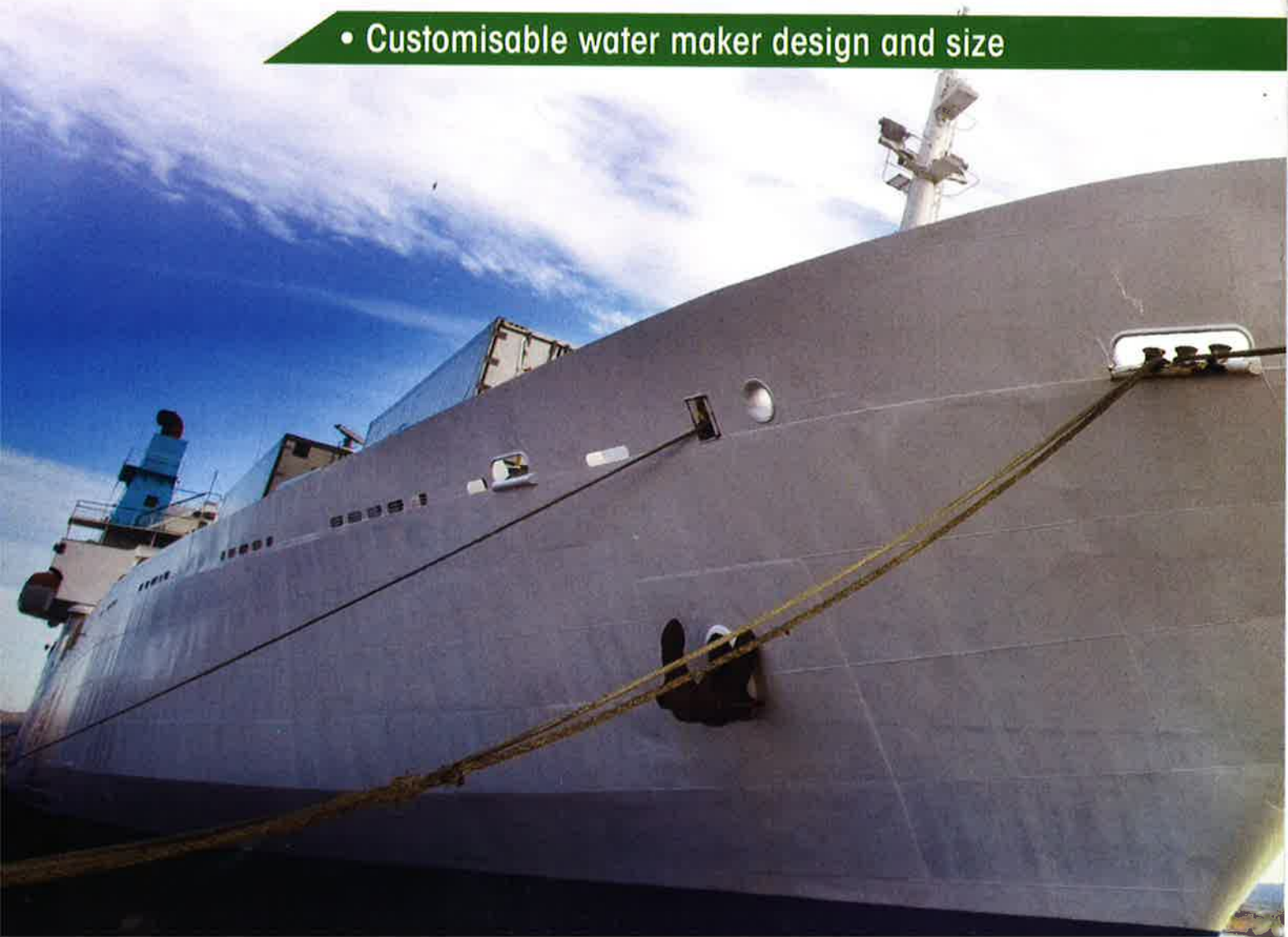


SEA WATER

REVERSE OSMOSIS DESALINATION SYSTEM MARINE APPLICATION

- Strategically located in Singapore
- Wide range of available spare parts
- Customisable water maker design and size



