

HYDRO MOS®
Reverse Osmosis Unit
Type: 2500 – 3500-4-S

Application

HYDRO MOS® reverse osmosis unit used for environmental friendly desalination of cold drinking and industrial water, well water, boiler water, process water, cooling water and climatic water.

Process

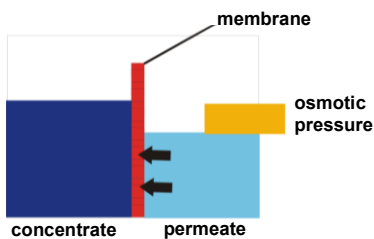
HYDRO MOS® reverse osmosis units equipped and working with semi-permeable membranes allowing the water (H₂O) to penetrate the pores but not allowing dissolved materials (ions) to penetrate.

If a salt solution and clear water are separated by a membrane (semi-permeable), clear water penetrates the membrane without any influence of exterior forces and gets to the salt solution, whereby it is diluted.

Such process known from nature is called osmosis (metabolism of cells). The process is stopped once the osmotic pressure of the corresponding solution is reached – an osmotic balance is given.

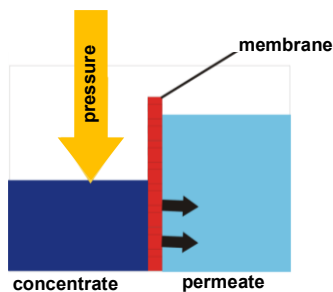


Osmosis



If the sequence is reversed by applying pressure on the higher concentrated solution, clear water penetrates the membrane in reverse direction after the osmotic pressure has been overcome. Dissolved salt is retained. Such process is called reverse osmosis.

Reverse osmosis



Advantage of reverse osmosis technology compared with other water treatment systems

- Removal of dissolved salts
- Removal of bacteria and germs
- Retention of particles
- Reduction of dissolved organic substances

Pre-treatment

Pre-treatment of water is dependent on the raw water quality that has to be determined by a water analysis. Normally, such pre-treatment is limited to water softening or scale dosing, whereby the membrane life is substantially extended and a significant save of water achieved. An additional treatment is necessary in case of increased content of iron, manganese and free chlorine.

Operation

The feed water is passing the inlet safety filter (5µm), solenoid valve with pressure switch (recognition of lack of water pressure) to the pressure increase pump.

The produced pump pressure is reduced to the necessary operating pressure by means of a regulating valve. The water is subsequently guided through the membrane installed in pressure pipes. Clear water (permeate) penetrates the membrane that can be continuously removed. Retained salt is direct fed into drain as concentrated solution (concentrate). Part of the concentrate is fed to the raw water (setting of volume by the regulating valve). Such concentrate return guarantees a good overflow of the membrane surface and reduces the waste water volume (operational cost saving).

An automatic concentrate rinse is performed after each production cycle. The system is equipped with a respective solenoid valve.

System designed as compact unit. All important operating parameters such as concentrate and permeate volume, operating pressure and permeate quality are shown on the corresponding sensors or in the control.

Note / Installation conditions

- Required water quality to be fed to the reverse osmosis unit
 - Total (permanent) hardness < 0,1 °dH
 - Salt volume max. 1.000 mg/l
 - Oxidant (chlorine, chlorine dioxide etc.) not detectable
 - Iron: < 0,1 mg/l
 - Manganese: < 0,05 mg/l
 - Silicate (SiO₂): < 15 mg/l
 - Colloidal index < 3
 - Turbidity < 1 NTU
 - pH-range: 3 – 9
- Technical data and general technical regulations as well as local installation rules shall be considered.
- A system separation to prevent return flow shall be guaranteed according to DIN 1988 part 4.
- A fine filter shall be installed before the RO unit to protect the system against particle contamination from the pipework.
- The ambient temperature shall not exceed 40 °C. Possible radiation heat shall not exceed a temperature of 40°C.
- The installation site must be frost free.
- The installation site shall be free from solvent, colour, lacquer and chemical vapor.
- The electric installation shall be in accordance with the actual regulations and the electric switching diagram. Local connections shall be dimensioned dependent on and according to the plant efficiency.
- A drain connection of min. DN70 shall be provided for the discharge of wash water.
- The RO unit shall be installed on even floor with sufficient bearing capacity.
- Any lifting appliance shall be resistant to salt water.
- Permeate from an RO unit is no drinking water. Any use as drinking water necessitates a treatment such as blending or hardening.

Design:

HYDRO **MOS**[®] reverse osmosis unit consisting of:

Aluminum base frame with plastic front panel

Special inlet filter with 5µm filter cartridge and 2 pressure gauges,

High pressure centrifugal pump with motor in energy efficiency category IE3,

high-efficient wound module(s) with PA/PS-composite membranes in GRP pressure vessels with inliner

Fittings such as feedwater sampling valve, solenoid inlet valve, pressure switches to control feedwater pressure, flow volume meter for permeate and concentrate, vibration-resistant pressure gauges for pump and concentrate pressure, stainless steel valves for adjustment of permeate and concentrate flow rate as well as concentrate return. Solenoid valve for concentrate rinse

Micro process controller

completely wired and pre-assembled with pipe work ready for installation

Micro processor controller for fully automated monitoring and control of our HYDRO **MOS**[®] Reverse Osmosis System. Multi-colour display (grey - standby / green - operation / orange - warning / red - error) for process visualisation and to monitor

Operating data: permeate conductivity (temperature compensation),

permeate temperature, operating hours.

