

# **VDM<sup>TM</sup> Series**

## All-In-One Vapor Delivery Modules

### > Mass Flow Meters/Controllers for Gases and Liquids

Bronkhorst High-Tech B.V. has many years of experience supplying mass flow control solutions for many different applications within such markets as semiconductor, chemical and solar industries. Our instruments are made to a customers' specification, in whichever style is suitable, for laboratory, industrial systems or OEM installations. Bronkhorst® thermal mass flow meters/controllers are used for accurate, repeatable control of inert gases as well as handling reactive gases, covering flow rates from 0,7 ml<sub>n</sub>/min up to 10.000 m<sup>3</sup><sub>n</sub>/h (Full Scale values). Bronkhorst offers liquid flow meters/controllers for small flow ranges, from 75 mg/h up to 20 kg/h based on thermal mass flow sensors and from 50 mg/h up to 600 kg/h using Coriolis mass flow sensors.

### > Controlled Evaporation and Mixing

As a modern alternative to conventional bubbler systems, Bronkhorst introduced their CEM-System (Controlled Evaporation and Mixing) in the mid-nineties, an innovative vapor delivery solution, based on a liquid flow controller, an MFC for carrier gas and a temperature controlled mixing and evaporation device. This solution provides high accuracy, excellent reproducibility, fast response and does not require an optimum conditioning of process temperature and pressure. CEM-technology has successfully been applied in e.g. analytical applications, coating systems and for humidification of reactors.

### > All-in-one Vapor Delivery Module

With the introduction of the VDM-Series Bronkhorst offers an all-in-one vapor delivery module, incorporating the components of the CEM-System and more! Besides gas and liquid flow controllers and the temperature controlled evaporator, the VDM-Series feature integrated power supply with display (1,8" TFT) and control functions. As an option, the unit offers local or remote trace heating temperature control. The compact, 'plug and work' module can generate (saturated) vapor flows within the range of 50 ml<sub>n</sub>/min up to 10 l<sub>n</sub>/min. It can be applied for atmospheric or vacuum processes and is capable of evaporating mixtures and even solids, dissolved in solvents.



### > Features

- ◆ Provides accurate and stable vapor (mass) flow
- ◆ Fast response
- ◆ High reproducibility
- ◆ Handles water, solvents, liquid mixtures
- ◆ Flexible selection of gas/liquid ratio
- ◆ Lower working temperature than conventional systems
- ◆ Field proven evaporation method
- ◆ No need for engineering or manufacturing
- ◆ Pre-tested, safe and ready to use
- ◆ Local or remote control (RS232 / FLOW-BUS)
- ◆ Readout/Control panel, incl. 1,8" TFT display, alarm/signaling and counter functions

### > Options

- ◆ Dual carrier gas supply
- ◆ Dilution gas supply
- ◆ Trace heating temperature control, incl. status indication

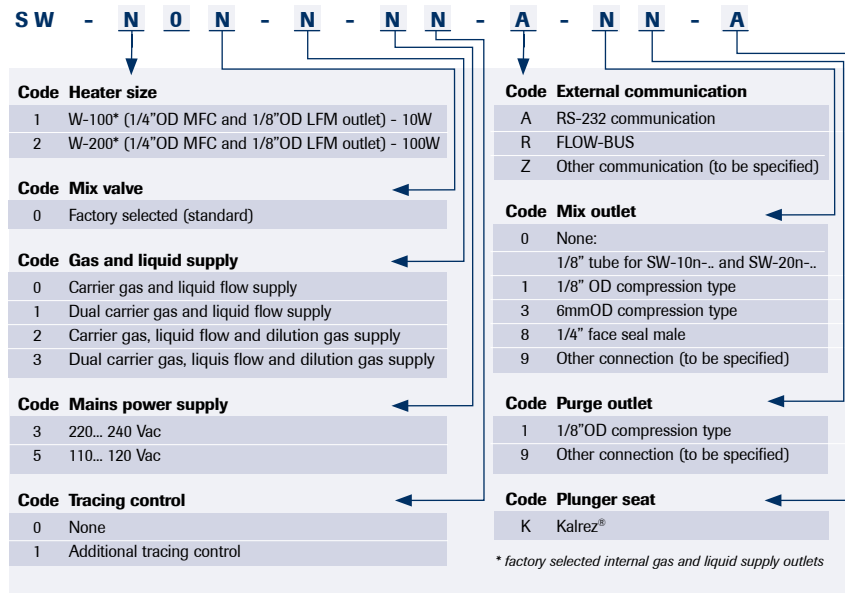


**Bronkhorst®**

## > Applications

VDM-Series vaporizers are ideally suited for vapor deposition and coating processes for the production of semiconductor chips, displays and solar cells. Compared to conventional bubblers, our vapor delivery modules take care of a fast, accurate and highly repeatable and efficient precursor flow control. The CEM principle has also proven itself in applications for calibration of analytical devices such as gas chromatographs and mass spectrometers, anesthetic delivery, and for humidification of fuel cells.

