

Load Interrupter Switch Replacement

Challenge

A prominent Southern California university had an extensive underground distribution system that was originally built in the 1960s. Loadbreak switching and overcurrent protection were performed using airinsulated, metal enclosed, Load Interrupter, or "LI" switches. Over a relatively short period of time, the equipment's performance would degrade, due to exposure to moisture and contaminants from irrigation, condensation, and their proximity to the Pacific Ocean.

The university wanted to find a replacement that was immune to the effects of the environment, with a maintenance free design that offered the operations personnel improved safety. The fusing that provided the overcurrent protection did not give them the coordination flexibility they wanted, and over time the costs of the replacement fuses added up. Because their equipment rooms and pads were all in place, they wanted a solution that would fit in these spaces without modification. They also wanted a design that in the future could be a part of an automated Smart Grid style self-healing distribution system.



PNI style deadfront switch

Solution

After a thorough investigation of their options, the university selected G&W Electric's PNI style deadfront, maintenance free, SF6 gas insulated switches, with resettable vacuum interrupters for overcurrent protection. While the problems associated with the metal enclosed fused LI switches had always been tolerated and worked around by the university's operations personnel, the G&W Electric PNI switches eliminated all of these shortcomings.

The mechanism used for loadbreak switching in the PNI has been tested to 1,200 loadbreaks of 600 amps with absolutely no maintenance, so it will provide the university with safe and reliable switching for many years to come. Consequently, it is an ideal choice for automatic transfer and distribution automation schemes. Also, when in the open position, the switch provides a visible disconnect to safely isolate a section of cable from line voltage.

The fault interrupting mechanism of the PNI provides substantial advantages over the fusing of the LI switch design. Unlike the LI switch, the PNI makes use of vacuum interrupter mechanisms that combine vacuum bottles and electronic controls to clear faults with a wide variety of time-current characteristic curves to better protect the downstream distribution system. The resettable vacuum interrupter means that replacing fuses are a thing of the past. In addition, they provide three phase trip, thereby preventing single phase conditions common to fusing. The vacuum interrupter is rated to clear faults up to 40kA asym., and can handle up to 600 amps of continuous current.

Due to the proximity of the university to the Pacific Ocean, the G&W Electric PNI switches are an ideal solution, as they are deadfront, with all live parts completely isolated from the outside environment, providing maximum protection from the detrimental effects of the coastal air. Their maintenance free design is a perfect match for the application, as the university's continuous operations offer no opportunities for any scheduled maintenance outages. And unlike LI switches, no high maintenance, energy wasting space heaters are required. The G&W Electric PNI switches are always ready when called upon to switch loads and interrupt faults. The PNI switches are configured specifically to fit in the spaces formerly designed for the LI switches. In most cases the existing cables and conduits can be reused, greatly minimizing replacement costs.

The university chose the G&W Electric solution for numerous reasons. G&W Electric switches are time proven products, known throughout the industry for their unmatched reliability, the university knew they could count on to provide reliable power throughout their campus. The switch designs allowed for easy and economical replacement of the aging LI switches. The university's operations personnel no longer have to deal with replacing fuses within unsafe equipment that has degraded due to the effects of the environment and insufficient or deferred maintenance. All of this contributed to the university personnel's satisfaction with the completed installation. As a result, the university is already thinking about an automated Smart Grid system, with the G&W Electric PNI switches as the backbone.

Overhead Automatic Transfer with Overcurrent Protection

Features

- High speed automatic transfer switching with overcurrent protection
- Distance between preferred and alternate sources is limited only by communication link selected.
- Communication can be via cable, fiber optic or wireless.
- Directional overcurrent protection
- Battery backup and sophisticated battery monitoring
- SCADA inputs/outputs
- DNP 3.0 available
- Total restoration time (using an Open before Close transition) in as little as 8 cycles*
- Verification of switch status before operation eliminates the possibility of paralleling sources
- User selection of transition sequence
- Complete events recorder with time/date stamp
- Delay timers for initial and return transfer
- Option for dead-line operation

* Communication devices and transfer delay timers will affect the total restoration time.

Ratings

Maximum Design Voltage, kV.....	15.5.....	29.2	38
Impulse Level (BIL) kV.....	110.....	125.....	150
Continuous and Load break Current, A	800	800	800
8 Hour Overload, A	960.....	960	960
Interrupting Current, kA rms sym.	12.5	12.5.....	12.5
Making Current, rms asym. kA	20.....	20.....	20
Peak, asym. kA.....	32.....	32.....	32
Mechanical Endurance, Operations.....	10,000	10,000	10,000

For more information:
Contact your local G&W Electric representative or visit us at www.gwelec.com.

Conclusion

If an overcurrent is detected on the load side of the system, the 351-R control will engage its overcurrent protection logic and override the automatic transfer sequence. This gives the user the benefits of both recloser overcurrent protection and high speed automatic source transfer in one package.

This solution simplifies the number and variety of distribution system components as well as providing a significant cost savings. It is one example of G&W's pre-engineered LaZer™ family of automation solutions.