

# DURATHERM™ HWS Series

## Reverse Osmosis

### Hot Water Sanitization / High Temperature

The Duratherm® HWS RO and HWS RO-**HR** are suitable for processes which require periodic hot water sanitizing up to 194°F (90°C).

The Duratherm® HWS RO elements provide reliable performance at continuous operating temperatures up to 122°F (50°C) in low crossflow environments with water-like viscosity and no suspended solids.

The Duratherm® HWS RO-**HR** is selected either when the application requires higher rejection or a feed stream temperature up to 158°F (70°C) continually.

Both products feature high temperature tolerant materials including the DURASAN® outer wrap.

### ELEMENT SPECIFICATIONS

MODEL	FLOW GPD (m³/d)	MAX. CROSSFLOW GPM (m³/H)	REJECTION AVG.	ACTIVE AREA ft² (m²)
DURATHERM HWS RO-HR 2540	420 (1.6)	4 (0.9)	99.5%	25 (2.3)
DURATHERM HWS RO-HR 4040	1,600 (6.1)	20 (4.5)	99.5%	85 (7.9)
DURATHERM HWS RO-HR 8040	6,500 (24.6)	65 (14.8)	99.5%	350 (32.5)
DURATHERM HWS RO 2521	270 (1.0)	4 (0.9)	99.0%	11 (1.0)
DURATHERM HWS RO 2526	410 (1.6)	4 (0.9)	99.0%	17 (1.5)
DURATHERM HWS RO 2540	600 (2.3)	4 (0.9)	99.0%	25 (2.3)
DURATHERM HWS RO 4014	760 (2.9)	20 (4.5)	99.0%	30 (2.8)
DURATHERM HWS RO 4040	2,200 (8.3)	20 (4.5)	99.0%	85 (7.9)
DURATHERM HWS RO 8040	9,200 (34.8)	65 (14.8)	99.0%	350 (32.5)

Specifications are based on a 2,000 mg/L NaCl solution at 225 psi (1,551 kPa) operating pressure, 77°F (25°C), pH 7.5, and 15% recovery after preliminary hot water sanitization cycles. Final flowrate is subject to individual temperature profile. In most cases, flowrate will stabilize to +/- 25% of the nominal flowrate after preliminary high temperature water cycles.

### OPERATING AND DESIGN PARAMETERS

#### DO NOT EXCEED 20 GFD (33 LMH)

TEMPERATURE	MAXIMUM PRESSURE
5°C - 50°C	600 psig - 41 bar
51°C - 90°C	hot water sanitizing ONLY

#### RECOMMENDED pH

TYPE	OPERATING RANGE BELOW 50°C	CLEANING RANGE BELOW 50°C
DURATHERM HWS RO-HR	2.0 - 10.0	2.0 - 11.5

Chlorine Tolerance: 500 ppm-hours, at temperature below 50°C.  
Dechlorination Recommended.



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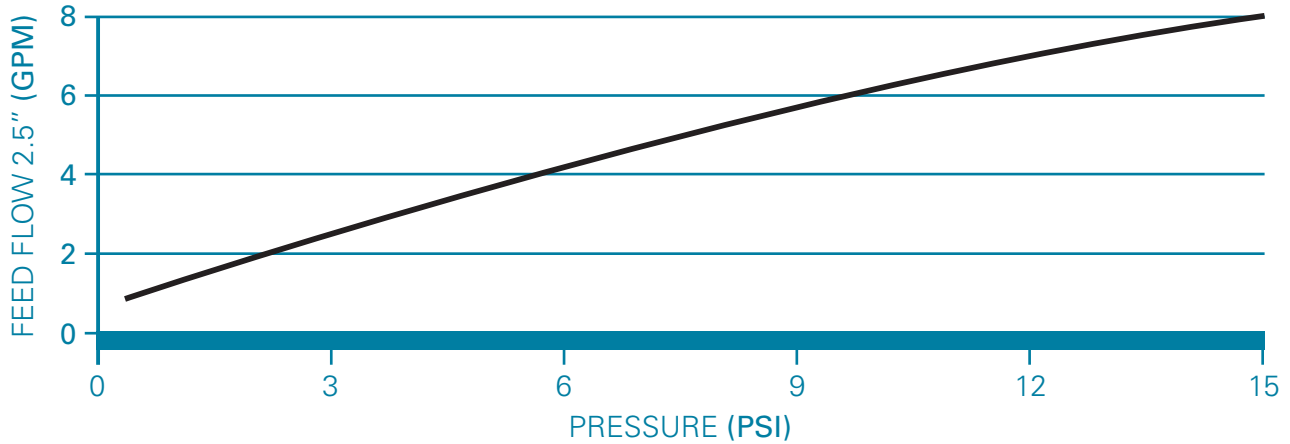
# DURATHERM™ HWS Series

