



MDI[®] MEMBRANE
DEIONIZATION

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Company Overview

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TOWARD THE GLOBAL No.1

Geumhwa WTS is No.1 water treatment company in Korea. Established in 1959 with the name of Hankook Jungsoo Industries, Geumhwa wts is a water treatment specialized company that has the ability to design, manufacture and install water treatment facilities supported by R&D Center and manufacturing factories.



Seoul Office

- MDI/UF Marketing and System Design
- Technical Seminar
- Technology Consulting



Factory/R&D Center

- Product manufacturing
 - MDI/UF
 - Tank, Vessel, SKID etc.
- Quality Inspection
- Analysis Services
- Product Improvement
- Development of New Technology

Geumhwa wts makes the history of Electro-Deionization in Korea

- 2000** Patent of Modules for 'Cylindrical Electro-Deionization Apparatus'
- 2001** First Commercial Operation in Korea
- 2003** 'Jang Young-sil Award' Winner
- 2003** Patent of Method for 'Making the Heterogeneous Ion Exchange Membrane'
- 2009** First Delivery to Nuclear Power Plant
- 2019** Development of MDI for UPW (Ultra-Pure Water)

MDI® is the brand name of Geumhwa wts CEDI (Continuous Electro-Deionization)

MDI Advantages

- Stable and continuous production operated with DC power
 - Enables unmanned operation
 - Reduces operating costs
- No need for resin regeneration, so no chemicals needed
 - Eco-friendly and safe operation
 - No need for wastewater treatment system
- Easy expansion of system capacity
 - Easy additional installation for the required additional flow rate
 - Easy installation and replacement due to simple structure
 - Compact installation area

