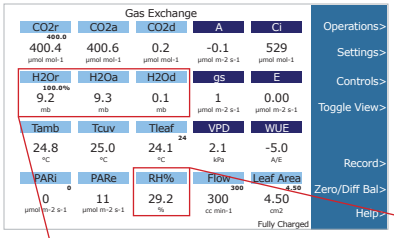
Controlling Humidity Above Ambient in a CIRAS-3 Portable Photosynthesis System

Often, the desired environment for photosynthesis measurements is for the leaf cuvette to be controlled to ambient humidity conditions outside the cuvette. If instead, it is desired to have the leaf cuvette humidity above ambient, it can be accomplished easily and safely by adding moisture-holding foam around the equilibrator element on the outside of the CIRAS-3 enclosure as shown below.

A humidity equilibrator is part of the Air Supply absorber assembly. Its normal function is to bring the gas stream back to ambient humidity after passing through the sodalime CO_2 absorber column which always adds humidity to the ambient gas as it removes CO_2. By surrounding the equilibrator with saturated foam, paper towels, or even a kitchen sponge, the gas can be brought close to the saturation vapor pressure. Then, any of the CIRAS-3 control modes will work to control the humidity to any desired level.

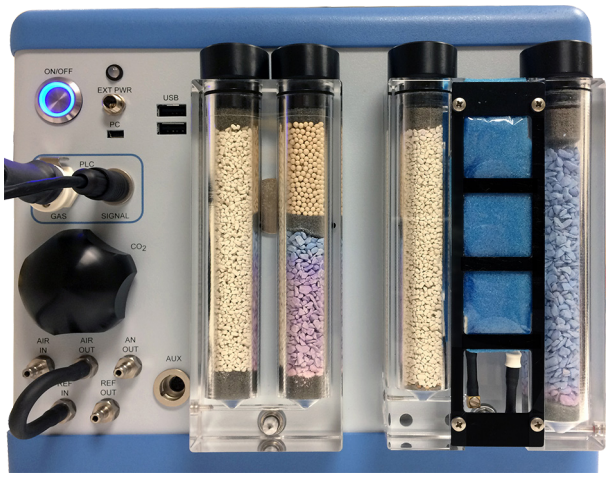
Bare Equilibrator: RH = 29.2%

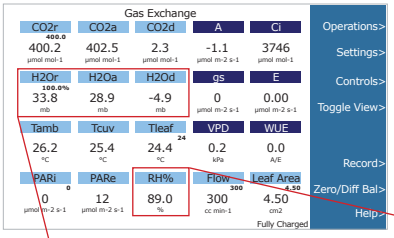


Ambient air in a dry ambient condition

H2Or	H2Oa	H2Od	RH%
100.0% 9.2 mb	9.3 mb	0.1 mb	29.2 %

With Saturated Foam: RH = 89%



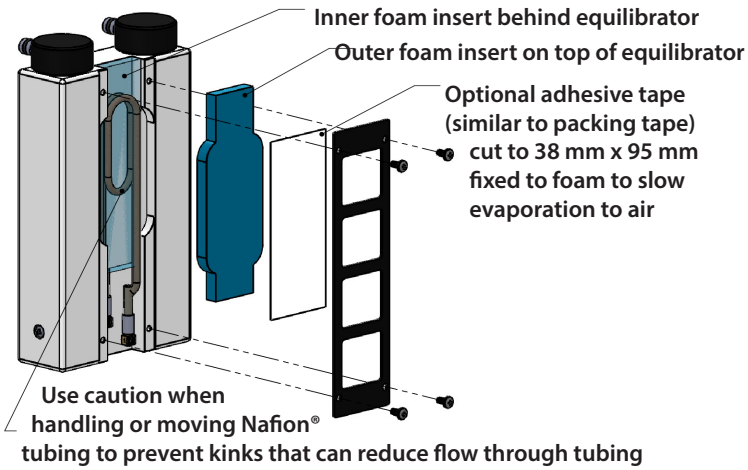


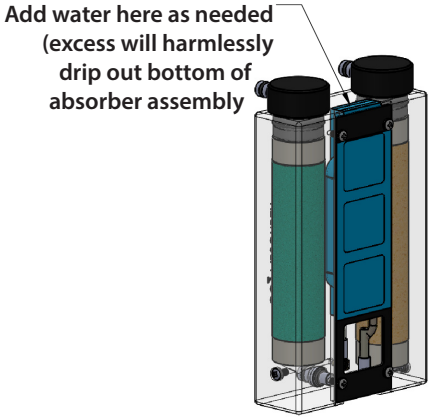
Elevated humidity condition with the equilibrator in saturated foam in the same dry ambient condition

