

LIQUI-FLOW™

Series L30 Digital Mass Flow Meters / Controllers for Liquids



> Introduction

Bronkhorst High-Tech B.V., the European market leader in thermal Mass Flow Meters/Controllers and Electronic Pressure Controllers, has many years experience in designing and manufacturing precise and reliable measurement and control devices. With a wide range of instruments, Bronkhorst 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, semi-conductor processing or analytical equipment.

> LIQUI-FLOW™ series L30

Bronkhorst has been the pioneer in the field of micro to low flow liquid metering instruments based on a thermal measuring principle. The L30 digital LIQUI-FLOW™ Mass Flow Meter was designed to cover the range between 2 and 20 kg/h (Full Scale) to expand from the product line of liquid flow meters/controllers with ranges down to 75 mg/h FS.

The L30 Mass Flow Meter is essentially a straight tube of 316L stainless steel with a unique thin film thermopile sensor/heater design, fixed to the outside of the tube. The sensor signal is obtained by measuring the power needed to maintain a constant temperature rise of the fluid. In a formula this can be expressed as follows:

$$\text{Signal output} = \frac{\text{Power}}{\Delta T} = k \cdot c_p \cdot \Phi_m$$

ΔT = temperature difference c_p = specific heat
 k = meter constant Φ_m = mass flow

> Liquid 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.

> Multi-Bus technology

Bronkhorst developed their latest digital instruments according to the "multi-bus" principle. The basic pc-board on the instrument contains all of the general functions needed for measurement and control. It has analog I/O-signals and also an RS232 connection as a standard feature. In addition there is the possibility of integrating an interface board with DeviceNet™, PROFIBUS DP, Modbus-RTU or FLOW-BUS protocol. The latter is a fieldbus based on RS485, specifically designed by Bronkhorst for their mass flow metering and control solutions.

> General features LIQUI-FLOW™ series L30

- ◆ no moving parts
- ◆ thru-flow measurement
- ◆ compact control loop with control valve or pump
- ◆ suitable for liquids with low boiling points
- ◆ all metal seals

> Digital features

- ◆ DeviceNet™, PROFIBUS DP, Modbus-RTU or FLOW-BUS slave
- ◆ RS232 interface
- ◆ other fieldbus options on request
- ◆ alarm and counter functions

> Fields of application

- ◆ Semiconductor industry
- ◆ Chemical industry
- ◆ Food & Pharmaceutical industry
- ◆ Packaging production and treatment
- ◆ Analytical laboratories



Bronkhorst®

> Technical specifications

Measurement / control system

Accuracy, standard (based on actual calibration)	: ±1% FS
Turndown	: 2 ... 100%
Reproducibility	: ±0,2% FS typical H ₂ O
Settling time (controller)	: standard: 4...10 seconds on request: 1...2 seconds
Max. operating pressure	: 100 bar
Pressure drop	: 35 ... 350 mbar (based on 2 ... 20 kg/h H ₂ O)
Operating temperature	: 5...70°C
Temperature sensitivity	: ±0,2% FS/°C
Attitude sensitivity	: negligible
Warm-up time	: 30 min. for optimum accuracy; 3 min. for accuracy ±2% FS

Mechanical parts

Material (wetted parts)	: electropolished stainless steel 316L; other on request
Process connections	: ¼" or 6 mm OD compression type or ¼" face seal male, orbitally welded; other on request
Outer seals	: metallic
Valve seat (controllers)	: Kalrez®-6375; other on request
Ingress protection (housing)	: IP65

Electrical properties

Power supply	: +15...24 Vdc
Power consumption	: meter: max. 18,5 Watt; controller: max. 22 Watt
Analog output/command	: 0...5 (10) Vdc or 0 (4)...20 mA (sourcing output)
Digital communication	: standard: RS232 options: PROFIBUS DP, DeviceNet™, Modbus-RTU, FLOW-BUS
Electrical connection	
Analog/RS232/Power	: 8 DIN male
PROFIBUS DP	: 5-pin M12 female
DeviceNet™	: 5-pin M12 male
Modbus-RTU/FLOW-BUS	: 5-pin M12 male

Calibration

References	: Traceable to international standards
Liquids	: Standard calibration liquid: H ₂ O; for other liquids apply to factory
System	: Precision laboratory balances

Technical specifications and dimensions subject to change without notice.

> Models and flow ranges

Liquid Mass Flow Meters

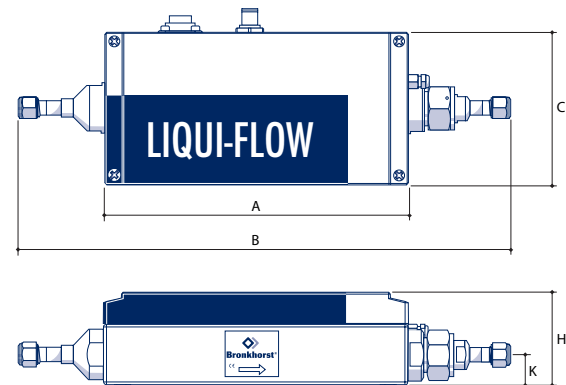
Model	min. flow	max. flow
L30	0,04...2 kg/h	0,4...20 kg/h

Liquid Mass Flow Controllers

Model	min. flow	max. flow
L30C2I (Kv-max: 2,37x10 ⁻³)	0,04...2 kg/h	0,4...20 kg/h
L30C5I (Kv-max: 6,93x10 ⁻²)	0,04...2 kg/h	0,4...20 kg/h

Indicated ranges are based on H₂O

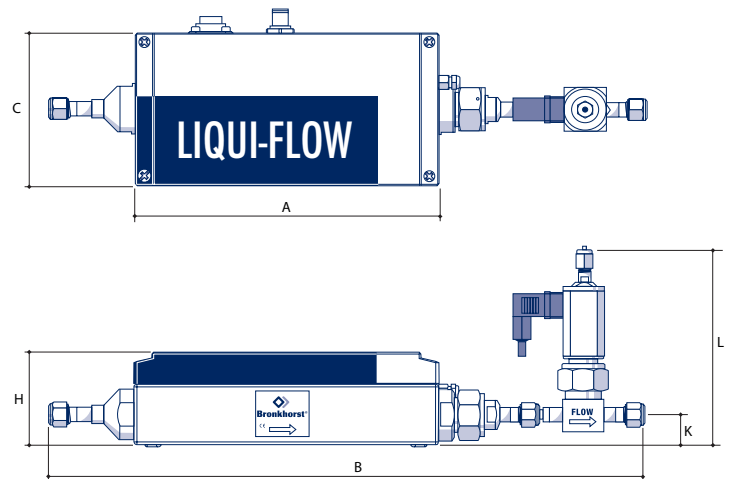
> Dimensions



Flow Meter

Model	A	B	C	H	K	Weight (kg)
L30 (1/4")	200	324	100	61	20	0,5

Dimensions in mm.



Flow Controllers

Model	A	B	C	H	K	L	Weight (kg)
L30C2I (1/4" OD)	200	393	100	61	20	129	0,8
L30C5I (1/4" OD)	200	393	100	61	20	114	1,0

Dimensions in mm.

