Features of Control at a Hydro Power Plant

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ABSTRACT

in this article, the main functions, control of modes and elements of modes of hydro power plants are considered, conclusions are given.

Keywords: hydroelectric power plant, energy, regime, parameters, energy system.

Hydro power plant (hydroelectric power plant) is a set of structures and equipment in which a single concentration of energy and its transformation into electricity are carried out.

Hydroelectric plants are an important part of energy systems. One of their main functions is to cover the load peaks and provide a load Reserve in the event of an emergency in the energy system. It should also be remembered that hydroelectric power plants are the most "clean" and inexpensive source of electricity.

Today, the efficiency of hydroelectric plants can reach 95%, which is a very high value, but the efficiency of hydroelectric power plants directly depends on the station regime and the efficiency of the implementation of the energy system requirements.

In this regard, the tasks of finding the best options for managing a hydroelectric plant during Operation come to the fore. However, before moving on to solving these problems, consider the features of managing hydroelectric power plant regimes.

The concept of mode of an electric power system is multifaceted and can be considered accordingly from several points of view: mode as a state, mode as a technological process and mode as a process control. Consider the main elements of the control mode.

The mode of operation of the hydroelectric plant:

- Mode as status (set of requirements and criteria);
- Mode as a technological process (set of mode parameters);
- Mode as management process (types and levels of management);

Mode refers to the composition of mode parameters as a technological process. Regime parameters include the characteristic values of a certain working state of technology and technologies at a certain time.

The most characteristic parameters for hydroelectric power plants:

- Active capacity of hydro aggregates;
- Reactive power of hydro aggregates;
- Effectiveness of Hydro hydrogenates;
- Voltage at Generator terminals;
- Composition of Station Units, etc.;

In this regard, two different modes can be distinguished.

1. steady state.

This mode is characterized by the fact that its parameters do not change, or they change very slowly and irregularly.

2. Transition mode.

This mode is characterized by a rapid change in its parameters over time.

In terms of the size of the mode parameters, we distinguish:

- Normal steady state in which the values of the regime parameters are close to the values necessary for the proper functioning of consumers or are located in a predetermined zone of these values;
- Some of the parameters are located within the limits of their normal state weight mode.
- State of emergency mode where some or all of the mode parameters exceed the allowed values
- Post-accident steady state where parameters may be close to normal mode parameters, in which case the accident result can be considered successful; if parameters are very contrary to normal mode parameters, the result should be considered accidents dysfunctional.

The mode as a state refers to the power system of the power plant and a number of requirements and restrictions on the part of consumers.

1. Ensuring the reliability of basic power equipment;

Reliability is the property of an object or technical device to perform specified functions, maintaining the values of the specified operating indicators within the specified limits corresponding to the established modes and conditions of use, maintenance and repair.

2. Electrical quality assurance;

The term" quality of electricity " refers to the degree of compliance with the characteristics of the electricity generated at the station, the set of normalized indicators of electricity.

3. Ensuring energy supply efficiency;

In modern conditions, the main indicators of station efficiency are often its technical and economic indicators, which can be related to technology and technology, or have commercial content.

Control of the energy system falls on its three sides:

1. Administrative and production management;

This type involves the management of all types of flows (raw materials, financial, etc.), both within the system and in the interaction of the system with the external environment. According to the temporal hierarchy, this process includes the place of operational, current and prospective planning. In this case, as a rule, there is enough time to make a decision.

2. Technological management (automatic regulation);

This type of control is carried out both at the speed of the production process (regulation of parameters with mode automation) and at the level of planning – determining the dates of repair, preventive measures, modernization based on the rules for operating the equipment and controlling its condition.

3. Operational management;

It is carried out by the operational staff of energy facilities of different levels and is reduced to managing technological flows during the process, generating, converting and transmitting energy. It involves controlling the values of the mode parameters, the operation of automation tools and the corresponding adjustment of the mode of operation of the equipment based on the requirements for the production process – both technological limitations and tasks at higher levels of control.

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