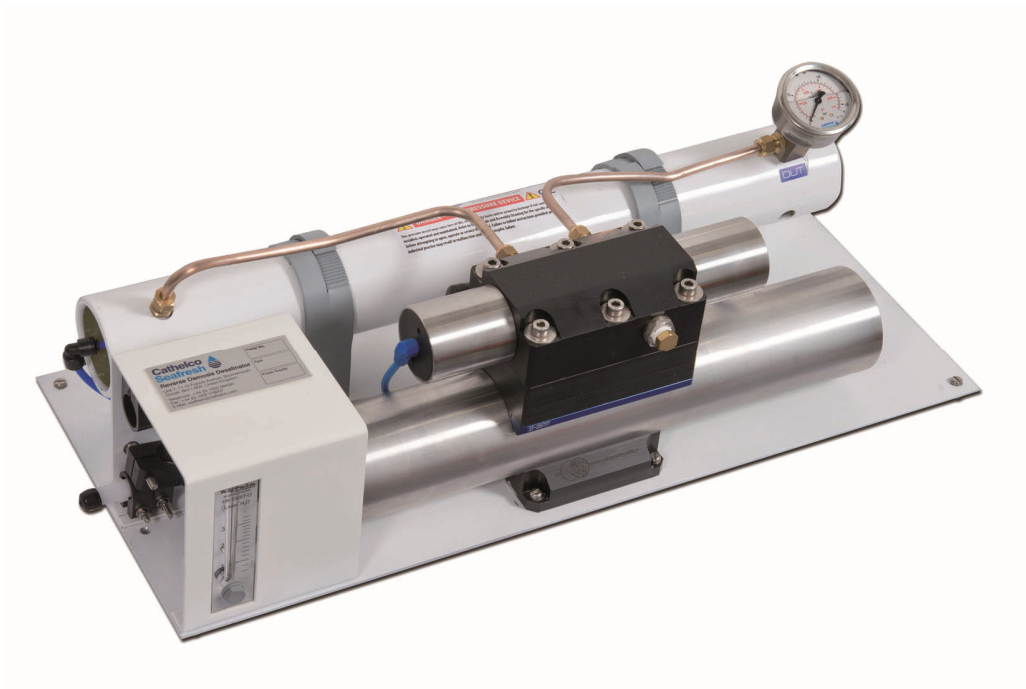




Reverse Osmosis Desalinators



Ocean Whisper Series

Technical Specification

Seafresh Desalinators Ltd, Marine House, Dunston Rd, Chesterfield, Derbyshire, England, S41 8NY

Tel: +44 (0)1246 457900 Fax: +44 (0)1246 457901 Email: seafresh@cathelco.com

System Summary

	Production Capacity	Feed Flow	Current Draw		Elec. Load (kW)	Plumbing Connections			Total Weight (kg)
			12V	24V		Feed	Dump	Store	
<i>Ocean Whisper 30</i>	30ltr/hr (8gal/hr)	325l/h	13a	7a	0.2	3/4"	3/4"	1/2"	
<i>Ocean Whisper 60</i>	60ltr/hr (16gal/hr)	660l/h	25a	13a	0.5	3/4"	3/4"	1/2"	
<i>Ocean Whisper 90</i>	90ltr/hr (24gal/hr)	990l/h	32a	16a	0.75	3/4"	3/4"	1/2"	

System Design Parameters

Feed water Pressure: 150PSI (10Bar)

Salt Rejection: 98.6%

Feed Water Salinity: 35,000ppm NaCl, 25°C

Operating Water Temperature: 5°C to 35°C

Product Flow/Membrane Rating: +/-15%

Product Water Quality: <450ppm (store point on auto models)

Principles of Reverse Osmosis

Reverse Osmosis (RO) is a low cost method of desalination, and is excellent for both marine and land based applications.

