Wireless integration of scraper bridges on wastewater treatment plants via Bluetooth

- Secure remote transmission of measuring data such as sludge level and sludge concentration
- Secure and reliable data transmission (failure rate with sliding contacts > 30%)
- Smooth parallel operation with other wireless systems (e.g. WLAN)
- Replacement for expensive, high-maintenance and interference-prone sliding contacts

Sedimentation basins such as primary and secondary clarifiers typically have a moving scraper bridge, which conveys both the deposited sludge and the floating particulate matter into a drain funnel. To monitor the sedimentation process, as well as to control the removal of excess sludge and return sludge, field technology such as pumps or measuring devices are used on scraper bridges for sludge level detection.

Both primary and secondary clarifiers are usually equipped with a rotating bridge. Process devices such as sludge blanket measuring devices are installed on the scraper bridges. The communication between the field devices on the scraper bridge and the process control system cannot be implemented with a cable connection due to the rotation of the scraper bridge.

The operator is faced with the decision to either forward the measuring data via traditional transmission media e.g. sliding contacts or alternatively to use a wireless connection. Because of corrosion or wear, the use of sliding contacts for data transmission is proven to be susceptible to interference and high maintenance, due to the low signal in this environment. The power supply of the field devices used, however, is more susceptible to interference due to the higher currents and voltages and is therefore still controlled using sliding contacts on the scraper. A limited bandwidth for data transmission using sliding contacts is another aspect, which is why a wireless solution is often favoured today.

Process solution:

For the wireless data transmission of the measured values, a Bluetooth converter is integrated in the local automation network. This communicates with another Bluetooth converter on the scraper bridge. These converters behave transparently on the network (they are not recognized by the control system as a device, but instead behave like a piece of cable). This allows the Ethernet-based transmission of the measuring data from the bridge to the process control using common protocols such as Profinet, ProfinetIO, EtherCAT or Modbus TCP via the physical transmission medium Bluetooth.

This technology allows the connection of up to 7 participants/basins to one access point. A range of up to 250m and a speed of up to 3 Mbit/s is available. In this way, remote controllers or I/O modules are wirelessly...
Customer benefits:

- Secure and reliable wireless transmission (failure rate with sliding contacts > 30%)
- Smooth parallel operation with other wireless systems (e.g. WLAN)
- Replacement for expensive, high-maintenance and interference-prone sliding contacts
- Point-to-multi-point connection of a Bluetooth server with up to 7 Bluetooth clients
- Integration into all common control systems using standardised telecontrol protocols
- Transmission of all data provided by the measuring device such as sludge level, sludge level concentration profile, zone tracking and fluff level

Products used:

- OPTISYS SLM 2100 sludge blanket measuring system
  - Direct measurement by immersion of optical sensor
  - 3 reliable measurement modes including determination of sedimentation profile, blanket and fluff levels as well as zone tracking
  - Common operating and service concept with flow and level devices
  - Built-in heater and ventilation for temperature regulation
  - 2 x rake guard switch or trigger inputs
  - 1 x maintenance switch
  - 2 x programmable relays (status output or limit switch)
  - Automatic cleaning unit for low maintenance requirements

- Bluetooth wireless transmission technology
  - FL BT EPA MP wireless module with omnidirectional antenna

- I/O control technology:
  - Inline/Axioline

- Waterworx function block library

- 24 V Quint power supply