6400-22 Opaque Conifer Chamber

6400-22 Opaque Conifer Chamber Installation Instructions

General Information

The 6400-22 Opaque Conifer Chamber (OCC) is designed to measure small diameter branches of short-needled conifers. The 6400-22 will accommodate branches 7.5 cm long with needles up to approximately 3 cm in length. It can be used with a user-supplied light source (sun, growth cabinet, etc.) or in conjunction with the 6400-18 RGB (Red, Green, Blue) Light Source. Follow the steps below to install the 6400-22 and the 6400-18, and read the operation considerations for information on configuring the LI-6400/6400XT software to compute leaf temperature using energy balance. Due to the nuances of the measurements, the accompanying Application Note #6 describes different configurations and protocols that are important to chamber operation and applications.

Assembly Instructions

Tools Required: #1 and #2 Phillips-head screwdriver; 5/64 and 3/32 inch Hex keys (included)
Time Required: approximately 30-45 minutes

Note: the sensor head handle must be removed to accommodate the 6400-22 chamber, so a tripod is recommended for making measurements.

Removing the Standard Chamber, Handle and Chamber Manifold Plate

1. Remove the male end of the leaf temperature thermocouple connector by pulling straight out (Figure 1). Remove the exhaust tube.
2. Disconnect the internal PAR sensor from the connector on the side of the sensor head by grasping the base of the plug and gently pulling straight out. If installed, the tripod mounting plate will need to be removed to access the connector (see LI-6400/6400XT instruction manual).
3. Unplug the log button. If the log button wires are threaded underneath the bottom cover of the sensor head, this cover must be removed to free the log button connector.
4. With the handle open, unscrew the knurled leaf chamber adjustment nut until it is free of the handle (Figure 1). Close and latch the handle. Wrap tape or a wire-tie around the handle so that it will not open. Failure to do so may result in the spring coming out.
5. Remove the 2 (older units have 3) screws on the backside of the handle (Figure 2) using a #1 Phillips head screwdriver.
6. Remove the upper half of the leaf chamber by removing the 2 remaining screws in the lower hinge plate. Use a 0.05 inch hex key (PN 610-01463) to remove the external quantum sensor from its mount for use with the 6400-22 if desired (see step 13). Disconnect the quantum BNC connector.
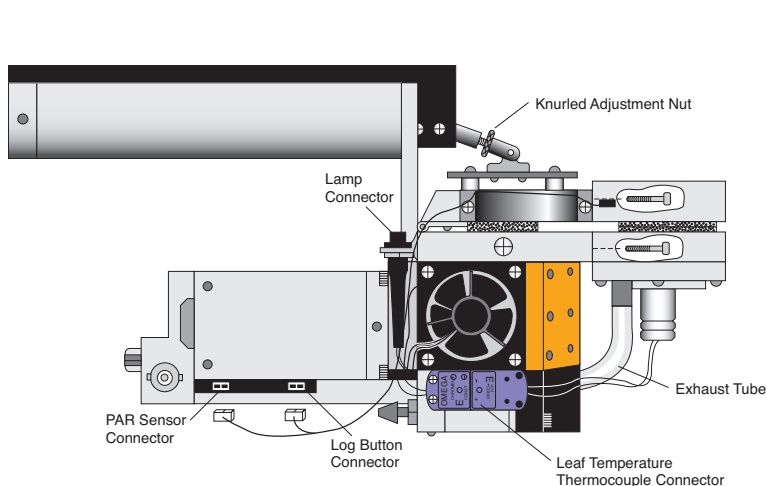

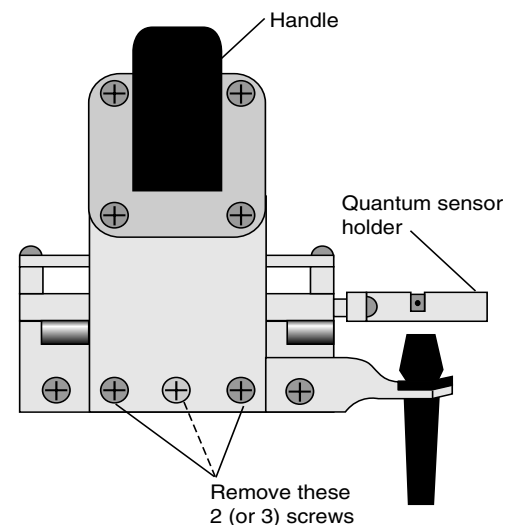*Figure 1. Disconnect the PAR sensor and log button on the side of the sensor head.*

Figure 2. Remove the 2 (or 3) screws on the back of the handle.