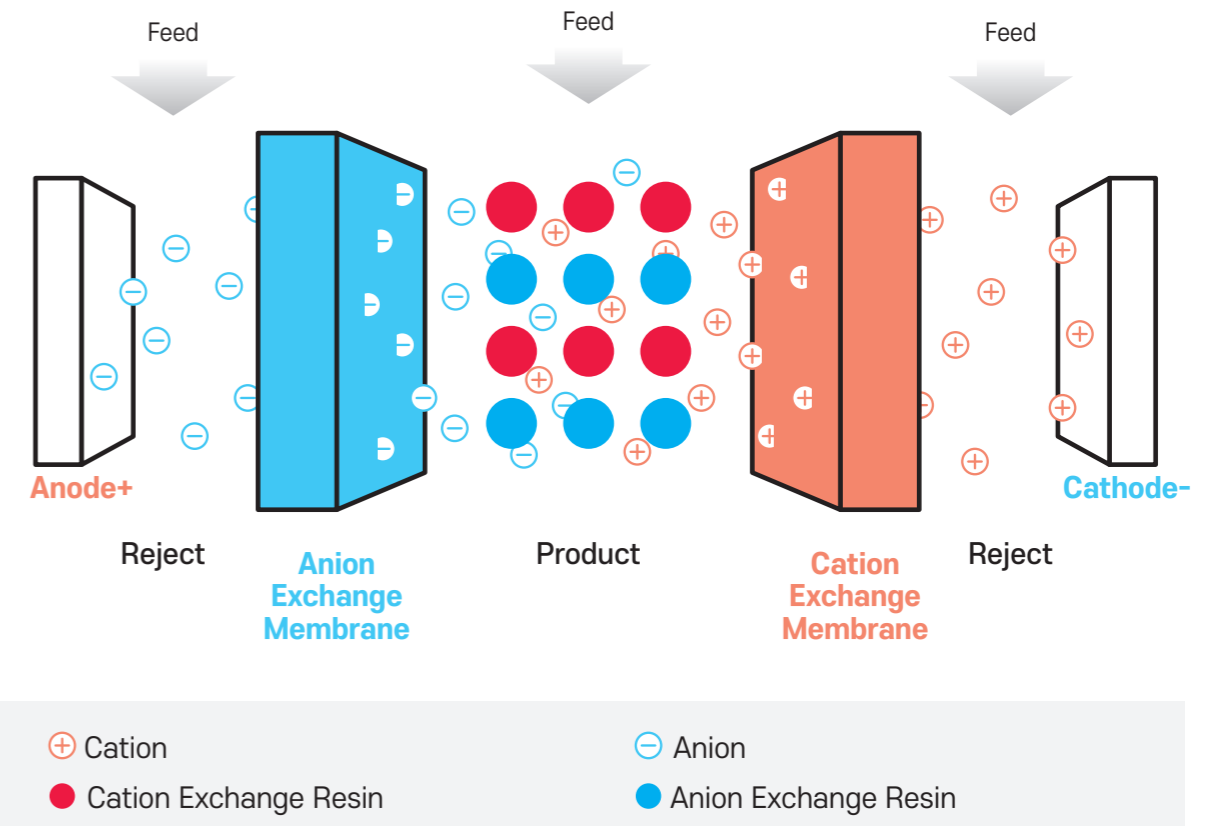
MDI Applications

Demineralized Water	Ultra-pure Water
<ul style="list-style-type: none"> • Thermal Power Plant • Nuclear Power Plant • Refinery/Chemical Plant • Food Manufacturing Process • All places where Demi water is needed 	<ul style="list-style-type: none"> • Manufacturing Processes <ul style="list-style-type: none"> - Semiconductor - Electronic Device - Pharmaceutical • All places where Ultra-pure water is needed

MDI Model

Demineralized Water	Ultra-pure Water
<ul style="list-style-type: none"> • DX-5012 • DX-5015 	<ul style="list-style-type: none"> • UX-5005 • UX-5010

MDI Mechanism



MDI consists of cell pairs of ion exchange membranes and resins, and operates with direct current.

A large number of cell pairs are stacked in parallel between anode(+) plate and cathode(-) plate, and cations pass through the cation exchange membrane and anions pass through the anion exchange membrane by electrical power. Those ions are moved to concentrated line and removed.

Ion exchange resin makes the current flow efficient and promotes ion movement. It is electrically regenerated and continuously reused.

Specification

Model	DX5012	DX5015
Maximum Feed Water Specifications		
Feed Water Conductivity including CO ₂ and Silica	< 40µs/cm (CO ₂ < 5 ppm, Silica < 0.5 ppm)	
Inlet Pressure	Max. 10kgf/cm ²	
Inlet Temperature / pH	5~45°C (Nor. 25°C) / 4 ~ 11	
Inlet T-Hardness	< 0.5 ppm (Recovery : 95%) < 1.0 ppm (Recovery : 90%) < 1.5 ppm (Recovery : 85%)	
Inlet Free Chlorine	0.02 ppm	
Inlet Fe, Mn, H ₂ S	< 0.01 ppm	
Inlet TOC / Silica	< 0.5 ppm / < 0.5 ppm	
Typical Module Performance		
Recovery	90 ~ 95%	
Capacity	Max. 20m ³ /hr	Max. 25m ³ /hr
Pressure Drop	< 2.5kgf/cm ²	
DC Voltage / Amperage	0~600V / 0~6A	
Product Resistivity	> 16MΩ·cm	
Silica / Boron Removal	≥ 95%	
Sodium / Chloride Removal	≥ 99.8%	
Physical Specifications		
Size	470mmID × 2,110mmL	470mmID × 2,310mmL
Weight	Empty : 470kg Oper. : 490kg	Empty : 490kg Oper. : 510kg
Material	Body : Glass Reinforced Plastic (GRP)	

