

Quo Vadis Water Treatment – Where It Comes from, Where It Goes

An increased recycling rate, more flexibility and quality with regard to measurement parameters, and reduced costs – these are the tasks that process engineers, measurement technology providers, and plant engineers are currently faced with.

Anyone who visits trade fairs concerned with the topic of water, wastewater, and the environment can see that the industry is adjusting to some new requirements and challenges. Treating and providing clean drinking water or technically perfected wastewater purification no longer hold the sole focus. In reality the questions, "where does it come from" and "where does it go" are being asked:

- Where is water taken from so that it can be treated?
- Where is wastewater sent to and what state should it be in?

Plant manufacturers are increasingly pushing for water recycling. Through clever recirculation of the valuable resource, as little "wastewater" as possible should be created with integrated processing.

Interestingly both questions – with regard to the "source" and the "destination" – are equally on the agenda in very different regions of the planet with very different climactic characteristics.

This was the case at the WASSER trade fair in Berlin in March 2015, a typically "German" and maybe "Central European" trade fair, despite a stronger international emphasis. This means that the topic is presented from a relatively local, Central European perspective. Ample groundwater is implied. Rain and river water to feed water reservoirs is also available in sufficient amounts. The message and presentation of many exhibitors clearly corresponded: well construction, drilling and reservoir technology, mechanical filtering plants, and classic wastewater engineering were the focus. "Dischargeable" still seems to be the desired quality to a great extent. And yet – upon closer inspection and in niche areas new approaches could also be discovered: where should water be taken from, where should it go after use? Is it possible to do even more? The way schools in Berlin grappled with the topic of water as a resource in a dedicated hall was beautiful. Solid ground for important insights is being created here.



Fig. 1: Highlight at the WETEX in Dubai: JUMO AQUIS touch S – multichannel measuring device with sensor technology for pH, redox, free chlorine, and temperature, tackling the topic of water disinfection with the new multifunction valve for sensors

A few days ago, the most important trade fair in the Arab region for water, environment, and energy – WETEX 2015 – closed its doors in Dubai, the lively trade and tourism emirate in the United Arab Emirates (UAE). Europeans always immediately associate the oil and natural gas industry with the UAE – which is certainly correct. Perhaps they also associate it with gold and luxury – which is also correct. Associations with palm trees, sandy beaches, and crashing waves are also allowed. The current ambient temperatures of 32 °C are considered "too cold for this time of year" by the locals; people are more used to 35 °C, 40 °C, or more in April.

The main topic at WETEX was, of course: water. During the region's boom years, people only thought about how large the system for desalination of seawater should be – cost what it may – now holistic environmental awareness has become the focus when it comes to the topic of water. Anyone who has experienced the rare rainfall in Dubai is familiar with the issue: there is extensive flooding in the streets because, unlike in Europe, there is practically no sewage system. And even with the ever-present off-road vehicles, people use caution when venturing through the mass of water waiting to evaporate. City planners focused on the visible aspects: opulent

buildings and skyscrapers, a metro train on stilts, and wide streets for fast cars bursting with horsepower.

Arguably, in the past people gave too little thought to wastewater or rainwater drainage. The theme of the trade fair, "At the forefront of sustainability," also demonstrates the will of the Sheik to play a leading role when it comes to topics of sustainability. His Highness Sheik Hamdan bin Rashid Al Maktoum, representative Emir of Dubai, Finance Minister of the UAE, and President of the DEWA (Dubai Electricity & Water Authority) was the personal patron of the trade fair and is considered knowledgeable about important environmental problems and possible solutions in the country.

Measures are becoming noticeable throughout the country. For example, extracting water from the ground is forbidden and only allowed in exceptional cases now. Extraction of groundwater or well water that is too intensive can lead to more than just a shortage. For example, salination due to pressure from seawater is also a problem. This is why maintaining a minimum level in the subterranean water reservoirs is an important aspect.

So JUMO presented a level probe for difficult operating conditions in Dubai as the innovation for 2015. The JUMO MAERA S29 SW is made of titanium and, as a result, is particularly suited for use in brackish and salty water. It can be deployed in deep wells up to 100 m or wastewater containers with high pollution loads. The probe for level measurement is available with ATEX and GL certificates.



Fig. 2: Small, robust, and chemically resistant – the proven JUMO MAERA S29 SW titanium level probe

So the "source" is already coming into focus. The "destination" too: recirculation and zero liquid discharge (ZLD) are being propagated. Both the local manufacturers and the international water treatment technology suppliers previously paid more attention to purification, desalination, and filtering of

brackish and seawater, thus focusing on supply. What happened to the water afterwards was not taken into consideration. Now things need to be relearned. Wastewater treatment is the key word – for instance, as a holistic concept for lossless water use in technical processes. Treat it so that, after it is used, it can supply the original process as losslessly as possible again.

German and European plant engineering certainly remains at the forefront when it comes to the topic of water/wastewater treatment. Considerable interest was also openly shown and expressed in measurement and control technology and German-made plants in Dubai. ZLD offers new opportunities to set itself apart again from the unfortunately much copied state-of-the-art here and help the environment in the process.

Recirculation according to the zero liquid discharge system means coupling different water treatment processes or steps. In every process step, diverse parameters are measured, regulated, and monitored. Actuators such as pumps, valves, and dispensing technology are controlled. ZLD only functions if both the process steps and the measurement parameters of the steps are combined and evaluated. The same applies here: a holistic view of the process must be the goal. It is a matter of recording and evaluating as many parameters as possible at the same time and automatically generating guidelines for control and regulation technology. Intelligent multichannel measuring devices such as the JUMO AQUIS touch S or P take on local subtasks here. The results are combined in the central control system, such as the JUMO mTRON T system.



Fig. 3: The modularly constructed JUMO mTRON T measuring, control, and automation system

In addition to standard modules for PID control, classic recording tasks (data logging with tamper-proof recording) and process controls can be performed using an integrated soft PLC. Of course, remote data transfer options such as Ethernet, SMS text message, and email are available, which allow control and intervention in remote water treatment plants.

Summary:

Whether in Central Europe or Arabia – the topic of water as a limited resource has now become an issue everywhere. And this is a good thing. The active approach of children and youth (Berlin school activities at the WASSER trade fair in Berlin) regarding the topic is welcome and important – ultimately, the problems will only intensify. ZLD – the "perpetual motion machine" of water technology – must be further developed and implemented. Intelligent measurement technology and robust sensor technology are available. Industry 4.0 or a robot is not what is needed now: humans have to apply themselves here and use their intelligence. The source and the destination have to be found.

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