

Application Analysis of Actual Scene Based on Analog Sending Device and Substation Client

Xiangbei Che¹, Qiangxing Liu^{2,3}

¹Shenzhen Power Supply Bureau Co, Ltd; Shenzhen, Guangdong, 518001, China

²Guodian Nanrui Science and Technology Co, Ltd, Nanjing, Jiangsu, 211106, China

³Nanrui Group Co, Ltd. (State Grid Electric Power Research Institute Co, Ltd.), Nanjing, Jiangsu Province, 211106, China

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Abstract: At present, all provinces have put into use the analog messenger device. The system has been put into use in large quantities and on a large scale, which has brought a series of operation and maintenance problems for field staff. Based on the collocation of the analog sender and the substation client, the application of the analog sender in the actual scene is analyzed. Research shows that under the condition of ensuring no communication interruption, this collocation method can enable maintenance personnel to realize physical isolation of maintenance equipment and operation equipment, which greatly improves the safety of maintenance work. In addition, the use of analog signaling devices can significantly reduce the impact on the operating part of the commissioning process, reducing the pressure on maintenance personnel.

1. Introduction

The substation is a modern substation that is built by intelligent primary equipment and networked secondary equipment. It is based on the IEC61850 communication specification and can realize information sharing and interoperability between intelligent electrical equipment in substation [1]. At the same time of technological advancement, the problems of secondary maintenance and maintenance of substations were exposed. The electric energy metering adopts the high supply and high meter method, and the current interruption and the pressure loss chronograph are installed [2]. The reactive power compensation adopts the distributed and local mode, and the online harmonic monitoring device is installed [3]. When the arc-suppression coil grounding method is adopted for 20kV, the grounding system of the customer substation is consistent with the 10kV supply voltage, and the grounding resistance is directly less than 4Ω , but for the 20kV power supply network with small resistance grounding method [4]. Because the grounding current of the system is much larger than that of the arc suppression coil grounding system, the grounding resistance design can no longer simply take 4 [5]. It is necessary to calculate the maximum grounding fault current and check the step voltage and contact voltage to ensure that they meet the safety requirements. Therefore, power users have doubts about whether the use of 20kV power supply will increase the investment amount [6]. The system realizes integrated fault simulation by switching box, load box, communication controller, virtual load power supply, epitope fault simulator, 485 fault simulator and other components.

The client implements the specific communication service mapping SCSM stipulated by IEC 61850-8-1 in the device of the station control layer, and completes the service interaction process between the client and server of IEC 61850 [7]. It can be used not only for data transmission of background system, but also for data transmission and Realization of engineer station, remote station and relay station. The secondary physical circuit in intelligent substation is simplified, but the complexity of virtual secondary circuit is not reduced. Under the same load density, the power supply radius of 20 kV voltage level is 1.26 times of that of 10 kV voltage level, and the power supply area is 1.6 times of that of 10 kV voltage level [8]. A new load control terminal device is installed, which uses local telephone communication. The power supply for substation maintenance

is self-generating, and reliable interlocking is set with the normal power supply. It mainly discusses the calculation of grounding resistance in the design of the grounding grid of the customer substation of the 20kV voltage level grid with small resistance grounding [9]. Through the typical acquisition channel fault simulation of the power consumption information collection site, the typical measurement fault simulation and the collection terminal parameter setting query simulation and other functions. The basic skills training of the front-line personnel is realized, so that the theoretical knowledge of the operation and maintenance personnel can be seamlessly integrated with the field practice skills [10]. Therefore, the construction investment 20kV client substation has obvious advantages over the 35kV client substation. The following examples illustrate the superiority of 20kV power supply.

2. Methodology

The maximum grounding grid fault current refers to the maximum value of the fault current flowing from the soil into the grounding grid when the grounding system flows into the soil or the fault occurs outside the station. It is the most important parameter that must be known when designing the grounding grid. The design must check the contact voltage and step voltage of the grounding device according to the fault current of the maximum grounding grid to ensure that it meets the safety requirements. The power substation of a power user refers to a substation that is invested and built by the customer and built and managed by itself. The power supply company only assists in its management, and the investment in the client substation and the increase in the cost of future operation and maintenance caused by the investment amount are especially important for power users. The integrated fault simulation device of intelligent power information system in low voltage distribution transformer area can carry out training of operation experiment, equipment maintenance, fault simulation and fault detection of power information acquisition system. Promote the construction progress of the electric power information acquisition system of the State Grid Corporation, and improve the technical and technical level of the electric mining operation and maintenance personnel. According to the software settings, not only the client function but also the server function can be realized, but also the client function and the server function can be realized at the same time.

The leakage reactance of stator and rotor is calculated as shown in Fig. 1. It can be seen that the leakage reactance of stator and rotor decreases during start-up, but the leakage reactance of rotor decreases greatly. This is because the rotor leakage resistance is affected not only by the saturation effect but also by the squeezing effect.