H2Or	H2Oa	H2Od	RH%
100.0% 33.8 mb	28.9 mb	-4.9 mb	89.0 %

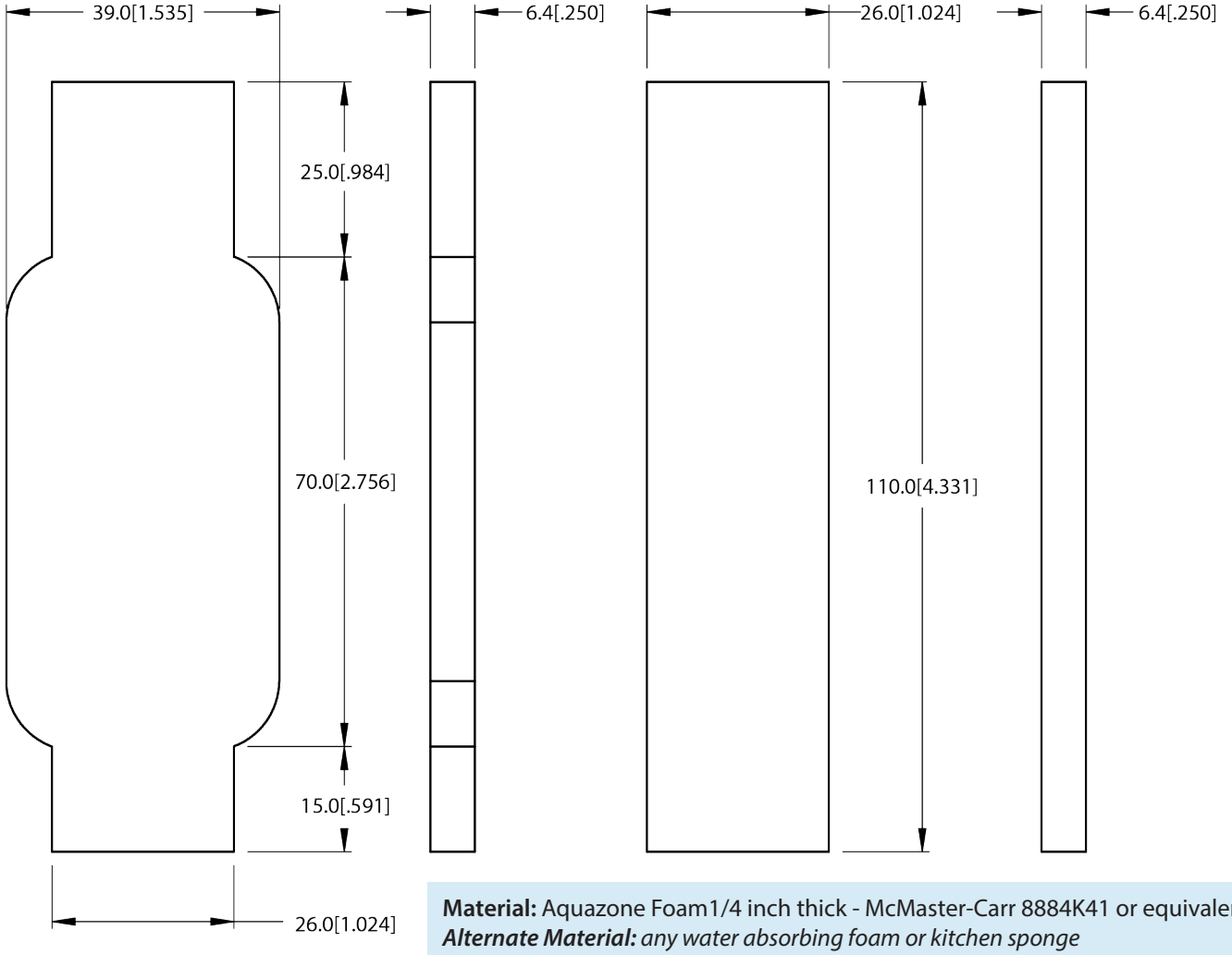
The drawing at the end of this application note shows the size of two foam inserts that can be installed into the absorber assembly and surround the equilibrator Nafion® tubing. Liquid water can be added to the top of the equilibrator while the CIRAS-3 is in operation and running. There is no danger of getting liquid water into the CIRAS-3 internals due to the function of the Nafion tubing. Excess water can harmlessly drip out the bottom of the absorber assembly without concern.

Foam Inserts Assembly into Absorber





Foam Inserts for Absorber



Material: Aquazone Foam1/4 inch thick - McMaster-Carr 8884K41 or equivalent.
Alternate Material: *any water absorbing foam or kitchen sponge*

PP SYSTEMS

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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