

FOR THOSE WHO WANT TO STAY AHEAD IN ENVIRONMENTAL AND QUALITY ISSUES



DESALINATION



Who is WatMan?

COMPANY OVERVIEW

Water Engineering

OEM-Equipment Manufacturing



Oy Wat Man Ab Water Management (*WatMan*) is a versatile supplier of water and waste water treatment and water recycling projects. As a subsidiary of Pumphohja Corporation, we have the advantage of a wide range of expertise and experience in the production of pressure tanks, pumps and other steel products. We deliver both OEM equipment and turnkey plants mainly to steel and metal industries, process industry, shipyards, and power plants.

Typical processes that we deliver are chemical treatment and chemical dosing, filtration, clarifying, ion exchange and membrane processes like desalination. We find custom engineered solutions, and even retrofit or upgrade existing systems.

Supporting the idea of our parent company to transfer and store liquids, our aim is to solve the problems mainly related to water quality in different parts of any production process.

Some of the key words that best describe our functions are customer-orientation, commitment, teamwork, flexible action, and a mission for constant improvement. We are strongly driven by our goals of preservation and enhancement of our environment and quality of life.

Some of WatMan's more notable customers include *Wärtsilä Corp.*, *Rautaruukki Corp.*, *Outokumpu Corp.*, *IDO (Sanitec) Bathrooms*, *Flextronics Corp.*, *Botnia Pulp Mills* and *Meyer Werft GmbH*.

We are confident that we can make you more competitive - both in monetary terms and in terms of environment friendliness and production quality.

Some key-figures of WatMan:

Established	1995
Owner	Pumphohja Corporation (100 %)
Personnel	12
Turnover	3 M€
D&B rating	



Who is Pumplohja?

COMPANY OVERVIEW

Equipment Manufacturing

Pumplohja Corporation (Pumppulohja) is located in Saukkola, Finland. The business idea is to solve the problems related to the transfer, storage and pressure boosting of different liquids.

Pumplohja is a manufacturer of medium heavy metal products, mainly for the water and air treatment and process industry's needs. Pumplohja has production permits for pressure tanks from TÜV, Det Norske Veritas and Lloyds Register. Pumplohja's welding operations comply with the SFS-EN-792-2.

Our expertise in tailor-made products is pressure vessels, tubular heat exchangers, filter tanks, welding of acid-proof steel and equipped units.

Some of Pumplohja's more notable customers include *Metso Paper Corp.*, *STX Europe (Aker) Corp.*, *Meyer Werft GmbH*, *Outokumpu Corp.*, *Wärtsilä Corp.*, *Jets AS Norway*, *Andritz GmbH Austria*, *Marioff Corp.*, *Auramarine Corp.*, *Ahlstom Corp.*, *Atlas-Copco Corp.* and *Heider GmbH*.

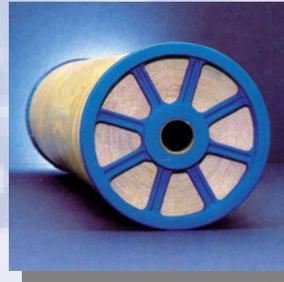
Some key-figures of Pumplohja:

Established	1991 (1980)
Owner	Privately owned
Personnel	60
Turnover	7 M€
Workshop area	5000 m²
D&B rating	



Drinking and Process Water Treatment — Desalination

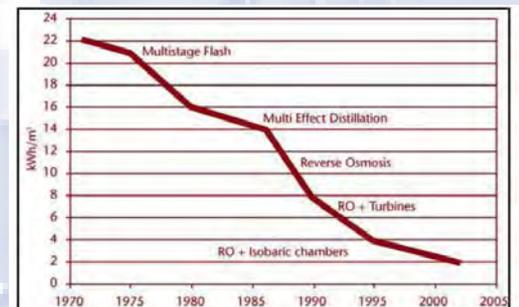
REVERSE OSMOSIS



Reverse Osmosis (RO) rejects typically 97-99% of the minerals in one pass. RO removes all the particles very effectively, but suitable pretreatment must be involved to remove the suspended solids, iron and hardness from the feed water. RO permeate conductivity will be higher by the rising temperature and lowering pressure correspondingly. RO loses up to 20% of the flux (capacity) with a 10 °C temperature decrease.

