

Research on Security Control Technology of Power System and its Automation Technology

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Abstract

Electric power system is an important security system in social production and living practice in our country, which plays a very prominent role in the stability of economic development. Therefore, in practice, it is of great practical significance to pay attention to the stability and security of the power system. Combined with the current power system development and application practice, we will find that automation technology has been widely used in power system. Moreover, the wide use of automation technology has realized the intelligent control and regulation of the power system, which provides important help for the operation optimization of the power system and the improvement of control precision. In the application of automation technology in power system, the problems of safety control have been found, which leads to the weakening of the value of automation technology and affects the stability and security of power system operation. In this paper, the safety control technology of power system and its automation technology is analyzed in order to provide some reference for the current work practice.

Keywords

Power System; Automation Technology; Safety Control Technology.

1. Introduction

As an important guarantee system of production and living practice and social and economic development, the value of electric power system is self-evident. In practice, it is of great practical significance to emphasize the stability, continuity and safety of power system operation. According to the current power system operation practice, the use of automation technology in the power system has shown outstanding value. For example, the control flexibility of the power system has been significantly improved, and the timeliness of control and regulation has also been significantly improved. Moreover, under the application background of automation technology, the operating efficiency and quality of power system have been significantly improved. Compared with the original power system, the power system under the application of automation technology has indeed produced obvious progress, but there are also problems in security control. Based on this, we make a specific summary of the generation of the problem, and discuss the solution of the problem, which is of great help to the development of practical work.

2. Power system and its automation technology

Analyzing the current power system applications will find that the power system has several components, and their components have certain complexity. From the perspective of power system automation analysis, the technical knowledge involved is more in-depth, including power system relay protection, power system high voltage technology, and safety automatic control technologies, which are very professional [1]. In the context of the general advancement of social science and technology, the power system needs to keep up with the pace of the times to achieve continuous renewal and progress. Therefore, it is not a simple matter to effectively realize the power system and its automation, but it is a more difficult task to realize the safety control of the power system and

automation. In current practice, in order to effectively control the power system and its automation, a number of control technologies and systems need to be utilized in actual operation. It is necessary to construct and use a comprehensive intelligent control system, and it is necessary to emphasize the use of expert control systems. The specific construction and use of these control systems can not only effectively improve the automation level of the power system itself, but also help improve the safety effects of the power system and the application of automation technology.

3. Safety control issues of power system and its automation technology

Analysis of the specific operation of the power system shows that the structural complexity of the power system is very prominent, so it is necessary to control the complex structure. The professional level of employees must be improved, and they must master the layout of the power system and the distribution of equipment proficiently, and at the same time make comprehensive considerations. In this way, a system that more satisfies actual operation requirements can be constructed. We have summarized the actual application of the current power system and automation technology, and found that its safety control problems are more significant, and they are mainly presented in two aspects.

3.1 Electric power and its automatic remote control safety issues

We conducted a specific analysis on the safety of electric power and its automatic remote control, and found that its existing problems are mainly concentrated in 5 areas. The following is the specific content analysis.

1) Safety issues caused by human error. Analyzing the automatic operation of the power system will find that the occurrence rate of personnel operating errors is relatively high, and the types of errors are diverse, which causes a very significant safety hazard for the normal operation of the power system [2]. The specific performance is that the position of the circuit breaker is very prone to control-by-control errors, and under the influence of some objective reasons, the wiring personnel need to work in a relatively small space, which will induce wiring errors and other situations. There are also problems such as incorrect connection and installation of circuit breakers by the staff in practice.

2) Cut into control security issues. In the context of the rapid development of computer technology, some criminals will gain illegitimate interests and invade power systems and automation systems through computers. In severe cases, the intrusion of criminals will cause the system to run stably. The emergence of this situation will greatly reduce the service quality of power automation technology, and will also cause very significant safety hazards.

