fumatech
Functional Membranes for Fuel Cells and Batteries
BWT GROUP

ECOMATE® Humidifiers

The ECOMATE® membrane humidifier modules are highly permeable to water vapor. The lightweight, compact humidifier provides high humidification efficiency at wide range of flow rates.

Our liquid-to-gas and gas-to-gas humidification-solutions are addressing the main challenges of fuel cell systems: cost, reliability, and zero-electrical-power-consumption.

The modules allow low pressure drop and high heat recovery rate.
The assembly, handling and operation are user-friendly.

The ECOMATE® membrane humidifier modules cover a range of fuel cell power from 0.7 kW to 150 kW. They are highly permeable to water vapor. The modules allow low pressure drop and high heat recovery rate, with long operating lifetime and no power consumption. Our humidifiers are specifically designed to achieve effective water transfer through a series of micro-porous hollow fiber membranes at a wide range of flow rates and temperatures. The durability and competitive pricing make it attractive to fuel cell powertrain manufactures that are seeking for improvement of the balance-of-plant. The assembly, handling and operation are user-friendly. The ECOMATE® products are designed as plug-and-play.

FIG. 1: Flow chart sketch of a cathode-sub-system (left system), which includes the humidifier, and its connection to the fuel cell (right) in automotive applications.

Part number:

1. air filter
2. turbo compressor
3. noise canceler
4. heat exchanger
5. bypass valve
6. water droplets separator
7. back pressure valve

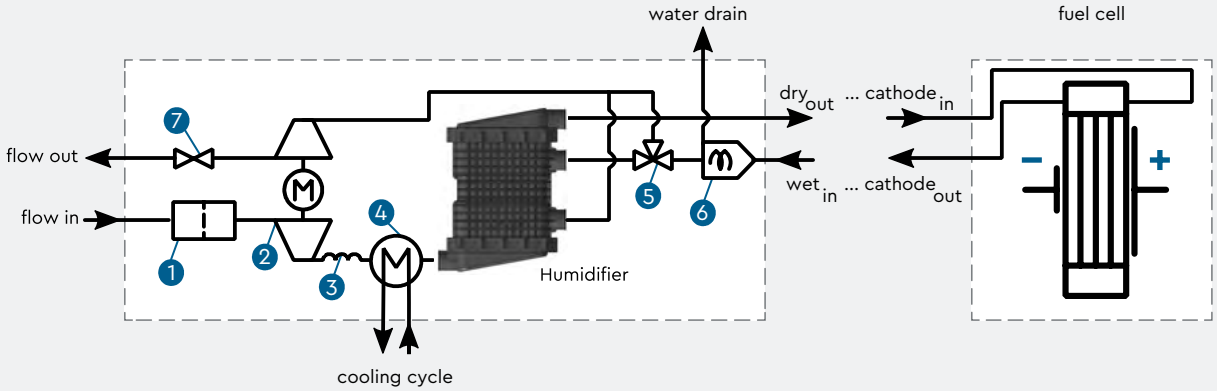
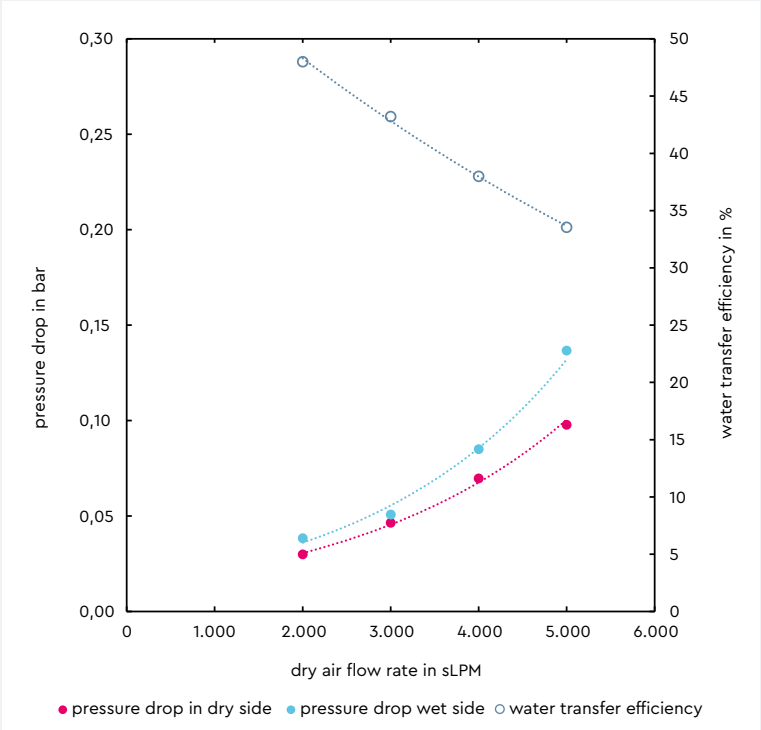


FIG. 2: Typical operational characteristics of H50N



Test conditions: Measurements are counter flow configuration.
The pressure at the dry airflow outlet is 1,8 bara.
The pressure at the wet side inlet is 1,6 bara
The humidity of the wet in air flow is about 95 % relative humidity.
The temperature of the air inflows is 80 °C

TECHNICAL DATA

General Specifications	
Fuel Cell Power	0.7 ~ 150 kW
Rated Air Flow Rate	50 ~ 9.000 sLPM
Flow Configuration	Counter & Co-Current
Life Time	Stationary > 7.000 hours
Operating Temperature Range	-30 °C to 90 °C
Operating Pressure	Moderate to 250 kPa
Low Impurities (Cation & Anion Extract in Hot water)	comply with automotive requirements
Humidification Efficiency (Approach Dew Temp.)	4 ~ 15 °C (Gas-to-Gas) 2 ~ 5 °C (Liquid-to-Gas)
Total Air Pressure Drop (shell + tube)	< 10 kPa @ Rated Flow Rate (dependent on total pressure)
Materials of Membrane	Polyimide, Polysulfone
Materials of Housing	PA-GF, PPA-GF (Non-flammable, Low Ion Extraction)

PRODUCTS

Ecomate®		H7	H02	H10	H20	H50	H100
Design Parameters	Fuel Cell Power (Rated Air Flow)	~0.7 kW (~50 sLPM)	1~3 kW (50~200 sLPM)	3~10 kW (200~600 sLPM)	10~45 kW (600~2500 sLPM)	45~90 kW (2000~5000 sLPM)	90~150 kW (5000~9000 sLPM)
	Weight	0.4 kg	0.6 kg	1.5 kg	3.2 kg	4.8 kg	6.2 kg
	Volume (Dimensions)	0.6 liter (ø 55 × 180 mm)	1 liter (ø 70 × 230 mm)	3.8 liter (165 × 80 × 286 mm)	7 liter (135 × 222 × 230 mm)	11 liter (178 × 223 × 280 mm)	16 liter (180 × 315 × 286 mm)
Performance	Approach Dew T. dependent on conditions	13.7 °C @ 50 sLPM	8.3 °C @ 100 sLPM	13.8 ° @ 600 sLPM	13.6 °C @ 2000 sLPM	15.3 °C @ 3000 sLPM	15.6 °C @ 5000 sLPM