

Reverse Osmosis System – BWB Series



Features

- Compact Stainless-steel open frame
- High pressure Sch80 UPVC rigid pipework
- Stainless steel control valves and pump
- Programmable PLC controller
- Low feedwater pressure sensor
- Permeate quality sensor & conductivity display
- Storage tank level sensor input
- Permeate, reject and recirculation rotameters
- Adjustable pressure regulator valve
- Permeate flush
- Panel mount pressure gauges
- Mimic panel with status indicators
- System recovery up to 75%
- High rejection membranes (typically >99.5%)
- Optional feedwater conductivity monitoring



BWB reverse osmosis systems are used to treat high TDS feedwaters or where permeate flush or PLC control is desirable. RO pressure vessels are FRP high pressure types with high performance membranes in an electropolished stainless-steel open frame. Metal wetted surfaces are stainless steel or marine grade brass. A permeate flush facility is standard and operates each time the system is started and every 3 hours thereafter to assist with keeping the membranes clean. The PLC continually monitors feedwater pressure, RO permeate quality and storage tank level. Options include automated pre-treatment with sediment removal filters and chemical dosing systems, feedwater boost pump, BMS alarm outputs, GSM monitors, permeate degassers and polishers.

Standard instrumentation includes:

- Pressure gauges – feedwater, membrane inlet and membrane discharge
- Rotameter for permeate, reject and recirculation
- Flow control valves for pump discharge, reject and recirculation flow management

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Specifications

Specifications/Models	BWB-660	BWB-1500	BWB-3000	BWB-4500	BWB-6000	BWB-8000
*Max Flow Rate (lpd @ 25°C)	2,000	5,000	10,000	15,000	20,000	30-36,000
*Operating Pressure (kPa)	1050-1400 (1750 maximum)					
Pre-filtration (standard)	Dual 2.5" x 20" filter housings					1 x 4.5"x20"
Pressure pump	RV or Vertical multi-stage in 304 or 316 grade SS					
Pump Rating (kw)	0.75	2.2	2.2	2.2	2.5	2.7-2.9
Membrane Type	TFC with FRP outer wrap suitable for fresh or brackish waters					
Membrane Number and Size	1 x 2.5"x40"	1 x 4"x40"	2 x 4"x40"	3 x 4"x40"	4 x 4"x40"	6 x 4"x40"
Membrane Pressure Vessel	FRP (rated to 2050kPa)					
Flow Meters	RO permeate, reject and reject recirculation streams					
Pressure Gauges	Feedwater, pump discharge, membrane discharge					
Quality Monitor	TDS monitor with LCD (optional conductivity monitor available)					
Electrical Controls	PLC, overload breakers, LED indicators. Mimic panel, HMI interface optional					
Power	220-240VAC 50Hz 15A single phase or 415VAC 3 phase (optional)					
Frame	AISI 304 grade SS, electro polished					
Dimensions (approx.)	50 x 60 x 156cm (side mount filter option), BWB8000 60 x 100 x 170cm (wdh)					

Note that permeate flow rate and operating pressure will vary according to feedwater quality, feedwater temperature and pre-treatment design. Actual system performance projections require a comprehensive feedwater analysis to be provided prior to confirmation of system recommendations.

Typical System Configurations

To maximise the efficiency and life of reverse osmosis systems, effective pre-treatment of the feed water is required. Selection of the proper pre-treatment maximises efficiency and membrane life by minimising fouling, scale formation, and membrane degradation. Correct pre-treatment also optimises product flow, product quality (salt rejection), product recovery, operating and maintenance costs

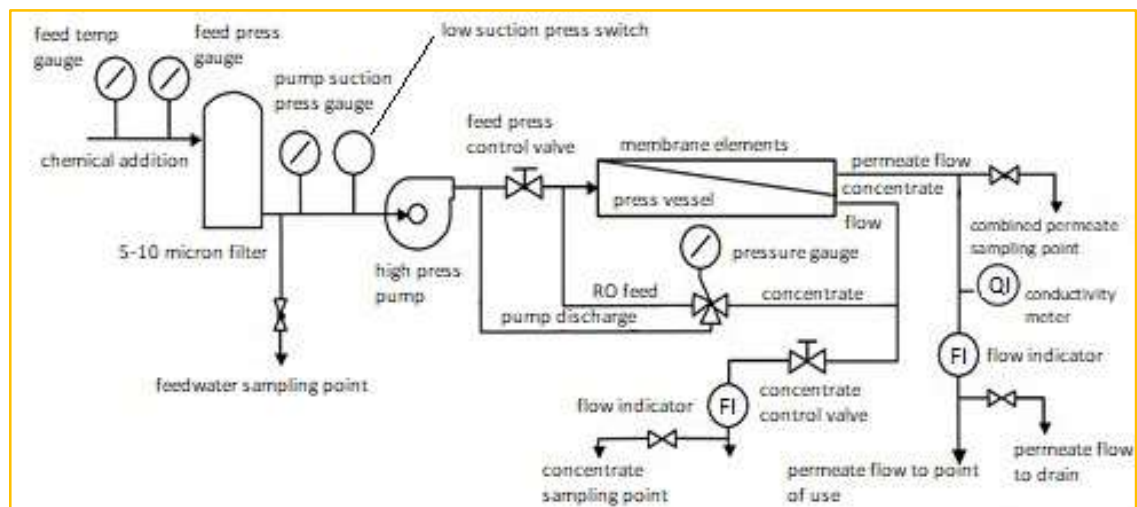
Pre-treatment of feed water involves a total system approach for continuous and reliable operation. Inadequate pre-treatment often necessitates frequent cleaning of the membrane elements to restore productivity and salt rejection. The cost of cleaning, downtime and lost system performance is significant. The proper treatment scheme for feed water depends on the feed water source and composition as well as the application.

