



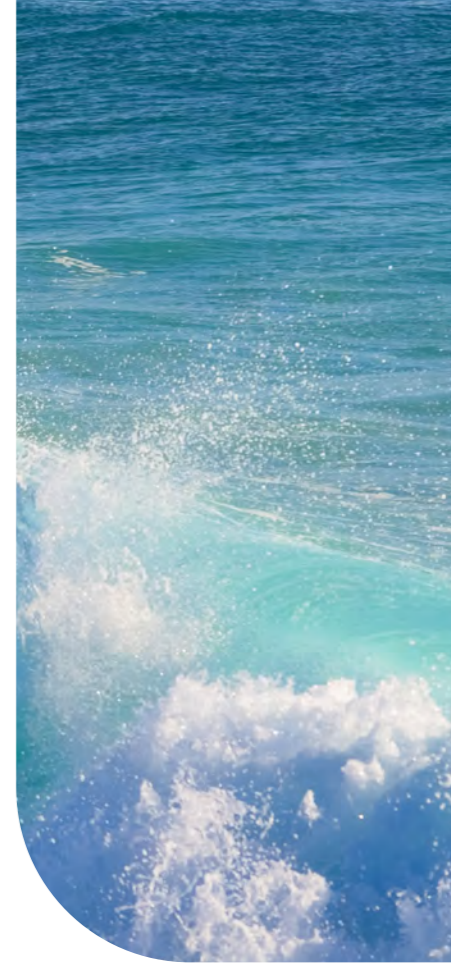
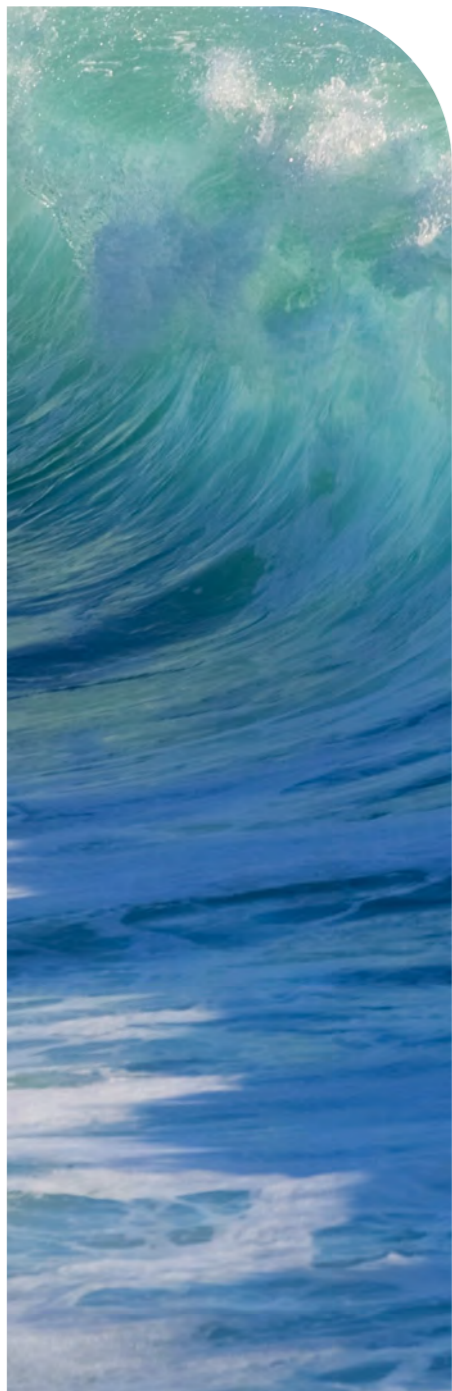
SINMEMB®

**The whole industry chain
problem solving expert**

Creates a fusion of products and services,
a brand-new technology



Solution Provider For Membrane Systems
www.siotech-env.com



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ABOUT US

Sino-membrane(Beijing)Technology Co.,Ltd.

is a high-tech enterprise that integrates research and development, manufacturing of water treatment membrane products, engineering design for water systems, complete set supply for projects involving membrane system construction and operation, as well as technology research and development and consultancy services.

The company possesses the core technologies required to manufacture ultrafiltration (UF), nanofiltration (NF), and reverse osmosis (RO) membranes. Its automated production capacity enables the manufacturing of various types of membrane elements, including those used in ultrafiltration processes or RO/NF applications. These high-performance water treatment membrane elements are widely utilized in industries such as electric power generation, petrochemicals, steel, electronics, medicine, food and beverage, municipal and environmental protection. They play a crucial role in seawater desalination and brackish water desalination processes; they also contribute to boiler make-up water preparation for industrial use; provide solutions for producing industrial pure water and electronic ultra-pure water; facilitate the production of purified drinking water; support wastewater treatment processes; enable material concentration and separation.



5,000,000 m²

Annual Output Of Reverse Osmosis Membrane

2,000,000 m²

Annual Output Of Ultrafiltration Hollow Fiber

50⁺ pieces/sets

Annual Machining Capacity

Including ultrafiltration equipment, reverse osmosis equipment, EDI equipment, dosing equipment and other full membrane system equipment

15,000 m²

Standardized Production Workshop



Qualification Certification

SINOMEMB® products encompass a wide range of industries, spanning from industrial to domestic applications. The long-term usage by our customers has proven their exceptional qualities, including resistance to pollution, extended lifespan, and the ability to easily recover after cleaning. Our outstanding team is proficient in all aspects of product development, application, water treatment system design, equipment manufacturing, as well as system operation and maintenance. Throughout the years, we have accumulated effective solutions for comprehensive challenges. Moreover, we possess numerous intellectual property rights and SINOMEMB® has obtained certifications such as ISO9001 for quality management system, ISO14001 for environmental management system, and OHSAS18001 for occupational health and safety management system.

SINOMEMB® has established a global research center for membrane technology in collaboration with various research institutes, universities, and government entities. This initiative aims to spearhead the advancement of high-end membrane materials and applications. The organization has strategically set up offices in Xi'an, Yinchuan, Urumqi, Jinan, Shenyang, Harbin, Xiamen, Chengdu, Zhengzhou and other key locations.

SINOMEMB® series of membrane products offers high-quality water treatment membranes for the coal chemical, petrochemical, power, and municipal industries. Over the course of more than ten years of relentless efforts, it has evolved into the world's leading manufacturer of ultrafiltration (UF) and reverse osmosis (RO) membranes.

- ◆ National High-Tech Enterprise
- ◆ Technology-based Small and Medium-sized Enterprises
- ◆ Specialized, Innovative and Entrepreneurial Small and Medium-sized Enterprises
- ◆ AAA Corporate Credit Rating
- ◆ Over 50 patents for invention
- ◆ Participation in the formulation of multiple industry standards
- ◆ NSF US National Sanitation Foundation Authoritative Certification
- ◆ ISO9001 Quality Management System Certification
- ◆ ISO14001 Environmental Management System Certification
- ◆ ISO45001 Occupational Health and Safety Management System Certification

10⁺ years Successful Experience

300⁺ m² Laboratorys

30⁺ people R&D Team

100⁺ pieces/sets Experimental Equipment

University Partner

Tongji University Donghua University
Tianjin University Tianjin Polytechnic University

50⁺ awards Sheet R & D Manufacturing
Application Patent

Quality System Certification



Certificater Of Patent



Technical Feature



Adjustable Membrane Selection And Superior Performance

The membrane selected for each SINOMEMB® series of membrane products has been specially developed for various industry applications. Through careful selection of base materials, precise adjustment and control of ultrafiltration support layer thickness, hole diameter shape and proportionality, as well as density regulation of the desalination function layer of loose membrane surface modification, we implement a customized membrane selection process based on different areas and conditions. This approach effectively maximizes the service life of all types of membrane elements during their application process, thereby significantly reducing replacement and maintenance costs for our valued customers. Through extensive practical application verification in relevant industries over many years, this solution has consistently proven to be highly effective in addressing customer challenges.



Exclusive Vip Customization Technology

SINOMEMB® series products can be customized to meet all the demands for our clients according to their specific requirements. Leveraging our extensive experience in membrane development and water treatment operations, we are capable of swiftly responding to customer specifications for membrane element performance, encompassing aspects such as membrane development or selection, main material selection or customization, and rolling design simulation. This includes customization of appearance and size according to customer requirements, enabling exclusive customization. Custom-made membrane elements effectively demonstrate the technical expertise of our membrane enterprise. The advantage for customers lies in consolidating their market position, highlighting their technical strength, and maintaining profitability.



Rolling Design And Simulation Technology of Membrane Elements

SINOMEMB® series products are available in various sizes to optimize membrane area and ensure consistent quality for each element. Depending on the operating conditions, suitable input water production cloth, glass wool, and other key materials are carefully selected to prevent performance fluctuations throughout the life cycle of the membrane element. Computer fluid dynamics is employed to design the membrane element's area, page number, and glue line position based on specific application conditions, maximizing stability and applicability. Moreover, our unique factory inspection technology guarantees that every membrane element undergoes thorough inspection to avoid performance variations within or between batches. Additionally, our fully automated production technology ensures uniform distribution of the membrane during rolling and feed flow, resulting in enhanced pollutant scouring effect and improved anti-fouling performance. This leads to quicker system installation with long-lasting stability, reduced debugging time, minimized flushing water waste, and enhanced customer convenience.



Product Superiority



Full Range Of Membrane Element

SINOMEMB® possesses autonomous core technology for the research and development as well as production of RO and NF membrane elements. This empowers us to provide customers with assistance in selecting and designing appropriate membrane elements tailored to their specific usage conditions within diverse application fields. We consistently offer a comprehensive range of SINOMEMB® series membrane elements that cater to your requirements, whether it be high desalination rates, abundant water yield, energy-saving capabilities, or selective filtration and treatment of high salt concentration wastewater.

SINOMEMB® Series Product Category

- SNLE Low Energy series
- SNBW Brackish water series
- SNSE Ultra Low Pressure series (Save electricity)
- SNNF Nano Filtration series
- SNSW Sea Water desalination series
- SNHW High-concentration-salt water series

SINOMEMB® Series Product Features

- FR Fouling Resistant
- XFR Ultra fouling Resistant(XSTR Fouling Resistant)
- HF High Flux
- HR High Rejection



Higher Cost Performance

SINOMEMB® series of membranes offer exceptional performance, reliable operation, extended lifespan, competitive pricing, and comprehensive support services. They are the optimal choice for achieving cost savings in the same application field and membrane product category.



More Professional Technical Services

Company boasts a highly skilled team with excellent expertise and advanced problem-solving capabilities in product manufacturing, product application, and system troubleshooting, etc., coupled with a diligent and accountable attitude. Their primary objective is to assist customers in resolving issues from their perspective without resorting to blame or argumentation. Over the years, SINOMEMB® has received exceptional customer feedback.

