



## Nano Sun NSMBR Series

Additive Manufactured Submersible Flat Sheet Membrane Module for Membrane Bioreactor (MBR)



### Nano Sun creates innovative membrane technology to improve MBR system performance

Nano Sun, a spin-off company from Nanyang Technological University is a Singapore based membrane manufacturing company with its own highly competitive research and development (R&D) team. With more than 20 years' research experience and technological accumulation in the multifunctional nano composite membrane and water industry, Nano Sun is one of the only few companies that are able to in-house mass produce membranes with strong R&D support and also possess robust (waste)water treatment system design capability - a solid one-stop solution provider for customers with wide range of demands.

### Nano Sun Additive Manufactured Membranes innovates Nanotechnology to produce high quality MBR modules.

The "Module Code: NSMBR" series is the submerged flat sheet Additive Manufactured Membrane module, which are used for the Containerized MBR (CMBR) series, or can be retrofitted into existing MBR systems. It is the primary barrier to separate the suspended solids to produce particle-free effluent<sup>#</sup>. The Additive Manufactured Membrane is a state-of-art innovation that was developed to produce superior effluent quality with higher flux at lower operating pressure.

<sup>#</sup> ≥ 95% particle rejection rate for 0.5 μm



### Collaboration Partner



© 2018, Nano Sun Pte Ltd

Nano Sun Pte Ltd, Singapore  
120 Pioneer Rd #03-02, Singapore 639597  
Phone: +65-67950953 Fax: +65-67907607  
Email: sales@nanosun-main.com

# Nano Sun Additive Manufactured Membrane in MBR System

## MBR for Municipal Wastewater and Industrial Wastewater Treatment

- Effective sludge and suspended solids separation
- High mixed liquor suspended solid (MLSS) concentration operation
- Higher throughput via interconnected voids
- "Super hydrophilic" nano-engineered surface for fouling control
- Excellent chemical compatibility with consistent water permeability

## Reduced System Footprint

- Modularised plug-and-operate model
- Direct immersion of additive manufactured membrane for easy operation and maintenance
- Elimination of sedimentation process with minimized sludge generation for post-treatment
- Effective reduction of conventional activated sludge (CAS) process footprint by more than 50%
- Further 10-20% reduction in size compared with other available MBR systems

## Additive Manufactured Nano-Structure (Module Series: NSMBR)

**Effective Membrane Area:** 0.9 m<sup>2</sup>

**Dimensions (W X H X T):** 510 mm X 1010 mm X 7 mm

**Membrane Material:** PVDF (Polyvinylidene Fluoride) and PET (Polyethylene Terephthalate) supporting layer

**Plate:** ABS Engineering Plastic

## Unique Membrane Nano-structure

Nano Sun's membrane are manufactured using state-of-the-art additive manufacturing technology. The additive manufactured nano-structure, provides interconnected voids which allow significantly higher water permeation than pore based membranes.

## Stable Membrane Material

The functional layer is made of modified PVDF which possess superior physical and chemical stability that could be used in adverse conditions. The supporting layer is made of PET with outstanding chemical compatibility and physical properties.

## Engineered Membrane Surface

The functional layer has been engineered to possess "super hydrophilic" property. This favours water permeation while reducing its fouling potential. This reduces the frequency of chemical while maintaining high flux output.

## Membrane Characteristics

Membrane flux (0.9 Bar pure water)	15000 LMH
Membrane Aperture	0.5 μm
Particles Removal Rate (0.5 μm)	≥ 95 %
Contact Angle (in Air)	≤ 10 °
Porosity	≥ 60%
Total Thickness	160 ± 10 μm
Tensile Strength	≥ 300 N
Breaking Elongation	≤ 5%

## Membrane Unit Parameters

Model <sup>^</sup>	NSMBR-60	NSMBR-90	NSMBR-120	NSMBR-150
Quantity of Membrane Components	60	90	120	150
Material	PVDF			
Total Area of the Membrane	54	81	108	135
Daily Treatment Capacity (m <sup>3</sup> /d)*	20~78	25.5 ~ 106	34.5 ~ 142	43.5 ~ 178
Operating pH	5 ~ 10 (Long-term) 2 ~ 12 (Short-term shock loading)			
Operating Temperature	5 ~ 40°C			
Recommended Operating Pressure	5 ~ 20 kpa			
Application	Biological and industrial wastewater filtration			
Unit Dimension (mm)	710 X 1550 X 1140	710 x 1550 x 1620	710 x 1550 x 2100	710 x 1550 x 2580

<sup>^</sup>can be customized

\*(10~60 LMH @22hr/d operation cycle)

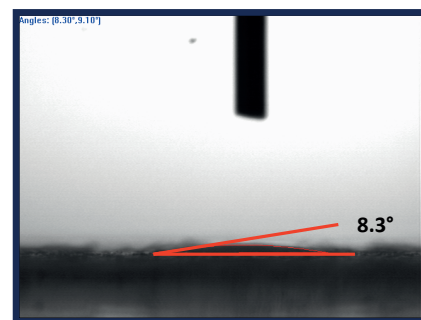
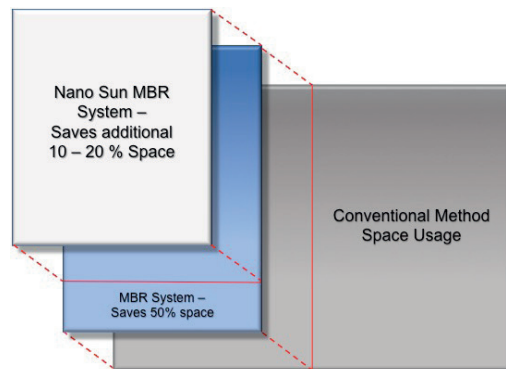
## Collaboration Partner



© 2018, Nano Sun Pte Ltd

## Flat Sheet Membrane Module

- Packed module concept is easy to maintain and replace
- Nano-engineered surface with reduced fouling tendency
- More efficient air scouring resulted in fewer chemical cleaning required



Nano Sun Pte Ltd, Singapore  
120 Pioneer Rd #03-02, Singapore 639597  
Phone: +65-67950953 Fax: +65-67907607  
Email: sales@nanosun-main.com