

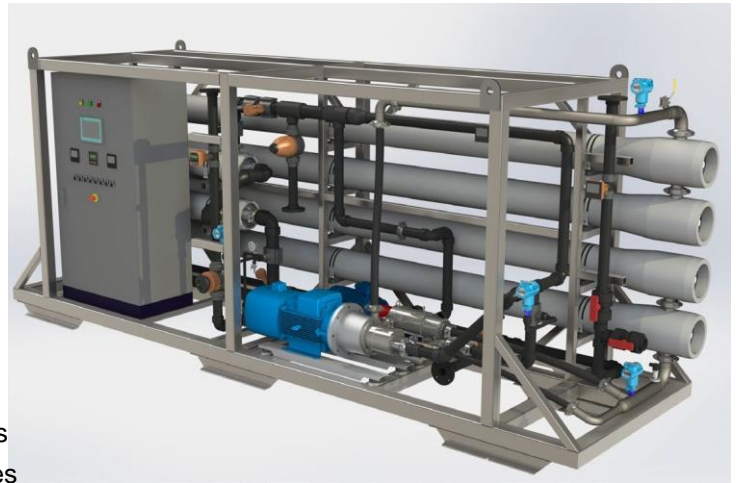
## AVRO Sea Water RO Systems

### SWRO-80 with ERD Series – Danfoss or Fedco options

SWRO-80 with ERD (energy recovery device) series are available with capacities ranging from 6m<sup>3</sup>/hr to 55m<sup>3</sup>/hr. Designed to convert seawater to drinking water with energy recovery devices, these systems use our proven technology to give reliable performance and meet the demanding requirements of the marine environment. By using high quality reverse osmosis seawater membranes in the water purification process, the product water is used in a variety of areas including hotels, resorts, navy, offshore platforms and industrial applications etc.

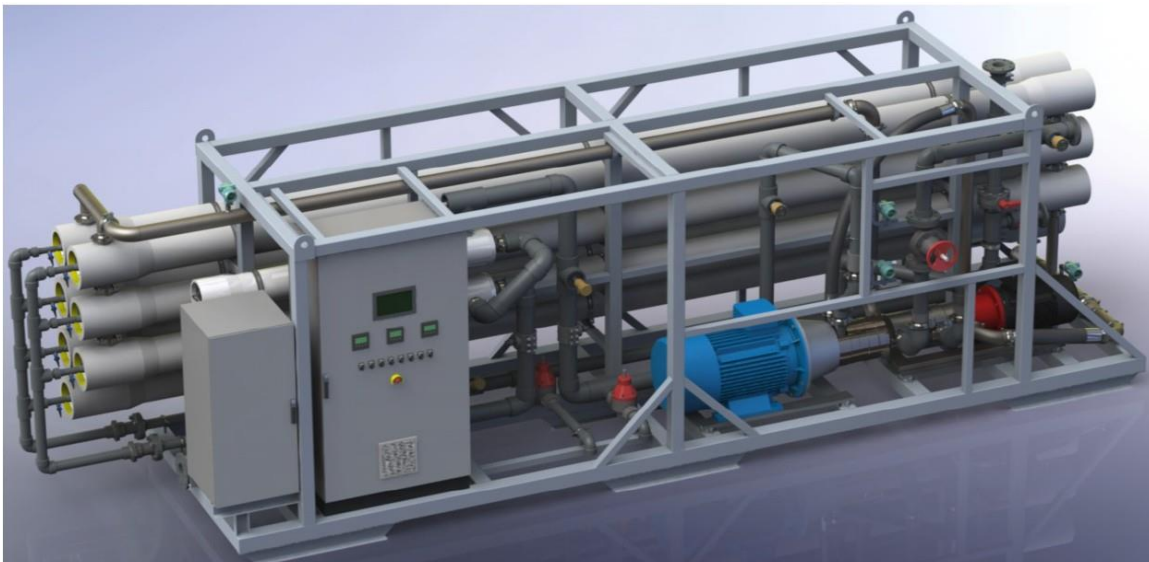
#### Features:

- Auto start-up flush
- HP pump with VFD
- Slow Start-up pressure build up
- Auto fresh water shut-down flush
- Auto Shut-down slow pressure release
- Low pressure/high pressure protection
- Pumps and valves switching smoothly
- SS304 Skid with marine grade coating
- SS304 control panel with marine grade coating
- Auto and manual 2 modes operation
- With pulsation dampener on applicable models
- Diaphragm isolation seals for pressure switches
- Diaphragm isolation seals for high pressure gauges
- Permeate and concentrate water low flow protection