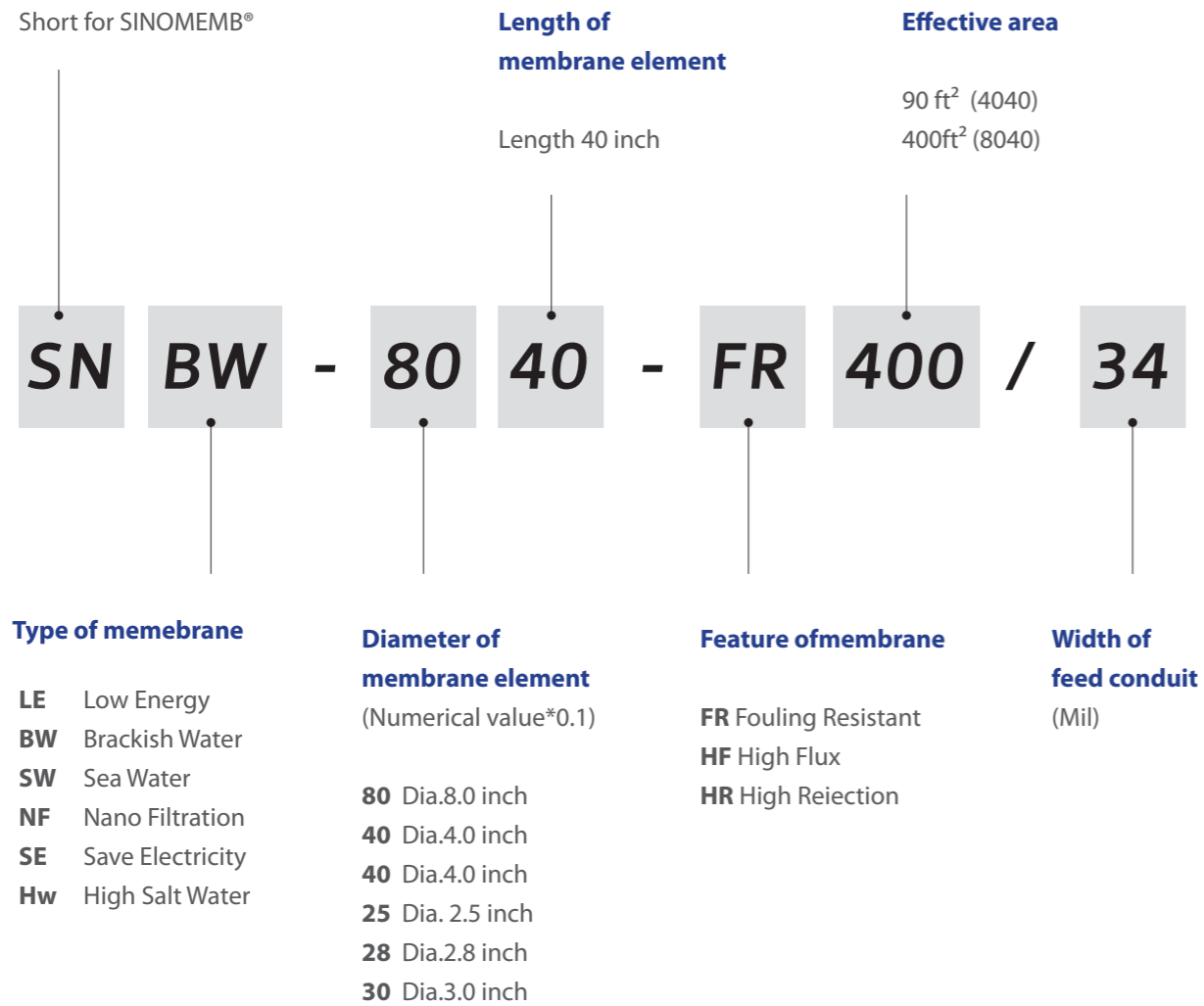


Membrane Life Cycle Care Service

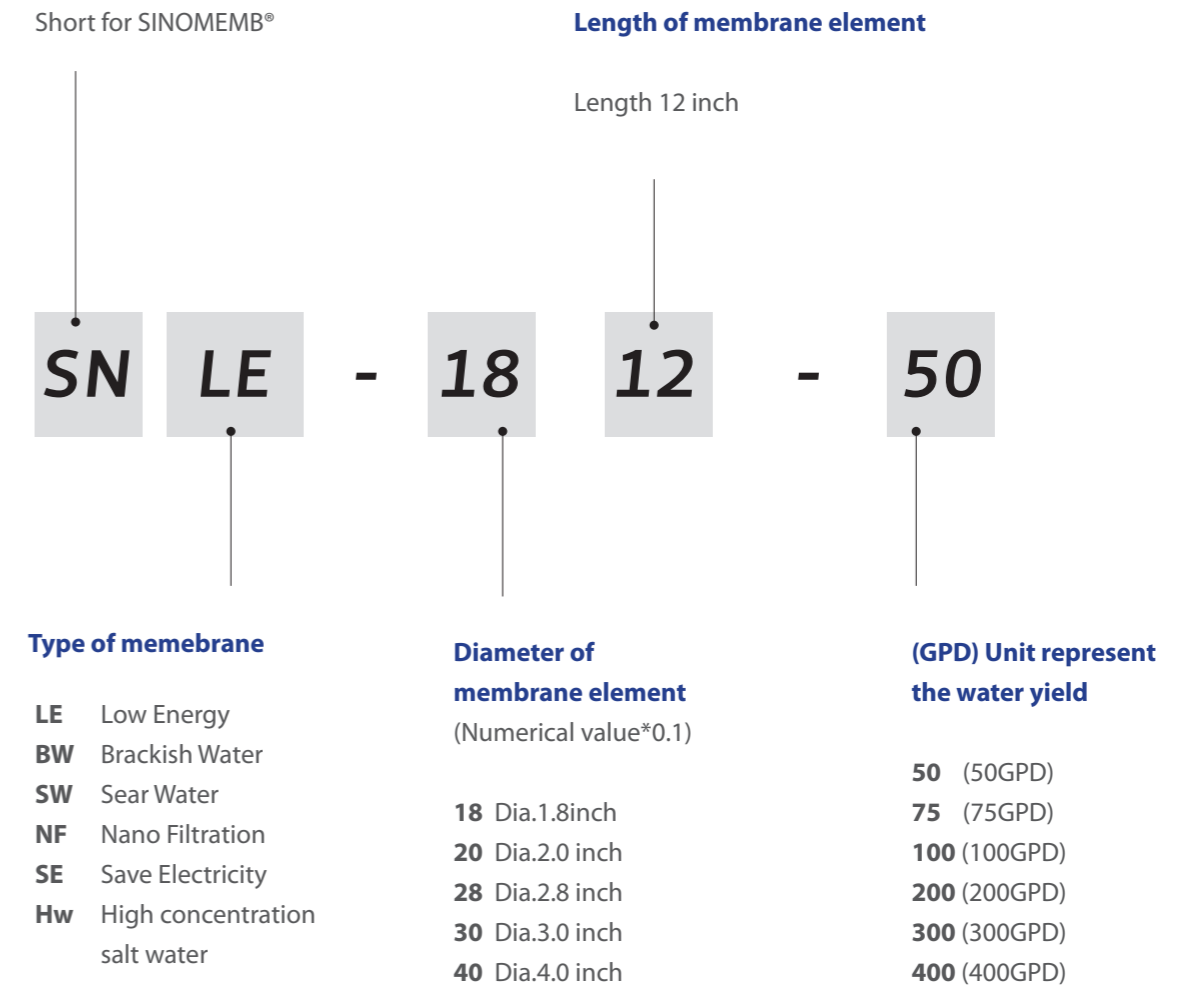
Application effectiveness of the membrane is not only dependent on the quality of the membrane itself, but also on the expertise in system operation and maintenance as well as the responsibility of the operator. SINOMEMB® leverages its extensive experience in professional operation and maintenance to offer customers comprehensive guidance and training throughout the entire lifespan of the membrane. This encompasses initial selection, optimization of operational parameters for different influent conditions, daily maintenance in complex working environments (including agentia matching selection), regular follow-up visits, with a focus on maximizing membrane element longevity and minimizing water production costs.

SINOMEMB® Series List Of Product Names

► Industrial Case



► Commercial & Residential Case



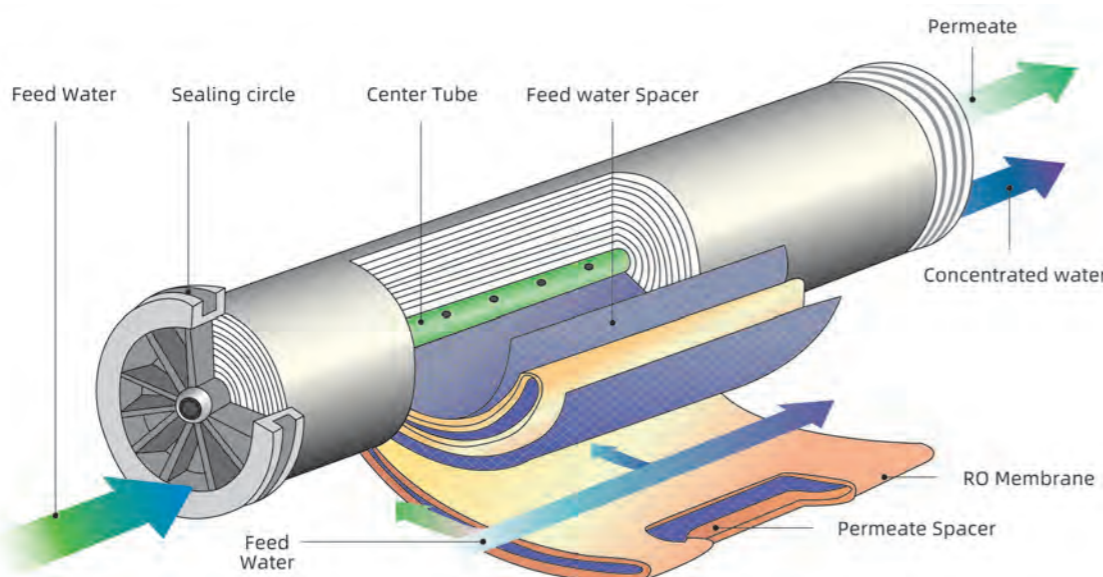
SINOMEMB® Series Selection Guide

RO and NF Membrane

SINOMEMB® RO and NF membranes are widely acknowledged as the most efficient and cost-effective essential elements for water treatment systems, both small-scale and large-scale, including natural brackish water and seawater. These membrane elements can be utilized independently or in conjunction with other processes such as ion exchange to minimize regenerator consumption and wastewater generation while producing superior quality pure water. They can also be combined with distillation processes to enhance equipment utilization, reduce energy consumption, and achieve the desired finished water.

SINOMEMB® membrane element is a spiral wound structure, also referred to as a rolled structure. It comprises multiple leaf-like membrane bags, each consisting of two membrane sheets and product water flow channels positioned between the sheets, along with turbulence mesh-like inlet flow channels situated on the surface of the membrane. The two outward-facing membrane sheets are sealed on three sides with adhesive, while the fourth side opens onto a perforated water collection pipe for convenient pure water collection. In comparison to other structural components such as tubular, plate-type, and hollow fiber types, it offers numerous advantages including uniform water distribution, high level of pollution resistance, low replacement cost, simple external pipeline, easy cleaning and maintenance procedures, and exceptional design flexibility. Consequently, it has emerged as the main structure form of membrane element in current times.

SINOMEMB® membrane elements are available in various types, each designed for specific applications.

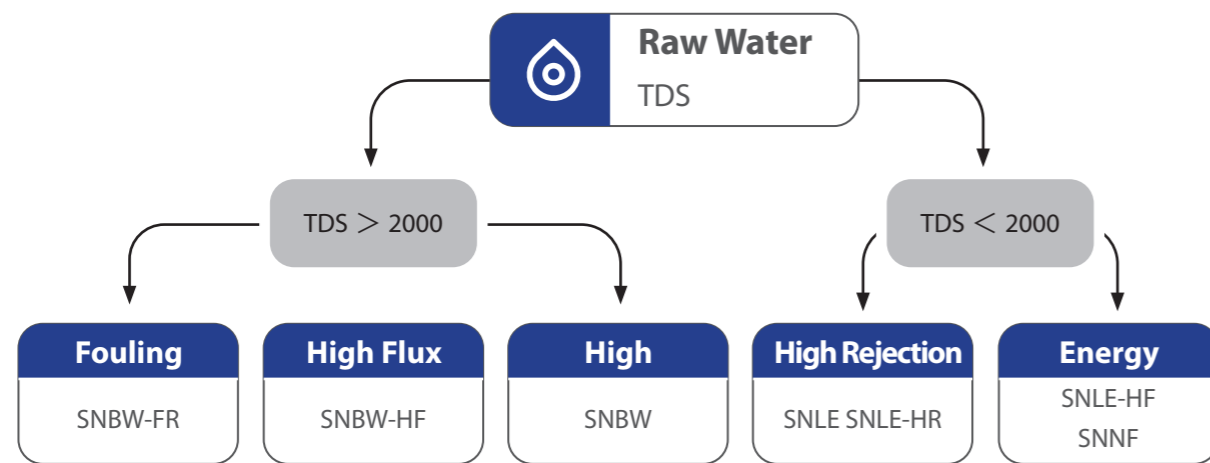


SINOMEMB® Membrane Element Have Different Types Each For Different Applications

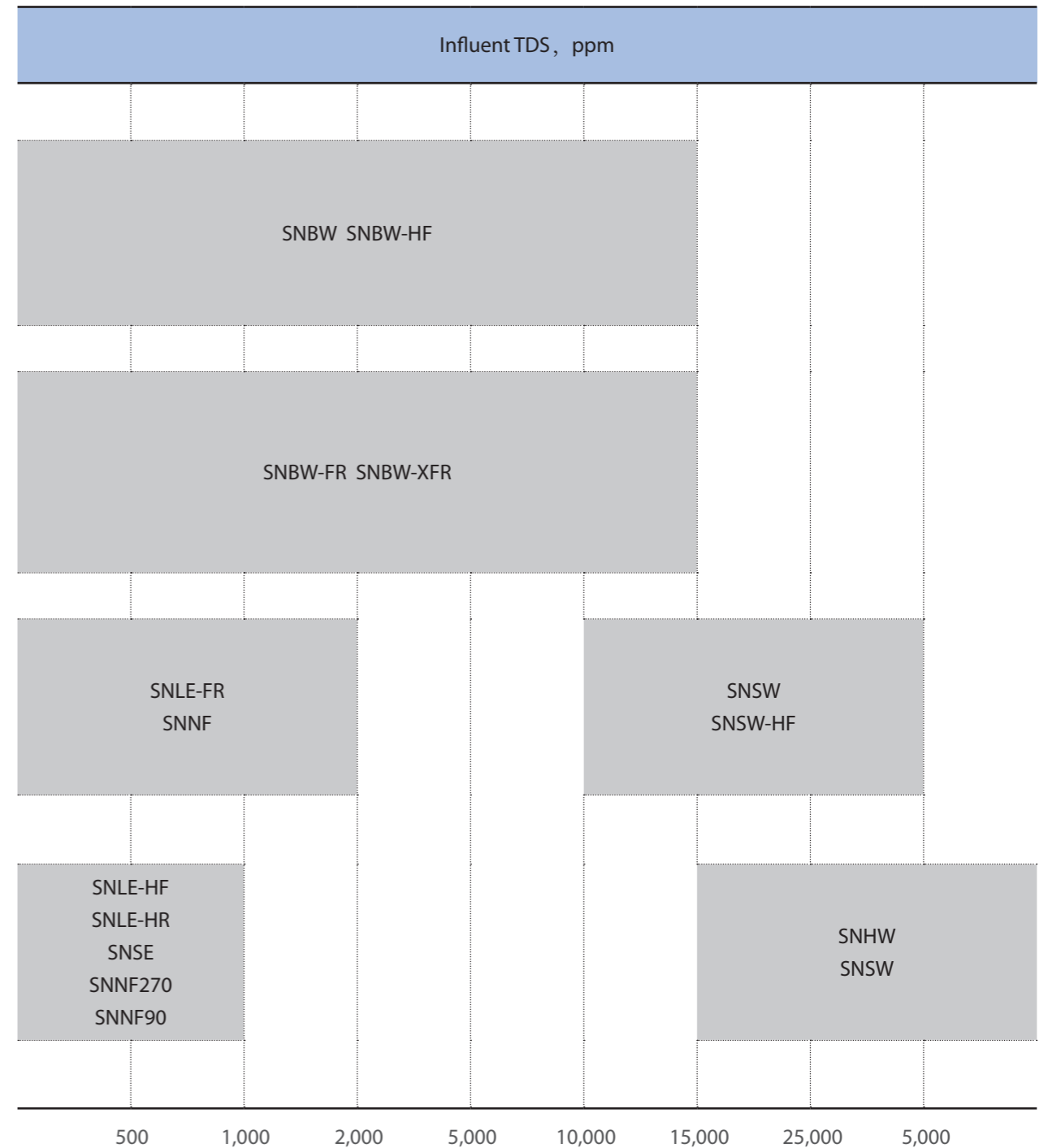
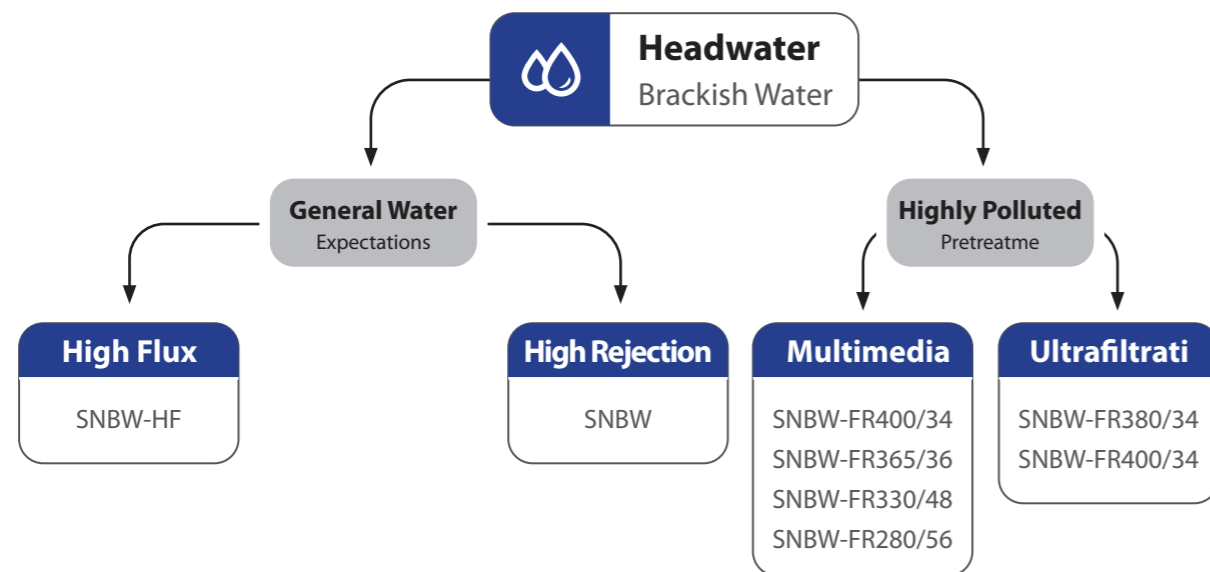
| Series | Application |
|-----------|---|
| SN-BW | FRP winding standard brackish water reverse osmosis membrane elements are mainly used in multi-branch series and high desalination rate RO systems |
| SN-BW-HF | High flux brackish water RO membrane elements |
| SN-BW-Pro | Energy Saving,high membrane area,high flux,low temperature resistance brackish water RO membrane elements are mainly used in commercial or large municipal water treatment systems |
| SN-BW-FR | Fouling Resistant brackish water RO membrane elements are applied in urban sewage and industrial wastewater recycling, desalination of slightly polluted surface water and recycling of cooling circulating wastewater |
| SN-BW-XFR | Fouling ultra-resistant brackish water RO membrane elements are used in various challenging water treatment applications, including recycling of municipal sewage and industrial wastewater , near-zero discharge treatment |
| SN-LE | FRP winding standard RO membrane elements with low energy consumption are mainly used in commercial reverse osmosis systems, specifically designed for tap water or low salt concentration as the inlet water source, to achieve exceptional desalination rates |
| SN-LE-HF | High flux RO membrane elements with low energy consumption are mainly suitable for water treatment system with low salt content |
| SN-SE | Ultra-low pressure brackish water RO membrane elements are mainly suitable for water purification system in the cold regions of the northern part, where the water salinity is below 500ppm , and water purification system without a pump |
| SN-NF90 | High desalination nanofiltration(NF) membrane elements for concentration of process materials, and reuse of concentrated brine wastewater |
| SN-NF270 | Nanofiltration (NF) membranes with moderate desalinization rate and hardness transmissivity effectively eliminate organic substances and result in high water production. They are primarily utilized for sewage treatment application such as leachate from garbage landfill |
| SN-HW | Seawater and high salinity Brackish water(sub-seawater) RO elements are mainly used in the treatment of wastewater, such as sub-seawater for the purpose of reuse |
| SN-SW | Standard seawater RO elements with high desalination rate |

