

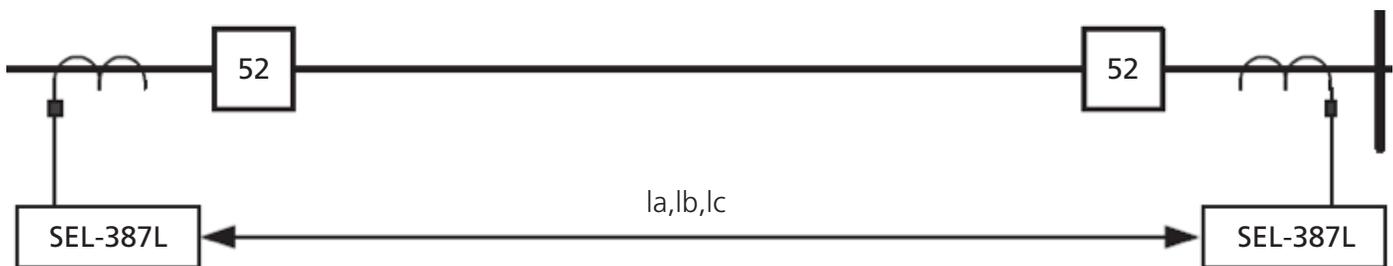
Line Current Differential For Overhead Feeder

G&W PRODUCTS: 15kV Viper-S reclosers paired with SEL-311L controls

ISSUE:

Umatilla Electric Cooperative (UEC), a Coop located in northern Oregon, was serving an important customer via an overhead feeder. This feeder was protected with (2) SEL-387L Line Differential relays and a main distribution breaker. This two-terminal 15kV line differential scheme is represented in Figure 1 below.

As the customer's facility expanded, a tap was installed in the middle of the feeder to provide power to additional load. As a result, the existing line current differential protection scheme was no longer suitable, as under normal operation the measured incoming current was no longer equal to the measured outgoing current.



▲ Figure 1: Existing Line Differential scheme

SOLUTION:

Adding a Terminal

In order to maintain the line current differential setup, G&W provided a Viper-S recloser factory integrated with an SEL-311L control to protect the newly added tap. The control was programmed to provide one-shot to lockout protection. A second Viper-S/311L combination was provided by G&W, and installed at the substation in place of one of the SEL-387L relays.

Maintaining Accuracy

To provide the relays with current data with the required accuracy, the Vipers were equipped by G&W with "external"

CTs, instead of the standard encapsulated internal CTs normally provided with the Viper. These 1,200:5 single ratio CTs have a C200 relaying class. The CTs are factory installed over the silicone insulators of the Viper-S, resulting in a compact, site-ready design as shown in the photo below.

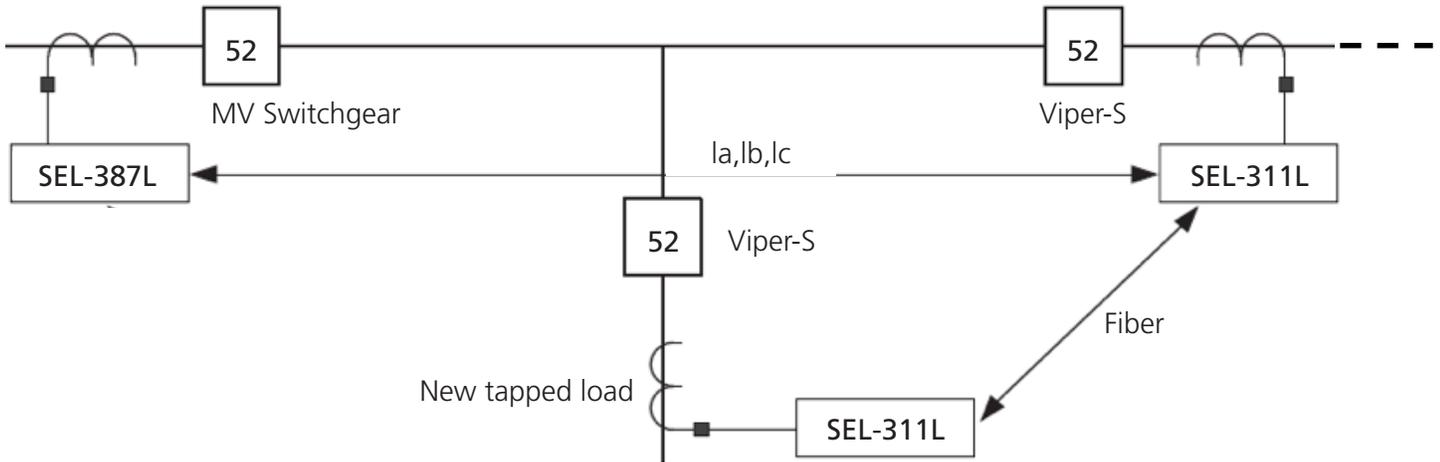
Advanced Communication

Fiber optic communication was installed between the pole mounted SEL-311L and the SEL-311L in the substation.

Benefits

This three-terminal line differential protection scheme as shown in Figure 2 maintains reliability of the circuit via the use of sub-cycle protection on faulted line conditions. The advanced protection this solution offers utilizes a vector ratio of the local and remote phase and sequence

currents, independent of line or tap loading and CT saturation. This innovative differential protection relay is easily implemented, and is powerful enough to handle unbalanced faults from negative-sequence elements.



▲ Figure 2: New three-terminal protection scheme

RESULTS:

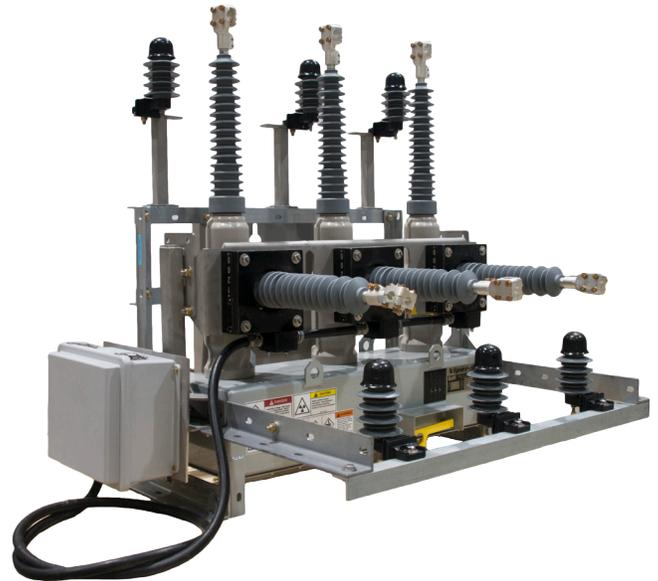
Full Package

UEC received a customized solution from G&W as a complete package, including the Viper-S recloser, SEL-311L relays integrated into a pole mount enclosure, and the slip-over type external CTs. This site-ready solution also includes the lightning arresters mounted on the Viper-S frame and a pole-mount bracket.

For More Information

For more information regarding this application, and to learn how G&W can provide solutions for your line current differential needs, please contact your local G&W representative.

Also visit: www.gwelec.com/reclosers.html



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