

Development of Highly Accurate Fault Locator System

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Abstract

In order to maintain the reliability of the electric power supply and provide information about faults to customers quickly, it is necessary to find the fault point on a transmission line in as short a time as possible. However, the maintenance work involved in finding a fault point is complicated and takes a long time, especially when the transmission line is in a mountainous area or is a long distance transmission line. Usually, we install traditional types of fault locators (FL) at these transmission lines, but they have some problems in location accuracy. So, a new type of FL with a high location accuracy and low cost is required.

In light of these considerations, we have developed a new type of FL system improving on the location accuracy and cost of the existing system. One of the new aspects of this system is the use of a new type of sensors. They can detect both the electric field and magnetic field, and measure the voltage and current on the conductors of a transmission line. The sensors are not installed on the conductors, but in close proximity to the conductors. Therefore it has advantages from the viewpoint of maintenance of power supply reliability. Moreover, the sensor has a good frequency characteristics and its output is not affected by environmental conditions. Therefore, this system can obtain the accurate fault current and voltage waves, and we use both types of data for estimation of the fault point when a transmission outage occurs.

After the development and construction, we installed the new FL system on five transmission lines of Chubu Electric Power Co., Inc. (CEPCO) and Hokkaido Electric Power Co., Inc. (HEPCO), and tested location accuracy for about three years. From the results of field tests, we confirmed that the average location error of the new FL system is about 0.4km, which is about 1/4 of the location error obtained using the traditional FL installed at the same transmission line, and the location accuracy is vastly improved.

CEPCO and HEPCO have introduced this system on 18 transmission lines up to 2004, and are planning to increase the transmission lines at which new FL systems are installed.