

Product overview

Mass flow and pressure measurement



About Bronkhorst



BRONKHORST HEADQUARTERS, THE NETHERLANDS

> Product range

Bronkhorst High-Tech B.V., established in 1981, offers an extensive range of thermal and coriolis Mass Flow Meters and Controllers. Numerous styles of both standard and customized instruments are offered for applications in laboratory, industrial and hazardous areas. The full scale measuring range for these instruments can be selected between 0...0.7 sccm (0...0.7 ml_n/min) and 0...388,461 scfh (0...11,000 m³_n/h) for gases and 0...75 mg/h up to 0...600 kg/h for liquids. Furthermore Bronkhorst offers pressure transducers and controllers with a minimum range of 0...75 torr (0...100 mbar) and a maximum range of 0...5,880 psi (0...400 bar).

In this brochure Bronkhorst briefly describes the various product lines. On request, a technical brochure of each product can be submitted.



> Round-the-clock support

Bronkhorst is a truly worldwide organisation with its Head Office being located in the town of Ruurlo in The Netherlands. With a total head-count now exceeding 330 employees, it is impressive that 60 of these are involved with R&D and 40 involved with after-sales service and customer care. In actual fact, the Customer Service Department offers "round-the-clock" support, seven days a week, to customers in every corner of the world. Our specialist teams are available to you to ensure pre- and post sales support with diverse

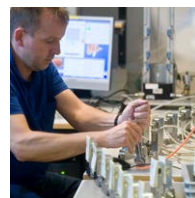
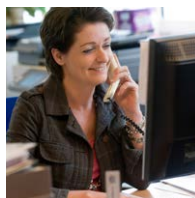
needs, such as application advice, on-site inspection & calibration and start-up assistance.

> Sales representation and service

In addition to the sales office in Veenendaal of The Netherlands there are subsidiary offices in Great Britain, France, Switzerland, Northern Germany, Japan, China, Taiwan, South Korea and the USA whereby local expertise and service is offered. Bronkhorst has also built up an extensive complimentary network of distributors and service stations across the rest of Europe and, indeed, yet further representation in such countries as Australia, New Zealand, Canada, Israel, India, South Africa, Argentina and Brazil.

> Quality

Customer satisfaction, innovation and quality of product and service have been the cornerstones of Bronkhorst's success. In 1987 the company obtained the Koning Willem I Award for a young successful enterprise and in 1992 the company was accredited to ISO 9001 with ISO 14001 (an International Standard for environmental management) following three years later. This ongoing commitment was rewarded by accreditation to the most recent Quality Management System, ISO 9001:2008.



Laboratory & instrumentation

Mass Flow Meters and Controllers for gas applications with an electronic housing suitable for laboratory conditions. EL-FLOW® series instruments are truly unique in their capability to control flow ranges between 0...0.7 sccm (0...0.7 ml_n/min) and 0...3,583 scfh (0...1670 l_n/min) with pressure rating ranging between vacuum and 5,800 psi (400 bar) - all in one range of instruments. This versatility in flow ranges and in operating conditions has ensured that the EL-FLOW® series remains our most popular and field proven of instruments.

> Features

- ◆ fast response
- ◆ best accuracy: $\pm 0.5\%$ of reading + $\pm 0.1\%$ of F.S.
- ◆ analog and digital (fieldbus) communication
- ◆ metal sealed versions available
- ◆ optional Multi-Gas/Multi-Range functionality

> Flow ranges (based on air)

smallest 0...0.7 sccm (0...0.7 ml_n/min),
highest 0...3,583 scfh (0...1670 l_n/min)



Industry

IN-FLOW series Mass Flow Meters / Controllers are thermal Mass Flow Meters for gas applications requiring a rugged design and suitability for industrial environments. The electronics housing is rated to IP65 and is suitable for use in Zone 2.

> Features

- ◆ IP65 protection (dust- and weatherproof)
- ◆ analog and digital (fieldbus) communication
- ◆ ATEX approved for Zone 2 (option)
- ◆ pressure ranges up to 10290 psi (700 bar)

> Flow ranges (based on air)

smallest 0...0.7 sccm (0...0.7 ml_n/min),
highest 0...388,461 scfh (0...11,000 m³_n/h)



Ex-proof

EX-FLOW series Mass Flow Meters / Controllers are thermal Mass Flow Meters / Controllers for gas applications requiring rugged design and suitability for hazardous areas. The electronics housing is rated to IP65 and approved according to ATEX with the classification II 2 G Ex ib IIC T4.

