

Low Energy, Low Temperature Liquid Source Evaporation

Bronkhorst UK Ltd

Many industries require a liquid source to be converted into a homogenous vapour. Traditional methods have involved either bubbling a carrier gas through the liquid source whilst precisely controlling the temperature and pressure, or directly introducing the liquid source onto a hot surface or plate. The former is extremely reliable, well-proven and offers high repeatability/reproducibility once the controlled process parameters have reached steady state. It is, however, less suited to applications where step changes in concentration are required, where fast switching on-off is required or where multiple liquid sources need to be introduced through one, single evaporation system. Furthermore, this system requires a large volume of potentially hazardous liquid to be housed in a pressurised (glass) container close to the application – often not ideal in highly populated laboratories. The latter has benefits as a highly simplified system however the temperature required for evaporation is much higher, the energy consumption is extremely high and variable control of flow rate/concentration can only be achieved on long cycle times.

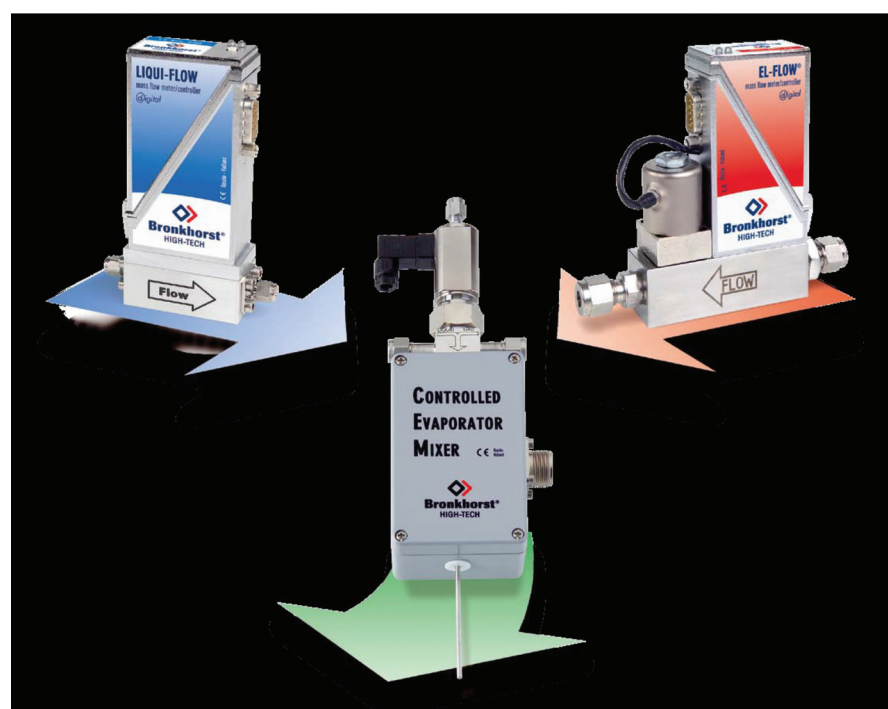
Bronkhorst has overcome these short-falls with a pre-engineered, low temperature, low energy consumption evaporation system that is ideal for variable flow rates, variable concentration, fast switching and multiple liquid sources. Bronkhorst's New Vapour Delivery Modules (VDM) are leading the way in vapour generation and control as a pre-assembled easy to use, plug and play, format. Simply connect the Gas and Liquid and Power to the unit and all is ready. The flow rates and heater temperature can then be set by using the easy to use OLED local display and control screen and the unit is working. An extremely useful benefit is that the VDM also has pre-existing electrical sockets for both a Trace Heated Line and a PT 100 thermocouple thereby simplifying the engineering, and control, of a uniform temperature after the outlet. The addition of trace heating can be useful when components of the vapour are prone to drop out of the vapour phase or where extremely low flow rates or pressures are involved.

At the very heart of the VDM is the tried and tested Controlled Evaporator Mixer (CEM) System supplied by Bronkhorst for many years. However, recent innovations in both liquid and gas control have further extended the capability and areas of use and these improvements have been incorporated into the VDM design.

What is available for Vapour Generation:

Traditionally, a liquid vapour within a carrier gas has been generated by using a Bubbler System although more recently Vapour Source Controllers have been used. Commonly, however, neither of these solutions can handle sufficient quantities of liquid with a low vapour pressure such that their performance rapidly deteriorates. Moreover, they cannot instantaneously provide vapour of a mixture of liquids with different vapour pressures.

