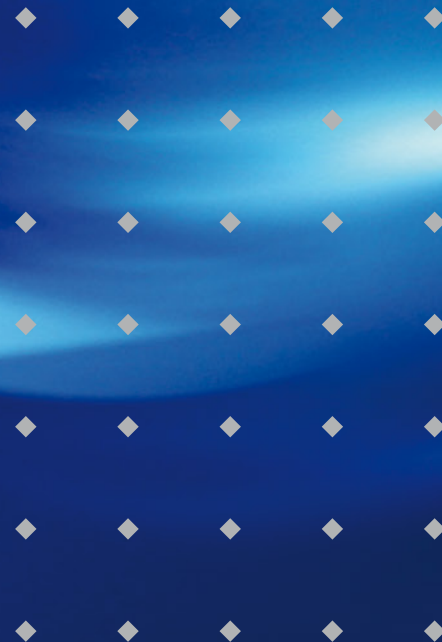


Product overview

Mass flow and pressure measurement and control



About Bronkhorst High-Tech



BRONKHORST HIGH-TECH 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 ml_n/min and 0...11000 m³_n/h for gases and 0...75 mg/h up to 0...600 kg/h for liquids. Furthermore Bronkhorst High-Tech offers pressure transducers and controllers with a minimum range of 0...100 mbar and a maximum range of 0...400 bar.

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



> Round-the-clock support

Bronkhorst High-Tech 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 265 employees, it is impressive that 45 of these are involved with R&D, 120 in manufacture 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.

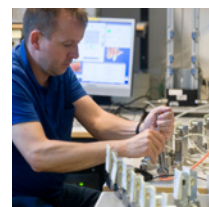
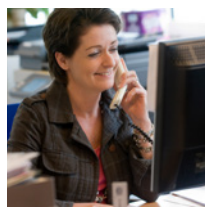
Our specialist teams are available to you to ensure pre- and post sales support with diverse needs, such as application advice, on-site inspection & calibration and start-up assistance.

> 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 High-Tech 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 and Brazil.

> Quality

Customer satisfaction, innovation and quality of product and service have been the cornerstones of Bronkhorst High-Tech'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 ml_n/min and 0...1670 l_n/min with pressure rating ranging between vacuum and 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: ± 0,5% of reading + ± 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 ml_n/min, highest 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 700 bar

> Flow ranges (based on air)

smallest 0...0,7 ml_n/min, highest 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

> Flow ranges (based on air)

smallest 0...7,5 ml_n/min, highest 0...11.000 m³_n/h



Low pressure drop

LOW- Δ P-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 0,5 to 5 mbar). Furthermore the larger flow channels minimize the risks of clogging and facilitate the cleaning and purging of these LOW- Δ P-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 ml_n/min, highest 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...100 mbar up to 0...400 bar. A differential pressure transmitter can also be supplied in the range of 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...100 mbar, highest 0...400 bar



OEM solutions

In addition to the standard product line, Bronkhorst High-Tech 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. 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 High-Tech 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 Evaporation and Mixing) 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 ml_v/min to 100 l_v/min.

> Features

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



Ultra compact – chip technology



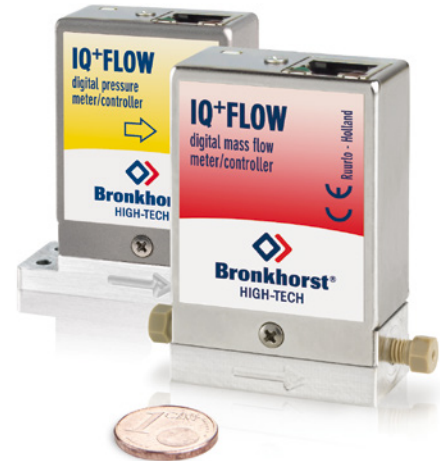
Equipment manufacturers are looking for compact solutions to monitor or control gas flow or pressure in their system. Due to the use of micro solid state technology (MEMS), Bronkhorst has been able to halve the footprint dimension of conventional instruments to 0.75", thereby realizing the IQ+FLOW® series 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 ml_n/min up to 5 l_n/min (FS), 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 High-Tech 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



Coriolis style instruments are manufactured and marketed by Bronkhorst Cori-Tech B.V.

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" colour 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 High-Tech 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 High-Tech 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 High-Tech 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 High-Tech products

In addition to the products mentioned on the previous pages, Bronkhorst High-Tech 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 internet site www.bronkhorst.com.



