Application Notes

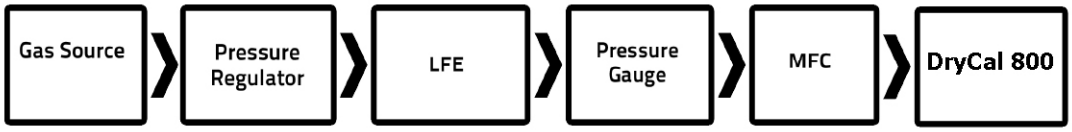
Verifying a Laminar Flow Element Using the DryCal 800 Primary Piston Prover

Introduction:
Laminar flow elements, (LFEs) are flow elements designed to measure gas flow rate. Flow of gas through a Laminar Flow Element generates a pressure difference proportional to the flow rate. A flow rate using the Poiseuille Equation is calculated based on the pressure difference, temperature, pressure, and viscosity of the gas.

The DryCal 800 is a primary gas flow meter that performs direct volumetric measurement of gas flow at ±0.15% of reading. Using patented proven DryCal® Technology, the DryCal 800 calculates the flow rate by measuring the time required to displace a piston through a glass cylinder of known volume (accuracy is dimensional, based upon length and time, two of the primary units of measure, or the SI Base Units).

Equipment required:
- DryCal primary piston prover
- Pressure regulator
- Pressure gauge
- Laminar flow element (LFE)
- Mass Flow Controller (MFC)

Test procedure:



Step 1
Connect the equipment as per the above configuration. Connect the LFE upstream of the MFC and the DryCal 800 downstream.

Step 2
Turn on the DryCal 800 and set the measurement type to STD or VOL depending on the calibration mode. Set the DryCal 800's standardizing temperature to match the LFE's standardizing temperature if the measurement type is set to STD.

Step 3
Turn on the flow. Using the pressure regulator, adjust the pressure to the LFE until the downstream pressure of the LFE matches to the rated inlet pressure of the MFC.

Step 4
Set the flow to the MFC (as applicable, this is done using either your Integrator 110 or the alternate MFC control box).

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Step 5

Press READ or AUTO in the DryCal 800 to begin taking readings. Determine the full scale accuracy of the LFE meter using the following formula:

% Accuracy = (DryCal 800 flow rate – LFE meter flow rate)*100 / LFE meter flow rate %

Application Notes:

- Allow the MFC to warm up before beginning a calibration
- Wait several minutes when changing the MFC flow rate
- Allow the DryCal 800 to stabilize before beginning a calibration for optimum measurement results

About DryCal Technology

Mesa Labs is a recognized leader in primary gas flow measurement. We provide products, services and solutions for professionals in diverse disciplines, including environmental protection, occupational health and safety, industrial process control, research and development and calibration laboratories. Mesa's Butler, NJ facility has been accredited to the calibration laboratory quality and proficiency standards set forth by ISO 17025, ANSI Z-540 and NIST Handbook 150, through the National Voluntary Laboratory Accreditation program (NVLAP) of the National Institute of Standards and Technology (NIST), the national lab of the United States. Our Scope of Accreditation uncertainty is ±0.08% of reading for gas flow measurements from 5 to 500,000 scc per minute. A current copy of our accreditation certificate and scope may be found on our website, at:

http://drycal.mesalabs.com/wp-content/uploads/sites/5/2013/12/Scope-of-Accreditation.pdf

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