INTRODUCTION

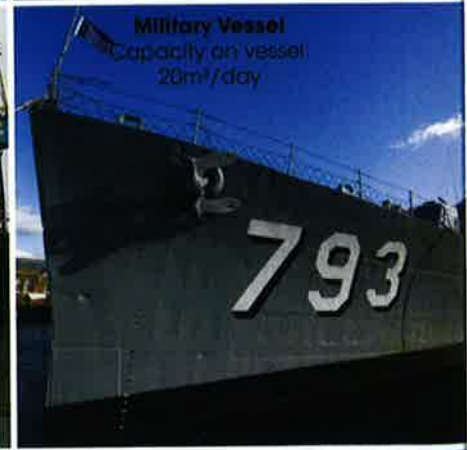
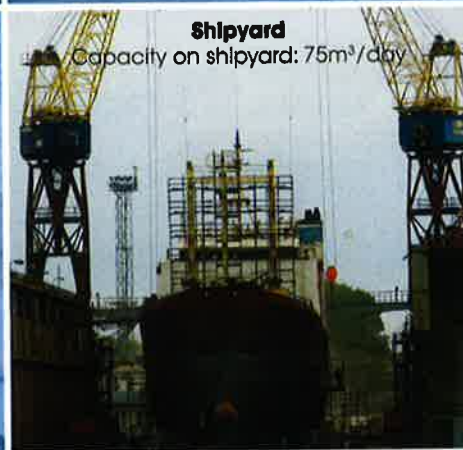
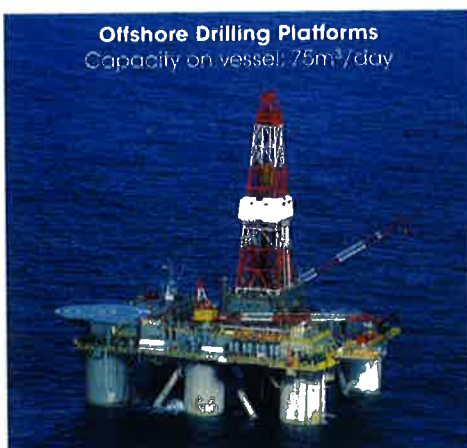
Hitachi Aqua-Tech is the world's leader in Reverse Osmosis (RO) Desalination systems or watermakers with proven track records. Our watermakers utilize high performance membranes and pumps to produce fresh water, which is free of particulate matter or contaminants from a seawater source.

Hitachi Aqua-Tech's watermakers are reliable and cost effective fresh water supply solution onboard ships and offshore facilities. The watermakers are easy to operate and built to withstand the harsh offshore and marine environments.

