6400-17 Whole Plant Arabidopsis Chamber

6400-18 RGB Light Source

For the LI-6400/6400XT Portable Photosynthesis System

LI-COR®
Biosciences

6400-17 Whole Plant Arabidopsis Chamber

- **Whole plant measurements**
- **Uses 2.5 in. pots or 1.5 in. Cone-tainers™**
- **O-ring seal instead of foam gaskets**

The 6400-17 mounts to the LI-6400/6400XT sensor head lower manifold

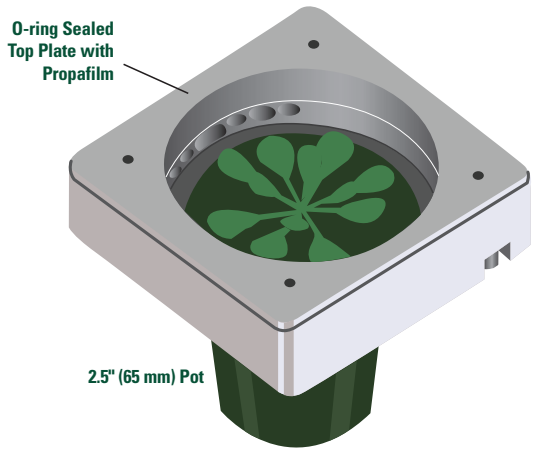
The 6400-17 Whole Plant Arabidopsis Chamber is the newest addition to the family of chamber accessories for the LI-6400/ 6400XT Portable Photosynthesis System. The large diameter (2.75 in., 7 cm) of the 6400-17 allows for measurements of entire *Arabidopsis* rosettes, rather than just the leaves. Measuring whole rosettes allows for repeatable measurements for growth studies that were previously difficult to achieve without the use of custom chamber configurations.

The 6400-17 is easily integrated with the LI-6400/6400XT sensor head by mounting to the lower leaf chamber manifold. Because the 6400-17 mounts directly to the lower manifold, excellent air mixing is achieved without the need for additional fans within the chamber.

Interchangeable chamber bottom plates are provided for use with readily available 2.5 in. (65 mm) pots or 1.5 in. (38 mm) Cone-tainers. Chamber air temperature is measured by a thermocouple in the air return path, preventing radiant effects from the light source. This thermocouple plugs into the existing thermocouple block on the LI-6400/ 6400XT sensor head. The leaf temperature is computed in software using an energy balance approximation.

An o-ring sealed top plate with a Propafilm covering is placed over the chamber when making measurements. The o-ring provides a tight seal that eliminates the need for traditional foam gaskets.

Because soils or artificial media are present within the chamber volume, CO_2 fluxes from the soil can be introduced into the whole plant measurement. A standard peat media mix capped with a heavy clay layer on top suppresses soil respiration. An exhaust tube fitting is also provided that can be used to apply a slight over-pressure within the chamber, which also suppresses CO_2 fluxes from the soil.



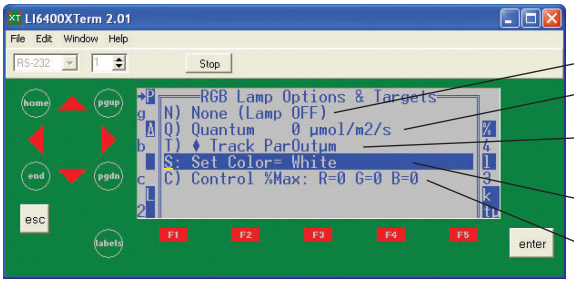
6400-18 RGB Light Source

- **Choose red, green, blue or white light, or any combination**
- **Continuously variable intensity**
- **Automatic light curve generation**
- **Integrates with 6400-17 Whole Plant Arabidopsis Chamber**

LI-COR is excited to introduce the new 6400-18 RGB (Red, Green, Blue) Light Source, designed to be used with the 6400-17 Whole Plant Arabidopsis Chamber. The 6400-17 and 6400-18 provide a powerful new tool for light response studies using whole rosettes. The 6400-18 can also be used with custom chambers and other LI-COR chambers with clear tops (requires user-designed mounting).

Independent Control of LED Output

The 6400-18 features LEDs with independent control of the intensity and percent of red, green, and blue light. White light can be achieved by using equal proportions of red, green, and blue. Select any intensity (to 2000 µmol m^{-2} s^{-1}) of a pre-defined color, or define your own blended color, by selecting the proportion of red, green, and/or blue light to be applied to the sample. As an example, for stomatal kinetics studies, you could measure stomatal conductance with 100% red, 100% green, and 0% blue, as compared to using 100% blue light. The 6400-18 can also be easily configured to emulate the output of the 6400-02B Red-Blue Light Source for comparison studies.



