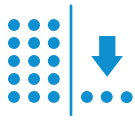


# Aquaporin Inside® Membranes

Hollow fiber forward osmosis module



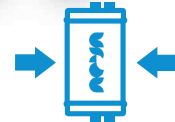
High rejection of difficult compounds



Low specific reverse salt flux



High recovery of water



Low footprint due to high packing density

## Product type

The Aquaporin Inside® HFFO14 module is designed for Forward Osmosis (FO) applications.

Biomimetic hollow fiber module comprising an active layer of polyamide thin film composite (TFC) with integrated aquaporin

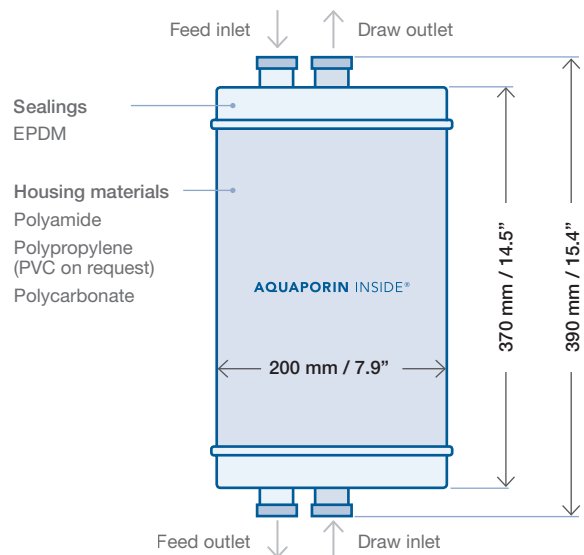
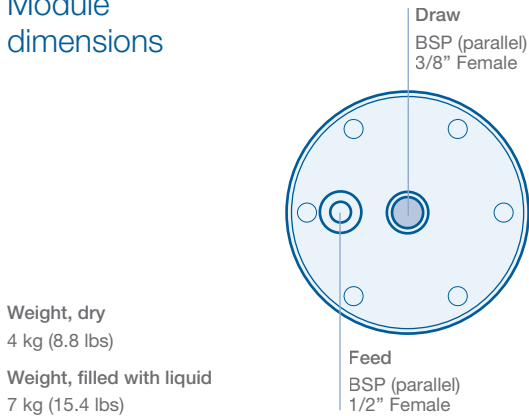
proteins. The addition of aquaporin water channels into the rejection layer makes the Aquaporin Inside® FO membrane capable of rejecting difficult contaminants and preserving valuable components. The use of hollow fibers allows for a very high packing density.

## Product specifications

	Fiber ID	Membrane area		Water flux	Specific reverse salt flux
	mm	m <sup>2</sup>	ft <sup>2</sup>	LMH	g/L
<b>HFFO14</b>	<b>0.20</b>	<b>13.8</b>	<b>148.5</b>	<b>11 ± 1.5</b>	<b>0.15 ± 0.05</b>

The stated product performance is based on following testing conditions: 0.5 M NaCl (2.9 %) draw vs DI water (FO mode), temperature: 25 °C (77 °F), single pass mode, counter-current flow, feed flow rate: 400 LPH, draw flow rate: 200 LPH, transmembrane pressure (TMP) feed to draw: 0.2 bar (2.9 psi).

## Module dimensions



## Recommended operating conditions

Operating mode	Counter-current flow, inside-out
Transmembrane pressure (TMP) feed to draw	0.2 bar / 2.9 psi
Temperature range	5-30 °C / 41-86 °F
pH range	3-8
Pre-filtration <sup>a</sup>	≤ 50 µm

<sup>a</sup>The optimal pre-filtration is application dependent.

<sup>b</sup>Under certain conditions, the presence of free chlorine and other oxidizing agents will cause premature membrane failure. Since oxidation damage is not covered under warranty, Aquaporin A/S recommends removing residual free chlorine by pre-treatment prior to membrane exposure.

<sup>c</sup>Refer to cleaning guidelines in the User Manual.

## Maximum operating conditions

Transmembrane pressure (TMP) feed to draw	≤ 2 bar / 29.0 psi
Feed inlet pressure	≤ 2 bar / 29.0 psi
Draw inlet pressure	≤ 2 bar / 29.0 psi
Max. particle size	≤ 50 µm
Free chlorine tolerance <sup>b</sup>	< 0.1 mg/L

## Clean-in-place (CIP)<sup>c</sup>

Temperature	≤ 40 °C / 122 °F
pH range (feed side)	2-11
pH range (draw side)	2-7
Pressure	≤ 0.5 bar / 7.3 psi
Duration	≤ 20 min

## Additional information

- ✓ Module should be operated in vertical position with feed inlet in the top and draw inlet in the bottom.
- ✓ It is recommended to rinse the module for 30 min, prior to first use.
- ✓ It is advisable to pre-treat the feed solution to remove suspended solids. Particles might damage the fibers and possibly cause a decrease in performance.
- ✓ Run feed solution prior to draw solution to avoid osmotic drying of the membrane.
- ✓ Do not allow the module to run dry as this will compromise the membrane performance.
- ✓ Immediately flush the module on feed side with clean water for ≥ 30 min after use (draw side connections open).
- ✓ The module can be stored at room temperature, but preferred storage is at 4 °C.
- ✓ Keep out of direct sunlight.
- ✓ To prevent biological growth during prolonged system shutdowns, the module should be immersed in a preservative solution. Rinse thoroughly before re-use.
- ✓ Keep the module moist at all times after initial wetting.
- ✓ The information provided in this document is for informative purposes only. It is the users own responsibility to ensure appropriate usage of this product. Aquaporin A/S assumes no obligation, liability or damages incurred for the misuse of the product or for the information provided in this document. This document does not express or imply any warranty as to the merchantability or fitness of the products.

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