DECENTRALISED ACQUISITION – Keeping pumping stations running smoothly

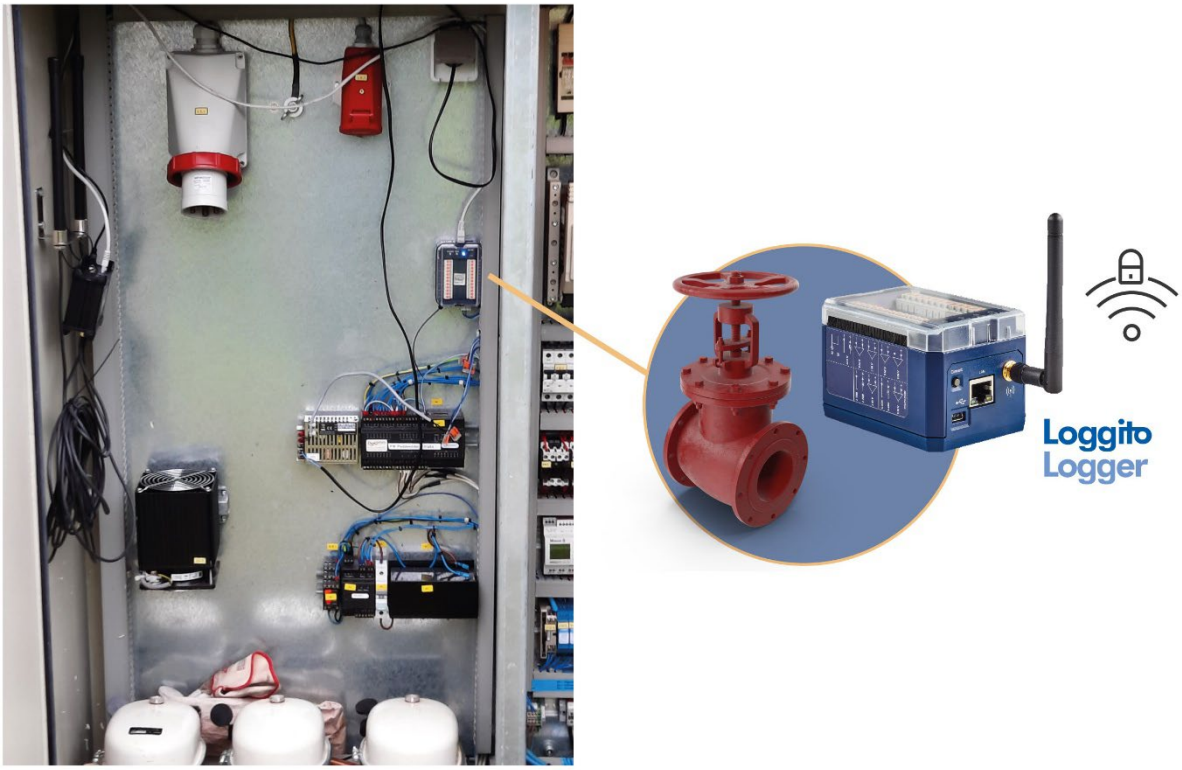
Decentralised data acquisition and autonomous monitoring of dispersed measuring locations, including connectivity options, are becoming increasingly important for monitoring of systems and machines, including remote monitoring. This was also required by Ennepetal's municipal wastewater utility, who are using the compact Loggito Loggers from Delphin Technology AG to monitor its pumping stations.

The municipal wastewater utility for the German town of Ennepetal operates 18 pumping stations located throughout the town. Pump sump levels and operating states are monitored at each station. Two pumps are alternately operated via a programmable logic controller (PLC), enabling optimum regulation of inflows and outflows in the overall system. This ensures the wastewater system operates reliably and requires monitoring around the clock to enable rapid response in the event of malfunctions, such as blockages or pump problems. In the past, the relevant data was transmitted to service technicians via the 3G mobile phone network. With 3G scheduled to be switched off and upgraded to LTE (4G) required upgrading of the measurement data acquisition system to a future-proof level using compact Loggito Loggers from Delphin Technology AG.