#### Benefits

- Fully Equipped and Customisable to your specifications
- Full containerization available
- Full FAT prior to shipping
- Expandable and Skid Mounted
- Low Operation and Maintenance Costs
- Components Easily Accessible
- Easy Maintenance and Servicing
- Pre-Plumbed Wired and Assembled
- 2205 or 2507 pipework options
- Manufactured in ISO9001 facility



## Standard Specifications

### Cartridge - High Flow Filter

- Housing --- ET80-150S-20/40/60
- Quantity --- 2 pcs
- Sediment filter --- 8" x 20"/40"/60" ; 5&1 micron

### Membrane Elements and Housings

- Membrane model --- SW30HRLE-400
- Membrane manufacturer --- Various options
- Housing Spec. --- FRP, 1000psi, Side port

### High Pressure Pump

- Pump head inner wet contact ---SS2507
- Pump head (case)—SS2205
- Pump Brand --- Danfoss

### Connection Port

- Feed sea water Inlet Port
- Fresh water inlet port (for shutdown flush)
- Permeate Port
- Drain Port
- Air release port

### Instrumentation

- Digital Flow meters --- Permeate, concentrate
- Conductivity --- Permeate
- Pressure gauge--- Pre-filter, post - filter, pump discharge, concentrate
- Pressure switch --- Feed, RO membrane inlet
- Pressure transmitter—Pre-filter, post-filter, Hp pump discharge, concentrate

### Options or Upgrades

- Feed water pump
- Feed Water Conductivity Meter
- Communication: Modbus RTU or others
- Ethernet on-line monitor and control
- Anti-scalant & other Dosing Systems
- 2507 pipework
- pH Meter
- Clean-in-Place (CIP) ports
- Pretreatment system
- OPR meter
- Containerised
- 316 frame

### Working Conditions

Maximum Feed Temperature °C (°F)	35 (95)	pH (Continuous)	4 ~ 9
Minimum Feed Temperature °C (°F)	5 (41)	Minimum pH (Continuous)	4
Maximum Feed Pressure bar (psi)	5 (72)	Free Chlorine	undetectable
Minimum Feed Pressure bar (psi)	2 (29)	Iron (ppm)	<0.1
Maximum TDS (ppm)	40000	Manganese (ppm)	<0.05
SDI	<5	Organic matter (ppm)	<1

### Control system

- PLC Control with HMI
- ABB VFD
- HP pump soft start
- Tank level control
- Low pressure/High pressure protection
- Auto feed water and fresh water flush
- Level switch control or manual
- Feed water pump VSD and control option

### Motorized valve

- Feed Water Valve --- UPVC; 10bar
- Fresh Water Inlet Valve (for flush)---UPVC; 10bar
- Fresh Flush outlet Valve (for flush)---SS2205; 128bar
- Actuator motor-220VAC or 24VDC

### Material of Construction

- High - pressure pipeline --- SS2205 Sch40 and flexible hose (SS2507 option)
- Low - pressure piping --- UPVC
- Frame --- SS304 marine grade coating (316 option)
- Control box --- IP54 (SS304 marine grade coating – other options available)