◆ Argentina

Dastec SRL
Pichincha 1580
C1249ABH - Ciudad de Buenos Aires
T 11 4343 6200 / 4331 2288, F 11 4334 3120
I www.dastecsr.com.ar, E dastecsr@dastecsr.com.ar

◆ Australia

Anri Instruments and Control Ltd
Unit 29, 756-758 Burwood HWY
Ferntree Gully, VIC 3156
T 03975-23782, F 03975-23783
I www.anri.com.au, E sales@anri.com.au

◆ Austria

HL-Trading GmbH
Rochusgasse 4, A-5020 Salzburg
T 0662-439484, F 0662-439223
I www.hl-trading.at, E sales@hl-trading.at

◆ Belgium and Luxemburg

Gefran-Flowcor
Lammerdries-zuid 14A, B-2250 Olen
T 014-248181, F 014-248180
I www.gefran.com/nl/benelux, E info@gefran.be

◆ Brazil

Hirsa Sistemas de Automacao e Controle LTDA
Av. Cel. Luiz de Oliveira Sampaio, 195 Ilha do Governador, Rio de Janeiro - RJ Cep: 21931-010
T (21) 2467 9200, F (21) 3396 9661
I www.hirsa.com.br, E hirsa@hirsa.com.br

◆ Canada

Hoskin Scientific
3735 Myrtle Street, Burnaby, BC, V5C 4E7
T 604-872-7894, F 604-872-0281
I www.hoskin.ca, E salesv@hoskin.ca

◆ China Bronkhorst (Shanghai)

Instrumentation Trading Co., Ltd - Room 1002, Xinan Building No. 99, Tianzhou Road, Shanghai 200233 China
T 21 6090 7259, F 21 6090 7260
I www.bronkhorst.cn, E info@bronkhorst.cn

◆ China

Advanced Technology Materials Corp.
Room 207, ZhongChen Office Building, No.2 Central LiZe Road, Beijing Wangjing New Industrial Zone, Chaoyang District, Beijing 100102
T 10 84990033 / 84990038, F 10 8499 0036
I www.atm-china.com, E info@atm-china.com

◆ Czech Republic

D-Ex Instruments
Optátova 37, 63700 Brno
T 05-41423211, F 05-41221580
I www.dex.cz, E info@dex.cz

◆ Denmark

Insatech A/S
Algade 133, 4760 Vordingborg
T 55372095, F 55377018
I www.insatech.com, E mail@insatech.com

◆ Finland

Kontram Oy
Tuupakantie 32a, 01740 Vantaa
T 09-88664500, F 09-88664599
I www.kontram.fi, E kontram@kontram.fi

◆ France Bronkhorst (France) S.A.S.

53 Rue Jacques Verniol
95370 Montigny-Les-Cormeilles
T 01-34508700, F 01-34508991
I www.bronkhorst.fr, E sales@bronkhorst.fr

◆ Germany (north) Bronkhorst Deutschland Nord GmbH

Südfeld 1b, 59174 Kamen
T 02307-925120, F 02307-9251255
I www.bronkhorst-nord.de
E info@bronkhorst-nord.de

◆ Germany (south)

Wagner Mess- und Regeltechnik GmbH
Otto-Scheugenpflug-Str. 6, 63073 Offenbach
T 069-829776-0, F 069-829776-10
I www.wagner-msr.de, E info@wagner-msr.de

◆ Greece

Flow Control and Measurement
31, Ifigeneias street, GR176 72 Kallithea, Athens
T 0210 9353080, F 0213 0242466
I www.fcm.gr, E info@fcm.gr

◆ India (North)

MTS Engineers Pvt Ltd
B-408, Wall Street-II, Opp. Orient Club, Nr. Gujarat College, Ellisbridge, Ahmedabad, Gujarat 380006
T 079-26400063, F 079-40047430
I www.mtsengrs.com, E info@mtsengrs.com

◆ India (South)

Toshniwal Systems and Instruments Pvt Ltd
267, Kilpauk Garden Road
Chennai, Tamil Nadu 600010
T 044-26445626, F 044-26442810
I www.toshniwal.net, E sales@toshniwal.net

◆ Ireland

Flowcon Technology Ltd
Lisboy House, Blackrock Road, Cork
T 353 21 429 58 22, F 353 21 429 39 98
I www.flowcon.ie, E info@flowcon.ie

◆ Italy

Precision Fluid Controls S.R.L.
Via G. Watt 37, 20143 Milano
T 02-89159270, F 02-89159271
I www.precisionfluid.it, E precision@precisionfluid.it

◆ Japan Bronkhorst Japan K.K.