Autonomous, decentralised measurement data acquisition at each pumping station

To ensure autonomous measurement data acquisition, Loggito Loggers were installed in each of the 18 pumping stations. By using high-precision and universal sensor inputs, it was possible to easily connect sensors required for fill levels and power consumption, as well as for operating data and fault messages. The acquired process data, in combination with internal monitoring and calculation channels as well as operating-hour meters, provide information about the current condition of the pumping stations, and also the expected times for maintenance. This enables predictive maintenance for the pumping stations. The pumps can then undergo optimal and proactive maintenance and downtimes can be prevented. The Loggito Logger pre-processes, monitors and stores every signal before forwarding them to a central data server.

Delphin Technology AG
Lustheide 81 | 51427 Bergisch Gladbach · Germany | Phone +49 (0)2204 97685-0 | Fax +49 (0)2204 97685-85
info@delphin.de | www.delphin.com



Internal data storage for extra security

The Loggito Logger is PC-independent so its internal data storage capability ensures a high level of data security, also in remote data transmission. In the event of mobile network connection failure or a malfunction of the central server, all recorded data will be stored in the internal data memory. Remote data transmission to the server then automatically resumes as soon as the mobile network and the server are available again, without requiring any intervention from the user. This means no data is lost and the measurement database on the server is updated without any omissions.

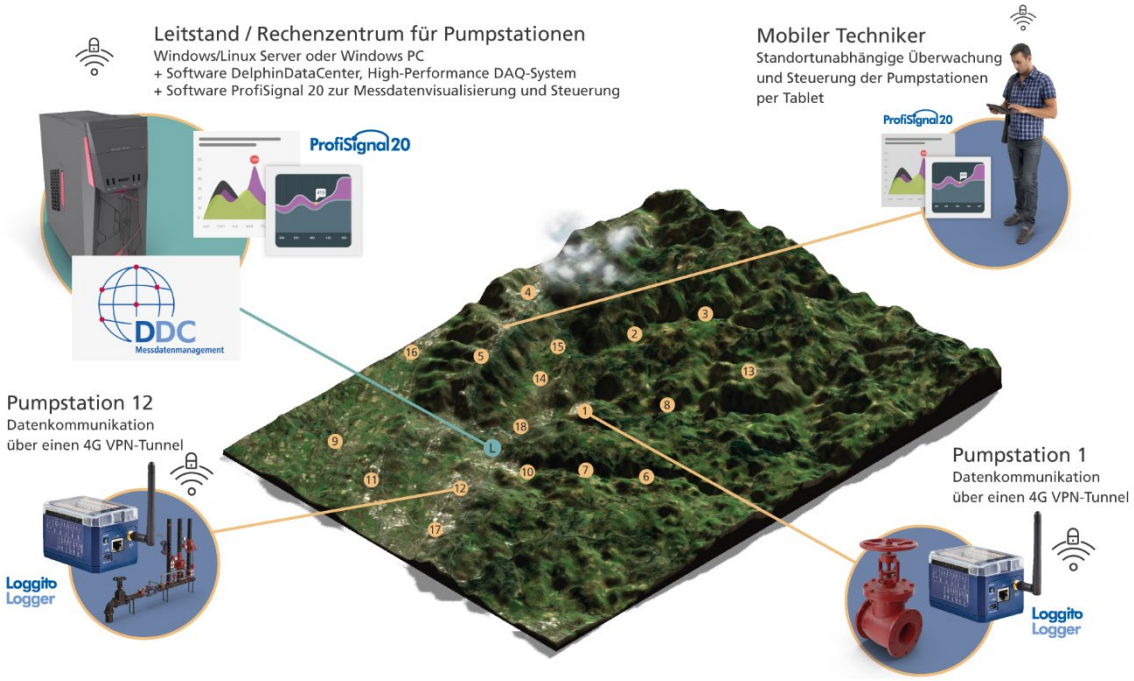
Monitoring @ the edge

Due to the Loggito Loggers autonomous capability to pre-process, monitor and analyse all signals at each pumping station, independent monitoring including automatic shutdown functions can be performed. Autonomous operation means such functions are always guaranteed, even when mobile communications to a pumping station are temporarily interrupted. For example, when a storage temperature threshold value or power consumption of a pump is exceeded, the Loggito Logger's digital outputs can be used to shut down the system.