With low salinity waters, low pressure high-rejection RO membranes working on very low pressure - as low as 5 - 8 bars - remarkably save energy compared to high to medium pressure membranes. The type of the RO unit - especially the type of membranes - must be observed and considered. In large-scale production, energy consumption creates a noticeable expense.

In conventional seawater desalination (SWRO) systems, the typical energy consumption varies from 6 to 10 kWh/m³-fresh water, depending on the salinity, temperature and recovery among others. In the state-of-the-art systems the energy consumption can be as low as 2..4 kWh/m³-fresh water.

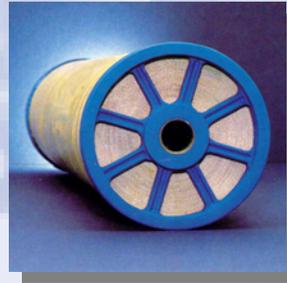


Evolution of energy consumption for the desalination of seawater over the last 30 years

On the other hand, 1-pass SWRO can produce fresh water of 100..150 mg/l of chloride at its best. These high rejection systems always need an average feed pressure of 55..70 bars. 2-pass SWRO can remove 99.8..99.9 % of the total salinity. These extremely high rejections are sometimes needed to spare the metal pipings from corrosion or in special processes.

Customers: Sanoma Corp., Wärtsilä Corp., Fortum Corp., Finnsementti Ltd., City of Laitila, City of Elimäki, Finnish Defence Forces, Meyer Werft GmbH ...





The WatMan reverse osmosis systems produce from 1 to 10000 m³ per day of high quality water suitable for communities, marine environment, boiler feed and general industrial applications. The systems can operate on a range of feedwater qualities at recoveries of up to 85 percent, and will remove up to 99,9 % of dissolved inorganics, organics, colloidal and suspended particulates. The WatMan RO systems come with a number of options and can be tailored to suit a customer's specific requirements.

PLANT SPECIFICATIONS

STANDARD EQUIPMENT

Powder-coated mild steel skid

IP54 coated steel control panel

Antiscalant dosing system or water softeners

PLC by Omron, Siemens or Mitsubishi

Stainless steel cartridge filter

Operation panel

Low pressure feed pump

HP pump pressure switch

Multi-stage high pressure pump or Piston pump

Feed conductivity indicator

Side-entry RO vessels

Permeate conductivity indicator

ABS or PVC low pressure piping

Permeate flow indicator

Stainless Steel high pressure piping

Reject rotameter or flow indicator

CIP/Flush tank

Low noise reject control valve

Air operated valves

Feed temperature indication

Sampling points

Pressure gauges



PLANT SPECIFICATIONS (cont.)

STANDARD EQUIPMENT

Low pressure pump
Centrifugal low pressure pump

Cartridge or Bag filter
Housing in stainless steel or plastic

Cartridge/Bag filter elements Polypropylene (5 micron rating)

Antiscalant dosing pump Solenoid-operated dosing pump

Antiscalant dosing tank Polyethylene tank with level control

High pressure pump Vertical or horizontal multistage centrifugal
Piston pump
Plunger pump

Pressure vessels FRP or SS sideport with victaulic ports

Membrane elements Spiral wound (high rejection, low pressure etc.)

CIP/Flush tank Polyethylene

PLC Controller Omron, Siemens or Mitsubishi

Operator Interface Operation panel, PLC Interface or PC with process visualization

Permeate flow Rotameter or flow transmitter

Permeate conductivity EC transmitter with temperature compensation

Reject flow Rotameter or flow transmitter

Pressure gauges Glycerine-filled 50/100mm diameter
Reject throttling valve Stainless steel angle seat globe valve
Constant flow controls

Low pressure piping ABS, PE or PVC

High pressure piping Stainless Steel (316 or High Grade)

TERMINATION POINTS

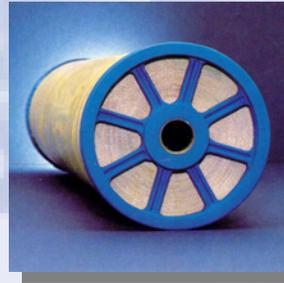
Feed inlet 32...140 Flange ABS, PE or PVC

