

Aquaporin Inside® HFFO®14 module

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® HFFO®14 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.

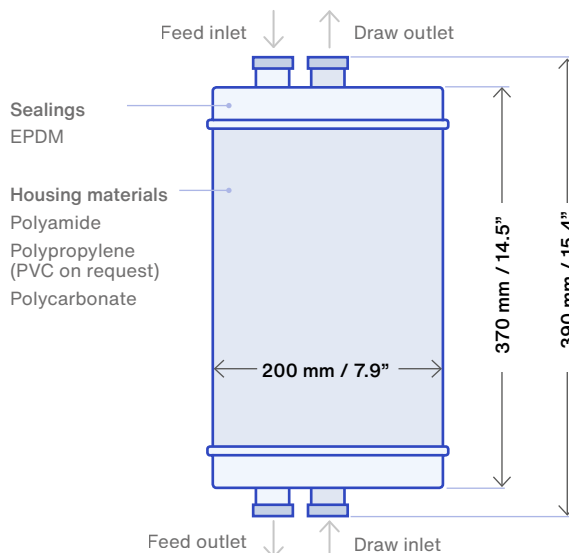
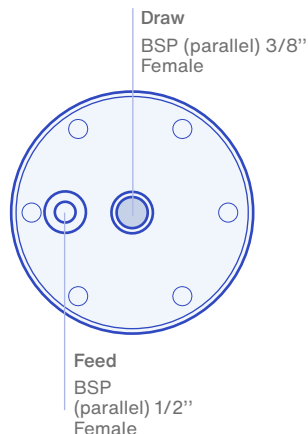
PRODUCT SPECIFICATIONS

Product name	Fiber ID	Membrane area	Water flux	Specific reverse salt flux
HFFO®14 module	0.20 mm	13.8 m ² 148.5 ft ²	11 ± 1.5 LMH	0.15 ± 0.05 g/L

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).

ELEMENT DIMENSIONS

Weight, dry
4 kg (8.8 lbs)
Weight, filled with liquid
7 kg (15.4 lbs)



RECOMMENDED OPERATING CONDITIONS

Operating mode	Counter-current flow, inside-out
Transmembrane pressure (TMP) feed to draw	0.2 bar / 2.9 psi
pH and Temperature range ^a	pH 3-7 at 5-40°C / 41-104°F pH 3-8 at 5-35°C / 41-95°F pH 3-9 at 5-25°C / 41-77°F
Pre-filtration ^b	≤ 50 µm

^a It is of utmost importance to respect the ranges for the different pH and temperature combinations. If in doubt, contact Aquaporin A/S to assist with a case-specific evaluation.

^b The optimal pre-filtration is application dependent.

^c 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.

^d Refer to cleaning guidelines in the User Manual.

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).

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 ^c	< 0.1 mg/L

CLEAN-IN-PLACE (CIP)^d

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

- ✓ 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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