

LICOR 6400 STANDARD OPERATING PROCEDURE FOR LEAF LEVEL GAS EXCHANGE

Materials needed for field measurements:

- 1) LI6400, umbilical (cords), chamber, light source, batteries, battery charger, main line power
- 2) CO₂ cartridges and O-rings
- 3) Tripod
- 4) Legs for instrument
- 5) Manuals #1&3
- 6) Twist ties, sharpies, silly putty to seal chamber if necessary
- 7) Field LiCor kit with spares, consumables, and tools
- 8) Data sheets

Turning on LI6400

Connect chamber to console (black to sample) – only connect or re-connect while machine is off or asleep

Turn on console

Run the appropriate configuration file

Follow warm-up procedures, Go through step-by-step instructions in manual Book #1, pages 4-2 to 4-8.

Taking measurements

Open log file, append if adding to previous or start new

Set condition settings

Light – if using opaque chamber, this will be ambient. If using LED chamber, set PAR

CO₂ – 400 μmol mol⁻¹

Flow rate – 300 mmol s⁻¹ for most systems, 200 mmol if photosynthesis is low

Temp – set to track ambient or set to desired level

Position leaf inside the leaf chamber and take picture of plant material inside the chamber, count leaves, measure width of material in chamber, and mark where on leaf measurements are taken in order to get precise leaf area

Check for leaks by breathing near the leaf chamber (watch CO₂ ref and sample) – if leaks exist, tighten leaf chamber seal or use silly putty to seal the leaks

Check stability - all 3 factors (flow, CO₂, H₂O) must be stable, total CV is between 0 and 0.2, and graph is stable for 2 min

Measure screen “ACE” – watch lines a, c, and e.

Match before every logged point

Log point - you will be prompted for plot, species, and plant # for each and every measurement.

Write down Photo, Cond, Ci, Trmol, PAR and T_{leaf} in data sheet

*Keep relative humidity in chamber below 80% by turning drierite dessicant towards scrub and then wait for conditions to re-stabilize.

*Shade chamber heads if conditions get too hot.

Things to watch for while taking measurements:

- 1) Stability is EVERYTHING – check that both “Photo” and “Cond” factors are stable in the “View Graph” menu under line 4
- 2) Make sure the thermocouple is touching the leaves and the T_{leaf} measure is stable
- 3) Match IRGAs between each set of measurements (between every measurement)

Shutting down

Check data

Close file

Esc to main open screen

Turn off LiCor

Turn both dessicant and soda lime to middle point between full scrub and full bypass

Take off CO₂ cartridge, discard used cartridge and O-ring

Leave chamber closed, but slightly opened to take pressure off gaskets

Store console and leaf chamber heads together/connected if in the field shed