

HydroMOS®

Reverse Osmosis Unit

Type: 30D - 660D

Application

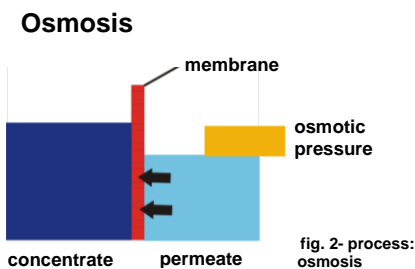
HydroMOS® reverse osmosis unit used for environmental friendly desalination of cold drinking and industrial water, well water, boiler water, process water, cooling water and climatic water.

Process

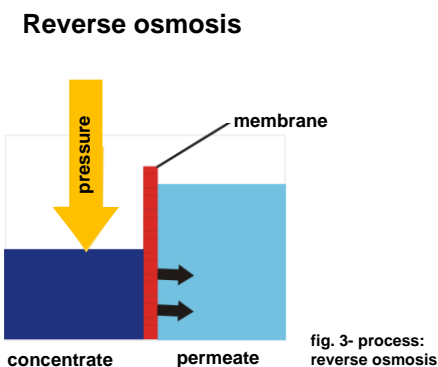
HydroMOS® reverse osmosis units equipped and working with semi-permeable membranes allowing the water (H_2O) to penetrate the pores but not allowing dissolved materials (ions) to penetrate.

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.



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.



Advantages

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
- of the vessel(s).

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).

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

Accessories

- HydroFIL® fine filter for pre-filtration
- System separator to protect drinking water systems
- HydroION® softener for pre-treatment or HydroDOS® dosing units suited to dose hardness stabilizer
- Control of water quality by hardness monitoring unit
- HydroFIL® active carbon filter to reduce the chlorine content

Notes / 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 EN 1717.
- 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 25 °C (e.g. humidifiers) respectively 40 °C (for technical applications). Possible radiation heat shall not exceed a temperature of 25 °C / 40°C.
- The installation site must be frost free.
- The installation site shall be free from solvent, colour, lacquer and chemical vapour.
- 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. DN50 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.

Installation example HydroMOS® D

A = Domestic water meter

B = Fine filter HydroFIL®

C = Backflow preventer

D = Softener HydroION®

E = Assembly block

F = Hardness monitor unit (Option)

G = System separator

H = Active carbon filtration (Option)

I = Reverse osmosis unit HydroMOS®

K = Concentrate (wastewater)

P = Permeate to consumer

T = Drinking water

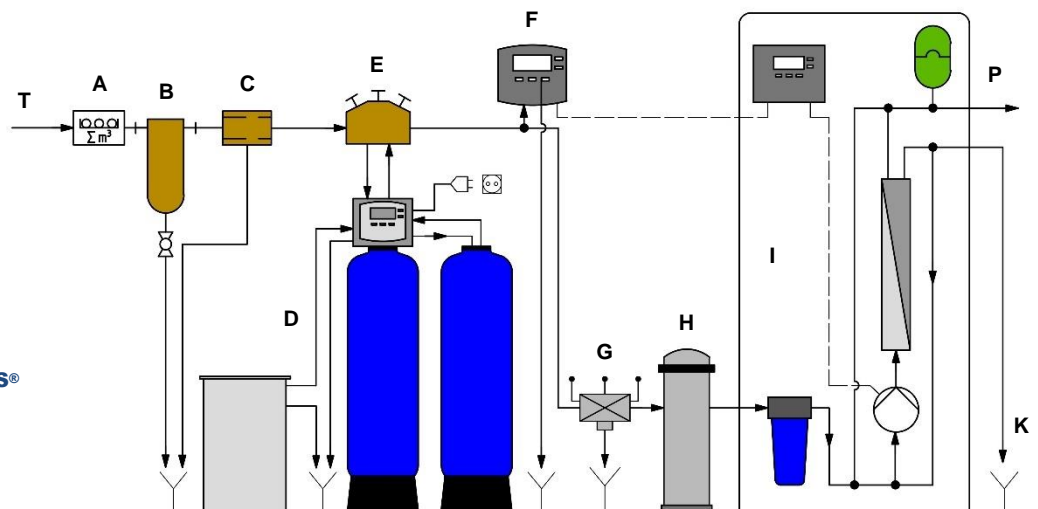


fig. 4- HydroMOS® installation example

Description

Hydro**MOS**® D reverse osmosis unit consisting of:

- **Base frame** of aluminium profiles with plastic front panel housing the control and monitoring elements
- **Special inlet filter** with 5µm filter cartridge and 2 pressure gauges
- **High pressure pump** designed as rotary or circulation pump (depend on type)
- **High-efficient wound module(s)** with PA/PS-composite membranes in GRP pressure vessels with inliner
- **Fittings** such as feedwater and permeate sampling valves, solenoid inlet valve, permeate reject and permeate displacement, stainless steel valves for adjustment of permeate and concentrate flow rate as well as concentrate return
- **Pressure switch** to control the feedwater pressure, permeate output pressure
- **Flow meter** for permeate concentrate
- **Vibration-damped pressure gauge** for pump, permeate and concentrate pressure
- **Hydro**MOS**® HC-control** with integrated **microprocessor control** as described below, plant ready wired.

