

# EUROWATER

A GROUP OF CO-OPERATING EUROPEAN WATER TREATMENT SPECIALISTS

REVERSE OSMOSIS

## EUROTEC SERIES 01, 02 & 03 REVERSE OSMOSIS PLANTS

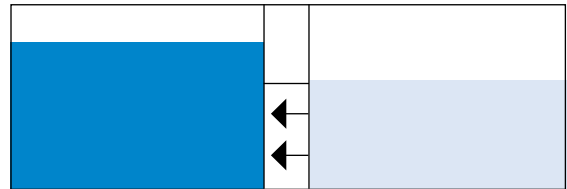
- DEMINERALIZED WATER WITHOUT ACID & CAUSTIC REGENERANTS
- REMOVES PYROGENS AND BACTERIA
- LOW OPERATING COSTS
- NO EFFLUENT NEUTRALIZATION REQUIRED
- NO HANDLING WITH HAZARDOUS REGENERANTS
- NO REGENERATION DOWN TIME
- ELECTRONIC QUALITY CONTROL
- CORROSION RESISTANT MATERIALS OF CONSTRUCTION
- COMPACT DESIGN



Type 01-3

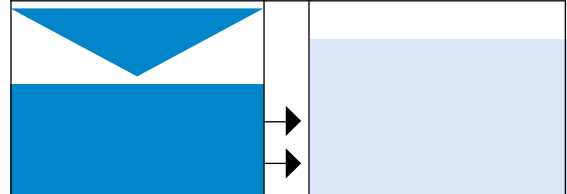
## APPLICATION FIELDS

- HOSPITALS AND DIALYSIS CENTRES
- PUBLIC AND PRIVATE LABORATORIES
- PROCESS WATER FOR FOOD AND DRINK INDUSTRIES
- PROCESS WATER FOR PHARMACEUTICAL AND CHEMICAL INDUSTRIES
- PROCESS WATER FOR METAL FINISHING AND PAINT INDUSTRIES
- RINSE WATER FOR THE PRODUCTION OF ELECTRONICS, GLASS AND MIRRORS
- COOLING AND BOILER FEEDWATER
- FEEDWATER FOR HUMIDIFICATION



### OSMOSIS

When a semi-permeable membrane separates two solutions with different salt concentrations, pure water from the low concentrated side will pass through the membrane to reach equilibrium in salt concentration on both sides.



### REVERSE OSMOSIS

By applying pressure on the more concentrated solution, the water flow is reversed and pure water is forced through the membrane into the less concentrated solution.



Type 02-12



Type 03-21

## REVERSE OSMOSIS PLANT

### PRINCIPLE OF OPERATION

Pretreated water is pumped into the membrane housings along the membrane surface. Pure water is permitted to pass through the membrane while ionic, organic, colloidal and bacterial contaminants are swept away in concentrated solution. Consequently, a reverse osmosis system always creates two continuous exit streams: pure water (permeate) and brine (concentrate). Normally up to 80 per cent of the feedwater can be recovered as permeate.

### DEMINERALIZATION

Salts are repelled from the surface of the membrane while water molecules are allowed to diffuse freely through the membrane creating a purified product stream. Higher valence ions (salts) are rejected to a greater degree. Average rejection of dissolved salts ranges between 98 and 99 per cent.

### ULTRAFILTRATION

The mechanism for organic retention is different from the mechanism for salt rejection. Dissolved organic materials with a molecular weight over 200 daltons but also colloidal matter, bacteria, pyrogens and viruses are widely removed because of their size and geometry, i.e. they are physically too large to pass through the pores of the membrane.

### PRETREATMENT

Proper pretreatment of the feedwater to a RO system is an essential factor for smooth long-term operation. Clogging of the membranes by suspended solids, scale-forming minerals and other impurities has to be prevented by appropriate measures. Hardness minerals can be removed in a softener, suspended solids in a mechanical filter while free chlorine can be removed in an activated carbon filter.

