Selection and Maintenance of Commonly Used Low-voltage Electrical Components

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Abstract: Low-voltage electrical appliances are widely used in people's daily life, and are closely related to people's lives and work, but often due to long-term use, low-voltage electrical appliances will have faults, and generally low-voltage electrical faults caused by component damage. Therefore, in the process of using low-voltage electrical appliances, it is necessary to timely detect and repair the control components of low-voltage electrical appliances, so as to avoid inconvenience to people's lives and work. In this paper, the author will elaborate on the faults and causes of low-voltage electrical control components, and propose the detection methods of low-voltage electrical control components, hoping to provide useful help to relevant people.

1. Introduction

At present, China's low-voltage electrical appliances mainly include three main types of circuit breakers, contactors and relays. The failure of low-voltage electrical appliances is mostly caused by the damage of control components. The control components of low-voltage electrical appliances are mainly divided into simple control components and complex control components. Simple control components mainly include: buttons, insurance, etc. Complex control components include: circuit breakers, contactors, thermal relays, time relays, and the like. In the event of electrical failure, use scientific and advanced testing methods to timely repair and replace the specific conditions of electrical components to reduce the impact of low-voltage electrical components failure.

2. Low voltage electrical appliances

The so-called low-voltage electrical appliances are electrical equipment with a working voltage of 1000V and a DC of less than 1200V, collectively referred to as low-voltage electrical appliances. The low-voltage electrical appliance can function as on-off, regulation, protection and control, and has high safety and reliability. Due to its different shape, structure and use, low-voltage electrical appliances can be divided into two types: power distribution appliances and control appliances; according to the operation mode, they can be divided into manual electrical appliances and automatic electrical appliances; according to the work content, It can be divided into industrial electrical appliances, marine electrical appliances, chemical electrical appliances, mining electrical appliances and other types; according to the action nature of electrical appliances, can be divided into electric appliances and manual electrical appliances; according to the use and performance of electrical appliances, Can be divided into two types of control appliances and protective appliances; according to the working principle of electrical appliances, can be divided into electromagnetic appliances and non-electrical control appliances; and so on. Different types of low-voltage electrical appliances have different properties such as moisture resistance, corrosion resistance and impact resistance. Intelligentization of low-voltage electrical appliances in China can not only protect people's personal safety, but also reduce energy consumption, especially the consumption of electricity, reduce the pressure on China's power supply system and save electricity costs, and maximize the interests of electrical appliances. It can improve the safety, reliability and energy saving of low-voltage electrical appliances.

The low-voltage electrical appliance can automatically or manually change the state and parameters of the circuit according to the requirements of the operation signal or the external field

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signal to realize the control, protection, measurement, indication and adjustment of the circuit or the controlled object. The role of low-voltage electrical appliances is:

Such as the elevator's up and down movement, fast and slow automatic switching and automatic stop layer.

Low-voltage electrical appliances can adjust some of the power and non-electricity to meet the requirements of users, such as the adjustment of the throttle of the diesel engine, the adjustment of the temperature and humidity of the room, and the automatic adjustment of the illumination.

According to the characteristics of the equipment, the equipment, the environment, and the human body can be automatically protected, such as overheat protection of the motor, short circuit protection of the power grid, and leakage protection.

Using the functions of control and protection of low-voltage electrical appliances, the operating conditions of the equipment and the working conditions of the electrical circuits, such as insulation monitoring and protection of card-off instructions, are detected.

3. Control component failure

In the failure of low-voltage electrical components, contactor failure is more common. Contactor failure is mainly caused by contact failure caused by contact failure. Contactors generally include the following: intermediate frequency contactors, AC contactors, AC vacuum contactors, DC contactors, etc. In low-voltage electrical appliances, AC contactors are widely used. If the AC contactor is damaged, it will cause certain accidents. If it is not checked and repaired in time, the consequences will be unimaginable. Contactor faults generally manifest as the following aspects: coil control line open circuit fault, the main performance is that after the power coil is energized, the contactor does not run or the operation mode is incorrect. After the power cycle is cut off, the contactor does not release or delay. Release and other conditions. Specifically, the contactor failure after the power coil is energized is mainly due to the fact that the control wire of the coil may be broken, loose, detached, aged, damaged, worn, etc. If the wire is damaged, it should be replaced, if it is loose or the phenomenon of falling off, the corresponding terminal should be fixed accordingly. If the coil is not visible to the naked eye, the resistance of the electronic ring can be tested by means of a multimeter, and the voltage of the electric ring should be tested. For standard, the relevant standard electric coil should be replaced in time. However, the contactor failure after the power failure of the electric coil is mainly due to the fact that the column in the magnetic system does not have a corresponding air gap, resulting in excessive remanence. In the general magnetic system, the air gap of the column is 0.1-0.3 mm, and if there is no air gap. Or if the air gap is too small, corresponding measures should be taken to enlarge the residual magnetic gap. It may also be because the iron core of the contactor is used for a long time, and oil stains appear, which affects the release effect of the contactor. At this time, it is only necessary to wipe off the oil stain on the surface of the contactor core, but care must be taken not to wipe too much. Light, otherwise it will cause contactor release delay. During the use of low-voltage electrical appliances, it should be regularly tested and maintained to prolong the service life of low-voltage electrical appliances.

