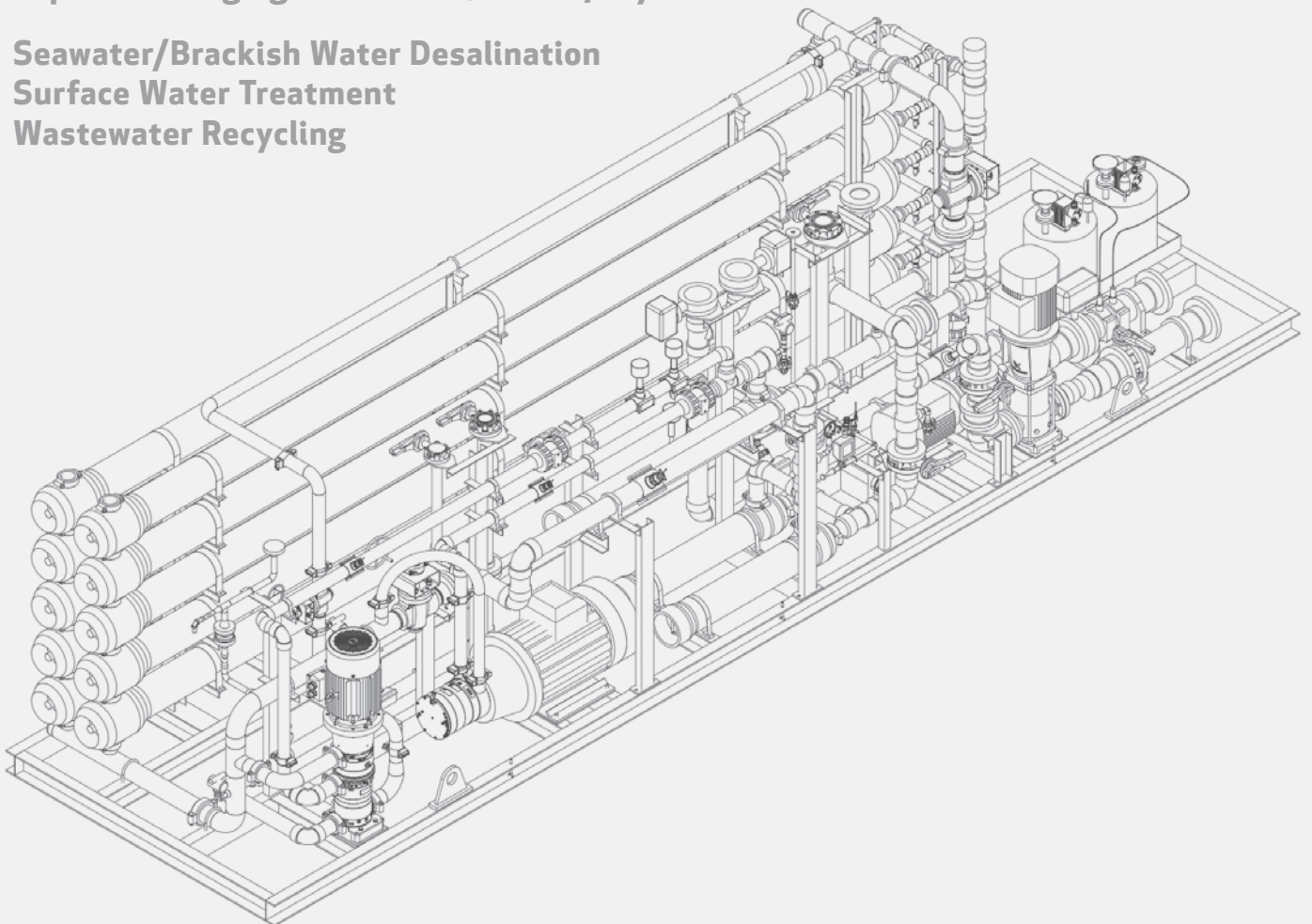


STANDARD MEMBRANE SYSTEMS

Capacities ranging from 84 - 9,000 m³/day

Seawater/Brackish Water Desalination
Surface Water Treatment
Wastewater Recycling



Hyflux[®]

ABOUT HYFLUX

Hyflux is one of the world's leading provider of an innovative suite of water and wastewater process technologies, **providing cost-effective and sustainable solutions in seawater desalination, water recycling, wastewater treatment, and potable water treatment.**

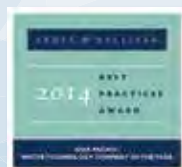


Founded since 1989, Hyflux has established its headquarters in Singapore and various sales offices in China, India, Indonesia, Oman, Algeria, Saudi Arabia and Nigeria. Hyflux is listed on the Singapore Stock Exchange since 2001. It is currently one of the top desalination players in the industry with a revenue of S\$445.2 million in 2015 and approximately 2,400 employees serving customers in over 130 countries.

At the core of Hyflux's business is the design and development of the award winning and proprietary Kristal® ultrafiltration membrane. It has achieved the NSF/ANSI Standard 61 certification, certified to remove drinking water contaminants like cryptosporidium and giardia.

Leveraging the unparalleled engineering know-how and experience from our large EPC projects, Hyflux has developed pre-engineered compact and modular Standard Membranes Systems, specially designed to achieve better energy efficiencies and ease of installation.

At Hyflux, we provide our clients with flexibility and peace of mind in addressing their water and wastewater challenges across industries.



KEY INDUSTRIES & APPLICATIONS



Food & Beverage



Municipal



Pharmaceutical



Power



Steel & Metal



Seawater Desalination Pre-treatment

High salinity, organic content and microbiological activity pose high fouling risk for the Reverse Osmosis (RO) membranes. This can be prevented with carefully designed pre-treatment. Hyflux's Standard Membrane Systems (SMS) utilise cutting edge technology that protects the Seawater Reverse Osmosis (SWRO) systems from fouling by delivering consistently high quality filtrate.



Drinking Water

SMS produce purified water that complies with World Health Organisation's drinking water standards, promising operational stability and safety for quality production. Kristal® ultrafiltration (UF) membranes are NSF certified, effectively removing viruses and pathogens such as cryptosporidium from the water source.



F&B Process Water for Reuse

Hyflux's expertise in wastewater management and process water recovery for reuse allows F&B companies to save millions of dollars per year and conserve fresh water. The beverage sector especially is increasingly motivated to reuse process waters for boilers, evaporators and chillers.



Temporary Water Management

Ideal for the supply of potable water from construction sites to disaster relief areas. Hyflux's containerised SMS are mobile and easy to install, supporting quick installation in plug and play configurations to supply potable water as well as treat wastewater.



Water Pre-treatment for Cooling Towers

For power plant operation, pre-treatment is critical for the water quality required prior to boiler feed water treatment or cooling tower make-up water. Hyflux's Kristal® UF membranes effectively remove suspended solids and reduce silica and organic particles to enhance plant operations.

STANDARD MEMBRANE SYSTEMS



System Benefits

- Modularized pre-engineered systems
- High system efficiency
- Small footprint
- High-quality product water
- Ease of installation
- Low capital outlay
- High quality components
- Reliable performance
- Fast delivery

From seawater reverse osmosis (SWRO) to brackish water reverse osmosis (BWRO) systems using proprietary Kristal® ultrafiltration (UF) pre-treatment technology, Hyflux has standard design configurations suitable for a wide range of water treatment applications. These pre-engineered Standard Membrane Systems (SMS) are designed for high performance efficiency, compact footprint, ease of use and low lifecycle costs, drawing on Hyflux's expertise in the design, development, installation, operation and maintenance of desalination facilities, from some of the largest municipal plants, to small and medium-sized industrial plants worldwide.

As a leader in membrane-based desalination, Hyflux has unmatched experience in tailoring integrated desalination solutions to meet customer's specifications and local water conditions.

Hyflux's SMS offer a sustainable solution for industries and communities facing the challenges of water shortages and water usage restrictions by providing a reliable, high quality supply of water in a simple, quick and cost-effective way. Each system has its own distinctive function: the MK-MSW-MBW Series produces industrial grade water, the MK-MSW Series provides potable water and the MK-MBWS Series produces high quality water from brackish water sources.

STANDARD MEMBRANE SYSTEMS

ROBUST PERFORMANCE IN A COMPACT DESIGN



Specifications For UF Systems

- Marine coated steel frame
- Kristal® UF membrane modules
- Set of auto disc filters
- VFD operated Feed / CIP pump
- VFD operated Backwash pump
- Automatic valves
- Complete set of piping
- Measurements and analysers
- RIO Panel
- Motor Control Centre (MCC) and Control Panel (CP)



Specifications For SWRO, BWRO and LPRO Systems

- Marine coated steel frame
- RO modules and RO pressure vessels
- VFD operated booster pump (for SWRO)
- VFD operated high pressure pump (for BWRO and LPRO only)
- Energy recovery system (ERS for SWRO only)
- Dosing pumps and tanks
- Cartridge filter
- Automatic valves
- Complete set of piping
- Instruments and analysers
- RIO Panel
- Motor Control Centre (MCC) and Control Panel (CP)

STANDARD MEMBRANE SYSTEMS

OVERVIEW

The Hyflux Standard Membrane Systems (SMS) comprise Ultrafiltration (UF), Seawater Reverse Osmosis (SWRO), Brackish Water Reverse Osmosis (BWRO) as well as Low Pressure Reverse Osmosis (LPRO) systems in compact designs, promising high reliability and energy savings. These systems are pre-engineered for ease of installation. Available in different series suited for seawater and/or brackish water, complete with choices of models suited for high salinity to low salinity to produce potable and industrial grade water. The Hyflux SMS are modular, able to mix and match, with capacities ranging from 84 to 9,000 m³/day with recovery of up to 90%.



UF SYSTEM: MKS / MKB SERIES

- Suitable as standalone system or pre-treatment for SWRO and BWRO systems
- Choice of MKS Series suited for treating seawater or MKB Series for treating brackish water
- Feed TDS for MKB Series ranges from < 3,000 mg/L
- Feed TDS for MKS Series ranges from < 50,000 mg/L
- Permeate Turbidity < 0.2 NTU
- Energy consumption of MK series is 0.2 to 0.4 kWh/m³



BWRO SYSTEM: MBWS SERIES

- Suitable for use after the MSW Series as a second pass to produce industrial grade water for pharmaceutical and semiconductor industries.
- Treats permeate from MSW Series to produce high purity water.
- Feed TDS ranging from <3,000 mg/L
- Permeate TDS < 100 mg/L
- Energy consumption of MBWS series is 0.8 to 1.2 kWh/m³



SWRO SYSTEM: MSW SERIES

- Suitable for use with UF systems: (MKS) Series to produce potable water for industries such as F&B, Hospitality, Water Bottling.
- Treats seawater to produce potable water for industries and small communities
- Choice of SWRO normal, high or low salinity series
- Feed TDS for MSW-L (Low Salinity) ranging from < 20,000-30,000 mg/L
- MSW-N (Normal Salinity) ranging from < 30,000-40,000 mg/L
- MSW-H (High Salinity) ranging from < 40,000-50,000 mg/L
- Permeate TDS < 500mg/L for MSW-L and MSW-N.
- For MSW-H TDS <750 mg/L*
- Energy consumption of MSW series is 3 to 3.5 kWh/m³,

* 750 mg/L in case of TDS > 40,000 mg/L as feed

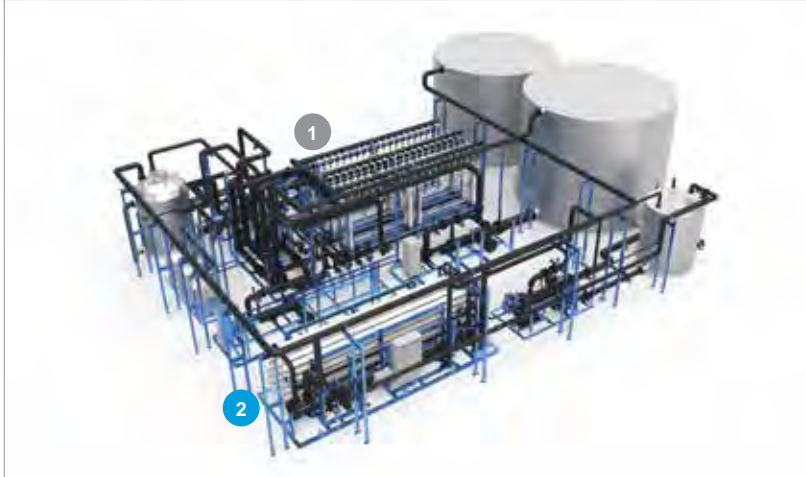


LPRO SYSTEM: MBW SERIES

- Suitable for desalinating brackish water sources to produce and recycle water for water intensive industries like agriculture, textiles and pulp and paper.
- Treats borewell, surface or river water.
- Feed TDS ranging from <1,000 mg/L
- Permeate TDS < 50 mg/L
- Energy consumption of MBW series is 0.6 to 1.0 kWh/m³

STANDARD MEMBRANE SYSTEMS

OVERVIEW



UF-BWRO SYSTEM: MK-MBWS SERIES

1 2

- Comprises UF and BWRO sub-systems
- Suitable for treating brackish water
- Feed TDS ranging from 1,500 – 3,000 mg/L
- Permeate TDS < 100 mg/L
- Energy consumption of MK-MBWS series is 1.0 to 1.5 kWh/m³



UF-SWRO SYSTEM: MK-MSW SERIES

1 3

- Comprises UF and SWRO sub-systems
- Choice of SWRO normal, high or low salinity series
- Suitable for producing potable water
- Feed TDS ranging from 20,000 – 50,000 mg/L
- Permeate TDS < 500 mg/L & 750* respectively
- Energy consumption of MK-MSW series is 3.6 to 4.1 kWh/m³


* 750 mg/L in case of TDS > 40,000 mg/L as feed



UF-SWRO-LPRO SYSTEMS MK-MSW-MBW SERIES

1 3 4

- Comprises UF, SWRO and LPRO sub-systems
- Choice of SWRO normal, high or low salinity series
- Suitable for producing industrial grade water
- Feed TDS ranging from 20,000 - 50,000 mg/L
- Permeate TDS < 50 mg/L
- Energy consumption of MK-MSW-MBW series is 4.5 to 5.0 kWh/m³



