

## **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**







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.



#### **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.

#### **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)

#### **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/m<sup>3</sup>



#### **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</li>
   MSW-N (Normal Salinity) ranging from < 30,000-40,000 mg/L</li>
   MSW-H (High Salinity) ranging from < 40,000-50,000 mg/L</li>
- Permeate TDS < 500mg/L for MSW-L and MSW-N.</li>
   For MSW-H TDS <750 mg/L\*</li>
- Energy consumption of MSW series is 3 to 3.5 kWh/m<sup>3</sup>,
- \* 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/m<sup>3</sup>

#### **OVERVIEW**



## UF-BWRO SYSTEM: MK-MBWS SERIES



- 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





- 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







- Comprises UF, SWRO and LPRO subsystems
- 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



## **WATER QUALITY FOR UF SYSTEMS**

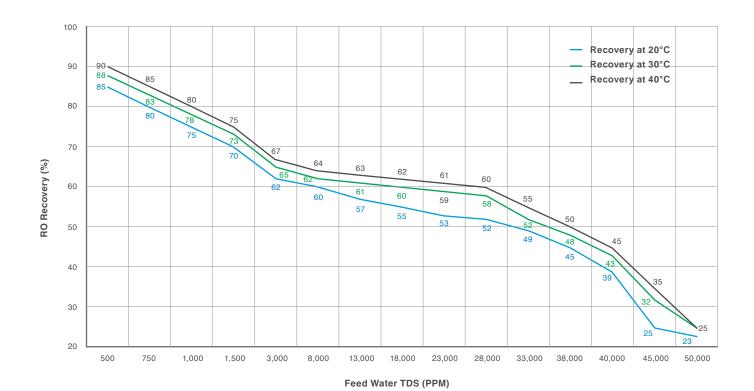
Feed Water Parameters	Units	Normal	Maximum		
Turbidity	NTU	< 10	< 25		
TSS	mg/L	< 20	< 50		
TOC	mg/L	< 5	< 15		
COD	mg/L	< 15	< 30		
Total Oil & Grease	mg/L	Negligible	< 1		
Total Iron	mg/L	< (	0.2		
Total Manganese	mg/L	< 0	.05		
Total Colour	Pt-Co/L	< 10	< 20		
Total Hardness as CaCO <sub>3</sub>	mg/L	< 2,000	< 3,000		
Product Water Parameters	Units	Expecte	ed Value		
Turbidity	NTU	< 0.2			
SDI	-	< 3			

## **WATER QUALITY FOR RO SYSTEMS**

Facil Water			Seawater		Brac	kish				
Feed Water Parameters	Units	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				
рН	рН			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 <sub>2</sub>	mg/L		< 40							
Product Water	Units	Seawater Brackish								
Parameters	Units	One Pass RO	Two Pas	s RO	One Pass F	RO				
TDS	mg/L	< 500-750*	< 50		< 100					

 $<sup>^{\</sup>star}$  750 mg/L in case of TDS > 40,000 mg/L as feed

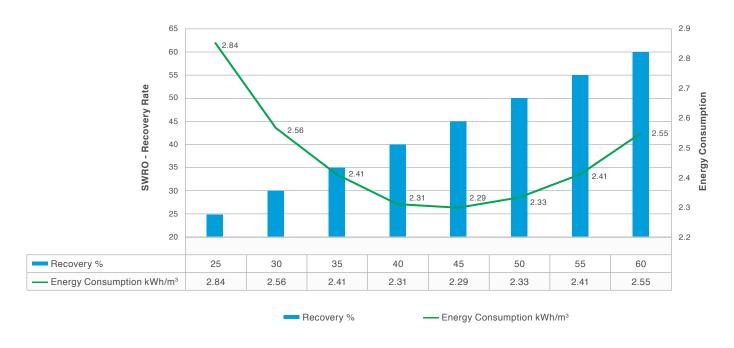
## **RO RECOVERY (%) VS FEED WATER TDS (PPM)**



DO Food TDC (DDM)		RO System Recovery (%)	
RO Feed TDS (PPM)	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

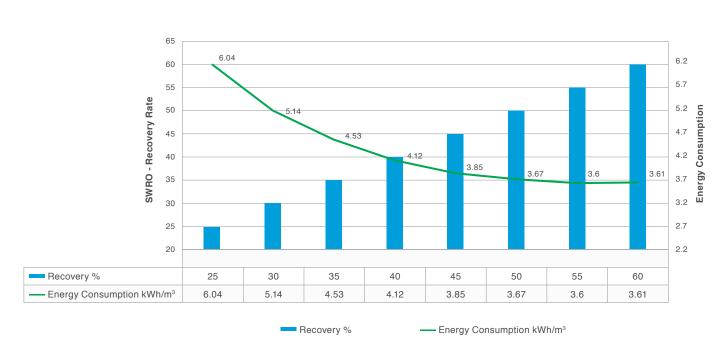
# SWRO RECOVERY VS ENERGY CONSUMPTION (WITH TURBOCHARGER AS ENERGY RECOVERY DEVICE (ERD))

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**

Oneveling Revenetors	I India	Seawater	Brac	kish
Operating Parameters	Unit	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 <sup>st</sup> 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 <sup>st</sup> pass	< 3,000	< 100

#### Note

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

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



## **ULTRAFILTRATION SYSTEMS**

## MKB / MKS SERIES



	Net Pe Capa		Fe	ed Rate	No.of UF Membranes	Insta	llation Connec	tions	Estimated Dry	Estimated Wet	System Dimension
Model	Оара	iony	1100	ruio	No.of UF embrane	Feed	Permeate	Concentrate	Weight	Weight	LxWxH
	(m³/day)	(m³/hr)	(m³/day)	(m³/hr)	_ 5		(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.

<sup>\*</sup> Based on optimal feed water conditions

<sup>^</sup> Above capacities, dimension and weights are based on best estimates.

MKB / MKS SERIE	S : T	ECHNICA	L SPECIF	ICATION	IS				
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.)	m³/day	240	360	720	1,440	3,000	4,800	7,200	9,000
Concentrate rate (Min.)	m³/day	27	40	80	160	333	533	800	1,000
Feed rate (Max.)	m³day	267	400	800	1,600	3,333	5,333	8,000	10,000
System recovery (Max.)	%				9	0			
Operating Temperature Range	°C				20	- 35			
		UF	Feed Pump / L	IF CIP Pump /	UF Backwash	Pump			
Model					NBG or e	equivalent			
Manufacturer					Grundfos o	r 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 Opera	ted			
MOC				Seawater: Du	plex Stainless S	Steel, Brackish	Water: SS316		
			Membran	e Elements a	nd Housings				
Membrane Model				K	ristal K600ETI-	-55 or equivale	ent		
Membrane Manufacturer					Ну	flux			
Membrane Quantity		5	8	14	26	54	86	130	160
Nominal Molecular Cut-off Weight	Daltons				120	,000			
Housing Shell MOC					P\	VC			
Flow Type					Outsi	ide-in			
			Installatio	n and Utility F	Requirements				
UF Feed flange end		2	2"	(	3"	10"	14"	18"	20"
UF Permeate flange end		2	2"	(	3"	6"	8"	10"	12"
UF Feed Water Pressure (min.)	bar				0.2	2-2			
Air Pressure (oil free)	bar				-	7			
Waste water volume for drain	MLD /	0.28 / 12	0.38 / 16	0.84 / 35	0.84 / 35	7.2 / 300	12 / 500	19.2 / 800	19.2 / 800
trench sizing requirement	m³/hr	0.26712	0.36 / 10	0.04 / 33	0.64735	7.27300	12 / 500	19.2 / 600	19.27 000
Power				400	VAC +/- 20%,	3-phase, 50/6	0Hz		
Control circuit					120/220V, 1-p	hase, 50/60Hz			
			Mea	asuring Instru	ıments				
Pressure switch			Instrume	nt air line		In	strument air Iir	e, UF feed pur	np
Pressure guage		Instrument lin	ne, UF air scou line, UF pe	ring line, Rejec rmeate line	ct recirculation	line, UF perm	neate line, CIP	ring line, Rejec pump discharg Cl, NaOH pum	je, Backwash
Flow indicator (rotameter)				UF air s	scouring line, R	Reject recircula	tion line		
Flow measurement				UF pe	rmeate line, Re	eject recirculati	on line		
DPS					Auto di	isc filter			
Pressure transmitter					UF F	Feed			
Analyzers			Turbidity me	ter (Optional)		pH mete	r for UF CIP, Ti	urbidity meter (	optional)
Level Switch		UF	feed / CIP tan	k, Backwash t	ank			aoH Dosing tan	
Level Transmitter			UF feed	CIP tank			UF CIP tank / I	Backwash tank	
		Recommended Tank Size							
UF Feed tank		15	25	50	75	100	150	200	250
UF Permeate tank*	m <sup>3</sup>	15	25	50	75	100	150	200	250
CIP tank		0.55	0.9	1.8	2.7	8	12	20	22
		Ove <u>ra</u>	ıll System D <u>in</u>	nensions (bas	ed on above v	volumes)			
Dimensions (L x W x H) Skid Configuration	m	3.8 x 2.1 x 3.3	ı	5.2 x 3.2 x 3.3 e Skid	7.1 x 3.5 x 3.6	UF feed pum	ip & auto-strair kid, UF CIP pu	17.5 x 19 x 5 ner skid, UF va mp skid, UF ba I dosing skid	lve rack 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
vvet vvelgiit	ĸy	4,000	0,000	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

	Net Pe Capa		Fe Flow		No.of RO Membranes	Instal	Installation Connections			Estimated Wet	System Dimension
Model	Сарс		1.00	riato	No.o	Feed	Permeate	Concentrate	Weight	Weight	LxWxH
	(m³/day)	(m³/hr)	(m³/day)	(m³/hr)	_ 2		(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

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

<sup>^</sup> Above capacities, dimension and weights are based on best estimates and rounded off.

UOM	MBWS-32	MBWS-50	MBWS-80	MBWS-100	MBWS-150	MBWS-200	MBWS-250	MBWS-300
								6750
								2250
								9000
	240	300	720			4000	7200	9000
10	-	oostor Bumn	and CIR Rum		- 35	CIR	- Dumm	
				ıþ		GIF I	- ump -	
							-	
		•					-	
kW / HP	3/4	3/4	5.5 / 7.5	7.5 / 10	15 / 20	18.5 / 25	30 / 40	37 / 50
			speed				-	
							-	
				מו				
				•	equivalent			
					•			
kW/HP	11 / 15	11 / 15	18.5 / 25	30 / 40	90 / 125	132 / 175	200 / 270	200 / 270
		Membrane E	lements and					
					0 or equivalen	t		
	12	15					224	294
	12	10	- 00			100	221	201
	4-element long, 4 port,	5-eleme	ent long, 4 port		,	7-element long	, 4 port, 300 ps	si
	· · · · · · · · · · · · · · · · · · ·	2 2 >1	2 1->2	6.6. >2	10 12 >6	27 19>0	26 24 >12	54, 36>18
					10, 12>0	21, 10>5	30, 24>12	34, 30>10
					8"	14"	14"	16"
	_			_				10"
				-		_	_	4"
har	1				_	т т	4	7
Dai	3"	3"	A"			6"	6"	8"
				-		-		2"
			_	-				8"
har			3			0	0	0
MLD/ m³/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
			400	VAC +/-220%,	3-phase, 50/6	0 Hz		
				120/220V, 1-p	hase, 50/60Hz			
		Measu	ring Instrume	nts				
							nt air line	
	Ir	strument air li	ne. HPP suction	on		Instrume		
			ne, HPP suction P pump, RO in		Instrument lir	ne, RO CIP pur	np discharge, l	RO interstag
			P pump, RO in	terstage line		ne, RO CIP pur lii		RO interstag
			P pump, RO in	terstage line BWRO permea	ate, concentrat	ne, RO CIP pur lii	np discharge, l	RO interstag
			P pump, RO in	terstage line BWRO permea BWRO p	ate, concentrate permeate	ne, RO CIP pur lii	np discharge, l	RO interstage
		ine, MBWS CII	P pump, RO in	terstage line BWRO permea BWRO p BWRO feed	te, concentrate permeate , concentrate	ne, RO CIP pur lii e	mp discharge, l ne	RO interstage
		ine, MBWS CII	P pump, RO in	terstage line BWRO permea BWRO p BWRO feed RO feed, cond	te, concentrate permeate , concentrate uctivity analyze	ne, RO CIP pur lii e er at RO perme	mp discharge, l ne	RO interstage
		ine, MBWS CII	P pump, RO in  RP analyzer of  RO CIP to	terstage line BWRO permea BWRO p BWRO feed RO feed, cond ank, antiscalar	te, concentrate permeate , concentrate	ne, RO CIP pur lii e er at RO perme	mp discharge, l ne	RO interstage
m <sup>3</sup>	Instrument I	one, MBWS CII	P pump, RO in  P analyzer of RO CIP to mended Tank	terstage line BWRO permea BWRO p BWRO feed RO feed, cond ank, antiscalar Size	ate, concentrate permeate , concentrate uctivity analyze at and SMBS de	ne, RO CIP pur lii e er at RO perme osing tank	np discharge, l ne eate	
m <sup>3</sup>	Instrument I	OR Recomr	P pump, RO in P analyzer of RO CIP to nended Tank 50	terstage line BWRO permea BWRO p BWRO feed RO feed, cond ank, antiscalar Size 75	ate, concentrate concentrate uctivity analyze and SMBS de 100	e er at RO perme osing tank	np discharge, line eate	250
m³	Instrument I	OR Recomm 25 25	P pump, RO in P analyzer of RO CIP to mended Tank 50 50	terstage line BWRO permea BWRO p BWRO feed RO feed, cond ank, antiscalar Size 75 75	ate, concentrate occupants and SMBS de 100 100	e er at RO perme tank	pate  200 200	250 250
	15 15 0.5	OR  Recomm 25 25 1.0	P pump, RO in  P analyzer of  RO CIP to  mended Tank  50  50  1.5	terstage line BWRO permea BWRO p BWRO feed, cond ank, antiscalar Size 75 75 2.5	ate, concentrate or concentrate uctivity analyze and SMBS de 100 100 8	e er at RO perme osing tank	np discharge, line eate	250
m³ m³	15 15 0.5 Overall S	OR Recommendation of the control of	P pump, RO in  P analyzer of  RO CIP to  mended Tank  50  50  1.5  sions (based	terstage line BWRO permea BWRO p BWRO feed RO feed, cond ank, antiscalar Size 75 75 2.5 on above volu	te, concentrate permeate , concentrate uctivity analyze it and SMBS de  100  100  8  Immes)	er at RO perme osing tank	eate  200 200 16	250 250 24
m³	15 15 0.5 Overall S	OR  Recommendation   25 25 1.0 ystem Dimendation   6.1 x 2.1 x 2.1	P pump, RO in  P analyzer of  RO CIP to  mended Tank  50  50  1.5  sions (based  6.1 x 2.1 x 2.6	terstage line BWRO permea BWRO p BWRO feed RO feed, cond ank, antiscalar Size 75 75 2.5 on above volu	te, concentrate permeate , concentrate uctivity analyze t and SMBS de  100 100 8  Image: 9.5 x 8.5 x 3.6	er at RO perme osing tank	200 200 16 9.5 x 13 x 4	250 250 24 11 x 13 x 4.
m³ m³	15 15 0.5 Overall S 5.1 x 2 x 1.8	OR  Recomm 25 25 1.0  ystem Dimen 6.1 x 2.1 x 2.1 Single	P pump, RO in  P analyzer of  RO CIP to  mended Tank  50  50  1.5  sions (based 6.1 x 2.1 x 2.6 e skid	terstage line BWRO permea BWRO p BWRO feed RO feed, cond ank, antiscalar Size 75 75 2.5 on above volu 6.4 x 2.2 x 1.9	te, concentrate permeate , concentrate uctivity analyze t and SMBS de  100 100 8  Immes) 9.5 x 8.5 x 3.6	er at RO perme posing tank  150 150 12  9.5 x 11 x 4  PT Skid, RO	200 200 16 9.5 x 13 x 4 HPP, RO CIP S	250 250 24 11 x 13 x 4.
m³ m³	15 15 0.5 Overall S	OR  Recommendation   25 25 1.0 ystem Dimendation   6.1 x 2.1 x 2.1	P pump, RO in  P analyzer of  RO CIP to  mended Tank  50  50  1.5  sions (based  6.1 x 2.1 x 2.6	terstage line BWRO permea BWRO p BWRO feed RO feed, cond ank, antiscalar Size 75 75 2.5 on above volu	te, concentrate permeate , concentrate uctivity analyze t and SMBS de  100 100 8  Image: 9.5 x 8.5 x 3.6	er at RO perme osing tank	200 200 16 9.5 x 13 x 4	250 250 24 11 x 13 x 4.7
	bar bar MLD/	m³/day 60 m³/day 240 % °C  B  Gi  kW/HP 3/4  12  4-element long, 4 port, 300 psi 3, 2>1  3" 2" 1" bar  bar  MLD/ 0.28/132	m³/day   60   90   90   m³/day   240   360   96   96   96   96   96   96   96	m³/day   60   90   180   m³/day   240   360   720   96   96   90   180   720   96   96   96   96   96   96   96   9	m³/day   60   90   180   360   m³/day   240   360   720   1440   %   70   20   20	m³/day   60   90   180   360   750   m³/day   240   360   720   1440   3000   %   75   20 - 35	m³/day   60   90   180   360   750   1200   m³/day   240   360   720   1440   3000   4800   75   75   75   75   75   75   75	m³/day         60         90         180         360         750         1200         1800           m³/day         240         360         720         1440         3000         4800         7200           %         75         20 - 35         20 - 35         CIP Pump           NBG or equivalent         -

