cembrane

clean water for life

Technical Brochure - SiCBlox™ FX

Cembrane a/s

Technical Brochure for Cembrane SiCBlox™ FX series

Read before taking product in use

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Notice

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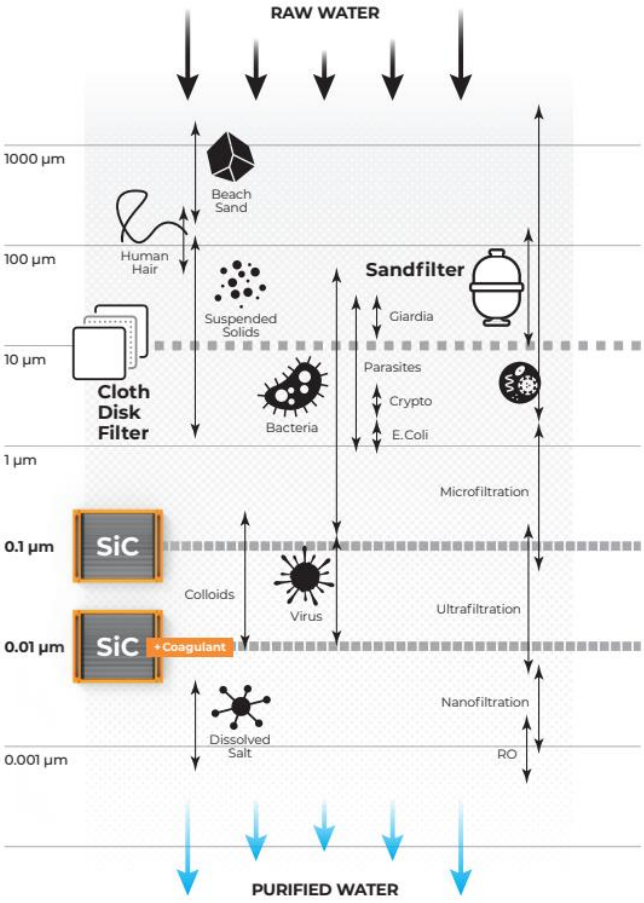
1 Technology overview

A Cembrane membrane is a solid-liquid separation technology that works as a membrane barrier to various contaminants, including:

- Suspended solids
- Turbidity
- Bacteria, viruses & algae
- PFAS/PFOS & Micropollutants
- Oil
- Heavy metals
- Dissolved substances when combined with integrated absorption & coagulation

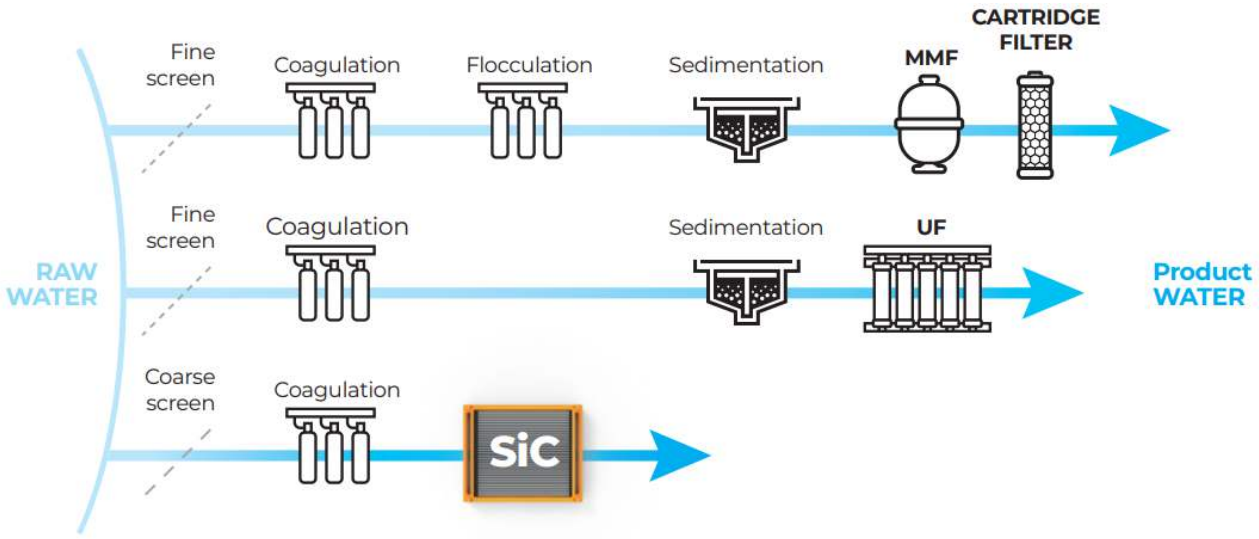


2 Value propositions

Our proprietary Silicon Carbide (SiC) membrane & module provides some unique advantages in water- & wastewater treatment:

