

INOVATIVE DEVICE FOR CONTROL OF ELECTRIC ENERGY CONSUMPTION

Prof. A. Mikhalevich, Institute of Power Engineering / National Academy of Sciences of Belarus,
Tel. +375-29-5007269, e-mail: amikhal@bas-net.by

Prof. J. Matukas, Vilnius University

Prof. V. Palenskis, Vilnius University

S. Žvirblis, of Power Engineering / National Academy of Sciences of Belarus

Overview

Today a particular interest is pointed to smart networks and to its development. A leading scope in the sphere of such networks is an effective usage of electric energy and better fulfillment of customer requirements. Nevertheless of the implementations of such inovative means, yet still there are losses in account of electric energy. According to World Bank statistics on account of the losses of electric energy follows that state-of-the-art electricity meters do not protect from illegal consumption of electric energy. According to statistics non-technical loses in electricity distribution vary from a few per cent in developed countries up to even 30 or more per cent in Latin America, India, some regions of Russia and others exceeding 10 billion USD lost revenue per year Worldwide. This problem is also actual for some EU countries (Bulgaria, Romania, Spain, Portugal, Italy *etc.*). It requires the new technological solutions.

In Vilnius University and Institute of Power Engineering the multifunction smart controller for electricity meters was developed which assure the precise account of consumption of electric energy, and the prevention of the losses of comercial electric energy in both traditional and smart electric distribution networks .

Scope

To implement in maintenance the new smart devices which would make the more effective and economical functioning of processes of saving, account and consumption control of electric energy.

Benefit

- due to not used reserves the addition into budget of both state and electricity supply organizations without increasing the tariff of electric energy for consumers;
- fire protection of municipal and commercial objects, prevention the usage of damaged electric equipments, and also protection in the case of emergency in electric network;
- protection of electric installation and appliances in consumer network from the damage and ignition due to emergency cases in the supply network;
- prevention of illegal consumption of electric energy due to such control, which completely transfer all control functions to controller, the latter immediately disconnect the illegal consumer, when he tried the illegal use of the electric energy.

Other advantages

- fabrication of the device “all in the same one” for account electric energy, input connection, and extended safety functions will decrease the total cost needed in the case for separate mentioned devices;
- the device also gives indirect benefit, because it decreases the expenses for energy suppliers, fire and insurance companies, consumers and other related groups;
- proposed device has no prototypes in the modern-day market, it is competitive and has a large potential.

It is input connection device and is designed to connect the consumer network to the electric supply network.

Particularities of device operation

The device can operate in two modes:

1. Normal, when the supply voltage is normally connected to the input.
2. Extreme, when the „null“ (ground) lead is disconnected from the input circuit, and the device has not the supply voltage. In this case other electricity meters become inactive, *i. e.* they do not calculate the electric energy, though the current is flowing through the meter, when the customer uses the local earthing. Besides, the electricity meter itself has no illegal marks of preparation for illegal consumption. In the case of such attempt of illegal consumption of electric energy the controller automatically disconnect the customer network from the supplier network. The customer can connect to supply network only then, when he will repair the earthing damages. In other cases the smart controller always will disconnect from the supply network. There is a possible modification of this smart controller, which can calculate the used electric energy. In this case the electricity meter operates without supply voltage.