

# 6400-01

## External CO<sub>2</sub> Source Assembly

### Installation Instructions for the LI-6400 Portable Photosynthesis System

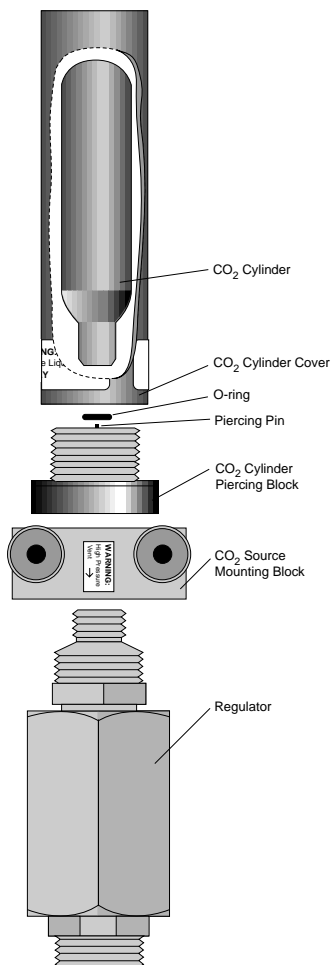


Figure 1. Exploded view of external CO<sub>2</sub> source assembly.



Figure 2. CO<sub>2</sub> source assembly mounted on LI-6400.

### General Description

The 6400-01 CO<sub>2</sub> Injector System consists of two major subassemblies; the CO<sub>2</sub> Controller, located in the LI-6400 console, and the External CO<sub>2</sub> Source Assembly (part no. 9964-026), which is attached to the outside of the LI-6400 case. These instructions pertain only to the installation of the External CO<sub>2</sub> Source Assembly.

**Warning:** CO<sub>2</sub> cylinders contain 12 grams of high pressure liquefied CO<sub>2</sub>. Follow the handling precautions on the cylinder and cylinder container carefully.

### Installation

1. Remove the red protective plastic cap covering the CO<sub>2</sub> inlet on the LI-6400 case, between the CO<sub>2</sub> and H<sub>2</sub>O scrub tubes.
2. The CO<sub>2</sub> source assembly is mounted on the left side of the LI-6400 console, between the CO<sub>2</sub> and H<sub>2</sub>O scrub tubes (Figure 2). Make sure that the O-ring seal on the back of the mounting block is properly seated. Note that the CO<sub>2</sub> cylinder cover faces up. Tighten the two knurled knobs on the mounting block to secure the assembly to the console.
3. Unscrew the CO<sub>2</sub> cylinder cover.
4. Place a new O-ring in the groove in the piercing block (Figure 3). Use your finger to press the O-ring into the groove. If the O-ring is not in place when the CO<sub>2</sub> cartridge is pierced, the gas will rapidly vent out of the hole on the underside of the mounting block.

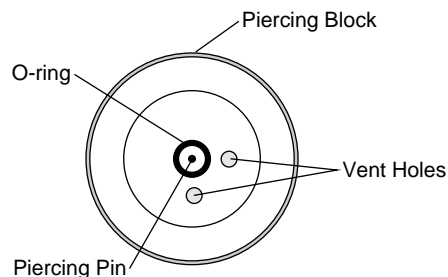


Figure 3. Location of O-ring in piercing block.

**Important Note:** Although the O-ring may perform properly for several cylinders, we recommend that it be replaced with each new cylinder. After being subjected to several high pressure cycles the O-ring will weaken and become perforated, and will more easily tear or split. If the O-ring is slightly torn or perforated the gas will slowly leak through the vent hole and shorten the life of the cylinder. If the O-ring is split, the gas will rapidly vent until empty.

5. Place a new CO<sub>2</sub> cylinder into the cylinder cover, large end first.
6. Screw the cylinder cover into the piercing block. You may feel some resistance as the piercing pin makes contact with the cylinder. A short burst of venting CO<sub>2</sub> may occur as the cylinder is pierced; the leak will be minimal if you continue to quickly tighten the cylinder cover.