HC-Control

Hydro**MOS**® HC-control for fully automated monitoring and control of Hydro**MOS**® reverse osmosis unit, including display, LED's and buttons for process visualisation.

Operating parameters: Permeate conductivity (temperature compensation), permeate temperature, operating hours.

Failure record: Low pressure, hard water, motor overload, conductivity pre-warning, limit value exceeded.

Operating states: Concentrate reject, permeate recirculation, discontinuous wash at standstill, switch-off by external signal (forced stop, regeneration).

LEDs for operation and failure.

Power Supply (230V) for HC-Control via power switch and additional power supply output (230V).

Inputs (pot.-free), external release, pressure switch dry-running protection, pressure switch pump/ external stop, RO-OFF, RO-ON.

Outputs (230V) high pressure pump, input valve, concentrate valve, permeate valve.

Outputs (pot.-free) operation/ warning, alert.

Hydro**MOS**® reverse osmosis unit delivered including detailed operation manual and wiring diagram.

Dimensional drawing

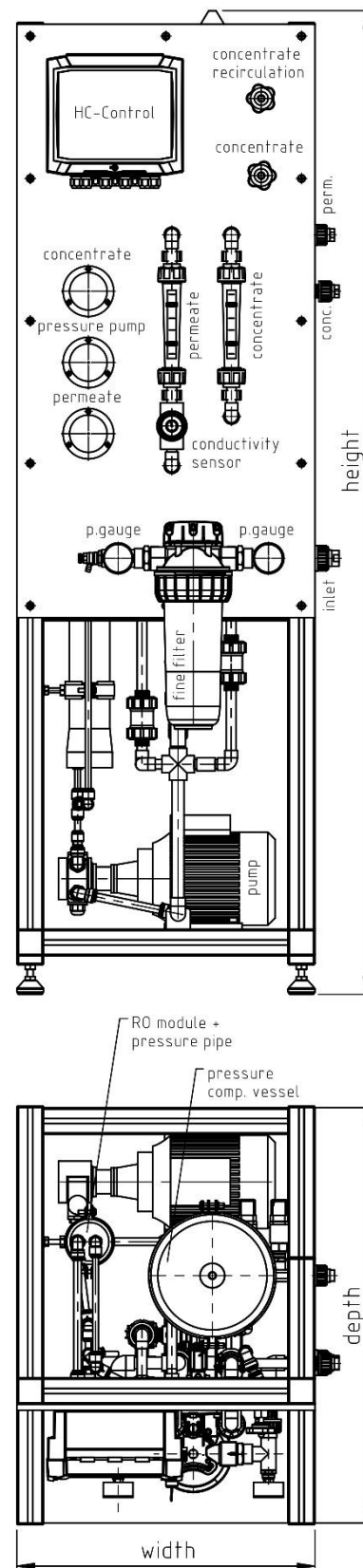


fig. 5- Hydro**MOS**® dimensional drawing

Technical Data

HydroMOS® D	Type	30D	90D	170D	340D	500D	660D
Daily permeate rate (24h)	m³/d	1.2	2.4	4.1	7.2	12	20.4
Permeate rate at 15°C (@4 bar counter pressure)	l/h	48	140	290	580	800	1000
Permeate rate at 15°C (@7 bar counter pressure)	l/h	30	90	170	340	500	660
Salt reject rate (min.)	%	97					
Recovery (max.)	%	75					
Operating pressure	bar	14					
Membrane element / number		2540/1	4040/1	4040/1	4040/2	4040/3	4040/4
Volume flow feed water (15 °C) at 75% recovery	l/h	65	200	400	800	1100	1330
Volume flow concentrate (wastewater) at 75% recovery	l/h	10-17	30-50	60-100	110-190	165-265	220-330
Electrical connection		230 V / 50 Hz		3x 400 V / 50 Hz			
Connected load	kW	0.55	0.55	1.5	2.2		
Nominal current	A	1.6	1.6	3.3	4.65		
Power Consumption Control Box	VA	max. 15					
Pre-fuse B16A (local)	A	16					
Protection type (controller)		IP 65					
Max. TDS feed water as NaCl	mg/l	1000					
Colloidal index / SDI		< 3					
pH value		3 - 11					
Feed water connection (female thread)	DN	15			20		
Permeate connection (female thread)	DN	10			15		
Concentrate connection (female thread)	DN	10			15		
Min. required drain connection	DN	50					
Conductivity measuring range	µS/cm	1 - 100					
Feed water pressure (min./max.)	bar	2 / 6					
Admissible pressure fluctuations	bar	± 0.5					
Permeate counter pres. (min./max.)	bar	4 / 7					
Feed water temperature (min./max.)	°C	5 / 35					
Ambient temperature (max.)	°C	25 (humidifier) / 40 (technical application)					
Height (ca.)	mm	1635				1665	
Width (ca.)	mm	500				745	895
Depth (ca.)	mm	700					
Weight (ca.)	kg	60	85	85	145	170	190

tab.- technical data