

# Using the CIRAS-3 as a stand-alone CO<sub>2</sub>/H<sub>2</sub>O IRGA or with external chambers

It is easy to use the console of the CIRAS-3 Portable Photosynthesis System in the following three configurations:

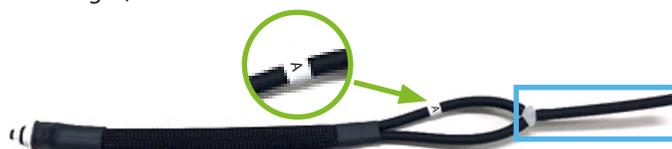
- As a stand-alone CO<sub>2</sub>/H<sub>2</sub>O gas analysis system
- With custom chambers utilizing the CIRAS-3's integral air supply system
- With custom chambers and a user-supplied air supply system

## Equipment Required

- **STD553 Leaf Cuvette Simulator**

This part is included in the standard CIRAS-3 spares kit supplied when the instrument was purchased from PP Systems.

In order to use the Leaf Cuvette Simulator in each of the three configurations listed above, simply remove the "Y" piece and single gas line as highlighted in blue (*shown below left*) to allow you to separately connect to the analysis line tube marked "A" (*shown below right*).



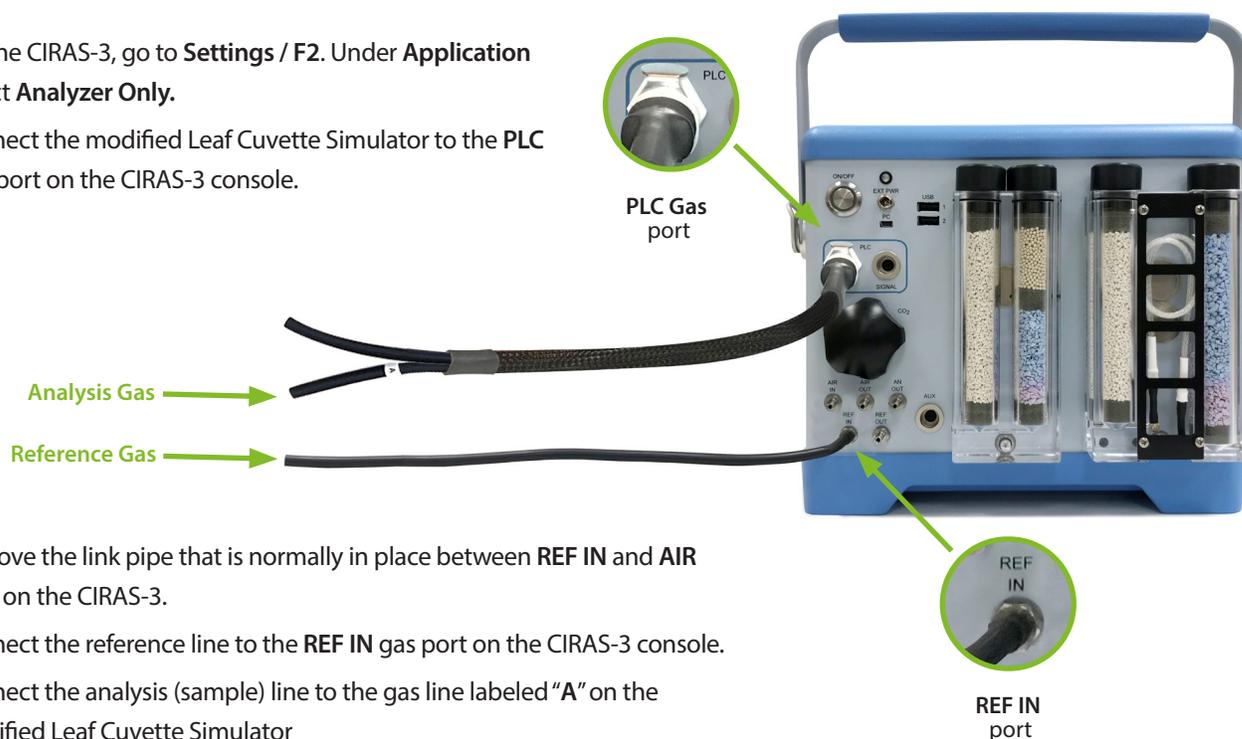
Leaf Cuvette Simulator with "Y" piece and single gas line attached.



Leaf Cuvette Simulator with "Y" piece and single gas line removed.

