

# (Ultra) low flow Coriolis competence



# Bronkhorst®

Bronkhorst® specializes in compact Mass Flow Meters and Controllers, based on the Coriolis principle. These instruments are able to measure and control a flow of 0,05 g/h up to 600 kg/h.

They are suitable for numerous applications within the confectionery industry. Combined with a (gear) pump or (shut-off) valve, compact liquid mass flow dosing systems can be offered as an alternative to gravimetric or volumetric filling and dosing methods.



Bronkhorst® is a supplier to many companies operating in the confectionery industry. Our Coriolis Mass Flow Meters and Controllers are mainly used to accurately measure or control liquid additives. Our products will lead to the following competitive advantages:

- Higher product consistency and product quality
- Increased production flexibility
- Faster production times
- Innovative and smarter production lines
- Less waste and rejection of products
- Short changeover times
- Excellent traceability



## Customer first

Bronkhorst® does not only deliver the instruments themselves, but can also supply total solutions. Our global perspective, but with local focus, ensures that our international distributor network is able to provide on-site support and discuss the best solution to any given application. This ethos also includes product adjustments to ensure that the finer details of your application will always be met with a bespoke solution if necessary.



## Round the clock support

Bronkhorst® is a worldwide organization with its Head Office located in Ruurlo, the Netherlands. The Customer Service Department offers 'seven days a week' support to customers in every corner of the world. Our specialist teams are available to you to fulfill the needs of pre- and aftersales support, on-site inspection & calibration and start-up assistance.



# Additive dosing in the confectionery market

Bronkhorst® instruments are used all over the world, for a wide variety of applications. The following application stories give an impression of just some of the processes in the confectionery market that have been significantly improved, using Bronkhorst's Coriolis Mass Flow Meters/ Controllers.



## Sweet advantages

As the demand for natural and more healthy ingredients increases, this customer, a leading manufacturer of sweets decided to change the existing artificial flavours, aromas and colours, into natural additives. As these additives are more expensive and have changing fluid properties (e.g. density and viscosity) improved traceability and a more accurate process were required. The solution should provide detailed process information, more efficient production lines, better product consistency and higher quality of the overall process.

With these key themes in mind Bronkhorst® was contacted. Bronkhorst® advised this leading candy manufacturer the use of the CORI-FILL™ technology, which perfectly matched with the requirements. Good cooperation between customer and Bronkhorst® resulted in multiple CORI-FILL™ dosing lines that fulfilled the following needs:

### Production efficiency

As described above, natural additives are more expensive than the artificial ones which were used before. For this reason dosing the exact amount of additives has become more important. Therefore the production efficiency had to be improved. By using the unique Bronkhorst® CORI-FILL™ solution, offering high accuracy (<0.5% of totalized value) and a very stable control, the production efficiency increased significantly.

### Better traceability

As every dosage of additives can be monitored and stored into databases, every single batch can be traced back years after production. This is possible by using digital communication with a supervisory system that automatically monitors and records for quality and regulatory purposes.

### Product quality

Due to the measuring principle, Bronkhorst® Coriolis mass flow meters are independent of varying fluid properties. This feature combined with a high accuracy and stable control, ensures and increases the quality of the produced hard and soft candy.



## About CORI-FILL™

CORI-FILL™ technology features an integrated batch counter function together with the facility to directly control shut-off valves, proportional valves or (gear) pumps. Due to this technology, Bronkhorst® can offer compact assemblies of (mini) CORI-FLOW™ instruments combined with a valve or pump, capable of dosing the exact desired amount of fluid.



## Bronkhorst® solution exceeds customer's expectations

On a typical day, one billion people around the world eat chocolate. The future of chocolate is bright with a positive annual growth rate. During fast growth, market suppliers continuously learn from the market to keep adding value to the daily life of their customers. A sustainable supply chain, improvement of the well-being of consumers and continuous product innovation are required to support the long term needs of this market.

