

Reverse Osmosis - EDI

The Basics

The RO/EDI unit uses electro-dionisation to further polish the RO water, producing water with a typical quality better than 10 Meg Ohms.

The EDI contains alternating semi-permeable anion and cation exchange membranes. The spaces between the membranes are configured to create liquid flow compartments with inlets and outlets. A transverse DC electrical field is applied by an external power source using electrodes at the ends of the membranes and compartments. When compartments are subjected to an electric field, ions in the liquid are attracted to their respective counter-electrodes. The result is that the compartments bounded by the anion membrane facing the anode and the cation membrane facing the cathode become depleted of ions and are thus called diluting compartments. The membrane facing the anode will then trap the ions that have transferred in from the diluting compartments. Since the concentration of ions in these compartments increases relative to the feed, they are called concentrating compartments, and the water flowing through them is referred to as the concentrating stream.



Reverse osmosis is therefore considered a much safer route of producing pure water for many commercial and industrial applications, and additionally the plant doesn't need to be taken out of service for regeneration as a demin plant does.

Rejection rates of salts from water is generally in the region of 95-99.5% dependant upon the membrane type used and the raw water feed quality. RO systems can be designed to utilise the wide range of membranes available, which will give different permeate water qualities. Standard designed RO's are manufactured using the low energy membranes which will give a permeate water quality of approx 10 microsiemens from an input water of between 500-700 microsiemens.

Reverse osmosis systems, in their most basic form, consist of a pressure pump, housing and membrane. Water is forced into the housing under pressure and the pure water (or permeate) is collected and passed to service. Reject water (or concentrate) is collected from another outlet and routed to drain, with a portion of the concentrate water recycled back to the inlet of the pump. This means that the portion of water sent to drain is kept to a minimum, allowing a recovery ratio of approx 75% to be achieved without significant fouling of the membrane. The recirculation allows a higher flow of water through the pump, reducing the load on it's bearings and keeping the pump running cooler. The recirculation on all units is adjustable.

The controller used on the RO system constantly monitors the quality of the permeate water and is also linked with safety controls on the system, to ensure the unit cuts out on low & high pressure, high & low conductivity, and full permeate tank signal. It will also run various pre and post flush cycles to maximise the life of the membranes. The constant monitoring is automatic and the programming is all pre-set to ensure protection of the system at all times and to maximise the quality of the pure water.

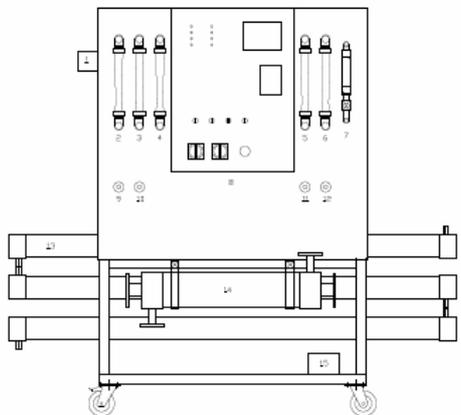
Pre-treatment

RO plants must be supplied with softened and de-chlorinated water. A duplex softener is recommended for continuous operation. Utilising softened water for the feed to the RO will reduce the scaling potential on the membrane and therefore lengthen it's working life. De-chlorination of the feed will reduce oxidation damage to the surface of the membrane. Membranes can also be fouled by Iron, Manganese, organics and micro-organisms. For boreholes and other private supplies a full water analysis is advised before installing an RO so that a pre-treatment system can be specified.

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Technical Table

Model	ROEDI-500E4-10	ROEDI-1000E4-20	ROEDI-2000E4-40	ROEDI2500E4-50	ROEDI-3000E4-60
Output (lph)	500	1000	2000	2500	3000
Input (lph)	667	1333	2667	3333	4000
Start up flush volume lpm					
Membrane type	OROM4040-2	OROM4040-2	OROM4040-2	OROM4040-2	OROM4040-2
Membrane number	3	6	10	14	18
Booster pump power (kw)	3.4	4.2	6.70	7.50	7.50
Amps	9	11	17	19	19
Power supply	3 phase				
Inlet connection	1" solvent weld				
Permeate connection	1/2"OD	1/2"OD	3/4"OD	3/4"OD	3/4"OD
Drain	1" solvent weld				
Suggested softener	30L duplex	40L duplex	50L duplex	50L duplex	
Delivered weight	350kg	450kg	550kg	650kg	750kg
Included pre-treatment	20" Carbon				
Width x depth x height (mm)	2500 x 1100 x 2000				



Comsoft Drawing

1. Controller
2. Transformer/relay box
3. Inlet
4. Drain outlet
5. GAC filter
6. Pressure control valve
7. Low pressure gauge
8. Pump pressure gauge
9. Back pressure gauge
10. Inlet solenoid
11. Re-circ flow control
12. Flush flow control
13. Flush solenoid
14. Conductivity probe
15. Permeate flow valve
16. Concentrate flow meter
17. Re-circ flow meter
18. membrane / housing
19. Low pressure switch
20. Membrane connections
21. Pump
22. Permeate outlet
23. High pressure switch
24. Water softener valve
25. Water softener vessel
26. Brine tank

Overview

The comsoft is a plug and play RO system which has an extended skid to accommodate an integrated softener. The duplex will provide an uninterrupted flow of soft water to the RO membranes thus protecting them from scaling. A Carbon cartridge is also included to remove chlorine. The power supply is single point and the skid comes with wheels for easy maneuvering on site.

The diagram to the left shows a typical plumbing layout involving a reverse osmosis system. The softened water is fed to a Carbon cartridge filter on the inlet to the B-series RO. Water is then forced at high pressure through the membranes and the resulting permeate can then be collected in the permeate storage tank. Level probes (which are included in the RO system) control the operation of the RO. A delivery pump (suitable for use with RO water) may be used to boost the treated water to service.

