AIL Elettricità in Lugano, Switzerland Re-Vamps its fault location concept

Vamp Ltd has delivered the VAMP 255 Feeder Manager Relays for AIL Elettricità's 150/16 kV substations. The feeder managers are installed in the substation incoming feeders for fault location function. Before the investment decision AIL Elettricitá has thoroughly tested the performance tolerances of the VAMP Feeder Manager Relays. The test results have been positive and AIL Elettricità has found the performance accurate both in the primary tests and laboratory environment.

AIL Background

AIL is a utility managing the distribution of the electricity, gas and water at the southern part of the Switzerland close to the Italian border. With its 250 employees, AIL is the biggest distribution utility at the Italian speaking part of Switzerland having its headquarters located in Lugano. AIL Elettricità, AIL's electricity distribution department, has interconnection from 220 kV network to it's 7 substations with voltage levels of 150, 50 and 16kV. They have 104 MV feeders with 635 kilometres of cable network and overhead lines at 16 kV and 1412 kilometres of LV network. AIL Elettricità is serving 90000 customers and has a yearly capacity of 1000 GWh.

Fault Location Concept

The project was identified by the need for quickly locating and restoring the faults at the MV overhead lines. Installing the new fault locators enable AIL Elettricità to transfer the fault reactance values directly to the duty officer's GSM phone by SMS messaging. AIL Elettricità has already a DMS (distribution management system) installed for their HV network and future plan is to further expand the DMS system to cover the MV part of the distribution system as well. The installation of the fault location units should support the future expansion of the DMS system.

Thorough testing

When planning the investment, AIL Elettricità went through a thorough testing procedure of the VAMP 255 feeder manager relay's fault location function. **Eng. Marco Veri, The Head of Substation Department at AIL Elettricità** reports about the testing: "The tests were performed both as primary tests at the substation and at the laboratory environment. At the primary testing VAMP 255 unit was connected to the 10MVA, 150/16 kV transformer feeder at the Mendrisio substation. The feeder consists of both cable and overhead conductors. Two phase short-circuit was created at the sectionalising point with the reactance of 3.21 Ohms (distance of 11.13 kilometres). VAMP 255 calculated the reactance of 3.29 Ohms corresponding to 11.33 kilometres, thus giving inaccuracy of 2 % and 200 meters.

Further the performance was verified at the laboratory using NEPLAN network simulation program. The results were similar to those of primary testing, the error margin at the far end faults was found to be at the magnitude of 3 %; thus resulting in a very satisfactory performance."

Communication

The fault reactance is transferred to the control system using communication. VAMP 255 Feeder Manager relays are communicating with existing RTU's by Modbus protocol. Additionally, a parallel port providing TCP/IP connection is utilized.

Mr. Veri finds the VAMP relays communication capabilities beneficial: "All of our substations are equipped with the Ethernet connection and the fault registers and disturbance recorder files of the VAMP 255 units are transferred via TCP/IP connection directly to our office PC's."

Vamp Ltd, member of Vaasa Electronics Group, is a Finnish manufacturer of arc-protection systems, numerical protection relays and power monitoring units.

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