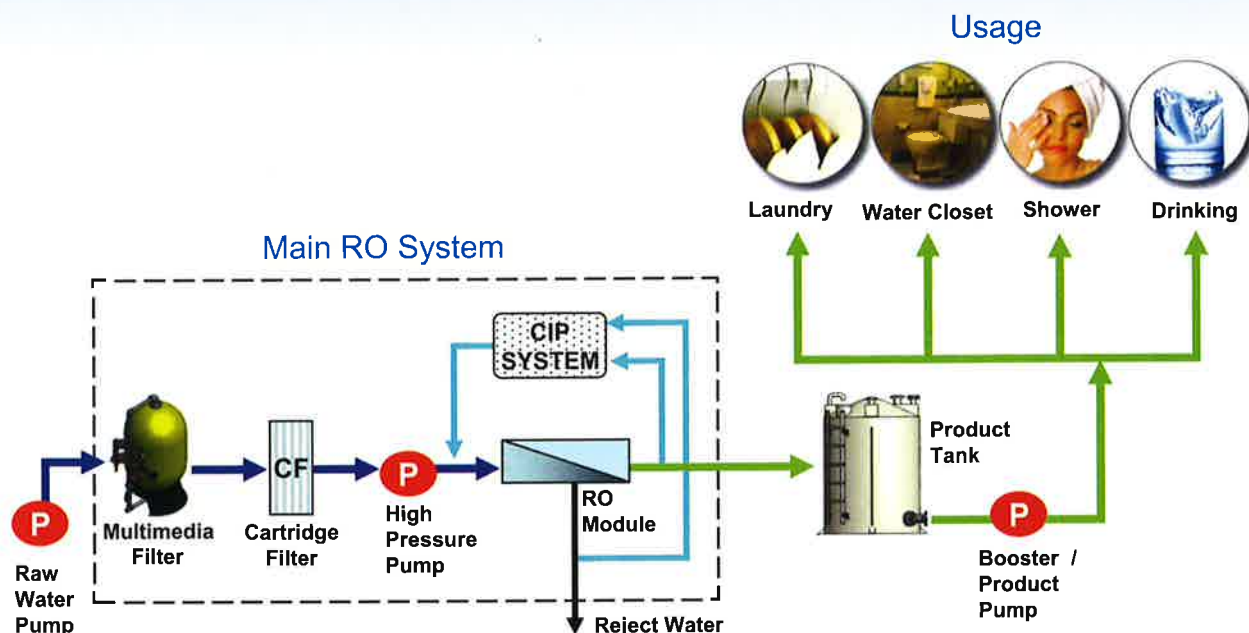
Hitachi Aqua-Tech's SWRO series cover a wide range of capacities and features to meet various needs and requirements from different offshore or marine application.

Hitachi Aqua-Tech, a brand name that you can trust and rely on.

TYPES OF APPLICATION



GENERAL PROCESS FLOW DIAGRAM



Notes :

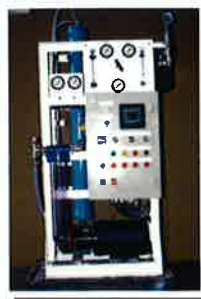
* CIP - Cleaning In Place

TYPICAL SPECIFICATIONS OF SWRO DESALINATION SYSTEMS

Model SWRO	Product Water Flow (m /day)	Feed Water Flow (m /day)	Main RO Skid Dimension (L x W x H) (m x m x m)	Overall* Floor Space (m ²)	Overall* Shipping Weight (kg)	Overall* Electrical Loading (kw)	Overall* Power Consumption (kwh/day)
STANDARD SERIES							
5T	5	33	1.0 x 0.8 x 1.7	2	600	4	88
10T	10	33	2.8 x 0.9 x 1.6	5	900	4	92
20T	20	80	2.8 x 1.0 x 1.5	6	1,600	8	180
30T	30	100	4.2 x 1.2 x 1.9	9	2,100	12	275
50T	50	167	3.2 x 1.2 x 2.0	10	2,700	15	345
ENERGY SAVING SERIES							
75T-TB	75	215	4.0 x 1.3 x 1.9	15	3,200	18	390
100T-TB	100	250	4.7 x 1.3 x 1.9	20	3,800	22	480
150T-PX	150	375	4.0 x 1.3 x 1.9	28	4,500	25	540
200T-PX	200	500	5.0 x 1.5 x 2.0	36	5,500	31	660
300T-PX	300	750	7.2 x 1.5 x 2.0	42	8,500	58	1,180

Notes:

* Overall system includes main RO system which comes with Pre-treatment, Post-treatment and CIP systems.
 TB - Turbocharger, PX: Pressure Exchanger