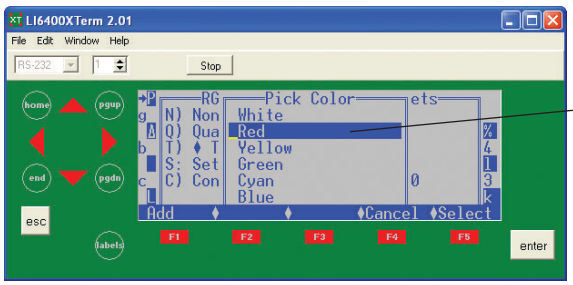
Turns light source ON/OFF

Sets output (µmol m^{-2} s^{-1}) of chosen color

Adjusts lamp output automatically to match measured PAR output of external quantum sensor

Color Picker, including 6400-02B emulation

Set proportion of R, G, and/or B



Choose Red, Green, Blue, White, Cyan, Magenta, Yellow, Red-Blue Light Source, or define your own color(s).

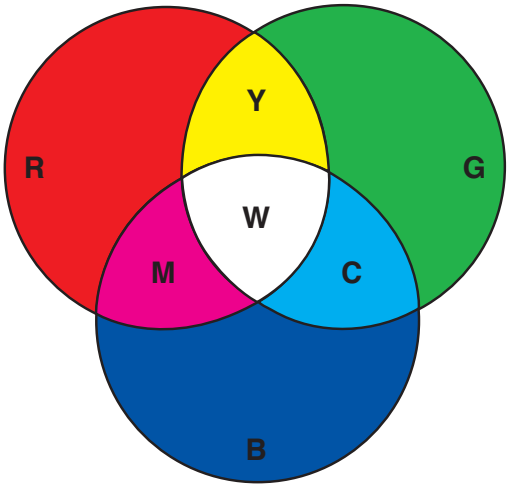


Fig. 1. RGB Lamp Options

Careful Design and Calibration

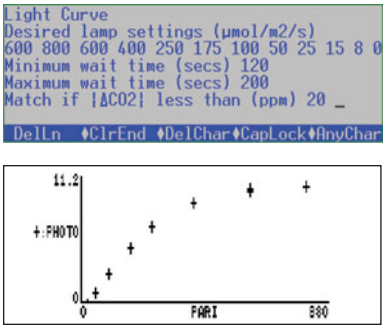
The LED tile in the 6400-18 is configured to ensure uniform light distribution at the leaf surface. LEDs minimize the influence of the light source on the leaf environment, as they have low heat generation compared to other light sources.

The 6400-18 is calibrated on an integrating sphere by measuring total output and spectral quality with a spectroradiometer. The output is used to calibrate a silicon feedback photodiode built into the light source (right). The feedback photodiode ensures an accurate light intensity by adjusting the light source as required. The light source also has temperature correction and linearization circuitry that are calibrated as well, to ensure the accuracy of radiant output at all rated operating temperatures and intensities.

The 6400-18 mounts easily to the 6400-17; the propafilm covered plate used with the Whole Plant Arabidopsis Chamber attaches directly to the Light Source. This method of attachment ensures that the geometry between the plant sample and the light source is repeatable for every measurement.

Software Automation

The 6400-18 is completely integrated with the LI-6400/6400XT. The light source intensity can be changed for light response curves, set to match external PAR sensor readings, or held constant while other environmental conditions are altered. Light and CO_2 response curve autoprograms are built into OPEN software that can be used to automatically control and collect data for unattended curves.



Simply set the desired chamber environmental conditions and light intensities from the 6400-18. The autoprogram prompts for the light levels at which measurements will be logged, the minimum and maximum time between measurements, and the stability parameter(s) that must be achieved before a measurement is logged. The 6400-18 light levels will be set, and all other environmental controls are maintained during the experiment.

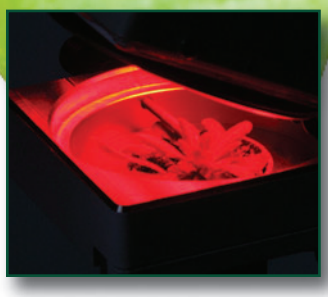
6400-17L Package

Combine the 6400-17 Whole Plant Arabidopsis Chamber and the 6400-18 RGB Light Source in a complete package (6400-17L) for your whole-plant *Arabidopsis* studies. The package includes an external power supply for the 6400-18 Light Source (100-240V, 1.5A, 50-60 Hz) that can be mounted to the LI-6400/6400XT console (below).

The power supply can be affixed to the LI-6400/6400XT console with a provided kit.

The 6400-17L also includes OPEN V6.1 software (OPEN 6.1 or above required). OPEN 6.1 contains a dedicated 6400-18 configuration that installs the new lamp control options.

NOTE: OPEN 6.1 Software can be installed on 200 MHz (ver 5.x) or 400 MHz (ver 6.x) digital boards. Older boards require a digital board upgrade – contact LI-COR for details.