SINOMEMB® Series Selection Guide

Main Products Series



Brackish Water Series RO Membrane Elements



Elements Application

- ▶ Seawater desalination
- ▶ Brackish water desalination
- ▶ Industrial pure water manufacturing
- ▶ Boiler supply water manufacturing
- ▶ Drinking water municipal water supply, drainage, water treatment
- ▶ Circulation cooling water
- ▶ Industrial and municipal sewage treatment
- ▶ Food, pharmaceutical and other processes using water manufacturing
- ▶ Semiconductor ultrapure water manufacturing
- ▶ Desalination, separation and concentration of various aqueous solutions
- ▶ Turbidity removal of surface water
- ▶ Wastewater treatment and decolorization
- ▶ Municipal landscape and agricultural irrigation
- ▶ Separated and concentrated of dairy products



Electric Power Industry

Electric-Thermoelectric

- Shanxi Yangquan ** Power Plant RO Concentrate Water
- Recycling Zero Discharge Project

| | | |
|--------------------|---|---|
| Product Quantity | Anti-pollution RO Membrane, Sub-sea Desalination Membrane | 420+192 pcs |
| | Ultrafiltration Membrane | 96 pcs |
| Raw Water Type | High-salinity Wastewater | Electrical Conductivity:5000-20000μS/cm |
| Purified Water Use | Process Water | |
| Project Features | The project's raw water is the wastewater from the entire plant (including domestic sewage, ion exchange regeneration wastewater, etc.) recycling system, including the first reverse osmosis system and the secondary concentrated reverse osmosis system. The raw water conductivity is $\geq 5000\mu\text{S}/\text{cm}$, and the secondary concentrated water conductivity is $\geq 15000\mu\text{S}/\text{cm}$ | |



Electricity - Waste Power Generation

- Ningxia Shizuishan Comprehensive Waste Disposal Project

| | | |
|---------------------------------|--|-----------------------|
| Quantity Of Product | Anti-Contamination Reverse Osmosis Membrane | 222 pcs |
| | Ultrafiltration Snu-H0-2880 | 40 pcs |
| Demineralized Water System | Multi-Media Filter → Ultrafiltration → Double Stage Reverse Osmosis → Edi | 2x20m ³ /h |
| Clean Wastewater System | Multi-Media Filter → Ultrafiltration → Reverse Osmosis | 2x20m ³ /h |
| Concentrated Water Reuse System | Reverse Osmosis + Concentrated Water Reverse Osmosis | 80m ³ /h |
| Project Characteristics | The raw water of this project is urban water, and the raw water conductivity is $\geq 3500\mu\text{S}/\text{cm}$ | |



Chemical Industry

Petrochemical

Yanan Petrochemical plant of Yanchang Petroleum Group
Domestic membrane components instead of imported membrane project

| | |
|-----------------------|--|
| Quantity Of Product | SNBW-8040FR400/34 780pcs |
| Raw Water Type | Water from the Yellow River conductance≥1000μS/cm |
| CIP Cycle | 4 months |
| System Desalting Rate | > 98.5% |

Coal Chemical

Huaneng Coal industry company Huating coal industry Qingneng coal chemical company
Domestic membrane components instead of imported membrane project

| | | |
|-------------------------|--|---------|
| Quantity Of Product | SNBW-8040FR400/34 | 378 pcs |
| | SNU-H0-2880 | 254 pcs |
| Project Characteristics | Raw water comes from two key processes of demineralized water and intermediate water in coal-based methanol production process. The process of desalting water, the intake water quality is unstable, the quality of the produced water is high, the use of core ultrafiltration for pretreatment, and then the use of reverse osmosis products to stabilize desalting; Water reuse process, water salt content is high, large discharge. Through the core ultrafiltration treatment, and then through the core anti-pollution series reverse osmosis membrane efficient desalination, so that the effluent water quality is stable, to meet the reuse standard. | |



Fluorine Chemical

Gansu Baiyin ** Co., LTD. Fluorine-containing wastewater treatment and water reuse renovation and upgrading project

| | | |
|-------------------------|--|---------|
| Quantity Of Product | Anti-contamination reverse osmosis membrane | 175 pcs |
| | Nanofiltration membrane | 130 pcs |
| | ultrafiltration SNU-H0-2880 | 96 pcs |
| Phase I EPC | Fluorinated wastewater → coagulation and precipitation → press filtration → inclined plate sedimentation tank → multi-media filter → nanofiltration → reverse osmosis → reuse | 50m³/h |
| Phase II EPC | Fluorine-containing wastewater → coagulation and precipitation → press filtration → high-density tank (dehardening) - (defluorination) inclined plate sedimentation tank → multi-media filter → ultrafiltration → nanofiltration → reverse osmosis | 80m³/h |
| Project Characteristics | Raw water is the sewage wastewater of fluorine chemical process, and the water quality is poor and complex, and the incoming water contains high oil, SS, hardness, alkalinity and fluorine content, The SS, hardness, alkalinity and fluorine ions are removed by multi-stage chemical precipitation and membrane filtration, and the system recovery is high. This subsequent membrane treatment process is not easy to form calcium fluoride inorganic scale which is insoluble in acid and base. | |





Steel/Metallurgy

Full Membrane Treatment Project In The Steel Industry

Wuhu **** Co., Ltd.

| | | |
|------------------|--|-----------------------|
| Product Quantity | Anti-fouling reverse osmosis membrane | 525 pcs |
| | Ultrafiltration membrane | 128 pcs |
| Raw Water Type | Yangtze River Water | |
| Water Use | Boiler and steelmaking process water | |
| Process Scale | Multi-media filter → Ultrafiltration → Double-stage reverse osmosis → EDI | 4x75m ³ /h |
| Project Features | This project is an example of transforming the traditional mixed bed process into a full membrane process. | |



Domestic reverse osmosis membrane replacement imported membrane element project

The total number of steel and metallurgical industry is nearly 10,000

Baosteel Group

| | | |
|---------------------|---|--|
| Product Quantity | Anti-fouling reverse osmosis membrane | 1944 pcs |
| Raw Water Type | Surface water from the Yellow River, unstable water quality | |
| Process Scale | 8 sets of two-stage reverse osmosis systems | Level 1: 4x252 sticks Level 2: 4x234 sticks |
| Salt Rejection Rate | The desalination rate of the first-stage system exceeds 99%, while the conductivity of the inlet water is measured at 976μS/cm. | |





Colliery Industry

Domestic reverse osmosis membrane replacement imported membrane element project

Zhongtian Hechuang Energy Co., Ltd.

| | | |
|------------------|--|----------|
| Product quantity | Anti-fouling reverse osmosis membrane | 3360 pcs |
| Raw water type | Mine wastewater, high salinity, high COD. | |
| Water use | Reuse as industrial circulating water or other process water | |
| Process scale | Three-stage reverse osmosis device, near zero-discharge process. The first-stage inlet water conductivity is 5000-7000 μ S/cm; the second-stage inlet water conductivity is 13000-15000 μ S/cm; the third-stage inlet water conductivity is 4-50000 μ S/cm. | |
| Project Features | The raw water undergoes a three-stage concentration process using reverse osmosis membranes, which imposes stringent requirements on the membrane's resistance to pollution and chemical stability. Additionally, it necessitates higher standards for water production and desalination stability in the presence of high salt content. | |



Electronics/Polysilicon

Ultrapure water and phosphorus and boron-containing wastewater treatment projects

Xinjiang**** Electronic New Materials Co., Ltd.

| | | |
|------------------------------|---|--------------------------------|
| Product quantity | Anti-pollution reverse osmosis membrane, sub-seawater membrane, acid-resistant reverse osmosis membrane, low-pressure reverse osmosis membrane, etc. | 1184 pcs |
| | SINOMEMB column membrane | 92 pcs |
| | Submerged ultrafiltration membrane | 6500m ² |
| Pure water reuse | MMF+UF+RO+RO+EDI | (100+180+160)m ³ /h |
| Wastewater Concentrate Reuse | High density pool → submerged ultrafiltration → RO | 3000m ³ /h |
| Project Features | The pure water project is implemented in three phases. Our company offers a comprehensive membrane design process for the recycling of wastewater from the entire plant, including wastewater containing phosphorus and boron. The overall treatment capacity reaches 880m ³ /h, providing high-quality ultrapure water for the enterprise's production processes. | |





Bioenergy Industry

Biopharmaceutical Industry

- **Epin Biotech

| | | |
|--------------------------|--|---------|
| Product quantity | Anti-pollution reverse osmosis sub-sea desalination membrane | 198 pcs |
| Raw water type | Mixed water of surface water and reclaimed water | |
| System Desalination rate | ≥90% | |

High-salt wastewater reuse system

- Ningxia*** Biotechnology Co., Ltd.

| | | |
|--------------------------|--|----------------------|
| Product quantity | Anti-fouling reverse osmosis membrane | 280 pcs |
| Process scale | Reverse osmosis concentrated water reuse project | 120m ³ /h |
| Raw water type | Concentrated salt water | |
| System desalination rate | ≥98.5% | |



Papermaking

Domestic reverse osmosis membrane replacement imported membrane element project

- Shandong Quanlin Group
- Shandong Huatai Paper Industry Co., Ltd.
- MCC Meiliyun Industrial Investment Co., Ltd.

| | | |
|--------------------------|---|---------|
| Product quantity | Brackish water, anti-pollution reverse osmosis membrane | 758 pcs |
| Raw water type | Yellow River water and recycled water recycling | |
| System desalination rate | ≥98.5% | |





Municipal Administration

Municipal high hardness tap water project

Daqing, Heilongjiang, a water works

Shanxi Xiangfen water works

- Xinjiang Loulan water works

| | | |
|-----------------------------|--|----------|
| Product Quantity | Water Plant Special Purpose Membrane Nanofiltration Membrane | 1518 pcs |
| Raw Water Type | Underground Water | |
| Producing Water Application | Drinking Water | |
| System Desalination Rate | ≥98.5% | |



Seawater Desalination

Seawater desalination system and membrane component replacement project

Ant Island drinking water project

Drinking water system of Belitung Island, Indonesia

Yantai *** island drinking water system

Hebei Tangshan Yutian ** industrial

| | | |
|------------------|--------------------------------|---------|
| Product Quantity | Seawater Desalination Membrane | 120 pcs |
|------------------|--------------------------------|---------|

- Zhongtian Hechuang Energy Co., LTD

| | | |
|------------------|--------------------------------|---------|
| Product Quantity | Seawater Desalination Membrane | 548 pcs |
|------------------|--------------------------------|---------|





SINOMEMB® Series Industry Product Data

SINOMEMB® series RO membrane elements are equipped with high-performance reverse osmosis membranes, ensuring a dense desalination layer that offers advantages such as high desalination rate and resistance to cleaning. This design ensures minimal decrease in the desalination rate during long-term use, thereby extending the lifespan of the membrane element. Moreover, The surface of the desalination membrane layer is modified with an anti-pollution treatment to enhance its smoothness, thereby inhibiting the formation of scaling crystal nucleus. Additionally, its electrically neutral surface minimizes adsorption of pollutants and prevents organic substances from contaminating the membrane element, significantly reducing cleaning frequency. The polysulfone support layer features uniform thickness and pore size distribution with an optimized arrangement of finger-like pores and sponge-like pores to prevent water production decline caused by channel collapse under high pressure or prolonged operation conditions. Furthermore, computer simulation calculations are employed during the rolling process using fully automated rolling technology to optimize factors such as number and length of membrane sheets as well as thickness and shape selection for feed water flow channels. This optimization effectively reduces fouling blockage while maximizing water production efficiency and significantly lowering operational costs.