## > Model number identification



Typical application: Coating of solar cells for optimum photovoltaic performance

## > Technical specifications

### Measurement / control system

|                         |  |
|-------------------------|--|
| Gas flow range (in)     | : 0,05...10 l <sub>n</sub> /min carrier gas* |
| Liquid flow range (in)  | : 0...120 g/h water, precursor fluid, etc.*  |
| Vapor flow (out)        | : 0,05...10 l <sub>n</sub> /min*             |
| Inlet pressure          | : up to 10 barg*                             |
| Outlet pressure         | : vacuum...5 barg*                           |
| Ambient temperature     | : 5...40 °C                                  |
| Max. heater temperature | : 200 °C                                     |

\* order specific

### Mechanical parts

|                         |  |
|-------------------------|--|
| Gas inlet               | : 1/8", 1/4" or 6 mm OD compr. type or 1/4" face seal male |
| Liquid inlet            | : 1/8", 1/4" or 6 mm OD compr. type or 1/4" face seal male |
| Vapor outlet connection | : 1/8" tube (other on request)                             |
| Purge outlet            | : 1/8" OD compression type or 1/8" face seal male          |
| Wetted materials        | : SS316, Viton/Kalrez seals, Kalrez plungers               |

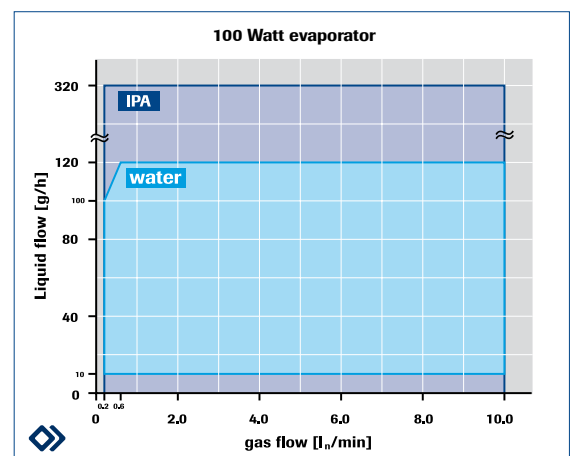
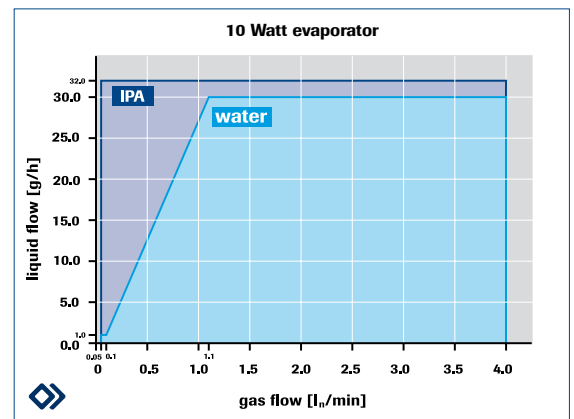
### Electrical properties

|                       |   |
|-----------------------|---|
| Display               | : 1.8" (TFT technology)   |
| Mains supply inlet    | : IEC 60320-1/C20 male socket with on/off switch, 230V / 115V; 50Hz / 60Hz  |
| Power consumption     | : max. 250 VA; add 300 VA for optional tracing control  |
| Electrical connection | : FLOW-BUS (2 x RJ45 connector) or RS232 (1 x 9-pin sub-D connector)<br>Optional: Pt100-connection (1 x 4-pin M12 male, a-coded)<br>Optional: IEC 60320-2-2/C13 female tracing outlet |

Note: For gas and liquid flow control the VDM modules are equipped with Thermal or Coriolis Mass Flow Meters/Controllers or a combination of these devices.

Technical specifications and dimensions subject to change without notice.

## > Capacities



## > Module configurations

Although the VDM-Series Evaporation Modules are greatly standardized, Bronkhorst offers the following configuration options:

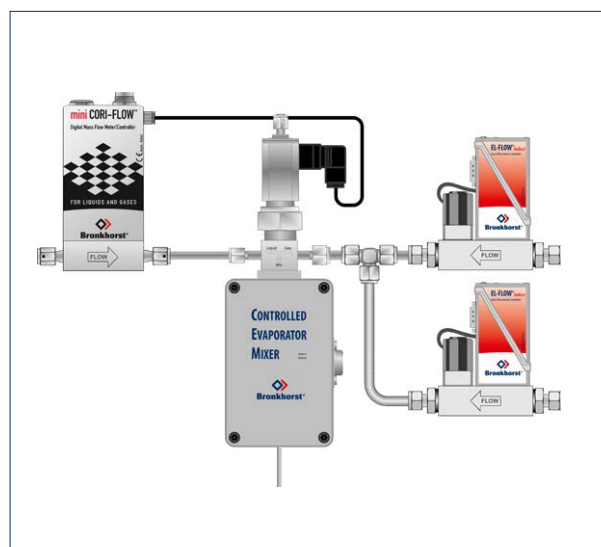
- ◆ Single carrier gas supply, no dilution (standard)
- ◆ Dual carrier gas supply, no dilution
- ◆ Single carrier gas supply with dilution
- ◆ Dual carrier gas with dilution
- ◆ Thermal or Coriolis Mass Flow Meter for liquid flow control