<sup>\* 1</sup>hr retention time

## **SWRO SYSTEM: MSW SERIES**

## **MSW-N (NORMAL SALINITY SERIES)**



Mardal	Net Per Capa		Fe Flow		No.of RO Membranes	S Installation Co		O S Installation Connec		ections	Estimated Dry	Estimated Wet	System Dimension
Model		,			No.of RO lembrane	Feed	Permeate	Concentrate	Weight	Weight	LxWxH		
	(m³/day)	(m³/hr)	(m³/day)	(m³/hr)	2		(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		

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

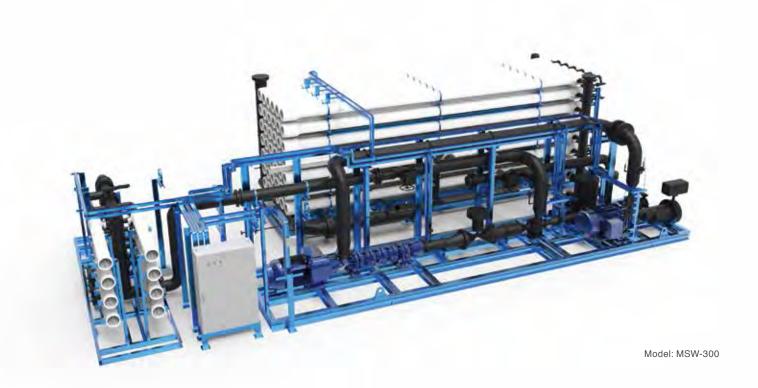
<sup>^</sup> Above capacities, dimension and weights are based on best estimates and rounded off.