Specification

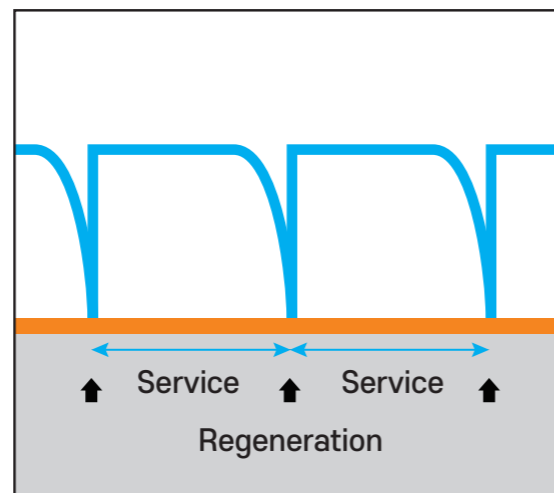
Model	UX5005	UX5010
Maximum Feed Water Specifications		
Feed Water Conductivity including CO ₂ and Silica	< 10µs/cm (CO ₂ < 1.25 ppm, Silica < 0.2 ppm)	
Inlet Pressure	Max. 10kgf/cm ²	
Inlet Temperature / pH	20~45°C (Nor. 25°C) / 4 ~ 11	
Inlet T-Hardness	< 0.2 ppm	
Inlet Free Chlorine	< 0.02 ppm	
Inlet Fe, Mn, H ₂ S	< 0.01 ppm	
Inlet TOC / Silica	< 0.5 ppm / < 0.2 ppm	
Typical Module Performance		
Recovery	≥ 95%	
Capacity	4~6m ³ /hr	10~13m ³ /hr
Pressure Drop	< 2.5kgf/cm ²	
DC Voltage / Amperage	0~500V / 0~6A	
Product Resistivity	> 17.5MΩ·cm (< 5µs/cm : 2Pass RO) , > 18MΩ·cm (< 1µs/cm : DI Water)	
Silica / Boron Removal	≥ 99%	
Sodium / Chloride Removal	≥ 99.9%	
Physical Specifications		
Size	470mmID × 1,095mmL	470mmID × 2,110mmL
Weight	Empty : 250kg Oper. : 260kg	Empty : 480kg Oper. : 500kg
Material	Body : Glass Reinforced Plastic (GRP)	

Comparison with Ion Exchange Resin System

MDI removes ions continuously with electrical power. Unlike Ion Exchange Resin systems that require downtime for Resin regeneration using chemicals, Electro-deionization systems can produce demineralized and ultra-pure water continuously and get stable water quality.

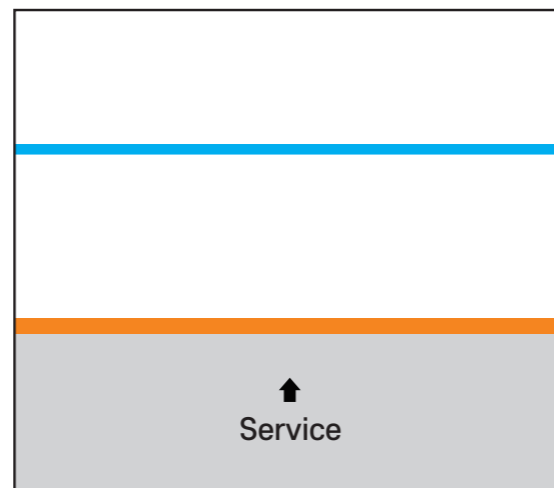
**Ion Exchange Resin System
Conductivity ($\mu\text{s}/\text{cm}$)**

