SYNOPEX

# 가습용 중공사 멤브레인
(Humidifying membrane)

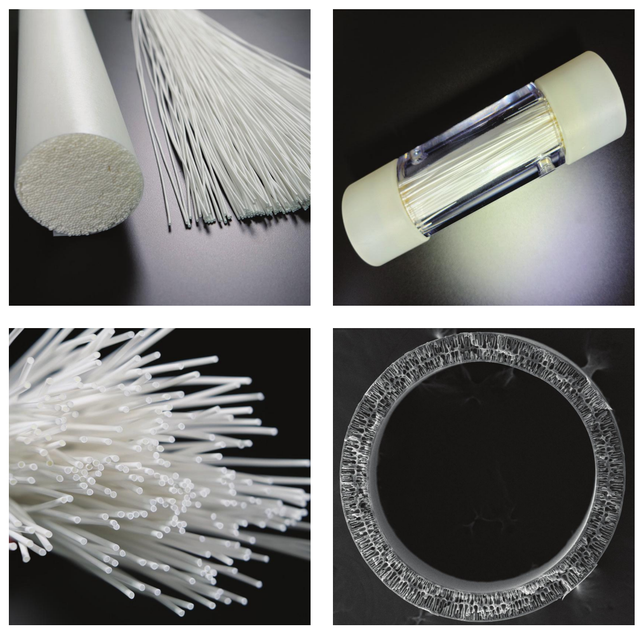
## 연료전지 가습용 중공사 멤브레인(HumiO)

### HumiO(휴미오)

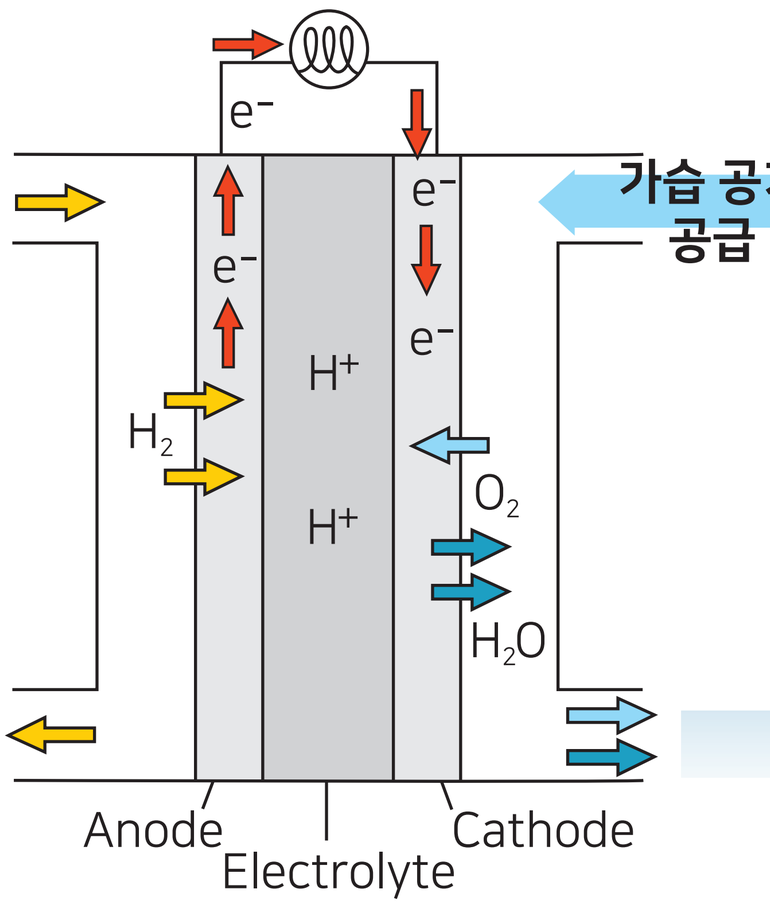
HumiO
Humidifying
Hollow Fiber & Hydrogen