Bronkhorst High-Tech has therefore developed a unique patented system to realise perfect ratio control of a gas and a liquid with controlled atomisation and stable temperature control. Mass Flow Control of Vapour with the Vapour Delivery Module (VDM) can be applied to atmospheric, pressurised and vacuum processes.



Typical Applications

Applications are extremely varied, spanning virtually every industry sector, with our customers regularly finding even more new and innovative ways to benefit from the technology. Common applications can be found in the Semiconductor Industry (ALD, APCVD, (MO)CVD, PECVD), the Analytical Industry (GC, MS), the Fuel Cell Industry (humidity control) Pharmaceutical and Biotech Industries, Solar Cell and Glass Production, Surface Treatment (surface coating of tools) and the Medical Industry (anaesthetic delivery and humidified synthetic breath generation) to name just a few.

With an accurately controlled ratio of gases (where more than one gas type is used) and a precisely controlled injection rate of a liquid source it is possible to calibrate other scientific instruments such as Gas Chromatographs, Mass Spectrometers and other gas sensors.

Technical Description

At room temperature the liquid is drawn from a container (with an inert gas blanket or membrane) and measured by a liquid flow meter. The required flow rate is controlled to the setpoint value by a control valve forming an integral part of the patented liquid flow and carrier gas mixing valve. The gas is applied to the mixing chamber from a Gas Controller accurately supplying the required gas to be mixed with the liquid. This mixture is then directed to the heating module of the system where the mixed gas and liquid are vaporised with a controlled heating range from room temperature to 200 Deg C. A complete system also incorporates a readout/control unit, including power supply, for operation of the CEM-system devices.

Features

- Compact design that is safety tested and ready to use.
- Clear, local 1.8" display for control with Alarm and Counter functions.
- Fast response & high reproducibility.
- Highly accurate controlled gas/liquid mixture
- Very stable vapour flow
- Lower working temperature than conventional systems
- Low power consumption
- Optional interface / control by PC/PLC (RS232/flowbus)

Liquids that are often used: (a selection of some references)

- ETOH • SnCl₄ • TiCl₄ • HMDSO • TCA • TMB • HMDSn • TEOS • Water • SiHCl₃ • TIBA
- Zn(C₂H₅)₂ • SiH₃Cl • CupraSelect™ • Organic compounds (such as Acetone, Alcohol, Butanol, Ethanol, Hexane, Methanol, etc.)

In summary, the Bronkhorst Vapour Delivery Module is standardised design solution whereby the components of the traditional CEM system have been engineered into a tailor-made housing. The design can, however, be tailor-made to meet any particular configuration that a customer may wish. The 'plug-and-play' module could be a stand-alone process or laboratory instrument or could be designed to be close-coupled to other equipment and analytical instruments to form a more complex solution. Above all, the modules have been designed to be extremely easy to use, pre-tested, safe and ready to use 'out of the box'.

All the above instruments are available in varying capacities depending on the total output required.



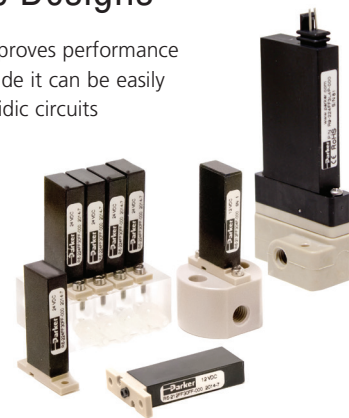
New Miniature Liquid Valve Combines Space Saving with Efficiency Improvements in Fluidic Designs

The Precision Fluidics Division of **Parker Hannifin** has announced the release of its newest Diaphragm Isolation Liquid Valve. This 6.4 mm diaphragm isolation valve improves performance of clinical diagnostic and analytical chemistry systems that require precision fluid, plus it delivers liquid dispense performance in a very small package. At just 6.4 mm wide it can be easily mounted over microplates improving performance and saving space. When mounted on a manifold the R6's ultra-small footprint enables smaller and more efficient fluidic circuits by taking less space and shortening fluid channels. The R6 provides solutions to today's demanding analytical, clinical and agent detection applications.

"As we listened to the future requirements of life science OEMs the need for simplified and compact instrument designs became clear," said Don McNeil, Senior Product Manager for Parker Hannifin. "Our new R6 valve enables OEM's to design fluid circuits that take less space and are more efficient. Its compact footprint enables it to be mounted as close as 7mm centres. With an internal volume of only 8.1 uL the R6 valve is ideal for low carryover designs and reduces use of precious reagents."

