

μ-FLOW SERIES L01

MASS FLOW METERS / CONTROLLERS FOR LIQUIDS

INTRODUCTION

Bronkhorst High-Tech B.V. has been the pioneer in the field of micro to low flow liquid metering instruments based on a thermal measuring principle. A wealth of experience has been gathered over the past 20 years, which has resulted in three product series that cover Full Scale flow ranges from 30 mg/h up to 20 kg/h.

FROM MICRO- TO NANO-FLOW RANGES

Bronkhorst High-Tech works in very close contact with its customers to ensure constant improvement and innovation to its' product range. Today's market for liquid flow meters tends to develop into the very small flow ranges - even into nano-flow ranges. With the new generation of thermal liquid mass flow meters / controllers of the μ-FLOW Series, Bronkhorst High-Tech offers the solution for this complicated task. The result of the new development is a small, compact instrument with ranges from 1,5...30 mg/h (25...500 nanolitres per minute) up to 0,1...2 g/h. In addition, the new instrument offers a digital pc-board with optional on-board interface to Profibus, DeviceNet, Modbus or FLOW-BUS.

DESCRIPTION

The μ-FLOW L01 mass flow meter is basically a straight sensor tube without any moving parts or built-in obstructions. The heater/sensor assembly utilises the heat transfer principle and is arranged around the tube. Upon flow, the ΔT is sensed by the upstream and downstream temperature sensors and this ΔT is a function of both the flow-rate and heat capacity of the liquid to be measured.

FLOW CONTROL

Flow control is achieved by integrating a control valve onto the body of the liquid flow meter. This control valve has a purge connection on top of the sleeve that enables easy elimination of air or gas when starting up the system. The electronic control function forms part of the normal circuitry in the liquid flow meter, so the need for an external controller is eliminated.



FEATURES

- Fast and accurate measuring signal
- Single rail power supply +15V or +24V
- Analog I/O 0...5(10) V or 0(4)...20 mA
- Digital RS232 + optional interface for Profibus-DP® / DeviceNet™ / Modbus / FLOW-BUS
- Thru-Flow measurement (no by-pass)
- Insensitive to mounting position
- Stainless steel sensor; other materials, e.g. PEEK™ or Fused Silica are available on request
- Very small internal volume (using SS316 1,5...50 μl)
- Cleanroom assembled (option)

APPLICATIONS

The μ-FLOW Series is suitable for low liquid flow applications in laboratories and OEM installations in the following markets (typically):

- Semiconductor industry
- Analytical laboratories
- HPLC applications
- Food industry
- Chemical industry
- Optical fibres
- Pharmaceutical industry

Performance specifications

Accuracy, standard : $\pm 2\%$ FS

(based on actual calibration)

Reproducibility : $\pm 0,2\%$ FS

Settling time (controller) : 2...4 seconds

Attitude sensitivity : negligible

Operating conditions

Flow capacity : meter: 1,5...30 mg/h up to 0,1...2 g/h

(for fluids with thermal properties similar to IPA or water) controller: 5...100 mg/h up to 0,1...2 g/h intermediate ranges available

Turndown : 1:20 (5...100%) for the performance specifications set out above

Operating temperature : 5...50°C

Maximum operating pressure : liquid flow meter: 400 bar
liquid flow controller: 100 bar

Mounting position : any position

Warm-up time : approx. 10 min. for accuracy $\pm 2\%$ FS

Mechanical specifications

Material (wetted parts) : stainless steel 316L; other (PEEK™, Fused Silica) on request

Process connections : std: $\frac{1}{16}$ " or $\frac{1}{8}$ " OD compression, 10-32 UNF female; other on request

Seals : meter: all metal, controller: Kalrez-6375; other on request

Weight : meter: 0,2 kg; controller: 0,3 kg

Electrical specifications

Power supply : + 15 / +24 Vdc, 100 mA for meter; add 250 mA for control valve

Analog output/command : 0...5 (10) Vdc or 0 (4)...20 mA (sourcing output)

Digital communication : standard: RS-232, option: Profibus-DP, DeviceNet, Modbus, FLOW-BUS

Electrical connection

Analog/RS232 : 9-pin D-connector (male);

Profibus-DP : bus: 9-pin D-connector (female);
power: 9-pin D-connector (male);

DeviceNet : 5-pin M12-connector (male);

Modbus / FLOW-BUS : RJ45 modular jack

Calibration

References : Verified by NKO, the Dutch calibration organisation, and traceable to Dutch and international standards.

Liquids : Standard calibration: H2O or IPA (Isopropyl Alcohol).
For other liquids apply to factory.

System : Precision laboratory balances

Model number identification

L01(V02) - A A A - N N - A - NNA

Function

L01 Liquid flow meter up to 2 g/h*
L01V02 Liquid flow controller up to 2 g/h*

Style

* IPA or water equivalent

A Meter/Controller; with RS-232 and analog I/O
D Meter/Controller; with RS-232 and DeviceNet I/O
M Meter/Controller; with RS-232 and Modbus I/O
P Meter/Controller; with RS-232 and Profibus-DP I/O
R Meter/Controller; with RS-232 and FLOW-BUS I/O

Output

A 0...5 Vdc
B 0...10 Vdc
F 0...20 mA sourcing
G 4...20 mA sourcing

Supply voltage

B +24 Vdc (DeviceNet)
D +15...+24 Vdc (Analog, Profibus, FLOW-BUS)

Connections

0 10-32 UNF female
1 $\frac{1}{8}$ " OD compression type
9 Other, e.g. $\frac{1}{16}$ " OD compression type

Internal seals

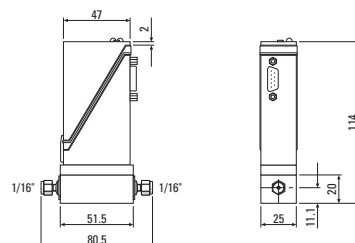
0 None (meters)
K Kalrez-6375 (controllers)

Sensor

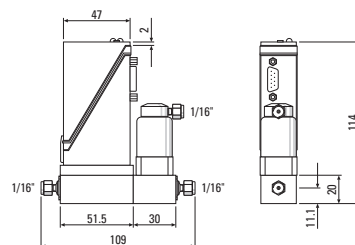
Sensor code will be selected by factory

Dimensions (mm)

Liquid flow meter model L01



Liquid flow controller model L01V02



Technical specifications and dimensions subject to change without notice.

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