

Martens

Member of GHM GROUP

Analysis technology for process water monitoring

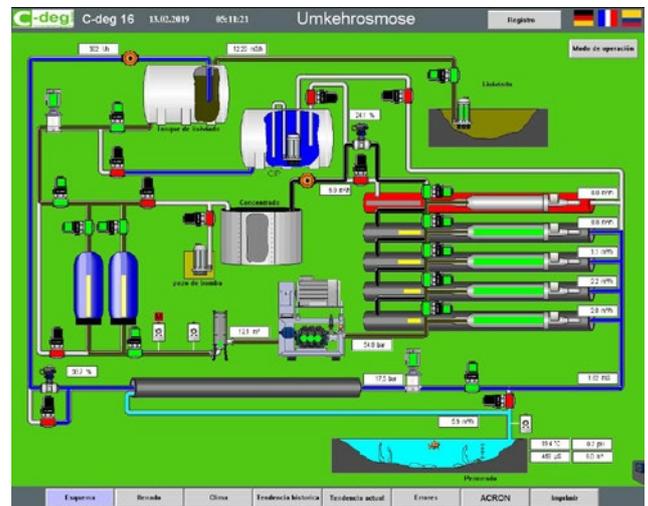
CONDIX meets GHM-ONE

Reverse osmosis process

Reverse osmosis is a process by which undesired substances that have dissolved in a liquid are reduced to a tolerable extent with the help of pressure and permeation.

In the case described here, landfill seepage water is treated with a reverse osmosis process so that it can be introduced directly to the environment in observance of the relevant limit value specifications.

For this purpose, the water is separated in two stages with reversal of the osmosis effect by means of semi-permeable membranes in order to retain undesired particles and substances from the clean water fraction (permeate). During the multi-stage separation process, the conductivity and pH value of the process water and the operating pressure and flow rate are monitored.



BENEFITS:

- o Optimal results achieved by combining devices
- o Simple connection by means of ProfiNet device description file
- o Plug and run – ready for operation immediately



CONDIX 4623



GHM-ONE

The requirements on us

The above mentioned process does not only produce the permeate, which is the filtered raw water. It also produces the retentate, the concentrate, which is not able to pass the membrane. It is an effect that reduces the efficiency of the system and can result in damage if the scaling effect with which the dissolved contents exceeds the solubility limit and deposits accumulate. An oversaturation of calcium carbonate must also be prevented. In order to counteract both of these effects, an antiscalant is added to reduce the precipitation level and the water to be treated is adjusted to an acidic level in order to prevent oversaturation with calcium carbonate.

The pH value at this point is the measured variable for the correct dosing. This objective is to minimise the use of additives with maximum filter effect. In addition, the development of ammonia, which is toxic for fish, must be avoided. Its concentration increases and decreases analogously to the prevailing pH value. Therefore, the pH value is monitored in the process input and upstream from the discharge and conditioned as necessary.

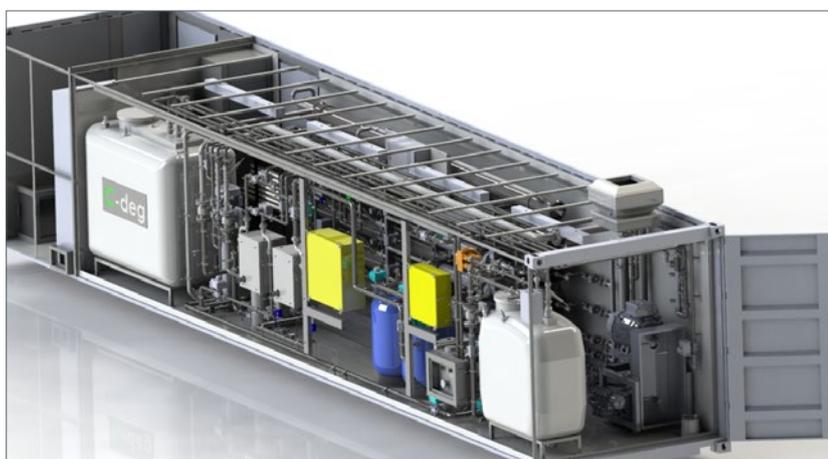
As described above, the concentrate causes clogging of the membrane over time, which has the effect of increasing the operating pressure and reducing the flow rate. The energy requirement increases as a result. Because the system is operated with an operating pressure of 60 bar, clogging can cause a rupture of the membrane.

During the process, the conductivity value is detected to determine the quality of the untreated water, for monitoring of the cleaning performance and for control of cleaning phases. If the conductivity in the untreated water is too high at the process input, the system can be damaged, which will result in a shut-down. Conductivity is the leading parameter of the reverse osmosis system with which the ion concentration and thus the contamination are determined. The conductivity of the untreated water is – depending on the contamination – in the mS/cm range. The permeate as an output product has a conductivity of approx. 100 µS/cm after the 2-stage purification.

In the analysis sensor system area, where process pressures of 2 - 6 bar / 2 - 232 PSI are prevalent, mounting takes place with stainless steel threaded fittings. The process signals are detected in the container and communicated to the PLC via ProfiNet field bus. The overall process data is visualised in the control room.



View into the container of the semi-permeable membranes of the RO system



3D representation of an RO system for landfill seepage water in container design

Our solution

The GHM Group's contribution to the described application is the CONDIX4623 digital 4-electrode conductivity converter and the GHM-ONE multi-function device. The conductivity probe detects whether the untreated water is unsuitable for operation of the system before the actual filtration process and whether it must be shut down and flushed as a result. Our Condix also provides the conductivity value of the process water continuously during the filtration process and uses this value to adapt the operating parameters as necessary.

This protects the material of the system from undesired deposits which necessitate cleaning work. It also has a positive effect on productivity, because downtimes are reduced. The precise, process-relevant, quality-relevant measuring results are visualised by our GHM-ONE, which is connected with the measuring probes via RS485 (MODBUS RTU) and the measured values can be read at any time on its display so that conclusions can be made about the status of the system throughout the entire process chain.

The multi-function device provides the measurements to the superordinate PLC via ProfiNet field bus, wherein it is easily integrated by means of a GSDML device description file.



Conductivity measuring point
with CONDIX4623



Semi-permeable membrane with
operating pressure of up to 60 bar

With the customer in focus

The unique process control of the C-deg company emphasises precision in order to be able to offer their customers results with the highest quality. With the exact monitoring at every stage of the filtration process using our CONDIX and the continuous availability of measurement results thanks to the GHM-ONE, C-deg ensures that the water produced via reverse osmosis is free from undesired substances.



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BENEFITS:

- o The system achieves optimal results thanks to operation with 4 conductivity measuring cells. The GHM-ONE and the CONDIX4623 display the conductivity values centrally. This device combination replaces individual conductivity transducers. This saves the customer time and money.
- o Simple connection of the GHM-ONE to the existing PLC by means of a ProfiNet device description file.
- o Plug and run – our CONDIX probes are supplied preconfigured. Our customer C-deg can commission our device immediately on delivery.
 - Configuration of the electrode types, the cell constant and scaling of the output signal for conventional conductivity converters are omitted.
 - The address assignment for the MODBUS participant (CONDIX) takes place in the application with fixed wiring in the switch cabinet. In doing so, the address can be assigned to each individual device via sensor cable and does not have to be configured.
- o High-precision and robust system that can withstand extreme operating conditions (C-deg 0 ... 500mS; 0 ... 16 bar).



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