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Flowmeter for very low gas flows of inert gases

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**Full title:**

Flowmeter for very low gas flows of inert gases

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**Abstract**

Gas flow was measured by using constant volume-variable pressure method. The gas flow is measured by pressure rise method using spinning rotor gauge (SRG). The design is relatively simple and has no precisely movable parts compared to the constant pressure-variable volume method. Due to outgassing effect we used a non-evaporable getter pump in order to diminish the influence of hydrogen outgassing on measured gas flow. Lower limit of pressure rise method is  $5 \times 10^{-10}$  mbar l/s and this is extended to  $3 \times 10^{-12}$  mbar l/s by using constant conductance method. With this flow meter we generated a calibration pressure of Argon in our calibration system in the range from  $8 \times 10^{-13}$  mbar up to  $2 \times 10^{-7}$  mbar.

**Keywords:** gas flow, outgassing, flowmeter

**ABSTRAKT**

Gas flow was measured by using constant volume-variable pressure method. The gas flow is measured by pressure rise method using spinning rotor gauge (SRG). The design is relatively simple and has no precisely movable parts compared to the constant pressure-variable volume method. Due to outgassing effect a non-evaporable getter pump was used in order to diminish the influence of hydrogen outgassing on measured gas flow. Lower limit of pressure rise method is  $5 \times 10^{-10}$  mbar l/s and this is extended to  $3 \times 10^{-12}$  mbar l/s by using constant conductance method. With this flow meter we generated a calibration pressure of Argon in our calibration system in the range from  $8 \times 10^{-13}$  mbar up to  $2 \times 10^{-7}$  mbar.

**1. INTRODUCTION**

Primary standards for ultrahigh and extremely high vacuum are normally pressure generators, which are realized and maintained at national metrological laboratories of the highest level. Working principle of the extremely high vacuum (XHV) calibration system is a dynamic (continuous) gas expansion. Main components of the XHV calibration system are: gas flow meter, calibration chamber and pumping system.

Gas flow rate is defined as the number of molecules or moles of a particular gas species passing through a system per unit time [1]. A basic gas flow measurement must start with the equation of state (ideal gas law). For the level of

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