Weinrich Chocolate (Germany) is in the forefront of manufacturing refined chocolate products. A conscientious control of quality, transparent production process and a specifically targeted purchase of raw materials are elements by which Weinrich distinguish themselves in the market and build trust at their customers. Weinrich recognized in Bronkhorst® a partner that could support them making their next improvement step come true. This collaboration resulted in significant improvements by reducing downtime in production, reducing waste of key raw materials and further improvements of the reproducibility of the product quality.

**In the past years Weinrich has used different techniques for the addition of a wide variety of flavours. One of the latest techniques was a volumetric dosing pump with the following disadvantages:**

- Recalibration needed per product changeover (new batch of chocolate)
- Disassembling for cleaning
- High downtime leads to inflexible production
- Pump fluctuated +/- 15%
- No traceability of dosed additive

The following overview shows the challenges for fast and accurate additive dosage versus the solutions, rendered by Bronkhorst's mini CORI-FLOW® Mass Flow Meter, controlling a close coupled gear pump via the integrated PID controller.

Challenges	Solutions
Controlling various liquid additives at a flow between 400...4,000 g/h	Possibility to control mass flow from 200 up to 30,000 g/h. The Coriolis mass flow measurement signal is independent to fluid properties. Therefore it can be used for several additives without recalibration.
Improve product consistency and product quality	The high accuracy of mini CORI-FLOW (Measurement accuracy of 0.2% Reading + Zero Stability on every setpoint) helped to improve the quality of the end product.
Decrease amount of waste	Waste reduction was realised by a fast response time, high accuracy and alarm functionalities.
Decrease downtime	It only takes approximately 5 minutes to purge/clean the system with natural alcohol (Clean In Place). Fast control actions, dosing additives within 2 seconds at the required setpoint.
Increase production flexibility (switching flavours)	Due to the decrease of downtime it is possible to change production recipes within 5 minutes.
User-friendly operation	Clear and user friendly PLC touchscreen. Only one click to change set point level.