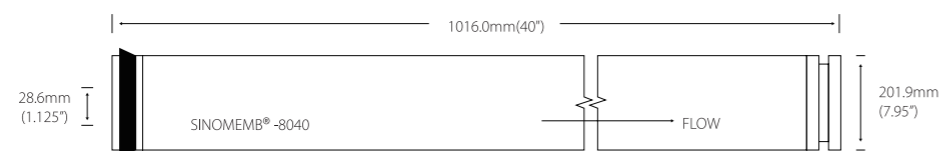


Industry Energy Saving SNLE Series RO Membrane Elements

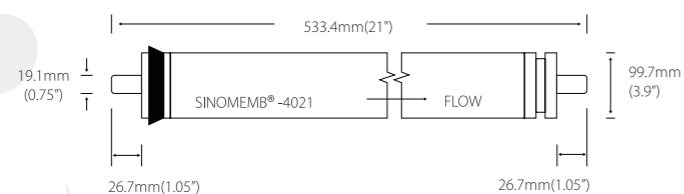
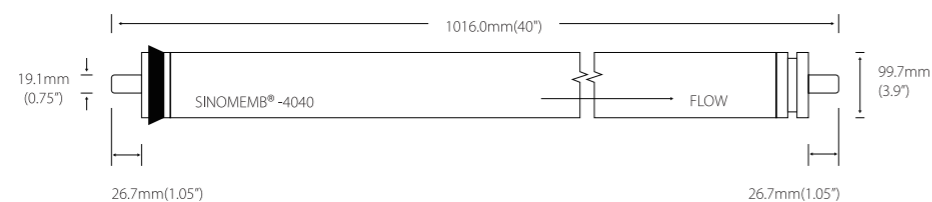
SINOMEMB® Low Energy Series (SNLE) RO membrane elements utilize low-pressure membranes to ensure adequate water production at low pressures. This product line is categorized into High Rejection (HR) and High Flux (HF), offering various membrane areas and water production capacities to meet diverse user requirements. These industrial low-energy series products can be flexibly assembled into systems that meet specific needs. Moreover, advanced design and rolling technology increase the membrane area by 10% under identical size conditions, resulting in an approximate 20% boost in water production. Unlike commercial membrane elements, these products employ fiberglass reinforced plastic (FRP) winding shells, which exhibit superior pressure resistance, longer service life, more stable performance, higher water production capacity and efficiency.

SNLE membrane elements are suitable for desalination treatment of surface water with salt content below 1000 ppm, groundwater, and slightly polluted water sources used in municipal landscapes, drainage systems, and agricultural irrigation under low-salt conditions; they are also applicable for municipal drinking water supply as well as small-scale low-pollution wastewater treatment plants in addition to pure ultra-pure water usage within the medical industry or commercial purified machines; operating at high pressures significantly enhances performance of the element while reducing operational costs.

Size Of 8 Inches



Size Of 4 Inches



Specification

| Model | Effective membrane area ft ² (m ²) | GPD(m ³ /d) | Stable desalination rate(%) | Min desalination rate(%) |
|---------------|---|------------------------|-----------------------------|--------------------------|
| SNLE-4040 | 90(8.4) | 2600(9.8) | 99.3 | 99.0 |
| SNLE-4040-HR | 90(8.4) | 2300 (8.7) | 99.5 | 99.0 |
| SNLE-4021 | 38(3.5) | 1000(3.8) | 99.3 | 99.0 |
| SNLE-8040 | 400(37.2) | 12000(45.4) | 99.5 | 99.0 |
| SNLE-8040-440 | 440(41.0) | 13500(51.1) | 99.5 | 99.0 |

Test Condition

| | |
|------------------------------|----------------------------|
| Test pressure | 150psi (1.03Mpa) |
| Test liquid temperature | 25°C |
| ppm(NaCl) | 1500ppm |
| Test liquid PH value | 7.5 |
| Recovery rate of single memb | 15%(8040/4040) 8%(4021) |

Important Information

- Please refer to the latest version of SINOMEMB® technical manual and design guide, or consult with membrane technical experts for recommended operating limits and guidelines. SINOMEMB® will not be held responsible for any consequences arising from failure to strictly adhere to the provided operating conditions in this sample.
- The water yield listed in the table represents an average value, with a maximum allowable error within 15% for membrane elements.
- Gradually increase feed water pressure over a time range of 30-60 seconds to prevent irreversible damage to the elements.
- Once wetted, please ensure that the element remains continuously wet; otherwise, it may result in membrane property deterioration.
- During initial operation, it is normal for membrane element performance not reaching its optimum state; therefore, any water produced during the first hour should be discharged. However, after running for more than three hours, membrane performance will progressively improve and stabilize.
- The maximum permissible pressure for a single pressure vessel is 30 psi (0.21 MPa).
- Avoid applying back pressure on the water producing side at all times and positions.
- If the system will be inactive for an extended period, store membranes in a protective solution (prepared using RO produced water) containing 1~1.5 wt% sodium bisulfite (food grade) to inhibit microbial growth.
- SINOMEMB® shall not be held responsible for any impact on membrane performance caused by chemicals added by users during storage or operation.

Absolute Maximum Ratings

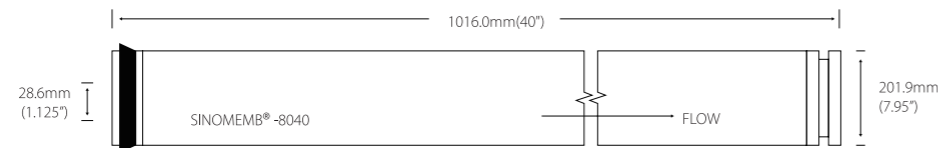
| | |
|--|------------------------------|
| Max operating pressure | 600psi(4.14Mpa) |
| Maximum feed flow of 4 inch memb | 16gpm(3.6 m ³ /h) |
| Max feed flow of 8 inch memb | 75gpm(17 m ³ /h) |
| Max feed temperature | 45°C |
| Max feed continuous operation temperature When PH > 10 | 35°C |
| Max feed SDI ₁₅ | 5 |
| Influent free chlorine concentration | <0.1ppm |
| PH range of feed water during continuous operation | 2~11 |
| PH range of inflow during chemical cleaning(30 Min) | 1~13 |
| Max pressure drop of single memb | 15psi(0.1Mpa) |

Brackish Water SNBW Series RO Membrane Elements

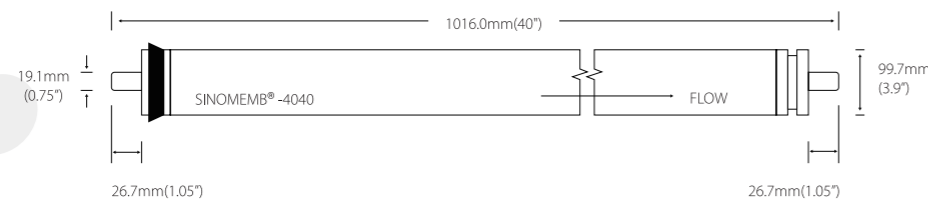
SINOMEMB® SNSW series products have made a significant breakthrough in membrane production technology, as evidenced by the optimization of the ultrafiltration support layer structure and the thickening of the desalination layer. Moreover, meticulous flow channel layout selection during the rolling process for seawater desalination has greatly enhanced its resistance to high pressure and pollution conditions. The successful development of seawater desalination membranes represents a new milestone in Sino-membrane(Beijing)Technology Co.,Ltd.'s membrane manufacturing technology, driving advancements into highly concentrated and challenging domains.

SINOMEMB® Brackish Water desalination membrane element (SNBW) is suitable for the desalination of surface water, groundwater, and low-pollution water sources with a salt content below 10000ppm. It finds extensive applications in various fields including pure water production in the food industry, ultrafiltration pretreatment for paper power plant boiler water, power plant desalination water, pharmaceutical industry pure water supply, integrated water purification systems, ion exchange softening system post-treatment, river purification softening system post-treatment, filtration water supply systems, groundwater purification systems and more. This product offers cost-effective performance with stability and reliability while demonstrating strong versatility.

Size Of 8 Inches



Size Of 4 Inches



Specification

| Model | Effective membrane area ft ² (m ²) | GPD(m ³ /d) | Stable desalination rate(%) | Min desalination rate(%) |
|------------------|---|------------------------|-----------------------------|--------------------------|
| SNBW-8040-400/34 | 400(37.2) | 10500(39.8) | 99.7 | 99.4 |
| SNBW-HF400/34 | 400(37.2) | 11500(43.5) | 99.7 | 99.4 |
| SNBW-8040 | 365(33.9) | 9800(37.1) | 99.7 | 99.4 |
| SNBW-4040 | 90(8.4) | 2400(9.1) | 99.7 | 99.4 |

Test Condition

| | |
|------------------------------|------------------|
| Test pressure | 225psi (1.55Mpa) |
| Test liquid temperature | 25°C |
| ppm(NaCl) | 2000ppm |
| Test liquid PH value | 7.5 |
| Recovery rate of single memb | 15% |

Important Information

- Please refer to the latest version of SINOMEMB® technical manual and design guide, or consult with membrane technical experts for recommended operating limits and guidelines. SINOMEMB® will not be held responsible for any consequences arising from failure to strictly adhere to the provided operating conditions in this sample.
- The water yield listed in the table represents an average value, with a maximum allowable error within 15% for membrane elements.
- Gradually increase feed water pressure over a time range of 30-60 seconds to prevent irreversible damage to the elements.
- Once wetted, please ensure that the element remains continuously wet; otherwise, it may result in membrane property deterioration.
- During initial operation, it is normal for membrane element performance not reaching its optimum state; therefore, any water produced during the first hour should be discharged. However, after running for more than three hours, membrane performance will progressively improve and stabilize.
- The maximum permissible pressure for a single pressure vessel is 50psi (0.34Mpa).
- Avoid applying back pressure on the water producing side at all times and positions.
- If the system will be inactive for an extended period, store membranes in a protective solution (prepared using RO produced water) containing 1~1.5 wt% sodium bisulfite (food grade) to inhibit microbial growth.
- SINOMEMB® shall not be held responsible for any impact on membrane performance caused by chemicals added by users during storage or operation.

Absolute Maximum Ratings

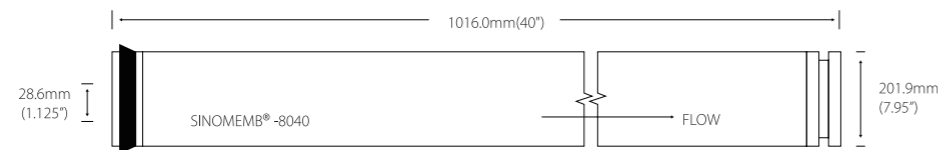
| | |
|--|------------------------------|
| Max operating pressure | 600psi(4.14Mpa) |
| Maximum feed flow of 4 inch memb | 16gpm(3.6 m ³ /h) |
| Max feed flow of 8 inch memb | 75gpm(17 m ³ /h) |
| Max feed temperature | 45°C |
| Max feed continuous operation temperature When PH > 10 | 35°C |
| Max feed SDI ₁₅ | 5 |
| Influent free chlorine concentration | <0.1ppm |
| PH range of feed water during continuous operation | 2~11 |
| PH range of inflow during chemical cleaning(30 Min) | 1~13 |
| Max pressure drop of single memb | 15psi(0.1Mpa) |

Brackish Water SNBW-FR Series Fouling Resistant RO Membrane Elements

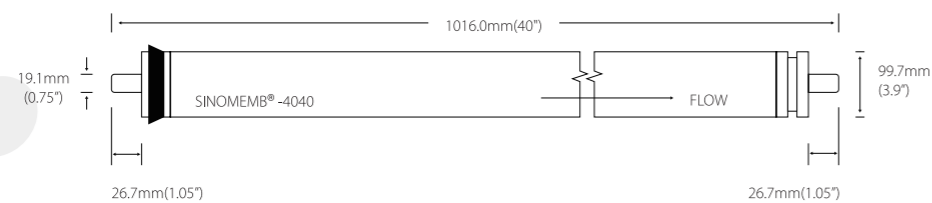
SINOMEMB® series fouling resistant (SNBW-FR) membrane elements are composed of a fouling resistant membrane and an expanded feed conduit (34mil-56mil, customized based on customer's operating conditions). The membrane surface is smoother and more hydrophilic, while the membrane charge approaches electric neutrality, effectively disrupting the foundation of fouling and organic pollution blockage. This results in enhanced resistance to inorganic salt scaling, colloid deposition, and organic contamination for improved cleaning efficiency and recovery performance. Consequently, the application range of these membrane elements is broadened while maximizing their lifespan. Even under high pollution conditions, this system maintains low pressure drop, high durability, excellent removal rate, and increased water yield throughout its life cycle.

SINOMEMB® series fouling resistant membrane elements (SNBW-FR) are suitable for water supply with a salt content below 10,000 PPM and strict pretreatment, while still containing organic pollutants in the water. Due to the smooth surface of the membrane, excellent hydrophilicity, near electric neutrality, and widened water supply conduit, bacterial and microorganism adsorption and accumulation on the membrane surface are significantly reduced. This not only enhances its fouling resistance but also enables effective recovery after chemical cleaning. It finds extensive applications in urban sewage treatment, industrial wastewater regeneration, desalination of slightly polluted surface water, and recycling of cooling circulating wastewater.

Size Of 8 Inches



Size Of 4 Inches



Specification

| Model | Effective membrane area ft ² (m ²) | GPD(m ³ /d) | Stable desalination rate(%) | Min desalination rate(%) |
|--------------------|---|------------------------|-----------------------------|--------------------------|
| SNBW-8040-FR280/56 | 280(26) | 7500(28.4) | 99.5 | 99.3 |
| SNBW-8040-FR330/48 | 330(30.7) | 8500(32.2) | 99.5 | 99.3 |
| SNBW-8040-FR365/36 | 365(33.9) | 9500(36.0) | 99.7 | 99.4 |
| SNBW-8040-FR400/34 | 400(37.2) | 11000(41.6) | 99.75 | 99.65 |
| SNBW-4040-FR | 90(8.4) | 2200(8.3) | 99.75 | 99.65 |

Test Condition

| | |
|------------------------------|------------------|
| Test pressure | 225psi (1.55Mpa) |
| Test liquid temperature | 25°C |
| ppm(NaCl) | 2000ppm |
| Test liquid PH value | 7.5 |
| Recovery rate of single memb | 15% |

Important Information

- Please refer to the latest version of SINOMEMB® technical manual and design guide, or consult with membrane technical experts for recommended operating limits and guidelines. SINOMEMB® will not be held responsible for any consequences arising from failure to strictly adhere to the provided operating conditions in this sample.
- The water yield listed in the table represents an average value, with a maximum allowable error within 15% for membrane elements.
- Gradually increase feed water pressure over a time range of 30-60 seconds to prevent irreversible damage to the elements.
- Once wetted, please ensure that the element remains continuously wet; otherwise, it may result in membrane property deterioration.
- During initial operation, it is normal for membrane element performance not reaching its optimum state; therefore, any water produced during the first hour should be discharged. However, after running for more than three hours, membrane performance will progressively improve and stabilize.
- The maximum permissible pressure for a single pressure vessel is 50 psi (0.34 MPa).
- Avoid applying back pressure on the water producing side at all times and positions.
- If the system will be inactive for an extended period, store membranes in a protective solution (prepared using RO produced water) containing 1~1.5 wt% sodium bisulfite (food grade) to inhibit microbial growth.
- SINOMEMB® shall not be held responsible for any impact on membrane performance caused by chemicals added by users during storage or operation.