7. Remove the lower half of the leaf chamber and the sensor head manifold. Remove the 8 hex head cap screws (Figure 3) with the 5/64 inch hex key (PN 611-04311) to remove the lower leaf chamber and manifold. There is a thin vinyl gasket between the sensor head block and the manifold plate. Provided the gasket is clean and undamaged, save it for reuse in step 8.
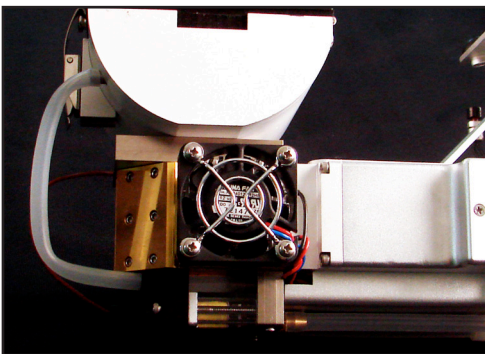
Note: the screw nearest the leaf chamber forms a metal to metal seal in the air pathway and must be tight upon reassembly of the standard leaf chamber.
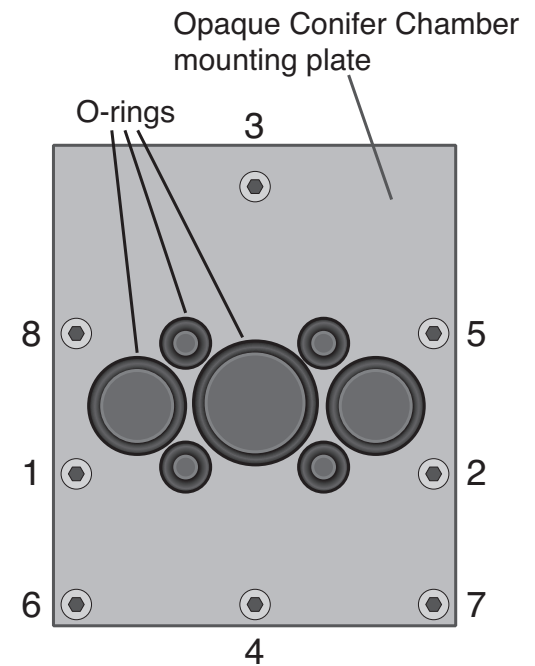
Installing the 6400-22 Opaque Conifer Chamber

8. Reuse the vinyl gasket from step 7 or use a new one from the spares kit (PN 6564-022). It should adhere to the optical bench, but if it becomes detached ensure that it is repositioned before attaching the new chamber mounting plate provided with the 6400-22. Attach the conifer chamber mounting plate with the 8 hex-head cap screws. Tighten the screws evenly in the cross-plate pattern shown in Figure 3. Repeat the tightening sequence. **Caution:** the screws are small and excessive force can break them.

9. Attach the lamp connector (Figure 1) to the 6400-22 mounting plate using one of the screws removed in Step 6.

10. Ensure that all 7 O-rings (3 different sizes) are installed on the mounting plate, as shown in Figure 3. Install the screen and attach the chamber bottom to the mounting plate using the 4 screws and washers provided (Figure 4, PN 122-02218 and 167-00155 respectively). Tighten the screws evenly in a cross pattern (begin with the lower left screw, then the upper right, then the lower right, and finally, tighten the upper left). Repeat the tightening sequence.