- **High flux rate** reduces footprint, energy & chemical consumption
- **Chemically inert** provides high chemical resistance & no permeability decline
- **Negatively charged surface** reduces fouling of organics and oil
- **Extremely hard & durable** makes it easy to clean
- **High solids loading** capability from few ppm to several % of TSS loading
- **Simplified flow sheet** combine filtration with sedimentation, flotation & absorption into one process step

The ability of SiC membrane to withstand high incoming solids loading and resist heavy foulants, allows the user to simplify their flow sheet, resulting in reduction in footprint, cost and complexity, see below illustration:



3 Operational capabilities

A Cembrane membrane and module is highly durable and hence able to effectively treat wide range of water sources.

Operational capabilities	
Solids loading tolerance (TSS)	1 ppm – 50.000 ppm
Temperature	2-60°C
Abrasive media in feed water	No limitations
Chemical tolerance	pH 2-12
Fat, Oil & Grease tolerance	Up to 400 ppm
Intermittent operation & dry storage	Allowed
Operational flux rate	1-1000 LMH

4 Application areas

Drinking water

Sandfilter rehabilitation
Filter backwash water recovery
Surface- & sea water
PFAS & Micro-Pollutant removal
Ground water both sweet & brackish
Pre-treatment to Reverse Osmosis

Industrial wastewater

Scrubber wastewater
Coal chemical industry
Food & Beverage
Electronic & Semiconductor industry
Produced water
Mining
Oily wastewater
Petrochemical

Municipal wastewater

MBR
Sludge thickening of activated sludge
Treated Sewage Effluent (TSE)
Storm water overflow

5 Filtration principle & how it works

The filtration principle is submerged outside in, where clean water is drawn through the membrane with suction pressure. Suspended solids & bacteria are rejected on the membrane surface forming a cake layer while clean water is passing through the membrane body and is collected at both end caps.