Osmosis is a naturally occurring process and is defined that when two solutions of different concentrations are separated by a semi-permeable membrane then the less concentrated (purer) water will flow towards the saltier (more concentrated) side of the membrane. This will happen until the pressures and concentrations are equalised.

The Cathelco Seafresh desalination plant reverses this process by pressurising salt water at double the natural osmosis pressure against the membrane surface, resulting in potable water being produced.

The principal of operation is such that the feed water has passed through a strainer (or similar) to ensure feedwater is free of large debris before entering the system. Sea water is pumped by a priming pump through a pre-filter to extract any free particles to a designed micron size according to the operating conditions.

The filtered feed water then passes through the energy recovery device which increases the pressure to required watermaking level.

Each membrane is held in the centre of a high pressure casing. The pressurised feed water is fed through the membranes and discharged through the energy recovery device to sea water discharge.

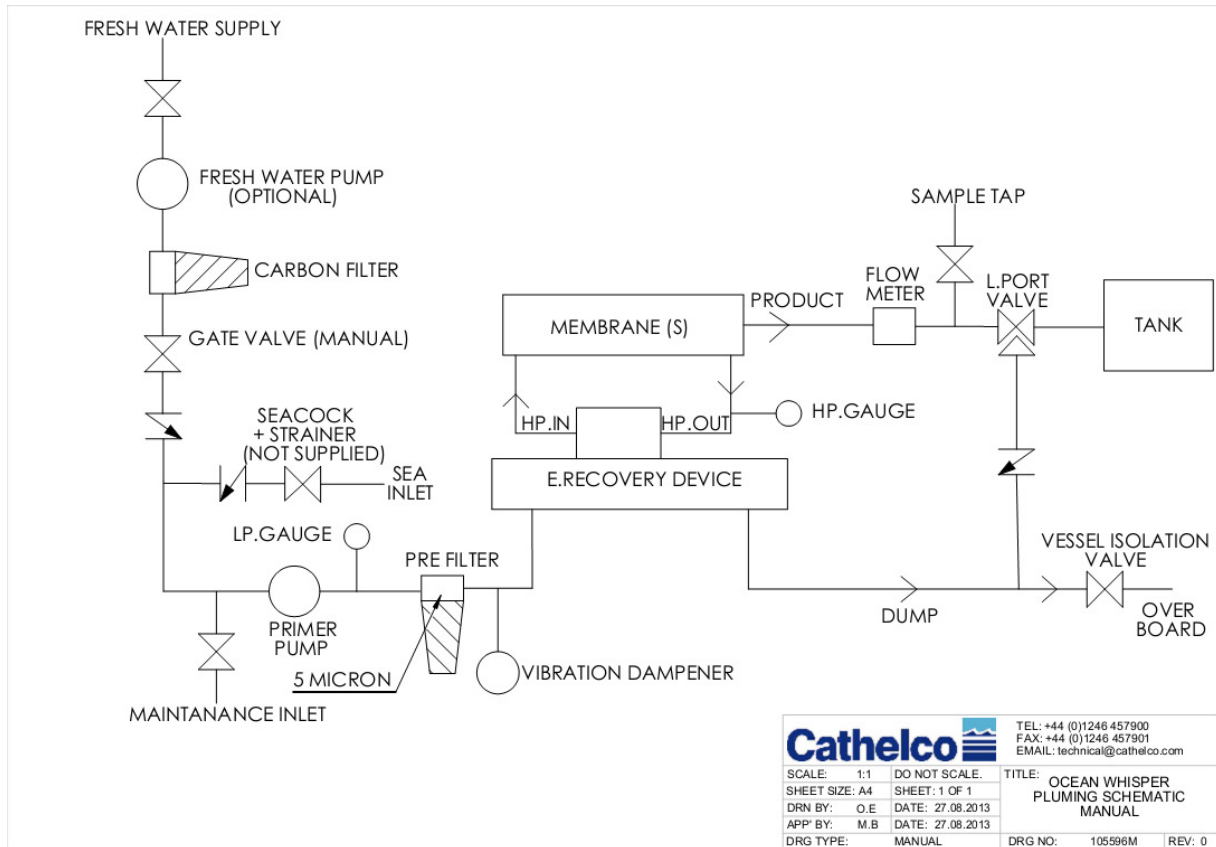
In the Automatic models the product water which permeates through the membranes is piped through a salinity sensor to a solenoid valve which diverts the fresh water either to store or to dump depending on the quality. This operation is controlled by a temperature compensated controller set to reject water that is not well within the WHO directive of a maximum 500ppm salinity for potable water.