## CIRAS-3 CO<sub>2</sub>/H<sub>2</sub>O Gas Analyzer Only

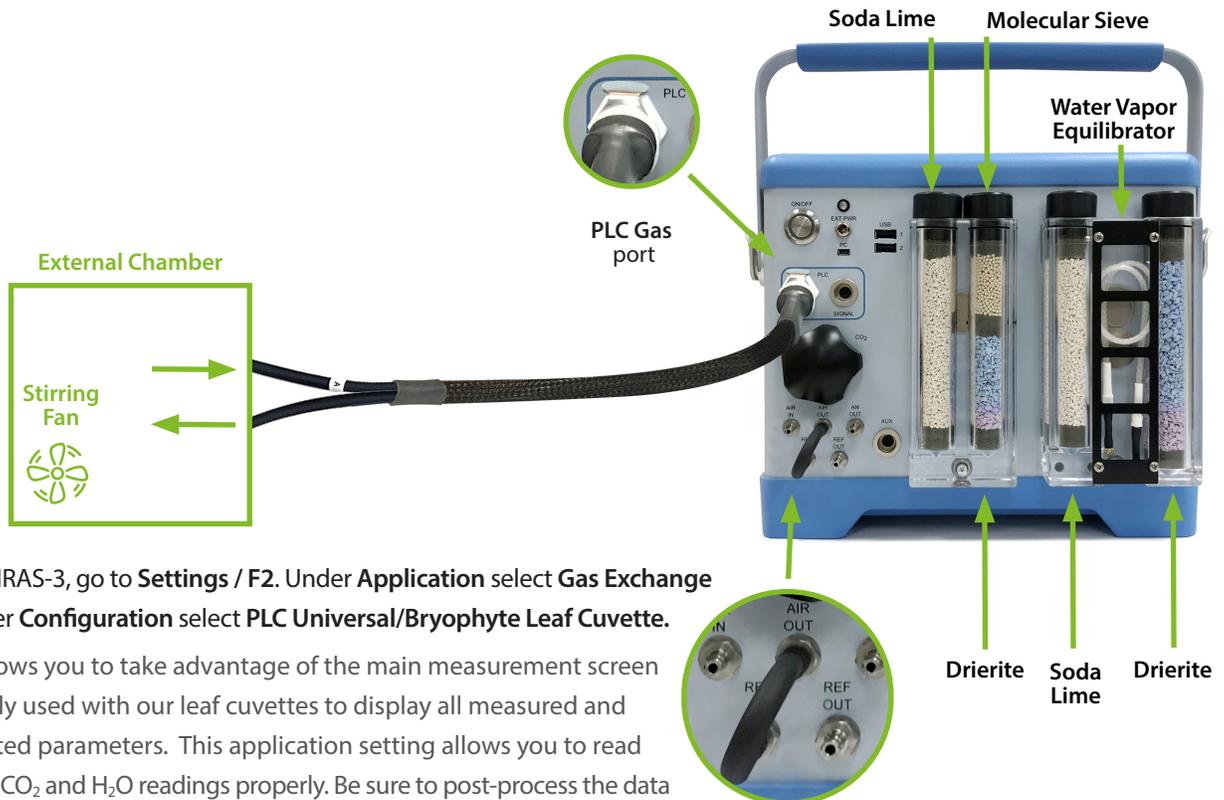
- 1 On the CIRAS-3, go to **Settings / F2**. Under **Application** select **Analyzer Only**.
- 2 Connect the modified Leaf Cuvette Simulator to the **PLC Gas port** on the CIRAS-3 console.



- 3 Remove the link pipe that is normally in place between **REF IN** and **AIR OUT** on the CIRAS-3.
- 4 Connect the reference line to the **REF IN** gas port on the CIRAS-3 console.
- 5 Connect the analysis (sample) line to the gas line labeled "A" on the modified Leaf Cuvette Simulator

## External chamber using the CIRAS-3 integral air supply system

Many customers use their own external chambers with the CIRAS-3. Please note that we assume your chamber incorporates an adequate gas mixing fan to mix the air inside the chamber. In addition, all chamber materials should be carefully selected to minimize influences such as infrared radiation, water sorption, CO<sub>2</sub> effects and leaks. If additional sensors are used with your chambers (i.e. PAR, temperature), you will need to incorporate these measurements when you post-process your data for proper calculation of results.



- 1 On the CIRAS-3, go to **Settings / F2**. Under **Application** select **Gas Exchange** and under **Configuration** select **PLC Universal/Bryophyte Leaf Cuvette**.

This allows you to take advantage of the main measurement screen normally used with our leaf cuvettes to display all measured and calculated parameters. This application setting allows you to read out the CO<sub>2</sub> and H<sub>2</sub>O readings properly. Be sure to post-process the data for proper calculation of leaf gas exchange results based on exact leaf area and any other sensor data you manually record (PAR, temperature, etc.). PP Systems offers a simple Excel spreadsheet for recalculation of results. Please note that sensor readings for temperature, PAR, etc. will not be displayed on the CIRAS-3 correctly because you are using your own chamber.