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### Hot Water Sanitization

MAXIMUM PRESSURE DROP	ELEMENTS PER PRESSURE VESSEL				
	1	2	3	4	5
$\Delta P$ - psig (kPa)	15 (103)	30 (207)	45 (310)	60 (414)	60 (414)

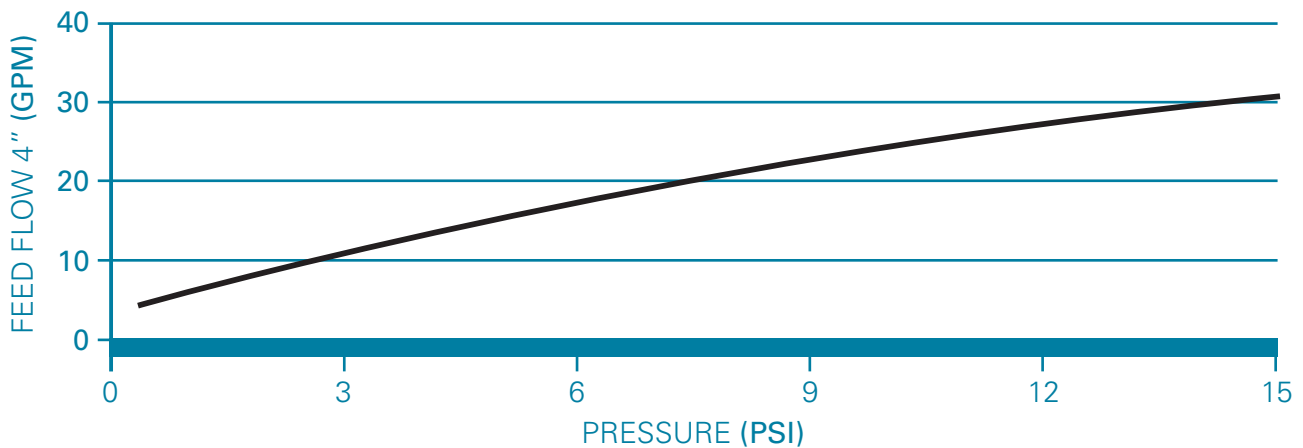
### PRESSURE DROP vs. FLOW (AT 25°C, 1cP)



\* Based on Desal 2.5" Housings

\* Use as a guideline, delta P will vary based on tolerances of housing.

### PRESSURE DROP vs. FLOW (AT 25°C, 1cP)



\* Based on Desal 4" Housings

\* Use as a guideline, delta P will vary based on tolerances of housing.



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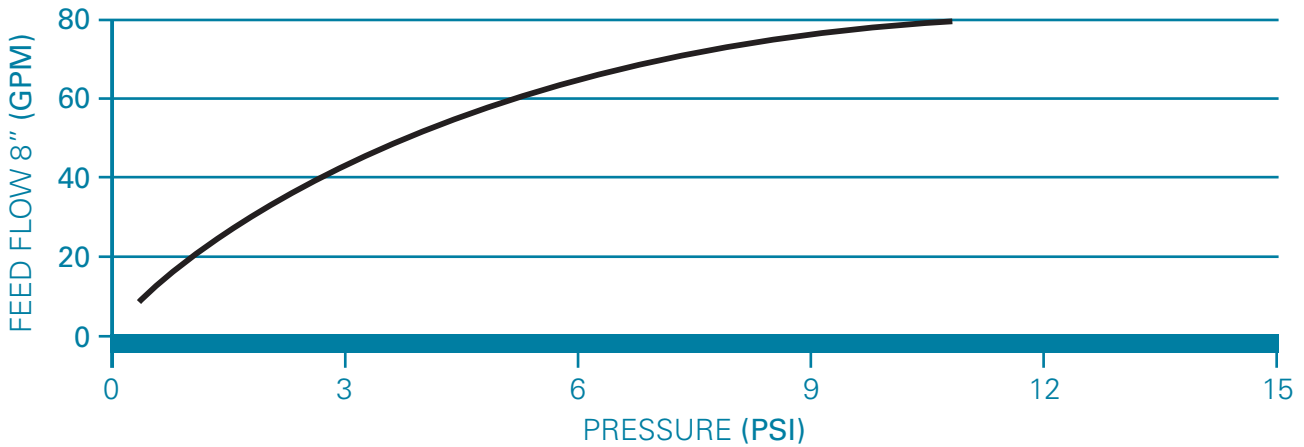
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**PRESSURE DROP vs. FLOW (AT 25°C, 1cP)**