STANDARD SYSTEMS OPERATING PARAMETERS

STANDARD MEMBRANE SYSTEMS

WATER QUALITY FOR UF SYSTEMS

Feed Water Parameters	Units	Normal	Maximum
Turbidity	NTU	< 10	< 25
TSS	mg/L	< 20	< 50
TOC	mg/L	< 5	< 15
COD	mg/L	< 15	< 30
Total Oil & Grease	mg/L	Negligible	< 1
Total Iron	mg/L	< 0.2	
Total Manganese	mg/L	< 0.05	
Total Colour	Pt-Co/L	< 10	< 20
Total Hardness as CaCO ₃	mg/L	< 2,000	< 3,000
Product Water Parameters	Units	Expected Value	
Turbidity	NTU	< 0.2	
SDI	-	< 3	

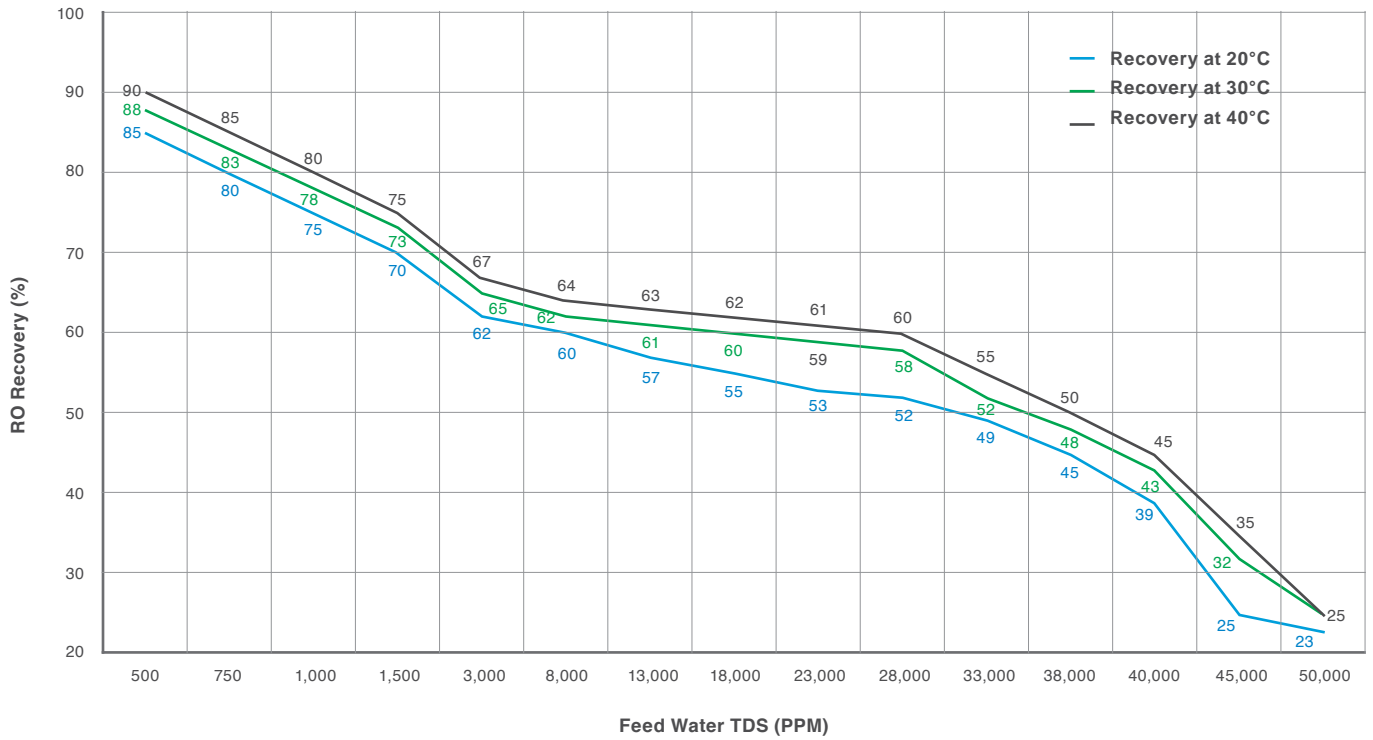
WATER QUALITY FOR RO SYSTEMS

Feed Water Parameters	Units	Seawater			Brackish	
		Low Salinity	Normal Salinity	High Salinity	Low Salinity	High Salinity
TDS	mg/L	20,000 – 30,000	30,000 – 40,000	40,000 – 50,000	1,500	3,000
pH	pH	6 - 9				
Turbidity	NTU	< 0.2				
SDI	-	< 3				
Temperature	°C	20 - 40				
Oil & Grease	mg/L	Nil				
Chlorine	mg/L	Nil				
TOC	mg/L	< 1				
COD	mg/L	Nil				
Silica, SO ₂	mg/L	< 40				
Product Water Parameters	Units	Seawater		Brackish		
		One Pass RO	Two Pass RO	One Pass RO		
TDS	mg/L	< 500–750*	< 50	< 100		

* 750 mg/L in case of TDS > 40,000 mg/L as feed

STANDARD MEMBRANE SYSTEMS

RO RECOVERY (%) VS FEED WATER TDS (PPM)

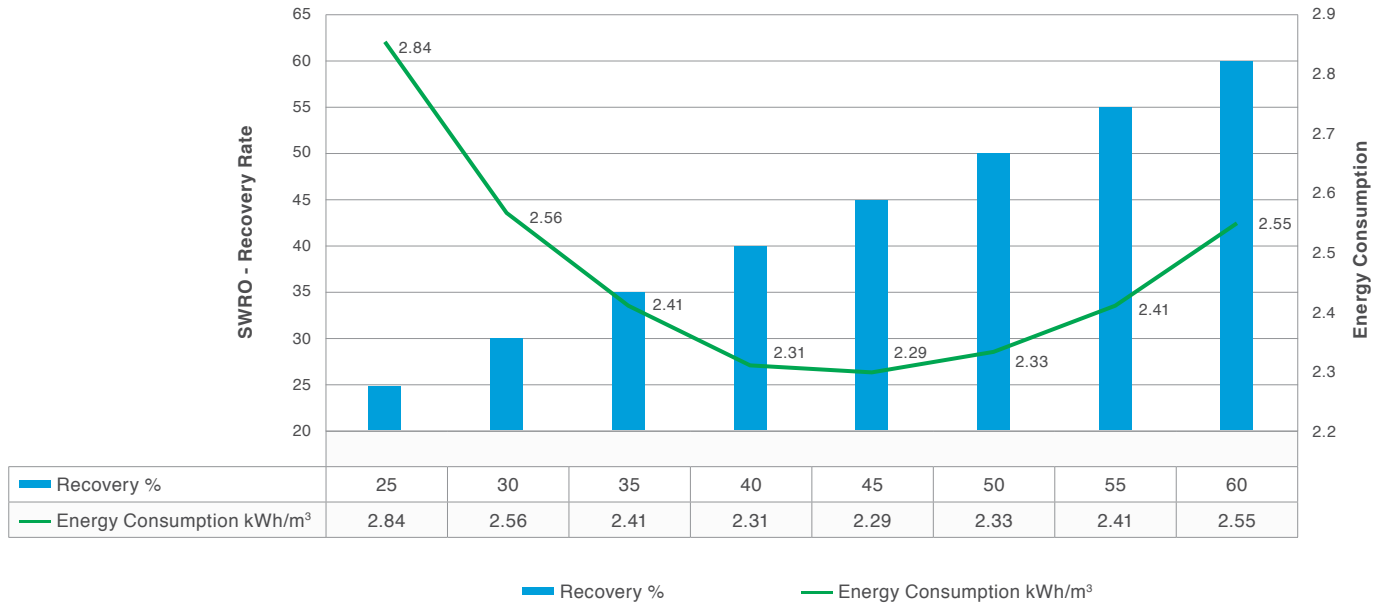


RO Feed TDS (PPM)	RO System Recovery (%)		
	20°C	30°C	40°C
500	85	88	90
750	80	83	85
1,000	75	78	80
1,500	70	73	75
3,000	62	65	67
8,000	60	62	64
13,000	57	61	63
18,000	55	60	62
23,000	53	59	61
28,000	52	58	60
33,000	49	52	55
38,000	45	48	50
40,000	39	43	45
45,000	25	32	35
50,000	23	25	25

STANDARD MEMBRANE SYSTEMS

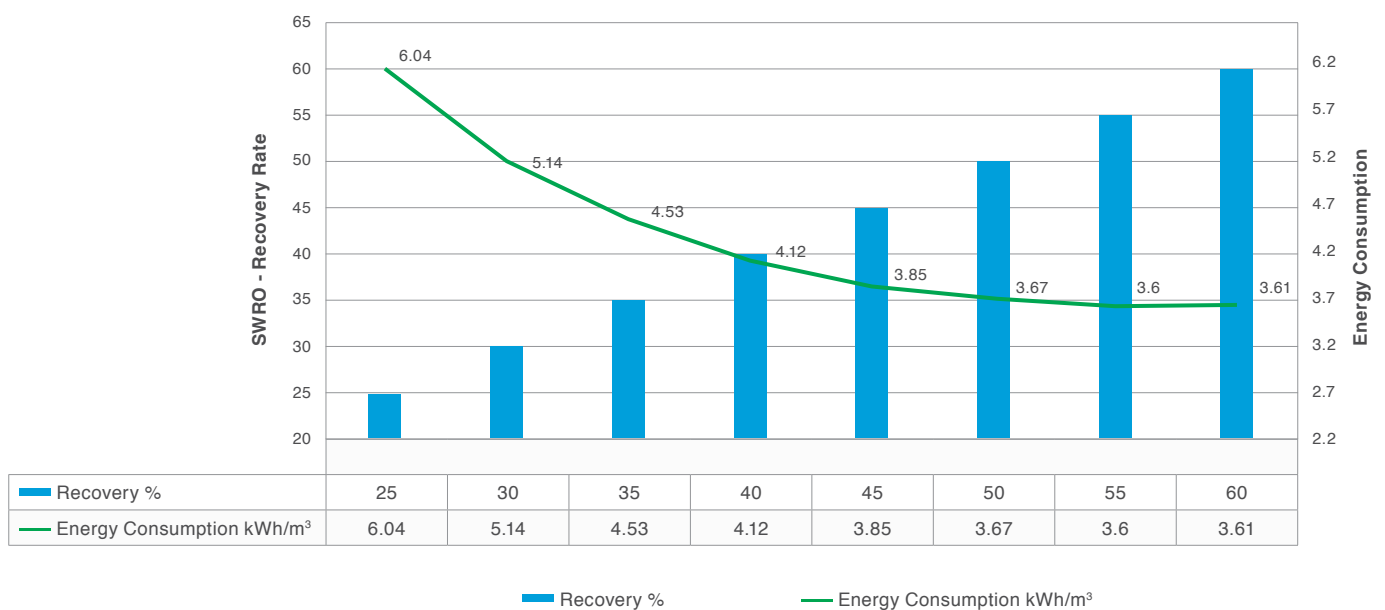
SWRO RECOVERY VS ENERGY CONSUMPTION (WITH TURBOCHARGER AS ENERGY RECOVERY DEVICE (ERD))

Based on - TDS - 35,000 ppm, 25°C & 3.5 year element age



SWRO RECOVERY VS ENERGY CONSUMPTION (WITHOUT TURBOCHARGER)

Based on - TDS - 35,000 ppm, 25°C & 3.5 year element age



SYSTEM OPERATING PARAMETERS

Operating Parameters	Unit	Seawater	Brackish	
		MSW Series	MBW Series	MBWS Series
Operating temperature	°C	20 - 35	20 - 35	20 - 35
Maximum system recovery	%	45	90	75
Maximum feed water pH	-	7.7	7.7	7.7
Maximum feed pressure	bar	65	15	15
Maximum permeate back pressure	bar	1	1	1
Requirement for CIP	mth	3	6	4 - 6

Series	System	Feed TDS (mg/L)	Product TDS (mg/L)
MKS-MSW-MBW	UF-SWRO-BWRO	20,000 – 50,000	< 50
MKS-MSW	UF-SWRO	20,000 – 50,000	< 500–750*
MKB-MBWS	UF-BWRO	1,500 – 3,000	< 100
MKB / MKS	UF	< 3,000 (MKB) < 50,000 (MKS)	Same as feed
MSW	SWRO 1 st pass	Low salinity: 20,000 – 30,000 Normal salinity: 30,000 – 40,000 High salinity: 40,000 – 50,000	< 500 < 500 < 750*
MBW	LPRO 2nd pass	< 1,000	< 50
MBWS	BWRO 1 st pass	< 3,000	< 100

Note:

According to World Health Organisation's guidelines, potable water is TDS < 500 mg/L

* 750 mg/L in case of TDS > 40,000 mg/L as feed

STANDARD SYSTEMS TECHNICAL SPECIFICATIONS

ULTRAFILTRATION SYSTEMS

MKB / MKS SERIES



Model: MK-200

Model	Net Permeate Capacity*		Feed Flow Rate		No. of UF Membranes	Installation Connections			Estimated Dry Weight	Estimated Wet Weight	System Dimension L x W x H
	(m ³ /day)	(m ³ /hr)	(m ³ /day)	(m ³ /hr)		Feed	Permeate	Concentrate			
						(inches)			(kg)	(kg)	(m)
MK-32	240	10	267	11	5	2"	2"	3"	2,000	4,000	3.8 x 2.1 x 3.3
MK-50	360	15	400	17	8	2"	2"	4"	2,500	6,000	4.4 x 2.5 x 3.3
MK-80	720	30	800	33	14	3"	3"	6"	4,500	10,000	5.2 x 3.2 x 3.3
MK-100	1,440	60	1,600	67	26	3"	3"	6"	5,500	15,000	7.1 x 3.5 x 3.6
MK-150	3,000	125	3,333	139	54	10"	6"	8"	15,000	24,000	12.0 x 13.0 x 4.5
MK-200	4,800	200	5,333	222	86	14"	8"	8"	21,000	31,000	15.5 x 17.0 x 4.5
MK-250	7,200	300	8,000	333	130	18"	10"	10"	32,000	54,000	17.5 x 19.0 x 5.0
MK-300	9,000	375	10,000	417	160	20"	12"	10"	35,000	59,000	17.5 x 19.0 x 5.5

Options of Brackish and Seawater versions: MKS for seawater application and MKB for brackish water application.

