Proposed Revision to the Design of the Daya Bay RPC Gas Mixing Panels

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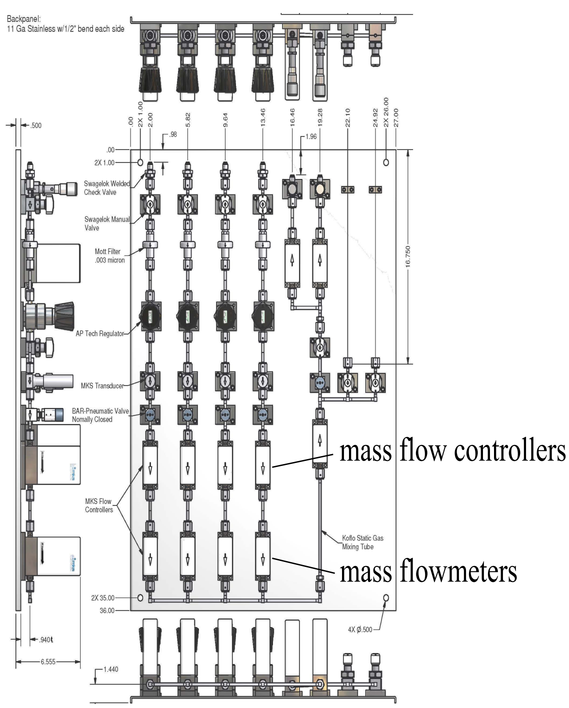
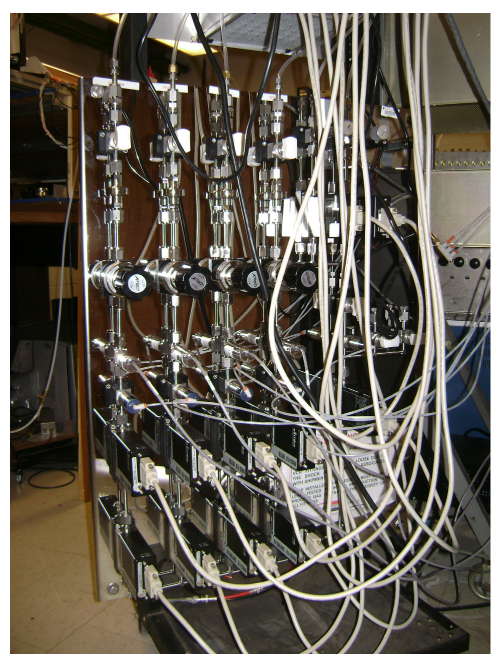
1 Introduction

As described in [1] and [2], we propose to use a four-component gas mixture in the Resistive Plate Chamber (RPC) subsystem Ar/R134a/Isobutane/SF6 (64/32/3.5/0.5 volume ratios). This mixture will be obtained from bottles of the individual gases as controlled by a gas-mixing panel based on mass flow controllers. The prototype mixing panel included a set of four mass flow meters to check the performance of the four mass flow controllers. We propose to eliminate this set of four mass flow meters in the production mixing panels. A check of the stability of the output gas mixture will be provided by a small monitor RPC [3].

2 The Prototype Gas Mixing Panel

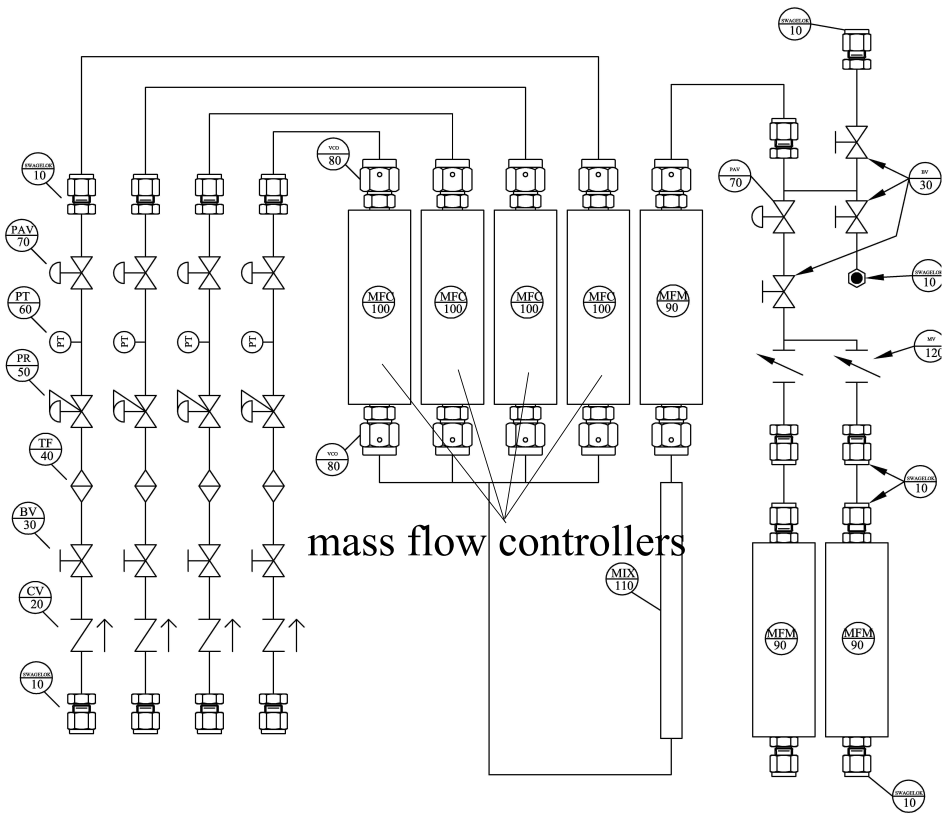
The diagram and a photo of the prototype gas mixing panel are shown below. Each of the four gas control paths includes a mass flow controller immediately followed by a mass flowmeter. The latter performed no control function, and only served as a check of the performance of the mass flow controller. The redundant mass flowmeters were included in the prototype design following the practice of the BaBar experiment.





3 The Proposed Revision

We propose to eliminate the mass flowmeters, that only served to check the mass flow controllers, and implement the following scheme in the three production gas mixing panels.



This revision will reduce the cost, and the physical size of the panels.

We also propose to implement the panels with modular components that are replaceable via access only to the front of the panel.

The cost of three such production panels is essentially the same as that for two additional panels of the same design as the prototype, plus the cost of retrofitting the prototype panels to the flow rates needed for the production panels.

References

[1] C. Lu and K.T. McDonald, *Daya Bay Reactor Antineutrino Experiment Resistive Plate Chamber Gas System Final Design Review* (Daya Bay DocDB#2011, April 11, 2008), http://kirkmcd.princeton.edu/dayabay/rpc_fdr_E.pdf

[2] C. Lu and K.T. McDonald, *Daya Bay RPC Gas Safety System Design* (Daya Bay DocDB#2324, June 19, 2008), http://kirkmcd.princeton.edu/dayabay/Lu/GasSafetySystemFDR_E.pdf

[3] Kwong Lau, *RPC Monintor Chambers* (Daya Bay DocDB#2620, Aug. 27, 2008).