\* Based on Desal 8" Housings

\* Use as a guideline, delta P will vary based on tolerances of housing.

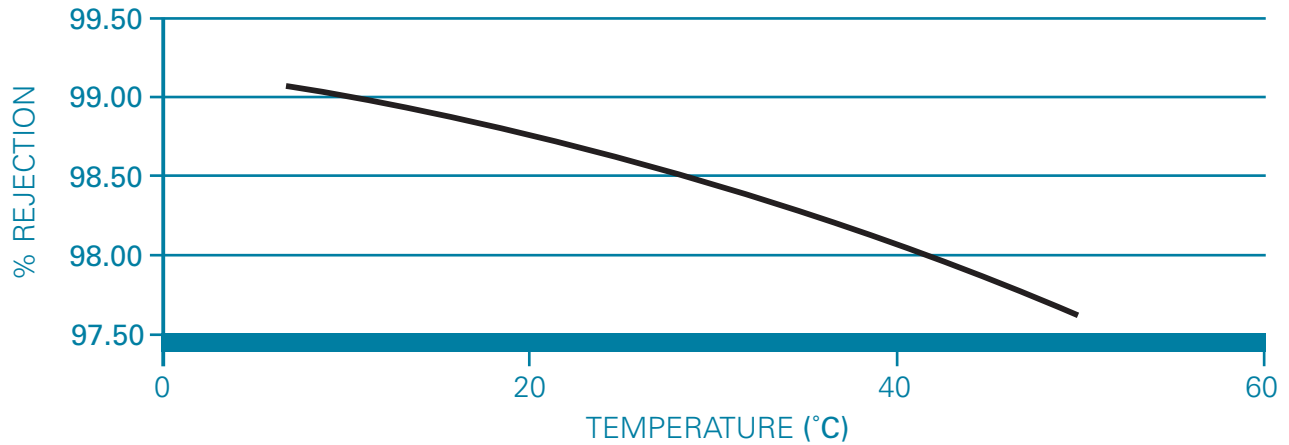
Maximum Temperature: 50°C during operation and 50°C during cleaning.  
 Hot water sanitizing up to 90°C.

Maximum Recommended Elements Per Housing: 6 elements

Hot Water Sanitization Recommendations: For optimal performance, Duratherm HWS RO elements should always be cleaned using approved CIP procedures and flushed with fouling-free water before the sanitization process. Feed pressure during sanitization should not exceed 40 psi and the crossflow should not incur a pressure drop greater than 2 psi per element. Heating rate to sanitizing temperature and cool down should not be faster than 5°C/minute. Maximum sanitization temperature is 90°C.