### Documentation Included

- Operation and maintenance manual
- Drawings: P&ID, Electrical diagram

MODEL	SWRO-80-42K	SWRO-80-63K	SWRO-80-84K	SWRO-80-132K	SWRO-80-150K
Feed Water TDS <sup>1</sup>	35000ppm	35000ppm	35000ppm	35000ppm	35000ppm
Permeate rate <sup>1</sup>	6 m <sup>3</sup> /hr	9 m <sup>3</sup> /hr	12 m <sup>3</sup> /hr	18 m <sup>3</sup> /hr	21 m <sup>3</sup> /hr
	up to 7m <sup>3</sup> /hr	up to 10m <sup>3</sup> /hr	up to 13.4m <sup>3</sup> /hr	up to 21m <sup>3</sup> /hr	up to 23.6m <sup>3</sup> /hr
Nominal Permeate rate (GPD)	42000	63000	84000	132000	150000
Nominal Permeate rate (M3/day)	168	240	320	500	566
Approx. conc. rate	8.6m <sup>3</sup> /hr	12.2m <sup>3</sup> /hr	16.4m <sup>3</sup> /hr	25.7m <sup>3</sup> /hr	28.9m <sup>3</sup> /hr
Design Recovery	40-45%	40-45%	40-45%	40-45%	40-45%
<b>HP Pump</b>					
Manufacturer	Danfoss (Fedco option available)				
Model	APP8.2 (50hz)	APP10.2 (50hz)	APP13 (50hz)	APP22 (50hz)	APP24 (50hz)
Quantity	1	1	1	1	1
Motor HP	22kw	30kw	37kw	55kw	55kw
Max. flow rate	8.3m <sup>3</sup> /hr	10.5m <sup>3</sup> /hr	13.8m <sup>3</sup> /hr	21.9m <sup>3</sup> /hr	24.5m <sup>3</sup> /hr
Max. Lubrication flow	0.4m <sup>3</sup> /hr	0.4m <sup>3</sup> /hr	0.4m <sup>3</sup> /hr	0.9m <sup>3</sup> /hr	0.9m <sup>3</sup> /hr
Pump head (case)	SS2205				
Pump head inner wet contact	SS2507				
Max. HP pressure	66.7bar				
<b>Energy Recovery Device</b>					
Manufacturer	Danfoss (Fedco option available)				
Model	iSave21 plus	iSave21 plus	iSave21 plus	iSave40	iSave40
Quantity	1	1	1	1	1
Motor HP	7.5kw	7.5kw	7.5kw	11kw	11kw
Allowed Flow rate range	6-22m <sup>3</sup> /hr	6-22m <sup>3</sup> /hr	6-22m <sup>3</sup> /hr	21-41m <sup>3</sup> /hr	21-41m <sup>3</sup> /hr
Max. Lubrication flow	0.4m <sup>3</sup> /hr	0.4m <sup>3</sup> /hr	0.4m <sup>3</sup> /hr	0.9m <sup>3</sup> /hr	0.9m <sup>3</sup> /hr
Pump head (case)	SS2205				
Pump head inner wet contact	SS2507				
<b>Membranes Elements and Housings 80240</b>					
Membrane qty.	12	18	24	36	42
Mem. Housing Style	6-element long				
Vessel array	2 in parallel	3 in parallel	4 in parallel	6 in parallel	7 in parallel
<b>Pre-filter (High-flow Cartridge)</b>					
Filter housing	ET80-150S-20	ET80-150S-40	ET80-150S-40	ET80-150S-60	ET80-150S-60
PP Cartridge Length	20"	40"	40"	60"	60"
Pre-filter housing Qty. (1st stage)	1	1	1	1	1
Pre-filter housing Qty. (2nd stage)	1	1	1	1	1
Capacity/each cartridge	15-25m <sup>3</sup> /hr	30-50m <sup>3</sup> /hr	30-50m <sup>3</sup> /hr	50-70m <sup>3</sup> /hr	50-70m <sup>3</sup> /hr

Main Valves					
Sea water motorised inlet valve	2" UPVC; butterfly	2.5" UPVC; butterfly	3" UPVC; butterfly	4" UPVC; butterfly	4"UPVC; butterfly
Fresh water motorized inlet valve	2" UPVC; butterfly	2.5" UPVC; butterfly	3" UPVC; butterfly	4" UPVC; butterfly	4"UPVC; butterfly
Concentrate valve	1.5"UPVC; diaphragm;	2"UPVC; diaphragm;	2"UPVC; diaphragm;	3"UPVC; diaphragm;	3"UPVC; diaphragm;
	adjustable	adjustable	adjustable	adjustable	adjustable
Installation					
Inlet	2" Flange	2.5" Flange	3" Flange	4" Flange	4" Flange
Permeate	1.5" Flange	2" Flange	2" Flange	2.5" Flange	3" Flange
Drain	1.5" Flange	2" Flange	2" Flange	3" Flange	3" Flange
Package Dimension					
Approx. Height	1800mm	1900mm	1900mm	1900mm	1900mm
Approx. Width	5000mm	5000mm	5000mm	6700mm	6700mm
Approx. Depth	1000mm	1000mm	1300mm	1000mm	1300mm
Approx. Shipping Weight	825kg	880kg	950kg	980kg	980kg
Options					
Feed water pump	16m <sup>3</sup> /hr@4bar	24m <sup>3</sup> /hr@4bar	32m <sup>3</sup> /hr@4bar	48m <sup>3</sup> /hr@4bar	55m <sup>3</sup> /hr@4bar
Antiscalant Dosing Unit	Metering pump: 0.95L/h	Metering pump: 2.57L/h	Metering pump: 2.57L/h	Metering pump: 2.57L/h	Metering pump: 4.2L/h
	Chemical tank: 200-300L	Chemical tank: 200-300L	Chemical tank: 300-500L	Chemical tank: 300-500L	Chemical tank: 300-500L
	CIP tank: 1000L	CIP tank: 1000L	CIP tank: 1500L	CIP tank: 2000L	CIP tank: 3000L
CIP system	CIP pump: 20m <sup>3</sup> /h@3.5bar	CIP pump: 30m <sup>3</sup> /h@3.5bar	CIP pump: 40m <sup>3</sup> /h@3.5bar	CIP pump: 60m <sup>3</sup> /h@3.5bar	CIP pump: 70m <sup>3</sup> /h@3.5bar
	CIP filter: BF-1-2	CIP filter: BF-1-2	CIP filter: BF-1-2	CIP filter: BF-1-2x2	CIP filter: BF-1-2x2
	As per request				

