- 6. Check the PWR> screen to ensure that the laser is off and no light is emitted.
- 7. Press the CHIL> button to go to the chiller menu. Press the Diode chiller and Xtal chiller buttons to turn the chillers off. Their respective flows should go to 0.

Never...

- 1. Start the oscillator, when the frontend is already running. Start the oscillator first or close the shutter between NPRO and amplifier.
- 2. Open the HPO internal shutter, when all laser-heads are pumped with nominal currents.
- 3. Block the 200W beam with metal or plastic parts as contamination of the table environment by ablated particles is certain. Furthermore, the reflected spray light from these obstacles can exceed the safety power levels.
- 4. Inconsiderately move the LRA actuator.
- 5. Interchange the water hoses for inlet and outlet or manipulate the water cooling.