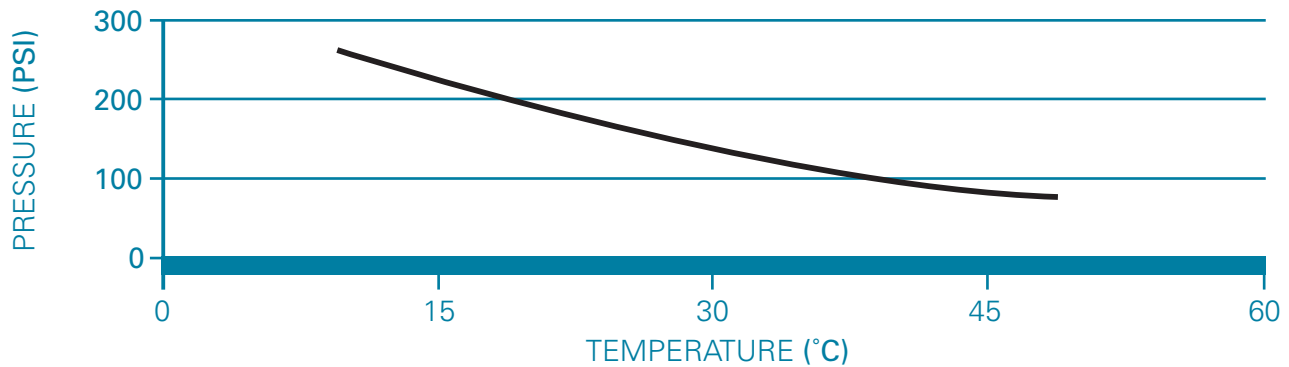


**NaCL REJECTION (20 GFD/33 LMH)**



\* Based on 2,000 ppm NaCL

**NET DRIVING PRESSURE (20 GFD/33 LMH)**



\* Based on 2,000 ppm NaCL



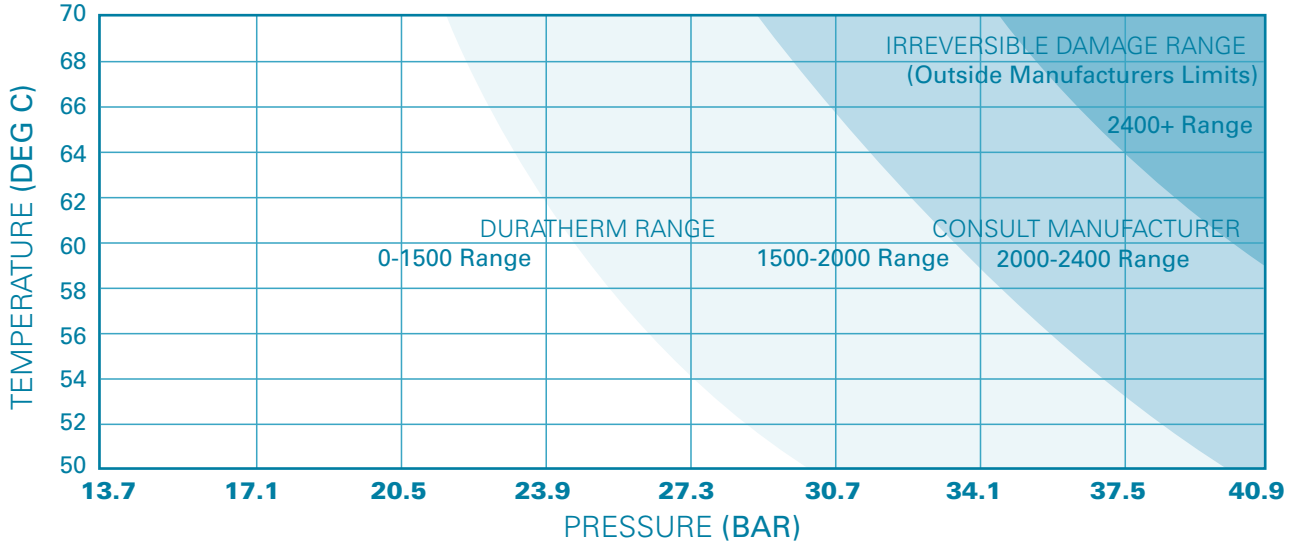
# DURATHERM™ HWS Series

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### Duratherm HWS-RO: High Temperature Operation

