Infrastructure

Customer case study

Figure 1: Early detection of natural hazards can protect human lives

Electronic monitoring system wtih plug-in timer modules

When a high level of reliability is key

Highlights

- Geopraevent AG develops alarm systems that notify people if a natural disaster such as a landslide, flood, or avalanche occurs.
- These systems are often located in harsh environments and require special properties for fail-safe performance and reliability.
- Plug-in timer modules from the RIFLINE Complete product family help create redundancy and safeguard key functions.

> “Relays are universal, robust devices, and millions are used in industrial applications.”

Customer profile

Geopraevent AG, jointly founded by Lorenz Meier and Geotest AG in 2013, has been part of Hexagon AB since January 1, 2020. The Swedish measurement technology and software group is a global market leader in the field of sensors, software, and autonomous solutions.

Figure 2: Early detection of natural hazards can protect human lives

Geopraevent develops, installs, and operates premium alarm and warning systems for natural hazards. These include rockfalls, landslides, tsunamis, floods, ice and snow avalanches, and glacial lakes that could pose threats to transportation routes, residential areas, or popular tourist attractions. In this environment, electronic monitoring systems are usually used in addition to or instead of structural measures – often at lower costs and with less interference with nature. The monitoring systems are also easy to install and flexible, so they can adjust to new requirements at any time.

Geopraevent focuses on solutions tailored to specific customer requirements. The company develops and adapts the necessary hardware and software in-house to ensure that projects can be implemented quickly and precisely for the particular location (Figure 2).

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Challenge: Automatic alarms in case of natural hazards

Since 2013, the company has completed 250 projects. Currently, the monitoring specialists operate more than 150 measuring systems, many located high in the Alps. The systems are continuously connected to the company's own servers, which control proper functioning and make current measurement data available online in a data portal. The sensors can detect natural hazards, then algorithms evaluate their data and visualize it on the portal. If a natural hazard occurs, it automatically triggers the alarm. Within seconds, people in danger can be notified, and the relevant roads and train tracks can be blocked.

Monitoring these critical measuring sensors requires special properties for fail-safe performance and reliability. The corresponding control cabinets are typically located in inaccessible areas with harsh weather conditions. In addition, the power supply is often self-sufficient.

Solution: Redundancy safeguards key functions

Geopraevent AG relies on the plug-in timer modules in the RIFLINE Complete product family from Phoenix Contact (Figure 1). Relays are universal, robust devices and millions of them are used in industrial processes. As digitalization becomes more common, these key interfaces between controllers and systems are often considered relatively unimportant. They do not seem to be very innovative, either. Yet it is important to remember that relays fulfill essential tasks, such as converting, galvanically isolating, and multiplying signals.

Various time signals that can be realized with relays are often used. In addition to stand-alone, multifunctional timer relays, the Phoenix Contact RIFLINE Complete product family includes a plug-in timer relay. This module can convert a conventional RIF-1 coupling relay module into a timer module in only a few seconds, without tools. A timer module redundantly safeguards key functions in measuring system control cabinets, ensuring smooth operation. Because of this, the Geopraevent AG team in Zurich specified plug-in timer modules.

To ensure that the monitoring systems function properly, several challenges must be overcome. One difficulty results from the communication between the monitoring system and the servers. Due to their harsh, inaccessible locations, the systems often can only be reached by cellular routers. Alarms are always triggered on site, via a communication channel intended specifically for this purpose. If malfunctions or a connection failure arise during router operation, it can be impossible to restore the correct function of the device with a reset. If the router must be restored to its initial state, this is detected by a small-scale controller that disconnects the supply voltage of the router.