Although the product water is suitable for potable storage directly from the Cathelco Seafresh plant, it can be treated in various ways including ultra violet sterilisation, active carbon filtration, remineralisation and chlorination. These are available as optional extras and are detailed later in the document.

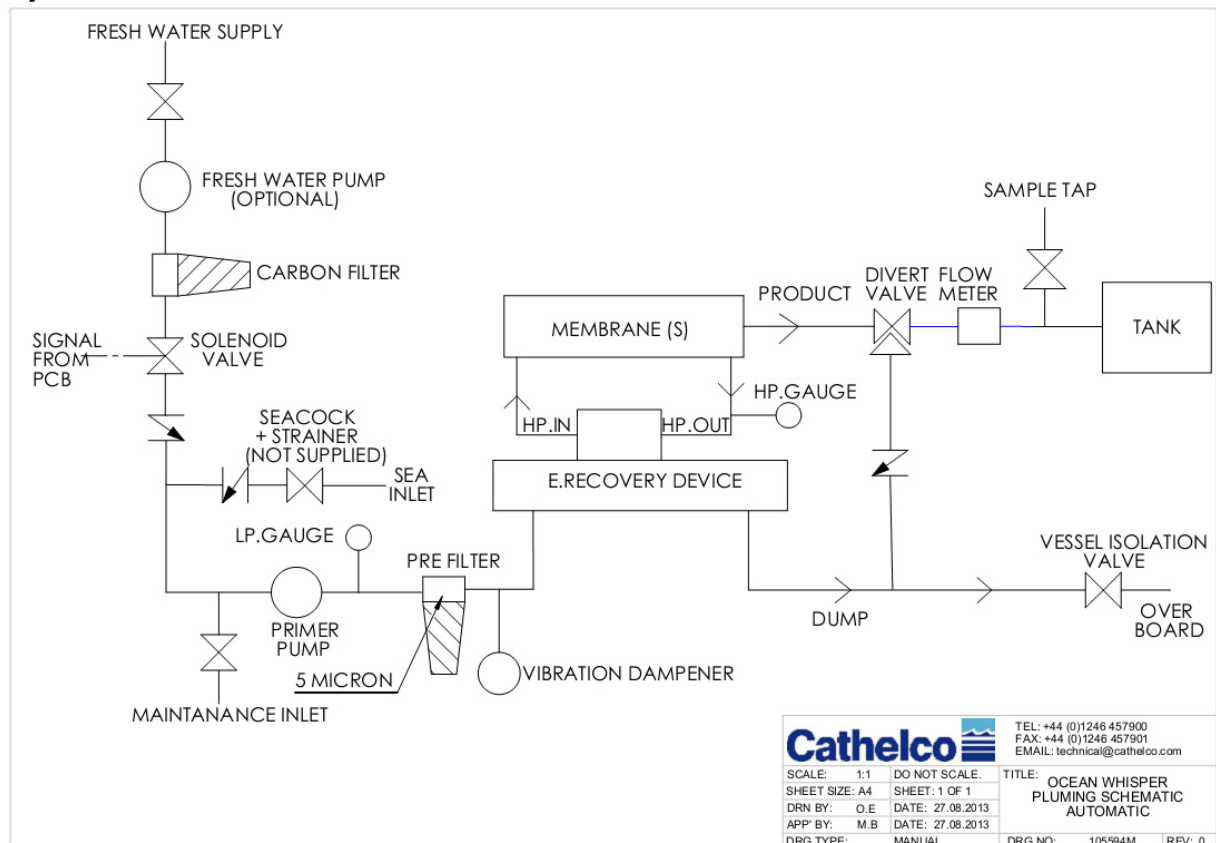
Product water without chlorine treatment tastes better but for long term storage chlorine dosing is advisable.