- 2 Keep the link pipe in place as normal between **REF IN** and **AIR OUT**.

- 3 Connect the unmarked tube of the modified Leaf Cuvette Simulator to the external chamber inlet port, and the analysis line to the tube labeled "A". We recommend that users fit a vent pipe on the analysis line to avoid overpressure if the chamber is tightly sealed.

### If CO<sub>2</sub> control is required

- Install a CO<sub>2</sub> cartridge to control the reference air from 0-2000 μmol mol<sup>-1</sup>.
- The CO<sub>2</sub> control column requires fresh soda lime.

### To run at ambient CO<sub>2</sub>

- Empty the soda lime column in the CO<sub>2</sub> control column (to the immediate left of the Water Vapor Equilibrator)
- Do not use a CO<sub>2</sub> cartridge.

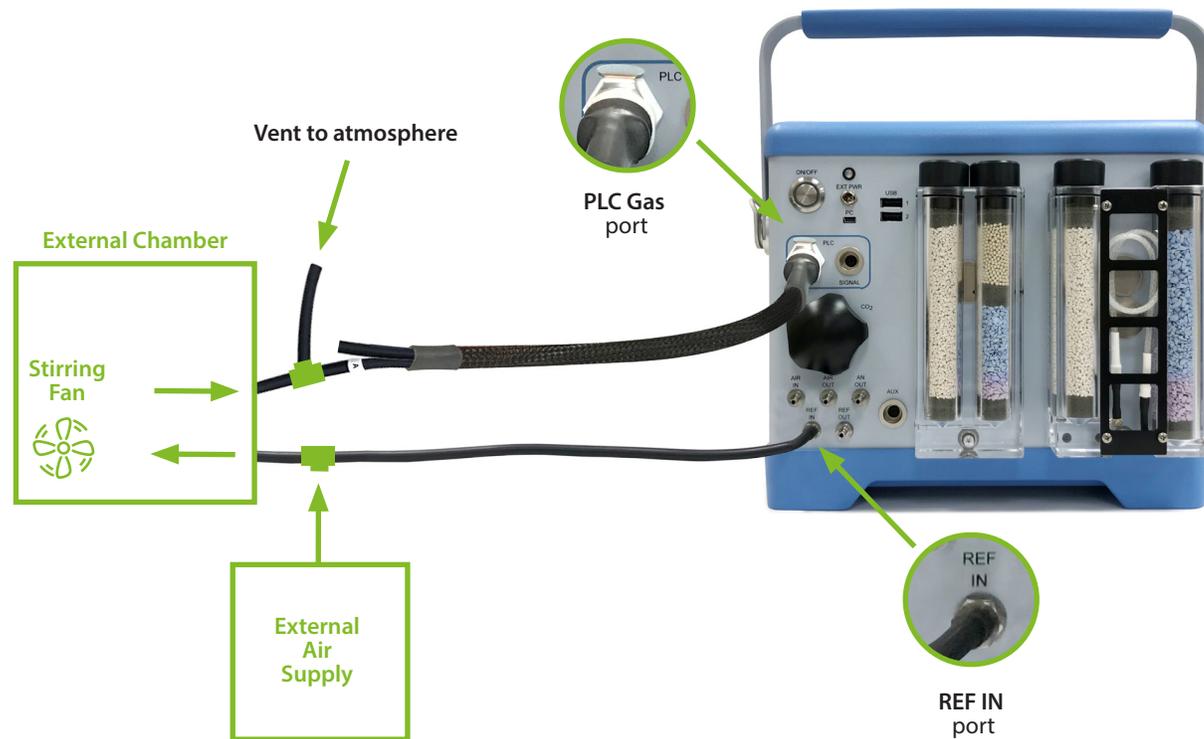
### If H<sub>2</sub>O control is required

- The H<sub>2</sub>O control column requires fresh Drierite.

### To run at ambient H<sub>2</sub>O

- The H<sub>2</sub>O control column (to the right of the Water Vapor Equilibrator) must be empty.

## External chamber with user supplied external air supply system



- 1 On the CIRAS-3, go to **Settings / F2**. Under **Application** select **Analyzer Only**.
- 2 Remove the link pipe that is normally in place between **REF IN** and **AIR OUT** on the CIRAS-3.
- 3 Connect the external air supply to both the inlet port on the external chamber and the **REF IN** port on the CIRAS-3.
- 3 Connect the outlet port of the external chamber (analysis or sample) to the gas line labeled "A" on the modified Leaf Cuvette Simulator with a vent to the atmosphere.

 A "T" fitting is recommended for use in the analysis line near the external chamber to vent gas to the atmosphere if the chamber is tightly sealed.



If you would like to learn more about this application or speak with one of our experienced technical staff, please feel free to get in direct contact with us via any of the contact information listed below:

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