(over)

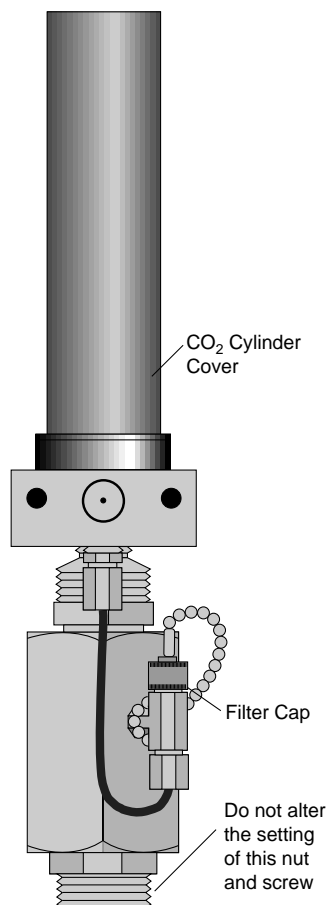


Figure 3. Back side of 6400-01 showing location of oil filter cap.

## Oil Filter Replacement

Inside the CO<sub>2</sub> cylinders, there is a small amount of residual oil from the manufacturing process. When the CO<sub>2</sub> cylinder is pierced, some of this oil is released along with the CO<sub>2</sub>. There is a filter attached to the regulator to prevent oil from clogging the flow restrictor. After using 25 CO<sub>2</sub> cylinders, the oil filter should be replaced. Instructions are given below. If the filter is not replaced, the flow restrictor may become clogged, severely restricting flow. See the LI-6400 Primer for instructions on replacing the flow restrictor.

**Warning:** Before replacing the filter, the CO<sub>2</sub> cylinder cover must be removed in order to depressurize the 6400-01 CO<sub>2</sub> Injector. If you attempt to remove the filter cap before the cylinder is exhausted, high pressure CO<sub>2</sub> will blow the filter out of its holder.

### Filter Installation

1. Remove the CO<sub>2</sub> cylinder cover (Figure 3).
2. After depressurizing the CO<sub>2</sub> cylinder, remove the filter cap to reveal the filter.
3. Use the filter hook included to carefully pluck out the old filter, trying not to scratch the O-ring seat.
4. Remove the paper from around the new filter.
5. Roll the filter between your thumb and index finger to smooth and compress it to a diameter that just fits into the body of the "T" fitting on the regulator.
6. Insert the filter and push it into the body. Do not use the filter cap to push the filter into the body because some of the filter fibers can become tangled in the O-ring seal and cause leaks.
7. Reconnect the filter cap.

### Making Your Own Filters

The oil filters are simply cigarette filters that can be cut from any unused filtered cigarette. When cutting the filter, use a razor blade to cut a 2 cm (3/4 inch) piece of the filter. Slit and remove the paper, and insert the filter as described above.

## 6400-01 CO<sub>2</sub> Injector Specifications

### CO<sub>2</sub> Source Assembly:

**CO<sub>2</sub> Source:** 12g pure liquid CO<sub>2</sub> cylinder.

**Cylinder Lifetime:** 8 hours after activation regardless of use, due to constant usage rate.

### CO<sub>2</sub> Tank Connector Block:

**Minimum Pressure:** 1250 kPa (180 psig).

**Maximum Pressure:** 1500 kPa (220 psig).

**Usage Rate:** constant at  $\approx 10$  sccm.

**CO<sub>2</sub> Mixing Range:**  $< 50 \mu\text{mol mol}^{-1}$  to  $> 2000 \mu\text{mol mol}^{-1}$ .

**Air Flow Range:**  $< 50 \mu\text{mol s}^{-1}$  (0.07 LPM) to  $> 600 \mu\text{mol s}^{-1}$  (0.9 LPM). (Higher altitudes will decrease the maximum flow rate).

**CO<sub>2</sub> Control Operating Characteristics:** CO<sub>2</sub> mixing ratios are independent of system flow rates. CO<sub>2</sub> ratio set point can null with feedback from either the reference or sample IRGA signals.

**Air Flow Operating Characteristics:** Null balance using H<sub>2</sub>O concentration in the sample cell or operate with fixed flow based on feedback from the flow meter.

**Operating Temperature Range:** 0-50 °C.

**Operating RH:** 0-100%, non-condensing.

**Temperature Dependence:** None.

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