Model Permeate capacity (Max.) Concentrate rate (Min.) Feed rate (Max.) System recovery (Max.) Operating Temperature Range Nominal RO Rejection  Model Manufacturer Quantity Motor Operation Model Manufacturer Quantity Motor Operation MoC  Model Manufacturer Quantity Sesion feed flow rate Design concentrate flow rate  Membrane Model Membrane Model Membrane Quantity Salt rejection at standard conditions  Housing specifications  Banking arrangement  RO inlet flange end RO concentrate flange end RO inlet water pressure (min) CIP rilet flange end CIP return permeate flange end CIP return concentrate flange end Air Pressure (oil-free)  Drain size requirement  MLD / m³/hr Power		APP or e Danfoss o  15 / 20  V  Ener iSave or Danfoss o  0.19 / 8  0.18 / 7.74  Membran  12	MSW-80N 324 396 720  Booster Pum 5.5 / 7.5  gh Pressure Prequivalent r equivalent	20 98 - 98 - 9 NGB or 6 Grundfos o  11 / 15 Fixed SD  ump  75 / 100  SD  urbine  0.77 / 32 0.71 / 32.15 d Housing SWC5 / TM82 ydranautics / To 60 99.8% (99.7	55 / 75 Speed SS  1 185 / 250 SS  1 3.46 / 144 2.18 / 90.65 0 or equivalent oray or equivale 112 % minimum)	Fedco or Fedco or Fedco or Fedco or 5.71 / 238 3.58 / 148.85	MSW-250N	MSW-300 4050 4950 9000 132 / 175 450 / 600 9.5 / 396 5.25 / 218.7
Concentrate rate (Min.) m³/day Feed rate (Max.) m³/day System recovery (Max.) % Operating Temperature Range °C Nominal RO Rejection  Model Manufacturer Quantity Motor kW / HF Operation MOC  Model Manufacturer Quantity Motor kW / HF Operation MOC  Model Manufacturer Quantity Motor kW / HF Operation MOC  Model Manufacturer Quantity Design feed flow rate Design concentrate flow rate Design concentrate flow rate Design specifications  Housing specifications  Banking arrangement  RO inlet flange end RO concentrate flange end RO concentrate flange end CIP return permeate flange end CIP return concentrate flange end CIP return concentrate flange end Air Pressure (oil-free) bar Drain size requirement Power	132 240 3/4 3/4 11/15 0.08/6 0.08/6 10 5 element long, 4 port, 1,200 psi	198 360 3/4 High APP or expension of the policy of the	396 720  Booster Pum  5.5 / 7.5  gh Pressure Pequivalent r equivalent gy Recovery Tequivalent r equivalent r equivalent 0.43 / 18 0.45 / 18.7 e Elements an	792 1440 4 20 98 - 98 - 9 NGB or e Grundfos o  11 / 15 Fixed SD ump  75 / 100  SD urbine  0.77 / 32 0.71 / 32.15 dd Housing SWC5 / TM82 ydranautics / Tc 60 99.8% (99.7	1650 3000 .5 - 35 99% equivalent r equivalent 1 55 / 75 Speed 9SS 1 1 185 / 250 SS 1 1 3.46 / 144 2.18 / 90.65 0 or equivalent pray or equivalent pray or equivalent 112 % minimum)	2640 4800 75 / 100 MSS or e Fedco or e Fedco or e Fedco or e Fedco or e 5.71 / 238 3.58 / 148.85	3960 7200 110 / 150 equivalent equivalent 335 / 500 Speed equivalent equivalent 7.36 / 307 4.09 / 170.35	4950 9000 132 / 175 450 / 600 9.5 / 396 5.25 / 218.7
Feed rate (Max.)  System recovery (Max.)  System recov	3/4  3/4  11/15  0.08/6  0.08/6  10  5 element long, 4 port, 1,200 psi	3/4  High APP or expansion of the property of	720  Booster Pum  5.5 / 7.5  gh Pressure Pequivalent r equivalent gy Recovery Tequivalent r equivalent 0.43 / 18 0.45 / 18.7 e Elements an	1440  4 20 98 - 98 - 9 NGB or e Grundfos o  11 / 15 Fixed SD ump  75 / 100  SD urbine  0.77 / 32 0.71 / 32.15 d Housing SWC5 / TM82 ydranautics / To 60 99.8% (99.7	3000 -5 - 35 99%	4800  75 / 100  MSS or e Fedco or 6  Fedco or 6  Fedco or 6  5.71 / 238  3.58 / 148.85  ent 196	7200  110 / 150  equivalent equivalent  335 / 500 Speed  equivalent equivalent 7.36 / 307 4.09 / 170.35	9000 132 / 175 450 / 600 9.5 / 396 5.25 / 218.
System recovery (Max.) % Departing Temperature Range °C Nominal RO Rejection  Model Manufacturer Quantity Motor Model Manufacturer Quantity Design feed flow rate Design concentrate flow rate Design concentrate flow rate Membrane Model Membrane Quantity Salt rejection at standard Conditions  Housing specifications  Banking arrangement  RO inlet flange end RO concentrate flange end RO inlet water pressure (min) DIP return permeate flange end CIP return concentrate flange end CIP return concentrate flange end CIP return size requirement  MLD / m³/hr Power	3/4  11/15  0.08/6  0.08/6  10  5 element long, 4 port, 1,200 psi	Below	Booster Pum  5.5 / 7.5  gh Pressure Pequivalent r equivalent gy Recovery Tequivalent r equivalent r equivalent 0.43 / 18 0.45 / 18.7 e Elements an	98 - 0 NGB or 6 Grundfos o  11 / 15 Fixed SD  ump  75 / 100  SD  urbine  0.77 / 32 0.71 / 32.15 d Housing SWC5 / TM82 ydranautics / To 60 99.8% (99.7	55 - 35 99% equivalent r equivalent 1 55 / 75 Speed SS 1 185 / 250 SS 1 3.46 / 144 2.18 / 90.65 0 or equivalent oray or equivalent oray or equivale 112 % minimum)	75 / 100  MSS or e Fedco or e  Fedco or e Fedco or e Fedco or e Fedco or e Fedco or e Fedco or e Fedco or e Fedco or e 196	110 / 150  equivalent equivalent  335 / 500 Speed  equivalent equivalent 7.36 / 307 4.09 / 170.35	132 / 175 450 / 600 9.5 / 396 5.25 / 218.
Model Manufacturer Quantity Motor kW / HP Operation MOC  Model Manufacturer Quantity Motor Moce Model Manufacturer Quantity Motor Operation MOC  Model Manufacturer Quantity Motor Operation MOC  Model Manufacturer Quantity Obesign feed flow rate Obesign concentrate flow rate O	0.08 / 6 0.08 / 6 0.08 / 6 10 5 element long, 4 port, 1,200 psi	High APP or e Danfoss of V Energi Save or Danfoss of 0.19 / 8 0.18 / 7.74 Membran 12	sh Pressure P equivalent r equivalent 30 / 40 FD gy Recovery T equivalent r equivalent 0.43 / 18 0.45 / 18.7 e Elements ar	98 -  NGB or e Grundfos o  11 / 15 Fixed SD  ump  75 / 100  SD  urbine  0.77 / 32 0.71 / 32.15 d Housing SWC5 / TM82 ydranautics / To 60 99.8% (99.7	99% equivalent r equivalent 1 55 / 75 Speed SS 1 185 / 250 SS 1 3.46 / 144 2.18 / 90.65 0 or equivalent oray or equivalent 112 % minimum)	Fedco or 15.71 / 238 3.58 / 148.85	equivalent  335 / 500 Speed  equivalent equivalent equivalent 4.09 / 170.35	9.5 / 396 5.25 / 218.
Model Manufacturer Quantity Motor kW / HF Operation MOC  Model Manufacturer Quantity Motor kW / HF Operation MOC  Model Manufacturer Quantity Motor Operation MOC  Model Manufacturer Quantity Design feed flow rate Design concentrate flow rate Design concentrate flow rate Design concentrate flow rate Design concentrate flow rate Outline Membrane Quantity Salt rejection at standard conditions Housing specifications Banking arrangement BO inlet flange end BO opermeate flange end BO concentrate flange end BO inlet water pressure (min) DIP return permeate flange end CIP return concentrate flange End Drain size requirement  MLD / m³/hr Power	0.08 / 6 0.08 / 6 0.08 / 6 10 5 element long, 4 port, 1,200 psi	High APP or e Danfoss of V Energi Save or Danfoss of 0.19 / 8 0.18 / 7.74 Membran 12	sh Pressure P equivalent r equivalent 30 / 40 FD gy Recovery T equivalent r equivalent 0.43 / 18 0.45 / 18.7 e Elements ar	NGB or e Grundfos o  11 / 15 Fixed SD  ump  75 / 100  SD  urbine  0.77 / 32 0.71 / 32.15 ad Housing SWC5 / TM82 ydranautics / Tc 60 99.8% (99.7	equivalent r equivalent 1 55 / 75 Speed SS 1 185 / 250 0SS 1 3.46 / 144 2.18 / 90.65 0 or equivalent oray or equivale 112 % minimum)	Fedco or 15.71 / 238 3.58 / 148.85	equivalent  335 / 500 Speed  equivalent equivalent equivalent 4.09 / 170.35	9.5 / 396 5.25 / 218.
Manufacturer Quantity Motor	0.08 / 6 0.08 / 6 0.08 / 6 10 5 element long, 4 port, 1,200 psi	High APP or e Danfoss of V Energi Save or Danfoss of 0.19 / 8 0.18 / 7.74 Membran 12	sh Pressure P equivalent r equivalent 30 / 40 FD gy Recovery T equivalent r equivalent 0.43 / 18 0.45 / 18.7 e Elements ar	NGB or e Grundfos o  11 / 15 Fixed SD  ump  75 / 100  SD  urbine  0.77 / 32 0.71 / 32.15 ad Housing SWC5 / TM82 ydranautics / To 60 99.8% (99.7	r equivalent 1	Fedco or 15.71 / 238 3.58 / 148.85	equivalent  335 / 500 Speed  equivalent equivalent equivalent 4.09 / 170.35	9.5 / 396 5.25 / 218.
Manufacturer Quantity Motor	0.08 / 6 0.08 / 6 0.08 / 6 10 5 element long, 4 port, 1,200 psi	High APP or e Danfoss of V Energi Save or Danfoss of 0.19 / 8 0.18 / 7.74 Membran 12	gh Pressure Pequivalent r equivalent 30 / 40 FD gy Recovery Tequivalent r equivalent 0.43 / 18 0.45 / 18.7 e Elements an	Grundfos o  11 / 15	r equivalent 1	Fedco or 196	equivalent  335 / 500 Speed  equivalent equivalent equivalent 4.09 / 170.35	9.5 / 396 5.25 / 218.
Quantity  Motor	0.08 / 6 0.08 / 6 0.08 / 6 10 5 element long, 4 port, 1,200 psi	High APP or e Danfoss of V Energi Save or Danfoss of 0.19 / 8 0.18 / 7.74 Membran 12	gh Pressure Pequivalent r equivalent 30 / 40 FD gy Recovery Tequivalent r equivalent 0.43 / 18 0.45 / 18.7 e Elements an	11 / 15     Fixed     SD ump  75 / 100  SD urbine  0.77 / 32 0.71 / 32.15 ad Housing SWC5 / TM82 ydranautics / To 60 99.8% (99.7)	1 55 / 75 Speed SS 1 185 / 250 SS 1 3.46 / 144 2.18 / 90.65 0 or equivalent pray or equiv	Fedco or 196	equivalent  335 / 500 Speed  equivalent equivalent equivalent 4.09 / 170.35	9.5 / 396 5.25 / 218.
Motor KW / HF Departion MOC  Model Manufacturer Quantity Motor Departion MOC  Model Manufacturer Quantity Motor Model Manufacturer Quantity Design feed flow rate Design concentrate flow rate Design concentrate flow rate Membrane Model Membrane Model Membrane Quantity Salt rejection at standard conditions Housing specifications  Banking arrangement  RO inlet flange end RO concentrate flange end RO inlet water pressure (min) DIP return permeate flange end CIP return concentrate flange end CIP return concentrate flange end Air Pressure (oil-free) Drain size requirement Power	0.08 / 6 0.08 / 6 0.08 / 6 10 5 element long, 4 port, 1,200 psi	High APP or e Danfoss of V Energi Save or Danfoss of 0.19 / 8 0.18 / 7.74 Membran 12	gh Pressure Pequivalent r equivalent 30 / 40 FD gy Recovery Tequivalent r equivalent 0.43 / 18 0.45 / 18.7 e Elements an	11/15 Fixed SD ump  75/100 SD urbine  0.77/32 0.71/32.15 d Housing SWC5/TM82 ydranautics/TG 60 99.8% (99.7	55 / 75 Speed SS  1 185 / 250 SS  1 3.46 / 144 2.18 / 90.65 0 or equivalent oray or equivale 112 % minimum)	Fedco or 196	equivalent  335 / 500 Speed  equivalent equivalent equivalent 4.09 / 170.35	9.5 / 396 5.25 / 218.
Operation MOC  Model Manufacturer Quantity Motor Operation MOC  Model Manufacturer Quantity Operation MOC  Model Manufacturer Quantity Oesign feed flow rate Oesign concentrate flow rate  Membrane Model Membrane Model Membrane Quantity Salt rejection at standard conditions Housing specifications  Banking arrangement  RO inlet flange end RO concentrate flange end RO concentrate flange end RO inlet water pressure (min) DIP inlet flange end CIP return permeate flange end CIP return concentrate flange End Air Pressure (oil-free) Drain size requirement  MMLD / m³/hr Power	0.08 / 6 0.08 / 6 0.08 / 6 10 5 element long, 4 port, 1,200 psi	High APP or e Danfoss of V Energi Save or Danfoss of 0.19 / 8 0.18 / 7.74 Membran 12	gh Pressure Pequivalent r equivalent 30 / 40 FD gy Recovery Tequivalent r equivalent 0.43 / 18 0.45 / 18.7 e Elements an	Fixed SD ump 75 / 100 SD urbine 0.77 / 32 0.71 / 32.15 id Housing SWC5 / TM82 ydranautics / To 60 99.8% (99.7	Speed SS	Fedco or 196	equivalent  335 / 500 Speed  equivalent equivalent equivalent 4.09 / 170.35	9.5 / 396 5.25 / 218.
Model Manufacturer Quantity Motor kW / HP Operation MOC  Model Manufacturer Quantity Design feed flow rate Design concentrate flow rate  Membrane Model Membrane Model Membrane Quantity Salt rejection at standard conditions Housing specifications  Banking arrangement  BO inlet flange end BO concentrate flange end BO concentrate flange end BO inlet water pressure (min) DIP return permeate flange end CIP return concentrate flange end CIP return size requirement  Power  MLD / m³/hr Prower	0.08 / 6 0.08 / 6 10 5 element long, 4 port, 1,200 psi	APP or e Danfoss o  15 / 20  V  Ener iSave or Danfoss o  0.19 / 8  0.18 / 7.74  Membran  12	gy Recovery T equivalent  30 / 40  FD  gy Recovery T equivalent r equivalent 0.43 / 18 0.45 / 18.7 e Elements ar	SD ump 75 / 100 SD urbine 0.77 / 32 0.71 / 32.15 id Housing SWC5 / TM82 ydranautics / To 60 99.8% (99.7	1 185 / 250 SS 1 3.46 / 144 2.18 / 90.65 0 or equivalent oray or equivale 112 % minimum)	Fedco or Fedco or Fedco or Fedco or 5.71 / 238 3.58 / 148.85	equivalent  335 / 500 Speed  equivalent equivalent 7.36 / 307 4.09 / 170.35	9.5 / 396 5.25 / 218.
Model  Manufacturer Quantity  Motor kW / HF  Operation  MOC  Model  Manufacturer Quantity  Design feed flow rate  Design concentrate flow rate  Membrane Model  Membrane Quantity  Salt rejection at standard  conditions  Housing specifications  Banking arrangement  BO oncentrate flange end  BO occentrate flange end  BO concentrate flange end  BO inlet flange end  BO inlet water pressure (min)  DIP return permeate flange end  DIP return concentrate flange end  CIP return sermeate flange end  CIP return serme	0.08 / 6 0.08 / 6 10 5 element long, 4 port, 1,200 psi	APP or e Danfoss o  15 / 20  V  Ener iSave or Danfoss o  0.19 / 8  0.18 / 7.74  Membran  12	gy Recovery T equivalent  30 / 40  FD  gy Recovery T equivalent r equivalent 0.43 / 18 0.45 / 18.7 e Elements ar	75 / 100  SD  urbine  0.77 / 32  0.71 / 32.15  d Housing SWC5 / TM82 ydranautics / To 60  99.8% (99.7)	1 185 / 250  1 3.46 / 144 2.18 / 90.65  0 or equivalent oray or equivale 112 % minimum)	Fedco or Fedco or Fedco or Fedco or 5.71 / 238 3.58 / 148.85	equivalent  335 / 500 Speed  equivalent equivalent 7.36 / 307 4.09 / 170.35	9.5 / 396 5.25 / 218.
Manufacturer Quantity Motor	0.08 / 6 0.08 / 6 10 5 element long, 4 port, 1,200 psi	APP or e Danfoss o  15 / 20  V  Ener iSave or Danfoss o  0.19 / 8  0.18 / 7.74  Membran  12	gy Recovery T equivalent  30 / 40  FD  gy Recovery T equivalent r equivalent 0.43 / 18 0.45 / 18.7 e Elements ar	75 / 100  SD  urbine  0.77 / 32  0.71 / 32.15  d Housing  SWC5 / TM82  ydranautics / To  60  99.8% (99.7)	185 / 250  DSS  1 3.46 / 144 2.18 / 90.65  0 or equivalent oray or equivale 112 % minimum)	Fedco or Fedco or Fedco or Fedco or 5.71 / 238 3.58 / 148.85	equivalent  335 / 500 Speed  equivalent equivalent 7.36 / 307 4.09 / 170.35	9.5 / 396 5.25 / 218.
Manufacturer Quantity Motor	0.08 / 6 0.08 / 6 10 5 element long, 4 port, 1,200 psi	Danfoss o  15 / 20  V  Enery iSave or Danfoss o  0.19 / 8  0.18 / 7.74  Membran  12	r equivalent  30 / 40  FD  gy Recovery T equivalent r equivalent  0.43 / 18 0.45 / 18.7 e Elements ar  H  30	75 / 100  SD  urbine  0.77 / 32  0.71 / 32.15  ad Housing  SWC5 / TM82  ydranautics / To  60  99.8% (99.7)	185 / 250  DSS  1 3.46 / 144 2.18 / 90.65  0 or equivalent oray or equivale 112 % minimum)	Fedco or Fedco or Fedco or Fedco or 5.71 / 238 3.58 / 148.85	equivalent  335 / 500 Speed  equivalent equivalent 7.36 / 307 4.09 / 170.35	9.5 / 396 5.25 / 218.
Quantity Motor kW / HF Departion MOC  Model Manufacturer Quantity Design feed flow rate Design concentrate flow rate  Membrane Model Membrane Model Membrane Quantity Salt rejection at standard conditions  Housing specifications  Banking arrangement  BO inlet flange end BO permeate flange end BO concentrate flange end BO inlet water pressure (min) DIP inlet flange end DIP return permeate flange end DIP return concentrate flange end DIP return concentrate flange end Dir return concentrate flange end Dir return concentrate flange end Dir return size requirement Dir an size requi	0.08 / 6 0.08 / 6 10 5 element long, 4 port, 1,200 psi	15 / 20  V  Energi Save or Danfoss o  0.19 / 8  0.18 / 7.74  Membran  12	gy Recovery Tequivalent requivalent  0.43 / 18 0.45 / 18.7 e Elements an	75 / 100  SD  urbine  0.77 / 32  0.71 / 32.15  ad Housing  SWC5 / TM82  ydranautics / To  60  99.8% (99.7)	185 / 250  DSS  1 3.46 / 144 2.18 / 90.65  0 or equivalent oray or equivale 112 % minimum)	300 / 400 Fixed  Fedco or 6  5.71 / 238  3.58 / 148.85	335 / 500 Speed equivalent equivalent 7.36 / 307 4.09 / 170.35	9.5 / 396 5.25 / 218
Motor kW / HF Departion MOC  Model Manufacturer Quantity Design feed flow rate Design concentrate flow rate  Membrane Model Membrane manufacturer Membrane Quantity Salt rejection at standard conditions  Housing specifications  Banking arrangement  BO inlet flange end BO concentrate flange end BO concentrate flange end BO inlet water pressure (min) DIP inlet flange end DIP return permeate flange end DIP return concentrate flange end DIP return concentrate flange end Dirain size requirement  MLD / m³/hr Dewer	0.08 / 6 0.08 / 6 10 5 element long, 4 port, 1,200 psi	V Energi Save or Danfoss o  0.19 / 8 0.18 / 7.74 Membran  12	gy Recovery Tequivalent requivalent  0.43 / 18 0.45 / 18.7 e Elements an	75 / 100  SD  urbine  0.77 / 32  0.71 / 32.15  ad Housing  SWC5 / TM82  ydranautics / To  60  99.8% (99.7)	185 / 250  DSS  1 3.46 / 144 2.18 / 90.65  0 or equivalent oray or equivale 112 % minimum)	Fedco or Fedco or 5.71 / 238 3.58 / 148.85	Speed equivalent equivalent 7.36 / 307 4.09 / 170.35	9.5 / 396 5.25 / 218.
Operation MOCC  Model Manufacturer Quantity Design feed flow rate Design concentrate flow rate  Membrane Model Membrane manufacturer Membrane Quantity Salt rejection at standard conditions  Housing specifications  Banking arrangement  BO inlet flange end BO permeate flange end BO concentrate flange end BO inlet water pressure (min) DIP inlet flange end DIP return permeate flange end DIP return concentrate flange End Dirain size requirement  MLD / m³/hr Power	0.08 / 6 0.08 / 6 10 5 element long, 4 port, 1,200 psi	V Energi Save or Danfoss o  0.19 / 8 0.18 / 7.74 Membran  12	gy Recovery Tequivalent requivalent  0.43 / 18 0.45 / 18.7 e Elements an	0.77 / 32 0.71 / 32.15 ad Housing SWC5 / TM82 ydranautics / To 60 99.8% (99.7	1 3.46 / 144 2.18 / 90.65 0 or equivalent pray or equivale 112 % minimum)	Fedco or Fedco or 5.71 / 238 3.58 / 148.85	Speed equivalent equivalent 7.36 / 307 4.09 / 170.35	9.5 / 396 5.25 / 218.
Model Manufacturer Quantity Design feed flow rate Design concentrate flow rate Membrane Model Membrane Manufacturer Membrane Quantity Salt rejection at standard conditions Housing specifications Banking arrangement BO permeate flange end BO concentrate flange end BO concentrate flange end BO inlet water pressure (min) DIP inlet flange end DIP return permeate flange end DIP return concentrate flange End Dirain size requirement Dirain size requirement Design feed flow rate Design f	0.08 / 6 10 5 element long, 4 port, 1,200 psi	iSave or Danfoss of O.19 / 8 O.18 / 7.74 Membran 12	gy Recovery T equivalent r equivalent 0.43 / 18 0.45 / 18.7 e Elements an	0.77 / 32 0.71 / 32.15 Id Housing SWC5 / TM82 ydranautics / To 60 99.8% (99.7	1 3.46 / 144 2.18 / 90.65 0 or equivalent pray or equivale 112 % minimum)	Fedco or Fedco or 5.71 / 238 3.58 / 148.85	equivalent equivalent 7.36 / 307 4.09 / 170.35	5.25 / 218
Model  Manufacturer Quantity Design feed flow rate Design concentrate flow rate  Membrane Model Membrane manufacturer Membrane Quantity Salt rejection at standard conditions  Housing specifications  Banking arrangement  BO inlet flange end BO concentrate flange end BO concentrate flange end BO inlet water pressure (min)  DIP return permeate flange end DIP return concentrate flange and DIP return concentrate flange Dip return concentrate flange Dip return size requirement  MLD / m³/hr Dower	0.08 / 6 10 5 element long, 4 port, 1,200 psi	iSave or Danfoss of Danfoss of O.19 / 8 O.18 / 7.74 Membran 12	equivalent r equivalent 0.43 / 18 0.45 / 18.7 e Elements ar	0.77 / 32 0.71 / 32.15 Id Housing SWC5 / TM82 ydranautics / To 60 99.8% (99.7	1 3.46 / 144 2.18 / 90.65 0 or equivalent pray or equivale 112 % minimum)	5.71 / 238 3.58 / 148.85 ent 196	7.36 / 307 4.09 / 170.35	5.25 / 218
Manufacturer Quantity Design feed flow rate Design concentrate flow rate Membrane Model Membrane manufacturer Membrane Quantity Salt rejection at standard onditions  dousing specifications  Banking arrangement  RO inlet flange end RO permeate flange end RO concentrate flange end RO inlet water pressure (min) DEP return permeate flange end DEP return concentrate flange and DEP return concentrate flange of the pressure (oil-free) Drain size requirement Design flow rate Design flow rate  MLD / m³/hr Design for the pressure flange of the pressure (oil-free) Drain size requirement Design flow rate  MLD / m³/hr Design flow rate  MED / m³/hr	0.08 / 6 10 5 element long, 4 port, 1,200 psi	iSave or Danfoss of Danfoss of O.19 / 8 O.18 / 7.74 Membran 12	equivalent r equivalent 0.43 / 18 0.45 / 18.7 e Elements ar	0.77 / 32 0.71 / 32.15 Id Housing SWC5 / TM82 ydranautics / To 60 99.8% (99.7	3.46 / 144 2.18 / 90.65 0 or equivalent oray or equivale 112 % minimum)	5.71 / 238 3.58 / 148.85 ent 196	7.36 / 307 4.09 / 170.35	5.25 / 218
Manufacturer Quantity Design feed flow rate Design concentrate flow rate Membrane Model Membrane manufacturer Membrane Quantity Salt rejection at standard onditions  dousing specifications  Banking arrangement  RO inlet flange end RO permeate flange end RO concentrate flange end RO inlet water pressure (min) DEP return permeate flange end DEP return concentrate flange and DEP return concentrate flange of the pressure (oil-free) Drain size requirement Design flow rate Design flow rate  MLD / m³/hr Design for the pressure flange of the pressure (oil-free) Drain size requirement Design flow rate  MLD / m³/hr Design flow rate  MED / m³/hr	0.08 / 6 10 5 element long, 4 port, 1,200 psi	Danfoss o  0.19 / 8  0.18 / 7.74  Membran  12  6 eleme	r equivalent  0.43 / 18  0.45 / 18.7 e Elements ar  H	0.77 / 32 0.71 / 32.15 Id Housing SWC5 / TM82 ydranautics / To 60 99.8% (99.7	3.46 / 144 2.18 / 90.65 0 or equivalent oray or equivale 112 % minimum)	5.71 / 238 3.58 / 148.85 ent 196	7.36 / 307 4.09 / 170.35	5.25 / 218
Quantity Design feed flow rate Design concentrate flow rate  Membrane Model Membrane Quantity Salt rejection at standard conditions Housing specifications Banking arrangement BO inlet flange end BO permeate flange end BO inlet water pressure (min) DIP inlet flange end DIP return permeate flange end DIP return concentrate flange end DIP return sermeate flange end DIP return size requirement DIP return size requirement	0.08 / 6 10 5 element long, 4 port, 1,200 psi	0.19 / 8 0.18 / 7.74 Membran 12	0.43 / 18 0.45 / 18.7 e Elements ar H	0.77 / 32 0.71 / 32.15 Id Housing SWC5 / TM82 ydranautics / To 60 99.8% (99.7	3.46 / 144 2.18 / 90.65 0 or equivalent oray or equivale 112 % minimum)	5.71 / 238 3.58 / 148.85 ent 196	7.36 / 307 4.09 / 170.35	5.25 / 218
Design feed flow rate Design concentrate flow rate Design feed flow rate Design feet flow rate Design flow rate Design feet flow rate Design flow rate Design feet flow rate Design flow rate	0.08 / 6 10 5 element long, 4 port, 1,200 psi	0.18 / 7.74 Membran  12  6 eleme	0.45 / 18.7 e Elements ar H 30	0.77 / 32 0.71 / 32.15 Id Housing SWC5 / TM82 ydranautics / To 60 99.8% (99.7	3.46 / 144 2.18 / 90.65 0 or equivalent oray or equivale 112 % minimum)	3.58 / 148.85 ent 196	4.09 / 170.35	5.25 / 218
Membrane Model Membrane Model Membrane manufacturer Membrane Quantity Salt rejection at standard conditions Housing specifications Banking arrangement BO inlet flange end BO permeate flange end BO concentrate flange end BO inlet water pressure (min) CIP inlet flange end CIP return permeate flange end CIP return concentrate flange end Air Pressure (oil-free) Drain size requirement  MLD / m³/hr	0.08 / 6 10 5 element long, 4 port, 1,200 psi	0.18 / 7.74 Membran  12  6 eleme	0.45 / 18.7 e Elements ar H 30	0.71 / 32.15 d Housing SWC5 / TM82 ydranautics / To 60 99.8% (99.7	2.18 / 90.65 0 or equivalent oray or equivaled 112 % minimum)	3.58 / 148.85 ent 196	4.09 / 170.35	5.25 / 218
Membrane Model Membrane manufacturer Membrane Quantity Salt rejection at standard conditions Housing specifications Banking arrangement BO inlet flange end BO permeate flange end BO concentrate flange end BO inlet water pressure (min) CIP inlet flange end CIP return permeate flange end CIP return concentrate flange end Air Pressure (oil-free) Drain size requirement  MLD / m³/hr	5 element long, 4 port, 1,200 psi	Membran  12  6 eleme	e Elements ar	SWC5 / TM82 ydranautics / To 60 99.8% (99.7	0 or equivalent oray or equivale 112 % minimum)	ent 196	238	
Membrane manufacturer Membrane Quantity Salt rejection at standard conditions  Housing specifications  Banking arrangement  BO inlet flange end BO permeate flange end BO concentrate flange end BO inlet water pressure (min)  CIP inlet flange end CIP return permeate flange end CIP return concentrate flange end CIP return concentrate flange end CIP return size requirement  MLD / m³/hr Power	5 element long, 4 port, 1,200 psi	12 6 eleme	30	SWC5 / TM82 ydranautics / To 60 99.8% (99.7	oray or equivale 112 % minimum)	ent 196		294
Membrane manufacturer Membrane Quantity Salt rejection at standard conditions  Housing specifications  Banking arrangement  BO inlet flange end BO permeate flange end BO concentrate flange end BO inlet water pressure (min)  DIP inlet flange end  DIP return permeate flange end  DIP return concentrate flange end  DIP return concent	5 element long, 4 port, 1,200 psi	6 eleme	30	ydranautics / To 60 99.8% (99.7	oray or equivale 112 % minimum)	ent 196		294
Membrane Quantity Salt rejection at standard conditions  Housing specifications  Banking arrangement  RO inlet flange end RO permeate flange end RO concentrate flange end RO inlet water pressure (min)  DIP inlet flange end  CIP return permeate flange end  CIP return concentrate flange end  CIP return sermeate flange end  CIP return concentrate flange  Air Pressure (oil-free)  Drain size requirement  Power	5 element long, 4 port, 1,200 psi	6 eleme	30	99.8% (99.7	112 % minimum)	196		294
Salt rejection at standard conditions  Housing specifications  Banking arrangement  BO inlet flange end BO permeate flange end BO concentrate flange end BO inlet water pressure (min)  CIP inlet flange end CIP return permeate flange end CIP return concentrate flange end CIP return concentrate flange end CIP return service flange end CIP return service flange end CIP return concentrate flange end CIP return size requirement  MLD / m³/hr  Power	5 element long, 4 port, 1,200 psi	6 eleme		99.8% (99.7	% minimum)			201
RO inlet flange end RO permeate flange end RO inlet water pressure (min) DIP return permeate flange end DIP return concentrate flange end DIP return concentrate flange end DIP return sermeate flange end DIP return sermeate flange end DIP return sermeate flange end DIP return concentrate flange end DIP return sermeate flange end DIP return	long, 4 port, 1,200 psi		nt long, 4 port,		,			
Housing specifications  Banking arrangement  BO inlet flange end BO permeate flange end BO concentrate flange end BO inlet water pressure (min)  CIP inlet flange end CIP return permeate flange end CIP return concentrate flange End Air Pressure (oil-free)  Drain size requirement  Drain size requirement  Drain size requirement  Drain size requirement	long, 4 port, 1,200 psi		nt long, 4 port,	1,200 psi	7			
RO inlet flange end RO permeate flange end RO concentrate flange end RO inlet water pressure (min)  CIP inlet flange end CIP return permeate flange end CIP return concentrate flange end Air Pressure (oil-free)  Drain size requirement  Drower		orollol				element long,	4 port, 1,200 ps	si
RO permeate flange end RO concentrate flange end RO inlet water pressure (min) CIP inlet flange end CIP return permeate flange end CIP return concentrate flange end Air Pressure (oil-free) Drain size requirement Power		araner	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
RO permeate flange end RO concentrate flange end RO inlet water pressure (min) CIP inlet flange end CIP return permeate flange end CIP return concentrate flange end Air Pressure (oil-free) Drain size requirement Power		Installation	and Utility Re					
RO concentrate flange end RO inlet water pressure (min) bar CIP inlet flange end CIP return permeate flange end CIP return concentrate flange end Air Pressure (oil-free) bar Orain size requirement MLD / m³/hr	3"	3"	4"	6"	8"	12"	14"	16"
ACO inlet water pressure (min) bar CIP inlet flange end CIP return permeate flange end CIP return concentrate flange end Air Pressure (oil-free) bar Orain size requirement MLD / m³/hr Power	2"	2"	3"	4"	4"	6"	6"	8"
CIP inlet flange end CIP return permeate flange end CIP return concentrate flange end Air Pressure (oil-free)  Drain size requirement  Drain size requirement  Drain size requirement	2"	2"	2"	3"	4"	6"	8"	8"
CIP return permeate flange end CIP return concentrate flange end Air Pressure (oil-free) bar Orain size requirement MLD / m³/hr				2	2			
CIP return concentrate flange end Air Pressure (oil-free) bar Drain size requirement MLD / m³/hr Power	2"	2"	3"	4"	6"	8"	8"	8"
Air Pressure (oil-free) bar  Orain size requirement MLD / m³/hr  Power	1"	1"	2"	3"	2"	2"	2"	2"
Air Pressure (oil-free) bar  Orain size requirement MLD / m³/hr  Power	2"	2"	3"	4"	6"	8"	8"	8"
Orain size requirement MLD / m³/hr Power								
Orain size requirement m³/hr Power					7			1
Power	0.26 / 11	0.33 / 14	0.77 / 32	1.33 / 58	3.46 / 144	5.71 / 238	7.36 / 307	9.5 / 396
			40	0 VAC +/- 20%,		)Hz		
Control circuit					hase, 50/60Hz			
		Mea	suring Instrur					
Pressure switch			., ., .		nt air line			
Pressure guage		ent air line, inle			Instrument a	air line, ERS ex	haust, CIP pum	np discharge
Flow measurement		eate, SWRO co Save suction & I			SW	RO permeate,	SWRO concent	rate
Conductivity measurement	10	Jave Juolion & I	i o o i uisolidi		ermeate			
Pressure transmitter	Cartridge filte	er suction and c	•		RO booste		rge, HPP disch	•
		concentrate i	nlet and outlet				RS feed (concer	
Analyzers	Ph analyzer a	at RO CIP & lev	el transmitter o	n RO CIP tank			P analyzer at S	
					reed,Col	iductivity analy	zer at SWRO p	ermeate
IF Filtrate toplet	45		mmended Tar		100	150	000	050
JF Filtrate tank* m³	15	25	30	50	100	150	200	250
SWRO permeate tank* m³	10	15	15	25	50	100	150	175
RO CIP tank m <sup>3</sup>	0.6	1.0	2.0	3.5	12	20	25	28
North Market		III System Dim	ensions (base	d on above vo		10 0 0 5	10 0 0	47 00
Dimensions (L x W x H) m		0 0 -	0.0 0.0 -	. U L V D E V O O		16 x 6 x 2.5	16 x 6 x 3	17 x 6.3 x 3
Skid configuration	Overa 7 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			
Ory Weight Net Weight			8.2 x 2.2 x 2.25 le skid 5,000	7,000			Skid, RO CIP po	