<sup>1</sup>Treatment ability and working pressure of the RO system are dependent on feed water quality.

<sup>2</sup> Nominal permeate rate listed at temperature 25°C, Permeate rate can be reduced by up to 20% as temperature drops.  
Specifications subject to change without notice



MODEL	SWRO-80-162K	SWRO-80-192K	SWRO-80-264K	SWRO-80-325K	SWRO-80-348K
Feed Water TDS <sup>1</sup>	35000ppm	35000ppm	35000ppm	35000ppm	35000ppm
Permeate rate <sup>1</sup>	24m <sup>3</sup> /hr	27m <sup>3</sup> /hr	36m <sup>3</sup> /hr	45m <sup>3</sup> /hr	48m <sup>3</sup> /hr
	up to 25.8m <sup>3</sup> /hr	up to 30.7m <sup>3</sup> /hr	up to 42m <sup>3</sup> /hr	up to 51.5m <sup>3</sup> /hr	up to 55m <sup>3</sup> /hr
Nominal Permeate rate (GPD)	162000	192000	264000	325000	348000
Nominal Permeate rate (M3/day)	615	730	1000	1230	1320
Approx. conc. rate	31.5m <sup>3</sup> /hr	37.5m <sup>3</sup> /hr	45.8m <sup>3</sup> /hr	63m <sup>3</sup> /hr	67.2m <sup>3</sup> /hr
Design Recovery	40-45%	40-45%	40-45%	40-45%	40-45%
<b>HP Pump</b>					
Manufacturer	Danfoss (50hz)				
Model	APP26 (50hz)	APP30 (50hz)	APP38 or APP46	APP53 (50hz)	APP53 or APP65
Quantity	1	1	1	1	1
Motor HP	75kw	75kw	90kw or 110kw	132kw	132kw or 160kw
Max. flow rate	26.7m <sup>3</sup> /hr	31.6m <sup>3</sup> /hr	39m <sup>3</sup> /hr or 39m <sup>3</sup> /hr	53m <sup>3</sup> /hr	53m <sup>3</sup> /hr or 67.3m <sup>3</sup> /hr
Max. Lubrication flow	0.9m <sup>3</sup> /hr	0.9m <sup>3</sup> /hr	1.5m <sup>3</sup> /hr	1.5m <sup>3</sup> /hr	1.5m <sup>3</sup> /hr
Pump head (case)	SS2205				
Pump head inner wet contact	SS2507				
Max. Pump pressure	66.7bar				
<b>Energy Recovery Device</b>					
Manufacturer	Danfoss Fedco Option available				
Model	iSave40	iSave40	iSave50	iSave70	iSave70
Quantity	1	1	1	1	1
Motor HP	11kw	11kw	18.5kw	18.5kw	18.5kw
Allowed Flow rate range	21-41m <sup>3</sup> /hr	21-41m <sup>3</sup> /hr	42-52m <sup>3</sup> /hr	50-70m <sup>3</sup> /hr	50-70m <sup>3</sup> /hr
Max. Lubrication flow	0.9m <sup>3</sup> /hr	0.9m <sup>3</sup> /hr	1.5m <sup>3</sup> /hr	1.5m <sup>3</sup> /hr	1.5m <sup>3</sup> /hr
Pump head (case)	SS2205				
Pump head inner wet contact	SS2507				
<b>Membranes Elements and Housings 80240</b>					
Membrane quantity	48	54	72	90	96
Memb. housing style	6-element long				
Membrane housing array	6 in parallel	9 in parallel	12 in parallel	15 in parallel	16 in parallel
<b>Pre-filter (High-flow Cartridge )</b>					
Filter housing	ET80-150S-80	ET80-150S-60	ET80-150S-60	ET80-150S-60	ET80-150S-60
PP Cartridge Length	80"	60"	60"	60"	60"
Pre-filter housing Qty. (1st stage)	1	2	2	3	3
Pre-filter housing Qty. (2nd stage)	1	2	2	3	3
Capacity/each cartridge	70-110m <sup>3</sup> /hr	50-70m <sup>3</sup> /hr	50-70m <sup>3</sup> /hr	50-70m <sup>3</sup> /hr	50-70m <sup>3</sup> /hr



