

## LIQUI-FLOW® SERIES L10/L20

### DIGITAL 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.

#### OBJECTIVE FOR NEW SERIES

Bronkhorst High-Tech works in very close contact with its customers to ensure constant improvement and innovation to its product range. Recent feedback has been used to develop a new generation of thermal liquid mass flow meters/controllers. The main objective was to cover the range between 5 and 1000 g/h (Full Scale) in a compact instrument with a fast response. In addition the instrument should have a digital pc-board with optional on-board interface to PROFIBUS®, DeviceNet™, Modbus or FLOW-BUS.

#### DESCRIPTION

The LIQUI-FLOW® L10/L20 mass flow meter is basically a stainless steel tube without any moving parts or built-in obstructions. The heater/sensor assembly is arranged around the tube and, by following the anemometric principle, a constant difference in temperature ( T ) is created and the energy required to maintain the T is dependent on the mass flow rate. Due to the benefits of the unique patented sensor, the fluid will be warmed to a maximum of 5°C, thereby making the L10/L20 Series just as suitable for fluids with low boiling points as the L1, L2 and L30 LIQUI-FLOW® Series.

#### 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.



#### DESIGN 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
- Very small internal volume
- Suitable for liquids with low boiling points
- Cleanroom assembled (option)

#### APPLICATIONS

The LIQUI-FLOW® L10/L20 Series is suitable for low liquid flow applications in laboratories and OEM installations in the following markets (typically):

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

## Performance specifications

Accuracy, standard : ±1% FS

(based on actual calibration)

Reproducibility : ± 0,2% FS typical H<sub>2</sub>O

Settling time (controller) : < 2 seconds

Temperature sensitivity : ± 0,1% FS/°C

Attitude sensitivity : negligible

Vibration sensitivity : negligible

## Operating conditions

Flow capacity (based on H<sub>2</sub>O) : smallest 0,25...5 g/h

(Intermediate ranges available) highest 20...1000 g/h

Turndown : L10 Series 1 : 20 (5...100%)

L20 Series 1 : 50 (2...100%)

Operating temperature : 5...50°C

Max. operating pressure : 100 bar

Pressure drop flow meter : max. 100 mbar dif.

(based on water)

Mounting position : any position

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

## Mechanical specifications

Material (wetted parts) : stainless steel 316L / 320;  
other on request

Process connections : 1/8", 1/4" or 6 mm OD compression type;  
1/8" or 1/4" face seal male;  
other on request

Seals : Kalrez-6375;  
other on request

Weight : meter: 0,2 kg; controller: 0,3...0,5 kg

## Electrical specifications

Power supply : +15 / +24 Vdc, 120 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/RS-232 : 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: H<sub>2</sub>O or IPA  
(Isopropyl Alcohol)

For other liquids apply to factory.

System : Precision laboratory balances

## Model number identification

LNN(V02) - A A A - N N - A - NNA

### Liquid Flow Meter (LFM)

Model	Ranges (based on water)	
L13	0,1...5 g/h	max. 5...100 g/h
L23	2...100 g/h	max. 20...1000 g/h

### Liquid Flow Controller (LFC)

Model	Ranges (based on water)	
L13V02	0,25...5 g/h	max. 5...100 g/h
L23V02	2...100 g/h	max. 20...1000 g/h

### Style

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 (in/out)

0	None
1	1/8" OD compression type
2	1/4" OD compression type
3	6 mm OD compression type
8	1/4" face seal male
9	other

### Internal seals

K	Kalrez-6375
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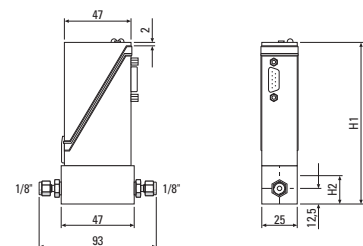
### Sensor

Sensor code will be selected by factory

## Dimensions (mm)

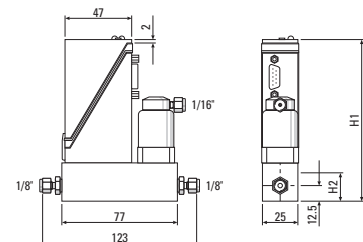
Liquid flow meter  
model L13/L23

	H1	H2
L13	119	25
L23	122	28



Liquid flow controller  
model L13V02/L23V02

	H1	H2
L13V02	119	25
L23V02	122	28



Technical specifications and dimensions subject to change without notice.

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