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 andthe 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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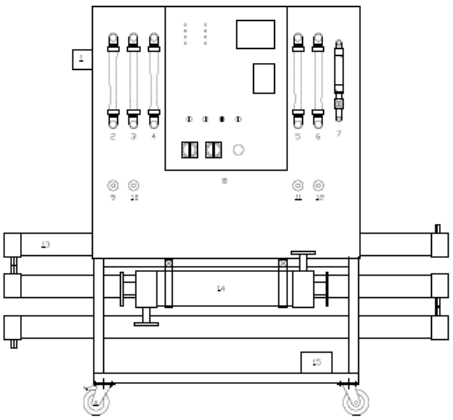
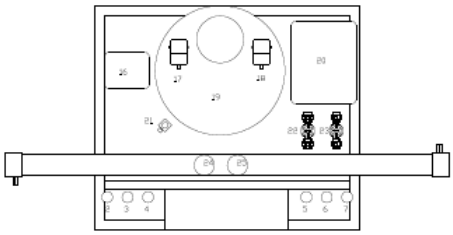
Technical Table

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
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	3 phase	3 phase	3 phase	3 phase
Inlet connection	1" solvent weld	1" solvent weld	1" solvent weld	1" solvent weld	1" solvent weld
Permeate connection	1/2"OD	1/2"OD	3/4"OD	3/4"OD	3/4"OD
Drain	1" solvent weld	1" solvent weld	1" solvent weld	1" solvent weld	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	20" Carbon	20" Carbon	20" Carbon	20" Carbon
Width x depth x height (mm)	2500 x 1100 x 2000	2500 x 1100 x 2000	2500 x 1100 x 2000	2500 x 1100 x 2000	2500 x 1100 x 2000

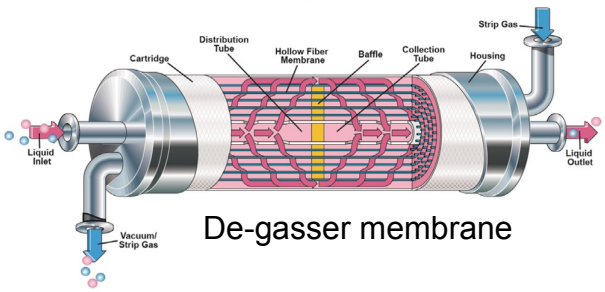




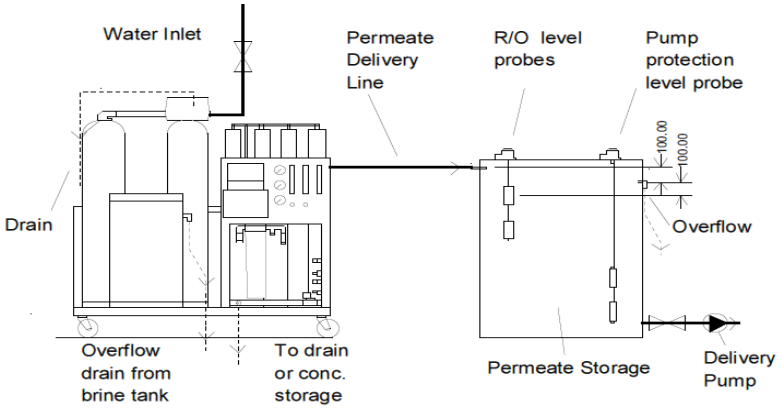
RO-EDI Drawing

1. RO divert valve
2. RO concentrate flowndicator
3. RO re-circulation flow indicator
4. RO permeate flow indicator
5. EDI dilute indicator
6. EDI concentrate indicator
7. De-gasser flow indicator
8. Control panel
9. RO concentrate needle valve
10. RO recirculation needle valve
11. EDI dilute needle valve
12. EDI concentrate needle valve
13. Membrane housing
14. De-gassing membrane
15. EDI divert valve
16. Pressure pump
17. High level float switch
18. Low level float switch
19. Raw water tank
20. EDI unit
21. Inlet solenoid
22. EDI concentrate back pressure valve
23. EDI dilute back pressure valve
24. Air filter
25. Air govener

EDI unit



De-gasser membrane



The diagram to the left shows a typical plumbing layout involving a reverse osmosis system. The softenened 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.