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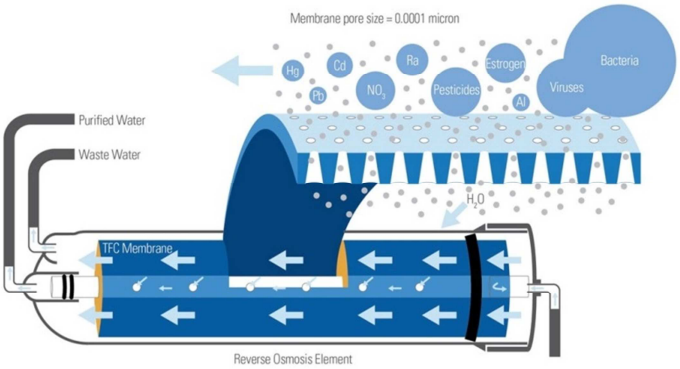
Mobile water treatment plant UMUV for sea water with salinity up to 45 000 ppm

Multi-purpose **mobile water treatment plant** which enables **treatment of contaminated and saline water** from the sea to produce drinking water quality.

It is based on the **reverse osmosis technology** combined with several stages of pre and post treatment which all together enable connection in different operation modes depending on water chemistry and type of input water in order to get the required quality of output water.



Technological components of the plant consist **of integrated system** installed on the fixed frame which are placed on the **lockable containers.** It enables its transport and quick fitting on the needed place. The plant is **fully automatic**. The source of **electric energy** can be **independent** on the public electricity network.

How it works

Raw water is pumped into the plant by two sets of pumps. The volume of **input water for pre treatment** must be higher to ensure the required output water production (1/3 of raw water in general leaves to waste as a result of treatment process). **Pre treatment of water** is performed before the filtration procedure starts by the proportional **automatic dosing of the standard set of chemicals**. Such pre-treated water passes through the **hydrocyclone,** which ensures a perfect mixing of the input water and **removing of rough dirt.** There is an ongoing **one to several-stage filtration for automatic stainless pressure filters** (number of stages for filtration depends on the capacity of the whole system), which is controlled by the control unit with microprocessor. Next to the three stage filtration, there is a **desinfection** of the water ensured by the **UV lamp**. The **backwashing of filters** is performed by the water accumulated in **the water storage tank**. The filling of the tank will be ensured by the branch behind the TVK filters with the separate backwashing pump.

Such pre treated water gets to the **reverse osmosis unit** (see picture). **Reverse osmosis** is an advanced level of filtration, where pressurized water passes through a semi-permeable membrane to separate dissolved substances from the water permeate. RO is the most effective barrier to salts, micro-contaminants and organic substances such as viruses and bacteria. At this stage, **all ions are removed** up to the level of 100-150 ppm.

The water treatment plant cleans up predominantly organic substances, iron, manganese, aluminum, water color, turbidity and hardness or nitrates, heavy metals and bacteriological contamination from the raw water. The water is **hygienically secured by chlorination** on its output from the plant and is bacteriologically safe after the treatment.

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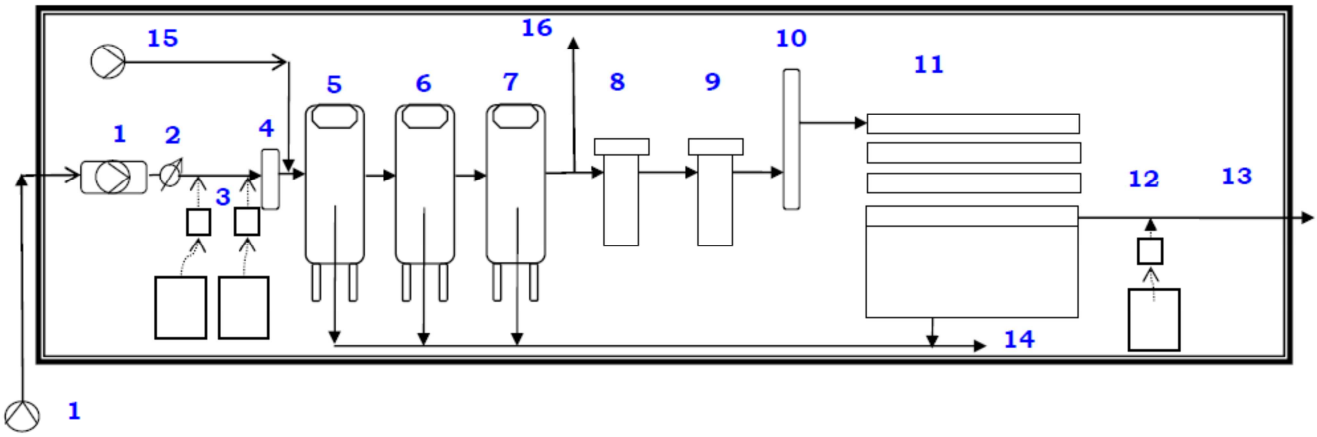
Example of process flow sheet of water treatment with reverse osmosis unit for treatment of sea water with an output of 10m3/hour



1. Raw water pumps (ATS station)
2. Induction flowmeter
3. Pre treatment dosing pump
4. Hydrocyclone
5. Stainless steel sand filter TVK
6. Stainless steelsand filter TVK S
7. Stainless steel carbon filter TVK U
8. Stainless steel sleeve filter RF
9. Stainless steel sleve filter SF
10. UV lamp
11. Reverse osmosis unit (RO)
12. Sodium hypochlorite dosing pump
13. Drain to treated water storage tank
14. Waste water from filters backwashing and RO
15. Backwashing pump
16. Backwashing water storage tank branch

Specification - examples

Capacity of plant is calculated for 6 hours daily production (night).

Type	Required raw water input per hour in m³	Amount of treated water (output capacity) per hour in m³	Size of plant (excl. drinking water storage tank)	Minimal size of drinking water storage tank in m³
UMUV 1	1	0,5	1 x 10“ container	1
UMUV 5	8	5	2 x 20“ container	10
UMUV 10	15	10	1 x 40“ container	20

All treatment is **certified by the ISO 9001:2001.** The quality of output water meets drinking water quality guidelines of WHO 2004 („Guidelines for Drinking Water Quality“). The entire technology is made from materials certified for drinking water. Piping and fitting materials are made of plastic type PVC-U. Spare parts and fillings of chemical substances can be delivered on request. Installation and maintenance can be provided on the place. The whole plant is designed and produced in order to **guarantee long service life, easy maintenance and low repair costs.**