* Based on optimal feed water conditions

^ Above capacities, dimension and weights are based on best estimates.

MKB / MKS SERIES : TECHNICAL SPECIFICATIONS

Model	UOM	MKS/B-32	MKS/B-50	MKS/B-80	MKS/B-100	MKS/B-150	MKS/B-200	MKS/B-250	MKS/B-300	
Permeate capacity (Max.)	m ³ /day	240	360	720	1,440	3,000	4,800	7,200	9,000	
Concentrate rate (Min.)	m ³ /day	27	40	80	160	333	533	800	1,000	
Feed rate (Max.)	m ³ /day	267	400	800	1,600	3,333	5,333	8,000	10,000	
System recovery (Max.)	%	90								
Operating Temperature Range	°C	20 - 35								
UF Feed Pump / UF CIP Pump / UF Backwash Pump										
Model		NBG or equivalent								
Manufacturer		Grundfos or equivalent								
Quantity		1								
Motor (Feed Pump)	kW/HP	3 / 4	4 / 5.5	7.5 / 10	7.5 / 10	22 / 30	37 / 50	55 / 75	75 / 100	
Motor (CIP Pump)	kW/HP					15 / 20	30 / 40	45 / 60	45 / 60	
Motor (Backwash Pump)	kW/HP	2.2 / 3	4 / 5	7.5 / 10	18.5 / 25	30 / 40	45 / 60	75 / 100	75 / 100	
Operation		VFD Operated								
MOC		Seawater: Duplex Stainless Steel, Brackish Water: SS316								
Membrane Elements and Housings										
Membrane Model		Kristal K600ETI-55 or equivalent								
Membrane Manufacturer		Hyflux								
Membrane Quantity		5	8	14	26	54	86	130	160	
Nominal Molecular Cut-off Weight	Daltons	120,000								
Housing Shell MOC		PVC								
Flow Type		Outside-in								
Installation and Utility Requirements										
UF Feed flange end		2"		3"		10"	14"	18"	20"	
UF Permeate flange end		2"		3"		6"	8"	10"	12"	
UF Feed Water Pressure (min.)	bar	0.2-2								
Air Pressure (oil free)	bar	7								
Waste water volume for drain trench sizing requirement	MLD / m ³ /hr	0.28 / 12	0.38 / 16	0.84 / 35	0.84 / 35	7.2 / 300	12 / 500	19.2 / 800	19.2 / 800	
Power		400 VAC +/- 20%, 3-phase, 50/60Hz								
Control circuit		120/220V, 1-phase, 50/60Hz								
Measuring Instruments										
Pressure switch		Instrument air line				Instrument air line, UF feed pump				
Pressure guage		Instrument line, UF air scouring line, Reject recirculation line, UF permeate line				Instrument line, UF air scouring line, Reject recirculation line, UF permeate line, CIP pump discharge, Backwash pump discharge, NaOCl, HCl, NaOH pump discharge.				
Flow indicator (rotameter)		UF air scouring line, Reject recirculation line								
Flow measurement		UF permeate line, Reject recirculation line								
DPS		Auto disc filter								
Pressure transmitter		UF Feed								
Analyzers		Turbidity meter (Optional)				pH meter for UF CIP, Turbidity meter (optional)				
Level Switch		UF feed / CIP tank, Backwash tank				NaOCl, HCl, NaOH Dosing tank				
Level Transmitter		UF feed / CIP tank				UF CIP tank / Backwash tank				
Recommended Tank Size										
UF Feed tank	m ³	15	25	50	75	100	150	200	250	
UF Permeate tank*		15	25	50	75	100	150	200	250	
CIP tank		0.55	0.9	1.8	2.7	8	12	20	22	
Overall System Dimensions (based on above volumes)										
Dimensions (L x W x H)	m	3.8 x 2.1 x 3.3	4.4 x 2.5 x 3.3	5.2 x 3.2 x 3.3	7.1 x 3.5 x 3.6	12 x 13 x 4.5	15.5 x 17 x 4.5	17.5 x 19 x 5	17.5 x 19 x 5.5	
Skid Configuration		Single Skid				UF feed pump & auto-strainer skid, UF valve rack skid, UF module skid, UF CIP pump skid, UF backwash skid, UF chemical dosing skid				
Dry Weight (without membranes)	kg	2,000	2,500	4,500	5,500	15,000	21,000	32,000	35,000	
Wet Weight	kg	4,000	6,000	10,000	15,000	24,000	31,000	54,000	59,000	

MK32-100 – Feed pump is also used as CIP pump

MK32-300 – Each system has 1 backwash pump

MK150 -300 – Each system has one Feed pump and CIP pump

BWRO SYSTEMS

MBWS SERIES (SINGLE PASS)



Model: MBWS-200

Model	Net Permeate Capacity*		Feed Flow Rate		No. of RO Membranes	Installation Connections			Estimated Dry Weight	Estimated Wet Weight	System Dimension L x W x H
	(m ³ /day)	(m ³ /hr)	(m ³ /day)	(m ³ /hr)		Feed	Permeate	Concentrate			
						(inches)			(kg)	(kg)	(m)
MBWS-32	180	8	240	10	12	3"	2"	1"	1,800	2,500	6.0 x 2.0 x 2.0
MBWS-50	270	11	360	15	15	3"	2"	1"	2,000	2,700	6.0 x 2.0 x 2.0
MBWS-80	540	23	720	30	30	3"	3"	2"	2,600	4,000	6.0 x 2.0 x 2.5
MBWS-100	1080	45	1440	60	45	6"	4"	2"	3,500	5,500	6.5 x 2.2 x 2.0
MBWS-150	2250	94	3000	125	105	8"	6"	3"	8,500	14,000	10.0 x 8.5 x 3.5
MBWS-200	3600	150	4800	200	189	12"	8"	4"	12,000	20,000	10.0 x 11.0 x 4.0
MBWS-250	5400	225	7200	300	224	14"	8"	4"	15,000	25,000	10.0 x 13.0 x 4.0
MBWS-300	6750	281	9000	375	294	16"	10"	4"	20,000	35,000	11.0 x 13.0 x 4.5

*Based on feed TDS of 2000 +/- 50%, 75% recovery rate, temperature of 20-40°C.

^ Above capacities, dimension and weights are based on best estimates and rounded off.

MBWS SERIES (SINGLE PASS): TECHNICAL SPECIFICATIONS

Model	UOM	MBWS-32	MBWS-50	MBWS-80	MBWS-100	MBWS-150	MBWS-200	MBWS-250	MBWS-300
Permeate capacity (Max.)	m ³ /day	180	270	540	1080	2250	3600	5400	6750
Concentrate rate (Min.)	m ³ /day	60	90	180	360	750	1200	1800	2250
Feed rate (Max.)	m ³ /day	240	360	720	1440	3000	4800	7200	9000
System recovery (Max.)	%	75							
Operating Temperature Range	°C	20 - 35							
Booster Pump and CIP Pump									
Model	NBG or equivalent						CIP Pump		
Manufacturer	Grundfos or equivalent						-		
Quantity	1						-		
Motor	kW / HP	3 / 4	3 / 4	5.5 / 7.5	7.5 / 10	15 / 20	18.5 / 25	30 / 40	37 / 50
Operation	Fixed speed						-		
MOC	SS316						-		
High Pressure Pump									
Model	NBG or equivalent								
Manufacturer	Grundfos or equivalent								
Quantity	1								
Motor	kW / HP	11 / 15	11 / 15	18.5 / 25	30 / 40	90 / 125	132 / 175	200 / 270	200 / 270
Operation	VFD Operated								
MOC	SS316								
Membrane Elements and Housing									
Membrane Model	ESPA2 / TM720 or equivalent								
Membrane manufacturer	Hydranautics / Toray or equivalent								
Membrane Quantity	12	15	30	45	105	189	224	294	
Salt rejection at standard conditions	99.6% (99.5% minimum)								
Housing specifications	4-element long, 4 port, 300 psi	5-element long, 4 port, 300 psi			7-element long, 4 port, 300 psi				
Banking arrangement	3, 2-->1	3, 2-->1	3, 4-->2	6, 6-->3	18, 12-->6	27, 18-->9	36, 24-->12	54, 36-->18	
Installation and Utility Requirements									
RO inlet flange end	3"	3"	3"	6"	8"	14"	14"	16"	
RO permeate flange end	2"	2"	2"	4"	6"	8"	8"	10"	
RO concentrate flange end	1"	1"	2"	2"	3"	4"	4"	4"	
RO inlet water pressure (min)	bar	2							
CIP inlet	3"	3"	4"	6"	6"	6"	6"	8"	
CIP return permeate	2"	2"	3"	4"	2"	2"	2"	2"	
CIP return concentrate	2"	3"	3"	4"	6"	6"	6"	8"	
Air Pressure (oil-free)	bar	7							
Drain size requirement	MLD/ m ³ /hr	0.28 / 12	0.33 / 14	0.76 / 32	1.39 / 58	2.85 / 119	4.75 / 198	7.32 / 305	9.45 / 394
Power	400 VAC +/-220%, 3-phase, 50/60 Hz								
Control circuit	120/220V, 1-phase, 50/60Hz								
Measuring Instruments									
Pressure switch	Instrument air line, HPP suction					Instrument air line			
Pressure guage	Instrument line, MBWS CIP pump, RO interstage line					Instrument line, RO CIP pump discharge, RO interstage line			
Flow measurement	BWRO permeate, concentrate								
Conductivity measurement	BWRO permeate								
Pressure transmitter	BWRO feed, concentrate								
Analyzers	ORP analyzer of RO feed, conductivity analyzer at RO permeate								
Level Switch	RO CIP tank, antiscalant and SMBS dosing tank								
Recommended Tank Size									
UF Filtrate tank*	m ³	15	25	50	75	100	150	200	250
BWRO permeate tank*	m ³	15	25	50	75	100	150	200	250
RO CIP tank	m ³	0.5	1.0	1.5	2.5	8	12	16	24
Overall System Dimensions (based on above volumes)									
Dimensions (L x W x H)	m	5.1 x 2 x 1.8	6.1 x 2.1 x 2.1	6.1 x 2.1 x 2.6	6.4 x 2.2 x 1.9	9.5 x 8.5 x 3.6	9.5 x 11 x 4	9.5 x 13 x 4	11 x 13 x 4.7
Skid configuration	Single skid					RO PT Skid, RO HPP, RO CIP Skid			
Dry Weight		1,800	2,000	2,600	3,500	8,500	12,000	15,000	20,000
Wet Weight		2,500	2,700	4,000	5,500	14,000	20,000	25,000	35,000

* 1hr retention time

SWRO SYSTEM: MSW SERIES

MSW-N (NORMAL SALINITY SERIES)



Model: MSW-150

Model	Net Permeate Capacity*		Feed Flow Rate		No. of RO Membranes	Installation Connections			Estimated Dry Weight	Estimated Wet Weight	System Dimension L x W x H
	(m ³ /day)	(m ³ /hr)	(m ³ /day)	(m ³ /hr)		Feed	Permeate	Concentrate			
						(inches)			(kg)	(kg)	(m)
MSW-32N	108	5	240	10	10	3"	2"	2"	2,500	3,000	7.0 x 2.0 x 1.5
MSW-50N	162	7	360	15	12	3"	2"	2"	3,000	4,000	8.0 x 2.0 x 1.5
MSW-80N	324	14	720	30	30	4"	3"	2"	5,000	6,000	8.2 x 2.2 x 2.25
MSW-100N	648	27	1,440	60	60	6"	4"	3"	7,000	9,000	8.5 x 2.5 x 2.2
MSW-150N	1,350	56	3,000	125	112	8"	4"	4"	9,000	15,000	15.0 x 5.0 x 3.0
MSW-200N	2,160	90	4,800	200	196	12"	6"	6"	17,000	24,000	16.0 x 6.0 x 2.5
MSW-250N	3,240	135	7,200	300	238	14"	6"	8"	22,000	29,000	16.0 x 6.0 x 3.0
MSW-300N	4,050	169	9,000	375	294	16"	8"	8"	28,000	36,000	17.0 x 6.3 x 3.3

*Based on feed TDS of 35,000 +/- 15%, 45% recovery rate, temperature of 20-40°C.

^ Above capacities, dimension and weights are based on best estimates and rounded off.