<sup>\* 1</sup>hr retention time

## **SWRO SYSTEM: MSW SERIES**

## **MSW-H (HIGH SALINITY SERIES)**



Madal	Net Pei Capa		Fe Flow		No.of RO Membranes	Instal	lation Conne	ections	Estimated Dry	Estimated Wet	System Dimension
Model	Сара		11011	riato	No.of RO lembrane	Feed Permeate Concentrate		Weight	Weight	LxWxH	
	(m³/day)	(m³/hr)	(m³/day)	(m³/hr)	_ 5		(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

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

<sup>^</sup> Above capacities, dimension and weights are based on best estimates and rounded off.

Model	UOM	MSW-32H	MSW-50H	MSW-80H	MSW-100H	MSW-150H	MSW-200H	MSW-250H	MSW-300	
Permeate capacity (max.)	m³/day	84	126	252	504	1050	1680	2520	3150	
Concentrate rate (min.)	m³/day	156	234	468	936	1950	3120	4680	5850	
Feed rate (max.)	m³/day	240	360	720	1440	3000	4800	7200	9000	
System recovery (max.)	%			0		15		, 200	0000	
Operating temperature range	°C					- 35				
Nominal ro rejection						99%				
Ro average membrane flux	LMH					I-15				
to average membrane nax	LIVIII			Booster pur		10				
Model			APP or a	equivalent	b		MSS or	equivalent		
Manufacturer				r equivalent				equivalent		
Quantity			Barnooo	- oquivaloni		1	1 0000 01	oquivaioni		
Motor	kW / HP	3/4	3 / 4	5.5 / 7.5	11 / 15	55 / 75	75 / 100	110 / 150	132 / 175	
Operation	10007111	071	071	0.077.0		e Speed	707100	1107100	102717	
MOC						OSS .				
			н	gh pressure		,00				
Model				gii pressure		equivalent				
Manufacturer			Danfoss	r equivalent	7(1 1 01 0	quivalent	Fedco or	equivalent		
Quantity			Danioss	i equivalent		1	1 6000 01	equivalent		
Motor	kW / HP	11 / 15	15 / 20	30 / 40	75 / 100	185 / 250	300 / 400	335 / 500	450 / 60	
Operation	NW/III	11/13	13 / 20	30 / 40		Speed	3007400	3007300	<del>-</del> 50760	
MOC						Speed DSS				
			_ Ene	rgy recovery		700				
Model					turbine		Endan ar	oguivalent		
vlogei Vlanufacturer				equivalent				equivalent		
vianutacturer Quantity			บสเมอรร 0	r equivalent		1	reaco or	equivalent		
Quantity 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 / 39	
Design concentrate flow rate		0.08 / 6	0.19 / 6	0.45 / 18.7	0.71 / 32.15		3.58 / 148.85			
Design concentrate now rate		0.0876		ne elements a		2.18 / 90.65	3.38 / 148.83	4.09 / 170.35	5.25 / 218	
A a mala mana a mana al a l			Membra	ne elements a		0	- 4			
Membrane model					SWC5 / TM82					
Membrane manufacturer		40		_	lydranautics / T			000	20.4	
Membrane quantity		10	12	30	60	112	196	238	294	
Salt rejection at standard					99.8% (99.7	9.7% minimum)				
conditions						,				
		5 element								
Housing specifications		long,	6 elemei	nt long, 4 port,	1.200 psi		7 element long,	4 port. 1.200 r	osi	
rearing approximation		4 port,			.,=== p=:			, . , , , ,		
		1,200 psi		1						
Banking arrangement		2, Pa	arallel	5, Parallel	2 X 5,	2 X 6, 1 X	4 X 6, 1 X 4,	5 X 6, 1 X 4,	7 X 6,	
				1	Parallel	4, Parallel	Parallel	Parallel	Parallel	
20 '-1-1 (1		0.11			requirements	0.11	40"	4.47	4.011	
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			1		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				
Orain size requirement	MLD /	0.26 / 11	0.33 / 14	0.77 / 32	1.33 / 58	3.46 / 144	5.71 / 238	7.36 / 307	9.5 / 396	
Stant Size requirement	m³/hr	0.20711	0.33714	0.11132	1.007 00	0.70 / 144	3.717230	7.507.507	9.57390	
Power				40	00 VAC+/- 20%,					
Control circuit					120/220V, 1-p	hase, 50/60H	lz			
			Mea	asuring instrι	ıments					
Pressure switch					Instrume	ent air line				
Pressure guage		Instrume	nt air line, inle	et/outlet of car	tridge filter	Instrument	air line, ERS ex	xhaust, CIP pur	np discharg	
Flow indicator (rotameter)						cluded				
, ,		SWF	RO Permeate.	SWRO Conce	ntrate.					
Flow measurement				suction & RO		SW	'RO Permeate,	SWRO Concer	ntrate	
Conductivity measurement		pamp ot				permeate				
•		Cartridge f	ilter suction a	nd discharge,			er pump discha	arge. HPP discl	harge FRS	
Pressure transmitter				ate inlet and ou			(feed side), Ef	0 /	0 /	
				level transmitt			and orp analy			
Analyzers		anaryzer		ank	J. 011110 011	Sondaotivity		swro permeate	.,oonaaonv	
				ommended ta	nk size		analyzor at a	pormoute		
JF filtrate tank*	m <sup>3</sup>	10	15	30	60	125	200	300	375	
	m <sup>3</sup>	5	7	14			90			
SWRO permeate tank*					27	56		135	169	
RO CIP tank	m <sup>3</sup>	0.6	1	2	3.5	12	20	25	28	
				•	ed on above v		10.1/.5.1/.5.	10.1/ - 1/ -	(= ) ( = = ::	
Dimensions (L x W x H)	m	7 X 2 X 1.5	8 X 2 X 1.5		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	
Skid configuration			Sina	le skid		RO pun	np skid, RO PT	skid, RO CIP r	ump skid	
Dry weight Wet weight	kg	2,500 3,000	3,000 4,000	5,000 6,000	7,000 9,000	10,000 16,000	18,000 25,000	23,000	30,000 38,000	

<sup>\*1</sup>Hr retention time

## **SWRO SYSTEM: MSW SERIES**

## **MSW-L (LOW SALINITY SERIES)**



Model: MSW-32

	Net Pe Capa	rmeate	Fe Flow	ed Rate	No.of RO Membranes	Installation Connections		Estimated Dry	Estimated Wet	System Dimension	
Model	Опре	,	11011	riato	No.o	Feed	Permeate	Concentrate	Weight	Weight	LxWxH
	(m³/day)	(m³/hr)	(m³/day)	(m³/hr)	_ 2		(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

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

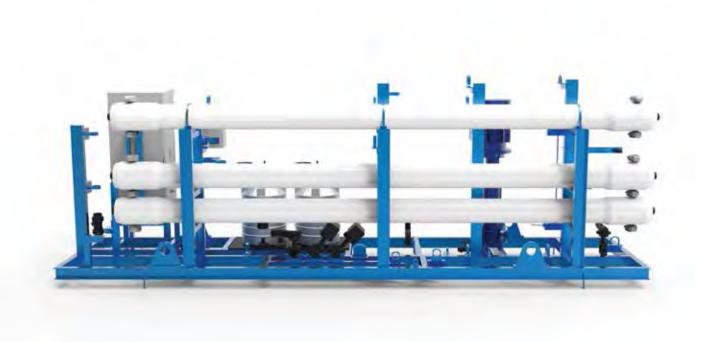
<sup>^</sup> Above capacities, dimension and weights are based on best estimates and rounded off.

