

LIQUI-FLOW®

Series L1 / L2 Mass Flow Meters and Controllers for Liquids

> Introduction

Bronkhorst High-Tech B.V., the European market leader in thermal Mass Flow Meters/Controllers and Electronic Pressure Controllers, has more than 25 years experience in designing and manufacturing precise and reliable measurement and control devices. With a wide range of instruments, Bronkhorst High-Tech offers innovative solutions for many different applications in many different markets. The instruments are made to customers' specification, in various styles, suitable for use in laboratory, industrial environment, hazardous areas, semiconductor processing or analytical equipment.

> LIQUI-FLOW® series L1 / L2

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. The LIQUI-FLOW® Mass Flow Meter was designed to cover the range between 5 and 1000 g/h (Full Scale) in a compact instrument. The Flow Meter basically consists of a stainless steel tube without any moving parts or built-in obstructions. A heater configuration causes a temperature rise of typically 1°C. The unique thermopile sensor measures the temperature differences across the in- and outgoing legs of the measuring tube. The signal resulting from the ΔT is linear to the mass flow rate. Due to the benefits of the unique patented sensor, the L1/L2 series is attitude insensitive and suitable for fluids with low boiling points. The Mass Flow Meter contains no elastomer seals (welds only) and has a weatherproof (IP65) housing.

> Liquid flow control

Flow control is achieved by coupling a control valve to 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 flow meter, so the need for an external controller is eliminated. The control valve contains an elastomer (Kalrez) valve seat and has an IP65 rated enclosure.



> LIQUI-FLOW® features

- ◆ thru-flow measurement
- ◆ insensitive to mounting position
- ◆ suitable for liquids with low boiling points
- ◆ super stable zero
- ◆ sterilizable
- ◆ weatherproof IP65 housing

> Fields of application

- ◆ Semiconductor industry
- ◆ Biotechnological processes
- ◆ (Petro-) Chemical industry
- ◆ Food & Pharmaceutical industry
- ◆ Analytical laboratories

> Technical specifications

Measurement / control system

Accuracy, standard (based on actual calibration)	: ±1% FS
Turndown	: 1 : 50 (2 ... 100%)
Reproducibility	: ±0,2% FS typical H ₂ O
Settling time (controller)	: < 2 seconds
Operating temperature	: 0...70°C
Temperature sensitivity	: zero: < 0,002% FS/°C; span: < 0,1% Rd/°C
Attitude sensitivity	: Negligible
Warm-up time	: 30 min for optimum accuracy; 10 min. for accuracy ±2% FS

Mechanical parts

Material (wetted parts)	: Stainless steel 316L or equivalent
Process connections	: 1/8", 1/4" or 6 mm OD compression type or 1/4" face seal, orbitally welded to body; other on request
Outer seals	: None in meter; controller only one metal-to-metal seal
Valve seat	: Kalrez-6375; other on request
Ingress protection (housing)	: IP65

Electrical properties

Power supply	: +15...24 Vdc
Max. power consumption	: Meters: 170 mA (L1) / 270 mA (L2); Controllers: 320 mA (L1C2I) / 370 mA (L2C2I)
Analog output/command	: 0...5 (10) Vdc or 0 (4)...20 mA (sourcing output)
Electrical connection	: Male, Amphenol C091 31 C008

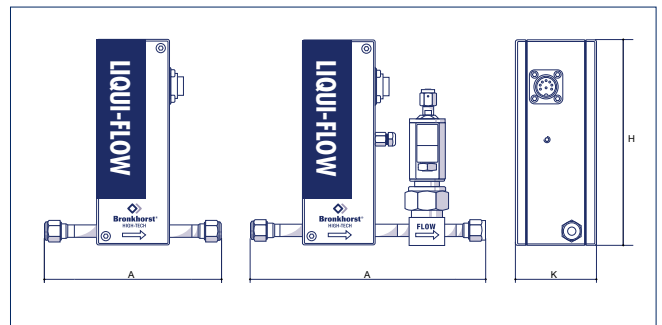
Calibration

References	: Verified by VSL, the Dutch calibration organisation, and traceable to Dutch and international standards
Liquids	: Standard calibration: H ₂ O or IPA (Isopropyl Alcohol); for other liquids apply to factory.
System	: Precision laboratory balances

Technical specifications subject to change without notice.



> Dimensions and weights



Mass Flow Meter

Model	A	H	K	Weight (kg)
L1 (1/8")	124	155	60	1,0
L2 (1/4")	127	155	60	0,9

Mass Flow Controller

Model	A	H	K	Weight (kg)
L1C2I (1/8")	169	155	85	1,4
L2C2I (1/4")	172	155	85	1,9

Dimensions in mm

> Models and flow ranges

Liquid Mass Flow Meters;

PN200 (pressure rating 200 bar; higher on application)

Model	Min. flow	Max. flow
L1	0,1...5 g/h	2...100 g/h
L2	2...100 g/h	20...1000 g/h

Liquid Mass Flow Controllers;

PN100 (P-max 100 bar)

Model	Min. flow	Max. flow
L1C2I	0,1...5 g/h	2...100 g/h
L2C2I	2...100 g/h	20...1000 g/h

Indicated ranges are based on H₂O.

> Model number identification