Specifications*

6400-17 Whole Plant Arabidopsis Chamber Specifications

Chamber Volume: 77 cm^3
Internal Dimensions: 7.0 cm Dia. x H 2.0 cm (2.76" x H 0.8")
External Dimensions: L 8.7 cm x W 8.4 cm x H 3.2 cm (L 3.4" x W 3.3" x H 1.25")

6400-18 RGB Light Source Specifications

Controllable Output Range (white): up to 2000 µmol m^{-2} s^{-1} at 25°C (typical)

	Red	Green	Blue
Max. Output	> 1000 µmol m^{-2} s^{-1}	> 700 µmol m^{-2} s^{-1}	> 800 µmol m^{-2} s^{-1}
Peak Wavelength	635 nm ± 5 nm	522 nm ± 5 nm	460 nm ± 5 nm
Half Power Bandwidth	16 nm	35 nm	24 nm

Output Spatial Uniformity: ± 10% within 90% of output area
Power Consumption: ≤ 45 W at 2000 µmol m^{-2} s^{-1} (white light) at 25°C
Operating Temperature Range: 0 - 50°C
Operating RH: 0 - 95%, non-condensing
Size: 12.4H 9.0W 9.5L cm (4.9 3.6 3.7 in)
Weight: 0.54 kg (1.20 lb)

Note: Light output specifications listed are at the light source window at a temperature of 25°C. White light is referred to as equal quantum fluxes of red, green, and blue.

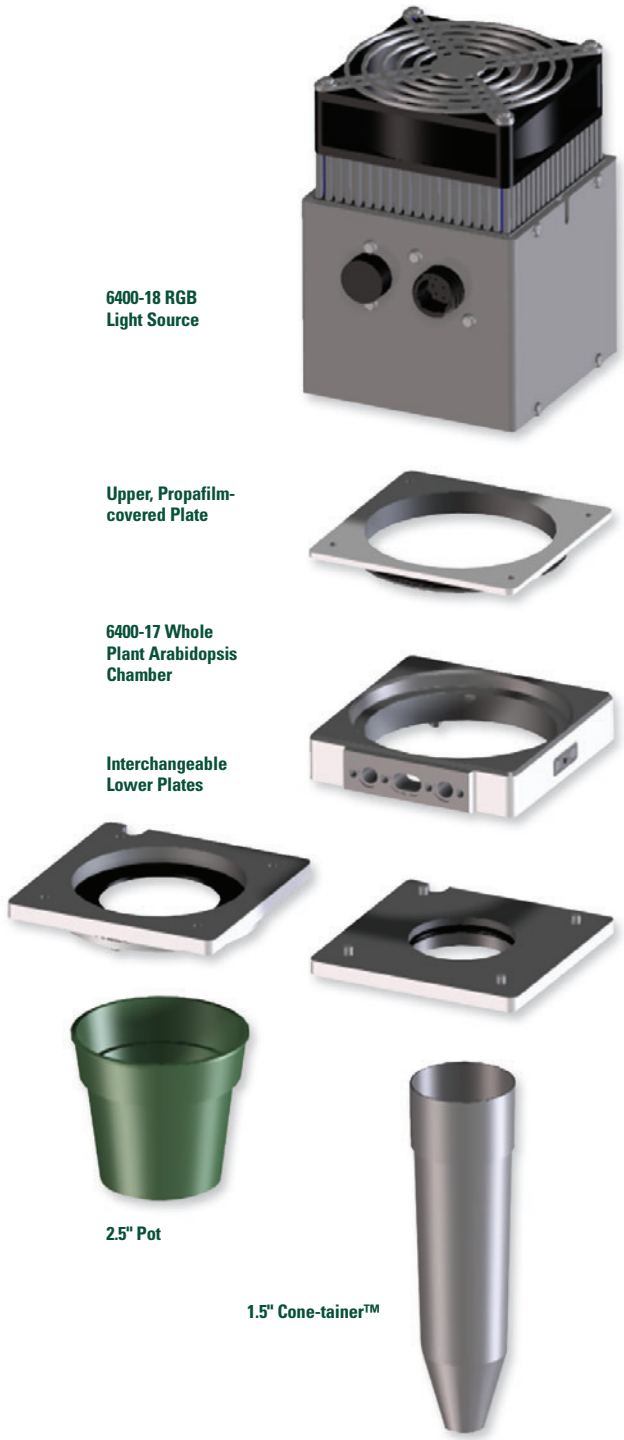
Ordering Information

6400-17 Whole Plant Arabidopsis Chamber. Includes chamber bottoms for 1.5 in. Cone-tainer™ and 2.5 in. pot, spare parts kit, exhaust tubes, 1.5 in. Cone-tainers, 2.5 in. pots, and installation instructions.

6400-18 RGB Light Source. Includes AC power supply, power and control cables, and Velcro kit for affixing AC power supply to LI-6400/6400XT console.

6400-17L Lighted Shole Plant Arabidopsis Chamber. Includes 6400-17 Whole Plant Arabidopsis Chamber and 6400-18 RBG Light Source at a package price.

*Specifications subject to change without notice.



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