

## HYDRAcap<sup>®</sup>-A Ultrafiltration

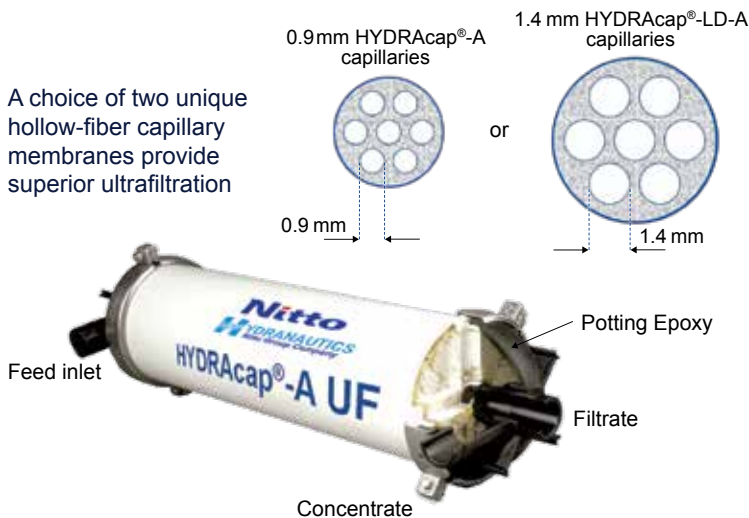
HYDRAcap<sup>®</sup>-A is used to treat surface water, ground water, seawater and wastewaters as either primary treatment or as pretreatment to reverse osmosis (RO) and nanofiltration (NF). Compared to conventional pretreatment, HYDRAcap<sup>®</sup>-A allows for higher fluxes for RO and NF systems while maintaining longer intervals between cleanings. In some cases it replaces conventional pretreatment for potable applications, ground water recharging and water recycling.



### Membrane Operation

**Filtration mode:** Feed water flows from the inside of the fibers to the outside. This is commonly referred to as inside-out filtration.

**Backwash mode:** Filtrate is forced through the fibers in reverse flow, from the outside to the inside, such that accumulated solids are removed from the fibers.

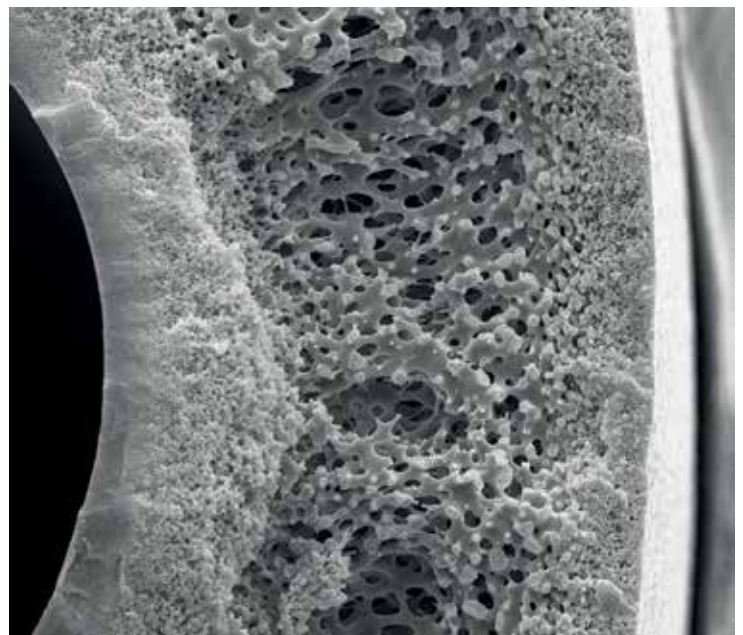


### HYDRAcap<sup>®</sup>-A Advantages

- Low fouling hydrophilic multi-bore polyethersulfone membrane
- Tolerant to chlorine, peroxide and other oxidants resistant to pH extremes
- Exhibits 5 log (99.999%) removal for bacteria, giardia, cryptosporidium and 4 log removal for viruses
- Reduces turbidity to < 0.06 NTU
- Operational flexibility: direct or cross flow filtration
- DHS (CA), DEP (MA), NSF/EPA certifications for materials of construction, operation and pathogen removal efficiency
- Low pressure operation

### Capillary Technology vs. Conventional Pretreatment

- Significantly better filtrate quality when compared to conventional pretreatment, exhibiting 100% removal of colloidal material.
- Filtrate quality is stable regardless of feedwater variation.
- Can significantly reduce use of predetermined chemicals.
- Backwash disposal is less problematic due to lower waste water volumes.
- Increased efficiency of RO membrane system design and operation, contributing to reduced capital and operational costs.
- Maximizes RO performance by allowing elements to operate longer with less cleaning.



