Research and Application based on the Condition Monitoring Device for Drop -out Fuse

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Abstract: This article is aimed at the technical bottlenecks of the existing drop fuse monitoring technology. Based on a full investigation and a lot of literature, based on the characteristics of the drop fuse after a failure, it combines modern methods such as wireless communication and mobile phone SMS to cooperate with the corresponding Failure research and judgment strategy, design and development of a set of drop-line fuse status online intelligent monitoring system. It has the characteristics of being easy to install on old equipment and supporting platform management. It can provide users with a variety of means to obtain operating conditions information of the distribution network, thereby effectively reducing the difficulty of troubleshooting, shortening the time for power supply recovery, and reducing power operation. Labor intensity of Uyghur people.

Introduction

Drop-out fuse is the most commonly used short-circuit protection switch for 10kV distribution line branch lines and distribution transformers. It is mainly composed of upper and lower static contacts and fuse-carrying parts (including composite fuses, fuses, and moving contacts). , Insulators and other parts. In normal operation, the fuse tube forms a closed position after the fuse is tensioned. When a short circuit or an overload fault occurs in the system, the fault current quickly fuses the fuse and forms an arc. After the arc extinguishing tube is heated by the arc, a large amount of gas is decomposed. The pressure in the pipe is raised and the longitudinal blow is strongly blown along the pipe, and the arc is extinguished due to rapid extension. When the fuse is blown, the lower static contact is turned down due to loss of tension, so that the shrinking mechanism releases the fuse tube, and the fuse tube forms an obvious breaking position, thereby achieving fault isolation.

2 Failure and Characteristics of Outdoor Drop Fuses

2.1 Principle of drop-out fuse

During the normal operation of the drop-out fuse, the moving contacts at both ends of the fuse tube are fastened by the fuse (melt). After the upper moving contact is pushed into the protruding part of the "duckbill", the phosphor copper sheet is made of the upper static contact is against the upper moving contact, so the fuse tube is firmly stuck in the "duckbill", forming a closed position. When the system fails, the fault current quickly blows the fuse and forms an arc. The phenolic paper tube lined with the fuse tube generates a large amount of gas under the action of the arc. Because the upper end of the fuse tube is sealed, a high pressure is formed in the tube. The gas is sprayed downward to form a vertical blow, and the arc is rapidly stretched and extinguished.

2.2 Drop-out fuse failure and its cause

Drop-out fuse failures are usually manifested in the following areas:

(1) The fuse has not fallen because of a load failure (action is incomplete)

(2) The drop-out fuse should be fused but not fused when the load fails (refuse to move)

There are three reasons why a fuse cannot operate correctly in a realistic 10kV line system.

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2.3 The problem of poor maintenance

Drop-out fuses are operated outdoors all year round, especially for circuits with a long load, the fuse tube will be exposed to water and moisture, causing mildew, which will cause the fuse to break and the mechanism to rust. At the same time, maintenance and repair are not carried out in some places all year round.

Drop-out fuses have been operating for many years,

2.4 The fuse is loose

When replacing the fuse, because it is too tight or too loose, after a period of operation, the fuse will be pulled out in an over-tight state or the fuse will come loose, causing a tube failure.

3. Intelligent State Monitoring Technology for Drop Fuses

Aiming at the analysis of various faults and causes of drop-out fuses, this article proposes to monitor the relevant electrical quantities of drop-out fuses by installing non-contact sensing equipment, comparing and logically analyzing the data between the electrical quantities to identify the fuse The type of the fault that has blown and formed a fault message, and then the fault message is uploaded to the dispatching center through the wireless communication device, and the maintenance personnel is notified by mobile phone SMS at the same time, so as to provide accurate information for the power company to quickly process and improve the processing efficiency .

4 Composition of Intelligent Monitoring System for Drop-out Fuse of Distribution Line

The intelligent monitoring system consists of a terminal device and a system master station. The terminal device consists of an electronic voltage transformer EVT, a collection unit, and a communication gateway. The system master station is located in the distribution automation system processing center. The terminal device can pass data information through wireless 4G The data is sent to the processing center of the distribution automation system for information fusion. At the same time, the GPS function provided by the master station can accurately locate the fault location. The data processing center pushes the data information to the client. The user can use the PC-WEB interface, Mobile browsers, text messages, etc. receive fault information data in real time, and present fault location information intuitively and accurately in the form of maps.

4.1 Terminal device

The electronic voltage transformer EVT can be installed live, which can complete the equipment assembly without affecting the line operation, which is suitable for the live upgrade of the running equipment. The 10kV overhead conductor current signal is obtained through Rogowski coil equipotential transformation, and the 10kV conductor voltage signal is obtained through I / V transformation equipotential. It is transmitted to the communication gateway through the RS485 communication interface, and the communication gateway forwards the information to the intelligent monitoring system through wireless communication.

5 Technical Characteristics

The technical characteristics of the drop-out fuse intelligent monitoring terminal device are as follows:

Firstly, the measurement circuit is completely isolated from the main circuit. The installation of the device does not require the main circuit to be powered off, and the operation status of the device is not affected by changes in the main circuit equipment.

Secondly, the fault judgment and the analysis of the operating status of the fuse adopt program logic analysis, which will not be affected by external interference. The judgment accuracy is high and the applicability is good.

Thirdly, data acquisition. The electronic voltage transformer uses inductive power acquisition

technology to accurately measure the operating voltage with a measurement accuracy of 1%, which ensures the authenticity and accuracy of the data source.

Conclusion

This system monitors the voltage and high-current fault information at both ends of the fuse, the fault current before the fuse and other information and data, to help operation and maintenance personnel find the fault point in time, and quickly realize the repair and restoration of power supply. The fault information can help the operation and maintenance personnel analyze the cause of the fault, do a good diagnosis of the fault, prevent the micro-duo gradually prevent the first, and avoid similar situations from happening again. From the perspective of applicability and safety, compared with the means of transforming the fuse body structure, increasing power equipment, and strengthening the inspection intensity, the drop-out fuse intelligent detection system can upgrade old equipment without power outages. Improve the efficiency of emergency repair, low cost, quick response, high stability, flexible network automation simple distribution automation system, more suitable for urban suburban and rural distribution network for adaptability, thereby effectively improving the reliability of the power distribution network.

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