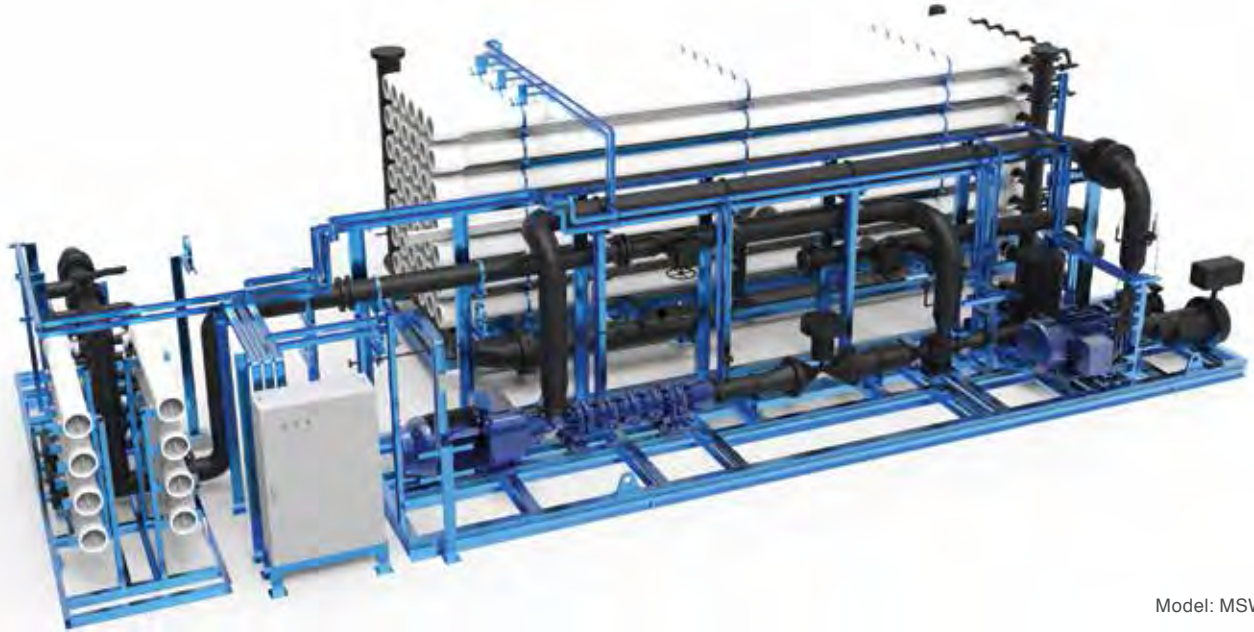
MSW SERIES : TECHNICAL SPECIFICATIONS

Model	UOM	MSW-32N	MSW-50N	MSW-80N	MSW-100N	MSW-150N	MSW-200N	MSW-250N	MSW-300N		
Permeate capacity (Max.)	m ³ /day	108	162	324	648	1350	2160	3240	4050		
Concentrate rate (Min.)	m ³ /day	132	198	396	792	1650	2640	3960	4950		
Feed rate (Max.)	m ³ /day	240	360	720	1440	3000	4800	7200	9000		
System recovery (Max.)	%	45									
Operating Temperature Range	°C	20 - 35									
Nominal RO Rejection		98 - 99%									
Booster Pump											
Model		NGB or equivalent									
Manufacturer		Grundfos or equivalent									
Quantity		1									
Motor	kW / HP	3 / 4	3 / 4	5.5 / 7.5	11 / 15	55 / 75	75 / 100	110 / 150	132 / 175		
Operation		Fixed Speed									
MOC		SDSS									
High Pressure Pump											
Model		APP or equivalent				MSS or equivalent					
Manufacturer		Danfoss or equivalent				Fedco or equivalent					
Quantity		1									
Motor	kW / HP	11 / 15	15 / 20	30 / 40	75 / 100	185 / 250	300 / 400	335 / 500	450 / 600		
Operation		VFD				Fixed Speed					
MOC		SDSS									
Energy Recovery Turbine											
Model		iSave or equivalent				Fedco or equivalent					
Manufacturer		Danfoss or equivalent				Fedco or equivalent					
Quantity		1									
Design feed flow rate		0.08 / 6	0.19 / 8	0.43 / 18	0.77 / 32	3.46 / 144	5.71 / 238	7.36 / 307	9.5 / 396		
Design concentrate flow rate		0.08 / 6	0.18 / 7.74	0.45 / 18.7	0.71 / 32.15	2.18 / 90.65	3.58 / 148.85	4.09 / 170.35	5.25 / 218.75		
Membrane Elements and Housing											
Membrane Model		SWC5 / TM820 or equivalent									
Membrane manufacturer		Hydranautics / Toray or equivalent									
Membrane Quantity		10	12	30	60	112	196	238	294		
Salt rejection at standard conditions		99.8% (99.7% minimum)									
Housing specifications		5 element long, 4 port, 1,200 psi	6 element long, 4 port, 1,200 psi			7 element long, 4 port, 1,200 psi					
Banking arrangement		2, parallel		5, parallel	2 x 5, parallel	2 x 6, 1 x 4, parallel	4 x 6, 1 x 4, parallel	5 x 6, 1 x 4, parallel	7 x 6, parallel		
Installation and Utility Requirements											
RO inlet flange end		3"	3"	4"	6"	8"	12"	14"	16"		
RO permeate flange end		2"	2"	3"	4"	4"	6"	6"	8"		
RO concentrate flange end		2"	2"	2"	3"	4"	6"	8"	8"		
RO inlet water pressure (min)	bar	2									
CIP inlet flange end		2"	2"	3"	4"	6"	8"	8"	8"		
CIP return permeate flange end		1"	1"	2"	3"	2"	2"	2"	2"		
CIP return concentrate flange end		2"	2"	3"	4"	6"	8"	8"	8"		
Air Pressure (oil-free)	bar	7									
Drain size requirement	MLD / m ³ /hr	0.26 / 11	0.33 / 14	0.77 / 32	1.33 / 58	3.46 / 144	5.71 / 238	7.36 / 307	9.5 / 396		
Power		400 VAC +/- 20%, 3-phase, 50/60Hz									
Control circuit		120/220V, 1-phase, 50/60Hz									
Measuring Instruments											
Pressure switch		Instrument air line									
Pressure guage		Instrument air line, inlet/outlet of cartridge filter				Instrument air line, ERS exhaust, CIP pump discharge					
Flow measurement		SWRO permeate, SWRO concentrate, HP pump suction, iSave suction & RO CIP discharge					SWRO permeate, SWRO concentrate				
Conductivity measurement		SWRO permeate									
Pressure transmitter		Cartridge filter suction and discharge, SWRO feed, iSave concentrate inlet and outlet				RO booster pump discharge, HPP discharge, ERS discharge (Feed side), ERS feed (concentrate side)					
Analyzers		Ph analyzer at RO CIP & level transmitter on RO CIP tank				Conductivity and ORP analyzer at SWRO feed, Conductivity analyzer at SWRO permeate					
Recommended Tank Size											
UF Filtrate tank*	m ³	15	25	30	50	100	150	200	250		
SWRO permeate tank*	m ³	10	15	15	25	50	100	150	175		
RO CIP tank	m ³	0.6	1.0	2.0	3.5	12	20	25	28		
Overall System Dimensions (based on above volumes)											
Dimensions (L x W x H)	m	7 x 2 x 1.5	8 x 2 x 1.5	8.2 x 2.2 x 2.25	8.5 x 2.5 x 2.2	12 x 5 x 3	16 x 6 x 2.5	16 x 6 x 3	17 x 6.3 x 3.3		
Skid configuration		Single skid				RO pump skid, RO PT Skid, RO CIP pump skid					
Dry Weight		2,500	3,000	5,000	7,000	9,000	17,000	22,000	28,000		
Wet Weight		3,000	4,000	6,000	9,000	15,000	24,000	29,000	36,000		

* 1hr retention time

SWRO SYSTEM: MSW SERIES

MSW-H (HIGH SALINITY SERIES)



Model: MSW-300

Model	Net Permeate Capacity*		Feed Flow Rate		No. of RO Membranes	Installation Connections			Estimated Dry Weight	Estimated Wet Weight	System Dimension L x W x H
	(m ³ /day)	(m ³ /hr)	(m ³ /day)	(m ³ /hr)		Feed	Permeate	Concentrate			
						(inches)			(kg)	(kg)	(m)
MSW-32H	84	4	240	10	10	3"	2"	2"	2,500	3,000	7.0 x 2.0 x 1.5
MSW-50H	126	5	360	15	12	3"	2"	2"	3,000	4,000	8.0 x 2.0 x 1.5
MSW-80H	252	11	720	30	30	4"	3"	2"	5,000	6,000	8.2 x 2.2 x 2.25
MSW-100H	504	21	1440	60	60	6"	4"	3"	7,000	9,000	8.5 x 2.5 x 2.2
MSW-150H	1050	44	3000	125	112	8"	4"	4"	10,000	16,000	15.0 x 5.0 x 3.0
MSW-200H	1680	70	4800	200	196	12"	6"	6"	18,000	25,000	16.0 x 6.0 x 2.5
MSW-250H	2520	105	7200	300	238	14"	6"	8"	23,000	30,000	16.0 x 6.0 x 3.0
MSW-300H	3150	131	9000	375	294	16"	8"	8"	30,000	38,000	17.0 x 6.3 x 3.3

*Based on feed TDS of 45,000 +/- 10%, 35% recovery rate, temperature of 20-40°C.

^ Above capacities, dimension and weights are based on best estimates and rounded off.

MSW SERIES : TECHNICAL SPECIFICATIONS

Model	UOM	MSW-32H	MSW-50H	MSW-80H	MSW-100H	MSW-150H	MSW-200H	MSW-250H	MSW-300H
Permeate capacity (max.)	m ³ /day	84	126	252	504	1050	1680	2520	3150
Concentrate rate (min.)	m ³ /day	156	234	468	936	1950	3120	4680	5850
Feed rate (max.)	m ³ /day	240	360	720	1440	3000	4800	7200	9000
System recovery (max.)	%	45							
Operating temperature range	°C	20 - 35							
Nominal ro rejection		98-99%							
Ro average membrane flux	LMH	13-15							
Booster pump									
Model		APP or equivalent				MSS or equivalent			
Manufacturer		Danfoss or equivalent				Fedco or equivalent			
Quantity		1							
Motor	kW / HP	3 / 4	3 / 4	5.5 / 7.5	11 / 15	55 / 75	75 / 100	110 / 150	132 / 175
Operation		Variable Speed							
MOC		SDSS							
High pressure pump									
Model		APP or equivalent							
Manufacturer		Danfoss or equivalent				Fedco or equivalent			
Quantity		1							
Motor	kW / HP	11 / 15	15 / 20	30 / 40	75 / 100	185 / 250	300 / 400	335 / 500	450 / 600
Operation		Fixed Speed							
MOC		SDSS							
Energy recovery turbine									
Model		iSave or equivalent				Fedco or equivalent			
Manufacturer		Danfoss or equivalent				Fedco or equivalent			
Quantity		1							
Design feed flow rate		0.08 / 6	0.19 / 8	0.43 / 18	0.77 / 32	3.46 / 144	5.71 / 238	7.36 / 307	9.5 / 396
Design concentrate flow rate		0.08 / 6	0.18 / 7.74	0.45 / 18.7	0.71 / 32.15	2.18 / 90.65	3.58 / 148.85	4.09 / 170.35	5.25 / 218.75
Membrane elements and housing									
Membrane model		SWC5 / TM820 or equivalent							
Membrane manufacturer		Hydranautics / Toray or equivalent							
Membrane quantity		10	12	30	60	112	196	238	294
Salt rejection at standard conditions		99.8% (99.7% minimum)							
Housing specifications		5 element long, 4 port, 1,200 psi	6 element long, 4 port, 1,200 psi			7 element long, 4 port, 1,200 psi			
Banking arrangement		2, Parallel		5, Parallel	2 X 5, Parallel	2 X 6, 1 X 4, Parallel	4 X 6, 1 X 4, Parallel	5 X 6, 1 X 4, Parallel	7 X 6, Parallel
Installation and utility requirements									
RO inlet flange end		3"	3"	4"	6"	8"	12"	14"	16"
RO permeate flange end		2"	2"	3"	4"	4"	6"	6"	8"
RO concentrate flange end		1"	1"	2"	3"	4"	6"	8"	8"
RO inlet water pressure (min)	bar	2							
CIP inlet flange end		2"	2"	3"	4"	6"	8"	8"	8"
CIP return permeate flange end		1"	1"	2"	3"	2"	2"	2"	2"
CIP return concentrate flange end		2"	2"	3"	4"	6"	8"	8"	8"
Air pressure (oil-free)	bar	7							
Drain size requirement	MLD / m ³ /hr	0.26 / 11	0.33 / 14	0.77 / 32	1.33 / 58	3.46 / 144	5.71 / 238	7.36 / 307	9.5 / 396
Power		400 VAC+/- 20%, 3-phase, 50/60Hz							
Control circuit		120/220V, 1-phase, 50/60Hz							
Measuring instruments									
Pressure switch		Instrument air line							
Pressure gauge		Instrument air line, inlet/outlet of cartridge filter				Instrument air line, ERS exhaust, CIP pump discharge			
Flow indicator (rotameter)		Not included							
Flow measurement		SWRO Permeate, SWRO Concentrate, HP pump suction, iSave suction & RO CIP discharge				SWRO Permeate, SWRO Concentrate			
Conductivity measurement		SWRO permeate							
Pressure transmitter		Cartridge filter suction and discharge, SWRO feed, iSave concentrate inlet and outlet				RO booster pump discharge, HPP discharge, ERS discharge (feed side), ERS feed (concentrate side)			
Analyzers		Ph analyzer at RO CIP & level transmitter on RO CIP tank				Conductivity and orp analyzer at swro feed, conductivity analyzer at swro permeate			
Recommended tank size									
UF filtrate tank*	m ³	10	15	30	60	125	200	300	375
SWRO permeate tank*	m ³	5	7	14	27	56	90	135	169
RO CIP tank	m ³	0.6	1	2	3.5	12	20	25	28
Overall system dimensions (based on above volumes)									
Dimensions (L x W x H)	m	7 X 2 X 1.5	8 X 2 X 1.5	8.2 X 2.2 X 2.25	8.5 X 2.5 X 2.2	12 X 5 X 3	16 X 6 X 2.5	16 X 6 X 3	17 X 6.3 X 3.3
Skid configuration		Single skid				RO pump skid, RO PT skid, RO CIP pump skid			
Dry weight	kg	2,500	3,000	5,000	7,000	10,000	18,000	23,000	30,000
Wet weight	kg	3,000	4,000	6,000	9,000	16,000	25,000	30,000	38,000

*1Hr retention time

SWRO SYSTEM: MSW SERIES

MSW-L (LOW SALINITY SERIES)



Model: MSW-32

Model	Net Permeate Capacity*		Feed Flow Rate		No. of RO Membranes	Installation Connections			Estimated Dry Weight	Estimated Wet Weight	System Dimension L x W x H
	(m ³ /day)	(m ³ /hr)	(m ³ /day)	(m ³ /hr)		Feed	Permeate	Concentrate			
						(inches)			(kg)	(kg)	(m)
MSW-32L	132	6	240	10	10	3"	2"	2"	2,500	3,000	7.0 x 2.0 x 1.5
MSW-50L	198	8	360	15	12	3"	2"	2"	3,000	4,000	8.0 x 2.0 x 1.5
MSW-80L	396	17	720	30	30	4"	3"	2"	5,000	6,000	8.2 x 2.2 x 2.25
MSW-100L	792	33	1,440	60	60	6"	4"	3"	7,000	9,000	8.5 x 2.5 x 2.2
MSW-150L	1,650	69	3,000	125	112	8"	4"	4"	9,000	15,000	15.0 x 5.0 x 3.0
MSW-200L	2,640	110	4,800	200	196	12"	6"	6"	17,000	24,000	16.0 x 6.0 x 2.5
MSW-250L	3,960	165	7,200	300	238	14"	6"	8"	22,000	29,000	16.0 x 6.0 x 3.0
MSW-300L	4,950	206	9,000	375	294	16"	8"	8"	28,000	36,000	17.0 x 6.3 x 3.3

*Based on feed TDS of 25,000 +/- 20%, 55% recovery rate, temperature of 20-40°C.

