# Hall B Drift Chamber Gas System during MEDCON6

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MEDCON6 is the period in which Jefferson Lab is closed except for a small number of on-site staff to maintain critical systems. During MEDCON6 the Drift Chamber (DC) gas system has a slightly modified configuration compared to normal operations [1]. This note describes the setup.

Instead of the usual 90% Ar/10% $CO_2$ gas mixture, 100% argon gas will be used to purge the drift chambers; hence, various valves are manipulated such that only a single mixing tank will be used and the gas will be supplied from a single MFC.

Along with the hardware changes, software changes were made as the existing software [2] didn't account for such an exceptional setup. It was hoped that supply in and out of the mixing tank could be set to the same value as during normal operations and that the pressure would be maintained. Unfortunately this turned out to not be the case, see Fig 1.

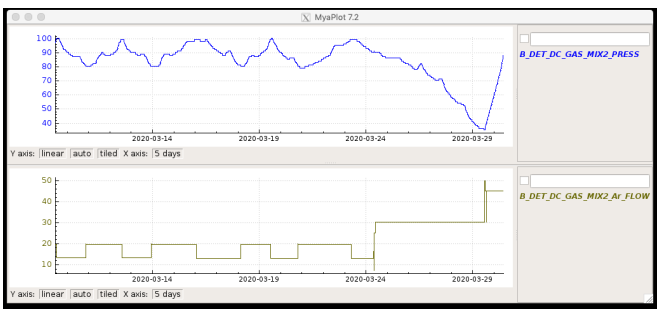


FIG. 1. 3–09 to 3–24 indicates normal operation, 3–24 to 3–29 after hardware changes, 3–29 to present after software changes.

So that changes are not made to a running system, a Virtual Instrument (VI) was created and deployed on a development cRIO. This VI uses existing shared variables served by the Shared Variable Engine to determine the state of the system as well as control the flow on the supply MFC. The VI first determines (as best as possible) if the system is set up for operations in MEDCON6, then sums the gas flow through the three mass flow controllers supplied by the tank. Finally, based on this sum and whether pressure in the tank needs to be increased or decreased, the program will set the mass flow controller supplying the tank to a value above or below the summed flow. See Fig. 2 for the Front Panel of the VI.

The system has been running for a few cycles with no significant issues. The input flow is currently set to ±20%. The output flow as of 4/1 is shown in Fig. 3.

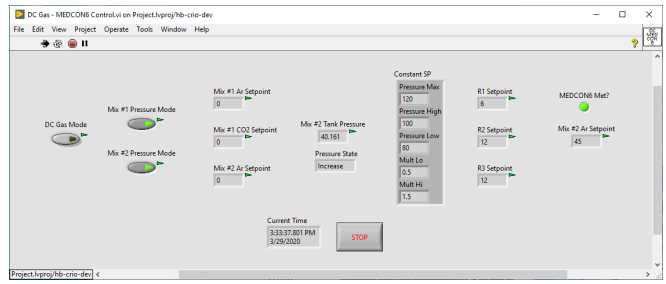


FIG. 2. Front Panel of VI that sets the tank supply mass flow controller based on three out flow mass flow controllers.

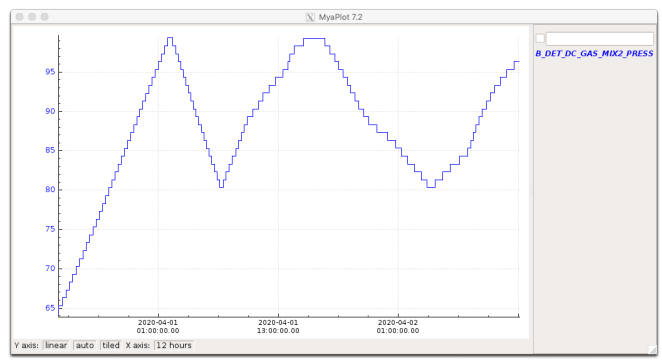


FIG. 3. Buffer tank pressure over several increase/decrease cycles.

[1] G. Jacobs, et al., *Drift Chamber Gas System*, DSG Note 2015-007, 2015.
[2] M. McMullen, et al., *Drift Chamber Gas System Controls and Monitoring Software*, DSG-Note 2018-27, 2018.