Transmitting measurement data to a central server

In addition to the installation of Loggito Loggers, LTE routers with powerful antennas have also been installed at the pumping stations to transmit the decentrally acquired measurement data to a central server via LTE. The routers are equipped with an

automatic restart function which re-establishes connections and ensures remote data transmission in the event of a connection failure or the VPN gateway becoming unavailable. The Delphin Data Center (DDC) and the ProfiSignal 20 software are installed on the server and perform centralised measurement data management tasks as well as user administration. All data collected from the 18 pumping stations is linked together on the server, centrally stored, monitored and analysed. Measurement data is securely and traceably archived and can be accessed within seconds, whether on a network using PCs, or mobile using smartphones or tablets. All pumping stations can be centrally linked with each other. This enables comparisons and a more detailed analysis of the individual pumping stations. Transmission of the measurement data to end devices is realised within a secured network via VPN tunnel. Connections to the individual Loggito Loggers as well as the status of each measuring site are also monitored centrally and automatic email alerts can be sent. The DataService runs on the server as a Windows service, so users are not required to log on to the operating system, and alarms can be sent by email at any time. Staff can access the Data Center via OpenVPN Client. Smartphones and tablets can also access the PS20 server and the Data Center via the OpenVPN app and PS20 client app and access visualisation features. The required PS20 app can be downloaded free of charge from app stores for both iOS and Android devices. Remote access to each pumping station has the additional advantages of being able to visualise measured data and configure the Loggito Loggers from any location. User management enables definition of the user groups authorised to make changes to the basic system and device configurations, and which user groups have read-only access to the system. Service technicians can then, for example, modify limit values or the monitoring and storage of various parameters without having to spend time and effort travelling to a pumping station. This increases flexibility while also saving resources.