^ Above capacities, dimension and weights are based on best estimates and rounded off.

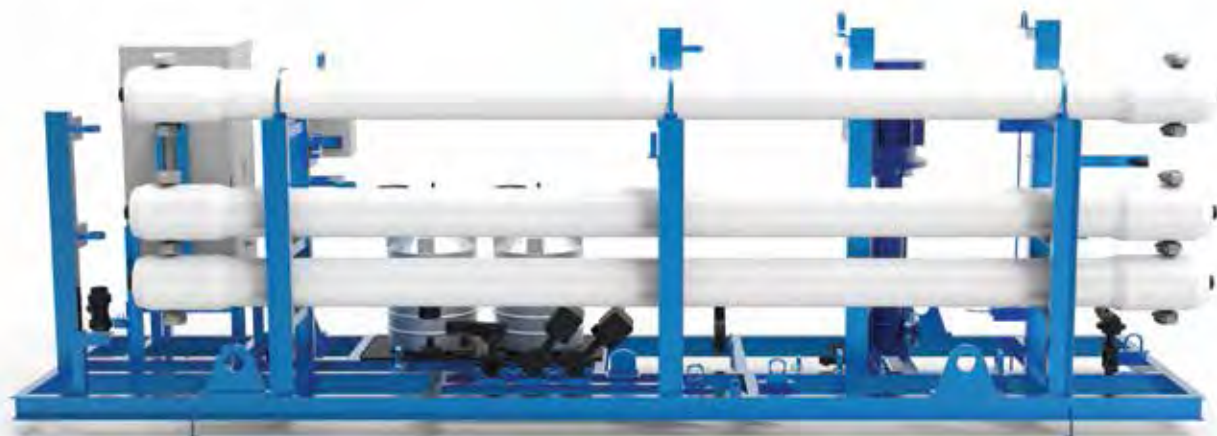
MSW SERIES : TECHNICAL SPECIFICATIONS

Model	UOM	MSW-32L	MSW-50L	MSW-80L	MSW-100L	MSW-150L	MSW-200L	MSW-250L	MSW-300L	
Permeate capacity (Max.)	m ³ /day	132	198	396	792	1650	2640	3960	4950	
Concentrate rate (Min.)	m ³ /day	108	162	324	648	1350	2160	3240	4050	
Feed rate (Max.)	m ³ /day	240	360	720	1440	3000	4800	7200	9000	
System recovery (Max.)	%	45								
Operating Temperature Range	°C	20 - 35								
Nominal RO Rejection		98-99%								
RO average membrane flux	LMH	16-17								
Booster Pump										
Model		NGB or equivalent								
Manufacturer		Grundfos or equivalent								
Quantity		1								
Motor	kW / HP	3 / 4	3 / 4	5.5 / 7.5	11 / 15	55 / 75	75 / 100	110 / 150	132 / 175	
Operation		Variable Speed								
MOC		SDSS								
High Pressure Pump										
Model		APP or equivalent				MSS or equivalent				
Manufacturer		Danfoss or equivalent				Fedco or equivalent				
Quantity		1								
Motor	kW / HP	11 / 15	15 / 20	30 / 40	75 / 100	185 / 250	300 / 400	335 / 500	450 / 600	
Operation		Fixed Speed								
MOC		SDSS								
Energy Recovery Turbine										
Model		iSave or equivalent				Fedco or equivalent				
Manufacturer		Danfoss or equivalent				Fedco or equivalent				
Quantity		1								
Design feed flow rate		0.08 / 6	0.19 / 8	0.43 / 18	0.77 / 32	3.46 / 144	5.71 / 238	7.36 / 307	9.5 / 396	
Design concentrate flow rate		0.08 / 6	0.18 / 7.74	0.45 / 18.7	0.71 / 32.15	2.18 / 90.65	3.58 / 148.85	4.09 / 170.35	5.25 / 218.75	
Membrane Elements and Housing										
Membrane Model		SWC5 / TM820 or equivalent								
Membrane manufacturer		Hydranautics / Toray or equivalent								
Membrane Quantity		10	12	30	60	112	196	238	294	
Salt rejection at standard conditions		99.8% (99.7% minimum)								
Housing specifications		5 element long, 4 port, 1,200 psi	6 element long, 4 port, 1,200 psi			7 element long, 4 port, 1,200 psi				
Banking arrangement		2, parallel		5, parallel	2 x 5, parallel	2 x 6, 1 x 4, parallel	4 x 6, 1 x 4, parallel	5 x 6, 1 x 4, parallel	7 x 6, parallel	
Installation and Utility Requirements										
RO inlet flange end		3"	3"	4"	6"	8"	12"	14"	16"	
RO permeate flange end		2"	2"	3"	4"	4"	6"	6"	8"	
RO concentrate flange end		1"	1"	2"	3"	4"	6"	8"	8"	
RO inlet water pressure (min)	bar	2								
CIP inlet flange end		2"	2"	3"	4"	6"	8"	8"	8"	
CIP return permeate flange end		1"	1"	2"	3"	2"	2"	2"	2"	
CIP return concentrate flange end		2"	2"	3"	4"	6"	8"	8"	8"	
Air Pressure (oil-free)	bar	7								
Drain size requirement	MLD / m ³ /hr	0.26 / 11	0.33 / 14	0.77 / 32	1.33 / 58	3.46 / 144	5.71 / 238	7.36 / 307	9.5 / 396	
Power		400 VAC +/- 20%, 3-phase, 50/60Hz								
Control circuit		120/220V, 1-phase, 50/60Hz								
Measuring Instruments										
Pressure switch		Instrument air line								
Pressure gauge		Instrument air line, inlet/outlet of cartridge filter				Instrument air line, ERS exhaust, CIP pump discharge				
Flow indicator (rotameter)		Not included								
Flow measurement		SWRO permeate, SWRO concentrate, HP pump suction, iSave suction & RO CIP discharge				SWRO permeate, SWRO concentrate				
Conductivity measurement		SWRO permeate								
Pressure transmitter		Cartridge filter suction and discharge, SWRO feed, iSave concentrate inlet and outlet				RO booster pump discharge, HPP discharge, ERS discharge (Feed side), ERS feed (concentrate side)				
Analyzers		Ph analyzer at RO CIP & level transmitter on RO CIP tank				Conductivity and ORP analyzer at SWRO feed, Conductivity analyzer at SWRO permeate				
Recommended Tank Size										
UF Filtrate tank*	m ³	10	15	30	60	125	200	300	375	
SWRO permeate tank*	m ³	5	7	14	27	56	90	135	169	
RO CIP tank	m ³	0.6	1	2	3.5	12	20	25	28	
Overall System Dimensions (based on above volumes)										
Dimensions (L x W x H)	m	7 x 2 x 1.5	8 x 2 x 1.5	8.2 x 2.2 x 2.25	8.5 x 2.5 x 2.2	12 x 5 x 3	16 x 6 x 2.5	16 x 6 x 3	17 x 6.3 x 3.3	
Skid configuration		Single skid				RO pump skid, RO PT Skid, RO CIP pump skid				
Dry Weight	kg	2,500	3,000	5,000	7,000	9,000	17,000	22,000	28,000	
Wet Weight	kg	3,000	4,000	6,000	9,000	15,000	24,000	29,000	36,000	

*1Hr retention time

LPRO SYSTEMS

MBW SERIES (SECOND PASS TO SWRO)



Model: MBW-80

Model	Net Permeate Capacity*		Feed Flow Rate		No. of RO Membranes	Installation Connections			Estimated Dry Weight	Estimated Wet Weight	System Dimension L x W x H
	(m ³ /day)	(m ³ /hr)	(m ³ /day)	(m ³ /hr)		Feed	Permeate	Concentrate			
	(inches)							(kg)	(kg)	(m)	
MBW-32	97.2	4	108	4.5	20 (4")	2"	2"	1"	1,500	2,000	6.0 x 1.0 x 2.0
MBW-50	145.8	6	162	6.8	25 (4")	2"	2"	1"	1,500	2,000	6.0 x 1.0 x 2.0
MBW-80	291.6	12	324	13.5	12	3"	2"	1"	1,500	2,000	6.0 x 1.2 x 2.0
MBW-100	583.2	24	648	27.0	30	4"	3"	2"	2,200	3,400	6.5 x 1.5 x 2.5
MBW-150	1215	51	1350	56.3	63	6"	4"	2"	4,400	7,000	8.5 x 2.5 x 2.5
MBW-200	1944	81	2160	90.0	84	8"	6"	2"	5,000	8,500	8.5 x 2.5 x 2.6
MBW-250	2916	122	3240	135.0	105	8"	6"	2"	7,000	11,500	8.5 x 2.5 x 3
MBW-300	3645	152	4050	168.8	126	10"	8"	3"	8,000	14,000	8.5 x 2.5 x 3.5

*Based on feed TDS of 500 +/- 20%, 90% recovery rate, temperature of 20-40°C.

^ Above capacities, dimension and weights are based on best estimates and rounded off.

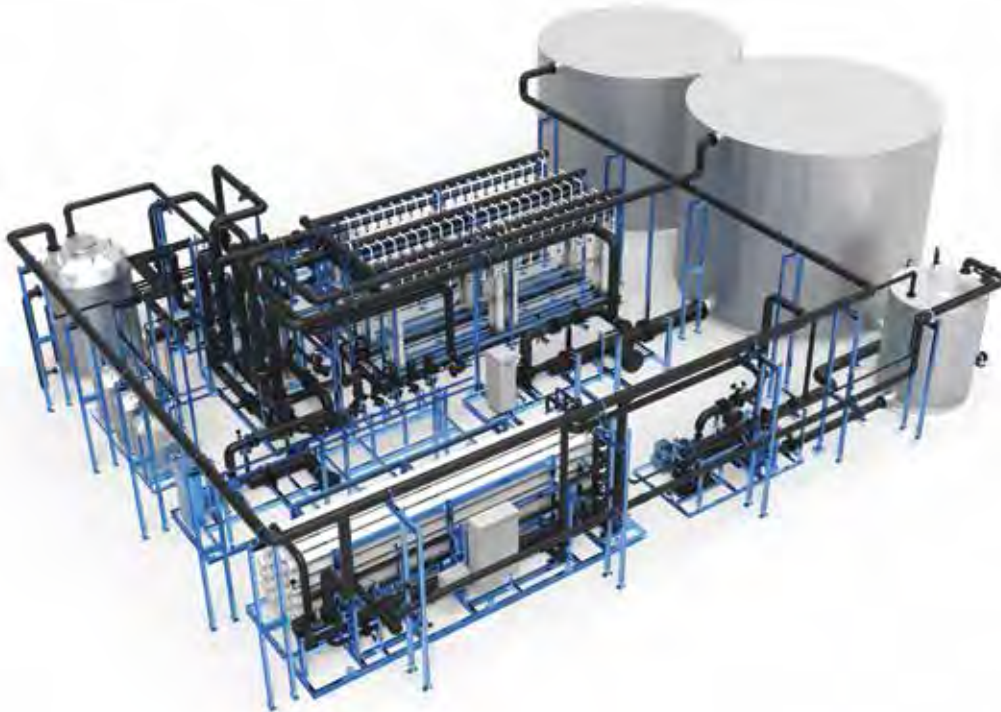
MBW SERIES (SECOND PASS TO SWRO) : TECHNICAL SPECIFICATIONS