Every unit is manufactured to Cathelco Seafresh exacting standards, and is comprehensively tested prior to despatch to ensure safety and operational excellence.

System Schematic- Manual



System Schematic- Automatic



Component Description

1. Primer Pump

This pump is installed on or below the waterline and forces water through the pre-filter units and deliver it to the Energy Recovery Device with a positive pressure. The pump also features a maintenance inlet, used to introduce chemicals into the system. A low pressure gauge is fitted to monitor the correct pressure is being fed into the energy recovery device for optimal operation and when pre-filters require changing.

2. Pre-filter

This consists of a disposable cartridge filter fitted with a bleed button for simple removal of air from the system. The 5 micron ensures “clean” water passes into the high pressure pump and pressure vessels to prevent damage. The clear filter housing makes it easy to see when the elements are in need of cleaning/replacing, this will be dependant on the quality of the feed water. Polyester elements are used instead of cotton as they are a poor host for bacteria and fouling. An additional 50micron filter can be added to extend the life of the elements.

Capacity: 1.0m³/hr

Filter cartridges: Polyester fibre elements, 5 micron 2.5” x 10”.

3. Energy Recovery Device

This unit includes an energy recovering circuit that utilises the pressure of the rejected water and drives it again towards the main circuit.

4. Pressure vessels and membranes

The pressure vessels are constructed of glass fibre epoxy resin and sealed with stainless steel reinforced nylon end plugs at either end. All salt water pipe fittings are Nickel Aluminium Bronze. The pressure vessels have been designed and tested to withstand more than 4x operating pressure. These can be arranged in a number of different ways depending on the output of the plant. A High Pressure Gauge is fitted at the membrane exit to monitor that the unit is functioning optimally.

Membrane type: Dow Filmtec SW30 2521 or SW30 2540 spiral wound

Chloride rejection: 99.5%

Max operating pressure: 1000 PSI (55-62BAR)

5. Control Panel-Automatic Only

This features simple electronic controls for ease of operation. These features include:

- Electronic enclosure rated to IP55
- Automatic fresh water flush on start up and shut down
- Fully automated salinity controller
- Product flow meter showing fresh water flow in litres per minute
- Product water sample tap

6. Connections

3/4" Hose barb for sea water inlet from seacock and primary strainer to Primer Pump

3/4" Hose barbs for pre-filter

3/4" Inlet to Energy Recovery Device

1/2" Hose barb for brine discharge to overboard

1/2" Hose barb for product connection to tank manifold

7. Fresh Water Flush

Upon system start up and shutdown the fresh water flush unit flushes potable water through the system to remove any bacteria, minerals, etc and periodically flushes on an automatic timer. This ensures maximum operational efficiency and longevity of the R.O membranes. Contains a carbon filter to remove any chlorine present in the stored fresh water, solenoid valve on automatic model or a manual valve. Can be supplied with its own pump if required.

