

FCMix

Simple gas mixer, humidification and overpressure control for small fuel cells

Problem

Students and researchers face a number of challenges in setting up a safe gas supply and humidification for even small button-sized fuel cell tests. The result can be for instance ill-designed glass apparatus in danger of overpressure rupture or explosions, or purchase of oversized commercial test stations that do not provide the fine control of flow and pressure that small fuel cells need. This applies especially to solid-state high temperature fuel cells like SOFCs.



Solution

FCMix is a simple and low cost gas mixer that controls the flows of fuel, oxidant, and one inert gas that can be routed to the fuel or oxidant for flushing, soft start, slow SOFC anode reduction, and safe operation, as well as tests of gas diffusion limitations. It is compact and easy to place in a 19-inch rack or directly on the lab bench. Two newly designed combined humidifier and overpressure control units are included – one for each cell chamber. These do humidification, overpressure relief, and fine pressure control in and between the two cell chambers, all in one simple unit that for additional safety contains no glass.



FCMix specifications

- Gases: Default Air, Ar, and H₂. Others by order or flow conversion factors.
- Flow control and readout: "red-y" units with manual needle valve, thermal mass flow measurement, and internal battery.
- Measurement range: Default 1-50 ml/min. Others on order.
- Pressure: up to 3.5 bar.
- Gas inlets and outlets: Standard Swagelok quick-connects (on unit rear by default). Front or side on order.
- Gas on/off and inert gas routing by Swagelok 2- and 3-way valves.
- Wiring: 1/8 inch copper tubing internally, and 1/8 inch tube fittings used throughout.
- Mounted in a 19 inch box to be placed in a rack or on the bench.
- Include two simple humidifier/overpressure control units.
- Suitable for button cell tests using the ProboStat™ or other small fuel cell test stems.
- No mains power needs.

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