

i-MBR

In Vitro-Side stream, MBR



- High turbidity water purification
- Separation and Concentration System for water
- MBR wastewater treatment

PHILOS

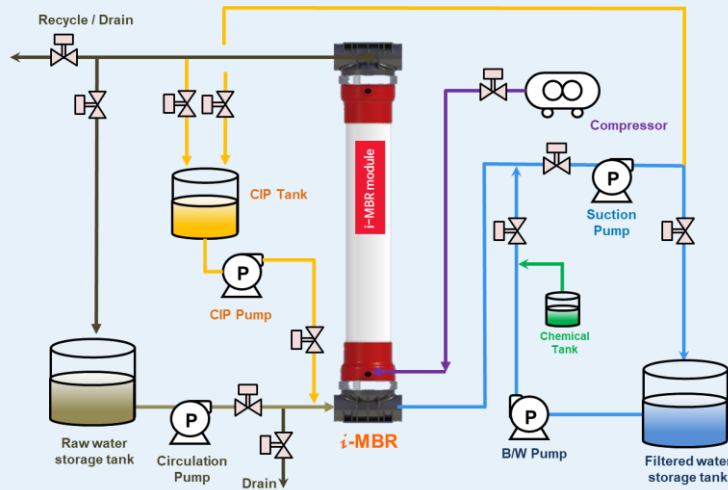
● **i-MBR ?**

PHILOS i-MBR is a DIY (Do It Yourself) type package system that is optimized for high-tolerance water treatment, separation concentration, and waste water treatment MBR process with high efficiency air cleaning technology through high-strength braid MF/UF composite membrane and case storage type membrane module structure composed of End-free technology.

The principle of operation

The raw water transferred by the circulation pump inside the i-MBR module circulates back into the water bath, while at the same time injecting membrane cleaning air to maximize membrane cleaning efficiency, resulting in stable filtration performance. The filtration process minimizes membrane contamination by operating at low pressure from the suction pump and restores membrane performance through periodic reverse and chemical reverse wash (CEBW). In the case of chemical cleaning (CIP), chemical cleaning can be done easily with simple operation by circulating cleaning agents along the source circulation path.

• i-MBR Package System process chart



i-MBR Technology

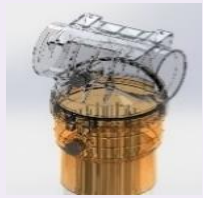
- External circulation-type membrane separation system
- High Strength MF/UF Braid Composite Membrane
- Ends-free Membrane
- Cyclic Aeration Device
- DIY type Skid Block
- CEBW and Mobile CIP Devices
- electromechanical driving

Patent Registration

- 10-0957825
- 10-0639821
- 10-0479427
- 10-1874407
- 10-1625603

A New Concept of Membrane Separation Technology Made from Five Patent Technologies

● **Key Features of i-MBR**



Stable membrane performance
End-free separation film and case-conceiving modular structure to eliminate debris and maximize membrane cleaning efficiency.



DIY-type module and block structure
On-site installation is fast and easy because ironwork such as welding is removed and assembled with simple tooth tools.



Clean surroundings
Closed membrane module and system structure can maintain clean environment without surrounding contamination by Fume.



package system
Application is excellent in package form of membrane modules, pumps, pipes and valves, electric panels, etc.



Easy Installation
Compared to the hard-to-lift bedding, Simple valve operation makes it easy to clean medicine at any time.



Easy capacity expansion
Without additional civil/construction work
By adding an i-MBR block, ease of capacity expansion work.

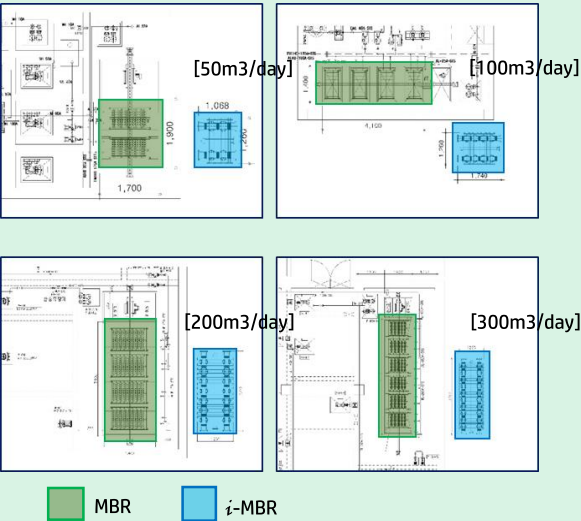
● **i-MBR's outstanding economics**

Reduced footprint

Compared to the same throughput, the floor area is reduced by more than 50% on average. Therefore, the space utilization is good, and the cost can be reduced by minimizing civil engineering construction or using it as a different space when building a new building.

Throughput (m ³ /day)	Comparison on Installation area *		Decrease ratio (%)
	MBR**	i-MBR***	
50	3.2 m ² (W1,700xL1,900mm)	1.3 m ² (W1,068xL1,260mm)	58.3
100	5.7 m ² (W4,100xL1,400mm)	2.2 m ² (W1740xL1,260mm)	61.8
200	7.0 m ² (W3,900xL1,800mm)	3.5 m ² (W2,742xL1,260mm)	50.8
300	8.0 m ² (W5,713xL1,400mm)	4.7 m ² (W3,744xL1,260mm)	41.0

Comparison of installation area based on sewage treatment MBR



* Comparison of floor area (wastewater treatment) and values may vary depending on the arrangement of the separator
** Based on the area of the placement of the diaphragm
*** i-MBR Block area

- 20% reduction in cleaning air capacity

- Case storage modular structure maximizes membrane cleaning effect with low air volume
- This reduces the amount of cleaning air by 20% compared to conventional bedding (60Nm³/hr/module) reducing power costs.

