



6400-01 CO₂ Injector System

LI-6400/6400XT Portable Photosynthesis System

The 6400-01 CO₂ Injector System allows you to null-balance on chamber CO₂ mole fraction, or provide a constant CO₂ input. CO₂ is controlled by delivering a precisely controlled pure CO₂ stream into air that is usually CO₂-free. The rate of pure CO₂ injection is varied according to demand from the leaf chamber, or from the input CO₂ setpoint, whichever approach you specify.

With the CO₂ injector, independent control of chamber CO₂ and H₂O is achieved by adjusting the incoming CO₂ mole fraction so that the chamber CO₂ setpoint is maintained. Subsequently, the controller vents a portion of the air flow in order to maintain chamber humidity.

The 6400-01 facilitates measurements at elevated CO₂ concentrations and the generation of A-Ci curves. The controller is under complete software control, allowing you to set CO₂ levels from the console, or to use AutoPrograms to easily set up automatic measurements at a series of concentrations.

For response curves (like the A-Ci curve in Fig. 4), you can null-balance on CO₂ in the sample analyzer, rather than the reference analyzer. This is practical only because the sample analyzers are in the sensor head and part of the chamber mixing volume. CO₂ concentrations



Figure 1. 6400-01 CO₂ Injector System; CO₂ Source Assembly (center) and quick-connect desiccant and soda lime tubes.

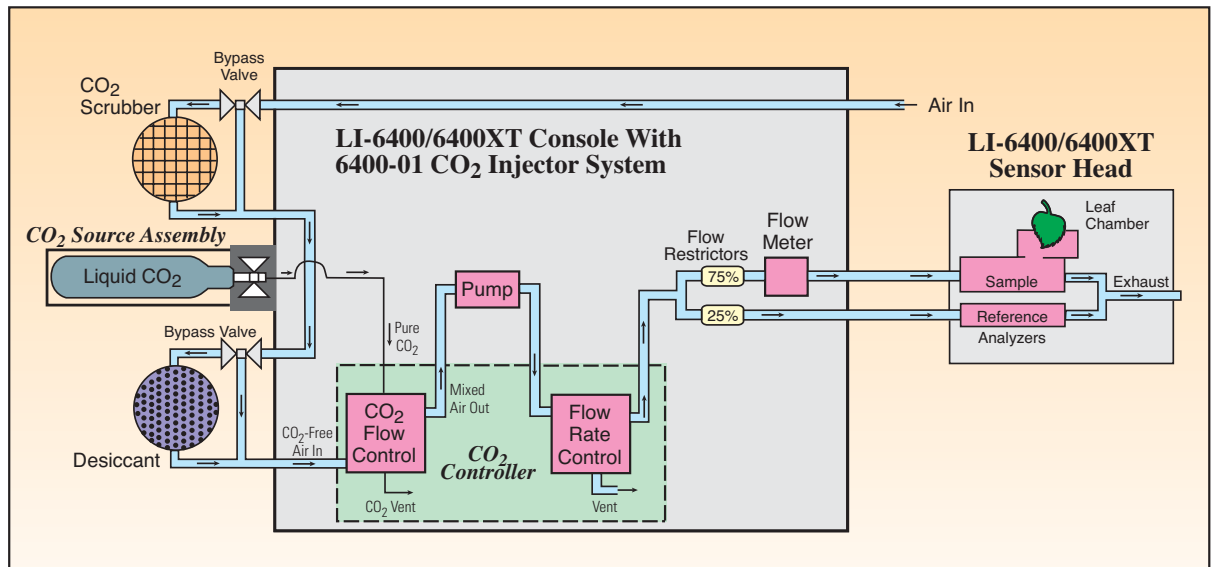


Figure 2. LI-6400/6400XT flow schematic with the 6400-01 CO₂ Injector System installed. Pure CO₂ is injected into a stream of CO₂-free air by the CO₂ Flow Controller. The pump runs at a constant speed and the flow rate to the leaf chamber is controlled by the Flow Rate Controller which vents a portion of the flow as needed in order to control chamber humidity.

can be held at precise levels because changes are very rapidly detected and compensated for by the 6400-01.

The 6400-01 CO₂ Injector System consists of an electronic controller, a CO₂ Source Assembly that uses mini-cartridges for portable operation, and a CO₂ tank fitting for greenhouse or laboratory operation. All parts integrate directly into the standard console with no external batteries or control modules.

The CO₂ Source Assembly is designed with robust materials for safe operation.

