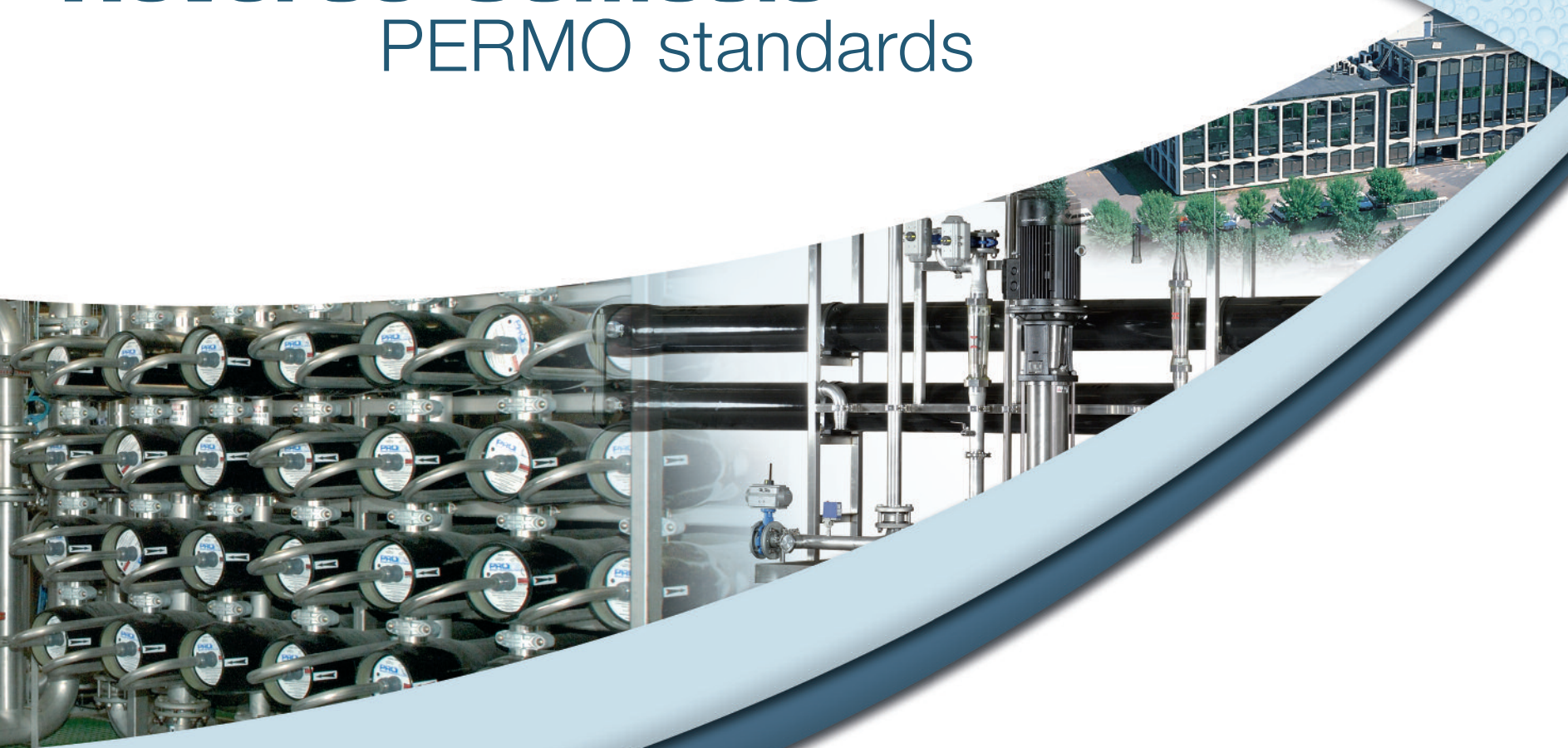
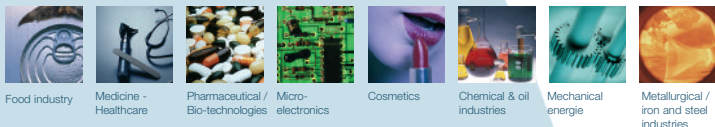


