

Investigation of a set procedure for the stability of pressure control in the newly developed flow-control system

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KRISS offers new flow-control system VCS-705 for the calibration of different types of vacuum gauges and standard leaks by comparison method. This system is mainly equipped with main process chamber unit, high vacuum pumping unit, gas flow control units, vacuum analysis units and Residual Gas Analyzer (RGA) etc. The main process chamber unit is cleaned electrically and ultrasonically and has heating jacket for baking temperature up to 200°C. A baffle is inserted in the chamber to get equilibrium pressure. The system has the facility of automatic control of gas flow through Mass Flow Controller (MFC) and Regulated Valve Controller (RVC) with 5 inlets of manifold. All the equipment including pumps, gauges, flow meters, valves and RGA etc are fully computer controlled through lab view program.

The preliminary data for the flow of N₂ is recorded as a function of pressure. The results are discussed depending upon the specs of MFC & RVC. During the calibration process, the vacuum system changes configuration from downstream dynamic pressure control to static pressure control. Three calibration points per decade are obtained over the entire range of calibration from 1x10³ to 1x10⁻⁶ Torr. It is important that, when taking the readings at the set points, the pressure is constant to approximately within ±0.5% for 3-5 min to ensure that a stationary equilibrium is established in both the vacuum process chamber and gauge heads. The measurements are performed in a sequence of increasing pressure.