가습 + 중공사 + 수소

Humidifying



## 연료전지



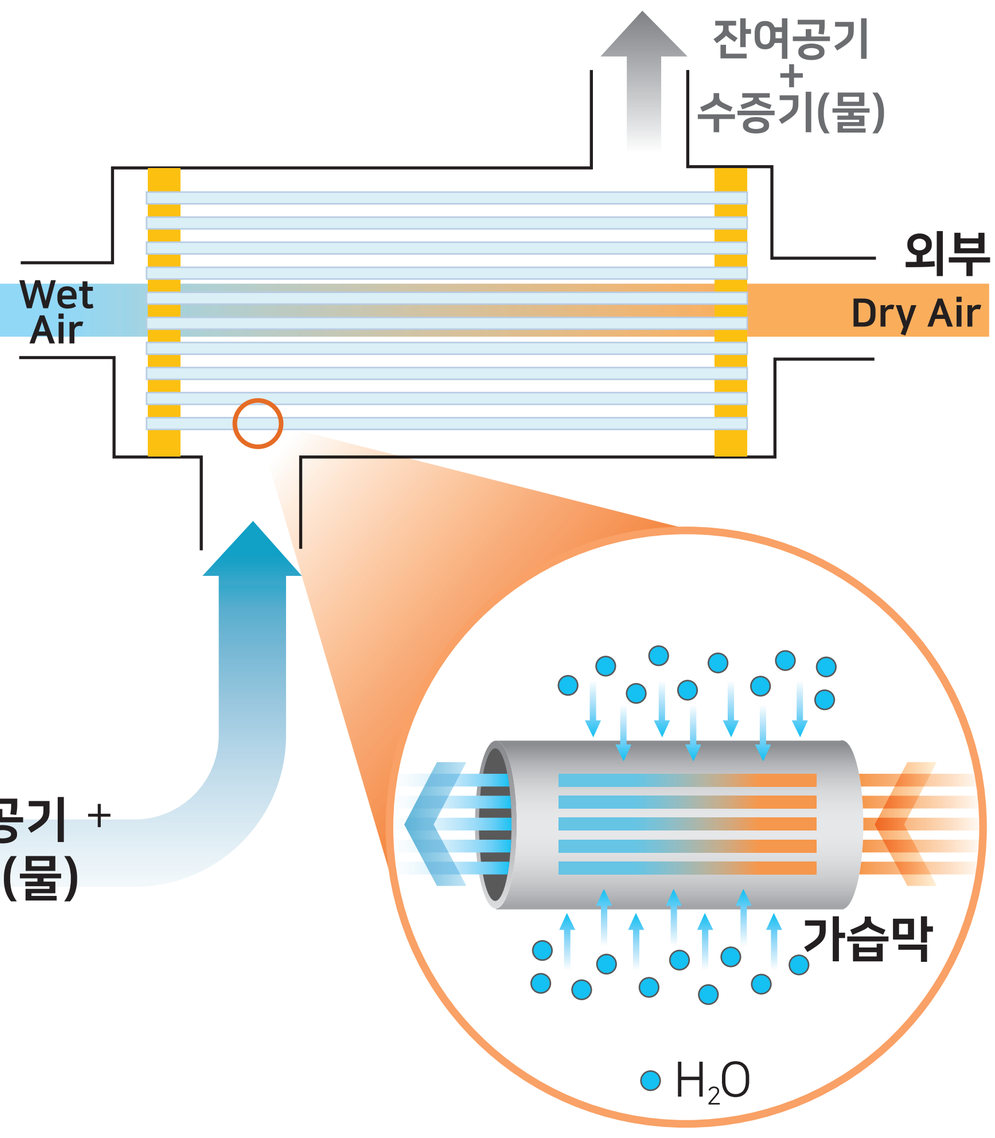

수소 반응

$2H_2 \rightarrow 4H^+ + 4e^-$

산소 반응

$O_2 + 4H^+ + 4e^- \rightarrow 2H_2O$

## 막 가습기




## 개발 History

| | |
|---|---|
| '20. 4 : 개발착수 | '23.1 : 중국 C사 1차 수출 완료 |
| '21. 3 : Global 수준 성능 확보 | '23.3 : 양산설비 2배 증설 |
| '22. 5 : 양산사양 확정 및 양산설비 구축 | '23.8 : 중국 C사 2차 수출 완료 |
| '22. 6 : 중국 V사 양산시험 평가 착수 | '24.5 : 중국 C사 3차 수출 완료 |
| '22. 8 : 중국 C사 공급계약 체결 | '24.8 : 중국 W사 공급계약 체결 |

SYNOPEX

# 가습용 중공사 멤브레인
(Humidifying membrane)

## 개발제품 사양 및 성능

### Technical Data

| | HUMIO 1109 | HUMIO 1411 |
|---|---|---|
| Features | High Performancece | High Durability |
| Membrane Material | PES (Polyethersulfone) | |
| Membrane Type | Hollow Fiber | |
| Outside Diameter (OD) | 1.15 mm | 1.4 mm |
| Inside Diameter (ID) | 0.9 mm | 1.1 mm |
| Tensile force | > 2.5 N | > 2.8 N |
| [1)] Air Permeability | < 1.5 L / min·㎡ @1bar | |
| Humidifying Efficiency | 25.0% ± 1.0% | 19.5% ± 0.5% |
| [1,2)] Water Vapor Transmittance | > 0.002 g / ㎠·min | |

