Modernizing the Water Well Visualization at Förstina Sprudel

For the modernization of the water well visualization of its now 14 wells, Förstina relies on proven measurement technology from JUMO. By using the JUMO mTRON T automation system in combination with the visualization software JUMO SVS3000, level sensors, and conductivity sensors, all water wells can now be monitored and visualized.

Mineral water from Förstina is the treasure of the Rhön region. The catchment area of the company's mineral water springs is located in the Hessian Rhön Nature Park, directly on the border with the biosphere reserve. The springs were first mentioned in the year 1200 and even the royal abbots of Fulda appreciated the preciousness of drinking and bathing treatments.

The mineral water bottler Förstina Sprudel currently operates 14 water well installations in the district of Lütter and Rönshausen, directly on the border with the Rhön biosphere reserve. The water is extracted from three different adjacent mineral water levels and directly bottled at the spring. The extraction of the mineral water is constantly monitored and its natural purity and quality is controlled.
The reason behind the current modernization was that the old plant had reached its capacity limits. The new plant will cover all 14 water wells and also offers the flexibility to subsequently add additional water wells.

Another objective of the modernized water well visualization is securing an environmentally-friendly and sustainable production, which allows for the sustainable use of the spring source. To provide the legally stipulated proof for the responsible authorities, Förstina can very easily record and transmit all the necessary data with the new automation and visualization system. This includes, for example, specifications for extraction quantities from the deep groundwater and flow rates with regard to the sinking of the water well.

The system
With JUMO mTRON T, the SVS3000 visualization software, and the level and conductivity sensors the following values are transmitted to the main server from the water well plants up to four kilometers away: the overall extraction in m^3, the extraction capacity in m^3 / h, the water level in m, the conductivity in µS/cm, and the operating hours. Additional digital values such as tank requirements, pump operation, and pump faults are also displayed.

The JUMO MAERA S28 level probe detects the water level in the water well system through the hydrostatic pressure. Here, the level probe can detect filling heights of 0 to 2.5 mWC – 0 to 100 mWC (water column). Thanks to its sturdy structure and the materials used, the device can be mounted indoors and outdoors. When determining the filling height, it must be considered that every liquid has its own temperature-dependent density. Accordingly, the density value of a liquid with a temperature of 5 °C is different to that of a liquid with a temperature of 30 °C. This data is represented in tables. To simultaneously record the temperature changes of the measurement medium during measurement, an optional version with integrated Pt100 temperature probe is available.

The output signal has a minimum current of 4 mA, allowing the electrical circuit to be indirectly monitored for cable/wire breakage with ease. The integrated overvoltage protection prevents the effects of lightning that could lead to the destruction of the level probe, thereby offering maximum process reliability. The core of the level probe is a piezoresistive measuring cell that works safely and reliably due to its high overload resistance and longevity. A wide spectrum of measuring ranges and electrical outputs, as well as a large number of process connections, guarantee a high variant versatility allowing individual adaptation to every application.

The mineral water is extracted using pumps directly from the water wells into the Förstina bottling plant, where its conductivity is measured as a first step. The conductivity measurement at this point is the equivalent of an incoming goods inspection. The conductivity value depends on the mineralization. The more minerals released by the water during its formation/creation, the higher the conductivity value. The mineralization depends on the respective layers of rock that it runs through over time.

The stainless steel JUMO CTI-750 version is used at Förstina to measure the conductivity. The integrated temperature measurement allows precise and quick temperature compensation, which is particularly important when measuring conductivity. Additional functions, such as the combined toggling of measuring range and temperature coefficient, enable optimum use in CIP processes. Two integrated switching outputs can be freely programmed for limit value monitoring of conductivity/concentration and/or temperature. The operation is carried out either via a membrane keypad and plain-text graphic display or via an easy-to-use PC setup program. The display screen can be read when installed in either vertically or horizontally routed pipelines simply by rotating the case cover.