Model	UOM	MBW-32	MBW-50	MBW-80	MBW-100	MBW-150	MBW-200	MBW-250	MBW-300
Permeate capacity (Max.)	m ³ /day	97.2	145.8	291.6	583.2	1215	1944	2916	3645
Concentrate rate (Min.)	m ³ /day	10.8	16.2	32.4	64.8	135	216	324	405
Feed rate (Max.)	m ³ /day	108	162	324	648	1350	2160	3240	4050
System recovery (Max.)	%	90							
Operating Temperature Range	°C	20 - 35							
Nominal RO Rejection		98 - 99%							
High Pressure Pump									
Model		CRN or equivalent							
Manufacturer		Grundfos or equivalent							
Quantity		1							
Motor	kW/HP	4.5 / 5.5	4.5 / 5.5	11 / 15	15 / 20	55 / 75	75 / 100	90 / 125	110 / 150
Operation		VFD Operated							
MOC		SS316							
Membrane Elements and Housing									
Membrane Model		ESPA2 / TM720 or equivalent							
Membrane manufacturer		Hydranautics / Toray or equivalent							
Membrane Quantity		20 (4")	25 (4")	12	30	63	84	105	126
Salt rejection at standard conditions		99.6% (99.5% minimum)							
Housing specifications		5-element long, 4 port, 300 psi		4-element long, 4 port, 300 psi	5-element long, 4 port, 300 psi	7-element long, 4 port, 300 psi			
Banking arrangement		5, 3-->2	5, 3-->2	3, 2-->1	6, 4-->2	9, 6-->3	12, 8-->4	18, 6,6-->6	18, 6,6-->6
Installation and Utility Requirements									
RO inlet flange end		2"	2"	3"	4"	6"	8"	8"	10"
RO permeate flange end		2"	2"	2"	3"	4"	6"	6"	8"
RO concentrate flange end		1"	1"	1"	1"	2"	2"	2"	3"
RO inlet water pressure (min)	bar	2							
CIP inlet		2"	2"	2"	3"	3"	4"	4"	4"
CIP return permeate		2"	2"	2"	2"	2"	2"	2"	2"
CIP return concentrate		2"	2"	2"	3"	3"	4"	4"	4"
Air Pressure (oil-free)	bar	7							
Drain size requirement	MLD/ m ³ /hr	0.12 / 5	0.16 / 7	0.38 / 16	0.6 / 27	1.3 / 53.4	2.1 / 89.2	3.3 / 138	4.3 / 178
Power		400 VAC +/-220%, 3-phase, 50/60 Hz							
Control circuit		120/220V, 1-phase, 50/60Hz							
Measuring Instruments									
Pressure switch		Instrument air line							
Pressure guage		Instrument air line, interstage line							
Flow indicator (rotameter)		Not included							
Flow measurement		BWRO permeate, concentrate							
Conductivity measurement		BWRO permeate							
Pressure transmitter		BWRO feed, concentrate							
Analyzers		PH analyzer at RO feed, conductivity analyzer at RO permeate							
Recommended Tank Size									
UF Filtrate tank*	m ³	15	25	50	75	150	250	300	400
SWRO permeate tank*	m ³	10	15	30	50	100	200	250	300
BWRO permeate tank*	m ³	5	10	15	25	50	100	125	150
RO CIP tank	m ³	Shared with SWRO CIP tanks							
Overall System Dimensions (based on above volumes)									
Dimensions (L x W x H)	m	5.7 x 0.9 x 1.7	5.7 x 0.9 x 1.7	5 x 1.2 x 1.9	6.2 x 1.5 x 2.7	8.2 x 2.2 x 2.2	8.2 x 2.2 x 2.6	8.2 x 2.2 x 3.3	8.2 x 2.2 x 3.4
Skid configuration		Single skid							
Dry Weight	kg	1,500	1,500	1,500	2,200	4,400	5,000	7,000	8,000
Wet Weight	kg	2,000	2,000	2,000	3,400	7,000	8,500	11,500	14,000

* 1hr retention time

COMBINATION SYSTEMS: UF-BWRO

MK-MBWS SERIES



Model: MK-MBWS-200

Model	Net Permeate Capacity* (Each sub system)		Feed Flow Rate		No. of UF / RO membranes	Estimated Dry Weight	Estimated Wet Weight	System Dimension L x W x H	Sub Systems
	(m ³ /day)	(m ³ /hr)	(m ³ /day)	(m ³ /hr)		(kg)	(kg)	(m)	
MK-MBWS-32	240	10	267	11	5	2,000	4,000	3.8 x 2.1 x 3.3	1 x MK-32
	180	8	240	10	12	1,800	2,500	6.0 x 2.0 x 2.0	1 x MBWS-32
MK-MBWS-50	360	15	400	17	8	2,500	6,000	4.4 x 2.5 x 3.3	1 x MK-50
	270	11	360	15	15	2,000	2,700	6.0 x 2.0 x 2.0	1 x MBWS-50
MK-MBWS-80	720	30	800	33	14	4,500	10,000	5.2 x 3.2 x 3.3	1 x MK-80
	540	23	720	30	30	2,600	4,000	6.0 x 2.0 x 2.5	1 x MBWS-80
MK-MBWS-100	1,440	60	1,600	67	26	5,500	15,000	7.1 x 3.5 x 3.6	1 x MK-100
	1,080	45	1,440	60	45	3,500	5,500	6.5 x 2.2 x 2.0	1 x MBWS-100
MK-MBWS-150	3,000	125	3,333	139	54	15,000	24,000	12.0 x 13.0 x 4.5	1 x MK-150
	2,250	94	3,000	125	105	8,500	14,000	10.0 x 8.5 x 3.5	1 x MBWS-150
MK-MBWS-200	4,800	200	5,333	222	86	21,000	31,000	15.5 x 17.0 x 4.5	1 x MK-200
	3,600	150	4,800	200	189	12,000	20,000	10.0 x 11.0 x 4.0	1 x MBWS-200
MK-MBWS-250	7,200	300	8,000	333	130	32,000	54,000	17.5 x 19.0 x 5.0	1 x MK-300
	5,400	225	7,200	300	224	15,000	25,000	10.0 x 13.0 x 4.0	1 x MBWS-300
MK-MBWS-300	9,000	375	10,000	417	160	35,000	59,000	17.5 x 19.0 x 5.0	1 x MK-300
	6,750	281	9,000	375	294	20,000	35,000	11.0 x 13.0 x 4.5	1 x MBWS-300

MK-MBWS SERIES : TECHNICAL SPECIFICATIONS

Model	UOM	MK-MBWS-32	MK-MBWS-50	MK-MBWS-80	MK-MBWS-100	MK-MBWS-150	MK-MBWS-200	MK-MBWS-250	MK-MBWS-300
Permeate capacity (Max.)	m ³ /day	180	270	540	1080	2250	3600	5400	6750
Concentrate rate (Min.)	m ³ /day	87	130	260	520	1083	1733	2600	3250
Feed rate (Max.)	m ³ /day	267	400	800	1600	3333	5333	8000	10000
System recovery (Max.)	%	65							
Operating Temperature Range	°C	20 - 35							
Sub-Systems									
UF Systems		1 x MK-32B	1 x MK-50B	1 x MK-80B	1 x MK-100B	1 x MK-150B	1 x MK-200B	1 x MK-250B	1 x MK-300B
BWRO System		1 x MBWS-32	1 x MBWS-50	1 x MBWS-80	1 x MBWS-100	1 x MBWS-150	1 x MBWS-200	1 x MBWS-250	1 x MBWS-300
RO CIP Pump									
Model		CRN or equivalent							
Manufacturer		Grundfos or equivalent							
Quantity		1							
Motor	kW / HP	3 / 4	3 / 4	5.5 / 7.5	7.5 / 10	90 / 125	18.5 / 25	30 / 40	37 / 50
Operation		Fixed Speed							
Cartridge Filter for RO CIP									
Filter Model		ETHF or equivalent							
Filter Dimensions (Dia. X L)	inch / cm	8" x 20" / 20.3 x 51	8" x 20" / 20.3 x 51	8" x 40" / 20.3 x 102	8" x 60" / 20.3 x 153	8" x 60" / 20.3 x 153	8" x 60" / 20.3 x 153	8" x 60" / 20.3 x 153	8" x 60" / 20.3 x 153
Filter/ Housing Quantity		1	1	1	1	2	3	4	6
Housing Model		ET80 or equivalent							
Housing Quantity		1	1	1	1	2	3	4	6
Installation and Utility Requirements									
UF Feed Flange End		3"	3"	4"	6"	10"	14"	18"	20"
BWRO Permeate flange End		2"	2"	3"	4"	6"	8"	8"	10"
Drain size requirement	MLD / m ³ /hr	0.31 / 13	0.48 / 20	1.08 / 45	1.92 / 80	4.8 / 200	7.9 / 330	10.44 / 435	12.96 / 540
Air Pressure (oil-free)	bar	7							
Power		400 VAC +/-20%, 3 phase, 50/60Hz							
Control circuit		120/220V, 1 phase, 50/60Hz							
Recommended Tank Size									
UF Filtrate tank*	m ³	15	15	35	60	120	200	300	400
BWRO permeate tank*	m ³	10	12	25	45	90	150	250	300
RO CIP tank	m ³	0.5	0.5	0.5	0.5	8	12	16	24
Overall System Dimensions (based on above volumes)									
Dimensions (L x W x H)	m	27.0 x 19.0 x 6.5							
Dry Weight	kg	3,800	4,500	7,100	9,000	23,500	33,000	47,000	55,000
Wet Weight	kg	6,500	8,700	14,000	20,500	38,000	51,000	79,000	94,000

* 1hr retention time

COMBINATION SYSTEMS: UF-SWRO

MK-MSW-N SERIES



Model: MK-MSW-100

Model	Net Permeate Capacity* (Each sub system)		Feed Flow Rate		No. of UF / RO membranes	Estimated Dry Weight	Estimated Wet Weight	System Dimension L x W x H	Sub Systems
	(m ³ /day)	(m ³ /hr)	(m ³ /day)	(m ³ /hr)		(kg)	(kg)	(m)	
MKS-MSW-32N	240	10	267	11	5	2,000	4,000	3.8 x 2.1 x 3.3	1 x MK-32S
	108	5	240	10	10	2,500	3,000	7.0 x 2.0 x 1.5	1 x MSW-32N
MKS-MSW-50N	360	15	400	17	8	2,500	6,000	4.4 x 2.5 x 3.3	1 x MK-50S
	162	7	360	15	12	3,000	4,000	8.0 x 2.0 x 1.5	1 x MSW-50N
MKS-MSW-80N	720	30	800	33	14	4,500	10,000	5.2 x 3.2 x 3.3	1 x MK-80S
	324	14	720	30	30	5,000	6,000	8.2 x 2.2 x 2.25	1 x MSW-80N
MKS-MSW-100N	1440	60	1600	67	26	5,500	15,000	7.1 x 3.5 x 3.6	1 x MK-100S
	648	27	1440	60	60	7,000	9,000	8.5 x 2.5 x 2.2	1 x MSW-100N
MKS-MSW-150N	3000	125	3333	139	54	15,000	24,000	12.0 x 13.0 x 4.5	1 x MK-150S
	1350	56	3000	125	112	9,000	15,000	15.0 x 5.0 x 3.0	1 x MSW-150N
MKS-MSW-200N	4800	200	5333	222	86	21,000	31,000	15.5 x 17.0 x 4.5	1 x MK-200S
	2160	90	4800	200	196	17,000	24,000	16.0 x 6.0 x 2.5	1 x MSW-200N
MKS-MSW-250N	7200	300	8000	333	130	32,000	54,000	17.5 x 19.0 x 5.0	1 x MK-200S
	3240	135	7200	300	238	22,000	29,000	16.0 x 6.0 x 3.0	1 x MSW-200N
MKS-MSW-300N	9000	375	10000	417	160	33,000	55,000	17.5 x 19.0 x 5.5	1 x MK-200S
	4050	169	9000	375	294	28,000	36,000	17.0 x 6.3 x 3.3	1 x MSW-200N

Above specifications refer to MK-MSW-MBW Normal Salinity Series.
MK-MSW-MBW Low Salinity and High Salinity Series are available on request.

MK-MSW-N SERIES : TECHNICAL SPECIFICATIONS

Model	UOM	MK-MSW-32N	MK-MSW-50N	MK-MSW-80N	MK-MSW-100N	MK-MSW-150N	MK-MSW-200N	MK-MSW-250N	MK-MSW-300N
Permeate capacity (Max.)	m ³ /day	108	162	324	648	1350	2160	3240	4050
Concentrate rate (Min.)	m ³ /day	159	238	476	952	1983	3173	4760	5950
Feed rate (Max.)	m ³ /day	267	400	800	1600	3333	5333	8000	10000
System recovery (Max.)	%	45							
Operating Temperature Range	°C	20 - 35							
Nominal RO Rejection		98 - 99%							
Sub-Systems									
UF Systems		1 x MK-32S	1 x MK-50S	1 x MK-80S	1 x MK-100S	1 x MK-150S	1 x MK-200S	1 x MK-250S	1 x MK-300S
SWRO System		1 x MSW-32	1 x MSW-50	1 x MSW-80	1 x MSW-100	1 x MSW-150	1 x MSW-200	1 x MSW-250	1 x MSW-300
RO CIP Pump									
Model		CRN / NBG or equivalent							
Manufacturer		Grundfos or equivalent							
Quantity		1							
Motor	kW / HP	4.5 / 5.5	4.5 / 5.5	7.5 / 10	15 / 20	15 / 20	30 / 40	37 / 50	45 / 60
Operation		Fixed Speed							
MOC		SS316							
RO Booster Pump		Refer to MSW-N series							
UF CIP/Backwash Pump		Refer to MK series and MSW-N series							
Cartridge Filter for RO CIP									
Filter Model		ETHF or equivalent							
Filter Dimensions (Dia. X L)	inch / cm	8" x 40" / 20.3 x 102	8" x 40" / 20.3 x 102	8" x 60" / 20.3 x 153	8" x 60" / 20.3 x 153	8" x 60" / 20.3 x 153	8" x 60" / 20.3 x 153	8" x 60" / 20.3 x 153	8" x 60" / 20.3 x 153
Filter/ Housing Quantity		1	1	1	2	3	5	6	8
Housing Model		ET80 or equivalent							
Housing Quantity		1	1	1	2	3	5	6	8
Installation and Utility Requirements									
UF Feed Flange End		3"	3"	4"	6"	10"	14"	18"	20"
BWRO Permeate Flange End		2"	2"	2"	4"	4"	6"	6"	8"
Drain size requirement	MLD / m ³ /hr	0.28 / 12	0.38 / 16	0.84 / 35	1.49 / 62	3.07 / 128	5.13 / 214	7.94 / 331	10.08 / 420
Air Pressure (oil-free)	bar	7							
Power		400 VAC +/-20%, 3 phase, 50/60Hz							
Control circuit		120/220V, 1 phase, 50/60Hz							
Recommended Tank Size									
UF Filtrate tank*	m ³	12	15	32	60	120	200	300	400
SWRO permeate tank*	m ³	5	7	15	30	65	110	150	180
RO CIP tank	m ³	0.6	0.7	1.7	3.3	12	20	24	28
Overall System Dimensions (based on above volumes)									
Dimensions (L x W x H)	m	12.0x9.0x3.8	12.0x9.0x3.8	12.0x9.0x3.8	12.0x9.0x3.8	12.0x9.0x3.8	12.0x9.0x3.8	12.0x9.0x3.8	12.0x9.0x3.8
Dry Weight	kg	4,500	5,500	9,500	12,500	24,000	38,000	54,000	64,000
Wet Weight	kg	7,000	10,000	16,000	24,000	39,000	55,000	83,000	96,000