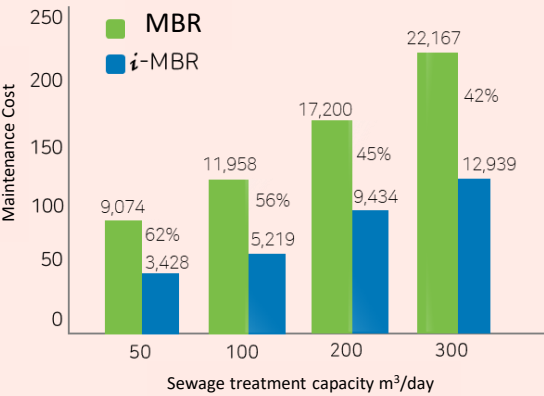
- 1/3 of the chemical cost compared to the submersible membrane

- The closed modular structure minimizes the requirement of chemical volume for cleaning compared to Submersible MBR.
- By performing periodic CEBW, the amount of chemical used for membrane cleaning is much less than that compared to submersible membrane.

- Process unit price per ton(m³), half as compared to submersible

- Compared to the same throughput, the cost of power, chemical, and separator replacement is lower than the submersible membrane per tonnage.

Maintenance cost comparison for MBR & i-MBR



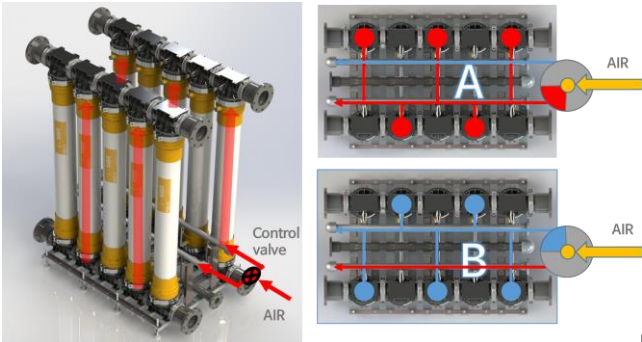
processing unit price per ton* (/ton)	50 m ³ /day		100m ³ /day		200m ³ /day		300m ³ /day	
	MBR	i-MBR	MBR	i-MBR	MBR	i-MBR	MBR	i-MBR
	497	188	328	143	236	129	202	118

* Based on the above annual maintenance cost, the annual 365Work, day 24 time work processing capacity at the time of calculation processing unit price.

● i-MBR's Unique Technology

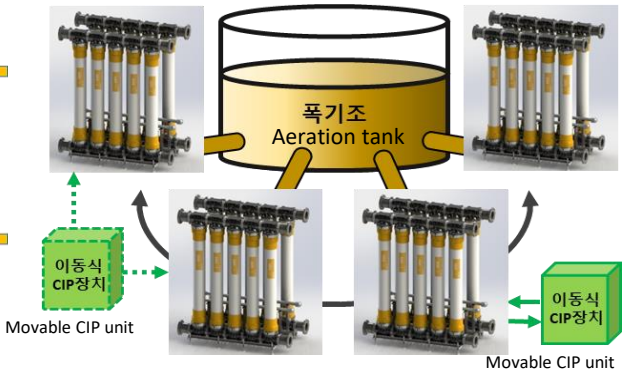
Cycle Aviation Device (CAD)

By applying CAD to clean air, the cleaning air is supplied sequentially to the membrane module, reducing the amount of cleaning air by less than 50% compared to the existing cleaning air.



Removable CIP Device

It is easy to clean chemicals for each i-MBR system through the mobile chemical cleaning unit (MCU) .MCU can be moved to another block after cleaning the chemical. Therefore, it is easy to clean the chemical anytime.



Features of Cyclic Aeration and Mobile CIP Devices			
Cyclic Aeration	<ul style="list-style-type: none"> • High Efficiency Cleaning Effect 	<ul style="list-style-type: none"> • Low Energy Consumption 	<ul style="list-style-type: none"> • Low Maintenance Cost
Removable CIP device	<ul style="list-style-type: none"> • Low Chemical Consumption 	<ul style="list-style-type: none"> • Convenient Chemical Cleaning 	<ul style="list-style-type: none"> • Cleaning Equipment Cost Reduction Due To Downsizing

● i-MBR module standard

Division		i-mbr module
Size		Diameter 8" x length 60"
Membrane area		36 m ²
Processing capacity		15 m ³ /day(sewage standards)
Separator	Pore	0.1 μm
	Texture	Hydrophilization PVDF
Module	Texture	PVC
	Glue	Polyurethane
Drive Condition	Filtration method	External circulation type decompression type
	Proper operating pressure	200-300 mm Hg
	Maximum operating pressure	400 mm Hg
	Use pH	5 ~ 11
	Operating temperature	Maximum 40℃

● i-MBR System Unit

Model	Module quantity (ea)	Power consumption (Kwh/m ³)**	Five-wastewater treatment capacity (m ³ /day)		
			Sewage	Industrial wastewater ***	Livestock wastewater ***
ISU-4	4	0.84	50	25	10
ISU-7	7	0.53	100	50	20
ISU-10	10	0.49	150	75	30
ISU-14	14	0.40	200	100	50
ISU-20	20	0.45	300	150	75

* Area for i-MBR Block
 **Depending on the original water quality and operation conditions
 *** High-concentration wastewater treatment may vary depending on the raw water quality and operating conditions

