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 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 L30

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 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 30 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 High-Tech 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 High-Tech for their mass flow metering and control solutions, and through which the company already has over ten years of experience with digital communication.

> 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

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> Technical specifications

Measurement / control system

Accuracy, standard	: ±1% FS
(based on actual calibration)	
Turndown	: 2 … 100%
Reproducibility	: ±0,2% FS typical H_2O
Settling time (controller)	: standard: 4…10 seconds
	on request: 1…2 seconds
Max. operating pressure	: 100 bar
Pressure drop	: approx. 350 mbar
	(based on 20 kg/h H_2O)
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
Weight	: meter: 0,5 kg; controller: 0,8...1 kg
Ingress protection (housing)	: IP65

Electrical properties

Power supply	: +15…24 Vdc
Power consumption	: meter: max. 1,25 A;
	controller: max. 1,6 A;
	add 50 mA for Profibus, if applicable
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

Technical specifications 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 H_2O

Calibration

References	: Verified by NKO, the Dutch
	calibration organisation, and
	traceable to Dutch and international
	standards
Liquids	: Standard calibration liquid: H_2O;
	for other liquids apply to factory
System	: Precision laboratory balances

L30 Mass Flow Meter for Liquids

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