* 1hr retention time

COMBINATION SYSTEMS: UF-SWRO-BWRO

MK-MSW-MBW SERIES



Model: MK-MSW-MBW-32

Model	Net Permeate Capacity* (Each sub system)		Feed Flow Rate		No. of UF / RO membranes	Estimated Dry Weight (kg)	Estimated Wet Weight (kg)	System Dimension L x W x H (m)	Sub Systems
	(m ³ /day)	(m ³ /hr)	(m ³ /day)	(m ³ /hr)					
MKS-MSW-MBW-32N	240	10	267	11	5	2,000	4,000	3.8 x 2.1 x 3.3	1 x MK-32S
	108	5	240	10	10	2,500	3,000	7.0 x 2.0 x 1.5	1 x MSW-32N
	97.2	4	108	5	20 (4")	1,500	2,000	6.0 x 1.0 x 2.0	1 x MBW-32
MKS-MSW-MBW-50N	360	15	400	17	8	2,500	6,000	4.4 x 2.5 x 3.3	1 x MK-50S
	162	7	360	15	12	3,000	4,000	8.0 x 2.0 x 1.5	1 x MSW-50N
	145.8	6	162	7	25 (4")	1,500	2,000	6.0 x 1.0 x 2.0	1 x MBW-50
MKS-MSW-MBW-80N	720	30	800	33	14	4,500	10,000	5.2 x 3.2 x 3.3	1 x MK-80S
	324	14	720	30	30	5,000	6,000	8.2 x 2.2 x 2.25	1 x MSW-80N
	291.6	12	324	14	12	1,500	2,000	6.0 x 1.2 x 2.0	1 x MBW-80
MKS-MSW-MBW-100N	1440	60	1600	67	26	5,500	15,000	7.1 x 3.5 x 3.6	1 x MK-100S
	648	27	1440	60	60	7,000	9,000	8.5 x 2.5 x 2.2	1 x MSW-100N
	583.2	24	648	27	30	2,200	3,400	6.5 x 1.5 x 2.5	1 x MBW-100
MKS-MSW-MBW-150N	3000	125	3333	139	54	15,000	24,000	12.0 x 13.0 x 4.5	1 x MK-150S
	1350	56	3000	125	112	9,000	15,000	15.0 x 5.0 x 3.0	1 x MSW-150N
	1215	51	1350	56	63	4,400	7,000	8.5 x 2.5 x 2.5	1 x MBW-150
MKS-MSW-MBW-200N	4800	200	5333	222	86	21,000	31,000	15.5 x 17.0 x 4.5	1 x MK-200S
	2160	90	4800	200	196	17,000	24,000	16.0 x 6.0 x 2.5	1 x MSW-200N
	1944	81	2160	90	84	4,400	7,000	8.5 x 2.5 x 2.5	1 x MBW-200
MKS-MSW-MBW-250N	7200	300	8000	333	130	32,000	54,000	17.5 x 19.0 x 5.0	1 x MK-250S
	3240	135	7200	300	238	22,000	29,000	16.0 x 6.0 x 3.0	1 x MSW-250N
	2916	122	3240	135	105	7,000	11,500	8.5 x 2.5 x 3	1 x MBW-250
MKS-MSW-MBW-300N	9000	375	10000	417	160	33,000	55,000	17.5 x 19.0 x 5.5	1 x MK-300S
	4050	169	9000	375	294	28,000	36,000	17.0 x 6.3 x 3.3	1 x MSW-300N
	3645	152	4050	168.8	126	8,000	14,000	8.5 x 2.5 x 3.5	1 x MBW-300

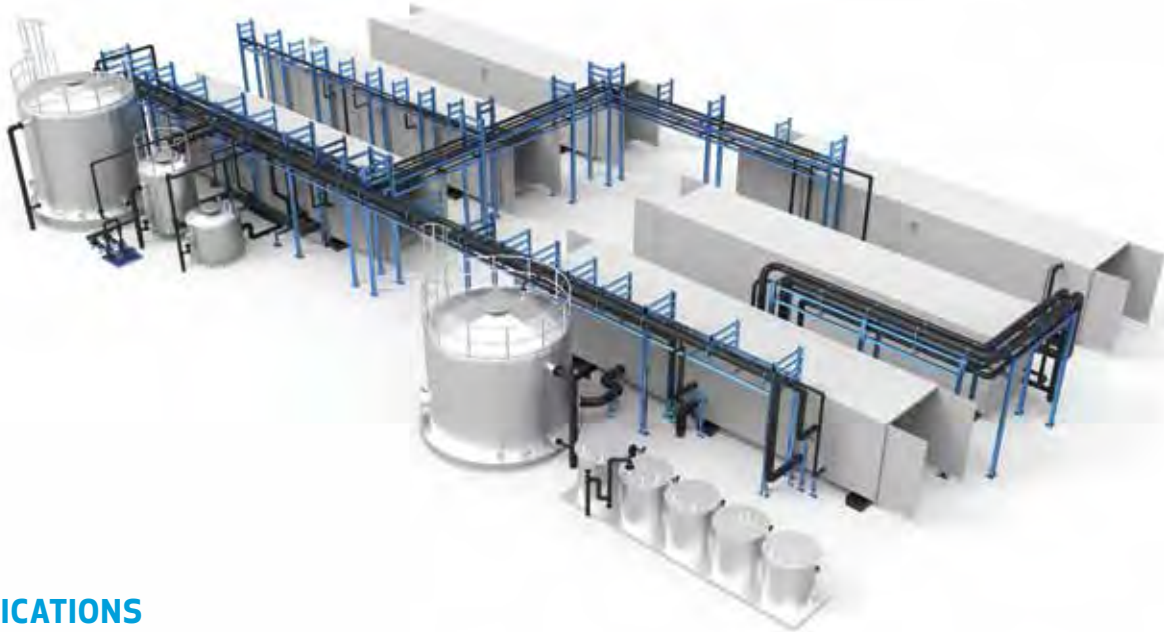
MK-MSW-MBW SERIES : TECHNICAL SPECIFICATIONS

Model	UOM	MK-MSW-MBW-32	MK-MSW-MBW-50	MK-MSW-MBW-80	MK-MSW-MBW-100	MK-MSW-MBW-150	MK-MSW-MBW-200	MK-MSW-MBW-250	MK-MSW-MBW-300
Permeate capacity (Max.)	m ³ /day	97.2	145.8	291.6	583.2	1215	1944	2916	3645
Concentrate rate (Min.)	m ³ /day	169.8	254.2	508.4	1016.8	2118	3389	5084	6355
Feed rate (Max.)	m ³ /day	267	400	800	1600	3333	5333	8000	10000
System recovery (Max.)	%	Overall recovery 38%							
Operating Temperature Range	°C	20 - 35							
Nominal RO Rejection		98 - 99%							
Sub-Systems									
UF Systems		1 x MK-32S	1 x MK-50S	1 x MK-80S	1 x MK-100S	1 x MK-150S	1 x MK-200S	1 x MK-250S	1 x MK-300S
SWRO System		1 x MSW-32	1 x MSW-50	1 x MSW-80	1 x MSW-100	1 x MSW-150	1 x MSW-200	1 x MSW-250	1 x MSW-300
BWRO System		1 x MBW-32	1 x MBW-50	1 x MBW-80	1 x MBW-100	1 x MBW-150	1 x MBW-200	1 x MBW-250	1 x MBW-300
RO CIP Pump									
Model		APP / CRN or equivalent							
Manufacturer		Danfoss /Grundfos or equivalent							
Quantity		1	1	1	1	1	1	1	1
Motor	kW / HP	4.5 / 5.5	4.5 / 5.5	7.5 / 10	15 / 20	15 / 20	30 / 40	37 / 50	45 / 60
Operation		Fixed Speed							
MOC		SS316							
RO Booster Pump?		Refer to MSW series							
UF CIP/Backwash Pump?		Refer to MK series							
Cartridge Filter for RO CIP									
Filter Model		ETHF or equivalent							
Filter Dimensions (Dia. X L)	inch / cm	8" x 40" / 20.3 x 102	8" x 40" / 20.3 x 102	8" x 60" / 20.3 x 153	8" x 60" / 20.3 x 153	8" x 60" / 20.3 x 153	8" x 60" / 20.3 x 153	8" x 60" / 20.3 x 153	8" x 60" / 20.3 x 153
Filter/ Housing Quantity		1	1	1	2	3	5	6	8
Housing Model		ET80 or equivalent							
Housing Quantity		1	1	1	2	3	5	6	8
Installation and Utility Requirements									
UF Feed flange end		3"	3"	4"	6"	10"	14"	18"	20"
BWRO Permeate flange end		2"	2"	2"	3"	4"	6"	6"	8"
Drain size requirement	MLD / m ³ /hr	0.28 / 12	0.38 / 16	0.84 / 35	1.49 / 62	3.07 / 128	5.13 / 214	7.94 / 331	10.08 / 420
Air Pressure (oil-free)	bar	7							
Power		400 VAC +/-20%, 3 phase, 50/60Hz							
Control circuit		120/220V, 1 phase, 50/60Hz							
Recommended Tank Size									
UF Filtrate tank*	m ³	12	15	32	60	120	200	300	400
SWRO permeate tank*	m ³	5	7	15	30	65	110	150	180
BWRO permeate tank*	m ³	5	6	15	25	60	100	125	160
RO CIP tank	m ³	0.6	0.7	1.7	3.3	12	20	24	28
Overall System Dimensions (based on above volumes)									
Dimensions (L x W x H)	m	12.0 x 9.0 x 3.8	12.0 x 9.0 x 3.8	12.0 x 9.0 x 3.8	12.0 x 9.0 x 3.8	12.0 x 9.0 x 3.8	12.0 x 9.0 x 3.8	12.0 x 9.0 x 3.8	12.0 x 9.0 x 3.8
Dry Weight	kg	6,000	7,000	11,000	14,700	28,400	42,400	61,000	72,000
Wet Weight	kg	9,000	12,000	18,000	27,400	46,000	62,000	94,500	110,000

* 1hr retention time

Above specifications refer to MK-MSW-MBW Normal Salinity Series.
MK-MSW-MBW Low Salinity and High Salinity Series are available on request.

CONTAINERISED SEAWATER DESALINATION SOLUTIONS



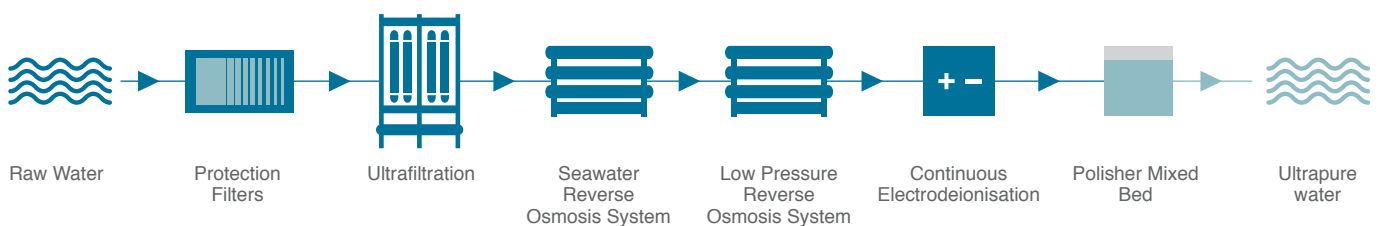
APPLICATIONS

Municipalities	Recreation Sites	Temporary Use (Construction, Camps)	Industries
<ul style="list-style-type: none"> • Potable Water • Park Irrigation • Large Public • Building Cooling Systems 	<ul style="list-style-type: none"> • Potable Water • Pools & Spas • Laundry Golf • Club Irrigation • Cooling Systems 	<ul style="list-style-type: none"> • Concrete Production • Potable Water • Process Water • Dust Suppression 	<ul style="list-style-type: none"> • Process Water • Ultra-Pure Water • Boiler Feed Water • Cooling Tower Make-Up Water

BENEFITS & ADVANTAGES

- Affordable, complete solution
- Fast delivery
- Minimal CAPEX
- Small footprint
- “Plug & Play” easy and quick installation
- Lower operation & maintenance costs
- Low energy and chemical consumption
- No cartridge filter replacement requirement
- Longer life cycle of UF and RO membranes
- High recovery (up to 50% depending on TDS)
- High production availability (up to 99%), with only 1% down-time for cleaning and maintenance
- Easy modular expansion capability

SYSTEM PROCESS



CONTAINERISED SEAWATER DESALINATION SOLUTIONS

STANDARD CONTAINERISED DESALINATION CAPACITIES

Different production capacity requirements can be accommodated by providing the optimum combination of Hyflux products.

A typical 1,000 m³/day containerised desalination system consists of 5 nos. of 40ft HC containers. All containers are pre-assembled and fully wet Factory Acceptance Tested (F.A.T) for its functional checks prior shipping to site.

1. UF Valve rack container (container 1)
2. UF Module rack (container 2)
3. SWRO container (container 3)
4. BWRO container (container 4)
5. Chemical skids container (container 5)

Containerised UF Standard Capacities (Seawater / brackish water)

Model	Capacity Up To		People Served with Potable Water @200 l/person/d
	m ³ /d	MLD	
MK-32C	275	0.275	1,375
MK-50C	350	0.350	1,750
MK-80C	775	0.775	3,875
MK-100C	1,675	1.675	8,375
MK-150C	3,350	3.350	16,750
MK-200C	5,550	5.550	27,750
MK-250C	7,775	7.775	38,875

Multiple modules can be operated in parallel to obtain larger production capacities.

