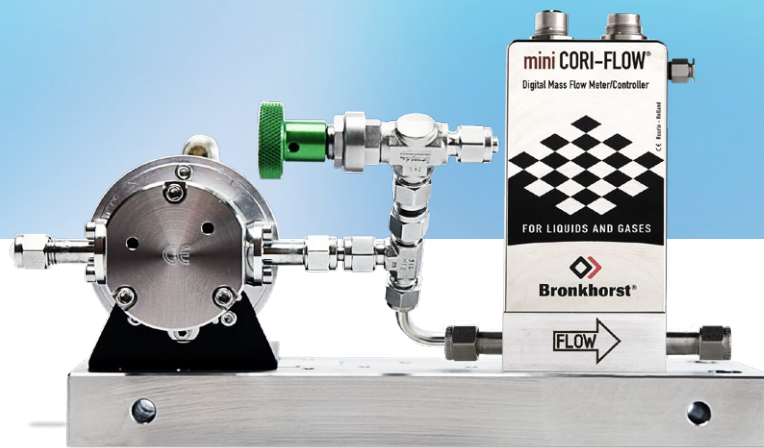


# COMPACT DOSING SOLUTIONS

Using flow meter controlled pumps



# COMPACT DOSING SOLUTIONS



## > Features

- ◆ Simple and compact assembly; factory tested and easy to use
- ◆ No need to pressurise liquid source
- ◆ Pump controlled by Bronkhorst® flow meter with adjustable PID-controller via output signal
- ◆ Direct flow measurement/control
- ◆ High accuracy and stability (nearly pulse free)
- ◆ Desired flow to be set via: analog 0...5(10) V / 0(4)...20 mA or digital communication by RS232 or fieldbus

## > Applications

Our Compact Dosing Solutions offer precise, automated flow control of reactants, additives or catalysts in:

- ◆ Analytical laboratories and systems
- ◆ Chemical industry
- ◆ Petrochemical and Offshore industry
- ◆ Food and Pharmaceutical industry
- ◆ Water Treatment
- ◆ Energy (fuel cells)

## > Introduction

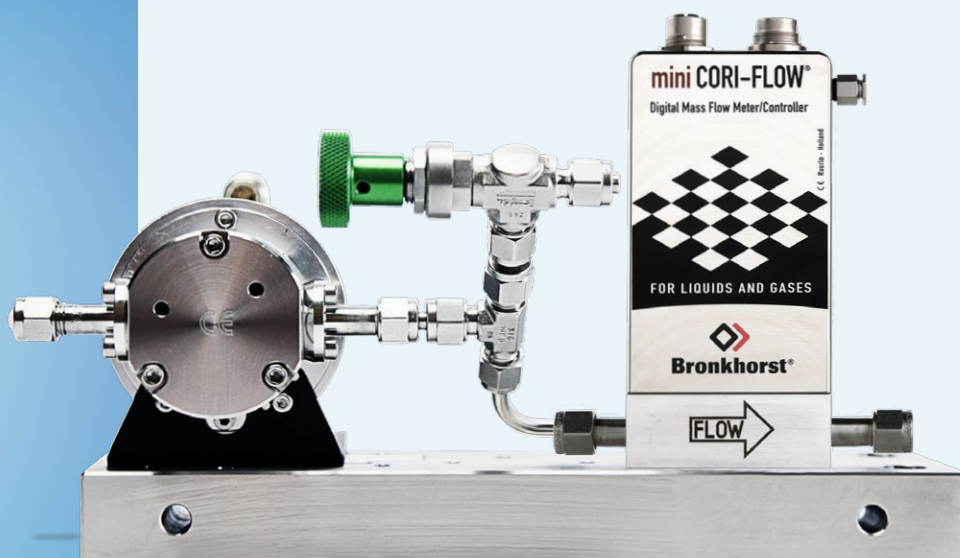
Bronkhorst High-Tech B.V. manufactures the largest variety of flow meters and controllers for low flow rates of gases and liquids. (mini) CORI-FLOW™ mass flow meters and controllers use the Coriolis measuring principle, covering flow rates from 50 mg/h up to 600 kg/h. ES-FLOW™ instruments are volumetric liquid flow meters for flow ranges between 4 and 1500 ml/min. These instruments operate on an innovative measuring principle, using ultrasound in a very small, straight tube. Both measuring principles, as applied by Bronkhorst, are independent of fluid density, temperature and viscosity. Flow meters can be combined with integrated or separate control valves. Alternatively, as described in this brochure, flow control can be achieved by using a close-coupled pump.