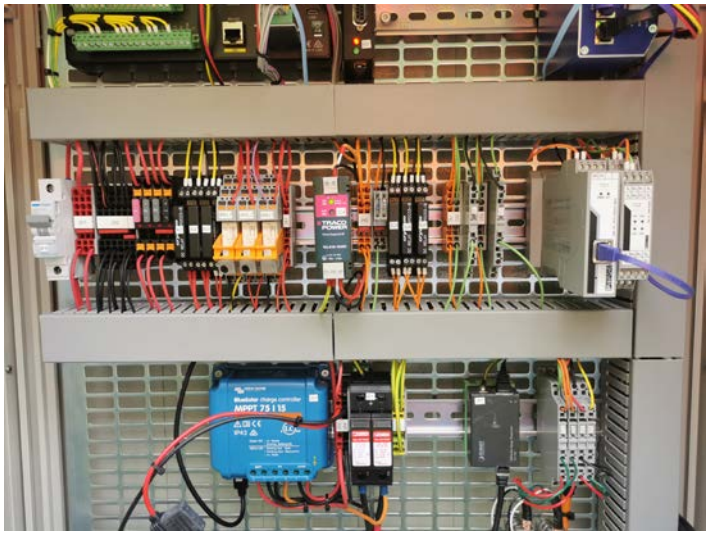

Figure 3: Control cabinet with three RIFLINE coupling relay modules on the center DIN rail, two with timer modules.

If the small-scale controller is unable to reset the router, a timer module plugged into the RIF-1 coupling relay module will switch off the voltage in parallel. This method implements redundancy, which can reset the router in two different ways. As mentioned earlier, the multifunctional plug-in timer module transforms the relay module into a timer relay. The timer module can be plugged into relay bases of variants RIF-1 to RIF-4. A DIP switch allows users to select from three time functions (delayed switch-on, passing make contact, pulse generator) and four time ranges. Detailed time settings are made with a potentiometer. The relays can be operated with an input voltage of 12 or 24 V AC/DC, respectively.

Easy extension with plug-in modules

Control cabinet heating, which results from extreme temperatures, is another key task that uses the timer module. Another controller regulates the heating operation. Switching the intervals on and off keeps the temperature in the cabinet at a constant level. If the controller experiences an error and cannot disable heating, the RIF-1 coupling relay connected in parallel with an integrated timer module takes over this function, protecting the system against overheating and the associated malfunction. This saves complex, time-consuming maintenance tasks and ensures that the monitoring system operates smoothly (Figure 3).

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Figure 4: The solar installation will help Phoenix Contact meet its long-term corporate goal of becoming a carbon-neutral company.

The relay modules provide the typical features of the RIFLINE Complete product family. For example, they are available with both the proven screw connection and Push-in fast connection technology. Push-in technology enables solid and flexible conductors with ferrules to be plugged in without tools – from a connection cross-section of as little as 0.14 square millimeters. In addition, the pluggable bridge system can reduce costs. Compared to conventional wire bridges, wiring is quick and easy. This allows simple and efficient potential distribution. The plug-in modules enable the relevant system to be extended easily and quickly, for example, to include a time function. It is also possible to include a protective circuit.

Comprehensive solution for control cabinets

The RIFLINE Complete product family is part of the Complete line. It is a system comprising technologically leading and coordinated hardware and software products, services, and system solutions intended to optimize processes in control cabinet building. The Complete line portfolio includes controllers and I/O systems, power supplies and device circuit breakers, terminal blocks and distribution blocks, relay modules and motor starters, signal conditioners, functional safety technology, surge protection, and heavy-duty connectors.

Complete line has the following distinguishing features:

- Intuitive handling, thanks to the uniform design, haptics, and function
- Time savings throughout the entire engineering process due to comprehensive software support
- Reduced inventory costs with standardized accessories and a reduced variety of parts
- Improved processes in control cabinet building due to customized services and innovative manufacturing solutions.

Conclusion

Because of the features described above, the Geopraevent AG team trusted the RIFLINE Complete product family in their monitoring systems. RIFLINE Complete is also used in many other industrial applications (Figure 4).

More information:
https://www.phoenixcontact.com/en-us/products/relays-and-optocouplers

Photo source: Geopraevent

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