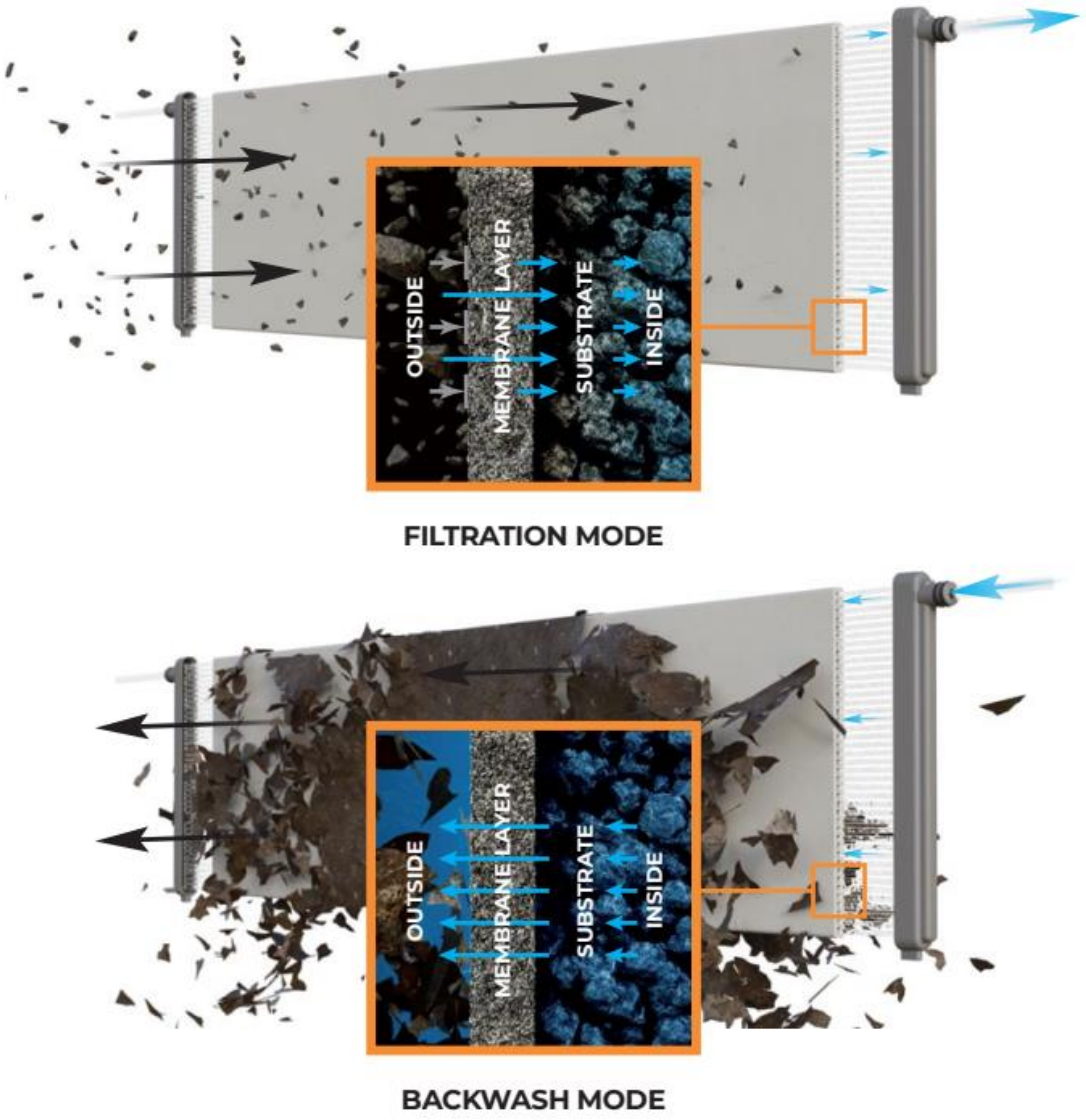


Figure 1 Illustration of outside-in filtration principle on a single membrane sheet

Video illustration: https://www.youtube.com/watch?v=llJ0y0KiRl0&feature=emb_imp_woyt

The permeate water from each of the 42 membrane sheets is collected inside both ends of the membrane module permeate lines and finally runs through the top permeate module manifold. During backwash, the flow rate is reversed to push off the solids build up on the membrane surface.

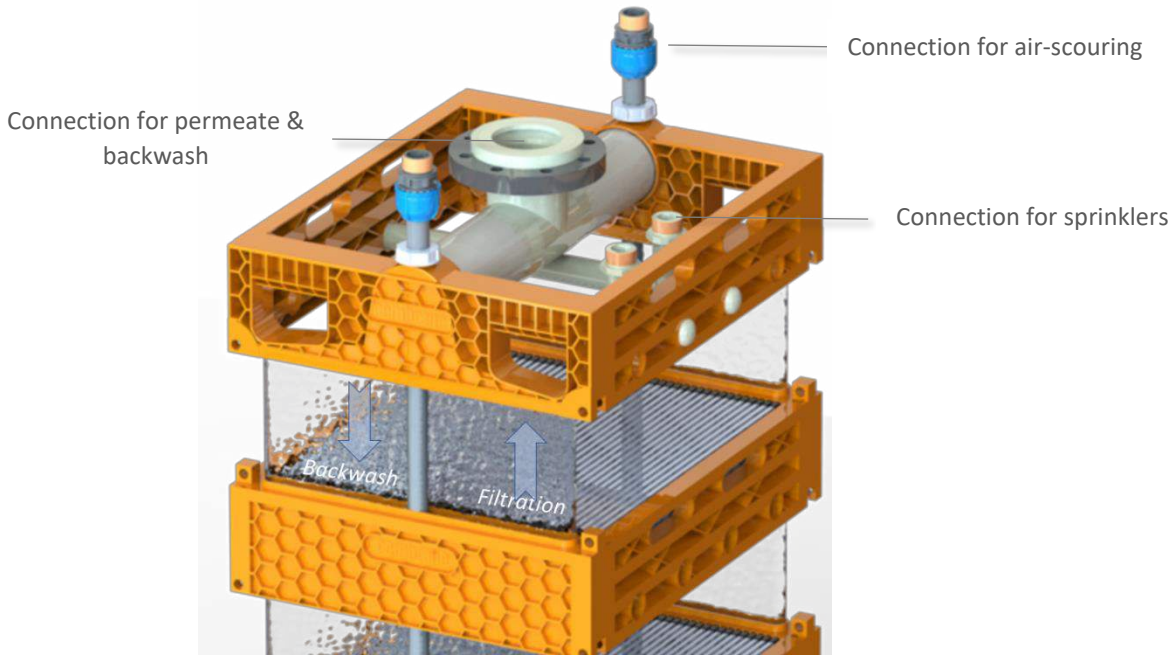


Figure 2 Illustration of water flow through the integrated permeate channels inside the membrane module.