Cross-sectional view of fiber

## HYDRAcap® Reference Plants

### Malaga UF Waste Water, Spain

8 racks of 52 HYDRAcap®60 modules are treating municipal waste water with a maximum capacity of 900 m<sup>3</sup>/day to feed cooling towers. The plant has been started up in 2009 with minimum maintenance operation, optimal filtrate turbidity (below 0.2 NTU) and negligible CIP frequency (none between 2012 and 2017)



## Integrated Membrane Solutions

### Al Hamriyah Sea Water RO Plant, U.A.E.

The biggest sea water reference! 24 racks of 120 HYDRAcap®60 modules (2,880 in total) are producing 61 mgd (228 MI/d) from an open intake sea water. UF membranes didn't receive CIP until 2017 and are delivering directly in line high quality permeate water to 8 trains of SWC5 membranes.

Start-up date: May 2014



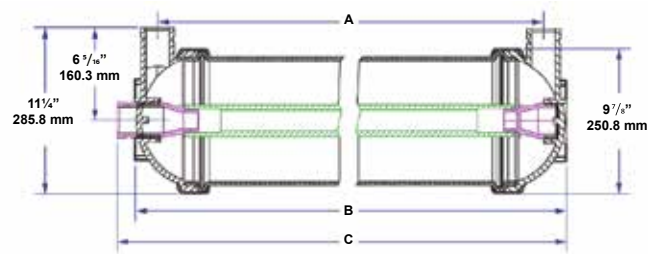
### Kindasa Seawater RO plant, Jeddah Port, Saudi Arabia

880 HYDRAcap®60 modules are utilized to produce 18.6 mgd (70,000 m<sup>3</sup>/day) filtrate from Red Sea water. The 10 UF racks, each equipped with 88 HYDRAcap®60 elements are continuously producing a high quality filtrate for Hydranautics SWC3+ seawater RO elements. Start-up date: August 2006



## Typical Process Conditions

Maximum Backwash Pressure:	20 psig (1.4 bar)
Backwash Flux:	100–150 gfd (170–255 l/m <sup>2</sup> /h)
Backwash Frequency:	20–60 minutes
Backwash Duration:	30–60 seconds
Chemical Enhanced Backwash Frequency:	0–4 times per day
Chemical Enhanced Backwash Duration:	1–30 minutes
Disinfection Chemicals:	NaOCl, H <sub>2</sub> O <sub>2</sub> , ClO <sub>2</sub> or NH <sub>2</sub> Cl
Cleaning Frequency:	Once every 1–6 months
Cleaning Chemicals:	NaOH, HCl, H <sub>2</sub> SO <sub>4</sub> or citric acid



Module length, inches (mm):

	A**	B	C
HYDRAcap®40-A	43" (1092)	46 1/4" (1172)	47 1/2" (1200)
HYDRAcap®60-A / HYDRAcap®60-LD-A / HYDRAcap®60+-A	63" (1600)	66 1/4" (1680)	67 1/4" (1708)

\*2" Grooved fitting at all ports

\*\*1 1/8"

## Specifications

Configuration	Capillary (inside-out)
Membrane Polymer	Hydrophilic multi-bore polyethersulfone
Nominal MWCO, Daltons	150,000
Average pore size	0.02 µm
<b>Nominal membrane Area, ft<sup>2</sup> (m<sup>2</sup>)</b>	
HYDRAcap®40-A	320 (30)
HYDRAcap®60-A	500 (46)
HYDRAcap®60-LD-A	323 (30)
HYDRAcap®60+-A	605 (56)
<b>Capillary inner diameter, inches (mm)</b>	
HYDRAcap®-A	0.035 (0.9)
HYDRAcap®LD-A	0.055 (1.4)
<b>Capillary outer diameter, inches (mm)</b>	
HYDRAcap®-A	0.149 (3.8)
HYDRAcap®-LD-A	0.232 (5.9)

## Application Data

Typical Filtrate Flux Range, gfd (l/m <sup>2</sup> /h)	35–85 (59–145)
<b>Flow Rate Range, gpm (m<sup>3</sup>/h)</b>	
HYDRAcap®40-A	7.7–18.9 (1.8–4.3)
HYDRAcap®60-A	12.1–29.5 (2.7–6.7)
HYDRAcap®60-LD-A	7.8–19 (1.8–4.3)
HYDRAcap®60+-A	14.7–35.7 (3.3–8.1)
Operating pH range	4.0–10
Cleaning pH range	1.5–13
Instantaneous Chlorine Tolerance, ppm	100*
Maximum Chlorine Exposure, ppm-hr	200,000
Instantaneous Hydrogen Peroxide Tolerance, ppm	200*
Operating Mode	Cross-flow or dead-end
Maximum Feed Pressure, psig (bar)	73 (5)
Transmembrane Pressure (TMP) Range, psig (bar)	2–20 (0.14–1.4)
<b>Maximum Instantaneous Turbidity (NTU)</b>	
HYDRAcap®-A	100
HYDRAcap®-LD-A	200

\*15 minutes or less



## Certification

NSF61. Acceptable for drinking water use under LT2ESWTR.

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