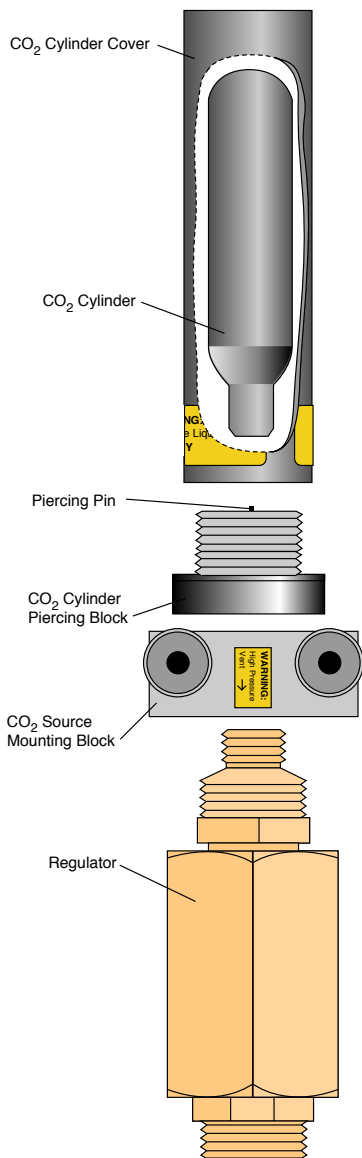


Figure 3. CO₂ Source Assembly

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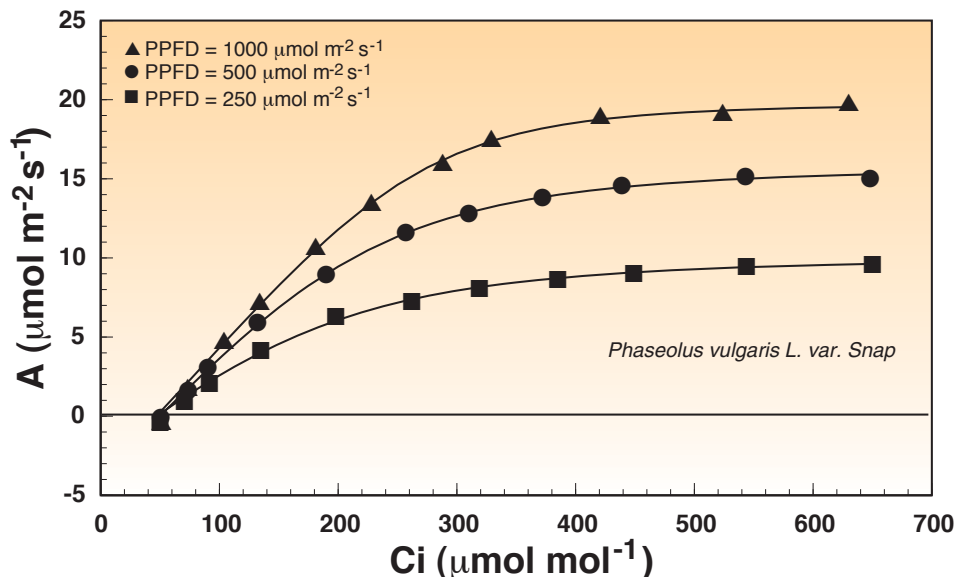


Figure 4. Using the 6400-01, A-Ci curves like the three shown above can be generated automatically. The instrument's A-Ci Curve AutoProgram lets you enter the CO₂ setpoints and then the 6400-01 controller automatically changes the chamber CO₂ concentration to each setpoint and logs data. Chamber humidity and temperature are maintained at constant levels during the measurements.

12g cartridges provide up to 8 hours of operation in the field at CO₂ concentrations up to 2000 μmol mol⁻¹. The mini-cartridges are easily accessible outside the instrument, making them easy to change.



Figure 5. 6400-01 disassembled for cartridge replacement.

Specifications

CO₂ Source Assembly:

Type: 12g pure liquid CO₂ cylinder.
Lifetime of One Cylinder: 8 hours after activation regardless of use, due to constant usage rate.

CO₂ Tank Connector Block:

Minimum Pressure: 1250 kPa (180 psig).

Maximum Pressure: 1500 kPa (220 psig).

Usage Rate: constant at ≈ 10 sccm.

CO₂ Mixing Range: <50 μmol mol⁻¹

(0.07 LPM) to >2000 μmol mol⁻¹ (0.9 LPM).

Air Flow Range: <50 μmol s⁻¹ to >600 μmol s⁻¹. (Higher altitudes will decrease the maximum flow rate).

CO₂ Control Operating Characteristics: CO₂ mixing ratios are independent of system flow rates. CO₂ ratio set point can null with feedback from either the reference or sample IRGA signals.

Air Flow Operating Characteristics: Null balance using H₂O 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.

Ordering Information

6400-01 CO₂ Injector System. Includes 9964-026 CO₂ Source Assembly (mini-cartridge system), 9964-038 CO₂ Controller (includes external tank fittings and metal tube compression fittings with 1/8" and 4 mm O.D.), and 3 packs of 9964-037 12g CO₂ Cylinders (25 per pack).

9964-037 12g CO₂ Cylinders (25 per pack).