SWRO 5T

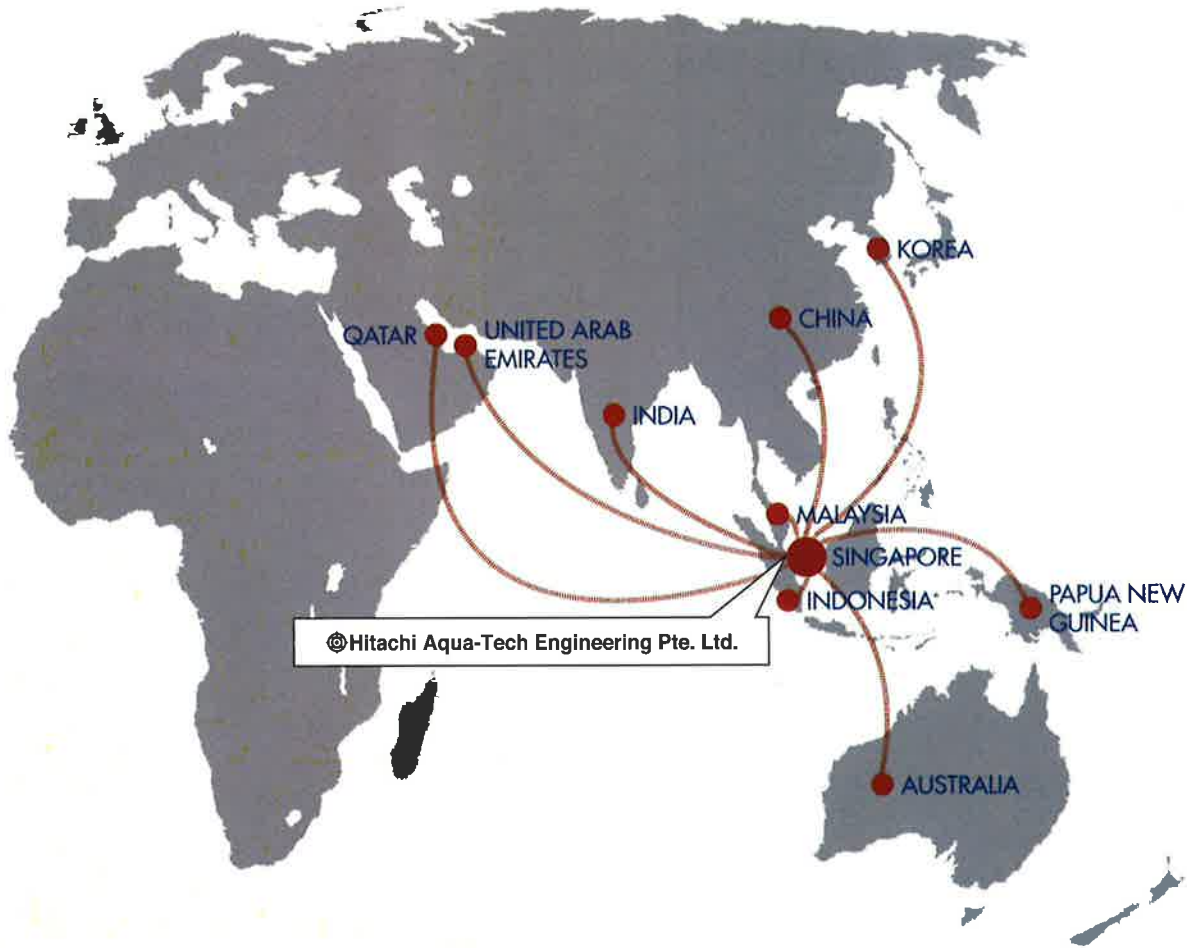


SWRO 75T-TB



SWRO 200T-PX

WORLDWIDE TRACK RECORD



COMPANY ACCREDITATION

- ISO 9001: 2008 - Quality Management System certified
- Member of International Water Association (IWA)
- Under Major Exporter Scheme (MES)



SWRO SYSTEM EXPLODED VIEW

(Model SWRO 200T-PX)

Cartridge/Bag Filter

The cartridge/bag filter is used to prevent particulate matter from entering the RO membranes.