Malfunction display: low pressure, hard water stop, motor overload, high conductivity pre-alarm, limit conductivity exceeded

Status signals: permeate reject, permeate return/recycling, concentrate displacement, concentrate rinse, discontinuous rinse at standstill of system, shut-down by external signal (forced stop error hard water, regeneration)

LEDs: for operation, error

Data logger on SD card

Inputs (low voltage) for level control/float switch for RO-OFF and RO-ON, shut-down by external signal (hardness control unit, forced stop, regeneration), external release, insufficient pressure.

Outputs (230 V / 50 Hz), input solenoid valve High-pressure pump, solenoid valves for concentrate rinse, permeate reject or return/recycling, analogue output for permeate conductivity (4-20 mA) and VFC changeover contact for error and operation or warning

HYDRO **MOS**[®] reverse osmosis unit delivered including detailed operation manual.

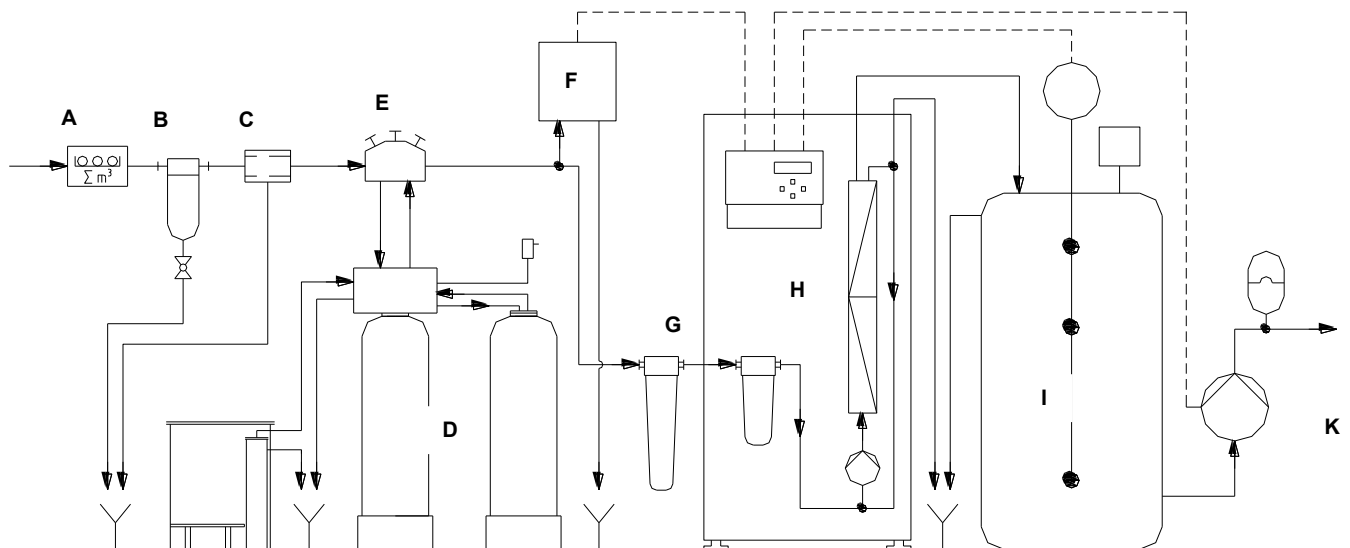
Accessories

- HYDRO **FIL**[®] fine filter for pre-filtration
- System separator to protect drinking water systems
- HYDRO **ION**[®] water softener for pre-treatment or HYDRO **DOS**[®] dosing units suited to dose hardness stabilizer
- Control of water quality by hardness monitoring unit
- HYDRO **FIL**[®] active carbon filter to reduce the chlorine content
- Permeate store for the permeate coming pressureless from the HYDRO **MOS**[®] reverse osmosis unit, different sizes incl. accessories (e.g. sterile fan).
- Pressure increase units of different sizes and used to convey permeate to the consumers. High-quality single or duplex pressure increase units on request with frequency converter for most efficient permeate conveyance

Technical Data:

HYDRO MOS®	Typ	2500-4-S	3000-4-S	3500-4-S
Daily permeate flow rate (24h)	m³/d	60	72	84
Permeate flow rate at 15 °C	m³/h	2,5	3,0	3,5
Min. salt rejection	%	97		
Recovery	%	75		
Operating pressure max	bar	14	14	14
Membrane elements / number		4040/8	4040/9	4040/12
Feed water volume flow (15 °C) at 75% recovery	m³/h	3,33	4,0	4,67
Concentrate volume flow (waste water) at 75% recovery	m³/h	0,83	1,0	1,17
Electrical connection	V/Hz	3 x 400 / 50		
Connected load	kW	4,0	4,0	4,0
Power Consumption Control Box	VA	max. 15		
Protection type		IP 55 / IP 65		
Max. total salt content feed water as NaCl	mg/l	1.000		
Blocking index / SDI		< 3		
pH-value		3 – 9		
Feed water connection	DN	32	32	32
Permeate connection	DN	25	25	25
Concentrate connection	DN	25	25	25
Min. required drain diameter	DN	70		
Conductivity measuring range	µS/cm	1 – 100		
Min./max. feed water pressure	bar	2,5 / 6		
Permeate discharge pressure	bar	ca. 0,5		
Min./max. feed water temperature	°C	5 / 35		
Max. ambient temperature	°C	40		
Height	mm	1650		
Width	mm	2600	3600	3600
Depth	mm	700	700	700
Weight	ca. kg	320	340	390
Article-Nr.:		511.274	511.286	511.287

Installation example HYDRO MOS®:



A Domestic water meter
 B Fine filter HYDRO FIL®
 C System separator
 D Softener HYDRO ION®
 E Assembly block / blending
 F Hardness monitoring unit (Option)

G Active carbon filtration (Option)
 H Reverse osmosis unit HYDRO MOS®
 I Permeate tank
 K Pressure increase unit