

Utility company maximizes operational safety in electrical substation application

Wireless turnkey solution reduces total cost of ownership, avoids costly shutdowns

Benefits at a glance

- Enables Smart Grid implementation (IIoT)
- Reliable and accurate monitoring of critical assets
- Remote access for commissioning, troubleshooting and maintenance
- Low cost of ownership
- High voltage isolation
- Low environmental impact in no dig areas
- No grounding required
- Asset management – documentation
- Turnkey project with single point of contact
- Engineering services
- Project management



Summary: A large industrial energy and utility company was looking for a solution to monitor pressure of the dielectric fluid in the pipe-type cables as well as dielectric fluid level in its electrical substations. Monitoring pressure in real time is one of the critical parameters in a pipe-type cable installation and proves to be

challenging by traditional methods, whether it is done manually or with pressure transmitters. The company was experiencing problems and challenges with its hardwired pressure transmitters around the substation environment and needed a new approach to monitor the substation application.

Endress+Hauser was able to offer an upgraded wireless turnkey system to replace its traditional method approach, maximizing operational safety and reducing the total cost of ownership, maintenance, and potential area power shortages and brown outs.

Challenge: The company uses a traditional approach to monitor the pressure in the terminal risers using dielectric fluid to insulate cables carrying 69 kV & 345 kV at 250 psig. Traditionally, most utility companies use pressure transmitters to make sure the lines are pressurized and to monitor for potential leaks on underground cables that run 10 to 30 miles between substations. Level transmitters are used to monitor the tanks where the dielectric fluid is stored to keep the lines at the right pressure.

The company wanted a wireless option to monitor the pressure transmitters and about ten years ago they decided to use battery powered pressure transmitters. Over time, the company had to manage changing batteries every three to four years, which increased cost of ownership. They also experienced some failures on pressure transmitters that were not holding up on the substation environment. The company was experiencing other common problems with the hardwired pressure transmitters around the substation environment including interferences such as noisy signals caused by high EMF, damage to the transmitters due to lightning storms, switching surges and ground loops.

Measuring other parameters such as dielectric fluid tank level, flow, and temperatures within the substation all involve similar challenges as well. Lightning, high EMF and voltage changes cause problems with 4-20 signal wires, causing transmitters and power supplies to fail. The company would have to send personnel to fix these issues or obtain data for daily operations. Since there was no centralized data in the control house, by the time personnel were informed of the problem, areas were already experiencing issues with equipment performance, environmental conditions, and potential safety conditions.

The company needed an efficient and reliable way to monitor and receive data in the control house, enabling early detection of issues and allowing for immediate actions to be taken.

Our solution/resolution: It is important to accurately monitor pressure in the pipe type cables. If the pressure drops below 200 psig, due to a leak, break or pump failure, the cable's insulation becomes compromised increasing the temperature rapidly causing damage to the cable, resulting in brown outs and/or black outs.

Endress+Hauser visited the company and performed a site survey and offered them a complete upgraded turnkey system which included WirelessHART® instrumentation (level, flow, pressure, temperature), SupplyCare®, which will be implemented in the future for remote monitoring, W@M®/IIoT, instrument commissioning, project management and engineering and design services.

Solution details: Endress+Hauser has worked with the utility company for more than a year on three of its electrical substations. The company made the decision to rely on Endress+Hauser because of the services and unique wireless capabilities. To solve the battery replacement issue and lower the cost of ownership, Endress+Hauser offers a universal mains power supply (24-240vAC/DC) on the WirelessHART adapters. This enables the customer to run the 108VDC power directly into the Wireless HART adapter, without the need of stepping down the voltage or additional field power supplies that are susceptible to noise and failure. This approach delivers a faster scan rate, no need to replace batteries and a wireless signal back to the control house. The deliverables range from hardware and products to site survey and installation. Endress+Hauser was able to provide them with a complete turnkey solution that includes: engineering, design, project management, installation, commissioning, training and documentation. The company asked Endress+Hauser to upgrade three of its electrical substations and are pleased with the accuracy and wireless monitoring. The company is currently developing a plan for Endress+Hauser to upgrade its remaining substations, as a new standard for the company.





Results: After installation in three of the companies substations the customer was able to see beneficial results, like increased reliability of critical measurements from their headquartered office to make sound decisions, and less trips to each location to verify measurements. Endress+Hauser's solution has been approved and will be implemented in the remaining substation applications. The turnkey solution could have a potential cost savings of up to \$5M.

Major components:

- WirelessHART
- SWG70 Gateway
- SWA70 Adapters (2-40)
- PMP71 Pressure Transmitters
- TMT82 Temperature Transmitters
- FMP54 Level Transmitters
- Control Panel (including: PLC, HMI and Remote Support Functionality)
- Isolation valves

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