### SYSTEM DESIGN

In order to protect the RO membranes against foulants a complete system usually consists of a softening plant and a re-

verse osmosis unit equipped with a pre-filter. An activated carbon filter has to be added if free chlorine is present in the feedwater. To further improve the water quality in terms of conductivity permeate can be polished downstream.

### DOSING SOLUTION

Dosing of antiscaling agents is an alternative to softening. Antiscaling agents prevent salt precipitations on the membranes. The dosing solution can effect major economies with large plants. Local regulations and recipient conditions determine and limit the dosing solution.

### POLISHING

Polishing of permeate in a mixed-bed unit (cf. special brochure) is normally required when high purity water is needed.

### PROJECTING

Besides the reverse osmosis unit, EURO-WATER has a complete programme for pretreatment of RO feedwater and post-treatment of permeate. Based on a water analysis or on measurements on the spot, a complete system can be designed.

### EUROTEC UNIT

Softened water is pre-filtered (1-5 µm) in a cartridge type filter or in a filter with filter bag and flows through an inlet solenoid valve to the pump. A high-pressure pump made of stainless steel drives the water through the membranes. The membranes of series 01 and 02 are mounted in stainless steel pipes whereas series 03 has pressure pipes of metal finished steel. Permeate and concentrate streams are led through flow meters to outlet and drain connections, respectively. All connections are made of pressure hoses or PVC pipes. A comprehensive set of interlocks is provided to control and protect the equipment, e.g. pre-rinse, quality rinse, post-rinse, quality monitoring, low pressure cut-off. The EUROTEC unit is skid-mounted and ready for installation.

### CONTROL PANEL

The electronic control panel can be programmed according to actual demand. The duration of pre-rinse, quality rinse, and post-rinse can be set individually. The conductivity meter continuously indicates the quality of the permeate measured in µS/cm. Special features include various control and alarm lamps as well as potential-free contacts for external signals and for remote alarm. The control panel operates on low voltage (12 V).

### QUALITY RINSE

After a period of standstill, the conductivity of the water in the membranes increases, i.e. the quality decreases. A restart of the unit triggers a quality rinse to drain until the permeate has reached the present quality limit. When the desired conductivity is reached the unit automatically switches to service.

### POST-RINSE

When water consumption is interrupted the high-pressure pump stops working and the membranes are rinsed with pretreated water at normal waterworks pressure for a preset number of minutes. This post-rinse reduces the risk of insoluble salt precipitations and minimizes algae and bacteria growth during standstill.

### CLEANING

EUROTEC reverse osmosis units are equipped with connections for a cleaning and sterilization device. Membranes are cleaned and disinfected periodically in order to avoid malfunctions of the plants due to high bacterial count and/or precipitations on the membrane surface. The frequency of cleaning depends on the composition of the raw water and on the type of pretreatment applied to the feedwater. Cleaning and sterilization agents are effected by circulating cleaning or sterilization agents through the membranes. A cleaning and sterilization unit can be offered as optional extra.

### CAPACITY

The unit capacity depends upon pressure, salt content and temperature of the feed-water. The capacity increases with increasing pressure and temperature and decreasing salt content. Capacities for individual membrane elements may vary by +/- 15 per cent.

### QUALITY

An EuRotec reverse osmosis unit will usually retain 95 to 99 per cent of all inorganic dissolved solids and more than 90 per cent of all organic contaminants. Carbonic acid, however, will penetrate through the membrane into the permeate.

### MEMBRANES

The membranes are of Thin Film Composite (TFC) type and packed in a spiral wound module configuration. TFC membranes have high salt rejections and good performances under wide-ranging pH and temperature conditions. They are not degradable by microorganism and hold their productivities over long periods of time.

New membrane types are developed all the time. EUROWATER continuously optimizes the plant range in accordance with the requirement of the individual customers. Usually, low-energy membranes are the best solution when both operating costs and water quality are considered. Several membrane types of various makes can be employed in our flexible plants without more ado.

