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APPLICATION NEWSLETTER

PROBLEM: Testing Air Flow Control Valves

The engineer in charge of product development and testing for a valve manufacturer needed a flow meter to measure the mass flow of air through valves. The company manufactures several valve models for various automotive manufacturers.

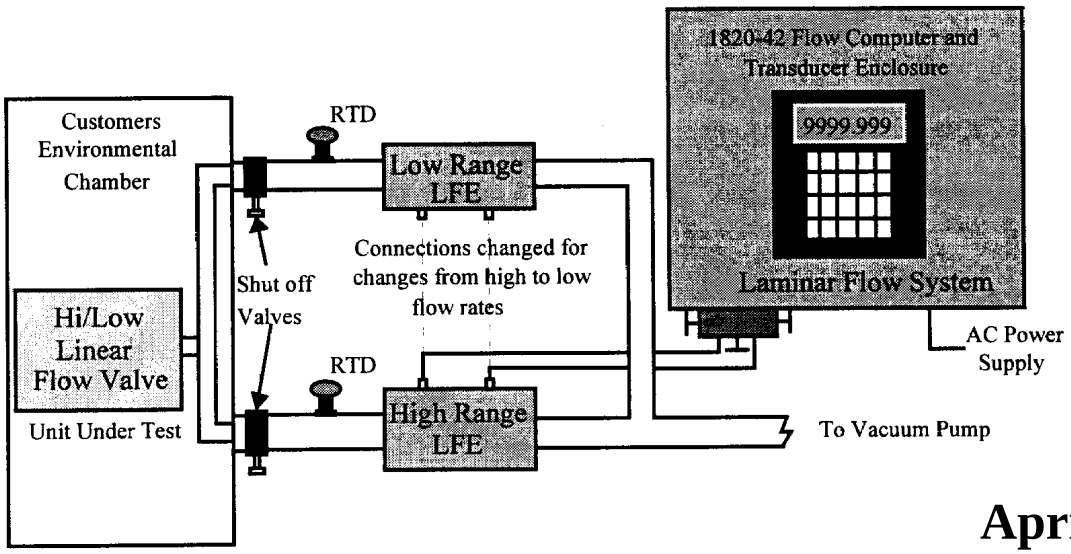
One of the company's customers required that the valves it purchased be calibrated for flow over broad temperature and flow ranges. The temperature at flow varied from -40° C to 125° C. The air flow rates varied from .02 kg/m to 2 kg/m. The static pressure at flow would start at barometric pressure, gradually drop to 3.8 psia, and return to barometric pressure during the test cycle.

The engineer needed a flow measurement system that monitored the pressure and temperature changes over the entire flow range. He wanted this information to be relayed to a flow computer that would make the necessary corrections for pressure and temperature changes and display the mass flow rate. Finally, the systems accuracy had to be traceable to NIST.

SOLUTION: Meriam's solution was a Laminar Flow System (LFS). Two Laminar Flow Elements (LFEs) were needed to cover the 100:1 turndown on flow rate and to maintain the required accuracy. A 50MW20-1 spanned the .02 kg/m to .2 kg/m measurement range. A 50MH10-3 was used for the .2 kg/m to 2 kg/m measurement range.

The LFS package included an RTD for temperature measurement and an absolute pressure transmitter to measure the static pressure upstream of the LFEs. A differential pressure transmitter measured the pressure drop across the LFEs. These measurements were sent to a Meriam model 1820-42 digital flow totalizer. The totalizer used these inputs to calculate the mass flow rates through the valves to a *system accuracy* of ± 1.0% of flow rate.

The Laminar Flow Elements offered higher accuracy, over a larger turndown, than square root type devices such as orifice plates, flow nozzles or venturis. They also had better stability and required less frequent calibration than thermal mass flow meters or mechanical meters such as turbines.



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