> Features

- ◆ ATEX approved for Zone 1
- ◆ rugged IP65 housing
- ◆ IECEx DEK14.0060
- ◆ TIIS = 検・第TC21584号 (Japanese certification)

> Flow ranges (based on air)

smallest 0...7.5 sccm (0...7.5 ml_n/min),
highest 0...388,461 scfh (0...11,000 m³_n/h)



Low pressure drop

LOW-ΔP-FLOW series Mass Flow Meters and Controllers are derived from the EL-FLOW series. The special construction of both sensor and flow restriction makes this series suitable for low pressure drop applications (the sensor only requires 0.38 to 3.75 torr (0.5 to 5 mbar). Furthermore the larger flow channels minimize the risks of clogging and facilitate the cleaning and purging of these LOW-ΔP-FLOW instruments.

> Features

- ◆ very low pressure drop
- ◆ suitable for corrosive gases
- ◆ all stainless steel construction
- ◆ no moving parts
- ◆ also available with IN-FLOW industrial housing
- ◆ analog and digital (fieldbus) communication

> Flow ranges (based on air)

smallest 0...10 sccm (0...10 ml_n/min), highest 0...7,063 scfh (0...200 m³_n/h)



Pressure

The EL-PRESS series electronic pressure meters and controllers have a well-proven compact thru-flow design and are available in pressure ranges for 0...75 torr (0...100 mbar) up to 0...5880 psi (0...400 bar). A differential pressure transmitter can also be supplied in the range of 0...220 psi (0...15 bar). The pressure controller performs with high accuracy and repeatability and should be specified for forward pressure control or backward pressure control.

> Features

- ◆ suitable for liquids and gases
- ◆ analog and digital (fieldbus) communication
- ◆ metal sealed versions available

> Pressure ranges

smallest 0...75 torr (0...100 mbar), highest 0...5,880 psi (0...400 bar)



OEM solutions

In addition to the standard product line, Bronkhorst provides tailor-made, complete fluid control solutions for OEM systems. On a compact manifold or rail system one or more mass flow or pressure sensor modules can be combined with control valves, shut-off valves, mixing chambers, filters or any other functional module as per customer's request.

> Features

- ◆ compact, modular construction
- ◆ combinations of functions possible
- ◆ pre-tested "plug-and-play" units
- ◆ attractive pricing
- ◆ downported; easy assembly / exchange of modules



Liquid

Mass Flow Meters and Controllers for liquids in ranges between 0...5 g/h and 0...20 kg/h (water equivalent). LIQUI-FLOW™ flow meters only require a small differential pressure. Despite utilizing direct measurement (i.e. without a by-pass) the temperature rise of the fluid is minimal; only approx. 31...41 °F (1...5 °C). This greatly limits the danger of evaporation or degradation of the fluid.

> Features

- ◆ fast and accurate measuring signal
- ◆ analog and digital (fieldbus) communication
- ◆ thru-flow measurement (no by-pass)
- ◆ insensitive to mounting position
- ◆ industrial style (IP65) available

> Flow ranges (based on water)

smallest 0...5 g/h, highest 0...20 kg/h



Ultra low flow

For ultra low flow ranges of liquids Bronkhorst developed the μ-FLOW series for 0...75 mg/h up to 0...2 g/h water equivalent. The thermal Mass Flow Meters can be close-coupled to a LIQUI-FLOW™ control valve for pulsation-free control.

> Features

- ◆ negligible internal volume
- ◆ analog and digital (fieldbus) communication
- ◆ insensitive to mounting position
- ◆ suitable for HPLC-applications
- ◆ alternative: ultra compact LIQUI-FLOW™ mini Mass Flow Meter

> Flow ranges (based on water)

smallest 0...75 mg/h, highest 0...2 g/h



Evaporation

The CEM-System (Controlled Evaporator Mixer) is an innovative Liquid Delivery System that can replace traditional Bubbler Systems. It consists of a liquid flow controller, an MFC for carrier gas and a temperature controlled mixing and evaporation device. The system is suitable for mixing liquid flows of 0.25...1000 g/h resulting in saturated vapor flows of 50 sccm to 212 scfh (50 ml_g/min to 100 l_g/min).