Reverse Osmosis

PERMO standards





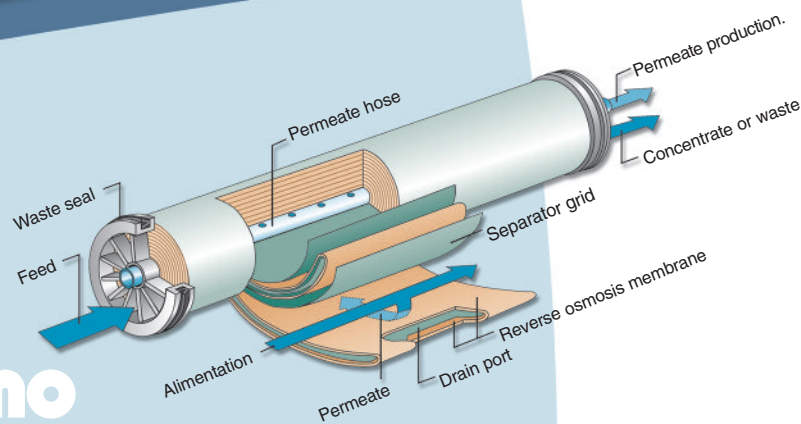
Reverse osmosis, units to meet all your requirements

For town water, brackish water, sea water, waste water or waste, reverse osmosis fully meets changes to legislation and standards relative to ultra-pure water, potabilisation and waste.

Equipment reliability, reduced use of chemical products and the absence of sub-products for process operations makes it a solution particularly appreciated by user industries.



SIGMA OSMOSIS MACHINE



Basic principle of reverse osmosis

Osmosis is a natural phenomenon. If two liquids of different concentrations are separated by a semi-permeable membrane, the pure water flows through the membrane, from the less concentrated liquid towards the more concentrated in such a way as to balance the « osmotic » pressures of the two solutions.

Pure water is then produced.

That is known as reverse osmosis.



DELTA OSMOSIS MACHINES

DELTA 0.2 TO 3.4 M3/HR

Reverse osmosis physically reduces the content of salt, organic impurities, heavy metals and waterborne germs to be treated but without the aid of chemicals.

The osmosis membrane holds back the salts contained in supply water. The latter are concentrated and discharged with the waste while the demineralized water is collected in the permeate.

The water produced in that way can supply installations for the production of sterile steam or humidification, for medical requirement devices (dialysis), pharmaceutical production systems, air-conditioning, washing-up or glass washing machines, laboratory water systems, ...

The new range of PERMO DELTA osmosis machines includes 10 models assembled on a brushed, polished stainless steel frame. The units provide water production to the quality of roughly 0.1 M.cm (10 μ S/cm) with flow rates of from 200 to 3400 litres/hour. They can be adapted for double osmosis operations (two stages).

CHARACTERISTICS: REFERENCE TEMPERATURE 15 °C

	Flow rate m3/hr.	Power (Watts)	Dimensions mm
Delta 10	0,25	1,5	750 x 750 x 1600
Delta 20	0,50	1,5	750 x 750 x 1600
Delta 30	0,75	2,2	750 x 750 x 1600
Delta 40	1,00	2,2	750 x 750 x 1600
Delta 50	1,25	2,2	750 x 750 x 1600
Delta 60	1,50	2,2	2500 x 550 x 1500
Delta 80	2,00	4	2500 x 550 x 1500
Delta 100	2,50	4	2500 x 550 x 1500
Delta 120	3,00	4	2500 x 550 x 1500
Delta 140	3,40	4	2500 x 550 x 1500