#### WAGNER DIAGRAM

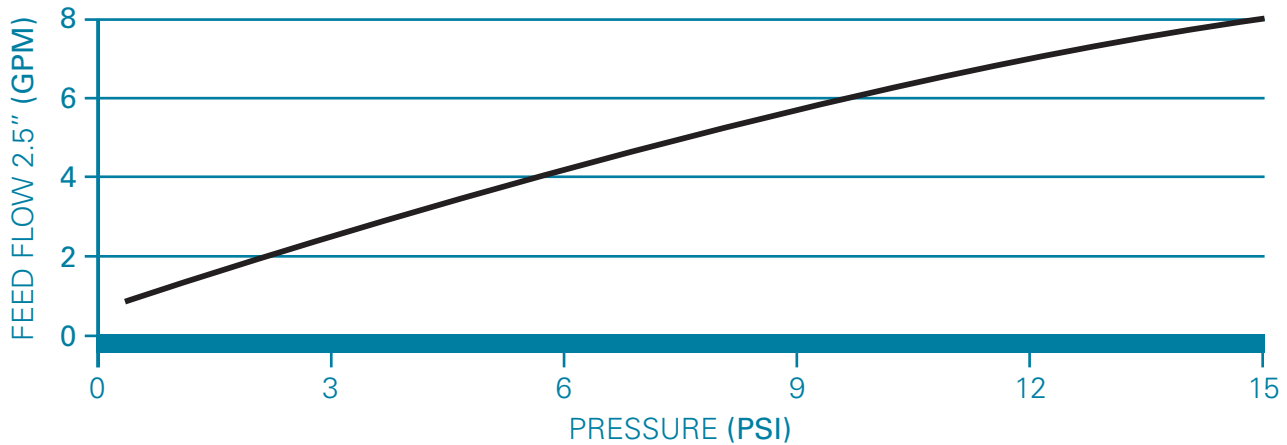
Wagner Unit = Temperature (°C) x Pressure (Bar)



#### MAXIMUM PRESSURE DROP

RANGE	5°C-50°C psig (bar)	51°C-60°C psig (bar)	61°C-70°C psig (bar)
PER ELEMENT	12 (0.8)	6 (0.4)	3 (0.2)
PER HOUSING	60 (4.1)	30 (2.1)	15 (1.0)

#### PRESSURE DROP vs. FLOW (AT 25°C, 1cP)



\* Based on Desal 2.5" Housings

\* Use as a guideline, delta P will vary based on tolerances of housing.



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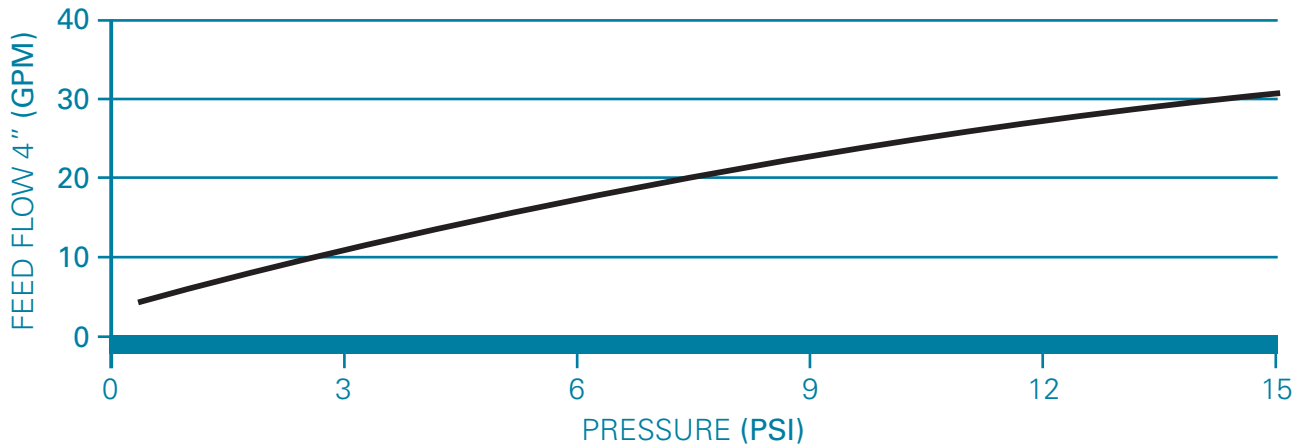
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### Duratherm HWSRO-HR: High Temperature Operation