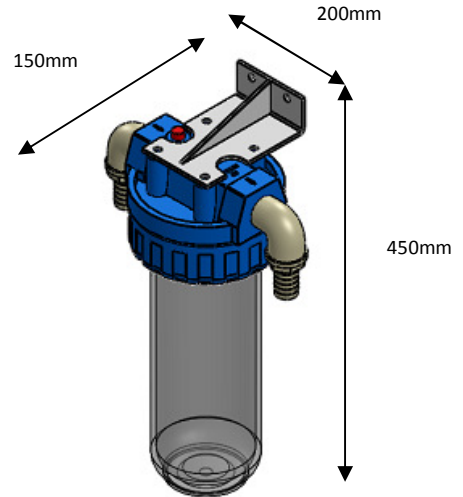
Dimensions (mm)

Primer Pump/Motor

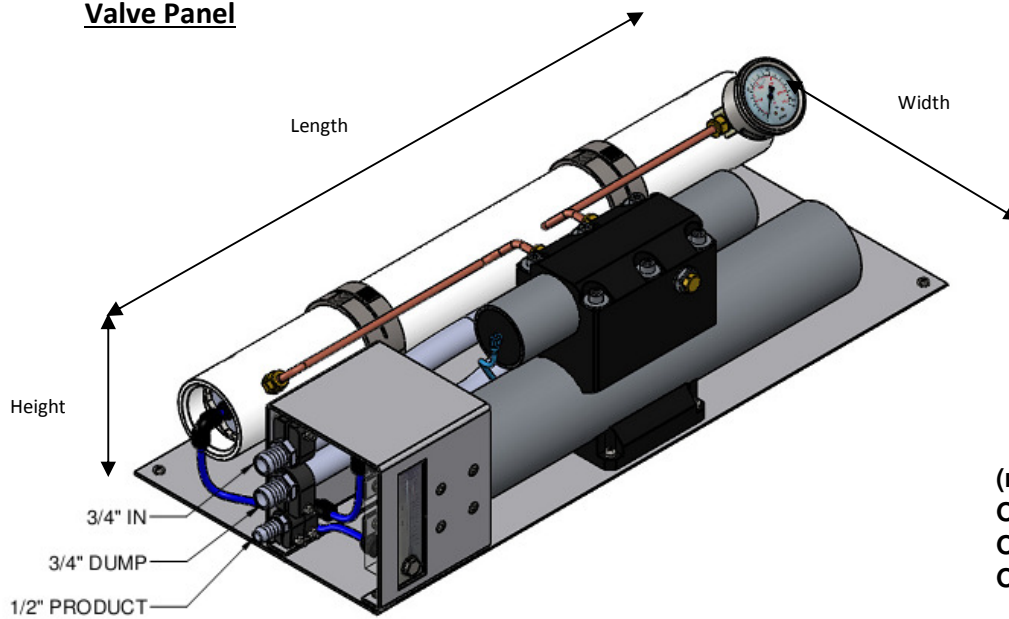


(mm)	Length	Width	Height
OW 30	310	105	135
OW 60	340	132	165
OW 90	400	132	165

Pre-filter (inc Vibration Dampener)



Valve Panel



(mm)	Length	Width	Height
OW 30	729	304	204
OW 60	1151	304	204
OW 90	1151	304	304

Optional Extras

Remote Control: The control features and basic diagnostics are taken from the main control panel and mounted on this remote panel to allow the system to be operated from the bridge or other convenient location. The controls include both pressure gauges, the pressure regulator, the product flow meter and a switch/indicator keypad.

Oil/water Separator: A pre-treatment option for use in water containing oil. The unit uses the same type housing as the standard pre-filters for compatibility and ease of replacement.

UV Steriliser: The unit sterilises the water to be completely free from bacteria, parasites and algae spores. This can be used as a pre-treatment when operating in dirty waters and also as a post treatment if the water has been held in storage for long periods of time.

Carbon Filter: Removes dissolved gases (incl. chlorine), tastes and odours to improve the taste of the product water. This unit uses the same housing as the pre-filtration cartridges for compatibility and ease of replacement.

Re-mineralisation Unit: Used to restore mineral content and restore equilibrium with alkalinity/CO₂ levels. Also known as re-hardening or de-acidification.

For additional information or drawings on any of the above components please contact Cathelco Seafresh