5.1 Sprinkler cleaning feature

Top permeate module comes with integrated sprinkler system. Two pipes with engineered hole pattern, provides an even water jet distribution over the membrane modules.
The sprinkler system serves two main purposes:

1. After membrane tank is drained, spraying of permeate-, tap- or service water to mechanically remove debris & sludge trapped between the membranes.

2. Chemical spray cleaning over the membranes. The capillary forces of the membrane will absorb the chemical solution and clean the membranes where it is needed. This has the following advantages:
   a) Replaces conventional CIP cleaning
   b) Reduces chemical consumption with 95% compared to conventional CIP

c) Keeps chemicals on the feed side & doesn't come into contact with permeate line

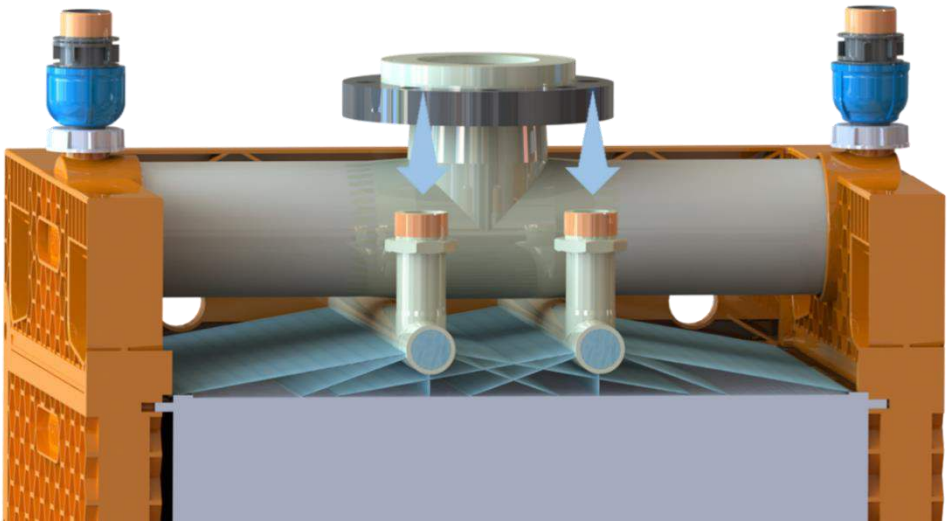


Figure 3 Illustration of module tower cross section showing sprinkler spray in action

Check out video animation of functionalities: https://www.youtube.com/watch?v=WzI0sps6VzY

5.2 Process flow sheet

This versatility of Cembrane SiC membrane technology, enables a wide range of use cases and allows the user to combine several process steps into one:

- Membrane filtration
- Sedimentation
- Flotation
- Absorption

This allows not only removal of suspended solids & bacteria, but also PFAS, dissolved organics, Heavy metals & radioactive isotopes in one filtration step!

