

## ANNOTATION

of the dissertation of Zhakipov Nazhmitden Berekeliuly "Development of methods and device of technical support of electrical safety in electrical networks with voltage up to 1000 V", presented for the degree of Doctor of Philosophy (PhD) in the specialty 6D071800 - «Electric Power»

**Relevance of the work** – the experience in operating three-phase electrical networks with voltage up to 1000 V at mining enterprises is in poor condition. This has an impact on internal power supply and operating safety of electric plant with voltage up to 1000 V at mining enterprises.

To improve the efficiency of internal power supply at mining enterprises, Doctors of Science Gladilin L.V., Schutssky V. I., Batsezhev Y. G., Sidorov A.I., Suvorov I. F. and others have made a significant contribution by developing a method for monitoring the state of isolation and developing technical means for protection of person against electric current.

Studies have shown that a control of a condition of isolation is performed poorly in the voltage in unbalance in the power grid, the main reason for this is that there are no effective methods for determining the parameters of isolation in a network with the isolated neutral with voltages up to 1000 V at damage of isolation of any phase concerning the earth. There are no effective methods and techniques of determining the current leakage and voltage in three-phase networks with isolated neutral with voltages up to 1000 V.

Based on the above mentioned, it follows that the development of methods and technical support of electrical devices in the networks with voltage up to 1000 V is relevant, so it provides the reliability of the internal power supply of system and ensures the growth of electrical safety in the operating electrical plants in mining enterprises.

**The work purpose** – achieving new scientific results that will solve a major scientific challenge in technical ensuring of electrical safety in networks with isolated neutral with voltages up to 1000 V by developing methods for insulation monitoring devices and monitoring the integrity of the breakdown fuse for networks with isolated neutral with voltage of 1000 V at mining enterprises.

**The idea of work** – is to use mathematical dependencies to determine the full and active admittance of network isolation from changes in linear tension and phase voltage with respect to ground after connecting an additional conductance between one phase of electric network and earth; to develop devices for controlling integrity punchy fuse for networks with isolated neutral with voltages up to 1000 V at the mining enterprises.

**Scientific novelty of this work consists in development of:**

1. Mathematical dependencies of defining:
  - the insulation parameters in asymmetrical three-phase power network with isolated neutral with voltage up to 1000 V based on the measurement of the line voltage, measurement of the current single-phase ground fault and phase measurement of voltage with respect to ground before and after the connection of active additional conductivity between it and the ground;

- value of the current leakage in a three-phase unbalanced network with isolated neutral with voltage up to 1000 based on the measurement: phase voltage with respect to ground after connecting more active conduction; admittances network isolation; total conductivity of insulation before connecting the network more active conduction; total conductivity of insulation network connection active after more conduction
  - touch tension in a three-phase asymmetrical power network with the isolated neutral with voltage up to 1000 V based on measurement: concerning phase-to-ground tension after connection of active additional conductivity; admittance of isolation of a network; total conductivity of isolation of a network before connection of active additional conductivity; total conductivity of isolation of a network after connection of active additional conductivity, and use of standardized parameters resistance of a network of grounding, coefficient of tension of a touch.
2. The device of controlling integrity punchy fuse in three-phase networks with isolated neutral with voltages up to 1000 V of mining enterprises through the use of thyristor optron as a measuring element that provides the sensitivity.

**The practical importance of the work is to develop:**

- The controlling device of the integrity of punchy fuse for networks with isolated neutral with voltages up to 1000 V at the mining companies aimed at providing electrical safety;
- methodology for determining the parameters of the state of isolation in a three-phase asymmetrical power network with isolated neutral with voltages up to 1000 V;
- methodology for determining the current leakage in a three-phase asymmetrical power network with isolated neutral with voltages up to 1000 V;
- methodology for determining the voltage of touch in three-phase asymmetrical power network with isolated neutral with voltages up to 1000 V.

The developed techniques provide a satisfactory accuracy, simplicity and safety of the work performance in the determination of the unknown quantities. By taking it into account the state of electrical safety in the operation of electrical equipment is being analyzed.