Absolute Maximum Ratings

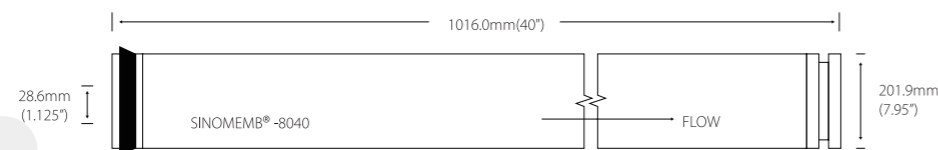
| | |
|--|------------------------------|
| Max operating pressure | 600psi(4.14Mpa) |
| Maximum feed flow of 4 inch memb | 16gpm(3.6 m ³ /h) |
| Max feed flow of 8 inch memb | 75gpm(17 m ³ /h) |
| Max feed temperature | 45°C |
| Max feed continuous operation temperature When PH > 10 | 35°C |
| Max feed SDI ₁₅ | 5 |
| Influent free chlorine concentration | <0.1ppm |
| PH range of feed water during continuous operation | 2~11 |
| PH range of inflow during chemical cleaning(30 Min) | 1~13 |
| Max pressure drop of single memb | 15psi(0.1Mpa) |

Brackish Water SNBW-XFR Series Ultra Fouling Resistant RO Membrane Elements

SINOMEMB®(SNBW-XFR) series of ultra-fouling resistant membrane elements represents cutting-edge technology in enhancing system resilience against organic biological pollution and tackling complex water treatment challenges. Compared to traditional fouling-resistant membranes, these membranes have a more uniform and smoother desalination layer due to their advanced design featuring 34 mil wide flow channels and improved distribution mechanisms using state-of-the-art eddy current water distributors that eliminate dead zones. This achieves Uniform Liquid Distribution Optimization (ULDO), enabling superior water dispersion across the entire system including the membrane element itself. Consequently, these membranes demonstrate heightened resistance against microbial contamination and organic fouling while significantly improving membrane cleaning performance for restoration purposes. Consequently, the application range of these membrane elements is broadened while maximizing their lifespan. Even under high pollution conditions, this system maintains low energy consumption, high durability, excellent removal rate, and increased water yield throughout its life cycle.

SINOMEMB®(SNBW-XFR) series fouling resistant membrane elements are suitable for water supply with a salt content below 10,000 PPM and strict pretreatment. However, the feed water still contains organic microorganisms and other pollutants. Due to the smooth membrane surface, excellent hydrophilicity, and neutral characteristics, it enables an expanded flow of feed water and a vortex-free design of water distribution that significantly reduces bacterial adsorption and accumulation on the membrane surface. This not only enhances its fouling resistance but also facilitates more effective recovery after chemical cleaning. Compared to other series, this membrane element requires reduced washing time by up to 40%, making it widely applicable in challenging water treatment scenarios such as urban sewage recycling, industrial wastewater treatment, and near-zero discharge treatment.

Size Of 8 Inches



Specification

| Model | Effective membrane area ft ² (m ²) | GPD(m ³ /d) | Stable desalination rate(%) | Min desalination rate(%) |
|----------------|---|------------------------|-----------------------------|--------------------------|
| SNBW-XFR400/34 | 400(37.2) | 11500(43.5) | 99.8 | 99.5 |

Test Condition

| | |
|------------------------------|------------------|
| Test pressure | 225psi (1.55Mpa) |
| Test liquid temperature | 25°C |
| ppm(NaCl) | 2000ppm |
| Test liquid PH value | 8 |
| Recovery rate of single memb | 15% |

Absolute Maximum Ratings

| | |
|--|-----------------------------|
| Max operating pressure | 600psi(4.14Mpa) |
| Max feed flow of 8 inch memb | 75gpm(17 m ³ /h) |
| Max feed temperature | 45°C |
| Max feed continuous operation temperature When PH > 10 | 35°C |
| Max feed SDI ₁₅ | 5 |
| Influent free chlorine concentration | <0.1ppm |
| PH range of feed water during continuous operation | 2~11 |
| PH range of inflow during chemical cleaning(30 Min) | 1~13 |
| Max pressure drop of single memb | 15psi(0.1Mpa) |

Important Information

- Please refer to the latest version of SINOMEMB® technical manual and design guide, or consult with membrane technical experts for recommended operating limits and guidelines. SINOMEMB® will not be held responsible for any consequences arising from failure to strictly adhere to the provided operating conditions in this sample.
- The water yield listed in the table represents an average value, with a maximum allowable error within 15% for membrane elements.
- Gradually increase feed water pressure over a time range of 30-60 seconds to prevent irreversible damage to the elements.
- Once wetted, please ensure that the element remains continuously wet; otherwise, it may result in membrane property deterioration.
- During initial operation, it is normal for membrane element performance not reaching its optimum state; therefore, any water produced during the first hour should be discharged. However, after running for more than three hours, membrane performance will progressively improve and stabilize.
- The maximum permissible pressure for a single pressure vessel is 50 psi (0.34 MPa).
- Avoid applying back pressure on the water producing side at all times and positions.
- If the system will be inactive for an extended period, store membranes in a protective solution (prepared using RO produced water) containing 1~1.5 wt% sodium bisulfite (food grade) to inhibit microbial growth.
- SINOMEMB® shall not be held responsible for any impact on membrane performance caused by chemicals added by users during storage or operation.

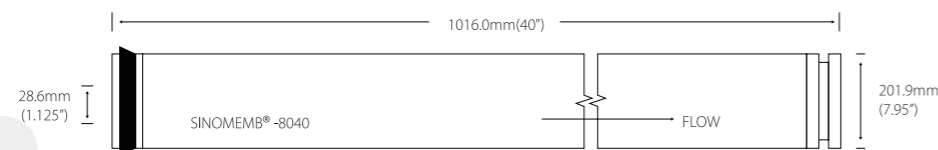
Brackish Water SNBW-440Pro Series

Waterworks Professional Grade RO Membrane Elements

SINOMEMB®(SNBW-PRO) series water-plant professional grade membrane elements have been newly developed and manufactured to address large-scale municipal water treatment challenges. During the membrane preparation process, the support structure of the ultrafiltration base membrane has been adjusted to provide a wider water production channel and enhanced pressure resistance, resulting in increased water production under the same membrane area. Additionally, these elements feature a 440ft² effective membrane area diaphragm and a 28mil thick water channel, which boosts the effective membrane area by 10% compared to ordinary membrane elements and further improves water yield. Moreover, these membranes exhibit excellent removal performance for silicon, boron, nitrate, IPA, and ammonia nitrogen in water when compared with SNBW-HF series membranes. This enables lower power consumption and higher water yield while treating low temperature water due to their wide pH tolerance range and good chemical resistance properties. Furthermore, they enhance membrane cleaning recovery performance leading to an extended service life even under low temperature conditions. These membranes offer advantages such as high durability, high water yield, low energy consumption etc., thereby reducing the number of required membrane elements and pump heads while minimizing equipment investment costs.

SINOMEMB®(SNBW-PRO) series of professional-grade water plant membrane elements are suitable for desalinating surface water and groundwater with influent salt content below 10,000ppm, as well as some pre-treated water sources with controllable low pollution levels. They are primarily used in the food industry for producing pure water and in municipal water treatment applications, offering advantages such as high durability, high water yield in low temperature environments, and low energy consumption.

Size Of 8 Inches



Specification

| Model | Effective membrane area ft ² (m ²) | GPD(m ³ /d) | Stable desalination rate(%) | Min desalination rate(%) |
|-------------|---|------------------------|-----------------------------|--------------------------|
| SNBW-440Pro | 440(41.0) | 12600(47.7) | 99.5 | 99.3 |

Test Condition

| | |
|------------------------------|------------------|
| Test pressure | 225psi (1.55Mpa) |
| Test liquid temperature | 25°C |
| ppm(NaCl) | 2000ppm |
| Test liquid PH value | 8 |
| Recovery rate of single memb | 15% |

Absolute Maximum Ratings

| | |
|--|-----------------------------|
| Max operating pressure | 600psi(4.14Mpa) |
| Max feed flow of 8 inch memb | 75gpm(17 m ³ /h) |
| Max feed temperature | 45°C |
| Max feed continuous operation temperature When PH > 10 | 35°C |
| Max feed SDI ₁₅ | 5 |
| Influent free chlorine concentration | <0.1ppm |
| PH range of feed water during continuous operation | 2~11 |
| PH range of inflow during chemical cleaning(30 Min) | 1~13 |
| Max pressure drop of single memb | 15psi(0.1Mpa) |

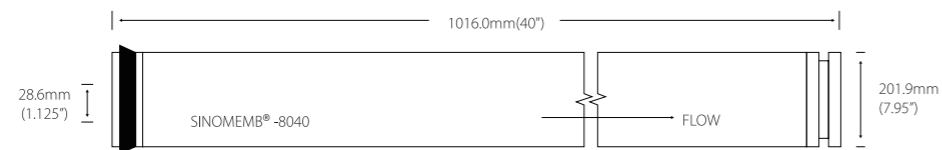
Important Information

- Please refer to the latest version of SINOMEMB® technical manual and design guide, or consult with membrane technical experts for recommended operating limits and guidelines. SINOMEMB® will not be held responsible for any consequences arising from failure to strictly adhere to the provided operating conditions in this sample.
- The water yield listed in the table represents an average value, with a maximum allowable error within 15% for membrane elements.
- Gradually increase feed water pressure over a time range of 30-60 seconds to prevent irreversible damage to the elements.
- Once wetted, please ensure that the element remains continuously wet; otherwise, it may result in membrane property deterioration.
- During initial operation, it is normal for membrane element performance not reaching its optimum state; therefore, any water produced during the first hour should be discharged. However, after running for more than three hours, membrane performance will progressively improve and stabilize.
- The maximum permissible pressure for a single pressure vessel is 50 psi (0.34 MPa).
- Avoid applying back pressure on the water producing side at all times and positions.
- If the system will be inactive for an extended period, store membranes in a protective solution (prepared using RO produced water) containing 1~1.5 wt% sodium bisulfite (food grade) to inhibit microbial growth.
- SINOMEMB® shall not be held responsible for any impact on membrane performance caused by chemicals added by users during storage or operation.

High-Concentration-Salt Water SNHW Series RO Membrane Elements

SINOMEMB® High Salt Water (SNHW) RO membrane elements are a novel type of membrane that exhibit the highest sustainable flow rate and exceptional desalination and boron removal capabilities in medium to high water salinity conditions (7000-20,000 PPM). These elements bridge the gap between brackish water membranes and desalination membranes, significantly reducing investment costs and operational expenses. Moreover, these membranes feature an extensive effective membrane area and wide feed channel design, which enhances pressure resistance, water yield, and reduces cleaning frequency during seawater desalination processes. Consequently, this enables the system to achieve the most cost-effective water production. This product is an ideal choice for designing two-stage desalination or high TDS brackish water systems.

Size Of 8 Inches



Specification

| Model | Effective membrane area ft ² (m ²) | GPD(m ³ /d) | Stable desalination rate(%) | Min desalination rate(%) |
|-------------------|---|------------------------|-----------------------------|--------------------------|
| SNHW8040-FR400/34 | 400(37.2) | 10500(39.7) | 99.75 | 99.5 |

Test Condition

| | |
|------------------------------|-----------------|
| Test pressure | 435psi (3.0Mpa) |
| Test liquid temperature | 25°C |
| ppm(NaCl) | 15000ppm |
| Test liquid PH value | 8 |
| Recovery rate of single memb | 10% |

Important Information

- Please refer to the latest version of SINOMEMB® technical manual and design guide, or consult with membrane technical experts for recommended operating limits and guidelines. SINOMEMB® will not be held responsible for any consequences arising from failure to strictly adhere to the provided operating conditions in this sample.
- The water yield listed in the table represents an average value, with a maximum allowable error within 15% for membrane elements.
- Gradually increase feed water pressure over a time range of 30-60 seconds to prevent irreversible damage to the elements.
- Once wetted, please ensure that the element remains continuously wet; otherwise, it may result in membrane property deterioration.
- During initial operation, it is normal for membrane element performance not reaching its optimum state; therefore, any water produced during the first hour should be discharged. However, after running for more than three hours, membrane performance will progressively improve and stabilize.
- The maximum permissible pressure for a single pressure vessel is 50 psi (0.34 MPa).
- Avoid applying back pressure on the water producing side at all times and positions.
- If the system will be inactive for an extended period, store membranes in a protective solution (prepared using RO produced water) containing 1~1.5 wt% sodium bisulfite (food grade) to inhibit microbial growth.
- SINOMEMB® shall not be held responsible for any impact on membrane performance caused by chemicals added by users during storage or operation.

Absolute Maximum Ratings

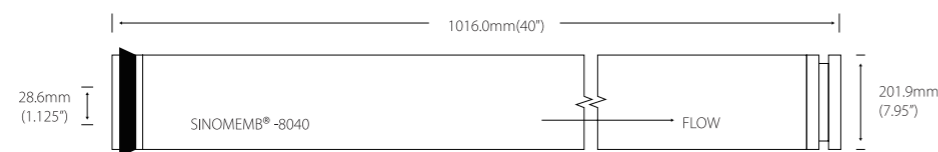
| | |
|--|-----------------------------|
| Max operating pressure | 1000psi(6.9Mpa) |
| Max feed flow of 8 inch memb | 75gpm(17 m ³ /h) |
| Max feed temperature | 45°C |
| Max feed continuous operation temperature When PH > 10 | 35°C |
| Max feed SDI ₁₅ | 5 |
| Influent free chlorine concentration | <0.1ppm |
| PH range of feed water during continuous operation | 2~11 |
| PH range of inflow during chemical cleaning(30 Min) | 1~13 |
| Max pressure drop of single memb | 15psi(0.1Mpa) |

Industrial Nanofiltration SNNF Series Ro Membrane Elements

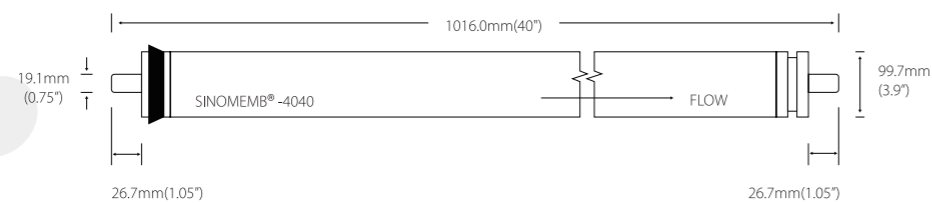
SINOMEMB® nanofiltration (SNNF) membrane elements are categorized into the 270 and 90 series. The 270 series employs piperazine and acyl chloride interface polymerization to generate a selective filtration and desalting layer, while the 90 series utilizes a polyamide composite membrane. Through the synergistic Donnan effect and screening mechanisms, the filtration process is highly selective without any chemical reactions occurring during separation. This method does not require heating or phase transformation, ensuring preservation of biological activity. Moreover, it operates at lower pressures compared to reverse osmosis with ultra-low pressure consumption. Consequently, it has found extensive applications in various industries such as drinking water and food preparation, biotechnology, medicine for separation and concentration purification purposes as well as decolorization. The two series of characteristics are as follows:

- ▶ NF270: high salinity transmission, moderate calcium transmittance (40-60%), and high rates of removal for TOC and THM precursors. SINOMEMB®270 series nanofiltration membrane elements offer low operating pressure, a large membrane area, and high water yield. They are specifically designed for efficient removal of total organic carbon (TOC) and trihalomethanes (THMs), while allowing moderate permeation of hardness components and other salts to maintain taste and protect the water supply network.
- ▶ NF90: excellent salt removal efficiency (90%) along with effective elimination of iron, pesticides, herbicides, and TOC. SINOMEMB®90 series nanofiltration membrane elements feature a large surface area and high water yield, making them particularly suitable for effective removal of salts, nitrates, iron, pesticides, herbicides, as well as organic compounds such as THMs.

