

0.0.1 RPC Gas System

The RPC gas system will be similar to that used in the BELLE[1] and BABAR[2] experiments, in which a gas mixing systems distributes gas to the individual RPCs through simple “flow resistors”, with the output flow from each chamber separately monitored by a low-cost electronics bubbler[3]. A high-level diagram of the system is given in Fig. 0.1.

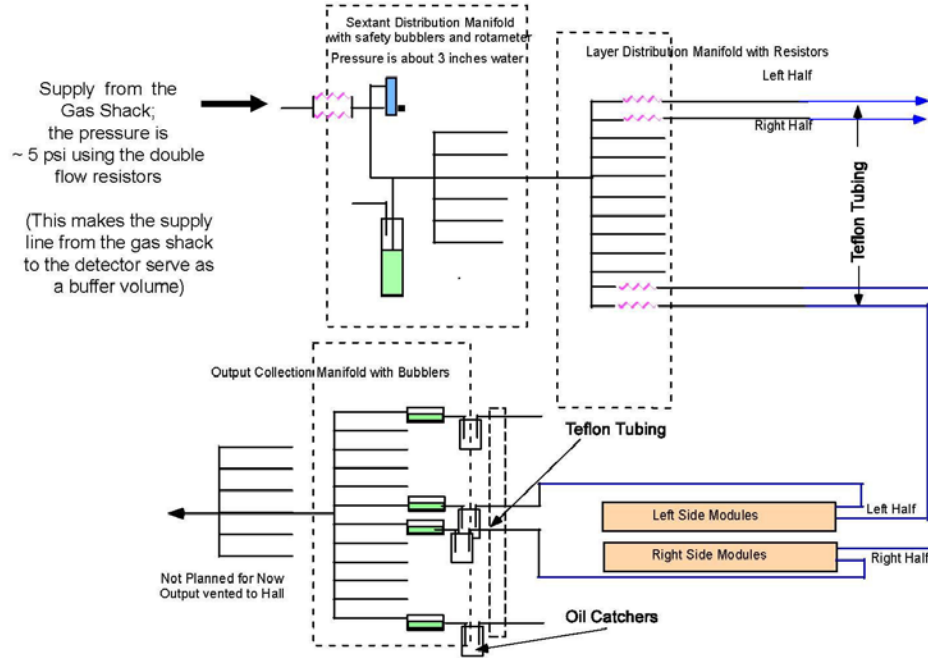


Fig. 0.1. Overall process diagram of the RPC gas system. From[4].

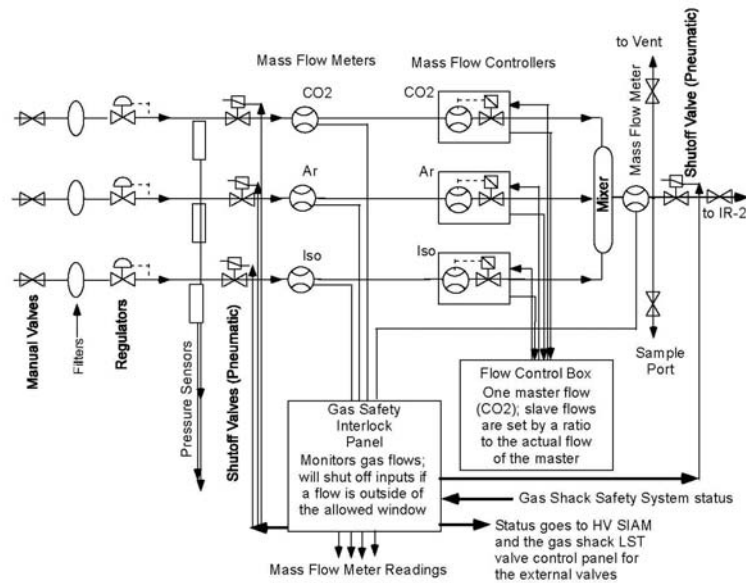


Fig. 0.2. Process diagram for the gas mixing subsystem. From[4].

