

Humonics MicroFlo 20 Flowmeter

Product Specification



994-0280

Features

- Calibrated for helium and hydrogen
- Range of 0.10-20mL/min (read linear velocity to 999cm/sec)
- Dependable accuracy: $\pm 2\%$ of volumetric reading, averaging ± 1 cm/sec in linear velocity mode
- Continuous readings in volume or linear velocity

The accuracy of any flow measuring device, especially at low flow rates, depends on the instrument's full scale or maximum flow capacity — the larger the capacity, the larger the margin of error.

This very affordable new unit, the MicroFlo 20 flowmeter, is the only dry-operation flowmeter specifically designed to provide continuous, accurate linear velocity and volumetric flow readings for helium and hydrogen in capillary GC — flows of 20mL/min or less. It is particularly useful in setting flows with methane-retaining columns, such as PLOT, CLOT or thick film; or when using detectors that do not respond to methane, such as Electron Capture, TSD or ELCD.

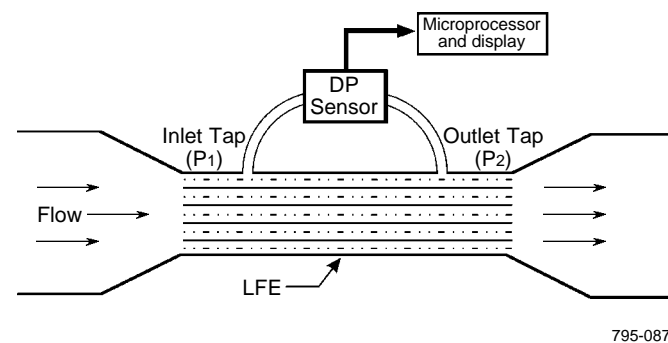
With the typical method of calculating flow rates, inaccuracies can result from nominal values of column length and dead volume, and from methane retention in the column. The MicroFlo 20 flowmeter gives exact flow rates through the application of long-established scientific theories — no guessing, no inconsistencies. Moreover, its easy-to-operate design will save GC set-up time.

Principle of Operation

The flow rate is determined by creating and measuring a differential pressure drop across a unique internal restriction known as the Laminar Flow Element (LFE). The restriction is designed so that the gas molecules move in parallel paths along the entire length of a passage, where the relationship between pressure drop and flow is very linear. Taps set some distance from the inlet and outlet activate a sensor that measures pressure drop, and thus laminar flow is established for the range of the instrument.

Figure A shows a simplified representation of the MicroFlo 20 flowmeter principle of operation. In theory, for best utilization of the linear relationship between flow and pressure, the pressure taps are placed at the same distance from the inlet and from the outlet of the flow element, where laminar flow is fully developed. The mechanical design of the flowmeter closely follows the theoretical prescriptions, and, as a result, these instruments have an unprecedented linearity.

Figure A. Laminar Flow Principle



Some back pressure is required to ensure accuracy at these low flow rates. The back pressure at 12mL/min for helium is about 0.6psi, which is significantly lower than most other units (typically 2-3psi). Since the flow for capillary columns is normally less than 10mL/min, the back pressure will be less than 0.5psi and will drop in a linear progression as the flow rate decreases.

Unlike other pressure-flow measuring technologies, the relationship between pressure drop and flow is very linear in this laminar flow element. The basic principle of operation of the MicroFlo 20 flowmeter is described with the Poiseuille Equation, stated as:

$$Q = K \frac{(P1 - P2)}{V}$$

Where:

- Q = volumetric flow rate
- P1 = static pressure — inlet tap
- P2 = static pressure — outlet tap
- V = absolute viscosity of the gas
- K = a constant dependent on restriction geometry

Because this underlying principle is well characterized both theoretically and experimentally, the conversion factors necessary for measuring the flow of different gases are easily and precisely determined through a microprocessor. These conversion factors are linear, and are simply calculated by ratio of the absolute viscosity of the gases. The gas switch (helium or hydrogen) selects the viscosity factor in the microprocessor to calculate and display the correct flow for that gas.

The MicroFlo 20 flowmeter is calibrated to NIST-certified volumetric standards for helium and hydrogen. When the unit is turned on, the display defaults to linear velocity readings — display mL/min readings simply by pushing a button. The unit is unaffected by temperature or pressure changes. The lifespan of its 9-volt battery is approximately 100 hours.

Ordering Information:

Description	Cat. No.
Humonics Laminar Micro-Flo 20 Flowmeter	23144

Contact our Technical Service Department
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for expert answers to your questions.

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