

# APPLICATION NOTE A083-FP08 - FLOW SOLUTIONS FOR CONTINUOUS PHARMACEUTICAL MANUFACTURING

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## APPLICATION NOTE

## LIQUID FLOW SOLUTIONS FOR CONTINUOUS MANUFACTURING

**Continuous Pharmaceutical Manufacturing involves designing a process where the various steps are automated from beginning to end with minimal manual intervention. Continuous manufacturing demands a higher level of accuracy and monitoring of chemical ingredients. This is best achieved by using mass flow measurement and control for liquid additives.**

Bronkhorst assisted a leading pharmaceutical company supplying a customised liquid dosing solution with Coriolis mass flow meter and pump for dosing liquid additives. For a **faster**, more **reliable**, and **flexible** process.

Traditionally, most human pharmaceuticals are manufactured in a step by step batch process to ensure consistent quality and efficacy of the finished medicine. More and more manufacturers switch from the traditional batch manufacturing process to a continuous manufacturing process.



Bronkhorst Liquid Dosing skid (copyright: ISPE)

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### Application requirements

To manufacture pharmaceuticals in a continuous way, the chemical reactants need to be added, mixed and transferred in an accurate and repeatable way throughout the entire process. The process was designed to be modular in that it needed to be easy to modify the process by adding and removing process components as required. Process data collection was vital with real time mass flow, densities and temperatures being recorded and archived for regulatory authorities.

### Important topics

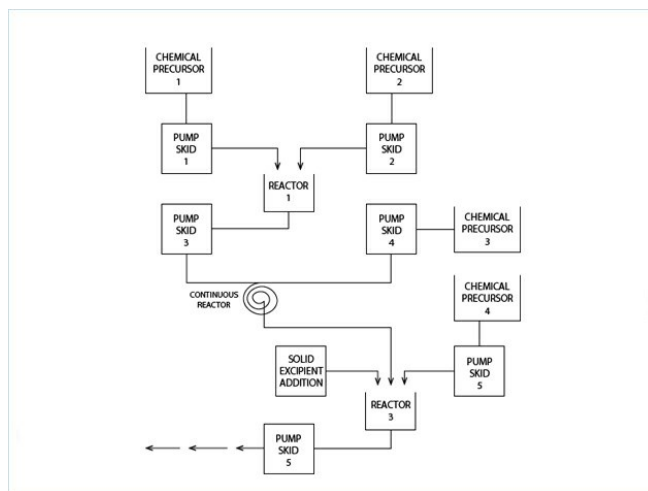
- Accurate liquid mass flow control
  - Repeatability
  - Flexibility, plug & play
  - Compactness
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## Process solution - Dosing skid

For accurate control of liquid flows in continuous pharmaceutical manufacturing applications, Bronkhorst designed a complete liquid dosing skid solution that combined mini CORI-FLOW mass flow devices with a gear pump, pressure sensor from the IN-PRESS range and a number of liquid filters and valves.

These compact dosing skids were designed to be stacked somewhat similar to "Lego building bricks", which allows for the flexible assembly and disassembly of the process system. Each medicine to be manufactured requires a different configuration of dosing devices for chemicals, so combining multiple skids offered the best solution. In this application 11 skids are used to manufacture one product, of which a part is shown in the flow scheme.

By eliminating time-consuming and error-inducing interruptions that can occur in traditional pharmaceutical batch processing, the new continuous manufacturing process is **faster**, more **reliable** and more **flexible**. Communication with the skid is via the Profibus protocol. The company utilises a DCS (Distributed Control System) which controls the entire process centrally, records data and archives all the data for regulatory and traceability purposes.



Flow scheme

## Recommended Products



### MINI CORI-FLOW™ M12

Min. flow 0,1 ... 5 g/h  
Max. flow 2 ... 200 g/h  
Pressure rating 200 bar  
Independent of fluid properties  
High accuracy, fast response



### IN-PRESS P-502CI

Min. pressure 2...100 mbar  
Max. pressure 1,28...64 bar  
Absolute or gauge pressure  
Compact IP65 design



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