Frequency Inverter Device

The frequency inverter is used to control the pump speed and save energy.

Electrical Control Panel

The PLC* + HMI* is installed on the control panel for easy operation. It has data logging function and it records the key RO operation parameters, time of start/stop, alarms, CIP and flushing date and time.

Booster Pump

The booster pump is installed to compensate the pressure difference between the energy recovery stream and the RO high pressure pump stream. It is made of stainless steel such as 904L.

RO Skid

The RO skid is made of mild steel material. It is sand blasted and coated (3 layers of coating).

Pressure Vessels & Membranes

The pressure vessels are made of GRP* material. The high performance RO membranes are installed in the pressure vessels.

RO High Pressure Pump

The high efficiency RO high pressure pump is installed to pressurize the RO feed water to overcome the osmotic pressure and push the product water through the RO membrane. It is made of stainless steel such as 904L.

Energy Recovery Device

The energy recovery device is used to recover the energy from the reject stream of the RO system. It saves up to 60% of the energy consumption for the RO system.

Notes:

* PLC - Programmable Logic Controller HMI - Human Machine Interface GRP - Glass-reinforced Plastic



SWRO 10T



SWRO 20T

FEATURES AND BENEFITS

STANDARD SERIES

- Customized design to fit into existing vessel
- Compact and flexible modular units
- Built-in cleaning and flushing system in main skid
- Module disinfectant dosing system

ENERGY SAVING SERIES

- Energy and cost efficient with energy recovery device
- Control panels with PLC for easy control (for PX series)
- Designed for ease of shipping
- Minimum site works required

GENERAL FEATURES AND BENEFITS

- Fast delivery with strong in-house fabrication capability
- Fail safe unattended operation
- High reliability with excellent service support
- High quality product water

TYPICAL WATER QUALITY OF SWRO DESALINATION SYSTEMS

ION	CONCENTRATION (ppm)		ION	CONCENTRATION (ppm)	
	FEED	PRODUCT		FEED	PRODUCT
Ca ²⁺	440	0.654	CO ₃ ²⁻	0.8	0.001
Mg ²⁺	1418	2.107	HCO ₃ ⁻	160	1.841
Na ⁺	11876.9	84.579	SO ₄ ²⁻	2976	4.767
K ⁺	420	3.737	Cl ⁻	21320	136.45
Ba ²⁺	0.055	0.0	F ⁻	1.5	0.019
Sr ²⁺	14	0.021	B	4.5	0.777
NH ₄ ⁺	0.1	0.0	SiO ₂	8.0	0.04
TDS	38640	235	pH	8	6.5-7.5

Design Criteria:

- 1) Recovery: 40%
- 2) Feed water temperature: 25°C
- 3) Product TDS meets WHO Guidelines for Drinking Water Quality

OPTIONAL FEATURES

- Raw water / product water pumps
- Product water tank
- Containerized unit
- Dismantlable skid
- UV disinfection system
- ABS / Lloyd classification



Containerized Unit



SWRO 20T - Customized Unit

SELECTIVE REFERENCE LIST

NAME OF CLIENT

1. Republic of Singapore Navy	- Military Defense	6. GuangDong Shipyard	- Ship Building
2. Sarku Marine	- Shipping	7. Korea Drilling Company	- Oil Rig
3. QGM Group	- Shipping	8. Valentine UAE	- Oil Rig
4. Mansal Offshore	- Oil Rig	9. Rooney Shipping	- Shipping
5. Star Cruise	- Cruise Liner	10. Sembawang Shipyard	- Ship Building

The content described here provides general information for the products. Hitachi Aqua-Tech Engineering Pte Ltd reserves all rights to revise the design, specifications and equipment without prior notice.

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CERT NO.: 2006-1-0801
ISO 9001:2008