CHARACTERISTICS: REFERENCE TEMPERATURE 15 °C

	Flow rate m3/d	Energy consumption kW/m3	Container dimensions (ft)
Sea RO 84 - ERS 1000	1000	3-4	40
Sea RO 42 - ERS 500	500	3-4	40
Sea RO 30 - ERS 400	400	3-4	40
Sea RO 20 - ERS 250	250	3-4	20
Sea RO 10 - ERS 150	150	3-4	20
Sea RO 100	100	5-8	20
Sea RO 50	50	5-8	20
Sea RO 25	25	5-8	20
Sea RO 10	10	5-8	20



SEA WATER OSMOSIS MACHINES

FROM 10 TO 1000 M3/D

Sea water osmosis machines are used for potabilisation by the desalinization of sea water with a high concentration of mineral salts (30 - 45 g/l). In order to reduce space requirements and facilitate installation, they are mounted on frames (10 m3/d) or in 20' or 40 containers (> 10 m3/d). Fitted with an energy recovery system (ERS) they provide water production with low energy requirements (3 to 4 kWh/m3). The units provide drinking water production of from 10 to 1000 m3/day.



MODULO SK OSMOSIS MACHINES

FROM 0.5 TO 1.2 M3/HR

MODULO SK units are complete water treatment installations by reverse osmosis incorporating all pre-treatment phases: filtration, softening, dechlorination together with osmosis itself. The unit is mounted on a very compact stainless steel frame, it is pre-assembled and prewired. On-site intervention therefore becomes largely superfluous. It enables the continuous production of from 500 to 1200 l/hr of osmosis-purified water.

CHARACTERISTICS: REFERENCE TEMPERATURE 15 °C

	Flow rate m3/hr	Power (Watts)
Modulo SK 500	0,5	1,5
Modulo SK 800	0,8	1,5
Modulo SK 1000	1,0	2,2
Modulo SK 1200	1,2	2,2

MODULO SK: complete pre-assembled units

MODULO OSMOSIS MACHINES

PERMO MODULO makes up a very compact, enclosed unit incorporating:

- pre-treatment
- membrane softening, and purification (reverse osmosis).
- storage (120 litres)
- la distribution (centrifugal pump)
- control operations (control box)

PERMO MODULO's noise level, along with its relatively small size, enables it to be installed in locations such as laboratories, hospitals and any environment requiring compactness, cleanliness and silence.

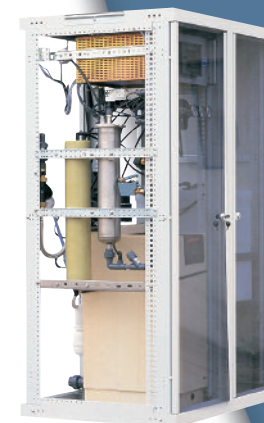
The following items are optional:

- mixed bed final stage to reduce conductivity
- disinfection by U.V. generator
- sterilization by filtration (0.2 µm)

The compact 1 or 2 door MODULO unit is ready to be hydraulically and electrically connected.

CHARACTERISTICS: REFERENCE TEMPERATURE 15 °C

	Flow rate m3/hr	Power (Watts)	Dimensions mm
Modulo 125	0,125	1,5	1200 x 800 x 1840
Modulo 250	0,250	2,2	1200 x 800 x 1840



PERMO +

Backed by 80 years experience in water processing, PERMO was a pioneer in the development and use of membrane separating techniques. PERMO offers a range of standard and customized osmosis machines with the capacity of meeting all user needs in any field of activity.

C.I.P

Reverse osmosis membrane cleaning is an indispensable operation both for the quality of the water produced and the durability of equipment.

PERMO's clean-in-place system (CIP) is automatic for frequent routine maintenance and requiring only limited intervention.

OSMOSIS WASTE RECYCLING

For reverse osmosis units, PERMO proposes fitting the installations with a system of secondary treatment of concentrates.

Capable of recovering up to 50% of waste and of considerably enhancing the operating performance of installations while reducing the environmental impact..

