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KEPCO Solution for Intelligent Digital SubStation

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Abstract

The substation at the center of power energy is accelerating the efficient transportation and intelligence of electricity energy by realizing an environment for information sharing through networks and compact facilities that operate by introducing an intelligent substation automation system that converts all signals into data. As a result, KEPCO is working on building a total of 893 substations as intelligent digital substations by 2035. In the first stage, a system that digitizes low-speed and small-capacity signals such as monitoring and controlling power facilities was developed with a domestic manufacturer led by the KEPCO Research Institute and is applying it to 154kV substations at the site. In order to complete the full digital substation in the second stage, a research project is underway to develop and demonstrate a system application technology that digitizes high-speed and large-capacity voltage and current measurement signals for automatic operation of electricity facilities.

In order to operate a substation as an intelligent system based on digital technology, all signals must be defined as an information model and the medium that transmits them must be converted from the electric signal transmission method by the existing power cable to the digital signal transmission method based on the digital network system. All electronic devices must apply products that comply with IEC 61850, an international standard that is used worldwide, to facilitate compatibility and system integration between manufacturers. In the case of legacy substations, the construction and testing process of facilities at the site is performed using the physical H/W method targeting individual equipment because the electrical signal by the control cable is transmitted 1:1; in the case of digital substations, all automated electronic facilities share digital signals through the network and operate as a single system.

System engineering work and testing are done through S/W tools connected to networks that can access electronic facilities through communication. In this paper, I would like to introduce S/W-based digital substation test tools and test facilities such as interoperability test sites for digital substation engineering and testing developed by KEPCO Research Institute.