

Subject: Single Phase Circuit Automation

Customer Category: Midwest Municipal Utility

G&W Products: Automated vacuum interrupters.

Utility Information: Utility serves approximately 47,000 residential and 3000 commercial/industrial customers. Distribution system is 90% underground and 10% overhead. Nominal system voltage is 12.47kV transformed from 34.5kV and 138kV transmission. Refer to system diagram on page 2.

Issue: Utility records showed that 75% of all outages occurred on their single phase circuits, most of which are direct buried. The faults typically seen on their direct buried lines are permanent, caused by construction dig-ins and cable deterioration. Repair crews indicated that manual troubleshooting to locate and repair the faulted cable took much more time than the repair of a major feeder. In an effort to improve reliability to their customers, this utility looked for an automated system to quickly isolate and restore faulted circuits.

Solution: The objective of this project was to have an economical, automated single-phase switch with pro-

tection that would coordinate with upstream fuses and would allow the control room operators to receive indications during different alarm conditions (Loss of AC, Operation of Switch, Trip Event, etc.). Based upon these alarms, the operator would then have enough information to quickly reconfigure the system remotely.

The utility and G&W developed a solution that will be used on all single-phase circuits. The G&W single phase padmounted vacuum interrupter was equipped with a motor operator and controller, electronic trip module controls, and a micro RTU/communications device (See Figure 1). The motor controller and auxiliary contacts are fed into the micro RTU. The micro RTU component is a newer technology supplied by Telemetric. It integrates cellular technology with some basic programmable logic and limited I/O to create an ideal partnership with the G&W single phase device. It communicates via the control channel of the cellular network and via the internet. When the vacuum interrupter has tripped, or if one of the user-programmable alarm conditions occur, the micro RTU contacts the operator via an alphanumeric cellular phone message and also sends a change of state indication to the customer's private, secure website. The operator can then operate any of the switches and receive new status indication remotely.

The G&W single phase vacuum interrupter was selected because it is a proven, robust, fuseless, resettable overcurrent protection device. It provides accurate coordination with any type of upstream fuse in case of downstream circuit fault isolation. The motor operator allows the operator to remotely open or close the device to reconfigure and restore service after a fault has been isolated or repaired. Standard controls provide the operator with switch status and system health information. Integrating the micro RTU provides a vehicle to communicate alarm and control signals.

Results: This package provides the optimum balance between system features, flexibility and cost. The utility plans to automate their entire single phase distribution system over the next two years.

For more information: Contact your G&W Electric Company representative, or visit www.gwelec.com.