3) Human error action problem. The human error action problem here specifically refers to the safety problem caused by the wrong operation caused by the staff's misjudgment during the automatic operation of the power system. According to the current practice analysis, the overall structure of the automation system is complex. Therefore, in the process of operation and maintenance, the staff need to correctly understand the characteristics of each structure of the system, and carry out corresponding maintenance work based on the correct judgment of the structure. In this way, the actual work effect will be more significant [3]. In the current practice, some staff have problems in professional judgment, so there will be misoperation caused by misjudgment, and this kind of problem is easy to cause safety problems.

4) Man-made malicious control issues. Here specifically refers to the specific use of power automation system, some physical means will destroy the normal operation of power automation, and then lead to the decline of power supply quality. In terms of malicious control, it is not technical, so the overall means is simple and violent. In the process of solving this problem, it is necessary for specialized departments to send professionals to solve it.

5) Safety accidents caused by environmental factors [4]. Combined with the current practice to do the analysis, if the control equipment works in extreme circumstances for a long time. For example, if the equipment is operated in a humid environment and accurate information collection is not possible, various types of damage will occur to the equipment due to inadequate management. This can lead to misinformation, omissions, or operational errors.

3.2 Electric Power system and its automation teleindication misinformation

Teleindication system is one of the most important systems in the application of power system automation technology. Its operation quality affects the realization of safety control. Combined with the current actual situation, it can be known that when false positives occur in remote signaling, safety problems will naturally occur. The following is a summary of the specific reasons for the teleindication misinformation.

- 1) The contact point is jittery or bad. After the signal is sent, the teleindication system mainly relies on the auxiliary contacts of the switch and the switch of the power automation system and the contacts of the signal relay for signal propagation. Because the contact is exposed to the air for a long time, its surface is very susceptible to oxidation. This oxidation will cause the contact point to be defective, so there will be a false alarm of the remote signal. In the case of a false alarm of the remote signal, The automatic operation of the power system will naturally be significantly affected [5]. Not only that, the frequent use of auxiliary contacts will lead to a relatively large gap. In this case, the connection of the contacts will be greatly affected.
- 2) It is more susceptible to electromagnetic interference. In terms of teleindication signal transmission, the acquisition device is the main device that provides power. In the early days, the power automation system mainly provided 24V DC voltage. Because the working environment of the remote signal acquisition loop was a weak current environment, it was very susceptible to electromagnetic interference. In this case, teleindication misinformation situation will occur. Teleindication misinformation has caused problems in the normalization of power system operation.
- 3) The motion channel has error code because of interference. In terms of the specific use of RTU power supply, it has a relatively large wave coefficient, and the problem of value voltage stability will cause the AC current to have a significant impact on the moving channel. In this way, the channel will have an error code. Under the influence of error code, the teleindication acquisition signal will appear error.
- 4) There is a glaring error in the software processing. In practice, technical limitations can cause errors in computer systems and RTU processing software on the master side. This situation affects the stability of the teleindication signal, so there is a signal false positives.

4. Safety control strategy of power system and its automation technology

Combined with the current power system and automation technology application practice, it can be seen that the safety control problems will lead to the decline of the overall safety effect of power system operation. This is very disadvantageous to maintain the stability and high quality of the power system operation, so in practice we need to actively summarize related problems. Through comprehensive analysis, it is found that in order to comprehensively solve the safety control problems of power system and automation technology, it is necessary to choose and implement strategies from the following aspects.

- 1) Emphasize the line numbering method to take. In terms of the specific work of the power sector, the value of the power automation system is very significant. Combined with the current operation practice of remote control system, it can be found that the remote control signal points only correspond to the line numbers of the main station terminal, and this situation is very easy to cause the wrong operation of equipment. Therefore, in practice, in order to avoid the occurrence of misoperation, the staff can number the signal points and then control the breaker to number, which can effectively improve the level of remote control [6]. Based on the analysis of practical work, the specific way of line number is the unified management of circuit breakers. The safety control problem of automation technology can be effectively alleviated by strengthening the safety control through the consistency of management.
- 2) The use of return correction control mode. Combined with the current remote control safety control of power automation system, in order to achieve safety prevention, the use of return correction control method has a very good effect [7]. In essence, the check and check of remote control return correction