Size Of 8 Inches



Size Of 4 Inches



Specification

| Model | Effective membrane area ft ² (m ²) | Type of solution | GPD(m ³ /d) | Stable desalination rate(%) |
|-----------------|---|-------------------|------------------------|-----------------------------|
| SNNF270-8040/34 | 400(37.2) | CaCl ₂ | 14700(55.6) | 40~60 |
| | | MgSO ₄ | 12500(47.3) | ≥97 |
| SNNF90-8040/34 | 400(37.2) | NaCl | 10000(37.9) | 85~95 |
| | | MgSO ₄ | 10500(39.7) | >97 |
| SNNF270-4040 | 82(7.6) | CaCl ₂ | 4260(16.1) | 40~60 |
| | | MgSO ₄ | 3645(13.8) | >97 |
| SNNF90-4040 | 82(7.6) | NaCl | 2040(7.7) | 85-95 |
| | | MgSO ₄ | 2700(10.0) | >97 |

Test Condition

| | |
|------------------------------|------------------|
| Test pressure | 100psi (0.69Mpa) |
| Test liquid temperature | 25°C |
| ppm(NaCl) | 2000ppm |
| ppm(MgSO ₄) | 2000ppm |
| ppm(CaCl ₂) | 500ppm |
| Test liquid PH value | 7.5 |
| Recovery rate of single memb | 15% |

Absolute Maximum Ratings

| | |
|---|------------------------------|
| Max operating pressure | 600psi(4.14Mpa) |
| Maximum feed flow of 4 inch memb | 16gpm(3.6 m ³ /h) |
| Max feed flow of 8 inch memb | 75gpm(17 m ³ /h) |
| Max feed temperature | 45°C |
| Max feed continuous operation temperature When PH > 10 | 35°C |
| Max feed SDI ₁₅ | 5 |
| Influent free chlorine concentration | <0.1ppm |
| PH range of feed water during continuous operation | 2~11 |
| (270Model)PH range of inflow during chemical cleaning(30 Min) | 1~12 |
| (90Model)PH range of inflow during chemical cleaning(30 Min) | 1~13 |
| Max pressure drop of single memb | 15psi(0.1Mpa) |

Important Information

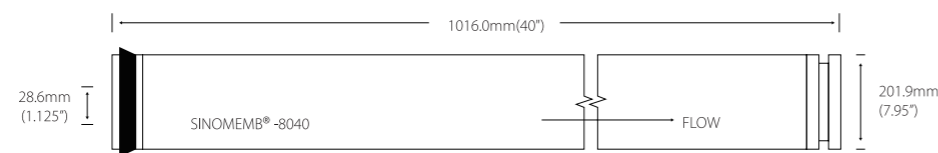
- Please refer to the latest version of SINOMEMB® technical manual and design guide, or consult with membrane technical experts for recommended operating limits and guidelines. SINOMEMB® will not be held responsible for any consequences arising from failure to strictly adhere to the provided operating conditions in this sample.
- The water yield listed in the table represents an average value, with a maximum allowable error within 15% for membrane elements.
- Gradually increase feed water pressure over a time range of 30-60 seconds to prevent irreversible damage to the elements.
- Once wetted, please ensure that the element remains continuously wet; otherwise, it may result in membrane property deterioration.
- During initial operation, it is normal for membrane element performance not reaching its optimum state; therefore, any water produced during the first hour should be discharged. However, after running for more than three hours, membrane performance will progressively improve and stabilize.
- The maximum permissible pressure for a single pressure vessel is 50 psi (0.34 MPa).
- Avoid applying back pressure on the water producing side at all times and positions.
- If the system will be inactive for an extended period, store membranes in a protective solution (prepared using RO produced water) containing 1~1.5 wt% sodium bisulfite (food grade) to inhibit microbial growth.
- SINOMEMB® shall not be held responsible for any impact on membrane performance caused by chemicals added by users during storage or operation.

Sea Water SNSW Series RO Membrane Elements

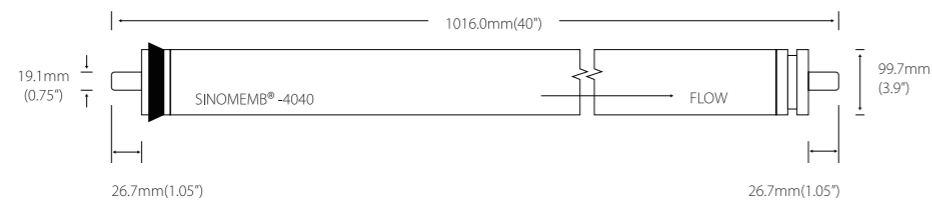
SINOMEMB® SNSW series products for high-quality water desalination have made advancements in membrane technology. This is achieved through the structural enhancement and thickening adjustment of the desalting support layer, as well as the selection of water channel cloth during the rolling process for fresh water production. These improvements ensure that our membranes can tolerate high-pressure and highly polluted working conditions, marking a significant step forward for SINOMEMB (Beijing) Company in membrane production technology. We will continue to advance into the field of high concentration and difficulty.

SINOMEMB® Seawater Desalination series (SNSW) membrane elements are designed for seawater with a salt content above 20,000 PPM and high concentration brackish water. Through optimization of the membrane and structure of the membrane element, as well as a fully automatic, high precision manufacturing process, fouling on the membrane surface is significantly reduced, resulting in lower operation costs. These elements exhibit stable boron removal rates and desalting efficiency, while also providing low pressure and high water yield. With its low investment and operational costs, this technology ensures reliable first-level penetration in specific systems to obtain drinking water from seawater. This type of membrane element can be applied in various industrial water treatment fields such as seawater desalination, extremely high concentration brackish water desalination, seawater recycling and recharge for power plant treatment processes, wastewater reuse, landfill leachate treatment, food processing applications.

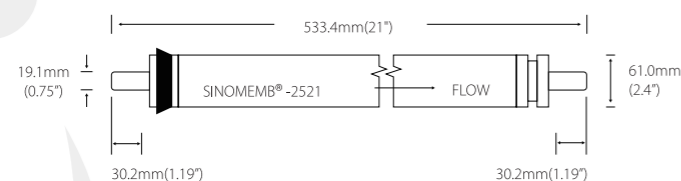
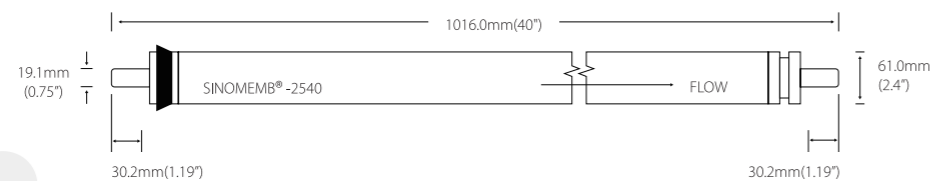
Size Of 8 Inches



Size Of 4 Inches



Size Of 2.5 Inches



Specification

| Model | Effective membrane area ft ² (m ²) | GPD(m ³ /d) | Stable desalination rate(%) | Min desalination rate(%) | Stable boron removal rate(%) |
|--------------|---|------------------------|-----------------------------|--------------------------|------------------------------|
| SNSW-2514 | 6.5(0.6) | 150(0.6) | 99.4 | 99.2 | 90 |
| SNSW-2521 | 13(1.2) | 300(1.1) | 99.4 | 99.2 | 90 |
| SNSW-2540 | 29(2.8) | 700(2.6) | 99.4 | 99.2 | 90 |
| SNSW-4021 | 33(3.1) | 800(3.0) | 99.4 | 99.2 | 90 |
| SNSW-4040 | 85(7.9) | 1950(7.4) | 99.75 | 99.6 | 91 |
| SNSW-8040 | 380(35.6) | 6000(22.7) | 99.7 | 99.6 | 91 |
| SNSW-8040-HF | 400(37.2) | 7500(28) | 99.82 | 99.65 | 93 |

Test Condition

| | |
|------------------------------|--------------------|
| Test pressure | 800psi (5.5Mpa) |
| Test liquid temperature | 25°C |
| ppm(NaCl) | 32000ppm |
| ppm(Boron) | 5ppm |
| Test liquid PH value | 8 |
| Recovery rate of single memb | 2%(2514) |
| | 8%(2540,4040,8040) |
| | 4%(2521,4021) |

Absolute Maximum Ratings

| | |
|--|---------------------------------|
| Max operating pressure of 8 inches and 4 inches | 1200psi(8.3Mpa) |
| Max operating pressure of 2.5-inch and other models | 1000psi(6.9Mpa) |
| Max feed flow of 8 inch memb | 75gpm(17m ³ /h) |
| Maximum feed flow of 4 inches | 16gpm(3.6m ³ /h) |
| Maximum feed flow of 2.5 inches | 6gpm(1.4m ³ /h) |
| Max feed temperature | 45°C |
| Max feed continuous operation temperature When PH > 10 | 35°C |
| Max feed SDI ₁₅ | 5 |
| Influent free chlorine concentration | <0.1ppm |
| PH range of feed water during continuous operation | 2~11 |
| PH range of inflow during chemical cleaning(30 Min) | 1~13 |
| Max pressure drop of single memb | 15psi(0.1Mpa) |
| | (2540,2514,4021,4040,2521,8040) |
| | 13psi(0.09Mpa) (8040HF) |

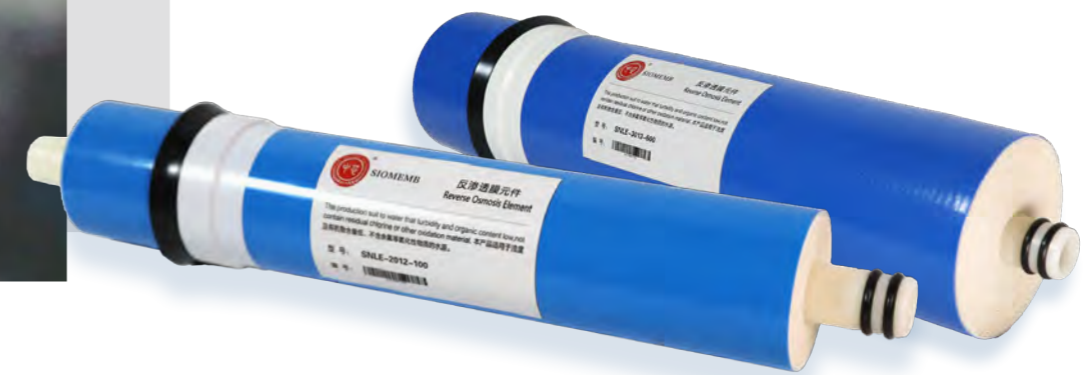
Important Information

- Please refer to the latest version of SINOMEMB® technical manual and design guide, or consult with membrane technical experts for recommended operating limits and guidelines. SINOMEMB® will not be held responsible for any consequences arising from failure to strictly adhere to the provided operating conditions in this sample.
- The water yield listed in the table represents an average value, with a maximum allowable error within 15% for membrane elements.
- Gradually increase feed water pressure over a time range of 30-60 seconds to prevent irreversible damage to the elements.
- Once wetted, please ensure that the element remains continuously wet; otherwise, it may result in membrane property deterioration.
- During initial operation, it is normal for membrane element performance not reaching its optimum state; therefore, any water produced during the first hour should be discharged. However, after running for more than three hours, membrane performance will progressively improve and stabilize.
- The maximum permissible pressure for a single pressure vessel is 50 psi (0.34 MPa).
- Avoid applying back pressure on the water producing side at all times and positions.
- If the system will be inactive for an extended period, store membranes in a protective solution (prepared using RO produced water) containing 1~1.5 wt% sodium bisulfite (food grade) to inhibit microbial growth.
- SINOMEMB® shall not be held responsible for any impact on membrane performance caused by chemicals added by users during storage or operation.



SINOMEMB® Series Commercial And Residential Application Product Data

SINOMEMB® series RO membrane elements is used high performance reverse osmosis membrane, the membrane desalination layer is dense, so that the membrane element has the advantages of high desalination rate, resistance to cleaning, which makes the membrane element in the long-term use of cleaning process desalination rate decreased less, prolong the life;The surface of the membrane desalting layer adopts anti-pollution modification to make the surface of the membrane more smooth, and it is not easy to form the crystal nucleus of scaling. At the same time, the surface is close to electric neutral, and it is not easy to adsorb pollutants, so that the membrane element is not easy to be polluted by organic matter, which greatly reduces the cleaning frequency;The polysulfone support layer of the diaphragm has uniform thickness, uniform pore size, reasonable distribution of finger and sponge holes, which greatly avoids the occurrence of water yield attenuation due to pore collapse under high pressure or long-term working conditions. In membrane element rolling process, meanwhile, combining fluid mechanics simulation automatic rolling membrane technology, the page number and length of membrane, and select input, permeate water runner cloth thickness and shape all through the computer simulation to achieve optimal ratio. It could effectively reduce the fouling scaling to maximize the water production efficiency of membrane, effectively reduce the operation cost.

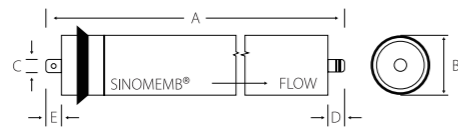


Commercial Low Energy Consumption SNLE Series RO Membrane Elements

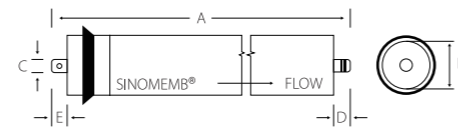
SINOMEMB® series of SNLE commercial membrane elements offers high water yield and low energy consumption. These elements utilize low pressure industrial membranes, which are designed using computer simulations and rolling processes to ensure long lifespan, excellent performance, consistent high quality, and reliable operation in civil applications. Advanced membrane technology and precise automatic production processes guarantee stable desalination rates while achieving high water yield within a compact volume. This ensures that equipment manufacturers and brands can earn the trust of consumers by providing membrane elements that deliver more water, higher desalination rates, strong stability, and extended service life – making them the most trusted and sought-after products for equipment manufacturers, water purification materials suppliers, agents, as well as residents.

