

WATER FROM AIR--FLOW-MACHINE

1) General Description

This **Machine** is designed for areas where it is too expensive to make deep wells, to transport the water over far distances by truck or pipelines, for camps who often change their place.

The complete equipment is covered in a 20/30-foot standard Container for easy handling and transport.



The maximum rate to condense water out of air is a function of air flow and humidity.

This maximal Water rate you can get between ambient conditions from 32°C with 60% of humidity until 40°C and 60% of humidity. With an air flow of 40 000 Nm³/h you can get with these conditions 12 000 l/day that means average 500 l/h of condensate out of air.

If the temperature together with the ambient humidity goes down under 32°C and 60 % even the rate will go down. Under 20° C with low humidity it is not economic to run the machine, but you even can get water. The maximum Air-Flow through this **Water-Unit Machine** is 40 000 NM³/h with a cooling capacity of 500 kW and with a power consumption of approx.80 KW.

The **Water-Unit Machine** is working with two separate cooling circulation systems.



The first stage is working with cooled water (18°C) and decreases the incoming air down from Max. 40°C to 25 °C. The outgoing air is used cooling down this warmed up water, and therefore only less energy is necessary to keep the water at cooling temperature.

The second stage is directly a refrigerant system, which is able to cool the air down to +3°C.

It is not possible to go down with the air temperature, because there is the risk of ice formation.

Ambient air with temperature over 40°C is cooled down with spray system, which are located near by the ventilator system, to avoid problems with that equipment.



To increase the efficiency of the **Water-Unit Machine** the outgoing air of 40 000Nm³/h and 20-22 °C can be used for conditioning rooms or other equipment.

The outgoing condensed water will be conditioned with minerals and treated with an UV-Unit killing bacteria and to avoid rising up any new bacteria

2) Steel Structure

The container is design in solid steel structure profile (galvanized) and contains all the necessary Equipment to run the machine automatically.

The outside panel are covered with 50 mm insulation, which reduces the noise of blowers and the compressors.

An inspection door is provided as an access door and can only be closed from outside.

For transport reasons the container has at all ends lifting corners and shelters.

3) Mechanical Equipment

The hearts of the container are two pumps for the water service. One for the circulation of cooling Water system, the other pump is feeding the **drinking water** to the water reservoir.

The condensed water is feed through an active carbon filter, than through a mineralize system and after an automatic dosing system is injecting chlorine dioxide to avoid bacteria rising up for more than 4 weeks.

Four air blowers are feeding the air through both air cooler systems.

4) Cooling Equipment

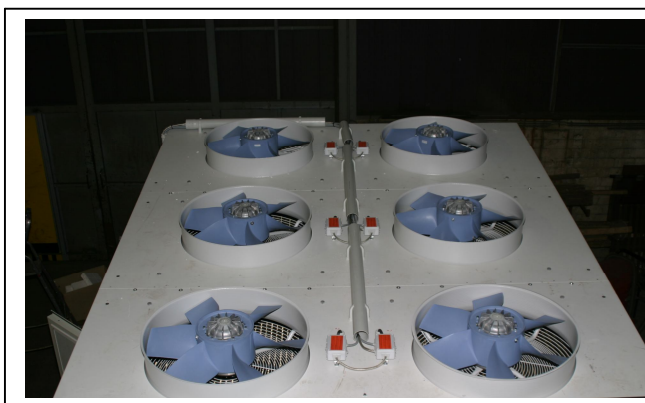


The system is working with refrigerant R134a and the two big compressors have each a cooling Capacity of 250 kW. Both systems are controlled separately.

The first stage contains two air coolers working circulation water, a circulation pump, a Plate Heat-exchanger and compressor for the refrigerant system.

The second stage is a complete cooling system. The incoming air is cooled down by vaporizing the R134a at $\pm 3^{\circ}\text{C}$. The

compressor feed the vaporized R134a to the condenser on top of the container. The ambient air is used to liquefy the refrigerant. All the air coolers are equipped with epoxy fins and copper tubes for high capacity.



5) Electrical & Instrumentation

Special the compressors needs for start up a high starting current, therefore soft Starter are installed, so that the start current never goes over 180 A.

All equipment runs with 400V-50 Hz as standard version, of course other versions are possible.(600V)

The switch cabinet contains all necessary

equipment to run the machine automatically.

The installed instrumentation asked for ambient temperature and humidity and runs the machine in according to this information by SPS automatically.

All the necessary information's are stored and can be asked by a mobile computer.



6) Power consumption

The design rate is 40°C and 60% of humidity and the power consumption will be approx. 110 kW/h. Of course with better ambient conditions it is possible to make more than 15000 l/d, But the power consumption will increase.

Nearly 80% of the used energy is necessary to condense the water out of air. If other Cooling systems are available the energy consumption can be reduced.

7) Additional System

The cool and dry air can be used for air conditioning, because this heated up air is about 20°C and less 40% of humidity. Therefore it can be interesting to use for climate-control. Even the waste energy after compressor (about 60°C) can be used making condensate with vacuum.



8) Maintenance

Of course even this machine needs some maintenance.

The mechanical equipment should be inspected every half a year. The oil of the compressors Should be changed every year. (Approx. 50 l) The dry-filter for refrigerant has an indicator and must be changed when it becomes red.

Beginning after the start up, than approx. after 4

weeks (incl. in delivery) than every 4-5 month.

The drinking water system contains:

- 1.) Filter cartridge for solids
- 2) Active carbon-filter for all aromatics
- 3) The mineralizing system
- 4) The chlorine dosing station

Part 1- 3 must be checked every 2 weeks and be change normally after 5 month.
Part 4 depends of resisting time of storage and the consumption is 1-2 l/per day.
The volume of the dosing box is 60l.

At least we can say, connect the machine with power; than press the start bottom and the **Water-Unit Machine** will run automatically.