Location 5-27-5, Toyo Koto-Ku, 135-0016 Tokyo
T 03-3645-1371, F 03-3645-1377
I www.bronkhorst.jp, E sales@bronkhorst.jp

◆ Netherlands Bronkhorst Nederland BV

Lunet 10C, 3905 NW Veenendaal
T 0318-551280, F 0318-565025
I www.bronkhorst.nl, E verkoop@bronkhorst.nl

◆ New Zealand

Streat Control Ltd
PO Box 25-755, St Heliers, Auckland
T 09 575 2020, F 09 575 7020
I www.streatcontrol.com

◆ Norway

Flow-Teknikk AS
Olav Brunborgs v 27, N-1396 Billingstad
T 66775400, F 66775401
I www.flow.no, E mail@flow.no

◆ Poland

Zach Metalchem Sp. z o.o.
ul.Chorzowska 44c, 44-100 Gliwice
T 032-2702262, F 032-2704528
I www.metalchem.pl, E biuro@metalchem.pl

◆ Portugal

STV - Equipamentos para a Indústria e Laboratórios Lda
Rua Alberto Sanches Castro, Lote 21B Loja Esq.
2625-069 Póvoa de Santa Iria
T 0219563007, F 0219562997
I www.stv.pt, E geral@stv.pt

◆ Romania

Termodensiroam s.a.
Bd. Basarabia, Nr. 171, Sector 3, Bucuresti
T 021-2550776, F 021-2553170
I www.tdr.ro, E office@tdr.ro

◆ Russia

Sigm Plus Co.
3 Vvedenkogost, 117342, Moscow
T 495-3333325, F 495-3344393
I www.massflow.ru, E info@massflow.ru

◆ Singapore and Malaysia

Flexisolve Technology Pte Ltd
10 Ubi Crescent, Ubi Tech Park, Lobby E,
#07-90 Singapore 408564
T 65-6743 5866, F 65-6745 3758
I www.flexisolve.com, E info@flexisolve.com

◆ Slovak Republic

D-Ex Instruments
Pražská 11, 81636 Bratislava
T 07-57297291, F 07-52499424
I www.dex.sk, E info@dex.sk

◆ South-Africa

Mecosa
OMSA House, cnr. Rabie and Aimee Street
2194 Fontainebleau
T 112576100, F 112576123
I www.mecosa.edx.co.za, E measure@mecosa.co.za

◆ South Korea Bronkhorst Korea Co. Ltd

STX W Tower 4th Floor 417
615-3 Gurodong Guro-gu Seoul
T 02 6124 4670, F 02 6124 4674
I www.bronkhorst.kr, E sales@bronkhorst.kr

◆ Spain

Iberfluid Instruments S.A.
C/ Botànica, 122
08908 L'Hospitalet de Llobregat (Barcelona)
T 93-333 3600, F 93-334 0524
I www.iberfluid.com, E intec@iberfluid.com

◆ Sweden

Omniprocess AB
Vretenvägen 12, 17154 Solna
T 08-564 808 40, F 08-564 808 50
I www.omniprocess.se, E info@omniprocess.se

◆ Switzerland Bronkhorst (Schweiz) AG

Nenzlingerweg 5, 4153 Reinach
T 061-7159070, F 061-7159079
I www.bronkhorst.ch, E info@bronkhorst.ch

◆ Taiwan Bronkhorst Taiwan Co. Ltd

10F., No. 407, Sec. 6, New Taipei Boulevard
Taishan district, New Taipei City, 24355
T 02 29019299, F 02 29013006
I www.bronkhorst.tw, E sales@bronkhorst.tw

◆ Thailand

Tonitech Equipment and chemical co.,Ltd
511/4 Soi Watchannai Chareonkrung Rd.
Bangkhok Bangkokkham 10120 Bangkok
T 00662-291-6078, F 00662-291-2769
I www.tonitech.co.th, E info@tonitech.co.th

◆ Turkey

RAM Ölçü ve Kontrol Sistemleri Dis Ticaret Ltd. Sti.
Oruç Reis mh. Tekstilcent Ticaret Merkezi A4 Blok
No:26 Esenler 34235, Istanbul
T 0212 320 09 95, F 0212 320 09 96
I www.ram-limited.com, E info@ram-limited.com

◆ United Kingdom Bronkhorst (UK) Ltd

1 Kings Court Willie Snaith Road, Newmarket
CB8 7TG Suffolk
T 01223-833222, F 01223-837683
I www.bronkhorst.co.uk, E sales@bronkhorst.co.uk

◆ U.S.A. Bronkhorst USA Inc.

57 So. Commerce Way, Suite 120, Bethlehem, PA 18017
T 1-610-866-6750, F 1-610-866-9212
I www.bronkhorstusa.com, E sales@bronkhorstusa.com

◆ = subsidiary offices



SENSORS FOR MASS FLOW AND PRESSURE

Nijverheidsstraat 1a, NL-7261 AK Ruurlo The Netherlands

T +31(0)573 45 88 00 F +31(0)573 45 88 08 I www.bronkhorst.com E info@bronkhorst.com