Model	UOM	MSW-32L	MSW-50L	MSW-80L	MSW-100L	MSW-150L	MSW-200L	MSW-250L	MSW-300
	m³/day	132		396	792		2640		4950
Permeate capacity (Max.)	-	_	198			1650		3960	
Concentrate rate (Min.)	m³/day	108	162	324	648	1350	2160	3240	4050
Feed rate (Max.)	m³/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	6-17			
				Booster Pur	np				
/lodel					•	equivalent			
/lanufacturer						or equivalent			
Quantity					Granaro (	1			
Motor	kW / HP	3 / 4	3 / 4	5.5 / 7.5	11 / 15	55 / 75	75 / 100	110 / 150	132 / 17
	KVV / FIF	3/4	3/4	5.577.5			757100	110 / 150	132/1/3
Operation						le Speed			
MOC						DSS			
			Hi	gh Pressure	Pump				
Model			APP or 6	equivalent			MSS or e	equivalent	
/lanufacturer			Danfoss o	r equivalent			Fedco or	equivalent	
Quantity						1			
Notor	kW / HP	11 / 15	15 / 20	30 / 40	75 / 100	185 / 250	300 / 400	335 / 500	450 / 60
Operation	1577 / 111	11713	13720	00740		Speed	0007400	0007000	100700
/OC						DSS			
				gy Recovery	Turbine				
Model				equivalent				equivalent	
// Anufacturer			Danfoss o	r 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		4.09 / 170.35	
besign concentrate now rate		0.0070				2.107 90.03	3.307 140.03	4.037 170.00	3.237210
			Membrai	ne Elements a					
Membrane Model						20 or equivaler			
Membrane manufacturer					lydranautics / T		lent		
Membrane Quantity		10	12	30	60	112	196	238	294
Salt rejection at standard					00.00/ /00	70/ minimum)			
conditions					99.8% (99.	7% minimum)			
		5 element							
lausing aposifications		0 0.0	5 element						
		long, 4 port, 6 element long, 4 port, 1,200 psi 7 element long.						4 nort 1 200 n	nei
Housing specifications		0	6 eleme	nt long, 4 port,	1,200 psi	7	element long,	4 port, 1,200 p	osi
nousing specifications		long, 4 port, 1,200 psi	6 eleme	nt long, 4 port,					
Banking arrangement		0		nt long, 4 port,	2 x 5, paral-	2 x 6, 1 x 4,	4 x 6, 1 x 4,	5 x 6, 1 x 4,	7 x 6, para
<u> </u>		1,200 psi	rallel	5, parallel	2 x 5, paral-				
Banking arrangement		1,200 psi 2, pa	rallel Installatic	5, parallel	2 x 5, paral- lel Requirements	2 x 6, 1 x 4, parallel	4 x 6, 1 x 4, parallel	5 x 6, 1 x 4, parallel	7 x 6, par
Banking arrangement  RO inlet flange end		1,200 psi 2, pa	rallel Installatio 3"	5, parallel on and Utility F	2 x 5, parallel Requirements 6"	2 x 6, 1 x 4, parallel	4 x 6, 1 x 4, parallel	5 x 6, 1 x 4, parallel	7 x 6, par- lel
Banking arrangement  BO inlet flange end BO permeate flange end		1,200 psi 2, pa 3" 2"	rallel Installatio 3" 2"	5, parallel on and Utility F	2 x 5, parallel lel Requirements 6"	2 x 6, 1 x 4, parallel 8" 4"	4 x 6, 1 x 4, parallel 12" 6"	5 x 6, 1 x 4, parallel 14" 6"	7 x 6, parallel
Banking arrangement  BO inlet flange end BO permeate flange end		1,200 psi 2, pa	rallel Installatio 3"	5, parallel on and Utility F	2 x 5, parallel Requirements 6"	2 x 6, 1 x 4, parallel	4 x 6, 1 x 4, parallel	5 x 6, 1 x 4, parallel	7 x 6, par- lel
Banking arrangement  BO inlet flange end BO permeate flange end BO concentrate flange end	bar	1,200 psi 2, pa 3" 2"	rallel Installatio 3" 2"	5, parallel on and Utility F	2 x 5, parallel lel Requirements 6"	2 x 6, 1 x 4, parallel 8" 4"	4 x 6, 1 x 4, parallel 12" 6"	5 x 6, 1 x 4, parallel 14" 6"	7 x 6, parallel
Banking arrangement  BO inlet flange end BO permeate flange end BO concentrate flange end BO inlet water pressure (min)	bar	1,200 psi 2, pa 3" 2"	rallel Installatio 3" 2"	5, parallel on and Utility F	2 x 5, parallel lel Requirements 6"	2 x 6, 1 x 4, parallel 8" 4"	4 x 6, 1 x 4, parallel 12" 6"	5 x 6, 1 x 4, parallel 14" 6"	7 x 6, para lel 16" 8"
Banking arrangement  BO inlet flange end BO permeate flange end BO concentrate flange end BO inlet water pressure (min) BOP inlet flange end	bar	1,200 psi 2, pa 3" 2" 1"	rallel Installatio 3" 2" 1"	5, parallel on and Utility F 4" 3" 2"	2 x 5, parallel lel Requirements 6" 4" 3"	2 x 6, 1 x 4, parallel 8" 4" 4"	4 x 6, 1 x 4, parallel 12" 6" 6"	5 x 6, 1 x 4, parallel 14" 6" 8"	7 x 6, par- lel 16" 8" 8"
Banking arrangement  BO inlet flange end BO permeate flange end BO concentrate flange end BO inlet water pressure (min) BIP inlet flange end BIP return permeate flange end	bar	1,200 psi 2, pa 3" 2" 1" 2" 1"	rallel Installatio 3" 2" 1"	5, parallel n and Utility F 4" 3" 2"	2 x 5, parallel Requirements 6" 4" 3"	2 x 6, 1 x 4, parallel  8" 4" 4" 2  6" 2"	4 x 6, 1 x 4, parallel  12" 6" 6" 8" 2"	5 x 6, 1 x 4, parallel  14" 6" 8" 2"	7 x 6, par lel 16" 8" 8" 8"
Banking arrangement  RO inlet flange end RO permeate flange end RO concentrate flange end RO inlet water pressure (min) CIP inlet flange end CIP return permeate flange end CIP return concentrate flange end		1,200 psi 2, pa 3" 2" 1"	rallel Installatio 3" 2" 1"	5, parallel on and Utility F 4" 3" 2"	2 x 5, parallel Requirements 6" 4" 4"	2 x 6, 1 x 4, parallel  8" 4" 4" 2  6" 2" 6"	4 x 6, 1 x 4, parallel  12" 6" 6" 8"	5 x 6, 1 x 4, parallel  14" 6" 8"	7 x 6, par lel 16" 8" 8"
Banking arrangement  RO inlet flange end RO permeate flange end RO concentrate flange end RO inlet water pressure (min) CIP inlet flange end CIP return permeate flange end CIP return concentrate flange end	bar	1,200 psi 2, pa 3" 2" 1" 2" 1"	rallel Installatio 3" 2" 1"	5, parallel n and Utility F 4" 3" 2"	2 x 5, parallel Requirements 6" 4" 3"	2 x 6, 1 x 4, parallel  8" 4" 4" 2  6" 2"	4 x 6, 1 x 4, parallel  12" 6" 6" 8" 2"	5 x 6, 1 x 4, parallel  14" 6" 8" 2"	7 x 6, par- lel 16" 8" 8" 8"
Banking arrangement  BO inlet flange end BO permeate flange end BO concentrate flange end BO inlet water pressure (min) BUP inlet flange end BUP return permeate flange end BUP return concentrate flange end	bar MLD /	1,200 psi 2, pa 3" 2" 1" 2" 1" 2"	rallel  Installatio 3" 2" 1" 2" 1" 2"	5, parallel n and Utility F 4" 3" 2"	2 x 5, parallel Requirements 6" 4" 3" 4" 4"	2 x 6, 1 x 4, parallel  8" 4" 4" 2  6" 2" 6" 7	4 x 6, 1 x 4, parallel  12" 6" 6" 8" 2" 8"	5 x 6, 1 x 4, parallel  14" 6" 8"  2" 8"	7 x 6, par- lel 16" 8" 8" 8" 2"
Banking arrangement  RO inlet flange end RO permeate flange end RO concentrate flange end RO inlet water pressure (min) CIP inlet flange end CIP return permeate flange end CIP return concentrate flange end	bar	1,200 psi 2, pa 3" 2" 1" 2" 1"	rallel Installatio 3" 2" 1"	5, parallel n and Utility F 4" 3" 2" 3" 2" 3" 0.77 / 32	2 x 5, paral- lel Requirements 6" 4" 3" 4" 4"	2 x 6, 1 x 4, parallel  8" 4" 4" 2  6" 2" 6" 7	4 x 6, 1 x 4, parallel  12" 6" 6" 8" 2" 8"	5 x 6, 1 x 4, parallel  14" 6" 8" 2"	7 x 6, par- lel 16" 8" 8" 8" 2"
Banking arrangement  RO inlet flange end RO permeate flange end RO concentrate flange end RO inlet water pressure (min) CIP inlet flange end CIP return permeate flange end CIP return concentrate flange end Air Pressure (oil-free) Orain size requirement	bar MLD /	1,200 psi 2, pa 3" 2" 1" 2" 1" 2"	rallel  Installatio 3" 2" 1" 2" 1" 2"	5, parallel n and Utility F 4" 3" 2" 3" 2" 3" 0.77 / 32	2 x 5, parallel Requirements 6" 4" 3" 4" 4"	2 x 6, 1 x 4, parallel  8" 4" 4" 2  6" 2" 6" 7	4 x 6, 1 x 4, parallel  12" 6" 6" 8" 2" 8"	5 x 6, 1 x 4, parallel  14" 6" 8"  2" 8"	7 x 6, para lel  16" 8" 8" 8"
Banking arrangement  RO inlet flange end RO permeate flange end RO concentrate flange end RO inlet water pressure (min) CIP inlet flange end CIP return permeate flange end CIP return concentrate flange end	bar MLD /	1,200 psi 2, pa 3" 2" 1" 2" 1" 2"	rallel  Installatio 3" 2" 1" 2" 1" 2"	5, parallel n and Utility F 4" 3" 2" 3" 2" 3" 0.77 / 32	2 x 5, parallel Requirements 6" 4" 3" 4" 4" 1.33 / 58	2 x 6, 1 x 4, parallel  8" 4" 4" 2  6" 2" 6" 7	4 x 6, 1 x 4, parallel  12" 6" 6" 8" 2" 8"  5.71 / 238	5 x 6, 1 x 4, parallel  14" 6" 8"  2" 8"	7 x 6, para lel  16" 8" 8" 2" 8"
Banking arrangement  RO inlet flange end RO permeate flange end RO concentrate flange end RO inlet water pressure (min) CIP inlet flange end CIP return permeate flange end CIP return concentrate flange end	bar MLD /	1,200 psi 2, pa 3" 2" 1" 2" 1" 2"	rallel  Installation 3" 2" 1" 2" 1" 2" 0.33 / 14	5, parallel on and Utility F 4" 3" 2" 3" 2" 3" 40	2 x 5, paral- lel Requirements 6" 4" 3" 4" 3" 4" 1.33 / 58 10 VAC +/- 20% 120/220V, 1-p	2 x 6, 1 x 4, parallel  8" 4" 4" 2 6" 2" 6" 7 3.46 / 144	4 x 6, 1 x 4, parallel  12" 6" 6" 8" 2" 8"  5.71 / 238	5 x 6, 1 x 4, parallel  14" 6" 8"  2" 8"	7 x 6, par- lel 16" 8" 8" 8" 2"
Banking arrangement  BO inlet flange end BO permeate flange end BO concentrate flange end BO inlet water pressure (min) BIP inlet flange end BIP return permeate flange end BIP return concentrate flange end BIP ressure (oil-free) BOTAIN SIZE REQUIREMENT	bar MLD /	1,200 psi 2, pa 3" 2" 1" 2" 1" 2"	rallel  Installation 3" 2" 1" 2" 1" 2" 0.33 / 14	5, parallel n and Utility F 4" 3" 2" 3" 2" 3" 0.77 / 32	2 x 5, paral- lel Requirements 6" 4" 3" 4" 1.33 / 58 10 VAC +/- 20% 120/220V, 1-parents	2 x 6, 1 x 4, parallel  8" 4" 4" 2 6" 2" 6" 7 3.46 / 144 , 3-phase, 50/60H	4 x 6, 1 x 4, parallel  12" 6" 6" 8" 2" 8"  5.71 / 238	5 x 6, 1 x 4, parallel  14" 6" 8"  2" 8"	7 x 6, par- lel 16" 8" 8" 8" 2"
Banking arrangement  BO inlet flange end BO permeate flange end BO concentrate flange end BO inlet water pressure (min) BOP inlet flange end BOP return permeate flange end BOP return concentrate flange end BOP return permeate flange end BOP return concentrate flange end BOP return concentrate flange end BOP return permeate flange end BOP	bar MLD /	1,200 psi 2, pa 3" 2" 1" 2" 1" 2" 0.26 / 11	Installation 3" 2" 1" 2" 1" 2" 0.33 / 14	5, parallel n and Utility F 4" 3" 2"  3" 2"  0.77 / 32  40  assuring Instru	2 x 5, paral- lel Requirements 6" 4" 3" 4" 4" 1.33 / 58 10 VAC +/- 20% 120/220V, 1-paraments Instrume	2 x 6, 1 x 4, parallel  8" 4" 4" 2  6" 2" 6" 7  3.46 / 144 , 3-phase, 50/60H ent air line	4 x 6, 1 x 4, parallel  12" 6" 6" 8" 2" 8"  5.71 / 238	5 x 6, 1 x 4, parallel  14" 6" 8" 2" 8" 7.36 / 307	7 x 6, paralel  16" 8" 8" 2" 8"
Banking arrangement  BO inlet flange end BO permeate flange end BO concentrate flange end BO inlet water pressure (min) BOP inlet flange end BOP return permeate flange end BOP return concentrate flange end BOP ressure (oil-free) BOP ressure switch BOP ressure switch BOP ressure guage	bar MLD /	1,200 psi 2, pa 3" 2" 1" 2" 1" 2" 0.26 / 11	Installation 3" 2" 1" 2" 1" 2" 0.33 / 14	5, parallel on and Utility F 4" 3" 2" 3" 2" 3" 40	2 x 5, paral- lel Requirements 6" 4" 3" 4" 4" 1.33 / 58 10 VAC +/- 20% 120/220V, 1-r iments Instrume	2 x 6, 1 x 4, parallel  8" 4" 4" 2 6" 2" 6" 7 3.46 / 144 , 3-phase, 50/60H ent air line Instrument	4 x 6, 1 x 4, parallel  12" 6" 6" 8" 2" 8"  5.71 / 238	5 x 6, 1 x 4, parallel  14" 6" 8" 2" 8" 7.36 / 307	7 x 6, paralel  16" 8" 8" 2" 8"
<u> </u>	bar MLD /	1,200 psi 2, pa 3" 2" 1" 2" 1" 2" 0.26 / 11	rallel Installatio 3" 2" 1" 2" 1" 2" 0.33 / 14	5, parallel n and Utility F 4" 3" 2" 3" 2" 3" 40 asuring Instruct/outlet of cart	2 x 5, paral- lel lequirements 6" 4" 3" 4" 3" 4"  1.33 / 58 0 VAC +/- 20% 120/220V, 1-p iments Instrume ridge filter Not in	2 x 6, 1 x 4, parallel  8" 4" 4" 2  6" 2" 6" 7  3.46 / 144 , 3-phase, 50/60H ent air line	4 x 6, 1 x 4, parallel  12" 6" 6" 8" 2" 8"  5.71 / 238	5 x 6, 1 x 4, parallel  14" 6" 8" 2" 8" 7.36 / 307	7 x 6, paralel  16" 8" 8" 2" 8"
Banking arrangement  RO inlet flange end RO permeate flange end RO concentrate flange end RO inlet water pressure (min) CIP inlet flange end CIP return permeate flange end CIP return concentrate flange end CIP return concentrate flange end CIP ressure (oil-free) Control circuit  Pressure switch Cressure guage	bar MLD /	1,200 psi 2, pa 3" 2" 1" 2" 1" 2" 0.26 / 11	rallel  Installation 3" 2" 1" 2" 1" 2" 0.33 / 14  Mea	5, parallel n and Utility F 4" 3" 2" 3" 2" 3" 40 assuring Instruct/outlet of cart	2 x 5, paral- lel tequirements 6" 4" 3" 4" 4" 1.33 / 58 0 VAC +/- 20% 120/220V, 1-p iments Instrume ridge filter Not ir	2 x 6, 1 x 4, parallel  8" 4" 2 6" 2" 6" 7 3.46 / 144 , 3-phase, 50/60H ent air line Instrument included	4 x 6, 1 x 4, parallel  12" 6" 6" 8" 2" 8" 5.71 / 238	5 x 6, 1 x 4, parallel  14" 6" 8" 2" 8" 7.36 / 307	7 x 6, paralel  16" 8" 8" 2" 8" 9.5 / 396
Banking arrangement  RO inlet flange end RO permeate flange end RO concentrate flange end RO inlet water pressure (min) CIP inlet flange end CIP return permeate flange end CIP return concentrate flange end CIP ressure (oil-free) Corain size requirement Control circuit  Cressure switch Cressure guage Flow indicator (rotameter)	bar MLD /	1,200 psi 2, pa 3" 2" 1" 2" 1" 2" 0.26 / 11	rallel  Installation 3" 2" 1" 2" 1" 2" 0.33 / 14  Mea	5, parallel n and Utility F 4" 3" 2" 3" 2" 3" 40 asuring Instruct/outlet of cart	2 x 5, parallel Requirements 6" 4" 3" 4" 1.33 / 58 10 VAC +/- 20% 120/220V, 1-puments Instrumeridge filter Not in HP pump succharge	2 x 6, 1 x 4, parallel  8" 4" 4" 2 6" 2" 6" 7 3.46 / 144 , 3-phase, 50/60H ent air line Instrument and a coluded  SW	4 x 6, 1 x 4, parallel  12" 6" 6" 8" 2" 8"  5.71 / 238	5 x 6, 1 x 4, parallel  14" 6" 8" 2" 8" 7.36 / 307	7 x 6, paralel  16" 8" 8" 2" 8" 9.5 / 396
Banking arrangement  RO inlet flange end RO permeate flange end RO concentrate flange end RO inlet water pressure (min) CIP inlet flange end CIP return permeate flange end CIP return concentrate flange end CIP return concentrate flange end CIP ressure (oil-free) Cover Control circuit  Pressure switch Cressure guage Clow indicator (rotameter)	bar MLD /	1,200 psi 2, pa 3" 2" 1" 2" 1" 2" 0.26 / 11  Instrumed SWRO permition, i	rallel  Installation 3" 2" 1" 2" 1" 2" 0.33 / 14  Meant air line, inlesseate, SWRO Save suction	5, parallel on and Utility F 4" 3" 2" 3" 2" 3" 0.77 / 32 40 asuring Instruct/outlet of cart	2 x 5, parallel Requirements 6" 4" 3" 4" 1.33 / 58 10 VAC +/- 20% 120/220V, 1-parallel Instruments Instruments Property of the pump succharge SWRO	2 x 6, 1 x 4, parallel  8" 4" 4" 2 6" 2" 6" 7 3.46 / 144 , 3-phase, 50/60H ent air line Instrument and a coluded  SW permeate	4 x 6, 1 x 4, parallel  12" 6" 6" 8" 2" 8" 5.71 / 238 60Hz z air line, ERS ex	5 x 6, 1 x 4, parallel  14" 6" 8"  2" 8"  7.36 / 307	7 x 6, parallel  16" 8" 8" 2" 8" 9.5 / 396
Banking arrangement  BO inlet flange end BO permeate flange end BO concentrate flange end BO inlet water pressure (min) BIP inlet flange end BIP return permeate flange end BIP return concentrate flange end BIP ressure (oil-free) BO cain size requirement BO control circuit BIP ressure switch BIP ressure guage BIP return concentrate flange end BIP return permeate flange end BIP return concentrate flange end BIP return permeate flange end BIP return concentrate flange en	bar MLD /	1,200 psi 2, pa 3" 2" 1" 2" 1" 2" 0.26 / 11  Instrumed SWRO permition, i	rallel  Installation 3" 2" 1" 2" 1" 2" 0.33 / 14  Meant air line, inlesseate, SWRO Save suction	5, parallel n and Utility F 4" 3" 2" 3" 2" 3" 40 assuring Instruct/outlet of cart	2 x 5, parallel Requirements 6" 4" 3" 4" 1.33 / 58 10 VAC +/- 20% 120/220V, 1-parallel Instruments Instruments Property of the pump succharge SWRO	2 x 6, 1 x 4, parallel  8" 4" 4" 2 6" 2" 6" 7 3.46 / 144 , 3-phase, 50/60H ent air line Instrument and a coluded  SW permeate	4 x 6, 1 x 4, parallel  12" 6" 6" 8" 2" 8" 5.71 / 238	5 x 6, 1 x 4, parallel  14" 6" 8"  2" 8"  7.36 / 307	7 x 6, par- lel 16" 8" 8" 2" 8" 9.5 / 396
Banking arrangement  BO inlet flange end BO permeate flange end BO concentrate flange end BO inlet water pressure (min) BIP inlet flange end BIP return permeate flange end BIP return concentrate flange end BIP ressure (oil-free) BO cain size requirement BO control circuit BIP ressure switch BIP ressure guage BIP return concentrate flange end BIP return permeate flange end BIP return concentrate flange end BIP return permeate flange end BIP return concentrate flange en	bar MLD /	1,200 psi 2, pa 3" 2" 1" 2" 1" 2" 0.26 / 11  Instrume SWRO perm tion, i	rallel  Installation 3" 2" 1" 2" 1" 2" 0.33 / 14  Meant air line, inledicate, SWRO Save suction  Iter suction as	5, parallel on and Utility F 4" 3" 2" 3" 2" 3" 0.77 / 32 40 asuring Instruct/outlet of cart	2 x 5, parallel Requirements 6" 4" 3" 4" 1.33 / 58 10 VAC +/- 20% 120/220V, 1-puments Instruments Inst	2 x 6, 1 x 4, parallel  8" 4" 2 6" 2" 6" 7 3.46 / 144 , 3-phase, 50/60H ent air line Instrument included  SW permeate RO booster	4 x 6, 1 x 4, parallel  12" 6" 6" 8" 2" 8" 5.71 / 238  60Hz z  RO permeate, pump discharg	5 x 6, 1 x 4, parallel  14" 6" 8" 2" 8" 7.36 / 307	7 x 6, parallel  16" 8" 8" 2" 8" 9.5 / 396  mp discharg