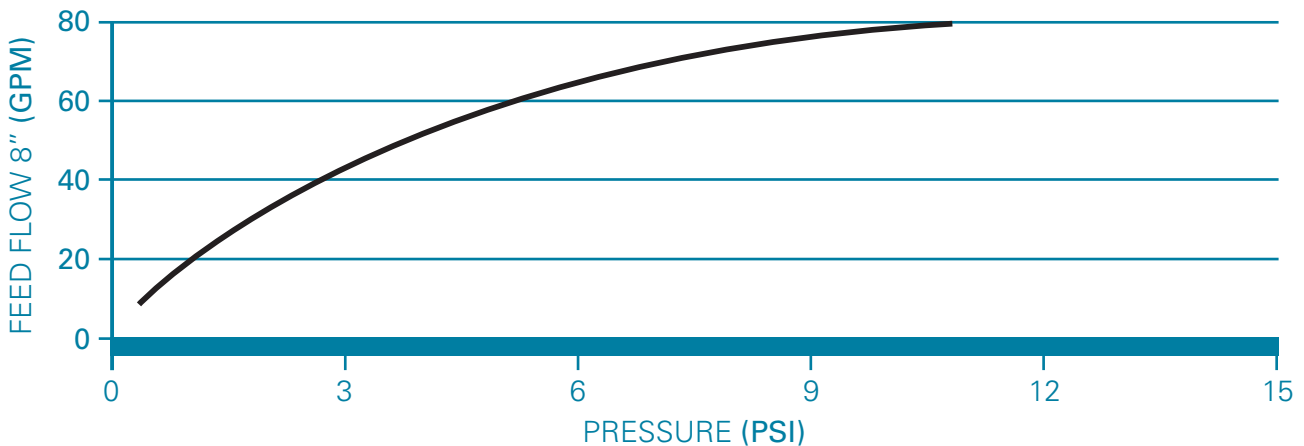
#### PRESSURE DROP vs. FLOW (AT 25°C, 1cP)



\* Based on Desal 4\"/>

\* Use as a guideline, delta P will vary based on tolerances of housing.

#### PRESSURE DROP vs. FLOW (AT 25°C, 1cP)



\* Based on Desal 8\"/>

\* Use as a guideline, delta P will vary based on tolerances of housing.

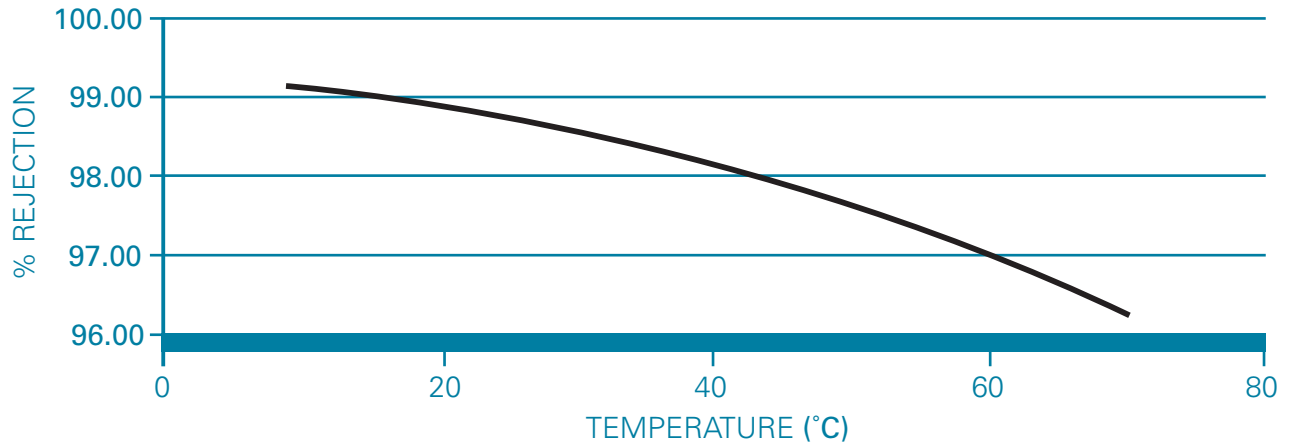
Maximum Temperature: 70°C during operation and 50°C during cleaning.  
Hot water sanitizing up to 90°C.