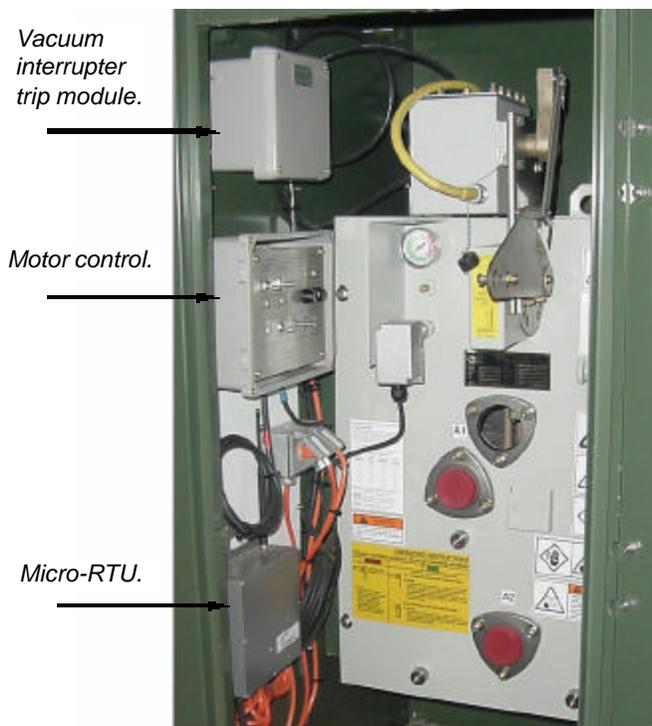
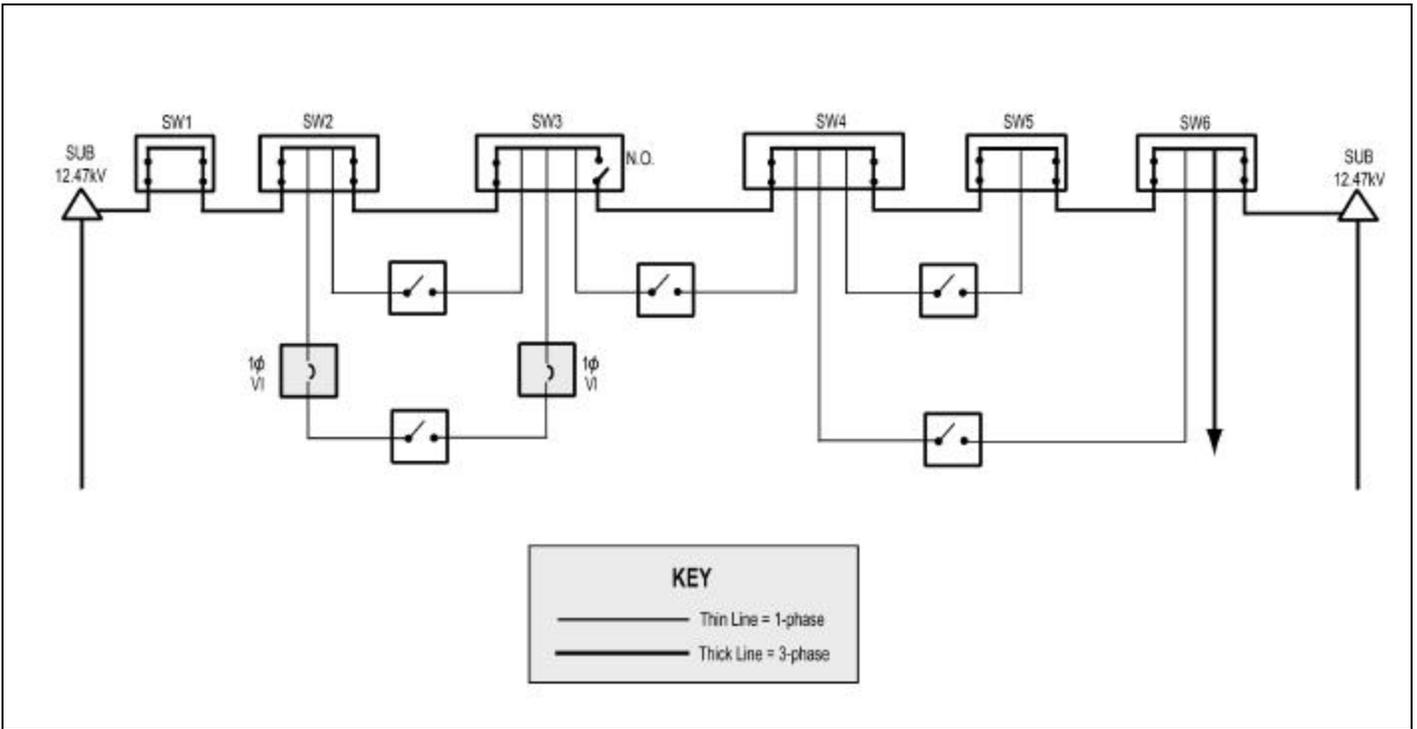


Figure 1: View of vacuum interrupter with enclosure open.



System Configuration

Typical circuit is a main loop configuration utilizing 600A padmount, three phase switchgear with 200A single phase taps. A normally open point (SW3) provides the capability to reconfigure the system in case of a problem.