## Bronkhorst® Dosing Unit integrated in a chocolate manufacturing line:



1. Chocolate production line

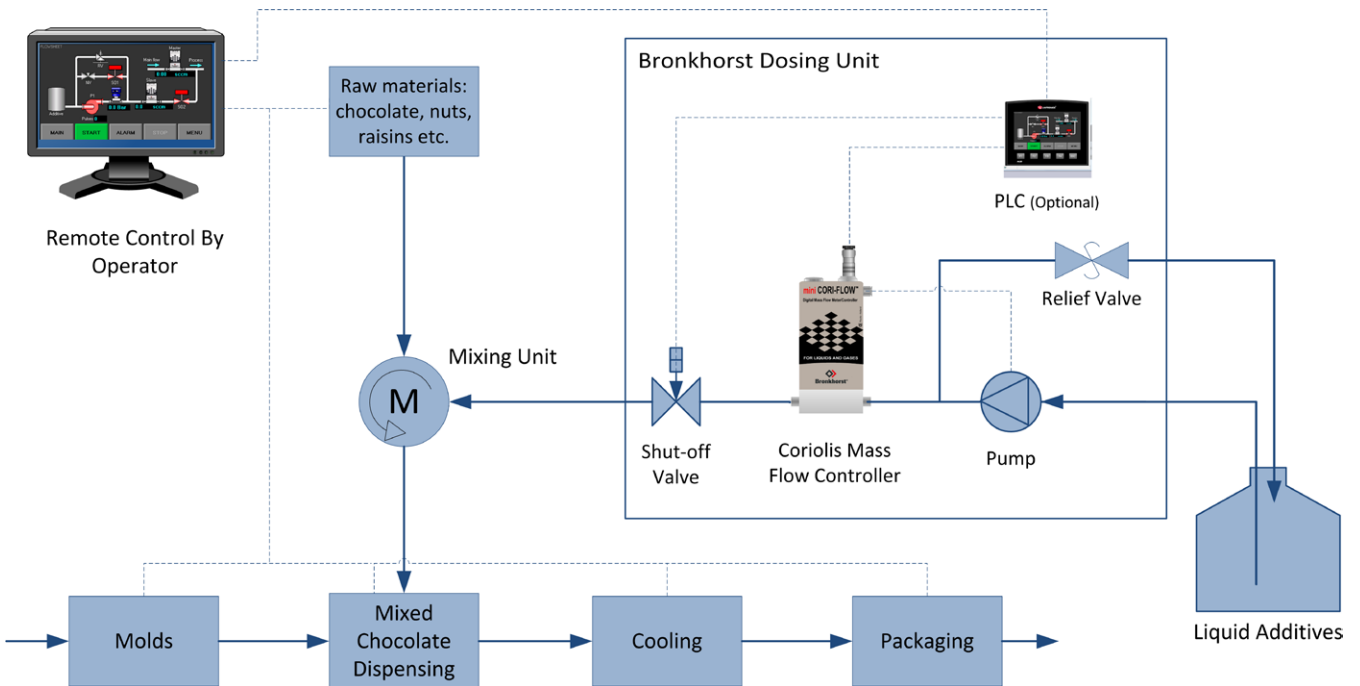


2. Mixing unit on top of the molds for adding:  
- Nuts, salt, other particles  
- Liquid additives



3. Bronkhorst liquid additive dosing unit

## Chocolate production process



### Advantages Bronkhorst® additive dosing unit

- Mass flow or volume flow mode
- Within 2 seconds on setpoint level
- High rangeability
- Alarms can be preset
- Easy to clean
- User friendly control by HMI/PLC touch panel
- Integrated totalizer
- Direct pump control by Coriolis meter

## Experiences of Weinrich Chocolate

*"We were surprised how fast we can switch between setpoints"*

*"Every employee can work with the system"*

*"The accuracy of adding flavors is significantly improved"*

*"We are more flexible to handle (small) customer specific requests"*

*"The service of Bronkhorst® is excellent"*

*"We are very satisfied with this solution"*

# The benefits of CORI-FLOW™

Bronkhorst® Coriolis Mass Flow Meters and Controllers are known for their high accuracy, repeatability and employability for multiple additives. The instruments behave like scales for flowing mass. Besides this the products provide a fast response and the capability to measure and optionally control very low flow rates. Looking specifically at the confectionery market, the following advantages are important.



## Optimize your process

With a (mini) CORI-FLOW™ it is possible to upgrade your existing production process to a more accurate and more stable process. Optimizing your process results in:

- Higher production efficiency due to a single solution for multiple processes and additives which leads to short changeover times.
- Better product consistency as a result of detailed measurement and control information, giving better insight and good traceability of the used additives.
- Higher product quality due to very accurate control of additives.

## One sensor for all additives without recalibration

Every additive has different compositions, therefore volumetric methods need to be recalibrated per changeover. Bronkhorst® Coriolis instruments measure direct mass flow which is independent of fluid properties. By also measuring the actual density and temperature it is possible to measure volume flow very accurately (mass flow ÷ density = volume flow).

### **This will ensure:**

- Convenience to work with a variety of additives without changing the instrument
- A reduction in inventory as proven by the most well-known confectionery companies across the world
- Increased accuracy and process insight for quality purposes
- Within seconds on the desired set point level



## Complete additive dosing solution from one supplier

Each confectioner has unique needs and objectives, Bronkhorst can play an important role in achieving these objectives. By using the features and the intelligence of our mass flow meters we are able to offer several solutions.

- Due to the integrated PID controller, a Bronkhorst® flowmeter is able to directly control a pump or valve;
- Optimal safety and monitoring of dosed additives;
- Easy integration into an existing production process.

# Bronkhorst® FlowWare, free software tools

For the convenience of their customers, Bronkhorst® developed various software tools, to support the operation of their digital mass flow meters and controllers.

These software tools are suitable for operation by personal computer and available free of charge.

## > FlowDDE

Interface between digital instruments and Windows software.

## > FlowView

FlowView is an application to easily operate Bronkhorst® digital instruments and readout units (E-8000 series).

## > FlowPlot

Software tool for monitoring and optimizing digital instruments.

- Free software program for monitoring and service purposes on Bronkhorst® digital instruments and readout units
- Good insight into the dynamic behaviour of meters and controllers and thus the process
- Allows adjustment of the controller, alarm and counter settings
- FlowPlot has benefitted a great many users when first establishing a new experiment or process. The graphical representation of so many measured parameters simultaneously, e.g. flow, temperature, density, etc is a useful visual tool at the point of set-up.

