

Alternative ground fault protection for PVI switches

The utility has numerous locations where they use large, three phase transformers which require ground fault protection. G&W Electric’s puffer vacuum interrupter (PVI) switches with Type 2 VI trip modules were purchased for this application, however the utility had some special requirements. First, for ease of coordination with other protection devices on their system, the utility requested that the ground fault feature of the vacuum interrupter trip module follow a similar protection curve. G&W Electric’s Type 2 trip module provides ground fault protection, however it is based on a threshold principle and time delay combination. Therefore the protection level does not follow a curve but is a straight line set at a value selected by the customer. When the ground fault follows a curve, the protection level (time delay) varies with the magnitude of the ground current. This scheme would allow a longer time delay for smaller ground faults and a shorter time delay for larger ground faults. This was the customer’s preference.

Secondly, the utility wanted to initiate a ground fault trip based off of real time ground fault current measurements. To accomplish this, current transformers were installed around the combined ground wires of each three phase switch feeder circuit. G& Electric’s Type 2 ground feature is based on a calculation of the phase imbalance.

The utility turned to G&W Electric for an alternative solution. In working with the customer, it was determined that the protection devices they mostly wanted to coordinate with utilized the SEL- 501-2 relay from Schweitzer™ Engineering. Both G&W Electric and the customer agreed that the best solution would be to work with Schweitzer to incorporate the 501-2 relay into the G&W Electric design rather than try to redesign the Type 2 trip module. The customer was pleased for this simplified their coordination requirements and eliminated the need for additional training of operating personnel. G&W Electric created a VI interface board that would allow the SEL relay to control operation of the vacuum interrupters in the PVI switch. A separate enclosure was added to the switch padmount enclosure to house the relay, UPS and wiring junction box. It must be noted that the SEL relay does require a 120 V source for powerup. The G&W Electric Type 2 trip module is self-powered.



Figure 1: SEL-501-2 control in switch enclosure.



Figure 2: SEL-501-2 control panel close-up