SHUTTING DOWN REVERSE OSMOSIS UNITS fitted with composite membranes Protection against freezing	EXP 49

When a reverse osmosis installation is exposed to freezing conditions for prolonged periods of non-use, steps must be taken to protect membranes and pressure elements from irreversible destruction.

This can be done by using cobalt-free antifreeze of the propylene glycol type (Codex standard), at a maximum concentration of 20 %. The minimum allowable temperature is - 4°C at this degree of concentration.

This antifreeze can be supplemented with a bacteriostatic product (sodium bisulphite at 1 %) in order to prevent bacterial proliferation.

N.B. : Before injecting the preservative solution, clean the membranes chemically (see EXP47) and disinfect (see EXP46) in order to clean the composite membranes as well as possible, thereby reducing risks of precipitation or bacterial growth during shut-down.

PROCEDURE

Prepare sufficient quantities of solution to fill the whole reverse osmosis unit :

	Minimum protective temperature	Volume of propylene glycol (density 1) to be used for a concentration of 20 % in weight	Volume of sodium bisulphite at 37.5 % to be used for a concentration of 1 % in weight.
Volume of the product in litres to be used for 100 l of diluting water	- 4°C	20	1.7

Diluting water should preferably be osmosed or else pre-treated (softened, microfiltered). **On no account must raw water be used**.

INJECTION

Once the solution has been prepared in sufficient quantities, turn off the reverse osmosis unit. Disconnect or isolate the production outlet and direct it towards the drain in order to prevent the preservative solution from penetrating the osmosed water system.

Inject the preservative solution by means of a pump or the release pan situated upstream (see diagrams below).

Once the solution has been injected, turn off the reverse osmosis unit and isolate it by closing all valves.

Note : in the event of a shut-down exceeding 2 months, renew the preservative solution.

RESTARTING THE INSTALLATION

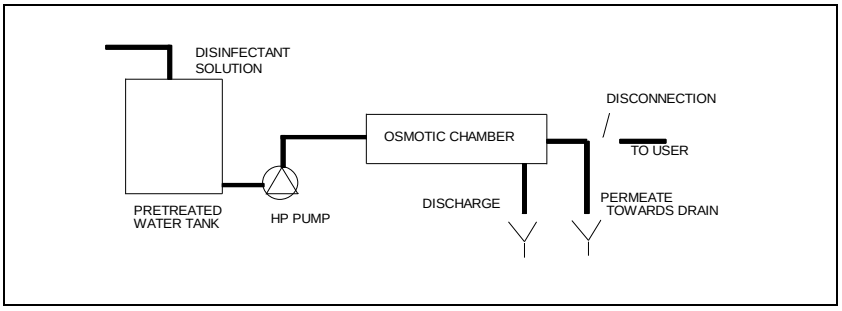
Once pre-treatment has been resumed, the pipes upstream from the reverse osmosis unit bled, and the microfiltration cartridges replaced and the various tests completed, open the reverse osmosis unit valves.

N.B. Make sure that all valves of the osmotic system have been opened in order to prevent a sudden rise in pressure which could damage the membranes and installation components.

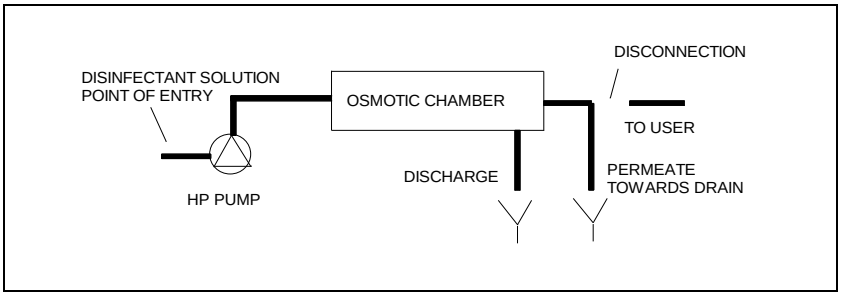
- Disconnect the permeate pipe.
- Open the discharge valve fully.
- Turn on the reverse osmosis unit and rinse it abundantly for about an hour in order to eliminate most of the solution.
- Adjust the discharge valve and the pressure settings in the reverse osmosis unit to their initial values. Continue to rinse the apparatus until the required resistivity/conductivity is obtained.
- Reconnect the production outlet.

The osmotic unit is ready to resume operation.

EXPLANATORY DIAGRAMS



- Diagram no. 1 -



- Diagram no. 2 -