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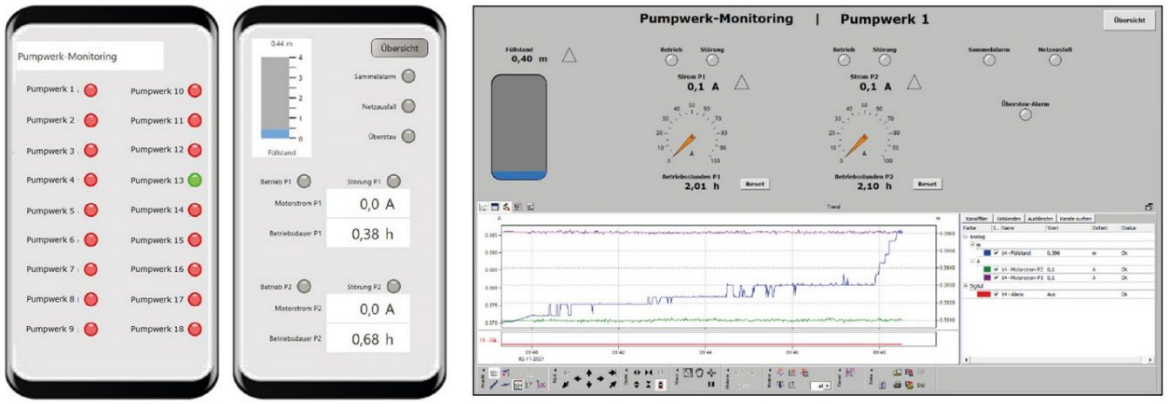
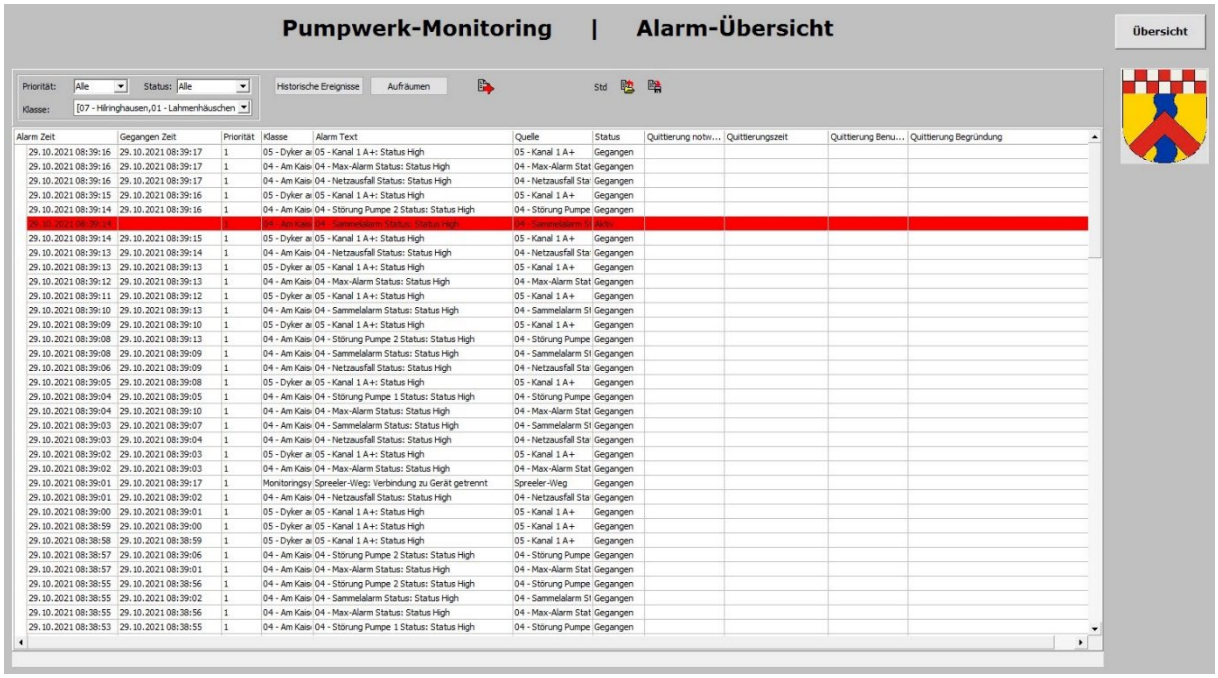
Visualising measurement data for service technicians

The ProfiSignal 20 Basic software provides the monitoring system's front end and acts as an interactive user interface. The platform-independent complete software package for visualising and analysing acquired measurement data can be installed in the control room as a desktop application or accessed at any time via the PS20 app on the mobile devices of service technicians. Measurement values and their progression over time are displayed on dashboards as measurement curves. These trend displays enable quick and easy viewing of historic measurement data. An overview diagram provides status readings based on combined alarms for all 18 monitored pumping stations. An alarm list is also displayed in tabular form in a separate diagram. This means that mobile service technicians as well as office staff have access to all measurement data at all times.





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Future outlook

The monitoring system can be further expanded by the Delphin DataCenter (DDC) pooling the data of all 18 Loggito loggers on a central server. For example, pumping stations could conceivably communicate with each other, i.e. Loggito Loggers sharing data via the DataService. In this way, levels within a downstream sump could be checked before issuing an upstream pumping command, thereby preventing overflows. Other peripherals, such as frequency converters and power meters at the pumping stations, can also be integrated into the Delphin monitoring system using versatile interfaces such as Modbus TCP and OPC UA.

A measurement data logger from Delphin Technology AG could also be used to control the pumps and replace existing control systems. Plenty of options for the system's future expansion are therefore available.

Statement

"Since we have been using Delphin's monitoring system, we always have at hand all the key pumping station data, both in the office and when we are mobile. We can therefore respond in the best possible way at any time and do not need to actually go out to the pumping station. This saves working time and money!"