Filtered water for potable use is only for brackish water application of TDS <1500 ppm, for higher TDS water, UF filtrate to be further treated using RO system

Containerised SWRO Standard Capacities – First Pass

Model	Capacity Up To		People Served with Potable Water @200 l/person/d
	m ³ /d	MLD	
MSW-32C	120	0.12	600
MSW-50C	150	0.15	750
MSW-80C	350	0.35	1,750
MSW-100C	750	0.75	3,750
MSW-150C	1,500	1.50	7,500
MSW-200C	2,500	2.50	12,500
MSW-250C	3,500	3.50	17,500

Multiple modules can be operated in parallel to obtain larger production capacities.

Containerised BWRO Standard Capacities – Second Pass

Model	Capacity Up To		People Served with Potable Water @200 l/person/d
	m ³ /d	MLD	
MBW-32C	100	0.100	500
MBW-50C	125	0.125	625
MBW-80C	300	0.300	1,500
MBW-100C	650	0.650	3,250
MBW-150C	1,250	1.250	6,250
MBW-200C	2,000	2.000	10,000
MBW-250C	3,000	3.000	15,000

Multiple modules can be operated in parallel to obtain larger production capacities.

CONTAINERISED SEAWATER DESALINATION SOLUTIONS

DESALINATION SYSTEM MAIN COMPONENTS

Each Hyflux containerized system, equipped with the most efficient high pressure pumps and ERD systems, uses three process stages for water desalination: disc filtration, UF and Two pass RO. The system is installed in a new, 40-foot-high cube container with thermo-acoustic insulation and uses only high-quality components from industry-leading suppliers.

PRE-TREATMENT

- UF feed pump, Automatic self-cleaning 130 µm disc filter, backwash pump
- Kristal® Hyflux Proprietary Hollow fibre UF modules
- Hydrogen Chloride (HCl), Caustic (NaOH) and Sodium Hypochlorite (NaOCl) dosing systems



UF Valve Rack Container



Chemical & CIP System Container



Pre-treatment UF System Module Container

DESALINATION (1ST PASS)

- Anti-scaling and anti-oxidant dosing systems
- High-pressure piston pump
- ERD combined with booster
- 1,200 psi multiport pressure vessels for SWRO.
- Ultra-low energy RO membranes
- Clean-In-Place (CIP) and flush systems



SWRO System Container

DESALINATION (2ND PASS)

- Anti-scaling and anti-oxidant dosing systems
- High-pressure centrifugal
- 450 psi multiport pressure vessels for BWRO.
- Ultra-low energy RO membranes



BWRO System Container

CONTROL, ELECTRICAL & ANALYTICS

- Pressure, flow, and temperature transmitters
- Turbidity, Oxidation-Reduction Potential (ORP), and pH transmitters
- Industrial panel PC equipped with 22" multi-touch screen
- Power and control boards
- Variable Frequency Drives (VFD) for all critical pumps
- Industrial Programmable Logic Controllers (PLC)

CONTAINERISED SEAWATER DESALINATION SOLUTIONS

OPTIONAL SYSTEM ADD-ONS - FEED SYSTEMS, ADDITIONAL PRE-TREATMENT & POST TREATMENT

FEED

1. Beach well pumping system
2. Raw water tank pumping system

PRE-TREATMENT

- Multimedia filter
- Activated Carbon filter
- DAF system

POST-TREATMENT

For Drinking Water Production:

1. Post-chlorination by NaOCl solution dosing
2. Re-mineralization by calcite filter system or by injection of sodium bicarbonate and calcium chloride solutions

For Demineralized Water Production:

- Permeate polishing by second pass RO
- Non re-generable mixed-bed

For Ultrapure Water Production:

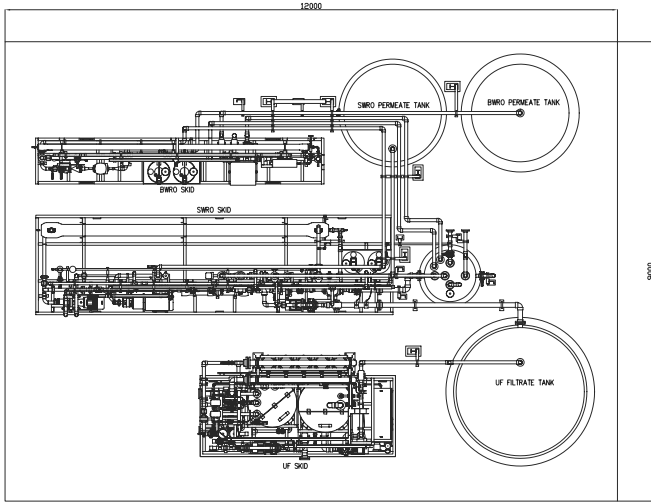
- Permeate polishing by Continuous Electrode ionization (CEDI)
- Conventional Ion exchange system

REFERENCES

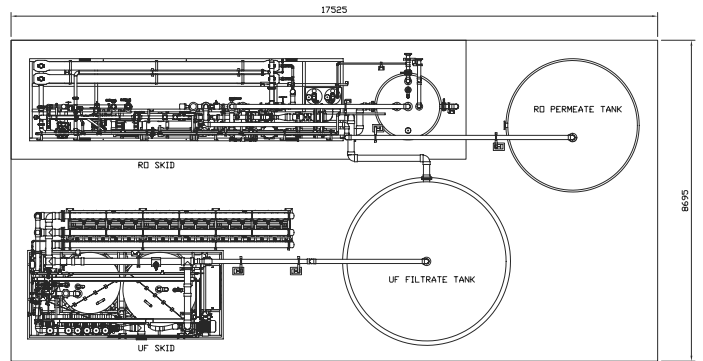
Hyflux has extensive knowledge and experience in customising and commissioning membrane systems of varying sizes to support the needs of a range of industries including electronics, power, semiconductor and textiles. The following table shows a selection of Hyflux's projects.

Application	Country	Capacity (m ³ /d)	Completion/ Estimated Completion
Brackish water treatment for potable water production	Myanmar	1,000	2015
Seawater desalination for chemical application water supply	Indonesia, Bontang	7,200	2014
Seawater desalination for water production	Indonesia	720	2013
Seawater desalination for boiler feed water production	Indonesia	2,400	2009
Seawater desalination for industrial water production	China	10,000	2007
Seawater desalination for industrial water production	China	5,000	2007
Surface water treatment for municipal water production	Malaysia	5,500	2007
Seawater desalination for industrial water production	China	10,000	2006
Industrial water production	China	10,000	2005
Seawater desalination for boiler feed water production	China	9,600	2005
Industrial water production	Namibia	17,120	2004
Seawater desalination for boiler feed water production	China	10,000	2004
Industrial water production	Indonesia	1,960	2004
Borewell water treatment for potable water	East Timor, Timor Leste	120	Ongoing
Borewell water treatment for industrial water use	Saudi Arabia, Yanbu	1,000	Ongoing

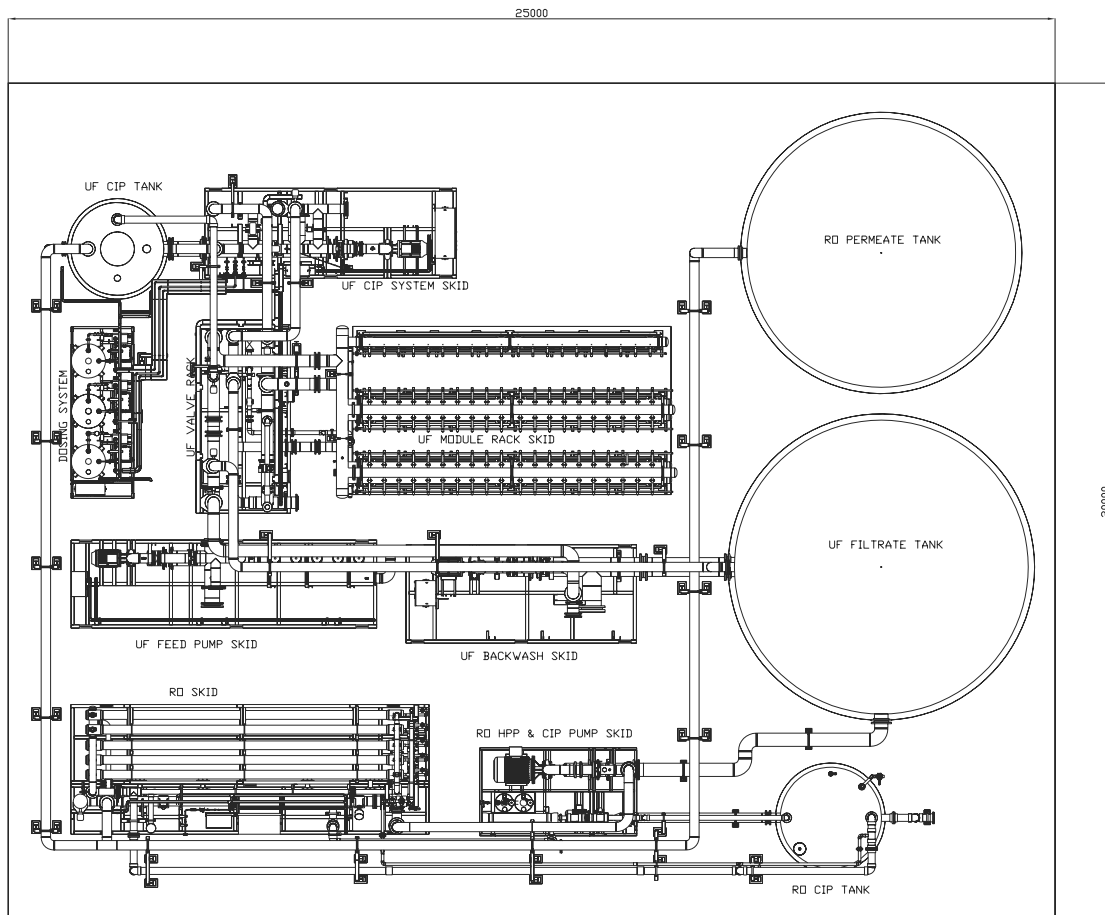
TYPICAL SYSTEM DRAWINGS



MK-MSW-MBW-32



MK-MSW-100



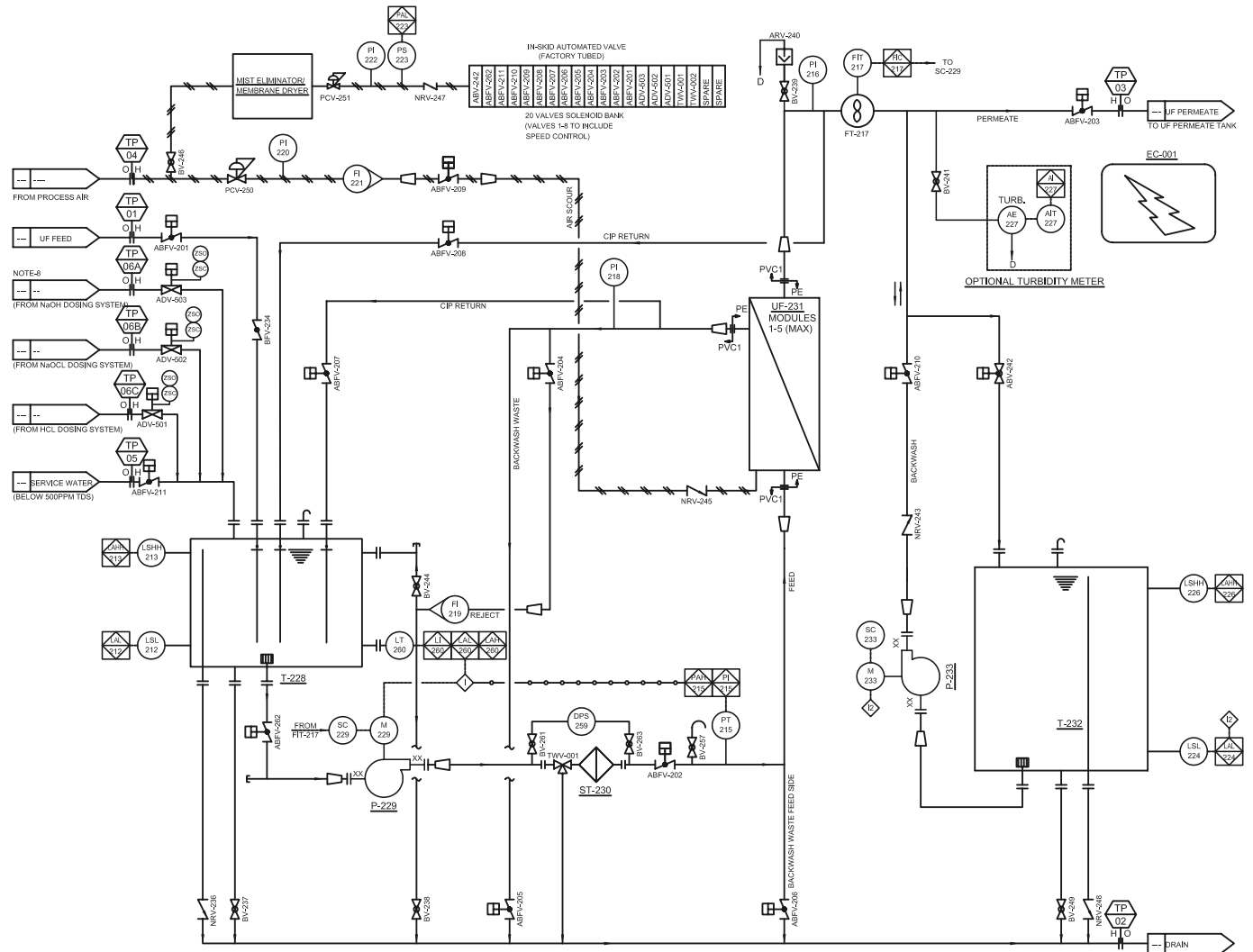
MK-MBWS-200

Images are for illustration only. Hyflux reserves the right to decide on the component brand(s) to use; Hyflux's decision is final and subject to change without notice.

TYPICAL P&ID

ULTRAFILTRATION (UF) SYSTEM

FOR REFERENCE ONLY



Filtrate tanks, permeate tanks and interconnecting pipes are drawn for reference only and do not form not part of Hyflux scope of supply.

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