

FIR-Laser FIRL 100

CO₂-Startup-Procedure

1. Before you start, check the following:
 - CO₂ beam goes into power meter, not FIR cavity
 - FIR cavity pressure is low (≈ 20 mTorr), i.e., pump is pumping the cavity
 - CO₂ gas is off, all valves closed, pump off
 - Chiller off
 - Set PZT control to hand controller, i.e., at the back of the power supply connect the BNC labeled "Piezo Drive EXT" with the BNC labeled "Piezo Drive INT" using the short BNC cable.
2. Turn on CO₂ pump with pump and bleed valve closed. Allow warm up (few minutes). Pressure: 0-1 mbar.
3. Open pump valve and pump hose; check pressure: 0-1 mbar.
4. Open CO₂ cavity valve on laser head. Pump cavity down to 0-1 mbar.
5. Set gas regulator at CO₂ premix bottle to 1 atm/15 psi.
6. Open needle valve on laser head and adjust to read about 10 mbar.
7. Turn on chiller; allow ≈ 5 min for temperature stabilization (15°C)
8. Turn on key-switch. HV-Off-light, Interlock-light, and Power-light must turn on.
9. After 10 sec. Ready-light comes on.
10. Turn HV on. Check current on current meter. Discharge is now on.
11. Set CO₂ pressure to about 29 mbar and check the power of the CO₂ beam. Power should be within approximately 10% of calibration sheet value.

Fill FIR cavity with methanol (single fill operation)

1. On first fill of day, evacuate fill volume above CH₄. Pump on it for a while (about 60 mTorr).
2. Transfer CH₄ from bottle into fill volume.
3. Close off CH₄ supply, close valve to pump and open fill volume to cavity.
4. Close off fill volume and pump FIR cavity to required operating pressure. If unknown: pump to 100 mTorr

CO₂ → FIR

1. Steer beam into FIR cavity
2. Observe FIR power on power meter.
3. Optimize PZT, cavity length, and FIR pressure. After a while, maybe take out some CH₄ to counteract CO₂ heating effect.
4. Also check FIR mode quality with liquid crystal paper. Should be TEM₀₀.
5. Fill out FIR Logbook after before changing laser line!!!

Shut-down procedure

1. If using stabilizer: Switch PZT controller back to “SEARCH”, and set PZT to 0 kV.
2. Turn off HV.
3. Turn off chiller.
4. Turn off Key-Switch.
5. Steer CO₂ beam into power meter.
6. Close CO₂ needle valve.
7. Close CO₂ gas cylinder.
8. Close CO₂ cavity valve after cavity pressure reduced to a few mbar.
9. Close CO₂ pump valve.
10. Turn off CO₂ pump.
11. Bleed CO₂ pump to atmosphere.
12. Turn off pyro-electric detector, CO₂ spectrum analyzer etc.
13. Start pumping the FIR cavity.