The heart of the new water well visualization is the JUMO mTRON T automation system (fig.1). The system here consists of the central processing unit, analog input modules, and digital input/output modules. All detected

values are transferred to the SVS3000 visualization software for visualization. The JUMO SVS3000 is a Windows-based visualization software, with a library containing especially pre-manufactured graphic elements for the connection of JUMO devices. As a result, application creation, configuration of the plant, and software project planning is made considerably easier.

The recorded data can be visualized as a real-time or historical trend. Extensive logging functions with batch-related protocol evaluation subsequently archive the data in a freely-adjustable period. Using an existing PC network, the SVS3000 can exchange system data between PCs. Protocols can therefore be recorded independently of each other for each PC. The protocols of up to 100 plants can be viewed in a PC network. Per plant, a protocol, recipes, group pictures, 8 week timetables, and 16 trend pictures are available.

Figure 1: Control cabinet with the JUMO mTRON T automation system

The advantages

The key advantages here arise from the combination of the automation system with the visualization software. All detected measured values, such as the level of the water wells, the conductivity values of the water, and the flow are recorded by the automation system and forwarded via Ethernet to the visualization software. A personalized user interface can now be designed here.

It is individually tailored to user needs (fig. 2). In addition, another water well can be commissioned at any time. Ultimately, important values such as the extraction quantity and rates can be recorded and documented for the responsible regulatory authorities.

Should a system malfunction occur (for example, on a pump), an alarm is then generated via the JUMO mTRON T and the Ethernet connection. The alarm can be sent by such methods as an email or an SMS text message.

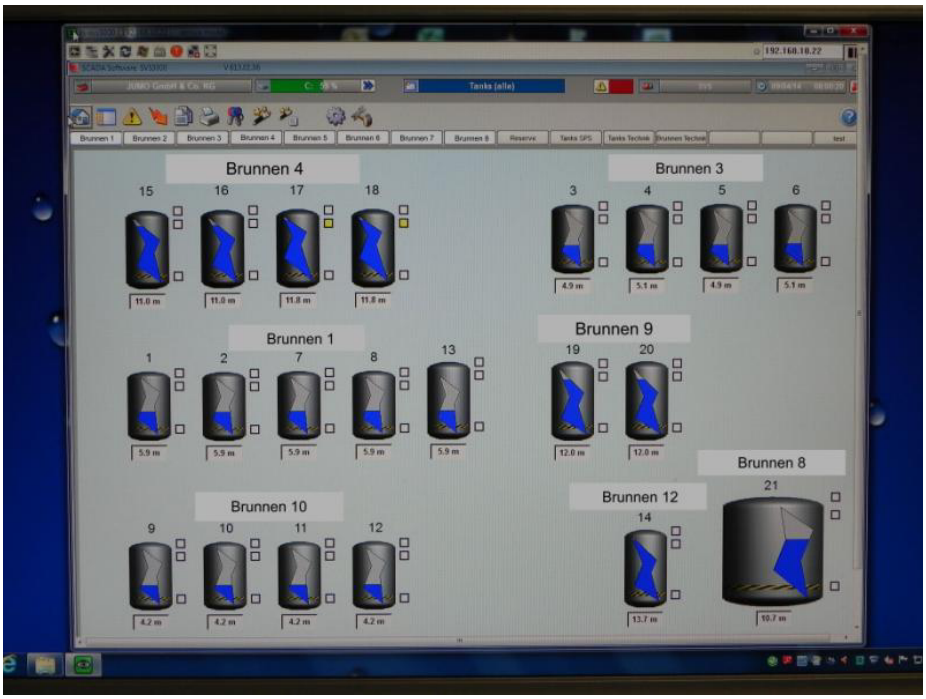

Figure 2: Water well overview

Summary

Thanks to modernization, additional capacity has been created at Förstina. All necessary measured values are now recorded and documented by an automation system. This ensures optimum water well capacity utilization among other things. The visualization software used offers a screen display precisely tailored to the user which, for example, also visualizes the water well levels.

Figure 3: The JUMO mTRON T automation system

The author

Dipl.-Ing. Christina Hoffmann
Market Segment Manager Pharma and Food
JUMO GmbH & Co. KG, Fulda, Germany
Phone: +49 661 6003-9384
christina.hoffmann@jumo.net
www.jumo.net