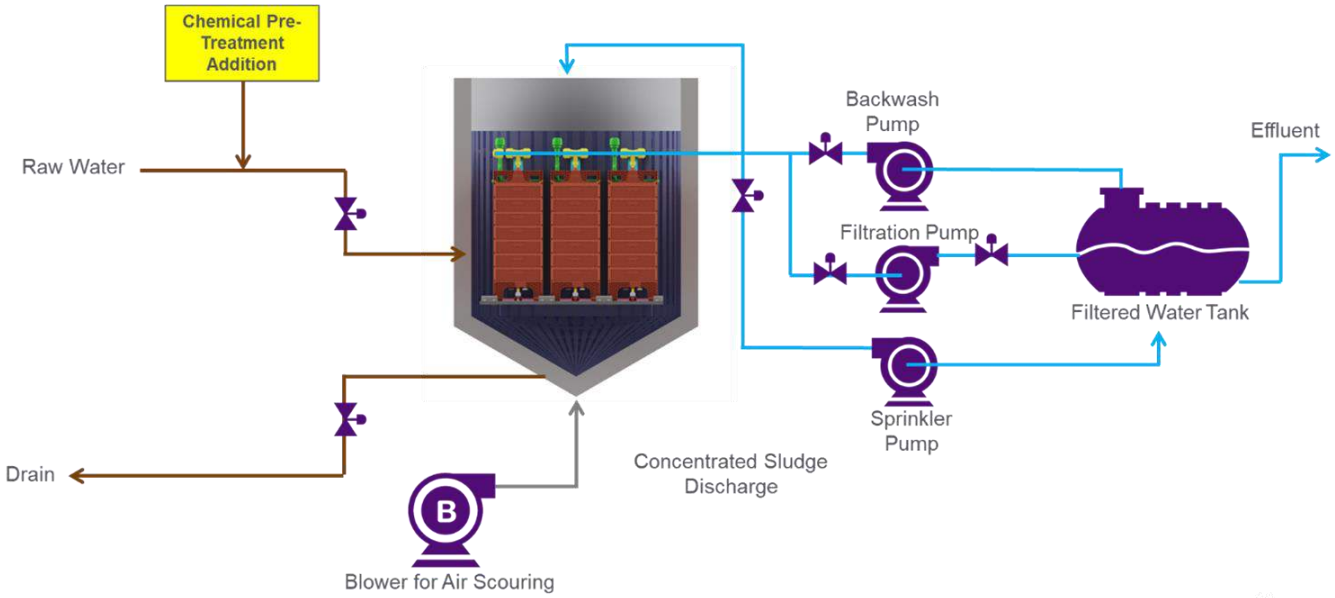
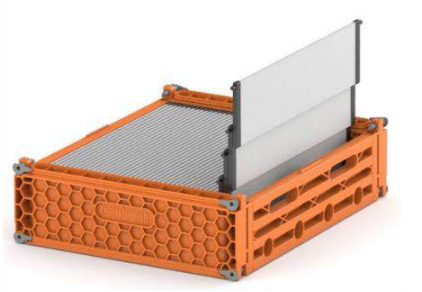


Figure 4 Simplified flow sheet

6 Product – Module towers & racks

The membrane sheets are fitted in a square module consisting of 42 membrane sheets that are individually interchangeable. The modules are submersible & can be stacked individually on top of each other up to 15 modules in total. The membrane surface area is the determining factor for the capacity of the installation, the more surface area the more flow through the plant.
Filtered water from each single plate is collected inside the module housing and transported to the top header integrated in both module housing sides.

SiC ceramic FS membrane



Single module

Racks & towers

Stack of module towers

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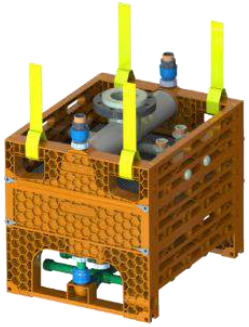
6.1 KEY FEATURES



- Lifting from top module
- Applicable in saline & aggressive water (No Steel parts)
- Reinforced ceramic & module structure
- Improved packing density
- Integrated aeration, permeate & sprinkler inside module tower
- Bottom connection to permeate line
- Check out video animation of module features: https://www.youtube.com/watch?v=G60jfvLcdcA&t=2s