> Features

- ◆ accurately controlled gas/liquid mixture (mass flow)
- ◆ fast response
- ◆ very stable vapour flow
- ◆ handles water, solvents, liquid mixtures



Ultra compact – chip technology



Equipment manufacturers are looking for compact solutions to monitor or control gas flow or pressure in their system. Due to the use of micro solid state technology (MEMS), Bronkhorst has been able to halve the footprint dimension of conventional instruments to 0.75", thereby realizing the IQ+FLOW® series of ultra compact Mass Flow and Pressure Controllers.

> Features

- ◆ compact assembly ensures space efficiency
- ◆ very stable Zero, thanks to thermally balanced chip-sensor
- ◆ high accuracy
- ◆ fast response
- ◆ optional: customer specific designs for OEM-applications

> Ranges

Flow ranges: from 10 sccm up to 5,000 sccm (10 ml_n/min up to 5 l_n/min), based on air
Pressure ranges: 0...5 / 0...15 / 0...30 / 0...100 / 0...150 psi (other ranges on request)



Coriolis mass flow

For flow ranges up to 0...600 kg/h Bronkhorst designed a series of mass flow metering instruments, offering highest accuracy. These instruments utilize patented, advanced Coriolis type mass flow sensors to achieve unsurpassed performance, even with changing operation conditions in pressure, temperature, density, conductivity and viscosity. (mini) CORI-FLOW™ is offered with or without integral control valve or pump, with both analog and digital communications.

> Features

- ◆ direct mass flow measurement
- ◆ fast response time
- ◆ high accuracy (up to ±0.2% of reading)
- ◆ IP65 housing with optional ATEX Zone 2 approval
- ◆ analog plus digital communication

> Flow ranges

smallest 0...5 g/h, highest 0...600 kg/h



Power supply / readout

Bronkhorst offers various solutions for powering, readout and control of their Mass Flow and Pressure Meters / Controllers:

- ◆ **E-8000** advanced digital PS/Readouts, both single- and multi-channel configurations.
- ◆ **BRIGHT** series, compact local Readout/Control Modules
- ◆ **PiPS** series, Plug-in Power Supplies

> Features E-8000 series

- ◆ table top / rack / panel mount housings
- ◆ 1.8" color displays (TFT technology)
- ◆ User friendly operation, menu driven with 4 push buttons

> Features BRIGHT series

- ◆ Mounting on instrument, pipework or wall
- ◆ IP40 or IP65 (weatherproof)
- ◆ 1.8" colour display (TFT technology)
- ◆ Push button operation



Digital 'multibus' instruments

The product series mentioned in this brochure can be supplied with analog or digital communication. Bronkhorst developed their latest digital Mass Flow Meters/Controllers according to the "multibus" principle. The basic pc-board on the instrument contains all of the general functions needed for measurement and control, including alarm, totalization and diagnostic functions. It has analog I/O-signals and also an RS232 connection as a standard feature. In addition to this there is the possibility of integrating an interface board with DeviceNet™, PROFIBUS DP, PROFINET, Modbus-RTU/ASCII, EtherCAT® or FLOW-BUS protocol. The latter is an easily accessible fieldbus with excellent price-performance ratio that has been specially designed by Bronkhorst for their mass flow metering and control solutions.

> General specifications

- ◆ based on a 16-bit micro controller with FLASH memory
- ◆ analog input/output: 0...5 Vdc, 0...10 Vdc, 0...20 mA, 4...20 mA (sourcing)
- ◆ valve output can be monitored
- ◆ 2 LED's for status indication
- ◆ 1 multifunctional switch for digital functions
- ◆ configuration software for operation and service (through RS232)
- ◆ best accuracy +/- 0.5% of reading plus +/- 0.1% full scale (based on actual calibration)
- ◆ up to 8 calibration curves

> Fieldbus options



FLOW-BUS



EtherCAT®



Software support

Bronkhorst offers FLOW-BUS software support for PC/PLC.

- ◆ *FlowDDE*: software tool to interface between digital instruments and Windows software
- ◆ *FlowPlot*: software tool for monitoring and optimizing digital instrument parameters
- ◆ *FlowView*: software tool to operate Bronkhorst digital instruments
- ◆ *FlowFix*: software tool for fieldbus connection of digital instruments
- ◆ *FlowTune*®: user-friendly Multi-Gas/Multi-Range software

Other Bronkhorst products

In addition to the products mentioned on the previous pages, Bronkhorst offers accessories such as filter assemblies, calibration equipment and gas mixing chambers. Please contact our local representatives (see back of the brochure) for more information or visit our website www.bronkhorstusa.com.



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