### PLANTS CONNECTED IN SERIES

To further improve water quality two plants can be connected in series so that the second plant further treats the water from the first plant. Plants connected in series will be built together to a so-called double-pass plant.

### SERIES 01. 1-5 MEMBRANES

The membranes are mounted in vertical pressure vessels made of stainless steel (AISI 304). Each membrane is housed in one vessel giving a compact, spacesaving design. To reduce the risk of fouling the membranes, the unit is equipped with an adjustable recirculation facility.

### SERIES 02. 6-24 MEMBRANES

The horizontally mounted pressure vessels contain two membranes each. Placing two membranes in one pressure vessel means reduced pressure loss and consequently increased capacity.

### SERIES 03. 6-24 MEMBRANES

This series is designed for flow rates from 5 to 30 m<sup>3</sup>/hour. The plants are equipped with membranes of eight inches unlike series 01 and 02 that contain membranes of four inches. Each pressure pipe has three membranes of eight inches.

### SPECIAL PLANTS

Plants with other capacities and choice of material are designed according to demand.

## SPECIFICATIONS

TYPE	STANDARD CAPACITY <sup>1)</sup> m <sup>3</sup> /hour	PUMP-MOTOR <sup>2)</sup> kW	CONNECTIONS				FRAME MEASURES <sup>3)</sup>		
			Inlet PVC	Outlet DN/mm PVC	Drain DN/mm PVC	Rinse DN/mm PVC	Height mm	Width mm	Depth mm
01-1	0,35	2,2	Rp 3/4	20/25	20/25	25/32	1620	800	400
01-2	0,70	2,2	Rp 3/4	20/25	20/25	25/32	1620	800	400
01-3	1,05	2,2	Rp 3/4	20/25	20/25	25/32	1620	800	400
01-4	1,40	2,2	Rp 3/4	20/25	20/25	25/32	1620	1140	400
01-5	1,75	2,2	Rp 3/4	20/25	20/25	25/32	1620	1140	400
02-6	2,1	4,0	DN 32/40 mm	25/32	25/32	40/50	1560	2500	550
02-8	2,8	4,0	DN 32/40 mm	25/32	25/32	40/50	1560	2500	550
02-10	3,5	4,0	DN 32/40 mm	25/32	25/32	40/50	1950	2500	550
02-12	4,2	4,0	DN 40/50 mm	25/32	25/32	40/50	1950	2500	550
02-16	5,6	5,5	DN 40/50 mm	40/50	25/32	40/50	1560	2650	700
02-20	7,0	5,5	DN 40/50 mm	40/50	25/32	40/50	1950	2650	700
02-24	8,4	7,5	DN 40/50 mm	40/50	25/32	40/50	1950	2650	700
03-6	8,4	11,0	DN 40/50 mm	40/50	25/32	40/50	1700	4000	1100
03-9	12,6	11,0	DN 40/50 mm	40/50	25/32	40/50	1700	4000	1100
03-12	16,8	15,0	DN 50/63 mm	50/63	25/32	50/63	1700	4000	1100
03-15	21,0	15,0	DN 50/63 mm	50/63	25/32	50/63	1700	4000	1100
03-18	25,2	18,5	DN 50/63 mm	50/63	40/50	50/63	2050	4000	1100
03-21	29,4	22,0	DN 50/63 mm	50/63	40/50	50/63	2050	4000	1100
03-24	33,6	22,0	DN 50/63 mm	50/63	40/50	50/63	2050	4000	1100

1) The standard capacities apply to low energy membranes at a temperature of 10°C and a salt content in the inlet water of 500 mg/l. Also see the section CAPACITY.

2) Wiring: 3x400 V, 50 Hz. The stated pump power is for your guidance. The actual power will often be less.

3) Dimensioned sketch with exact installation dimensions is available.