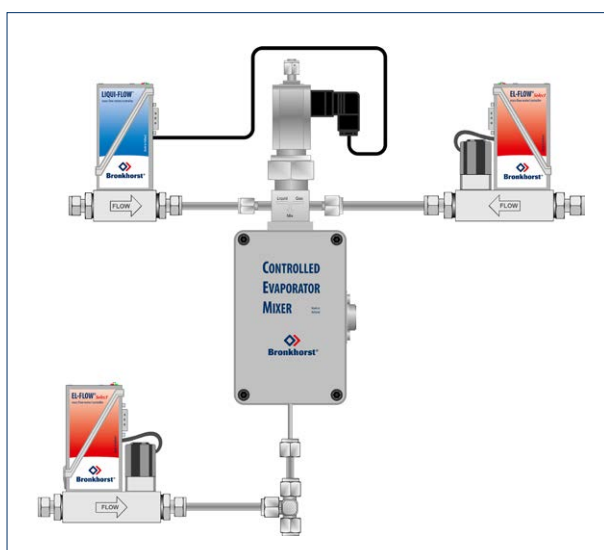
Illustration showing the internal mounting position of the liquid flow meter and the MFC for the carrier gas



Single carrier gas supply, no dilution, thermal liquid flow meter



Dual carrier gas supply, no dilution, Coriolis liquid flow meter



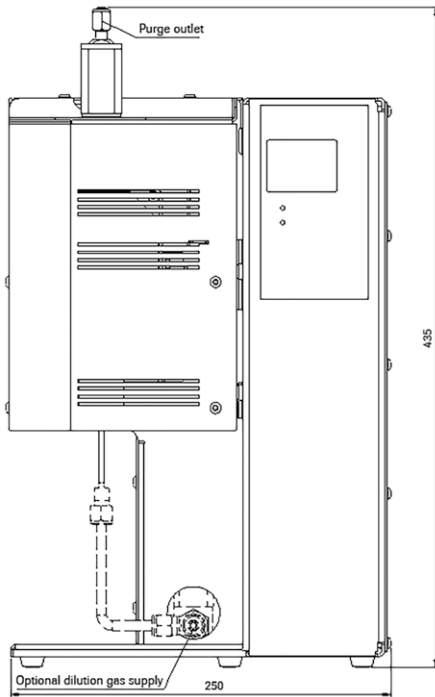
Single carrier gas supply with dilution, thermal liquid flow meter



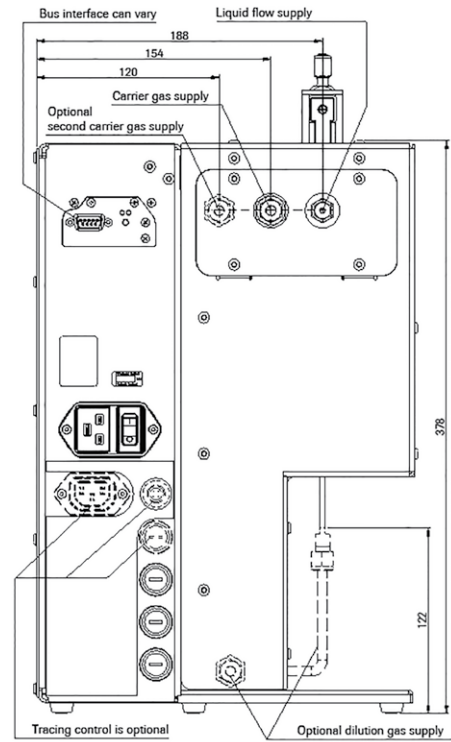
Dual carrier gas supply with dilution, Coriolis liquid flow meter

## > Dimensions

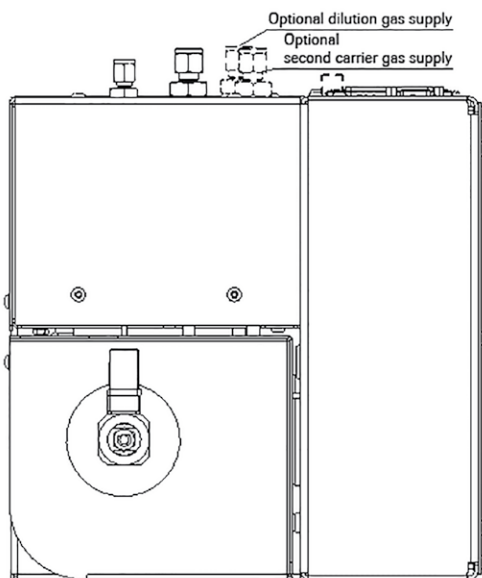
Front view



Rear view



Top view



Side view

