



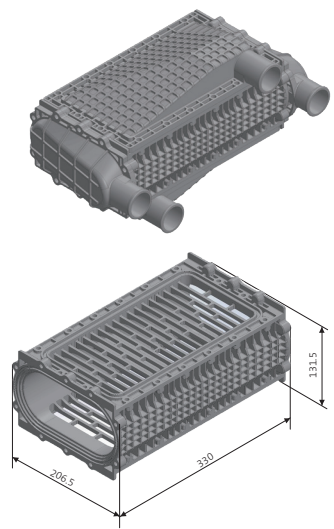
# 高性能中空纤维膜增湿器

在质子交换膜燃料电池(PEM-FC)应用中,为了确保质子在所有功率条件下,都可以顺利移动,必须保证PEM膜具有可靠恒定的含水量。因此,高质量的增湿器是燃料电池实现高性能的必要部件,并能防止由电解质干燥而导致的性能退化(如局部过热)。

高性能中空纤维膜增湿器具有良好的耐久性,适用于不同功率下对系统的各种增湿要求。低压降及优良的水分传输率确保了稳定的加湿性能,实际操作中已经得到了验证。该增湿器提供标准件的同时可为大型汽车应用需求提供定制化的样件生产。

## 为客户带来的价值

- 特有的中空纤维管利用毛细管冷凝作用可实现较高的水蒸气渗透性
- 较高的水分子传导能力和较低的压力损失
- 不仅提供水蒸气交换也提供热交换
- 较高的耐热性和耐化学性
- 在汽车应用中具有良好的耐久性和可靠性
- 较高的耐压性
- 接口布局,易于吹扫



## 基本参数

	中型-1	中型-2
典型应用	更好的增湿性能	更低的压力损失
膜管直径 (OD/ID)	910×650 μm	1,340×940 μm
膜管数量 (近似)	9,000	4,000
标称体积流量	2,000 ~ 3,000 SLPM	
壳体尺寸 (L×W×H)	330×213×132 mm (不含接口)	431×257×207 mm (含接口)
壳体材料	PPS + 40 GF	
质量	4 kg	
最大压强 (绝对压强)	300 kPa (3 bar)	
适用温度	80°C (通过 120°C 高温测试和 -35°C 到 95°C 热震试验)	
接口	标准型号接口连接组件; 壳体可以与接口分开连接	

## 性能参数

测试条件	干侧进气		测试结果	中型-1	中型-2
	干侧进气	湿侧进气			
流量	3,000 NL/M	3,000 NL/M	露点接近温度 (ΔT)	15.4°C	19.2°C
温度 (T)	80°C	80°C	干侧压降	8.4 kPa	3.9 kPa
压强 (p)	250 kPaA	250 kPaA	湿侧压降	6.9 kPa	3.0 kPa
相对湿度 (RH)	<5%	90%			

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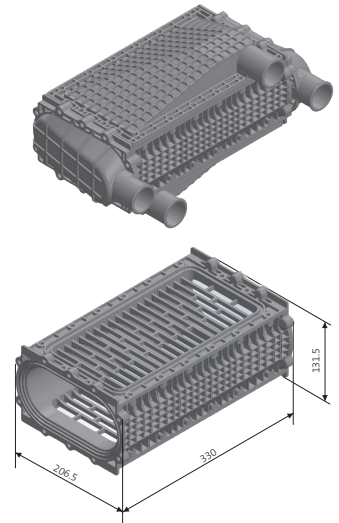
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恩福(中国)

# High Performance Hollow Fiber Humidifier

PEM-FC need a constant and reliable water-content of their proton exchange membrane (PEM) to ensure the proton transfer processes in the membrane at all power conditions in the specific FC application. Fuel cells can only achieve high performance with a high-quality humidifier preventing early degradation (e.g. hot-spots) due to the electrolyte drying out.

We offer long-durable humidifiers based on hollow fiber technology that are adapted to the requirements of your system at different power levels. The outstanding water transfer rate at a low pressure drop guarantees stable humidification that have been tested in real operations. We offer standard modules and for large scale automotive vehicle requirements the manufacture of prototypes all the way to individual series production.



## Values for the Customer

- High water vapor permeability by applying proprietary membrane (capillary condensation)
- High water transmission and low pressure loss
- Not only water vapor exchange but also heat exchange
- High heat and chemical resistance
- High durability and reliability for automobile application
- High pressure resistance
- The port design is easy to clean

## Basic parameters

	Middle-1	Middle-2
Typical application	Optimized for high humidification performance	Optimized for low overall pressure drop
Fiber diameter (OD/ID)	910 × 650 μm	1,340 × 940 μm
Fiber quantity (approx.)	9,000	4,000
Nominal volume flow rates	2,000 ~ 3,000 SLPM	
Case module outer dimensions (LxWxH)	330 × 213 × 132 mm (w/o ports)	431 × 257 × 207 mm (w/ ports)
Housing material	PPS + 40 GF	
Weight	4 kg	
Max. Pressure (absolute)	300 kPa (3 bar)	
Temperature (nominal)	80°C (passed 120°C high temp test and heat shock test b/w -35°C to 95°C)	
Connection	Standard connecting elements with ports are available; the base case module also separately available with connection scheme	

## Test data

Test condition	Dry in		Test result	Middle-1	Middle-2
	3,000 NLM	3,000 NLM		15.4°C	19.2°C
Flow rate	3,000 NLM	3,000 NLM	Dew point approach temperature	15.4°C	19.2°C
Temperature	80°C	80°C	Pressure drop at dry side	8.4 kPa	3.9 kPa
Pressure	250 kPaA	250 kPaA	Pressure drop at wet side	6.9 kPa	3.0 kPa
Relative humidity	<5%	90%			

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