Mixing of the chamber gases is performed with mass flowmeters, as sketched in Fig. 0.2. It will be

advantageous to use “drop-in” modular mixing components recently developed for the semiconductor processing industry, such as the Integrated Gas System of Fujikin[5].

The electronic bubbler system[3] monitors the chamber gas flow by counting gas bubbles in a small oil bubbler as they pass a photogate, as indicated in Fig. 0.3. Detailed histories of the input and output gas flow will be available via the online slow-control system (ref?).

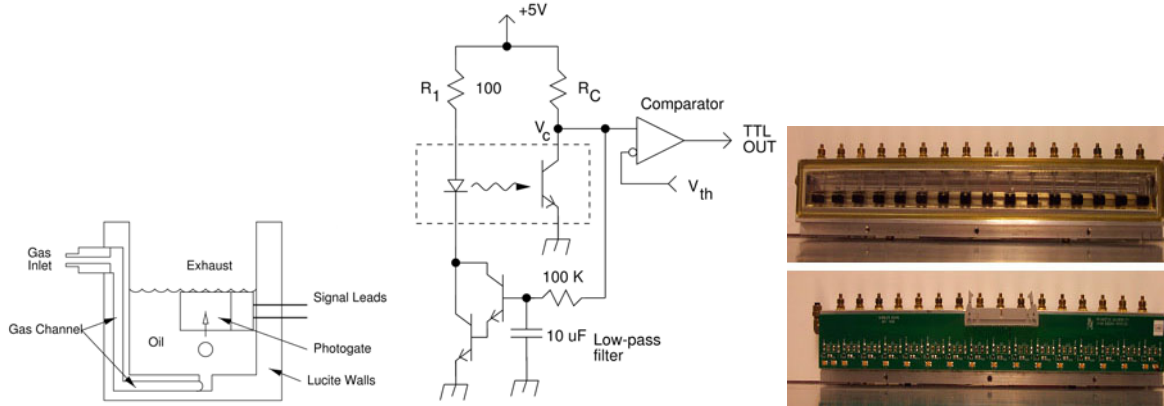


Fig. 0.3. concept, circuit diagram and photographs of the electron bubbler system. From[3].

The gas will be input from multiple, switchable sources to minimize interruptions of the gas flow during chamber operation. However, the gas flow rate will be only ≈ 1 (?) chamber volume per day, so that short interruptions of the flow will be of little consequence.

An extensive safety system with status monitors and interlocks will be implemented via the slow-control system. For a recent example of a muon-chamber-gas safety system, see[4].

1. A. Abashian *et al.*, *The K_L/μ detector subsystem for the BELLE experiment at the KEK B-factory*, Nucl. Instr. Meth. A **449**, 112 (2000).
2. S. Foulkes *et al.*, *Gas system upgrade for the BaBar IFR detector at SLAC*, Nucl. Instr. Meth. A **538**, 801 (2005).
3. M. Ahart *et al.*, *Flow Control and Measurement for RPC Gases*, Belle Note 135 (Aug. 26, 1996), <http://www.phy.princeton.edu/~marlow/rpc/gas/flow.ps>
4. R. Messner, *The LST Gas Mixing System* (Oct. 4, 2004), http://puhep1.princeton.edu/~mcdonald/dayabay/BaBar_gas_system/messner_LST_gas_system.pdf
5. *Fujikin Integrated Gas System Brochure*, <http://www.technofittings.com/pdf/igs/igsbroc.pdf>
6. G. Benelli *et al.*, *The BABAR LST Detector High Voltage System: Design and Implementation*, IEEE Nucl. Sci. Symp. Conf. Rec. **2**, 1145 (2005), <http://www.slac.stanford.edu/cgi-wrap/getdoc/slac-pub-12069.pdf>
7. Extensive documentation of the BABAR LST high voltage system is available online at <http://www.physics.ohio-state.edu/~klaus/LST/HV/osu/OSUHV.htm>