



Case Study 2: Voltage Monitoring and Auto-Sectionalizing



Customer: Investor Owned Utility

Location: Southeast U.S.

Problem Definition: The Utility's industrial customer is a 12 MVA load served off a 46 kV line with both a primary and secondary (backup) source; there are two 46 kV lines from separate substations separated by a normally open switch on one side of the customer's tap line. The customer has had low voltage problems when switched from the primary to the secondary source, which typically occurs whenever the Utility performs maintenance on the 46 kV line. Also, line faults on the primary source cause costly service interruption to the industrial customer until the secondary source is switched in. The industrial customer is a process manufacturer and can experience significant financial loss by both voltage drops and loss of service. The Utility has used a single, group operated disconnect switch to manually switch from primary source to secondary.

Business Objective(s): Improve power quality and system reliability. Reduce customer outage time.

Primary functional requirements of the new system were to include: (1) a means to switch in or out (close or open) both primary and secondary 46 kV feeders, (2) monitor and report voltage on both feeders, and (3) automatically switch in secondary source upon loss of potential on primary source.

Other requirements included: (4) a light weight, unitized, factory pre-assembled equipment package that was easy for field personnel to install.



Solution: To meet the customer's several requirements, SEECO provided an integrated solution, which included these major system components:

- (2) SEECO 69 kV, 1200 amp center-break switches
- (6) SEECO 69 kV, 1200 amp combination current and voltage sensors; one per phase
- (2) SEECO motor operators with integral power supply (batteries and charger)
- (2) Quindar RTU's w/ communication devices
- (2) SEECO aluminum truss assemblies

Note: Though the circuit is currently operated at 46 kV, the new switch/sensor units were supplied with ratings for 69 kV anticipating the later upgrade of the system.

One of the primary requirements for the new system was to monitor and report voltage on either side of the customer's tap line. Utilizing the voltage sensing function of the combination sensor device (type CSVS) provided the data collection capability to capture and report the actual voltage information necessary for the Utility to regulate service to the industrial customer. One sensor was used for each phase so that voltage differences between phases could be recognized. Voltage could then be regulated at either the primary or secondary source (station) at the System Operator's discretion.

Another major requirement of the new system was to provide an automatic throw-over capability in the event a line fault caused loss of the primary source; when this occurs the secondary source is switched in automatically. Automatic throw-over utilizes the voltage-monitoring function of the combination sensors in conjunction with the auto-sectionalizing feature of each motor operator. The sensor provides indication of the presence or absence of voltage, which then initiates the independent automatic operation of the motor operator through the operator's internal logic to open or close the switch.

The complete equipment package was fully factory assembled and adjusted prior to shipment. To unitize the SEECO 69 kV center-break switch, individual switch poles were assembled, adjusted and then mounted on the assembled truss. All three poles were then connected to the interphase pipe and the crank arm was adjusted for toggle (closed position). This enabled the unitized switch to be shipped installation-ready with no field assembly or adjustment required, other than to mount the switch and motor operator to the concrete pole structure, connect the sensor communication cable, and hang the vertical control pipe.

The total equipment package when installed weighed approximately 1,500 lbs making it extremely light in weight. An aluminum truss structure was used because it provided a more favorable strength to weight ratio than steel. The current and voltage combination sensors weighed just 63 pounds each, far less than comparable oil filled CT/PT devices. The light weight of the switch/truss combination made it easier to handle and work with, contributing to the ease and speed of installation.

SEECO provided a single vendor solution to the Utility, acting as the integrator of all material regardless of source. The customer recognized the benefit of writing a single purchase order to one supplier (SEECO), who provided one point of coordination and one vendor to guarantee the performance of all elements of the new system.