Media filter inlet/outlet 32...140 Flange ABS, PE or PVC

Permeate outlet/dump 32...100 Flange ABS, PE or PVC

Reject outlet 32...100 Flange ABS, PE, PVC or SS

Air supply ½" or equivalent



UTILITY REQUIREMENTS

Power supply 230/380/400/440/460/ 690V
50/60 Hz
1/3 phase

Air supply 600 kPa instrument air



FEEDWATER REQUIREMENTS

Feedwater Pressure	Flooded Suction or upto 3-10 bar
Feedwater temperature	2 – 40 °C
Total Dissolved Solids	LP: up to 1,500 mg/L MP: up to 7,500 mg/L HP: up to 45,000 mg/L

Silt Density Index Less than 5.0

AVAILABLE OPTIONS

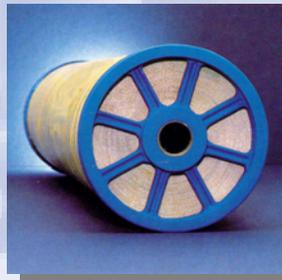
Site tailored pre and post-treatment

- Multi-media filtration for suspended solids removal
- Activated carbon filtration or chemical dosing for chlorine removal
- Micro or ultrafiltration
- Iron removal filtration
- Chemical dosing
- Polypropylene or coated filter housing for high chloride applications
- Antiscalant low level alarm
- Variable Frequency Drive (VFD) for high pressure pump control
- RO Module inlet/outlet pressure transmitters
- Reject flow transmitter
- Reject recycle with flow rotameter or constant flow controls
- Remote monitoring facility
- Stainless steel skid frame
- Containerized models
- Electrically controlled valves
- ASME certified pressure vessels
- 2-pass systems for high-purity applications
- Energy recovery for low-energy applications
- Fresh water remineralization or rehardening
- DI water polishing by packed bed ion exchange, Mixed Bed or EDI





SYSTEM PERFORMANCE and DIMENSIONS



Model	Nominal Product Flow * (m ³ /day)	Max Recovery ** (LP/MP/HP)	Max Pressure (bar) (LP/MP/HP)	Max Power (kW) *** (LP/MP/HP)	Max Weight (kg)	Dimension [mm] HxWxD
RO100	2	75/60/45	12/30/65	1.5/1.5/1.5	80	1650x750x650
RO200	5	75/60/45	12/30/65	1.5/2.2/3.0	110	1650x750x650
RO500	10	75/60/45	12/30/65	2.2/3.0/5.0	160	1650x750*650
RO1000	20	75/60/45	12/30/65	3.0/5.0/10	260	1850x1000x1000
RO2000	40	75/60/45	12/30/65	3.0/10/15	500	1850x1000x1000
RO3000	60	75/60/45	12/30/65	5.0/12/22	1050	1750x2600x1000
RO5000	100	75/60/45	12/30/65	7.5/15/30	1300	1750x2600x1000
RO7500	150	75/60/45	12/30/65	10/20/45	1750	1750x2600x1000
RO10000	200	75/60/45	12/30/65	15/30/60	2250	1900x3600x1000
RO15000	300	75/60/45	12/30/65	18.5/40/90	2650	1900x3600x1000
RO20000	400	75/60/45	12/30/65	22/45/75	3100	2100x4600x1250
RO25000	500	75/60/45	12/30/65	30/55/90	3400	2100x4600x1250
RO30000	600	75/60/45	12/30/65	30/75/110	3700	2100x5600x1400
RO40000	800	75/60/45	12/30/65	37/90/160	4250	2100x5600x1400
RO50000	1000	75/60/45	12/30/65	37/110/200	5100	2300x6600x1400
RO60000	1200	75/60/45	12/30/65	45/132/250	6050	2300x6600x1400
RO70000	1500	75/60/45	12/30/65	45/145/315	6900	2300x6600x1400

NOTE: LP: Low Pressure; MP: Medium Pressure; HP: High Pressure Seawater Desalination

*: Nominal product flow rates are based on feed temperatures of 10 °C (LP/MP) or 25 °C (HP);

** : Recovery rates greater than informed are achievable. Operating conditions should be verified by WatMan.; ***: Max. power is for your information only. Actual guarantee values are given case-by-case.

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