Downtime for resin regeneration required



**Electro-Deionization System
Conductivity ($\mu\text{s}/\text{cm}$)**

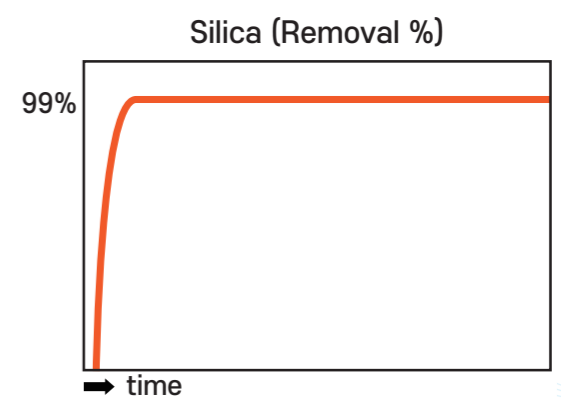
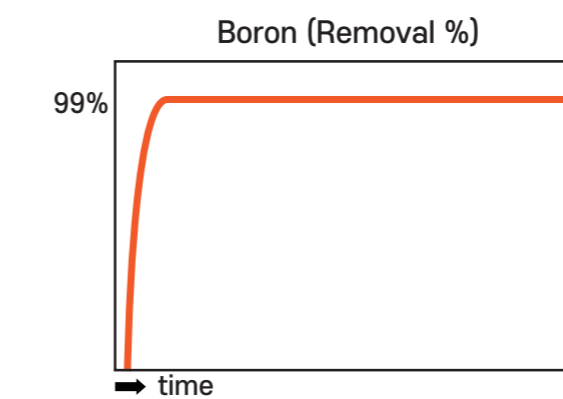
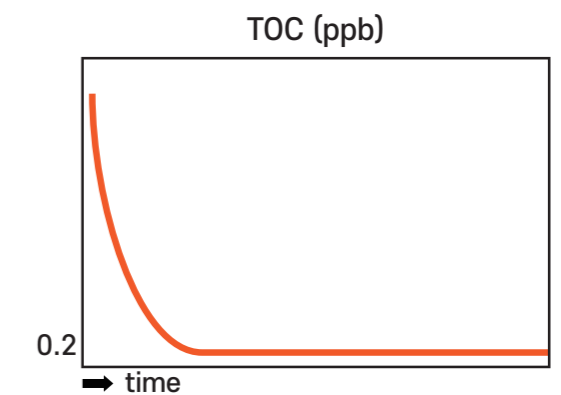
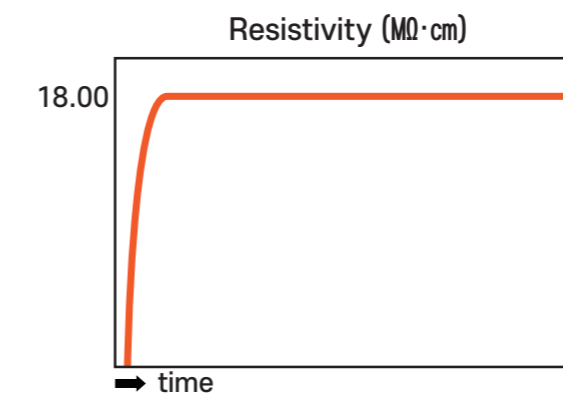
No need for chemical regeneration,
No downtime required



MDI for Ultra-Pure Water

The importance of ultra-pure water is being increased for the manufacturing processes in the area of semiconductor, electronic device, pharmaceutical, and others, and the required purity and reliability is strictly controlled.

Treated Water Quality



4S Technical Services

Geumhwa wts provides signature services for maintenance after delivery . We try to satisfy customer's needs through specialized 4S services. Other technical services such as analysis and pilot tests with the support by R&D center are also provided.

Before Service (B/S)



Technology Consulting and Performance Test

After Service (A/S)



Warranty and Maintenance

Trouble Shooting (T/S)



Trouble Shooting and Providing Solutions

Instant Service (I/S)



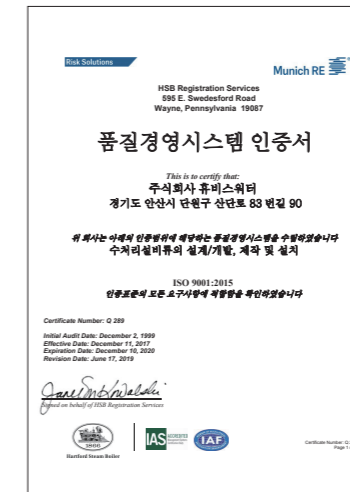
Immediate Response System

Patents and Certificates

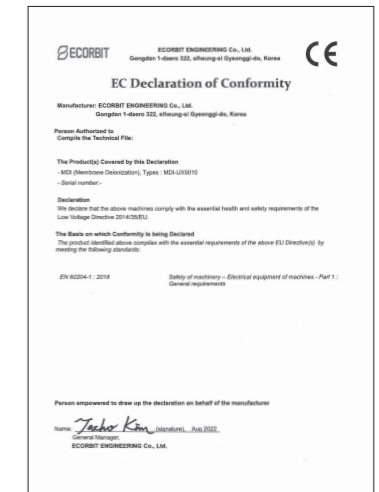
- Management System Certificates
 - ISO 9001 | 14001 | 45001, ASME, CE, etc.



MDI Patent
(Reg. No.10-0769051)



ISO 9001, ISO 14001,
OHSAS 18001



CE - Certificate

Precautions for Handling

- Protection from physical damage
- Protection from direct sunlight, high temperature and freezing
- Storage temperature : 5~30°C
- Storage period : about 6 months (contact us for longer storage)
- Storage with original packaging recommended