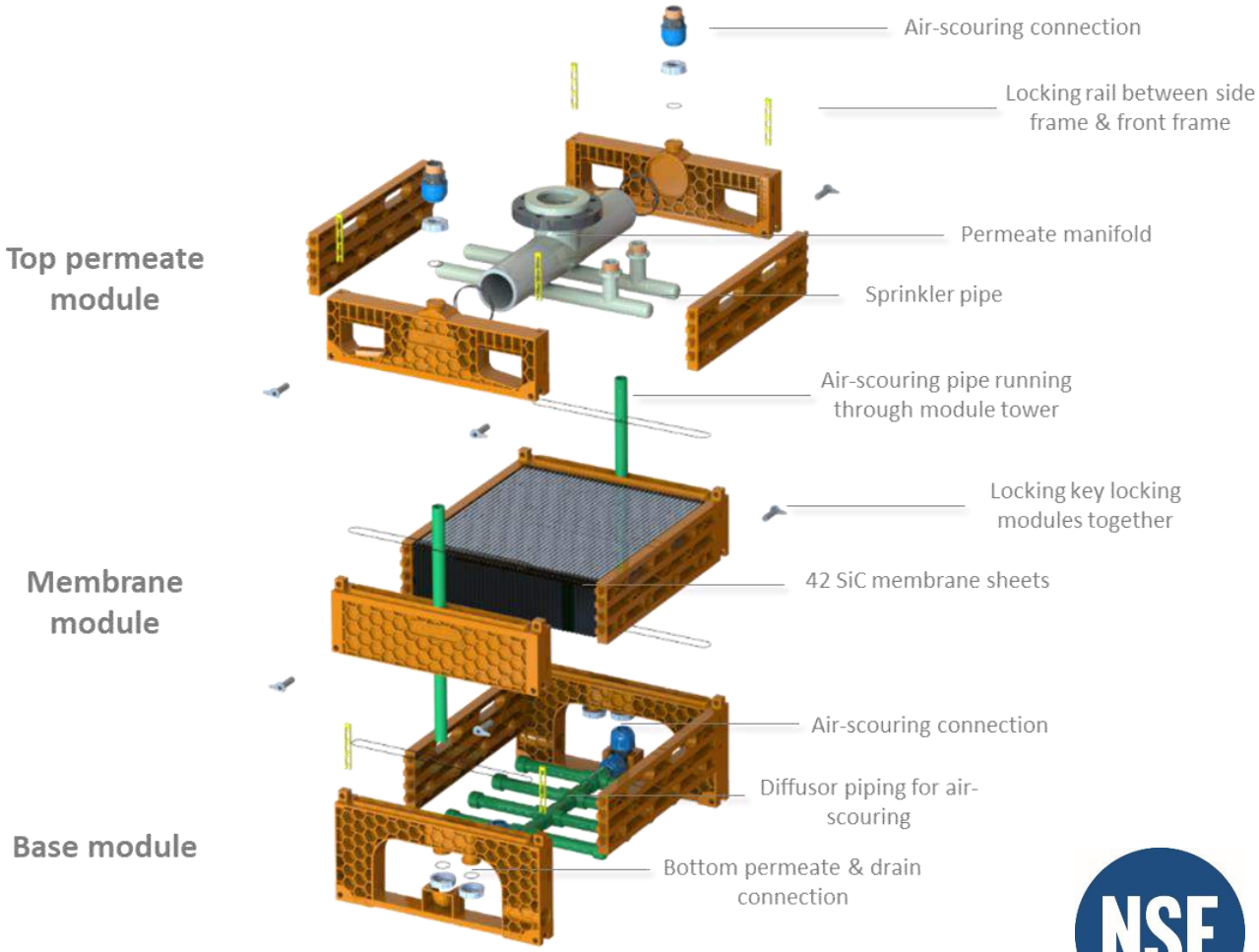
7 Membrane specification

Classification	
Item code	SICFS-00163-DO-T-145-561
Membrane type	Submerged Flat sheet
Operation mode	Out-to-in filtration
Pore size	0,1 µm
Clean water permeability	>3.000 LMH/bar @20° C
Certification	NSF61 HOT (60° C)
Material	
Membrane material	Silicon Carbide (SiC) ceramic
End-cap material	PPS 40% Glass fill
O-ring	EPDM (Viton or NBR on demand)
Potting material	PU
Dimensions	
Membrane surface area	0,164 m^2
Length	575 mm
Width	145/154 mm
Thickness	6/11 mm
Weight	0,9 kg

8 Module & tower specification

Specification	
Item code	SiCBlox™ FX Series
Number of flat sheet membranes pr. module	42 pcs
Active membrane surface pr. module	6,9 m^2
Module material	PPO/PS GF
Piping material	PP
Clean water permeability	>3.000 LMH/bar
Maximum suction pressure	-0,7 bar
Maximum backwash pressure	1,2 bar
Certification	NSF61 HOT (60° C)
Dimensions & connections	
Internal aeration pipe dimensions	OD32 / ID28 mm
Sprinkler pipe dimensions	OD40 mm
Top permeate module dimensions	L700xW570xH250 mm
Permeate manifold dimensions	OD110 / ID90 mm
Membrane module dimensions	L700xW570xH160 mm
Base module dimensions	L700xW570xH260 mm
Allowable stacking height	1-15 modules
Air-scouring connection	2x R1 1/4" Thread
Sprinkler pipe connection	R1 1/4" Thread
Bottom permeate connection	1 ½" thread BSP
Top permeate connection	Flange DN100 (ISO 7005 PN10)
Weight & displacement volume	
Dry weight Top-/Filter-/Base module	10/44/9 kg
Wet weight Top-/Filter-/Base module	11/56/9 kg
Displacement volume Top-/Filter-/Base module	8/16/7 liter

8.1 Module tower parts



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For more information explore our Youtube-, Linkedin- & Web page!