

Localized Temperature Sensing (LTS) as new approach to HV cable system monitoring and uprating

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Even if distributed temperature sensing (DTS) has been accepted as the best way to manage undergrounded HV cable systems' exploitation, there are several inconveniences that have stopped its general usage and with it the installation of fiber optics in cable screens.

The concept of Localized Temperature Sensing (LTS) tries to give an answer to utilities' needs of monitoring the real operation temperature of certain existing lines, in order to be able to optimize their exploitation regimes even if there is no fiber optics inside cable screens.

While DTS systems use Raman or Brillouin effects, LTS system uses Bragg effect to measure the temperature in some defined points of the cable system with measurement answers every second and accuracies of 1 °C.

These Bragg sensors can be connected in parallel through standard G652 single mode fiber optics, so they are installed in the accessible points of the cable route (joint bays, substations, GIS building) without the necessity of laying new fiber optics in case there are available communication fiber optics in parallel to the HV circuit.

Each sensor is customized according to the final place where it will be installed in order to measure temperature, strain or both, and to fulfill the IP and pollution requirements.

This article presents the pilot installation of the first LTS system applied to a cable system, hosted by UNION FENOSA DISTRIBUCIÓN in one of their HV circuits in Madrid. It describes the development of the equipment, its specifications, the process of customizing the sensors, their installation and the first results of the on line measurements.

LTS will make possible the on line temperature measurements required to achieve the exploitation flexibility necessary to answer to the challenges that the HV grid will face in the forthcoming years with a reduced installation and economic impact.