Maximum Recommended Elements Per Housing: 5 elements



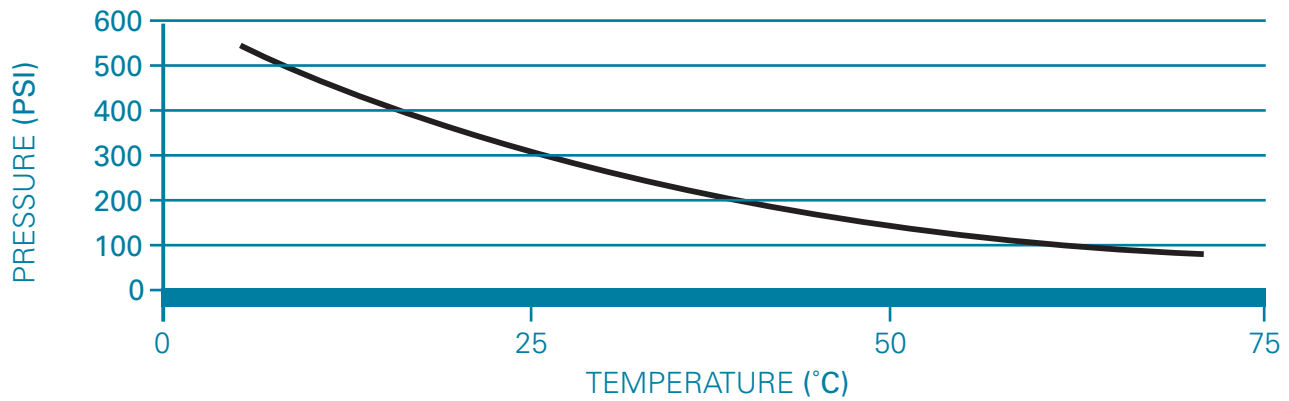
### Duratherm HWSRO-HR: High Temperature Operation

#### NaCL REJECTION (20 GFD/33 LMH)



\* Based on 2,000 ppm NaCL

#### NET DRIVING PRESSURE (20 GFD/33 LMH)



\* Based on 2,000 ppm NaCL



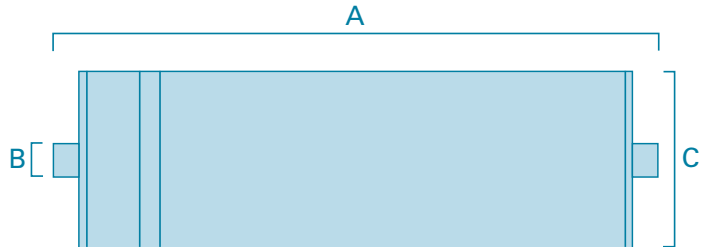
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Hot Water Sanitization / High Temperature

### ELEMENT DIMENSIONS AND WEIGHT

#### MODEL NUMBER LEGEND



MODEL	DIMENSIONS INCHES(MM)			DRY BOXED
	A	B	C*	WEIGHT LBS (KG)
DURATHERM HWS RO 2521**	21.00 (533)	0.750 (19)	2.40 (61)	1.3 (0.6)
DURATHERM HWS RO 2526**	26.00 (660)	0.750 (19)	2.50 (64)	3.7 (1.7)
DURATHERM HWS RO 2540**	40.00 (1016)	0.750 (19)	2.40 (61)	5.0 (2.3)
DURATHERM HWS RO 4014**	14.00 (356)	0.750 (19)	3.88 (99)	2.0 (0.9)
DURATHERM HWS RO 4040**	40.00 (1016)	0.750 (19)	3.88 (99)	12.0 (5.5)
DURATHERM HWS RO 8040	40.00 (1016)	1.125 (29)	7.88 (200)	32.0 (14.5)
DURATHERM HWS RO-HR 2540**	40.00 (1016)	0.750 (19)	2.40 (61)	5.0 (2.3)
DURATHERM HWS RO-HR 4040**	40.00 (1016)	0.750 (19)	3.88 (99)	12.0 (5.5)
DURATHERM HWS RO-HR 8040	40.00 (1016)	1.125 (29)	7.88 (200)	32.0 (14.5)

\* The element diameter (dimension C) is designed for optimum performance in GE pressure vessels. Other pressure vessel dimension and tolerance may result in excessive bypass and loss of capacity.

\*\* Element includes external permeate tube.  
 Length includes ATDs. Elements are shipped dry.



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