





Cleverly combined

Existing telecontrol using a modern controller

The water supply and distribution industry often uses telecontrol applications to automate processes: in this way, remote outdoor facilities such as wells, elevated tanks, storm water retention works or pump stations can be connected to a control station. Apart from hardware components and transmission networks, communications protocols are required that are tailored to the special requirements of telecontrol. When modernizing, the new hardware should work along with existing protocols, otherwise the complete replacement of the telecontrol system threatens. In Wismar a new controller generation fits seamlessly into the existing telecontrol system.

The disposal and public transport services EVB of the town of Wismar is responsible, among other things, for the drainage of the Baltic hanseatic city. It operates not only a sewage treatment plant but numerous external facilities and supervises more than 300 kilometers of channel network with connected pumping stations. Of more than three dozen pumping stations six are connected to the municipal sewage treatment plant for central monitoring with telecontrol from Siemens. These are particularly important for the wastewater disposal and transfer fault messages and operating data. One of these pumping stations is in a water protection area: Possible overflow of the wastewater shaft is particularly critical, every fault message must be followed up immediately.



The location in a water protection area makes special monitoring of this pumping station in Wismar absolutely necessary.

In the invitation to tender for the renewal of the now old electrical engineering of this station, the EVB also specified equipping with modern control technology. The contract was awarded to the Actemium H&F GmbH from Kavelstorf, Germany. Since 1991, the company has been planning and implementing electrotechnical systems in the area of water and environmental engineering – from the controller of an individual well through to the complete electro-technical equipment of systems.

Expansion of a field-proven system

Due to the business relationship over many years, the engineers of Actemium H&F are very familiar with the existing automation and control technology in Wismar. The telecontrol with which the other pumping stations are connected into the control system, has proved itself for years. Controllers of the type SIMATIC S7-300 from Siemens with suitable communications modules in the substations communicate with a SIMATIC S7-400 in the control room using the Sinaut ST7 protocol. As the transmission network the EVB uses both classic dial-up networks as well as the Internet with the mobile wireless standard GPRS (General Packet Radio Service).

A modern SIMATIC S7-1200 controller along with a SIMATIC touch panel is intended to take over the control and on-site operation of the pumping station. With the introduction of the new controller generation, Siemens initially used the internationally standardized transmission protocol 60870-5-104. The wide distribution of Sinaut ST7 and the associated customer demands for preservation of the status quo led to the development of the communications processor CP 1243-8 IRC (Industrial Remote Communication). This allows telecontrol applications based on the telecontrol protocol Sinaut ST7 and connects the SIMATIC S7-1200 controller as a cost-effective remote station to a control center or a higher-level ST7 station.



The touch panel allows cost-effective operation and monitoring of the pumping station on-site.



The control and telecontrol technology is located in the control cabinets.

For these (telecontrol) connections of the CP external industrial routers can be connected to the Ethernet interface of the CP and plug-in expansion modules can be used, for example to connect analog dial-up networks. To increase the system availability, functions for path redundancy and for alarming, for example via e-mail are available. Data security and access protection are ensured by the integrated firewall (stateful inspection) and VPN support (VPN: Virtual Private Network) with IPsec.

Pioneer work makes it possible

After Actemium was committed to essential definitions and product properties of the CP already in the development phase, the first use followed at EVB in Wismar, Germany. The specialists from Actemium configured both the controller and the control panel in the TIA Portal, the engineering framework from Siemens. Here the hardware configuration and the data point engineering were preformed. The ST7 configuration was handled in the classic Step7 V5.5 with the Sinaut engineering software. The data of the controller relevant for the control station can simply be selected in Step7 and given transmission parameters in a clearly laid out menu. The connection-specific Sinaut parameters are then made available to the TIA portal in the form of system data blocks (.sdb files) using a transfer file.

The communication between the substation and Sinaut central station is handled via IP-based Ethernet. Since the mobile wireless network is used combined with the Internet for the transfer, Actemium used SCALANCE devices from Siemens to ensure data security. For example, the router SCALANCE M874-2 which is in use provides security functions such as IPsec (VPN) and has its own firewall. The connection via a VPN network ensures that communication is only possible after an authentication. Secure encryption and verification of the data integrity protects the entire data access from espionage and attempted manipulation.



Compact automation solution with potential for retaining the system: With the aid of the communications processor CP 1243-8 IRC (far left), the SIMATIC S7-1200 controller can be connected seamlessly to the existing telecontrol system.

More transparency - less standby interventions

After the project had been running for four months the modernized pumping station with new technology was connected to the control system. The previously used Teletnot box that signaled all disturbances as a group disturbance could be switched off. Uwe Albrecht responsible for the EMSR and the automation technology at EVP is satisfied with the solution. „Up to now a message via the old system meant that something was in disorder. The employees from standby had to drive to the station and check. Today we receive differentiated fault messages and know precisely what is happening. Following from the data, we can then decide on a course of action.“ Apart from the fault messages, all relevant operating data is visualized in the control system and archived on the server. The fully automatic time stamping of the data in the controller SIMATIC S7-1200 ensures correct transfer of the archive entries. „We have arranged that our customer now receives operating data and analog values of the pumping station in the central station. Fill levels, flows, pump run times and so on“ explains Dr. Ronald Scheel who is responsible for the automation software at Actemium H&F. „From the fault messages of the min. and max. monitoring or the dry run protection we can take immediate measures. Albrecht tells: „But the normal operating data such as the pump flows are extremely important to us since can derive the status of the pumps from the values and can plan suitable maintenance measures.“

In Wismar, they are very pleased with the operation of the Siemens products. The use of the controller SIMATIC S7-1200 combined with the communications processor CP 1243-8 IRC allows the existing Sinaut system to be retained. Apart from this investment protection, EVB profits from an improved information basis. Instead of a group disturbance, differentiated fault messages are now transferred from the pumping station in the water protection area. This increases operational reliability and reduces interventions and traveling costs.

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