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The power of memory. Secured.

Logging Critical Compliance Data When IoT Cloud Connection Fails

Aquatic Life Ltd.

Aquatic Life Ltd. is a Canadian mine water solutions company providing online monitoring technology and services to the mining industry. Aquatic Life Ltd. provides Aquahive a smart, remote water quality monitoring platform that provides real-time data analysis – even from the world's most isolated locations. Using Aquahive's vast selection of industrial sensors, organizations can ensure environmental compliance, log historical data and reduce operational costs via real-time technology.

Applications:
Data Logging
Firmware Updates

Market:
Mining

Challenge

Monitoring water quality and quantity is crucial for the mining industry to comply with environmental regulations. However, this is an extremely difficult task for large mine sites. Mine water management has traditionally been a resource-intensive process that is costly, inefficient and sometimes even dangerous. Aquatic Life Ltd. recognized the need for a rugged remote water-monitoring system for mining applications. With years of research and development, and collaboration with mining professionals, the company developed the Aquahive smart water-monitoring system.

The Aquahive system provides mining companies with the ability to remotely collect, analyze and report data from various environmental sensors in real time. The sensor-agnostic design allows for a variety of sensors to be used to monitor parameters such as water level, flow rate, temperature, conductivity, dissolved oxygen, pH/ORP, pressure, total suspended solids, chemical concentrations (ammonium, chloride, nitrate) and salinity. The data from these sensors are sent to secure cloud storage via satellite or cellular telemetry. The cloud-based data can be accessed from anywhere for real-time data analysis. The Aquahive system can detect critical events, trigger commands, notify users and export data to water management software.

With cloud-based IoT (Internet of Things) systems, like the Aquahive system, it is critical to have a method for backing up the data locally in case the connection to the cloud is lost. "There is always a risk of lost reception in a telemetry-based system, whether it is cellular or satellite based communication," says Steven Simpson. Head of Projects & Solutions at Aquatic Life Ltd. "Local data storage allows the data to be 'patched' at the next available communication." In early prototype designs, the engineers at Aquatic Life Ltd. used a commercial third-party data logger and a USB flash drive for data backup. Ultimately, they recognized the need for a more integrated, robust and secure data logging solution.

Solution

Aquatic Life Ltd. conducted an extensive search for military-grade flash storage devices, which led them to discover ATEK Access Technologies' Datakey brand of portable memory products, and particularly the RUGGEDrive™ line. Aquatic Life Ltd. selected the DFX-IS RUGGEDrive token, which provides SD card functionality in a more robust and secure form factor. The DFX-IS memory token is rated for operation over the industrial temperature range of -40°C to +85°C and features robust SLC NAND flash. Simpson stated that the DFX-IS RUGGEDrive solution, "provided us with a wide range of storage capacity, high performance SLC NAND architecture, a robust industrial casing and rating, and a proprietary physical interface that provides an additional layer of data security for our clients."
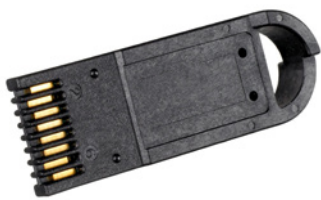
The proprietary shape of the RUGGEDrive memory token prevents it from plugging into standard ports. Instead, RUGGEDrive receptacles are used on the embedded device. This prevents unapproved devices (like USB flash drives or SD cards) from connecting to the system. For the receptacle, Aquatic Life Ltd. selected the Datakey SR4410IL panel-mount receptacle. Mounting to the backside of the Aquahive system's control panel, the SR4410IL receptacle presents just an open slot and provides an IP67 rating.

Results

While originally intended as a backup for logged data, engineers have found additional uses for the RUGGEDrive memory token. The memory token is also used to provide additional system storage for sensor libraries and other software-based features, which allows the company to push updates and add functionality to Aquahive systems already in the field.

"The implementation of the Datakey product line has allowed us to move to our own proprietary microcontroller while reducing our cost by approximately half, as compared to the previous datalogging solution," added Simpson. "Additionally, the use of commonly available Molex connectors (on the SR4410IL receptacle) and the ease of assembly has reduced the cost associated with assembly and repair."

Since launching the Aquahive smart water-monitoring system in April of 2018, Aquahive customers have noticed the unique removable memory device. "Our customers have consistently praised the secure RUGGEDrive interface," said Simpson. "Remote monitoring systems are susceptible to theft and vandalism, and the proprietary interface of the RUGGEDrive memory token has afforded our customers a physical layer of security for their high value data."

With RUGGEDrive, Aquatic Life Ltd. can provide a new level of data security at the physical hardware level that its competitors lack, along with an unmatched level of environmental robustness which translates to less downtime and penalties relating to environmental regulations compliance.

"Datakey continues to provide us with a competitive OEM solution that accelerates innovation," added Simpson.

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