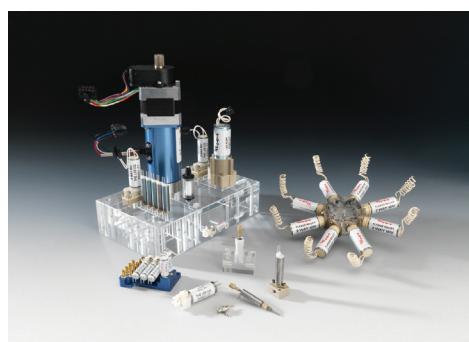
The Parker R6 is ideal for applications such as in-vitro diagnostics, haematology, molecular diagnostics, flow cytometry, genomics, proteomics, liquid handling, sample preparation, chromatography and precision flow control.

"We are very excited about another addition to our precision fluidic product portfolio. Last year we introduced the Parker Smart Syringe Pump, which offers the highest performance in the smallest package on the market. We are excited that with this expanded portfolio that Parker can provide the pumps and valves needed across today's laboratory instrumentation, including sampling, reagent addition, wash, waste and decontamination sub systems."



For More Info, email: 33286pr@reply-direct.com

Specialists in Miniature Valves for Precision Fluid Control



Lee's Electro-Fluidic Systems group produces high quality miniature solenoid valves, micro-dispense valves, atomising and dispense nozzles, fixed and variable volume pumps, inert tubing and fluid control components for use in medical and scientific instrumentation, analytical / clinical chemistry, in-vitro diagnostics, drug discovery and ink jet printing applications.

Lee Products can supply custom designed and fully tested manifolds populated with solenoid valves, pumps, passive components (restrictors) and active components (transducers). Manifolds offer several advantages such as fewer leakage points, lower internal volumes, easier assembly into instruments and higher reliability, as well as optimum packaging to reduce weight and space. They can be provided in a variety of materials such as stainless steel, aluminium, PEEK, PMMA and Ultem with inlet and outlet ports as brass barbs, stainless steel hypo tubes or 1/4-28 or M6 threaded ports. Electrical circuit boards and connectors can also be integrated if required.

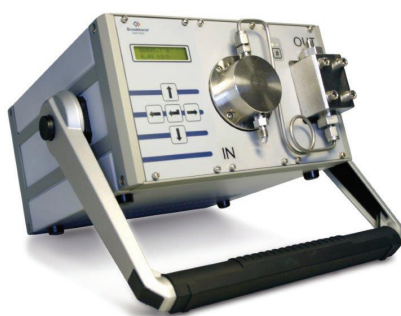
For More Info, email: 34110pr@reply-direct.com

ADVERTORIAL

(Ultra) Low-Flow Coriolis Meter/Controller with Integrated Laboratory Solutions

Bronkhorst UK Ltd is proud to announce the availability of their new mini CORI-FLOW™ Series ML120 Coriolis Mass Flow Meters and Controllers for (ultra) low flow ranges. The instruments are designed to provide the user with highly stable, accurate and repeatable mass flow in advanced research, laboratory or production processes. ML120 offers flow ranges from 50 mg/h to 200 g/h, measured with an accuracy as high as 0.2% of reading. Utilising a uniquely shaped, single loop sensor tube, forming part of an oscillating system, providing superior flow measurement performance. When a fluid flows through the tube, Coriolis forces cause a variable phase shift, which are detected by sensors and fed into the integrally mounted pc-board. The resulting output signal is strictly proportional to the real mass flow rate. Coriolis mass flow measurement is fast, accurate, easy to install and inherently bi-directional.

The mini CORI-FLOW™ features density and temperature of the fluid as secondary outputs. The compact Mass Flow Controller is equipped with a microprocessor based pc-board with signal and fieldbus conversion and an integrated digital controller for accurate mass flow control by means of the integrated piezoelectric



control valve. The flow controller has a very small internal volume, making the Coriolis MFC an ideal device for fast, repetitive dosing and filling processes for drugs research, additives and solvents etc., in addition to specialised applications such as Super-critical Fluid Chromatography and LED Production.

mini CORI-FLOW™ Series Coriolis Mass Flow Meters / Controllers are offered with both analog and digital communication, RS232 and various fieldbus options.

Furthermore, the smallest Coriolis instrument in the world is ideally suited for incorporation into Bronkhorst table-top or rack-mounted complete gas and liquid solutions including direct control of pumps, shut off valves and other actuation devices for single-point responsibility for laboratory dispensing systems.

email: 33852pr@reply-direct.com

Vapour Generation

All-in-one Vapour Delivery Modules

ACCURATE control of expensive liquid precursors

STABLE vapour delivery for consistent product quality

COMPATIBLE with SiCl₄, DEZ, TiCl₄, TMA, etc.

Innovation - Experience - Responsibility



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