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The type of pre-treatment system depends on the feed water source.

- Bore water is a consistent feed source that has a low fouling potential, requiring a very simple pre-treatment scheme such as acidification and/or anti-scalant dosing and a 5µm sediment filter.
- Surface water is a variable feed water source that is affected by seasonal factors. It has a high fouling potential, both microbiological and colloidal. Pre-treatment for surface water is more elaborate than pre-treatment for bore or well water. Additional pre-treatment steps often include chlorination, coagulation/flocculation, clarification, multimedia filtration, dechlorination, acidification and/or anti-scalant dosing.
- Industrial and municipal wastewaters have a wide variety of organic and inorganic constituents. Some types of organic components may adversely affect RO membranes, inducing severe flow loss and/or membrane degradation (organic fouling), making a well-designed pre-treatment scheme imperative.

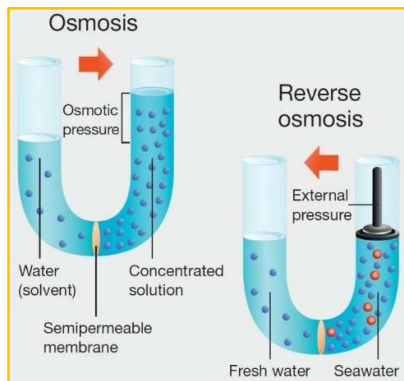
Once the feed water source has been determined, a complete and accurate analysis of the feed water should be made. A feed water analysis is critical in determining the proper pre-treatment and RO system design.



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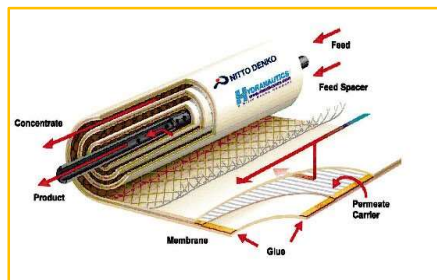
The Reverse Osmosis Process

Reverse osmosis is a very mature, well developed technology whose performance is easily measured. It is the method of choice for many industrial, municipal and commercial works when a reduction in feedwater TDS/conductivity or similar contaminants is required.



Osmosis is a term used to describe the diffusion of fluid through a semipermeable membrane from a solution with a low solute concentration to a solution with a higher concentration. Osmosis can be reversed if sufficient pressure is applied to the concentrated side of the membrane. This reversal process is used for water purification and desalination as the membrane allows only the water to pass through, but not larger molecules or ions (like salt).

For the reverse osmosis system to operate effectively, the feedwater must be filtered to remove suspended solids (to around 5 microns and then de-chlorinated). An anti-scalant injection system is generally required to remove hardness minerals (calcium, magnesium and iron) which would otherwise increase in concentration on the waste side of the membrane to the point where they form scale and foul the membranes. Water softeners may also be used to remove hardness minerals.



The pre-treated feedwater is pressurised and forced into a series of membrane and pressure vessel assemblies where the separation of pure water and contaminants occurs. Multiple membranes may be used for the higher flow rates and are housed in single or multi-place pressure vessels. RO membranes are available for a wide variety of feedwater types and all have a similar physical structure.

They differ in membrane polymer type, membrane thickness, surface area, spacer thickness, outer membrane covering and physical size. Surface modified membranes are used in more specialised areas to yield maximum stable performance and are preferred with difficult feedwater types.

The raw (untreated) feedwater source and quality of that source water are the key elements that directly affects the choice of pre-treatment equipment, pumps, piping, membranes and all system components. ROTEK has been designing Reverse Osmosis systems and their critical pre-treatment equipment for over twenty years to ensure our systems are suitable for each application. We can arrange thorough water testing through our NATA certified laboratory as well as on-site testing for limited parameters prior to making a recommendation to best suit your site.