The product is suitable for high-end space-saving barrelless water purification systems with salt content below 1000ppm. It is also ideal for commercial and civil water systems serving approximately 800 people in shopping malls, hotels, canteens, communities, office buildings, schools, and hospitals.

Size Of The Elements

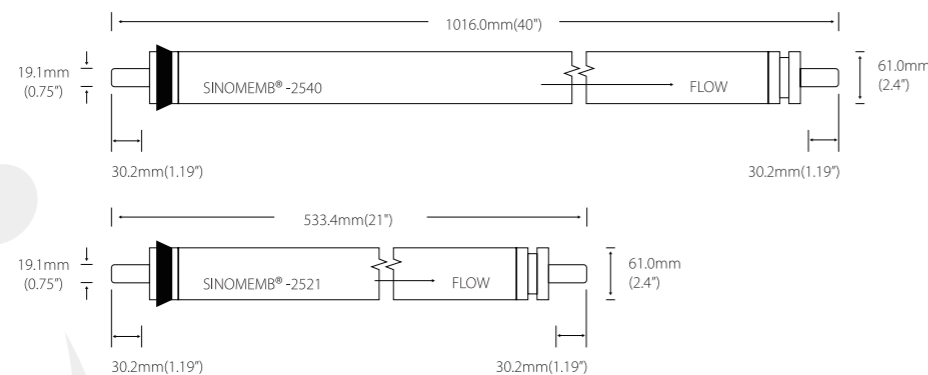


| Model | A (mm/inch) | B1 (mm/inch) | C (mm/inch) | D (mm/inch) | E (mm/inch) |
|-------|-------------|--------------|-------------|-------------|-------------|
| 3213 | 333(13.1") | 77(3.03") | 17(0.67") | 16(0.63") | 19(0.75") |
| 3313 | 333(13.1") | 85(3.35") | 17(0.67") | 16(0.63") | 19(0.75") |
| 4013 | 333(13.1") | 92(3.62") | 17(0.67") | 16(0.63") | 19(0.75") |



| Model | A (mm/inch) | B2 (mm/inch) | C (mm/inch) | D (mm/inch) | E (mm/inch) |
|-------|-------------|--------------|-------------|-------------|-------------|
| 2812 | 298(11.7") | 70(2.8") | 17(0.67") | 21(0.83") | 21(0.83") |
| 3012 | 298(11.7") | 72(3.0") | 17(0.67") | 21(0.83") | 21(0.83") |
| 3013 | 328(12.9") | 68(2.7") | 17(0.67") | 19(0.75") | 19(0.75") |

Size Of 2.5 Inches



Specification

| Model | Stable Desalination Rate(%) | GPD(m ³ /d) | Test Condition | | |
|----------------|-----------------------------|------------------------|------------------------|-----------|------------------|
| | | | Test Pressure Psi(MPa) | PPM (PPM) | Recovery Rate(%) |
| SNLE-3213-600 | 95.0 | 600(2.3) | 100(0.7) | 250,NaCl | 15 |
| SNLE-3313-800 | 95.0 | 800(3.0) | 100(0.7) | 250,NaCl | 15 |
| SNLE-4013-1000 | 95.0 | 1000(3.8) | 100(0.7) | 250,NaCl | 15 |
| SNLE-2812-200 | 97.0 | 200(0.8) | 100(0.7) | 250,NaCl | 15 |
| SNLE-3012-300 | 97.0 | 300(1.2) | 100(0.7) | 250,NaCl | 15 |
| SNLE-3012-400 | 97.0 | 400(1.6) | 100(0.7) | 250,NaCl | 15 |
| SNLE-3013-400 | 97.0 | 400(1.6) | 100(0.7) | 250,NaCl | 15 |
| SNLE-3013-600 | 96.0 | 600(2.3) | 100(0.7) | 250,NaCl | 15 |
| SNLE -2521 | 99.0 | 300(1.13) | 150(1.05) | 250,NaCl | 8 |
| SNLE -2540 | 99.0 | 750(2.84) | 150(1.05) | 250,NaCl | 8 |

Note: The model (membrane performance, appearance size) that is not mentioned can be specially customized according to the order quantity.

Test Condition

| | |
|-------------------------|------|
| Test liquid temperature | 25°C |
| Test liquid PH value | 7.5 |

Absolute Maximum Ratings

| | |
|---|-----------------------------|
| Max operating pressure of 2.5-inch memb | 600psi(4.1Mpa) |
| Max operating pressure of other commercial model | 150psi(1.03Mpa) |
| 3213,3313Max feed flow rate of memb | 4.0gpm(15lpm) |
| 3012,3013,2812 Max feed flow rate of memb | 2.5gpm(9.5lpm) |
| 4013Max feed flow rate of memb | 16gpm(3.6m ³ /h) |
| Maximum inflow rate of 2.5-inch memb | 6gpm(1.4m ³ /h) |
| Max feed temperature | 45°C |
| Max feed continuous operation temperature When PH > 10 | 35°C |
| Max feed SDI ₁₅ | 5 |
| Influent free chlorine concentration | <0.1ppm |
| PH range of feed water during continuous operation | 2~11 |
| PH range of inflow during chemical cleaning(30 Min) | 1~13 |
| Max pressure drop of 2.5 inches single memb | 13psi(0.09Mpa) |
| Max pressure drop of other commercial model single memb | 10psi(0.07Mpa) |

Important Information

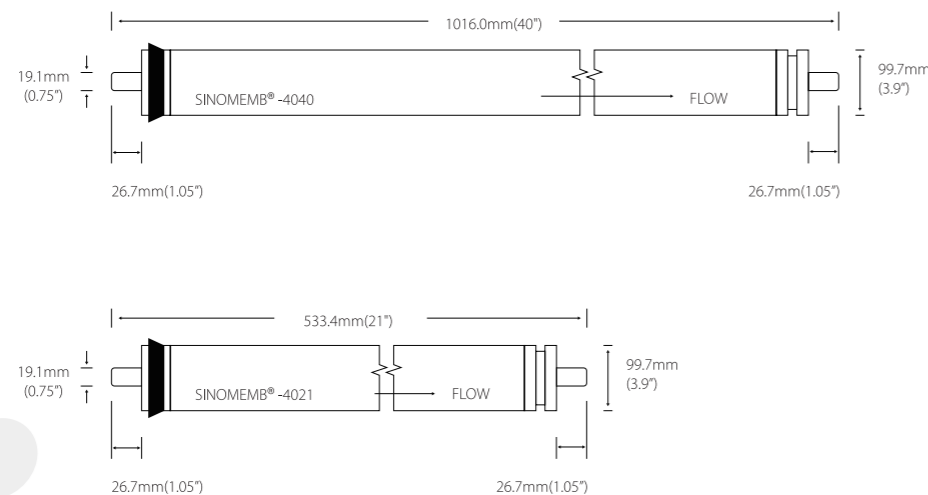
- Please refer to the latest version of SINOMEMB® technical manual and design guide, or consult with membrane technical experts for recommended operating limits and guidelines. SINOMEMB® will not be held responsible for any consequences arising from failure to strictly adhere to the provided operating conditions in this sample.
- The water yield listed in the table represents an average value, with a maximum allowable error within 15% for membrane elements.
- Gradually increase feed water pressure over a time range of 30-60 seconds to prevent irreversible damage to the elements.
- Once wetted, please ensure that the element remains continuously wet; otherwise, it may result in membrane property deterioration.
- During initial operation, it is normal for membrane element performance not reaching its optimum state; therefore, any water produced during the first hour should be discharged. However, after running for more than three hours, membrane performance will progressively improve and stabilize.
- The maximum permissible pressure for a single pressure vessel is 30psi (2.1bar).
- Avoid applying back pressure on the water producing side at all times and positions.
- If the system will be inactive for an extended period, store membranes in a protective solution (prepared using RO produced water) containing 1~1.5 wt% sodium bisulfite (food grade) to inhibit microbial growth.
- SINOMEMB® shall not be held responsible for any impact on membrane performance caused by chemicals added by users during storage or operation.

Ultra Low Pressure Commercial SNSE Series Ro Membrane Elements

SINOMEMB® Ultra-low pressure SNSE commercial series membrane elements utilize specialized membrane technology to adjust the thickness of the ultrafiltration support layer and the pore ratio of the membrane, enhancing the hydrophilicity of the desalination layer. This results in a moderate level of desalination while significantly increasing water yield. Additionally, a customized special flow cloth is employed in the rolling process design to further improve water yield and expand its application range.

The 4-inch and 4021 models are capable of operating at a pressure of 0.7mpa, while the 2812 and 3013 models can function efficiently even under low-pressure conditions as low as 36psi in pumpless municipal water supply systems, meeting the required water yield and desalination rates. The system equipped with these products are designed to ensure low operational costs with no noise or vibration disturbances. Furthermore, increasing the operating pressure will result in further improvements in water flux and desalination rate. Under similar usage conditions, particularly in regions and seasons characterized by lower water temperatures, greater water yield and desalination rates can be achieved. This makes them especially suitable for cold areas in the north with salt content below 500ppm where pump drive design is not needed for the water purification system. Additionally, these products employ dry technology which facilitates easy preservation during transportation and use.

Size of 4 Inches



Specification

| Model | Stable Desalination Rate(%) | GPD(m ³ /d) | Test Condition | | |
|-----------|-----------------------------|------------------------|------------------------|-----------|------------------|
| | | | Test Pressure Psi(Mpa) | PPM (PPM) | Recovery Rate(%) |
| SNSE-4040 | 99.0 | 2500 (9.5) | 114(0.8) | 1000,NaCl | 15 |
| SNSE-4021 | 98.0 | 1000 (3.8) | 114(0.8) | 1000,NaCl | 8 |
| SNSE-2812 | 93.0 | 125(0.3) | 36(0.25) | 250,NaCl | 15 |
| SNSE-3013 | 93.0 | 350(1.33) | 36(0.25) | 250,NaCl | 15 |

Note: The model (membrane performance, appearance size) that is not mentioned can be specially customized according to the order quantity.

Test Condition

| | |
|------------------------------|-----------------------------|
| Test pressure | 100psi (0.7Mpa)/36psi(0.25) |
| Test liquid temperature | 25°C |
| PPM(NaCl) | 1000ppm/250ppm |
| Test liquid PH value | 7.5 |
| Recovery rate of single memb | 15%,8%(4021) |

Absolute Maximum Ratings

| | |
|--|----------------------------|
| Max operating pressure | 300psi(2.07Mpa)(2812,3013) |
| Max operating pressure | 600psi(4.14Mpa)(4021,4040) |
| Maximum inflow rate | 16gpm(3.6 m3/h)(4021,4040) |
| Maximum inflow rate | 2lpm(3.6 m3/h)(2812) |
| Maximum inflow rate | 2.5gpm(9.5lpm)(3013) |
| Max feed temperature | 45°C |
| Max feed continuous operation temperature When PH > 10 | 35°C |
| Max feed SDIs | 5 |
| Influent free chlorine concentration | <0.1ppm |
| PH range of feed water during continuous operation | 2~11 |
| PH range of inflow during chemical cleaning(30 Min) | 1~13 |
| Max pressure drop of 2.8 inches single memb | 13psi(0.09Mpa) |
| 3013Max pressure drop of single memb | 10psi(0.07Mpa) |
| Max pressure drop of 4inches single memb | 15psi(0.1Mpa) |

Important Information

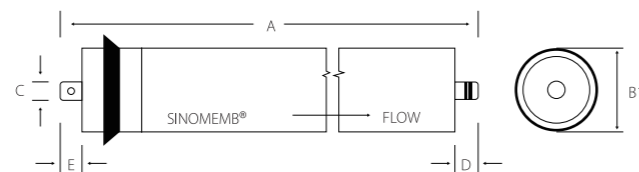
- Please refer to the latest version of SINOMEMB® technical manual and design guide, or consult with membrane technical experts for recommended operating limits and guidelines. SINOMEMB® will not be held responsible for any consequences arising from failure to strictly adhere to the provided operating conditions in this sample.
- The water yield listed in the table represents an average value, with a maximum allowable error within 15% for membrane elements.
- Gradually increase feed water pressure over a time range of 30-60 seconds to prevent irreversible damage to the elements.
- Once wetted, please ensure that the element remains continuously wet; otherwise, it may result in membrane property deterioration.
- During initial operation, it is normal for membrane element performance not reaching its optimum state; therefore, any water produced during the first hour should be discharged. However, after running for more than three hours, membrane performance will progressively improve and stabilize.
- The maximum permissible pressure for a single pressure vessel is 30psi (2.1bar).
- Avoid applying back pressure on the water producing side at all times and positions.
- If the system will be inactive for an extended period, store membranes in a protective solution (prepared using RO produced water)containing 1~1.5 wt% sodium bisulfite (food grade) to inhibit microbial growth.
- SINOMEMB® shall not be held responsible for any impact on membrane performance caused by chemicals added by users during storage or operation.

Household SNLE Series RO Membrane Elements

SINOMEMB® series of general domestic membrane elements comprises ordinary domestic membrane elements, highly desalinated membrane elements, and ultra-low pressure membrane elements. These include large flux low-pressure membranes, high desalination anti-pollution industrial membranes, and low-pressure ultra-high yield water membranes respectively. It is considered one of the most comprehensive, stable, and reliable membrane elements in the industry. Among them, the ultra-low pressure membrane element can operate under a pumpless municipal water supply pressure of 36psi, providing channel suppliers with new possibilities for water machine development and offering convenience for kitchen spaces without power supply in old terminal buildings. Additionally, our high-level design ability for membrane elements allows us to customize performance and appearance for special-shaped membrane products.