Banking arrangement  RO inlet flange end RO permeate flange end RO concentrate flange end RO inlet water pressure (min) CIP inlet flange end CIP return permeate flange end CIP return concentrate flange end CIP ressure (oil-free) Corain size requirement Control circuit  Pressure switch Cressure guage Flow indicator (rotameter) Conductivity measurement Conductivity measurement Coressure transmitter	bar MLD /	1,200 psi 2, pa 3" 2" 1" 2" 1" 2" 0.26 / 11  Instrume SWRO perm tion, i Cartridge fi	Installation 3" 2" 1" 2" 1" 2" 0.33 / 14  Meant air line, inleaded, SWRO Save suction  Iter suction are ave concentral.	5, parallel n and Utility F 4" 3" 2" 3" 2" 3" 0.77 / 32 40 asuring Instruction of cart concentrate, F & RO CIP disconding discharge, attended on the concentrate of the cart and discharge, attended on the concentrate of the cart and discharge, attended on the cart and discharge on the cart and discharge on the cart and discharge of the cart	2 x 5, parallel Requirements 6" 4" 3" 4" 3" 4" 1.33 / 58 10 VAC +/- 20% 120/220V, 1-parallel Instrume ridge filter Not in HP pump succharge SWRO SWRO feed, uttlet	2 x 6, 1 x 4, parallel  8" 4" 4" 2 6" 2" 6" 7 3.46 / 144 , 3-phase, 50/60H ent air line Instrument ancluded  SW permeate RO booster charge (I	4 x 6, 1 x 4, parallel  12" 6" 6" 8" 2" 8" 5.71 / 238 60Hz z RO permeate, pump dischargeed side), ERS	5 x 6, 1 x 4, parallel  14" 6" 8" 2" 8" 7.36 / 307	7 x 6, parked lel  16" 8" 8" 2" 8" 9.5 / 396  mp dischargetrate  trate  rge, ERS ditrate side)
Banking arrangement  BO inlet flange end BO permeate flange end BO concentrate flange end BO inlet water pressure (min) BIP inlet flange end BIP return permeate flange end BIP return concentrate flange end BIP return concentrate flange end BIP ressure (oil-free) BIP ressure flange end BIP ressure (oil-free) BIP ressure guirement BIP ressure switch BIP ressure guage BIP ressure guage BIP ressure flow indicator (rotameter) BIP ressure ment BIP ressure transmitter	bar MLD /	1,200 psi 2, pa 3" 2" 1" 2" 1" 2" 0.26 / 11  Instrume SWRO perm tion, i Cartridge fi	Installation 3" 2" 1" 2" 1" 2" 0.33 / 14  Meant air line, inleaded, SWRO Save suction  Ilter suction are ave concentral at RO CIP &	5, parallel n and Utility F 4" 3" 2" 3" 2" 3" 0.77 / 32 40 asuring Instruction of Cartesian of C	2 x 5, parallel Requirements 6" 4" 3" 4" 3" 4" 1.33 / 58 10 VAC +/- 20% 120/220V, 1-parallel Instrume ridge filter Not in HP pump succharge SWRO SWRO feed, uttlet	2 x 6, 1 x 4, parallel  8" 4" 4" 2 6" 2" 6" 7 3.46 / 144 , 3-phase, 50/60H ent air line Instrument and the control of the cont	4 x 6, 1 x 4, parallel  12" 6" 6" 8" 2" 8"  5.71 / 238  60Hz z  RO permeate, pump discharg Feed side), ERS uctivity and OF	5 x 6, 1 x 4, parallel  14" 6" 8" 2" 8" 7.36 / 307	7 x 6, par lel  16" 8" 8" 2" 8" 9.5 / 396  mp dischargetrate  trate  rge, ERS ditrate side)  SWRO
Banking arrangement  BO inlet flange end BO permeate flange end BO concentrate flange end BO inlet water pressure (min) BIP inlet flange end BIP return permeate flange end BIP return concentrate flange end BIP return concentrate flange end BIP ressure (oil-free) BIP ressure flange end BIP ressure (oil-free) BIP ressure guirement BIP ressure switch BIP ressure guage BIP ressure guage BIP ressure flow indicator (rotameter) BIP ressure ment BIP ressure transmitter	bar MLD /	1,200 psi 2, pa 3" 2" 1" 2" 1" 2" 0.26 / 11  Instrume SWRO perm tion, i Cartridge fi	Installation 3" 2" 1" 2" 1" 2" 0.33 / 14  Meant air line, inleaded, SWRO Save suction all line at RO CIP & talks.	5, parallel n and Utility F 4" 3" 2" 3" 2" 3" 0.77 / 32 40 asuring Instructional discharge, F & RO CIP discounted discharge, International dischar	2 x 5, parallel Requirements 6" 4" 3" 4" 1.33 / 58 10 VAC +/- 20% 120/220V, 1-parallel Instruments Instruments Instruments Instruments SWRO SWRO feed, SWRO feed, SWRO CIP	2 x 6, 1 x 4, parallel  8" 4" 4" 2 6" 2" 6" 7 3.46 / 144 , 3-phase, 50/60H ent air line Instrument and the control of the cont	4 x 6, 1 x 4, parallel  12" 6" 6" 8" 2" 8" 5.71 / 238 60Hz z RO permeate, pump dischargeed side), ERS	5 x 6, 1 x 4, parallel  14" 6" 8" 2" 8" 7.36 / 307	7 x 6, par lel  16" 8" 8" 2" 8" 9.5 / 396  mp dischargetrate  trate  rge, ERS ditrate side)  SWRO
Banking arrangement  BO inlet flange end BO permeate flange end BO concentrate flange end BO inlet water pressure (min) BIP inlet flange end BIP return permeate flange end BIP return concentrate flange end BIP ressure (oil-free) BIP ressure guirement BIP ressure switch BIP ressure guage BIP ressure guage BIP return concentrate flange end BIP ressure switch BIP ressure guage BIP ressure guage BIP ressure flange end BIP ressure ment BIP ressure transmitter BIP ressure transmitter	bar MLD / m³/hr	1,200 psi 2, pa 3" 2" 1" 2" 1" 2" 0.26 / 11  Instrumer  SWRO perm tion, i  Cartridge fi iSa Ph analyzer	Installation 3" 2" 1" 2" 1" 2" 0.33 / 14  Meant air line, inleaded, SWRO Save suction all liter suction at ARO CIP & tarkers.	5, parallel n and Utility F 4" 3" 2" 3" 2" 3" 0.77 / 32  40 asuring Instructional discharge, the inlet and outlevel transmittents and outlevel transmittents and the commended Tank	2 x 5, parallel Requirements 6" 4" 3" 4" 3" 4" 1.33 / 58 10 VAC +/- 20% 120/220V, 1-r Iments Instrume ridge filter Not in HP pump succharge SWRO SWRO feed, utlet er on RO CIP	2 x 6, 1 x 4, parallel  8" 4" 4" 2 6" 2" 6" 7 3.46 / 144 , 3-phase, 50/60H ent air line Instrument and a line Cluded  SW permeate RO booster charge (I Cond feed,Co	4 x 6, 1 x 4, parallel  12" 6" 6" 6" 8" 2" 8" 5.71 / 238 60Hz z RO permeate, pump discharg eed side), ERS uctivity and OF	5 x 6, 1 x 4, parallel  14" 6" 8" 2" 8" 7.36 / 307	7 x 6, par lel  16" 8" 8" 2" 8" 9.5 / 396  mp dischargetrate  trate  rge, ERS ditrate side)  SWRO permeate
Banking arrangement  BO inlet flange end BO permeate flange end BO concentrate flange end BO inlet water pressure (min) BIP inlet flange end BIP return permeate flange end BIP return concentrate flange end BIP ressure (oil-free) BIP ressure switch BIP ressure switch BIP ressure guage BIP situation (rotameter) BIP ressure transmitter BIP ressure transmitter BIP ressure transmitter BIP Filtrate tank*	bar MLD / m³/hr	1,200 psi 2, pa 3" 2" 1" 2" 1" 2" 0.26 / 11  Instrume SWRO perm tion, i Cartridge fi iSa Ph analyzer	rallel  Installation 3" 2" 1" 2" 1" 2" 0.33 / 14  Meant air line, inleaded, SWRO Save suction  Ilter suction and ave concentral at RO CIP & tarks at Roccion at Rocci	5, parallel n and Utility F 4" 3" 2" 3" 2" 3" 0.77 / 32 40 asuring Instructional discharge, the inlet and outlevel transmitt and outlevel transmitted	2 x 5, parallel Requirements 6" 4" 3" 4" 3" 4" 1.33 / 58 10 VAC +/- 20% 120/220V, 1-r Iments Instrume ridge filter Not in HP pump succharge SWRO SWRO feed, utlet er on RO CIP ank Size 60	2 x 6, 1 x 4, parallel  8" 4" 4" 2 6" 2" 6" 7 3.46 / 144 , 3-phase, 50/60H ent air line Instrument ancluded  SW permeate RO booster charge (I Cond feed,Co	4 x 6, 1 x 4, parallel  12" 6" 6" 6" 8" 2" 8"  5.71 / 238  60Hz z  RO permeate, pump dischargeed side), ERS exuctivity and OF inductivity analy	5 x 6, 1 x 4, parallel  14" 6" 8" 2" 8" 7.36 / 307	7 x 6, par lel  16" 8" 8" 2" 8" 9.5 / 396  mp dischargetrate  trate  rge, ERS ditrate side) SWRO permeate  375
Banking arrangement  BO inlet flange end BO permeate flange end BO concentrate flange end BO inlet water pressure (min) BIP inlet flange end BIP return permeate flange end BIP return concentrate flange end BIP ressure (oil-free) BIP ressure switch BIP ressure switch BIP ressure guage BIP situation (rotameter) BIP ressure transmitter BIP ressure transmitter BIP Filtrate tank* BIP Filtrate tank* BIP Filtrate tank* BIP Filtrate tank*	bar MLD / m³/hr	1,200 psi 2, pa 3" 2" 1" 2" 1" 2" 0.26 / 11  Instrume SWRO perm tion, i Cartridge fi iSa Ph analyzer	rallel  Installation 3" 2" 1" 2" 1" 2" 0.33 / 14  Meant air line, inleaded, SWRO Save suction  Ilter suction and ave concentral at RO CIP & 15 Record 15 7	5, parallel n and Utility F 4" 3" 2" 3" 2" 3" 0.77 / 32 40 asuring Instruct/outlet of cart concentrate, F & RO CIP disc and discharge, the inlet and outlevel transmitt and outlevel transmitt and outlevel transmitt and sommended Tail	2 x 5, paral- lel lequirements 6" 4" 3" 4" 3" 4"  1.33 / 58 0 VAC +/- 20% 120/220V, 1-p iments Instrume ridge filter Not ir HP pump suc- charge SWRO SWRO feed, utlet er on RO CIP ank Size 60 27	2 x 6, 1 x 4, parallel  8" 4" 4" 2 6" 2" 6" 7 3.46 / 144 , 3-phase, 50/60H ent air line Instrument ancluded  SW permeate RO booster charge (I Cond feed,Co	4 x 6, 1 x 4, parallel  12" 6" 6" 8" 2" 8"  5.71 / 238  60Hz z  RO permeate, pump discharg eed side), ERS uctivity and OF nductivity analy 200 90	5 x 6, 1 x 4, parallel  14" 6" 8"  8" 2" 8"  7.36 / 307  Swron Concented (Concented (Con	7 x 6, par lel  16" 8" 8" 2" 8" 9.5 / 396  trate  rge, ERS di trate side) SWRO permeate  375 169
Banking arrangement  BO inlet flange end BO permeate flange end BO concentrate flange end BO inlet water pressure (min) BIP inlet flange end BIP return permeate flange end BIP return concentrate flange end BIP ressure (oil-free) BIP ressure switch BIP ressure switch BIP ressure guage BIP silv indicator (rotameter) BIP ressure transmitter BIP ressure transmitter BIP Filtrate tank* BIP Filtrate tank* BIP Filtrate tank* BIP Filtrate tank*	bar MLD / m³/hr	1,200 psi 2, pa 3" 2" 1" 2" 1" 2" 0.26 / 11  Instrume SWRO perm tion, i Cartridge fi iSa Ph analyzer	rallel  Installation 3" 2" 1" 2" 1" 2" 0.33 / 14  Meant air line, inleaded, SWRO Save suction  Ilter suction and ave concentral at RO CIP & tarks at Roccion at Rocci	5, parallel n and Utility F 4" 3" 2" 3" 2" 3" 0.77 / 32 40 asuring Instructional discharge, the inlet and outlevel transmitt and outlevel transmitted	2 x 5, parallel Requirements 6" 4" 3" 4" 3" 4" 1.33 / 58 10 VAC +/- 20% 120/220V, 1-r Iments Instrume ridge filter Not in HP pump succharge SWRO SWRO feed, utlet er on RO CIP ank Size 60	2 x 6, 1 x 4, parallel  8" 4" 4" 2 6" 2" 6" 7 3.46 / 144 , 3-phase, 50/60H ent air line Instrument ancluded  SW permeate RO booster charge (I Cond feed,Co	4 x 6, 1 x 4, parallel  12" 6" 6" 6" 8" 2" 8"  5.71 / 238  60Hz z  RO permeate, pump dischargeed side), ERS exuctivity and OF inductivity analy	5 x 6, 1 x 4, parallel  14" 6" 8" 2" 8" 7.36 / 307	7 x 6, paralel  16" 8" 8" 2" 8" 9.5 / 396  mp dischargetrate  trate  rge, ERS ditrate side) SWRO permeate  375
Banking arrangement  BO inlet flange end BO permeate flange end BO concentrate flange end BO inlet water pressure (min) BIP inlet flange end BIP return permeate flange end BIP return concentrate flange end BIP ressure (oil-free) BIP ressure switch BIP ressure switch BIP ressure guage BIP silv indicator (rotameter) BIP ressure transmitter BIP ressure transmitter BIP Filtrate tank* BIP Filtrate tank* BIP Filtrate tank* BIP Filtrate tank*	bar MLD / m³/hr	1,200 psi 2, pa 3" 2" 1" 2" 1" 2" 0.26 / 11  Instrumer  SWRO perm tion, i Cartridge fi iSa Ph analyzer	Installation 3" 2" 1" 2" 1" 2" 0.33 / 14  Meant air line, inleaded the suction are aveconcentral at RO CIP & tarker at Ro CIP &	5, parallel n and Utility F 4" 3" 2" 3" 2" 3" 0.77 / 32 40 asuring Instruct/outlet of cart concentrate, F & RO CIP disc and discharge, the inlet and outlevel transmitt and outlevel transmitted and outlevel tra	2 x 5, paral- lel lequirements 6" 4" 3" 4" 3" 4"  1.33 / 58 0 VAC +/- 20% 120/220V, 1-p iments Instrume ridge filter Not ir HP pump suc- charge SWRO SWRO feed, utlet er on RO CIP ank Size 60 27	2 x 6, 1 x 4, parallel  8" 4" 4" 2 6" 2" 6" 7 3.46 / 144 , 3-phase, 50/60H ent air line Instrument included  SW permeate RO booster charge (I Cond feed,Co  125 56 12	4 x 6, 1 x 4, parallel  12" 6" 6" 8" 2" 8"  5.71 / 238  60Hz z  RO permeate, pump discharg eed side), ERS uctivity and OF nductivity analy 200 90	5 x 6, 1 x 4, parallel  14" 6" 8"  8" 2" 8"  7.36 / 307  Swron Concented (Concented (Con	7 x 6, par lel  16" 8" 8" 2" 8" 9.5 / 396  trate  rge, ERS di trate side) SWRO permeate  375 169
Banking arrangement  RO inlet flange end RO permeate flange end RO concentrate flange end RO inlet water pressure (min) CIP inlet flange end CIP return permeate flange end CIP return concentrate flange end CIP return concentrate flange end CIP ressure (oil-free) Corain size requirement Control circuit Cressure switch Cressure guage Clow indicator (rotameter) Conductivity measurement Conductivity measurement Cressure transmitter Conductivity measurement	bar MLD / m³/hr  m³ m³ m³	1,200 psi 2, pa 3" 2" 1" 2" 1" 2" 0.26 / 11  Instrumer  SWRO perm tion, i Cartridge fi iSa Ph analyzer  10 5 0.6 Overal	Installation 3" 2" 1" 2" 1" 2" 0.33 / 14  Mea  Intair line, inless Inter suction and ave concentral at RO CIP & takes The suction of the succession of the succ	5, parallel n and Utility F 4" 3" 2" 3" 2" 3" 0.77 / 32  40 asuring Instructional discharge, the inlet and outlevel transmitt and outleve	2 x 5, parallel Requirements 6" 4" 3" 4" 1.33 / 58 10 VAC +/- 20% 120/220V, 1-parallel Instrume ridge filter Not in HP pump succharge SWRO SWRO feed, utlet er on RO CIP ank Size 60 27 3.5 sed on above v	2 x 6, 1 x 4, parallel  8" 4" 4" 2 6" 2" 6" 7 3.46 / 144 , 3-phase, 50/60H ent air line Instrument included  SW permeate RO booster charge (I Cond feed,Co  125 56 12 /olumes)	4 x 6, 1 x 4, parallel  12" 6" 6" 6" 8" 2" 8"  5.71 / 238  60Hz z  air line, ERS ex  RO permeate, pump discharg Feed side), ERS uctivity and OF nductivity analy 200 90 20	5 x 6, 1 x 4, parallel  14" 6" 8"  2" 8"  7.36 / 307  Swhaust, CIP pur  Swhood concen ge, HPP dischala S feed (concen RP analyzer at swhood 300 135 25	7 x 6, parallel  16" 8" 8" 2" 8" 9.5 / 396  mp dischargetrate  trate  rge, ERS ditrate side) SWRO permeate  375 169 28
Banking arrangement  BO inlet flange end BO permeate flange end BO concentrate flange end BO inlet water pressure (min) BO inlet water pressure (min) BO inlet water pressure (min) BO inlet flange end BO inlet water pressure (min) BO inlet flange end BO inlet flange end BO inlet water pressure (min) BO inlet flange end BO inl	bar MLD / m³/hr	1,200 psi 2, pa 3" 2" 1" 2" 1" 2" 0.26 / 11  Instrumer  SWRO perm tion, i Cartridge fi iSa Ph analyzer	Installation 3" 2" 1" 2" 1" 2" 0.33 / 14  Meant air line, inleaded to success the success to success the success t	5, parallel n and Utility F 4" 3" 2" 3" 2" 3" 0.77 / 32  40 assuring Instruction of Cart concentrate, F & RO CIP disc nd discharge, the inlet and outlevel transmitt ank ommended Tain 30 14 2 nensions (bas 8.2x2.2x2.25	2 x 5, parallel lequirements 6" 4" 3" 4" 3" 4" 1.33 / 58 0 VAC +/- 20% 120/220V, 1-puments Instrume ridge filter Not in HP pump succharge SWRO SWRO feed, witlet let er on RO CIP ank Size 60 27 3.5	2 x 6, 1 x 4, parallel  8" 4" 4" 2 6" 2" 6" 7 3.46 / 144 , 3-phase, 50/60H ent air line Instrument included  SW permeate RO booster charge (I Cond feed,Co  125 56 12 /olumes) 12 x 5 x 3	4 x 6, 1 x 4, parallel  12" 6" 6" 8" 2" 8" 5.71 / 238  60Hz z  RO permeate, pump dischargeed side), ERS extivity and OF inductivity analy 200 90 20  16 x 6 x 2.5	5 x 6, 1 x 4, parallel  14" 6" 8" 2" 8" 7.36 / 307  SWRO concen le, HPP dischales feed (concen RP analyzer at syzer at SWRO) 300 135 25	7 x 6, paralel  16" 8" 8" 2" 8" 9.5 / 396  mp dischargetrate side) SWRO permeate  375 169 28
Banking arrangement  RO inlet flange end RO permeate flange end RO concentrate flange end RO inlet water pressure (min) CIP inlet flange end CIP return permeate flange end CIP return concentrate flange end CIP return concentrate flange end CIP ressure (oil-free) Corain size requirement Control circuit  Pressure switch Pressure guage Flow indicator (rotameter) Flow measurement Conductivity measurement	bar MLD / m³/hr  m³ m³ m³	1,200 psi 2, pa 3" 2" 1" 2" 1" 2" 0.26 / 11  Instrumer  SWRO perm tion, i Cartridge fi iSa Ph analyzer  10 5 0.6 Overal	Installation 3" 2" 1" 2" 1" 2" 0.33 / 14  Meant air line, inleaded to success the success to success the success t	5, parallel n and Utility F 4" 3" 2" 3" 2" 3" 0.77 / 32  40 asuring Instructional discharge, the inlet and outlevel transmitt and outleve	2 x 5, parallel Requirements 6" 4" 3" 4" 1.33 / 58 10 VAC +/- 20% 120/220V, 1-parallel Instrume ridge filter Not in HP pump succharge SWRO SWRO feed, utlet er on RO CIP ank Size 60 27 3.5 sed on above v	2 x 6, 1 x 4, parallel  8" 4" 4" 2 6" 2" 6" 7 3.46 / 144 , 3-phase, 50/60H ent air line Instrument included  SW permeate RO booster charge (I Cond feed,Co  125 56 12 /olumes) 12 x 5 x 3	4 x 6, 1 x 4, parallel  12" 6" 6" 6" 8" 2" 8"  5.71 / 238  60Hz z  air line, ERS ex  RO permeate, pump discharg Feed side), ERS uctivity and OF nductivity analy 200 90 20	5 x 6, 1 x 4, parallel  14" 6" 8" 2" 8" 7.36 / 307  SWRO concen le, HPP dischales feed (concen RP analyzer at syzer at SWRO) 300 135 25	7 x 6, par lel  16" 8" 8" 2" 8" 9.5 / 396  trate  trate  rge, ERS ditrate side) SWRO permeate  375 169 28