is a very important function. But in the actual operation of electric power automation, it is difficult to play a prominent role in the reverse correction control mode. Therefore, the staff must carefully carry out a comprehensive inspection of the electric power automation system, emphasizing the play of the check and check function in the practice of return correction control. In this way, the practice effect of repeat correction control will be significantly improved, and the comprehensive effect of safety control will be significantly strengthened.

3) Emphasize the use of channel check mode. Summing up the operation practice of power system, it can be seen that in the process of automatic operation, the master station will send a request to the system, and the system can automatically check the parameters [8]. If the parameter is in the normal state, the system will automatically give a response. If there is an obvious error in the parameter, the system will reject it. It is emphasized that the correct connection state can be established by using the channel check mode, and the power automation system will require the master station to enter the password. If the password can pass the verification, then will connect directly; If the password is incorrectly entered three times, the automatic system will directly alarm and close the channel. In this way, the practical effect of safe operation will be significantly improved.

4) Increase the teleindication signal sampling voltage. Combined with the operation practice of the power system, in order to effectively improve its anti-interference ability, the staff will often increase the early commonly used RTU power supply voltage from 24V to 220V. In this way, the value of the power supply voltage will be significantly higher than the secondary circuit voltage of 180V, so the ability of the power system to resist external interference factors will be effectively improved, and the accuracy of the teleindication signal will be significantly enhanced. The specific use of this method is a relatively common way in the current power automation system [9]. Combined with the relevant power system maintenance data analysis, it can be seen that the effective use of this method greatly reduces the frequency of false positives in teleindication, and the safety control effect of the power automation system has been significantly improved.

5) The method of double contact collection is adopted. According to the analysis of the current application practice, the so-called double contact acquisition specifically refers to the selection of any two contacts from the switch device, so that TeleIndication signal through the acquisition device, and after the processing of the device is transmitted to the computer system at the master station end. With dual contacts, the accuracy of the TeleIndication signal itself will be significantly improved as both of the teleIndication signals can operate at the same time. Combined with the specific use of this method, it will be found that its impact on the secondary loop changes is relatively small, so the operability of this method is very prominent. Based on practical analysis, in current application practice, double contact acquisition mainly has the following three ways: 1. Two contacts are connected in series to realize the function of "and" calculation [10]. 2. A pair of normally open or normally closed contacts can be connected at the same time to realize the operation of "AND" and "NOT". 3. Realize a pair of normally closed contacts in parallel, through the "OR" logic to achieve the output of the circuit. In practice, although the use of this way is also the use of double contact, and to achieve the effective suppression of contact bad situation, but the amount of signal will appear significantly increased. In this case, the processing burden of the acquisition device will be increased, which will result in a significant increase in construction mate.

6) To strengthen the equipment operation management. In practice, the operation and management problems of equipment also lead to safety control problems. Therefore, in practice, the operation environment of the secondary automation equipment should be monitored and strengthened, and timely dehumidification and dehumidification should be done to ensure that the environment can meet the operation needs of the equipment. In this way, the adverse effects of the environment on the equipment have been significantly controlled. At the same time, do a good job of periodic inspection of equipment, in the necessary areas to do a good job of sealing work. This can effectively prevent small animals from entering the equipment and causing damage. The stability of equipment operation and the effectiveness of safety control will be significantly enhanced.

5. Conclusion

To sum up, the specific utilization of power system and automation technology plays a positive role in the operation stability and efficiency improvement of power system itself. However, according to the current practical research, there are many problems in the application of automation technology in safety control, so it is necessary to actively solve these problems in practice. This paper analyzes the safety control problems of power system and automation technology, and discusses the specific methods and measures to solve the safety control problems, its ultimate purpose is to guide the practice work.

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