- ▶ High recycling rate to help consumers save water bills
- ▶ Anti-scaling, resistant to high TDS, longer service life
- ▶ Dry membrane, convenient operation and longer shelf life
- ▶ High quality elements significantly reduce or even eliminate QC costs for membrane elements

Size Of The Elements



| Model | A (mm/inch) | B1 (mm/inch) | C (mm/inch) | D (mm/inch) | E (mm/inch) |
|-------|----------------|-----------------|----------------|----------------|----------------|
| 1810 | 256(10.1") | 44(1.73") | 17(0.67") | 25(0.98") | 15(0.59") |
| 1812 | 298(11.7") | 44(1.73") | 17(0.67") | 21(0.83") | 21(0.83") |

Specification

| Model | Stable Desalination Rate(%) | GPD(m ³ /d) | Test Condition | | |
|-----------------|-----------------------------|------------------------|---------------------------|-----------|------------------|
| | | | Test Pressure Psi(Mpa) | PPM (PPM) | Recovery Rate(%) |
| SNLE-1810-50 | 97.0 | 50(0.2) | 60(0.4) | 250,NaCl | 15 |
| SNLE-1812-50 | 97.0 | 50(0.2) | 60(0.4) | 250,NaCl | 15 |
| SNLE-1812-75-HR | 98.0 | 75(0.28) | 60(0.4) | 250,NaCl | 15 |
| SNLE-1812-75 | 97.0 | 75(0.28) | 60(0.4) | 250,NaCl | 15 |
| SNLE-1812-100 | 96.0 | 100(0.4) | 60(0.4) | 250,NaCl | 40 |
| SNLE-1812-150 | 96.0 | 150(0.6) | 60(0.4) | 250,NaCl | 40 |
| SNSE-1812 | 93.0 | 60(0.23) | 36(0.25) | 250,NaCl | 15 |

Note: The model not mentioned model (performance, appearance size) can be specially customized according to the order quantity.

Test Condition

| | |
|-------------------------|------|
| Test liquid temperature | 25°C |
| Test liquid PH value | 7.5 |

Important Information

- Please refer to the latest version of SINOMEMB® technical manual and design guide, or consult with membrane technical experts for recommended operating limits and guidelines. SINOMEMB® will not be held responsible for any consequences arising from failure to strictly adhere to the provided operating conditions in this sample.
- The water yield listed in the table represents an average value, with a maximum allowable error within 15% for membrane elements.
- Gradually increase feed water pressure over a time range of 30-60 seconds to prevent irreversible damage to the elements.
- Once wetted, please ensure that the element remains continuously wet; otherwise, it may result in membrane property deterioration.
- During initial operation, it is normal for membrane element performance not reaching its optimum state; therefore, any water produced during the first hour should be discharged. However, after running for more than three hours, membrane performance will progressively improve and stabilize.
- The maximum permissible pressure for a single pressure vessel is 30psi (2.1bar).
- Avoid applying back pressure on the water producing side at all times and positions.
- If the system will be inactive for an extended period, store membranes in a protective solution (prepared using RO produced water)containing 1~1.5 wt% sodium bisulfite (food grade) to inhibit microbial growth.
- SINOMEMB® shall not be held responsible for any impact on membrane performance caused by chemicals added by users during storage or operation.

Absolute Maximum Ratings

| | |
|--|-----------------|
| Max operating pressure | 150psi(1.03Mpa) |
| Maximum feed rate | 2.0gpm(7.6lpm) |
| Max feed temperature | 45°C |
| Max feed continuous operation temperature When PH > 10 | 35°C |
| Max feed SDI ₁₅ | 5 |
| Influent free chlorine concentration | <0.1ppm |
| PH range of feed water during continuous operation | 2~11 |
| PH range of inflow during chemical cleaning(30 Min) | 1~13 |
| Max pressure drop of single memb | 10psi(0.07Mpa) |

SINOMEMB® Membrane Temperature Correction Factor TFC

In the operational process of reverse osmosis membrane, an increase in pressure and temperature leads to higher water yield from the membrane, while a decrease has the opposite effect. However, it is crucial to consider the temperature and pressure range suitable for membrane elements. To achieve optimal performance, membrane elements should operate within the standard test conditions for temperature and pressure requirements. In non-standard situations, users should comprehensively consider pump selection and insulation measures based on operating condition of water yield and desalination rate requirements. Generally, customer pump selection falls within the system design range, but actual water yield from reverse osmosis membranes is significantly influenced by temperature. It is recommended to maintain a temperature range of 20°C to 25°C when operating these membranes. The table provides temperature correction coefficients.

| °C | TCF | °C | TCF | °C | TCF | °C | TCF | °C | TCF |
|-----|-------|------|-------|------|-------|------|-------|------|-------|
| 5.0 | 2.072 | 12.2 | 1.575 | 19.4 | 1.214 | 26.6 | 0.956 | 33.8 | 0.786 |
| 5.1 | 2.064 | 12.3 | 1.552 | 19.5 | 1.210 | 26.7 | 0.954 | 33.9 | 0.784 |
| 5.2 | 2.056 | 12.4 | 1.564 | 19.6 | 1.206 | 26.8 | 0.951 | 34.0 | 0.782 |
| 5.3 | 2.048 | 12.5 | 1.558 | 19.7 | 1.201 | 26.9 | 0.948 | 34.1 | 0.780 |
| 5.4 | 2.040 | 12.6 | 1.552 | 19.8 | 1.197 | 27.0 | 0.946 | 34.2 | 0.778 |
| 5.5 | 2.032 | 12.7 | 1.547 | 19.9 | 1.193 | 27.1 | 0.943 | 34.3 | 0.776 |
| 5.6 | 2.024 | 12.8 | 1.541 | 20.0 | 1.189 | 27.2 | 0.940 | 34.4 | 0.774 |
| 5.7 | 2.016 | 12.9 | 1.535 | 20.1 | 1.184 | 27.3 | 0.938 | 34.5 | 0.772 |
| 5.8 | 2.009 | 13.0 | 1.529 | 20.2 | 1.180 | 27.4 | 0.935 | 34.6 | 0.770 |
| 5.9 | 2.001 | 13.1 | 1.524 | 20.3 | 1.176 | 27.5 | 0.933 | 34.7 | 0.768 |
| 6.0 | 1.993 | 13.2 | 1.518 | 20.4 | 1.172 | 27.6 | 0.930 | 34.8 | 0.766 |
| 6.1 | 1.985 | 13.3 | 1.513 | 20.5 | 1.168 | 27.7 | 0.927 | 34.9 | 0.764 |
| 6.2 | 1.978 | 13.4 | 1.507 | 20.6 | 1.164 | 27.8 | 0.925 | 35.0 | 0.762 |
| 6.3 | 1.970 | 13.5 | 1.502 | 20.7 | 1.160 | 27.9 | 0.922 | 35.1 | 0.760 |
| 6.4 | 1.962 | 13.6 | 1.496 | 20.8 | 1.156 | 28.0 | 0.920 | 35.2 | 0.758 |
| 6.5 | 1.955 | 13.7 | 1.491 | 20.9 | 1.152 | 28.1 | 0.917 | 35.3 | 0.756 |
| 6.6 | 1.947 | 13.8 | 1.485 | 21.0 | 1.148 | 28.2 | 0.915 | 35.4 | 0.754 |
| 6.7 | 1.940 | 13.9 | 1.480 | 21.1 | 1.144 | 28.3 | 0.912 | 35.5 | 0.752 |
| 6.8 | 1.932 | 14.0 | 1.474 | 21.2 | 1.140 | 28.4 | 0.910 | 35.6 | 0.750 |
| 6.9 | 1.925 | 14.1 | 1.469 | 21.3 | 1.136 | 28.5 | 0.907 | 35.7 | 0.748 |
| 7.0 | 1.918 | 14.2 | 1.464 | 21.4 | 1.132 | 28.6 | 0.905 | 35.8 | 0.746 |
| 7.1 | 1.910 | 14.3 | 1.458 | 21.5 | 1.128 | 28.7 | 0.902 | 35.9 | 0.744 |
| 7.2 | 1.903 | 14.4 | 1.453 | 21.6 | 1.124 | 28.8 | 0.900 | 36.0 | 0.742 |
| 7.3 | 1.896 | 14.5 | 1.448 | 21.7 | 1.120 | 28.9 | 0.897 | 36.1 | 0.740 |
| 7.4 | 1.888 | 14.6 | 1.442 | 21.8 | 1.116 | 29.0 | 0.895 | 36.2 | 0.738 |
| 7.5 | 1.881 | 14.7 | 1.437 | 21.9 | 1.112 | 29.1 | 0.892 | 36.3 | 0.736 |
| 7.6 | 1.874 | 14.8 | 1.432 | 22.0 | 1.108 | 29.2 | 0.890 | 36.4 | 0.734 |
| 7.7 | 1.867 | 14.9 | 1.427 | 22.1 | 1.105 | 29.3 | 0.888 | 36.5 | 0.732 |
| 7.8 | 1.860 | 15.0 | 1.421 | 22.2 | 1.101 | 29.4 | 0.885 | 36.6 | 0.730 |
| 7.9 | 1.852 | 15.1 | 1.416 | 22.3 | 1.097 | 29.5 | 0.883 | 36.7 | 0.728 |

| °C | TCF | °C | TCF | °C | TCF | °C | TCF | °C | TCF |
|------|-------|------|-------|------|-------|------|-------|------|-------|
| 8.0 | 1.845 | 15.2 | 1.411 | 22.4 | 1.093 | 29.6 | 0.880 | 36.8 | 0.726 |
| 8.1 | 1.838 | 15.3 | 1.406 | 22.5 | 1.089 | 29.7 | 0.878 | 36.9 | 0.725 |
| 8.2 | 1.831 | 15.4 | 1.401 | 22.6 | 1.086 | 29.8 | 0.875 | 37.0 | 0.723 |
| 8.3 | 1.824 | 15.5 | 1.396 | 22.7 | 1.082 | 29.9 | 0.873 | 37.1 | 0.721 |
| 8.4 | 1.817 | 15.6 | 1.391 | 22.8 | 1.078 | 30.0 | 0.871 | 37.2 | 0.719 |
| 8.5 | 1.811 | 15.7 | 1.386 | 22.9 | 1.075 | 30.1 | 0.868 | 37.3 | 0.717 |
| 8.6 | 1.804 | 15.8 | 1.381 | 23.0 | 1.071 | 30.2 | 0.866 | 37.4 | 0.715 |
| 8.7 | 1.797 | 15.9 | 1.376 | 23.1 | 1.067 | 30.3 | 0.864 | 37.5 | 0.713 |
| 8.8 | 1.790 | 16.0 | 1.371 | 23.2 | 1.063 | 30.4 | 0.861 | 37.6 | 0.712 |
| 8.9 | 1.783 | 16.1 | 1.366 | 23.3 | 1.060 | 30.5 | 0.859 | 37.7 | 0.710 |
| 9.0 | 1.776 | 16.2 | 1.361 | 23.4 | 1.056 | 30.6 | 0.857 | 37.8 | 0.708 |
| 9.1 | 1.770 | 16.3 | 1.356 | 23.5 | 1.053 | 30.7 | 0.854 | 37.9 | 0.706 |
| 9.2 | 1.763 | 16.4 | 1.351 | 23.6 | 1.049 | 30.8 | 0.852 | 38.0 | 0.704 |
| 9.3 | 1.756 | 16.5 | 1.346 | 23.7 | 1.045 | 30.9 | 0.850 | 38.1 | 0.702 |
| 9.4 | 1.750 | 16.6 | 1.341 | 23.8 | 1.042 | 31.0 | 0.847 | 38.2 | 0.701 |
| 9.5 | 1.743 | 16.7 | 1.337 | 23.9 | 1.038 | 31.1 | 0.845 | 38.3 | 0.699 |
| 9.6 | 1.737 | 16.8 | 1.332 | 24.0 | 1.035 | 31.2 | 0.843 | 38.4 | 0.697 |
| 9.7 | 1.730 | 16.9 | 1.327 | 24.1 | 1.031 | 31.3 | 0.841 | 38.5 | 0.695 |
| 9.8 | 1.723 | 17.0 | 1.290 | 24.2 | 1.028 | 31.4 | 0.838 | 38.6 | 0.693 |
| 9.9 | 1.717 | 17.1 | 1.285 | 24.3 | 1.024 | 31.5 | 0.836 | 38.7 | 0.692 |
| 10.0 | 1.711 | 17.2 | 1.280 | 24.4 | 1.021 | 31.6 | 0.834 | 38.8 | 0.690 |
| 10.1 | 1.704 | 17.3 | 1.276 | 24.5 | 1.017 | 31.7 | 0.832 | 38.9 | 0.688 |
| 10.2 | 1.698 | 17.4 | 1.271 | 24.6 | 1.014 | 31.8 | 0.829 | 39.0 | 0.686 |
| 10.3 | 1.691 | 17.5 | 1.267 | 24.7 | 1.010 | 31.9 | 0.827 | 39.1 | 0.685 |
| 10.4 | 1.685 | 17.6 | 1.262 | 24.8 | 1.007 | 32.0 | 0.825 | 39.2 | 0.683 |
| 10.5 | 1.679 | 17.7 | 1.258 | 24.9 | 1.003 | 32.1 | 0.823 | 39.3 | 0.681 |
| 10.6 | 1.672 | 17.8 | 1.253 | 25.0 | 1.000 | 32.2 | 0.820 | 39.4 | 0.679 |
| 10.7 | 1.666 | 17.9 | 1.249 | 25.1 | 0.997 | 32.3 | 0.818 | 39.5 | 0.678 |
| 10.8 | 1.660 | 18.0 | 1.244 | 25.2 | 0.994 | 32.4 | 0.816 | 39.6 | 0.676 |
| 10.9 | 1.654 | 18.1 | 1.240 | 25.3 | 0.992 | 32.5 | 0.814 | 39.7 | 0.674 |
| 11.0 | 1.647 | 18.2 | 1.236 | 25.4 | 0.989 | 32.6 | 0.812 | 39.8 | 0.672 |
| 11.1 | 1.641 | 18.3 | 1.231 | 25.5 | 0.986 | 32.7 | 0.810 | 39.9 | 0.671 |
| 11.2 | 1.635 | 18.4 | 1.227 | 25.6 | 0.983 | 32.8 | 0.807 | 40.0 | 0.669 |
| 11.3 | 1.629 | 18.5 | 1.223 | 25.7 | 0.981 | 32.9 | 0.805 | | |
| 11.4 | 1.623 | 18.6 | 1.218 | 25.8 | 0.978 | 33.0 | 0.803 | | |
| 11.5 | 1.617 | 18.7 | 1.290 | 25.9 | 0.975 | 33.1 | 0.801 | | |
| 11.6 | 1.611 | 18.8 | 1.285 | 26.0 | 0.972 | 33.2 | 0.799 | | |
| 11.7 | 1.605 | 18.9 | 1.280 | 26.1 | 0.970 | 33.3 | 0.797 | | |
| 11.8 | 1.599 | 19.0 | 1.276 | 26.2 | 0.967 | 33.4 | 0.795 | | |
| 11.9 | 1.593 | 19.1 | 1.271 | 26.3 | 0.964 | 33.5 | 0.792 | | |
| 12.0 | 1.587 | 19.2 | 1.267 | 26.4 | 0.962 | 33.6 | 0.790 | | |
| 12.1 | 1.581 | 19.3 | 1.262 | 26.5 | 0.959 | 33.7 | 0.788 | | |



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