## > Control valve or controlled pump?

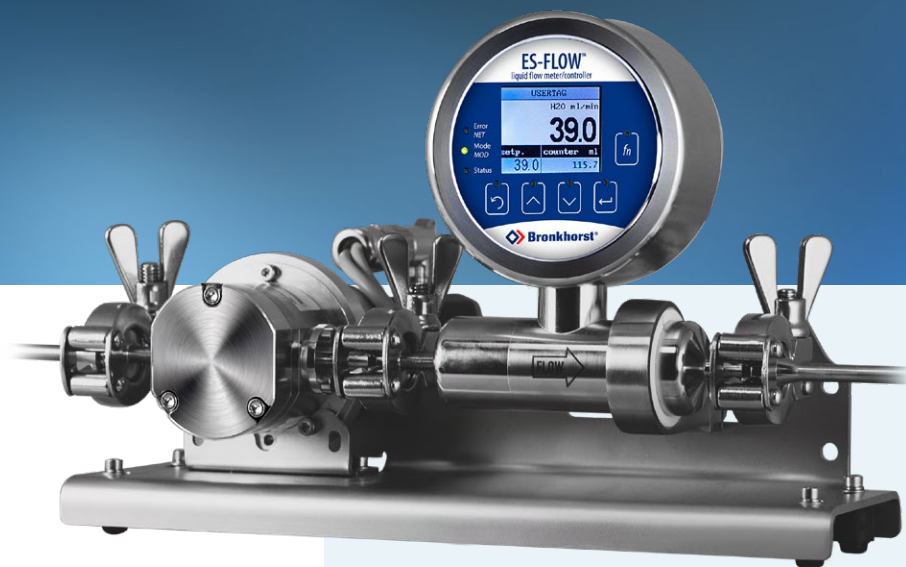
The concept of using a straight forward flow controller is simple and economical. It requires a certain head pressure, which can be achieved by pressurising a vessel filled with liquid, for instance by using an inert gas blanket. In some applications this method is not possible or not recommended. The alternative of using a pump for fluid transfer seems logical, but was not always advisable because of the pulsating flow pattern of most low-flow pumps.

Bronkhorst offers Compact Dosing Solutions for (very) low liquid flow rates, consisting of a flow sensor of the ES-FLOW™ or (mini) CORI-FLOW™ series with controlling function, a pump, an optional particle filter and interconnecting materials. Bronkhorst will take care of electrical and mechanical connection, testing and optimization including the PID-integrated controller.

In addition to a series of standard, low-flow pumps, a variety of pumps can be offered for applications which require higher flow rates, higher pressures, large turndown ratios or aggressive fluids. Further to operation in analog mode, the dosing solutions can also be used digitally via RS232 or using an on-board interface to PROFIBUS DP, DeviceNet™, Modbus-RTU or FLOW-BUS. For the lowest flow ranges (up to 200 g/h) also PROFINET or EtherCAT® fieldbus options are available.



Combination of a Coriolis flow meter with dosing pump



### > Application example: Pump system used as a batch counter

The (mini) CORI-FLOW™ or ES-FLOW™ instrument measures the flow rate and the integrated PID-controller drives the pump using its analog actuator output signal. The pump with integrated U/f converter translates the PID-controller output voltages into more or less rpm's to reach the desired flow rate. This flow rate setpoint can be provided using the flowmeters' analog input or via digital communication interfaces (RS232 or fieldbus).

The desired batch can be programmed into the integrated counter limit value. After each batch, the batch counter can be reset using the button on the instrument or via the digital interface. Each time when the counter limit (batch) has been reached, the instrument will automatically stop the pump until the next reset. These integrated digital features, available in all Bronkhorst digital instruments, enable the user to define a highly accurate, fast, repeatable and compact dosing system. Using the special ratio control modes, complete master/slave systems with other flow instruments can easily be supplied.

Combination of an ultrasonic flow meter with dosing pump

### > Technical specifications

#### A standard Compact Dosing Solution consists of:

- ◆ a flow meter: (mini)CORI-FLOW™ or ES-FLOW™ with integrated PID-controller and (batch)counter
- ◆ a liquid gear pump with brushless 24Vdc motor and integrated U/f converter
- ◆ a mass block (4 kg) + large dampeners for (mini) CORI-FLOW™ or mounting plate for ES-FLOW™
- ◆ mechanical connection of flow meter and pump (prepared for optional by-pass)
- ◆ electrical connection of the pump to the flow meter

#### Standard features:

- ◆ PPS or PEEK gears and bearings
- ◆ Material of construction : SS316, optional Hastelloy
- ◆ Teflon O-rings
- ◆ Required power supply : + 24 Vdc / 6 A
- ◆ Viscosity range : 0.3...2000 mPa.s, higher on request.

#### Additional options and recommendations:

- ◆ For liquids containing particles > 20 µm we advise to use a filter to protect the pump against damage;
- ◆ Check valve to avoid backflow when the pump has stopped and to enable fast start-up from zero;
- ◆ Pumps can generate high pressures when flow lines are blocked. In order to prevent burst of tubing, flow leakage and damage of gears, the use of a safety device, e.g. a pressure relief valve as available at Bronkhorst, is strongly advised.

# MARKETS AND APPLICATIONS