Main Valves					
Sea water motorised inlet valve	4" UPVC; butterfly	5" UPVC; butterfly	5" UPVC; butterfly	6" UPVC; butterfly	6"UPVC;butterfly
Fresh water motorised inlet valve	4" UPVC; butterfly	5" UPVC; butterfly	5" UPVC; butterfly	6" UPVC; butterfly	6"UPVC; butterfly
Concentrate valve	3"UPVC; diaphragm;	4"UPVC; diaphragm;	4"UPVC; diaphragm;	5"UPVC; diaphragm;	5"UPVC; diaphragm
	adjustable	adjustable	adjustable	adjustable	adjustable
Installation					
Inlet	4" Flange	5" Flange	5" Flange	6" Flange	6" Flange
Permeate	3" Flange	3" Flange	4" Flange	4" Flange	4" Flange
Drain	3" Flange	4" Flange	4" Flange	5" Flange	5" Flange
Package Dimension					
Approx. Height	1800mm	1900mm	1900mm	1900mm	1900mm
Approx. Width	5000mm	5000mm	5000mm	6700mm	6700mm
Approx. Depth	1000mm	1000mm	1300mm	1000mm	1300mm
Approx. Shipping Weight	825kg	880kg	950kg	980kg	980kg
Options					
Feed water pump	60m <sup>3</sup> /hr@4bar	70m <sup>3</sup> /hr@4bar	90m <sup>3</sup> /hr@4bar	115m <sup>3</sup> /hr@4bar	125m <sup>3</sup> /hr@4bar
Antiscalant Dosing Unit	Metering pump: 4.2L/h Chemical tank: 300-500L	Metering pump: 4.2L/h	Metering pump: 7.57L/h	Metering pump: 7.57L/h	Metering pump: 7.57L/h
	Chemical tank: 300-500L	Chemical tank: 300-500L	Chemical tank: 500-800L	Chemical tank: 500-800L	Chemical tank: 500-800L
CIP system	CIP tank: 3000L	CIP tank: 3000L	CIP tank: 4000L	CIP tank: 5000L	CIP tank: 5000L
	CIP pump: 80m <sup>3</sup> /h@3.5bar	CIP pump: 90m <sup>3</sup> /h@3.5bar	CIP pump: 120m <sup>3</sup> /h@3.5bar	CIP pump: 150m <sup>3</sup> /h@3.5bar	CIP pump: 160m <sup>3</sup> /h@3.5bar
	CIP filter: BF-1-2x2	CIP filter: BF-1-2x3	CIP filter: BF-1-2x3	CIP filter: BF-1-2x4	CIP filter: BF-1-2x4
Pretreatment:	As per request				

<sup>1</sup>Treatment ability and working pressure of the RO system are dependent on feed water quality.

<sup>2</sup> Nominal permeate rate listed at temperature 25°C, Permeate rate can be reduced by up to 20% as temperature drops.  
Specifications subject to change without notice

AVRO Seawater RO Systems are available in a variety of voltages. Please select the desired voltage code as below. The three-digit code will be added to the end of the Seawater RO System Model number.

Example: SWRO-2000-116 = 110v/1ph/60Hz. Voltage Codes (available for all models):

-116 = 110V/1Ph/60Hz

-216 = 220-240V/1Ph/60Hz

-215 = 220-240V/1Ph/50Hz

-235 = 220-240V/3Ph/50Hz

-236 = 220V-240V/3Ph/60Hz

-335 = 380V-420V/3Ph/50Hz

Remark: All weights and dimensions are approximate. Other custom designs are available upon request