11. Connect the chamber air temperature thermocouple by pushing the purple connector straight into the connector on the IRGA head. Install either the standard 6400-22 exhaust tube or the 6400-22 exhaust tube with needle valve assembly (see Application Note #6 for a discussion of these configurations). It is easiest to first attach it to the metal tube on the sensor head and then to the metal tube on the chamber (Figure 5).

12. If you are not using the RGB Light Source, attach the provided external quantum sensor mount (PN 9816-020) to the upper chamber housing (above the hinge), using the 2 provided screws (PN 122-00003). Secure the external quantum sensor (removed in step 6) in the mount with the provided thumbscrew (PN 125-04975). Connect the quantum sensor cable to the BNC connector on the sensor head.
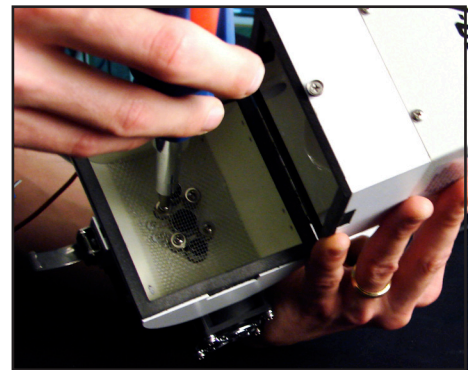
Installing the 6400-18 RGB on the 6400-22

13. Remove the 4 screws on the bottom of the RGB light source using a #2 Phillips head screwdriver.

14. Perforate the clear plastic covering the 4 small holes on the top of the 6400-22. *Ensure that the clear top of the OCC is not damaged over the large aperture since this will still be creating the airtight chamber seal.*

15. Connect the 6400-18 RGB to the top of the 6400-22 with 4 hex cap screws (PN 140-06022) using the 3/32 inch hex key (Figure 6).
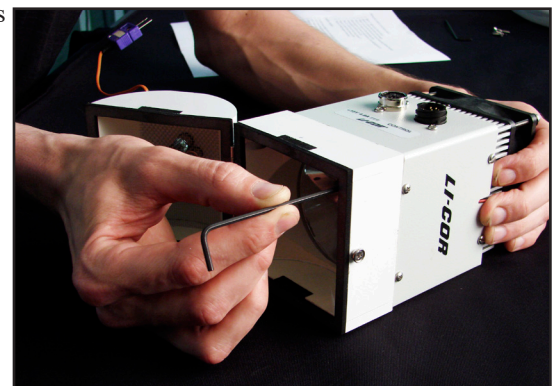

Figure 3. Tighten the OCC mounting plate screws in the order indicated above.

Figure 4. Insert the screen and attach the chamber to the mounting plate using the 4 screws and washers provided.

Figure 6. Attach the 6400-18 RGB light source to the 6400-22 chamber top using 4 hex cap screws. Be sure to carefully perforate the plastic covering the 4 small screw holes first.

Figure 5. Install the exhaust tube (pictured) or the exhaust tube with needle valve assembly.

16. Connect power supply and control cables to the RGB. Connect the opposite end of the control cable to the 37-pin connector on the LI-6400/6400XT console.
17. Close and latch the chamber.

Install the 6400-18 RGB Support Bracket

18. Connect the log button cable to the connector nearest the purple thermo-couple connector (Figure 7).
19. Attach the 6400-22 support bracket to the sensor head with the 3 provided screws (PN 122-00008) as shown in Figure 8. If desired, the tripod mounting bracket can also be attached under the RGB support bracket.
20. Optional: Install the provided external quantum sensor mount (PN 9816-020) to the 6400-22 with the 2 screws provided (PN 122-00002). Install the external quantum sensor in the mount with the included thumbscrew (PN 125-04975) and connect the sensor cable to the BNC connector on the sensor head.

Figure 7. Reattach the log button cable connector as shown.