<sup>\*1</sup>Hr retention time

## **LPRO SYSTEMS**

## MBW SERIES (SECOND PASS TO SWRO)



Model: MBW-80

Madal	Net Pe Capa		Fe Flow		P and		Estimated Dry	Estimated Wet	System Dimension		
Model	Сара	.0.1.	1.00	riaio	Vo.o	Feed	Permeate	Concentrate	Weight	Weight	LxWxH
	(m³/day)	(m³/hr)	(m³/day)	(m³/hr)	- ž		(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

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

<sup>^</sup> Above capacities, dimension and weights are based on best estimates and rounded off.

MBW SERIES (SECO	ND P	ASS TO S	SWRO):	TECHNIC	AL SPEC	IFICATIO	ONS		
Model	UOM	MBW-32	MBW-50	MBW-80	MBW-100	MBW-150	MBW-200	MBW-250	MBW-300
Permeate capacity (Max.)	m³/day	97.2	145.8	291.6	583.2	1215	1944	2916	3645
Concentrate rate (Min.)	m³/day	10.8	16.2	32.4	64.8	135	216	324	405
Feed rate (Max.)	m³/day	108	162	324	648	1350	2160	3240	4050
System recovery (Max.)	%		'		9	0			
Operating Temperature Range	°C				20	- 35			
Nominal RO Rejection					98 -	99%			
			High	Pressure Pu	np				
Model					CRN or e	quivalent			
Manufacturer					Grundfos o	r 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 O	perated			,
MOC					SS	316			
			Membrane	Elements and	Housing				
Membrane Model					ESPA2 / TM72	0 or equivalen	t		
Membrane manufacturer				H	/dranautics / To	oray or equival	ent		
Membrane Quantity		20 (4")	25 (4")	12	30	63	84	105	126
Salt rejection at standard conditions					99.6% (99.5	% minimum)			
Housing specifications			long, 4 port, ) psi	4-element long, 4 port, 300 psi	5-element long, 4 port, 300 psi		7-element long	ı, 4 port, 300 ps	i
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
		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		and Utility Rec	- /	0,000	, , , , ,	, , , , , ,	, .,.
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/ m³/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, 50/6	0 Hz		
Control circuit					120/220V, 1-p	hase, 50/60Hz			
			Measi	uring Instrum	ents				
Pressure switch					Instrume	nt air line			
Pressure guage				In	strument air lin	e, interstage li	ne		
Flow indicator (rotameter)					Not in	cluded			
Flow measurement					BWRO permea	ite, concentrate	е		
Conductivity measurement					BWRO p	ermeate			
Pressure transmitter					BWRO feed	concentrate			
Analyzers			Р	H analyzer at F	RO feed, condu	ctivity analyze	r at RO permea	ate	
			Recom	mended Tank	Size				
UF Filtrate tank*	m <sup>3</sup>	15	25	50	75	150	250	300	400
SWRO permeate tank*	m³	10	15	30	50	100	200	250	300
BWRO permeate tank*	m <sup>3</sup>	5	10	15	25	50	100	125	150
RO CIP tank	m <sup>3</sup>				Shared with S\	VRO CIP tanks	S		
		Overall	System Dimei	nsions (based	on above vol	umes)			
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					Singl	e 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

