

THE RELEVANCE OF THE APPLICATION OF MICROPROCESSOR RELAY PROTECTION

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ABSTRACT

The article examines the relevance of microprocessor relay protection devices. The advantages of programmable information devices are announced. The fields of application are considered, as well as the advantages and disadvantages of these types of protection are analyzed.

Keywords: relay protection, microprocessor devices, reliability, automation.

АКТУАЛЬНОСТЬ ПРИМЕНЕНИЯ МИКРОПРОЦЕССОРНОЙ РЕЛЕЙНОЙ ЗАЩИТЫ

АННОТАЦИЯ

В статье исследуется актуальность микропроцессорных устройств релейной защиты. Озвучены преимущества программируемых информационных приборов. Рассмотрены области применения, а также проанализированы достоинства и недостатки данных типов защиты.

Ключевые слова: релейная защита, микропроцессорные устройства, надежность, автоматика.

INTRODUCTION

Relay protection (RP) is a complex of automatic devices designed to quickly identify and separate damaged elements of this electric power system from the electric power system in emergency situations, in order to ensure the normal operation of its serviceable part. The actions of relay protection devices are organized according to the principle of continuous assessment of the technical condition of individual controlled elements of electric power systems. RP carries out continuous monitoring of the condition of all elements of the electric power system and reacts to the occurrence of damage and abnormal modes. In case of damage, the RP must identify the damaged area and disconnect it from the electric power system (EPS) by acting on special power switches designed to open the fault currents[3].

Relay protection is the main type of electrical automation, without which the normal operation of power systems is impossible.

One of the strategic tasks of the energy sector is the comprehensive technical re-equipment and reconstruction of the RPA systems with a focus on maximum automation of dispatching control operations. The solution of this problem is impossible without the use of microprocessor devices.

Microprocessor relay protection device (MRPD) is a relay protection device implemented on the basis of microprocessor elements.

At present, MRPDs are the main direction of development of relay protection. In addition to the main function — the emergency shutdown of power systems, MPRS have additional functions in comparison with relay protection devices of other types (for example, electromechanical relays) for the registration of emergency situations. In some types of devices, additional protection modes are introduced, for example, the function advanced shutdown of synchronous electric motors in case of loss of stability, the function of long-range redundancy of failures of protections and switches. These functions cannot be implemented on electromechanical or analog-based relay protection devices[3].

The advantages of the MPRS include: Performance, selectivity, sensitivity, reliability.

The disadvantages of the MRPS include the use of a microcontroller — higher cost and non-maintainability (in case of failure of the functional unit, it can only be replaced entirely) In addition, in the absence of a single standard for equipment, MPRS of various developers are not interchangeable[4].

Modern trends in the design of microprocessor protections.

If we introduce a certain indicator: the "coefficient of specific functionality" (CUF) of microprocessor relay protection devices (MPDs), which characterizes the degree of functional saturation per unit volume of MPDs, then we can state that this indicator is growing from year to year: the physical dimensions of MPDs remain unchanged (or even decrease), and their functionality they are constantly expanding. Since the value of the CUF is directly related to the level of technology and technology, the increase in the CUF is usually directly associated with the technical level MPD and high technological capabilities of the manufacturing company. Is this trend useful and does it really lead to an increase in the quality of MPD? At first glance, yes, because, as noted above, the increase in the CUF is provided by The use of more advanced materials, elements and technologies is directly associated with an increase in the technical level of the MPD. In fact, everything turns out to be not so simple. Since the progress in the field of new materials and technologies is actually not as rapid as the

manufacturers of the MPRD would like, any methods are used achieving the set goal, that is, increasing the KUF. The constant complication of software, the "heaped-up" interface, a huge number of functions that are not used in practice have already become a trend, significantly complicating work with the MPD and increasing the likelihood of error due to the so-called "human factor". Some frequently advertised "outstanding abilities" MPAs that increase the KUF, for example, such as complete internal self-diagnosis, in fact turn out to be nothing more than an advertising trick designed to justify the complication and increase in the cost of MPAs [1].

CONCLUSION

Currently, relays on an electromechanical element base meet all the necessary requirements for both RPA devices. On modern MRZ, the functions of the RZ are combined with the functions of data transmission and accumulation, information processing, emergency registration, and others. Such multifunctional complexes are compared with simple relays and talk about the absolute advantage of microprocessor-based protective relays. However, this comparison omits the fact that we are talking about devices that perform completely different functions. In the articles describing microprocessor devices, namely MPDs, the world's leading companies and their representatives, only the advantages of these devices are disclosed. Only a few articles by well-known authors have been published on the analysis of the shortcomings associated with the transition to modern microprocessor relay protection equipment, but in fact there are enough of them. Thus, issues related to the use of modern MPAs are becoming more and more relevant.

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