1) Module Spec.
Number of Fibers: 200
Length : 108 mm

2) Test Conditions
Dry In : 150 NLPM, 50℃, RH 0%
Wet In : 135 NLPM, 70℃, RH 50%

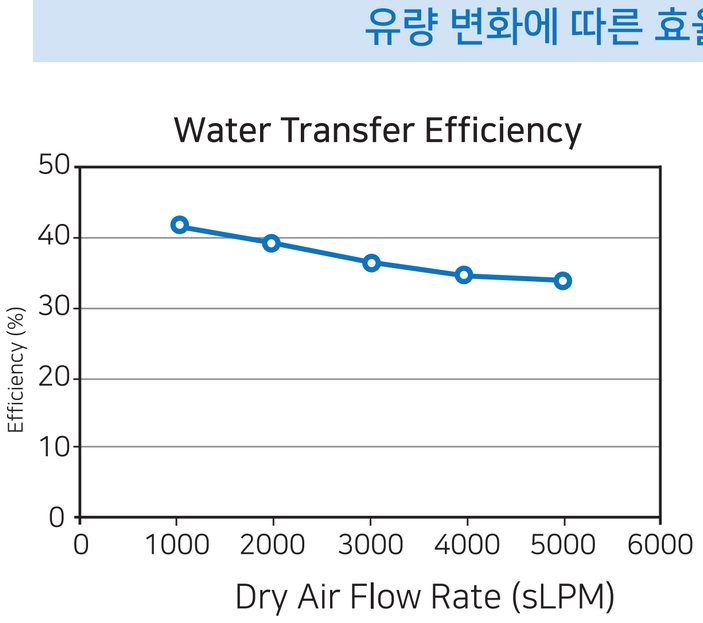
### Certifications

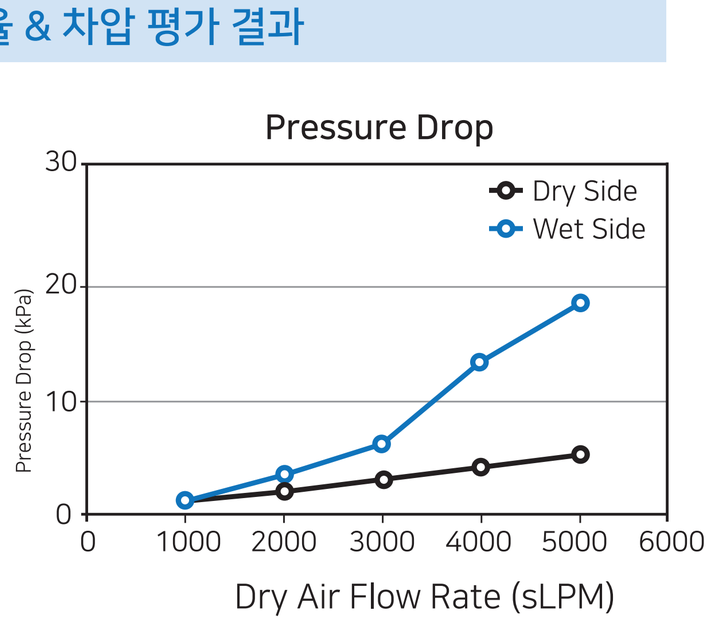
| | Test Item | Test Result | Test Method |
|---|---|---|---|
| RoHS 2.0 | RoHS 2.0 | Not detected, below [1)]DL | |
| Ion Precipitation | $Li^+$, $Na^+$, $K^+$, $NH^{4+}$, $Ca^{2+}$, $Mg^{2+}$ | Not detected, below [2)]DL | Dissolution Test_IC (Ion Chromatography) |

1) RoHS Detection Limit : 5.0 mg/kg
2) Ion Precipitation Detection Limit : 0.1 mg/L

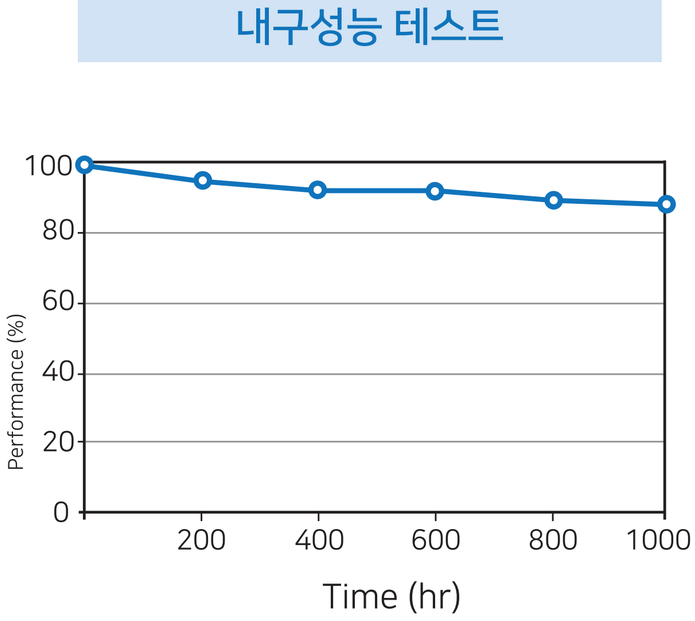
## 개발 제품 성능

### 유량 변화에 따른 효율 & 차압 평가 결과




### 내구성능 테스트




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our customer's competitiveness.

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