Software Configuration

21. The 6400-22 requires that the LI-6400/6400XT be operating version OPEN 6.1 or above. OPEN 6.1 can be installed on 200 MHz (previously OPEN 5.x) or 400 MHz (previously OPEN 6.x) digital boards. Older boards require a digital board upgrade; contact LI-COR Biosciences regarding your system's compatibility.
22. The 6400-22 software is accessed in the Config Menu **(f2)**. Select "New…", and scroll to "Larger Chambers" and expand this list (▼/▶). Select the "6400-22 Opaque Conifer Chamber" (Figure 9). When prompted, select the desired light source (RGB) and then save as a new (N) configuration. See the LI-6400/LI-6400XT instruction manual, Chapter 16, for more information about configurations.
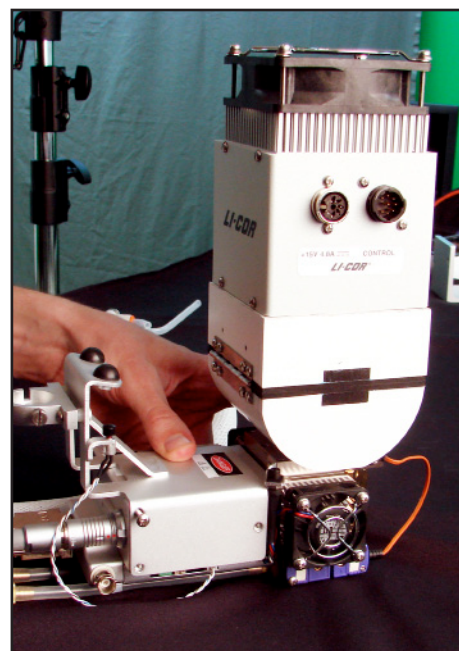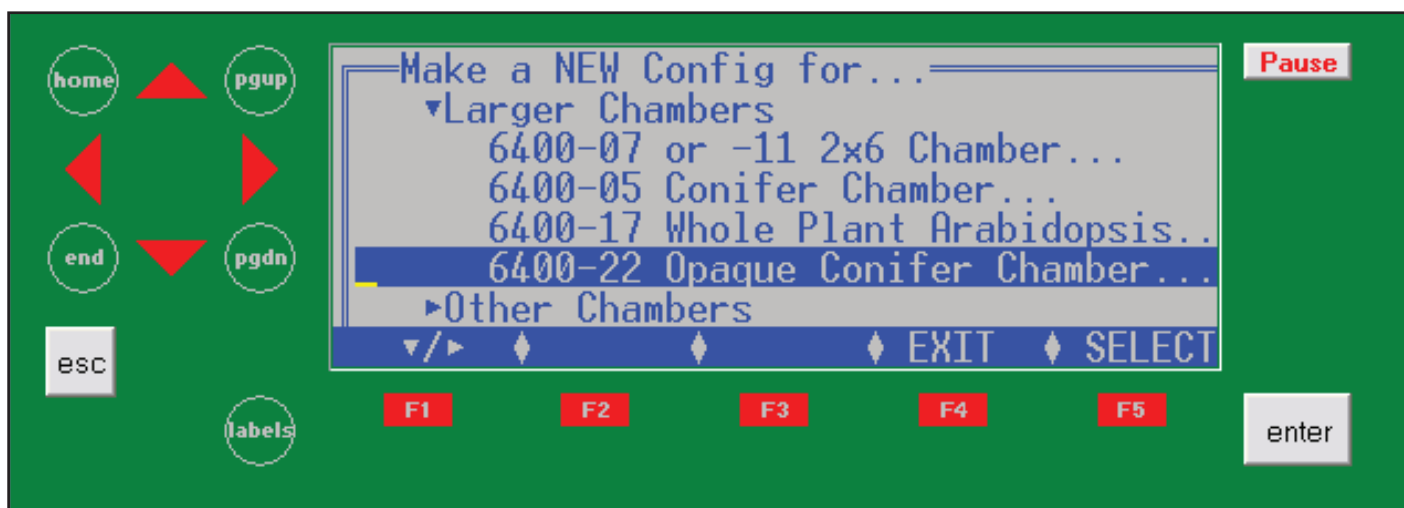

Figure 8. Install the support bracket.

Figure 9. Select the "6400-22 Opaque Conifer Chamber" and you will be prompted to choose a light source.

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