- Density (100% = 2000 kg/m<sup>3</sup> - 0% = 0 kg/m<sup>3</sup>)
- Temperature (percentage = °C)
- Setpoint (wanted value; 100% = FS = capacity)
- Measure (actual flow; 100% = FS = capacity)
- Controller output value



### Typical functions

#### • Re-ranging mini CORI-FLOW™ instruments

Coriolis instruments are very linear, therefore the instruments can be rescaled at any desired value within the specifications of the instrument.

#### • Optimizing (PID) controller settings

The products of Bronkhorst® have an integrated PID controller. Therefore it is possible to control valves and pumps directly. With FlowPlot it is possible to optimize these setting to your personal preferences. In addition it is also possible to save your personal preferences. This can be very useful if you would like to use one MFC for several processes.

#### • Printing a hardcopy of graphs

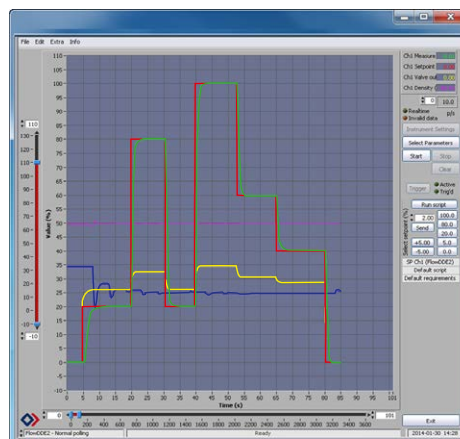
Share your results with colleagues and/or customers.

#### • Data logging to comma separated files

All parameters can be logged, therefore you will have an excellent traceability of your process. This is very useful when it comes to quality assurance.

#### • Batch counter settings

The Bronkhorst® Coriolis instruments are equipped with the CORI-FILL™ technology. With the integrated counter function it is possible to perform highly accurate batch dosages. The counter function also ensures that the actuator will react as soon as the batch has been reached. Normally several components would be needed to achieve this. By using CORI-FILL™ you will have this functionality in one component, in one assembly and from one supplier, without the need of complex programming of additional hardware.



This screen shows the selected parameter value sizes as a function of the time to get an impression of the dynamic flow (and other parameter) behavior.

# Coriolis Mass Flow Meters and Controllers for Gases and Liquids



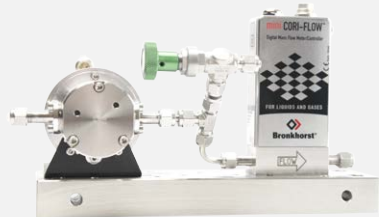
## mini CORI-FLOW™ series M12-M15

Compact Coriolis Mass Flow Meter / Mass Flow Controller for liquids and gases.

Both analog and digital output. Housing according to IP65 classification.

World's smallest, lowest flow Coriolis Mass Flow Controller!

**Flow ranges from 0-5 g/h up to 0-300 kg/h.**



## Pump Controlled Liquid Dosing

Compact solution consisting of a virtually pulse-free pump, mechanically and electrically coupled to a Coriolis Mass Flow Meter. True mass flow dosage, continuous or batch process, independent of the fluid's physical properties, ambient temperature and back pressure.



## CORI-FILL™ Technology

Very fast and accurate gas and liquid batching solutions using a Coriolis Mass Flow Meter in combination with a valve or pump. Compact systems with minimized internal volume for filling processes. **Flow ranges from 0-5 g/h up to 0-600 kg/h.**



## CORI-FLOW™ series

Precision Mass Flow Meters and Controllers based on Coriolis measuring principle. Housing according to IP65 classification. With analog or digital output. Metal sealed Meter, Controller either metal or elastomer sealed.

**Flow ranges from 0-500 g/h up to 0-600 kg/h.**



## Dosing Unit

Modular assembly of (mini) CORI-FLOW and pump or valve, built together in an enclosure as a complete dosing unit with power supply, local HMI/PLC touch panel (or optionally remote) operation.

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