<sup>\* 1</sup>hr retention time

## **COMBINATION SYSTEMS: UF-BWRO**

## **MK-MBWS SERIES**



Model	Capa (Eacl	Net Permeate Capacity* Feed No.of Dry (Each sub Flow Rate system) UF / RO Weight		Dry	Estimated Wet Weight	System Dimension L x W x H	Sub Systems		
	(m³/day)	(m³/hr)	(m³/day)	(m³/hr)		(kg)	(kg)	(m)	
MIC MENUO OO	240	10	267	11	5	2,000	4,000	3.8 x 2.1 x 3.3	1 x MK-32
MK-MBWS-32	180	8	240	10	12	1,800	2,500	6.0 x 2.0 x 2.0	1 x MBWS-32
MIC MENUO 50	360	15	400	17	8	2,500	6,000	4.4 x 2.5 x 3.3	1 x MK-50
MK-MBWS-50	270	11	360	15	15	2,000	2,700	6.0 x 2.0 x 2.0	1 x MBWS-50
MIC MENUO OO	720	30	800	33	14	4,500	10,000	5.2 x 3.2 x 3.3	1 x MK-80
MK-MBWS-80	540	23	720	30	30	2,600	4,000	6.0 x 2.0 x 2.5	1 x MBWS-80
	1,440	60	1,600	67	26	5,500	15,000	7.1 x 3.5 x 3.6	1 x MK-100
MK-MBWS-100	1,080	45	1,440	60	45	3,500	5,500	6.5 x 2.2 x 2.0	1 x MBWS-100
	3,000	125	3,333	139	54	15,000	24,000	12.0 x 13.0 x 4.5	1 x MK-150
MK-MBWS-150	2,250	94	3,000	125	105	8,500	14,000	10.0 x 8.5 x 3.5	1 x MBWS-150
141/ 14B14/0 000	4,800	200	5,333	222	86	21,000	31,000	15.5 x 17.0 x 4.5	1 x MK-200
MK-MBWS-200	3,600	150	4,800	200	189	12,000	20,000	10.0 x 11.0 x 4.0	1 x MBWS-200
	7,200	300	8,000	333	130	32,000	54,000	17.5 x 19.0 x 5.0	1 x MK-300
MK-MBWS-250	5,400	225	7,200	300	224	15,000	25,000	10.0 x 13.0 x 4.0	1 x 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
MK-MBWS-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	иом	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.)	m³/day	180	270	540	1080	2250	3600	5400	6750
Concentrate rate (Min.)	m³/day	87	130	260	520	1083	1733	2600	3250
Feed rate (Max.)	m³/day	267	400	800	1600	3333	5333	8000	10000
System recovery (Max.)	%		1		6	5		'	
Operating Temperature Range	°C				20	- 35			
				Sub-Systen	ns				
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-300E
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-30
				RO CIP Pun	тр				
Model					CRN or e	quivalent			
Manufacturer					Grundfos o	r 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			I.		Fixed	Speed	ı		1
			Carti	ridge Filter fo	r RO CIP				
Filter Model					ETHF or 6	equivalent			
Filter Dimensions (Dia. X L)	inch /	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				
Filter/ Housing Quantity		1	1	1	1	2	3	4	6
Housing Model		-	-			equivalent			_
Housing Quantity		1	1	1	1	2	3	4	6
January,			Installatio	n and Utility F	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 / m³/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		1			7			
Power				40	0 VAC +/-20%,	3 phase, 50/60	)Hz		
Control circuit					120/220V, 1 pl	hase, 50/60Hz			
			Rec	ommended Ta	ank Size				
UF Filtrate tank*	m³	15	15	35	60	120	200	300	400
BWRO permeate tank*	m³	10	12	25	45	90	150	250	300
RO CIP tank	m³	0.5	0.5	0.5	0.5	8	12	16	24
		Overa	all Syst <u>em Din</u>	nensio <u>ns (bas</u>	sed on above v	volume <u>s)</u>			
Dimensions (L x W x H)	m		•			9.0 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

<sup>\* 1</sup>hr retention time

## **COMBINATION SYSTEMS: UF-SWRO**

## MK-MSW-N SERIES



Model	Net Pe Capa (Each syst	n sub	Fe Flow		No.of Dry UF / RO Weight membranes	Estimated Wet Weight	System Dimension L x W x H	Sub Systems	
	(m³/day)	(m³/hr)	(m³/day)	(m³/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
IVING-IVIGVV-32IV	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
IVIKS-IVISVV-50IV	162	7	360	15	12	3,000	4,000	8.0 x 2.0 x 1.5	1 x MSW-50N
MALCO MAGNAL GONE	720	30	800	33	14	4,500	10,000	5.2 x 3.2 x 3.3	1 x MK-80S
MKS-MSW-80N	324	14	720	30	30	5,000	6,000	8.2 x 2.2 x 2.25	1 x MSW-80N
MICO MONI 100M	1440	60	1600	67	26	5,500	15,000	7.1 x 3.5 x 3.6	1 x MK-100S
MKS-MSW-100N	648	27	1440	60	60	7,000	9,000	8.5 x 2.5 x 2.2	1 x MSW-100N
MICO MOVAL450NI	3000	125	3333	139	54	15,000	24,000	12.0 x 13.0 x 4.5	1 x MK-150S
MKS-MSW-150N	1350	56	3000	125	112	9,000	15,000	15.0 x 5.0 x 3.0	1 x MSW-150N
MI/O MOM 000M	4800	200	5333	222	86	21,000	31,000	15.5 x 17.0 x 4.5	1 x MK-200S
MKS-MSW-200N	2160	90	4800	200	196	17,000	24,000	16.0 x 6.0 x 2.5	1 x MSW-200N
1440 14044 0501	7200	300	8000	333	130	32,000	54,000	17.5 x 19.0 x 5.0	1 x MK-200S
MKS-MSW-250N	3240	135	7200	300	238	22,000	29,000	16.0 x 6.0 x 3.0	1 x MSW-200N
MIKO MOM OCCO	9000	375	10000	417	160	33,000	55,000	17.5 x 19.0 x 5.5	1 x MK-200S
MKS-MSW-300N	4050	169	9000	375	294	28,000	36,000	17.0 x 6.3 x 3.3	1 x MSW-200N

## MK-MSW-N SERIES: TECHNICAL SPECIFICATIONS

Model	иом	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.)	m³/day	108	162	324	648	1350	2160	3240	4050
Concentrate rate (Min.)	m³/day	159	238	476	952	1983	3173	4760	5950
Feed rate (Max.)	m³/day	267	400	800	1600	3333	5333	8000	10000
System recovery (Max.)	%			1		15			
Operating Temperature Range	°C				20	- 35			
Nominal RO Rejection					98 -	99%			
				Sub-Systen	าร				
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 Pun	ıp				
Model					CRN / NBG	or equivalent			
Manufacturer					Grundfos o	r 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					SS	316			
RO Booster Pump					Refer to MS	SW-N series			
UF CIP/Backwash Pump				Ref	er to MK series	and MSW-N s	eries		
			Cart	ridge Filter fo	r 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				
Filter/ Housing Quantity		1	1	1	2	3	5	6	8
Housing Model						eguivalent	0	0	
Housing Quantity		1	1	1	2	3	5	6	8
Trodoning equations				n and Utility F			- U		
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 / m³/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	0.20712	0.00710	0.04703		7	3.107214	7.547 001	10.007 420
Power	Dai			40		3 phase, 50/60	)Hz		
Control circuit				10		hase, 50/60Hz			
Control circuit			Rec	ommended Ta	· · ·	11430, 30/00112			
UF Filtrate tank*	m <sup>3</sup>	12	15	32	60	120	200	300	400
SWRO permeate tank*	m <sup>3</sup>	5	7	15	30	65	110	150	180
RO CIP tank	m <sup>3</sup>	0.6	0.7	1.7	3.3	12	20	24	28
on win					sed on above v			<u>_</u>	
Dimensions (L x W x H)	m		_	` `		12.0 x 9.0 x 3.8	120x90x38	120x90x38	12.0 x 9.0 x 3.8
Dry Weight	kg	4,500	5,500	9,500	12,500	24,000	38,000	54,000	64,000
,oigin	1,9	1,000	0,000	0,000	12,000	21,000	00,000	0 1,000	01,000

<sup>\* 1</sup>hr retention time

## **COMBINATION SYSTEMS: UF-SWRO-BWRO**

## **MK-MSW-MBW SERIES**



Model	Net Per Capa (Each sub	city*	Fe Flow		No.of UF / RO	Estimated Dry Weight	Estimated Wet Weight	System Dimension L x W x H	Sub Systems
	(m³/day)	(m³/hr)	(m³/day)	(m³/hr)	membranes	(kg)	(kg)	(m)	
	240	10	267	11	5	2,000	4,000	3.8 x 2.1 x 3.3	1 x MK-32S
MKS-MSW- MBW-32N	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
	360	15	400	17	8	2,500	6,000	4.4 x 2.5 x 3.3	1 x MK-50S
MKS-MSW- MBW-50N	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
	720	30	800	33	14	4,500	10,000	5.2 x 3.2 x 3.3	1 x MK-80S
MKS-MSW- MBW-80N	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
	1440	60	1600	67	26	5,500	15,000	7.1 x 3.5 x 3.6	1 x MK-100S
MKS-MSW- MBW-100N	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
	3000	125	3333	139	54	15,000	24,000	12.0 x 13.0 x 4.5	1 x MK-150S
MKS-MSW- MBW-150N	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
	4800	200	5333	222	86	21,000	31,000	15.5 x 17.0 x 4.5	1 x MK-200S
MKS-MSW- MBW-200N	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
	7200	300	8000	333	130	32,000	54,000	17.5 x 19.0 x 5.0	1 x MK-250S
MKS-MSW- MBW-250N	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
	9000	375	10000	417	160	33,000	55,000	17.5 x 19.0 x 5.5	1 x MK-300S
MKS-MSW- MBW-300N	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

Permeate capacity (Max.) Concentrate rate (Min.) Feed rate (Max.) System recovery (Max.) Operating Temperature Range Nominal RO Rejection	m³/day m³/day m³/day	97.2		MBW-80	MBW-100	MBW-150	MBW-200	MBW-250	MBW-300
Feed rate (Max.) System recovery (Max.) Operating Temperature Range	m³/day	400.0	145.8	291.6	583.2	1215	1944	2916	3645
System recovery (Max.) Operating Temperature Range	-	169.8	254.2	508.4	1016.8	2118	3389	5084	6355
Operating Temperature Range		267	400	800	1600	3333	5333	8000	10000
Range	%		ı		Overall rec	overy 38%			
	°C				20 -	35			
					98 -	99%			
				Sub-Systen	ns				
UF Systems		1 x MK-32S	1 x MK-50S	1 x MK-80S		1 x MK-150S	1 x MK-200S	1 x MK-250S	1 x MK-3005
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 Pur	np				
Model					APP / CRN o	r equivalent			
Manufacturer					anfoss /Grundf	•	nt		
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					SS	<u> </u>			
RO Booster Pump?					Refer to M	SW series			
UF CIP/Backwash Pump?					Refer to N	//K series			
			Car	tridge Filter fo	RO CIP				
Filter Model					ETHF or e	equivalent			
Filter Dimensions	inch /	8" x 40" /	8" x 40" /	8" x 60" /	8" x 60" /	8" x 60" /	8" x 60" /	8" x 60" /	8" x 60" /
(Dia. X L)	cm	20.3 x 102	20.3 x 102	20.3 x 153	20.3 x 153	20.3 x 153	20.3 x 153	20.3 x 153	20.3 x 153
Filter/ Housing Quantity		1	1	1	2	3	5	6	8
Housing Model					ET80 or e	quivalent			
Housing Quantity		1	1	1	2	3	5	6	8
			Installati	on and Utility F	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 / m³/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	7			
Power				40	0 VAC +/-20%,	3 phase, 50/60	Hz		
Control circuit					120/220V, 1 ph	nase, 50/60Hz			
			Re	commended Ta	ank Size				
UF Filtrate tank*	m³	12	15	32	60	120	200	300	400
	m <sup>3</sup>	5	7	15	30	65	110	150	180

BWRO permeate tank\*

Dimensions (L x W x H)

RO CIP tank

Dry Weight

Wet Weight

 $m^3$ 

m<sup>3</sup>

m

kg

kg

5

0.6

6,000

9,000

6

0.7

7,000

12,000

15

1.7

11,000

18,000

25

3.3

14,700

27,400

60

12

28,400

46,000

 $12.0 \times 9.0 \times 3.8 \quad 12.0 \times 9.0 \times 9.0$ 

100

20

42,400

62,000

125

24

61,000

94,500

160

28

72,000

110,000

<sup>\* 1</sup>hr retention time



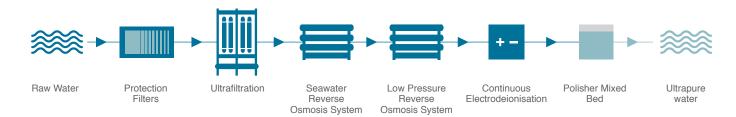
Municipalities	Recreation Sites	Temporary Use (Construction, Camps)	Industries
<ul><li>Potable Water</li><li>Park Irrigation</li><li>Large Public</li><li>Building Cooling Systems</li></ul>	<ul><li>Potable Water</li><li>Pools &amp; Spas</li><li>Laundry Golf</li><li>Club Irrigation</li><li>Cooling Systems</li></ul>	<ul><li>Concrete Production</li><li>Potable Water</li><li>Process Water</li><li>Dust Suppression</li></ul>	<ul><li>Process Water</li><li>Ultra-Pure Water</li><li>Boiler Feed Water</li><li>Cooling Tower Make- Up Water</li></ul>

#### **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**



#### 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)
- Chemical skids container (container 5)

#### **Containerised UF Standard Capacities (Seawater / brackish water)**

Model	Capacity Up To		People Served with	
	m³/d	MLD	Potable Water @200 l/person/d	
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	Capaci	Capacity Up To		
	m³/d	MLD	Potable Water @200 l/person/d	
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	
	m³/d	MLD	Potable Water @200 l/person/o	
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.

#### **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<sup>®</sup> Hyflux Proprietary Hollow fibre UF modules
- Hydrogen Chloride (HCI), Caustic (NaOH) and Sodium Hypochlorite (NaOCI) 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)

# 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 NaOCI 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:**

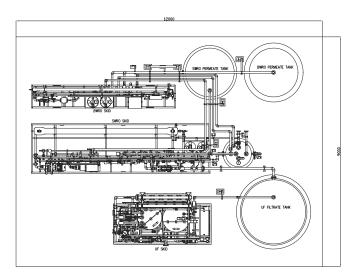
- · Permeate polishing by Continuous Electrode ionization (CEDI)
- · Conventional Ion exchange system

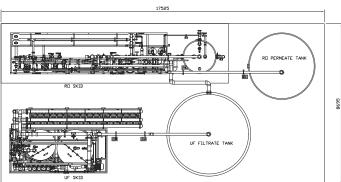
## **REFERENCES**

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.

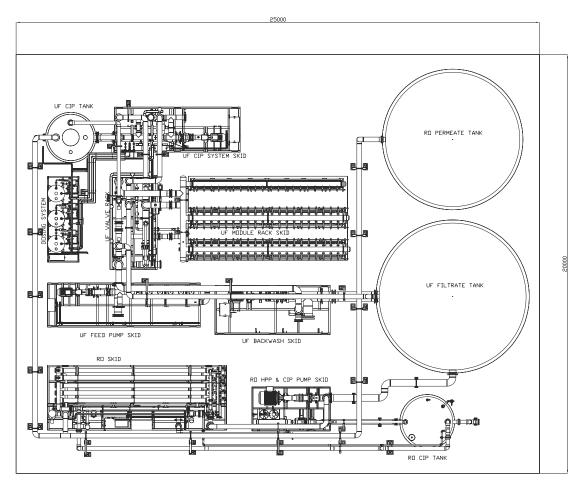
Application	Country	Capacity (m³/d)	Completion/ Estimated Completion
Brackish water treatment for potable water production	Myanmar	1,000	2015
Seawater desalination for chemical application water supply	Indonesia, Bontang	7,200	2014
Seawater desalination for water production	Indonesia	720	2013
Seawater 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



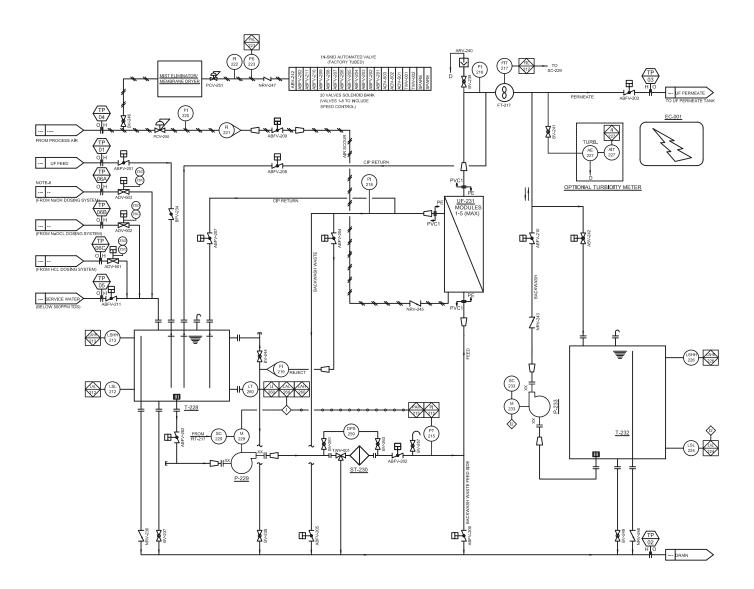
MK-MBWS-200

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



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