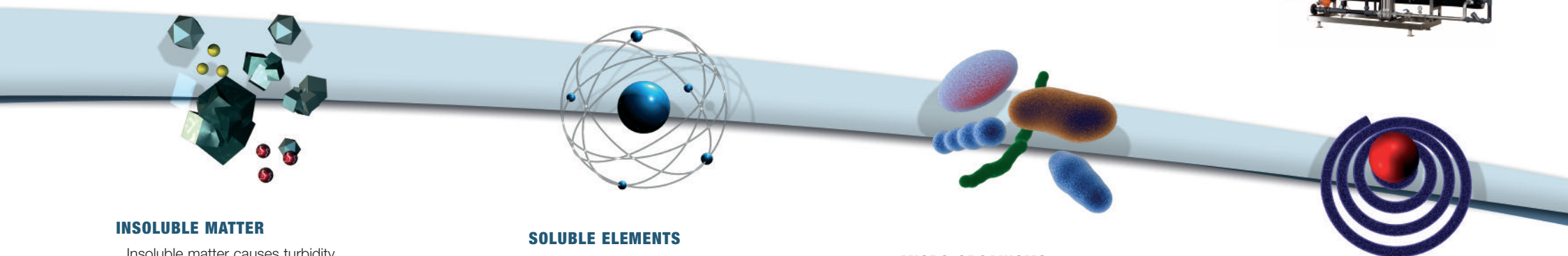
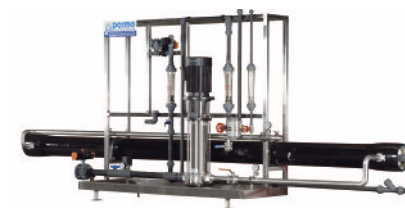
SIGMA OSMOSIS

SIGMA 3 TO 42 M3/H OSMOSIS MACHINES

SIGMA osmosis machines are mounted with their main components on stainless steel frames. Membranes used are of 8" diameter and can treat both fresh water (salinity < 800 mg/l) to produce demineralized water (for instance, boiler feed water) and brackish water (salinity < 2 500 mg/l) to produce drinking water. Operations are entirely automatic, as a rule controlled by the levels in a osmosis-purified water tank upstream of the machine. The units can also be assembled in double osmosis configuration to produce low conductivity water (for instance, pharmaceutical purified water). Several units can be set up in parallel to obtain large flow rates.

CHARACTERISTICS: REFERENCE TEMPERATURE 15 °C

	Flow rate m3/hr.	Power (Watts)	Dimensions mm
Sigma 3	3	5,5	3500 x 600 x 1500
Sigma 4	4	5,5	4500 x 700 x 1500
Sigma 5	5	5,5	5500 x 700 x 1500
Sigma 6	6	5,5	3500 x 700 x 1500
Sigma 8	8	11	4500 x 700 x 1500
Sigma 10	10	15	5500 x 700 x 1500
Sigma 12	12	15	6500 x 700 x 1500
Sigma 15	15	15	5500 x 750 x 1800
Sigma 20	20	18,5	5500 x 750 x 2000
Sigma 25	25	30	5500 x 750 x 2000
Sigma 30	30	30	6500 x 750 x 2000
Sigma 36	36	30	6500 x 750 x 2000
Sigma 42	42	37	6500 x 850 x 2000



INSOLUBLE MATTER

Insoluble matter causes turbidity, colouring and conditions the water's fouling index. It can be of suspended matter such as sand, mud, clay, metallic hydroxides or plant debris.

Treatment by reverse osmosis: yes, indirectly after microfiltration.

SOLUBLE ELEMENTS

Elements that are dissolved in the water and invisible to the naked eye. They are the cause of many phenomena including corrosion, scaling and condition the water's potability. The matter can be mineral salts or ions contained in the water.

Treatment by reverse osmosis: yes.

MICRO-ORGANISMS

Living organisms invisible to the naked eye. They can also be bacteria, thrus fungus, moulds, viruses, algae or protozoa.

Treatment by reverse osmosis: yes.

INDUCED IMBALANCES

The presence of certain soluble elements or micro-organisms in water leads to significant and costly disorders: scaling, corrosion or biofouling (fouling by biocontamination).

Treatment by reverse osmosis: yes, partly.



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