Vacuum circuit breaker faults are also common in low-voltage electrical faults. Vacuum circuit breaker faults are mainly manifested in the operation of closing and opening. When a vacuum circuit breaker in a low-voltage electrical appliance fails, if it is not repaired in time, it will cause damage to other components of the low-voltage electrical appliance, forming a safety hazard. The vacuum circuit breaker failure generally shows the following aspects: empty. The air-to-air refers to the failure of the vacuum circuit breaker to complete the closing operation under the premise of the closing action. Generally, such failure is caused by the energy storage failure. No closing action. The failure of the closing action may be caused by the closing of the closing electromagnet, or it may be caused by the energy storage function not meeting the standard. Unable to store energy. The most common fault in vacuum circuit breakers is that the ratchets and pawls in the energy storage equipment have failed. Generally, such faults are mainly manifested in the energy storage motor, the drive mechanism and the positioning parts. As long as these three aspects are comprehensively tested, The specific cause of the failure can be quickly discovered. The brake failed. The failure of

the opening is mainly due to the fact that the remote control can not be opened regardless of whether it is operated by a remote controller or manually operated. The vacuum bubble has a low vacuum. If the degree of vacuum is low, it will not only affect the current capacity of the circuit breaker during the switching process, but also affect the service life of the circuit breaker, and there may be an explosion. The fundamental reason for the low vacuum is that the vacuum material and the manufacturing process are not in conformity. The standard causes the connecting rod to operate at a large distance during the use of the circuit breaker, affecting the operating standard of the switch and reducing the vacuum of the circuit breaker. In the failure of low-voltage electrical control components, vacuum bubble and vacuum failure are more difficult to detect, which is a hidden fault. In the event of a fault, the withstand voltage test should be performed first.

Among the faults of low-voltage electrical contacts, the most common types are faults such as contact overheating, excessive contact wear, and contact welding. The main reason for the overheating of the contact is that the heat caused by the insufficient contact pressure during the operation of the contact is too large. If the contact pressure is insufficient, the spring pressure structure can be changed. If the contact surface has oil stains, In the case of unevenness, oxidation, etc., it is necessary to treat the contacts with gasoline or a tool. The contacts are excessively worn. If it is caused by different operating frequencies of the three-phase contacts, it can be solved by adjusting the working frequency of the contacts or replacing the contacts. However, if the load side is short-circuited, it is necessary to repair the short-circuit fault; the contact welding may be Because the working strength of the contact is large and the overload is working, it is necessary to replace the contact according to the actual situation, or re-weld, or it may be because the contact pressure is too small, then the pressure structure of the contact should be adjusted. . Electromagnetic faults are also common in the failure of low-voltage electrical control components. Electromagnetic faults are generally classified into excessive noise, armature suction problems, and armature release problems. Its main manifestations are the following forms: excessive noise. If it is a noise problem caused by a low voltage, it can be solved by increasing the power supply voltage; if it is caused by oil, dust, dirt, raw embroidery, etc. of the armature and iron core, the contact surface can be directly cleaned; because the core is excessively worn, the core needs to be replaced. The problem of armature suction. If the armature does not absorb or the suction is not enough, the power supply voltage should be adjusted according to the standard of the armature suction to avoid the shortage of power supply or excessive pressure. The problem of armature release. The armature does not release or the release speed is slow. If the contact spring pressure is small, the pressure structure of the spring can be exchanged. If the contact is welded, the cause of the fusion welding needs to be checked and replaced.

4. Detection methods

At present, the detection technology of traditional low-voltage electrical control components in China is mainly for the detection of relay, contact control and contact level. It is constantly developing towards scientific computer detection technology. Compared with traditional manual electrical control technology, it is also beginning to be automated. Intelligent and technological development, especially in the life test of low-voltage electrical appliances, due to many factors, it is impossible to accurately measure and display the over-voltage data when the contacts are disconnected. Therefore, it is necessary to continuously introduce advanced detection. Technology to reduce the probability of failure of low-voltage electrical appliances.

With the intelligent development of low-voltage electrical appliances, the detection technology of electrical appliances has also put forward higher requirements. After continuous development and innovation of professional technicians in China, remarkable results have been achieved. The "High-speed Acquisition and Processing System for Electrical Test Data" developed by Hebei University of Technology is a good example. The collection and processing system of this low-voltage electrical appliance has achieved remarkable results, improving the accuracy of electrical detection, and China's circuit. In terms of intelligent detection of arc faults, there have also been major breakthroughs, improving the overall level of China's electrical testing technology

and promoting the development of China's electrical testing technology.

5. Conclusion

Low-voltage electrical appliances are indispensable in people's lives, directly affecting people's quality of life and China's economic development. In the process of using low-voltage electrical appliances, they should be regularly tested and maintained, and contactor failures and vacuums appearing on low-voltage electrical appliances. Circuit breaker failure, contact failure, electromagnetic failure, etc. take reasonable measures, and constantly research new types of detection technology, prolong the service life of low-voltage electrical appliances, reduce the occurrence of electrical failures, and promote the sustained and steady development of China's economy.

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