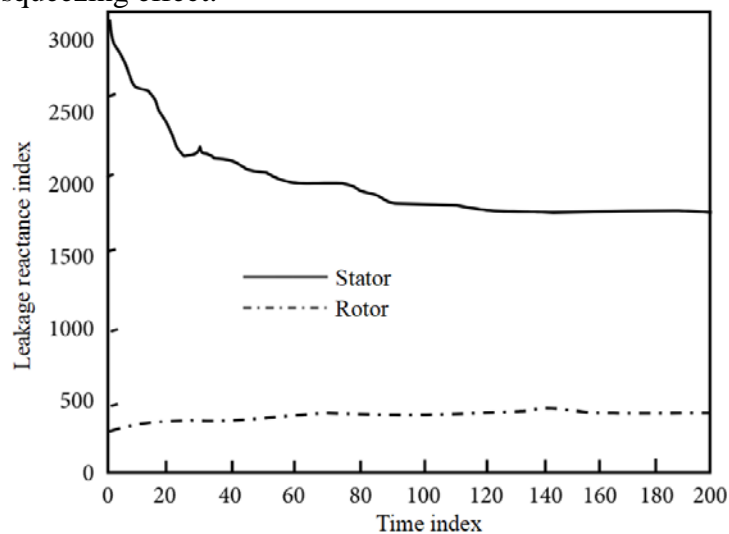


Fig.1. Stator and rotor leakage reactance during start-up

With the rapid popularization of the DL/T860 standard, the domestic intelligent substation has been put into operation for nearly a thousand. The copper secondary signal cable of the dense spider

web has been replaced by the optical fiber, and the physical structure of the secondary circuit of the substation has been simplified. Save non-ferrous metals and reduce line loss. At a comparable load level, the 20kV voltage level power loss is only 1/4 of the 10kV voltage level. During the actual inspection of the lockout logic, the acceptance personnel found that there was a problem with the electrical lockout. When the 301 switch was closed, the 302 switch could also be closed. When the 301 switch was in the open position, the 302 switch could not be closed. The line outside the station is faulty. Only the neutral point of the system substation is grounded, and the fault current returns from the point of failure to the neutral point through the earth. For the power users who originally used 20kV power supply, because of the relatively large investment in power equipment, they are more concerned about the increase of investment due to the change of supply voltage level than the original 10kV power users. The main innovations of the integrated fault simulator of intelligent power information system are the simulation of wiring and communication faults. Two kinds of wiring simulation faults, the wiring faults of AC sampling and metering circuit and 485 communication faults are mainly designed.

Oil-immersed transformer and dry-type transformer for 20kV voltage grade transformer. Short-circuit impedance is 5.5% or 6% for oil-immersed transformer and 6% for dry transformer. The insulation level of 20kV transformer is shown in Table 1.

Table 1 Insulation Level of 20kV Transformer

Neutral grounding mode	Rated voltage	Ceiling voltage	Rated lightning impulse withstand voltage	Rated short construction frequency withstand voltage	
				Oil immersion	Dry
Low rental land	20	26	85	45	50
Ungrounded or arc suppression coil grounded	20	26	115	50	50

3. Result Analysis and Discussion

Complete receiving service return result, call back function of corresponding service. Receive and process reports from servers. It can also receive and process requests from other clients. Under intelligent conditions, analog signals are transmitted through optical fibers. Simple disconnection of optical fibers will result in communication interruption of bus protection. Risk control after communication interruption is all realized by equipment, and maintenance personnel can not intuitively control. However, the power supply mode increases the number of trips and outage time of the line, and produces a large fault current, resulting in a larger step voltage, which poses a security threat to the people and equipment around. For the grounding fault in the system station, because it occurs in the system substation, 20kV belongs to the (medium) low voltage side of the system substation, the maximum grounding fault current of the substation may occur only when the high voltage side grounding fault occurs, so it is not analyzed. The device simulates the actual situation on the spot to the greatest extent, and combines the actual teaching needs, covering the practical application of the integrated fault of the power information system. Moreover, in the cooperation of the user's main station system, the functions of data acquisition, online sales and line loss management of the main station system are simulated. Site structure each attribute value read and write interface, the site structure of each attribute value read and write interface, through these interfaces access to each attribute value, plus synchronization processing within the interface to prevent read and write errors in the case of multi-threaded.

For the client transformer, the choice of the breaker short-circuit current, in addition to special circumstances, the choice of 25kA can meet the requirements. The insulation level of the 20kV switchgear is shown in Table 2.

Table 2 Insulation Level of 20kV Switchgear

Neutral grounding mode	Rated voltage	Rated lightning impulse withstand voltage		Rated short construction frequency withstand voltage	
		Right ground	Fracture surface	Right ground	Fracture surface
Low Resistance Grounding	25	90	110	45	60
Ungrounded or arc suppression coil grounded		120	155	65	74

Provide site initialization, site status processing and other operational interfaces. When using flexible pressure plate to isolate maintenance equipment and operation equipment, maintenance equipment still has an impact on the operation equipment, such as the impact of large flow of maintenance messages will affect the message throughput capacity of operation equipment. The neutral arc suppression coil grounding system compensates the capacitance current, and the single-phase fault grounding current is smaller, and it can allow the line to continue running for a period of time when the single-phase fault occurs. Through the inspection, the acceptance personnel believe that there are two main reasons: first, the current blocking voltage regulation action value is not set (then at the maximum value of 100A), the protection of the soft pressed plate is not put in. Secondly, no on-load voltage regulating switch control circuit is introduced into the blocking voltage regulating contacts (output of electric shock) of the protection device. In fact, the shunt coefficient changes during the fault, which is related to the fault source attenuation speed and the cut-off delay of the protection device. In engineering design, it is assumed that the shunt coefficient remains constant throughout the fault. By comparison, it can be found that if the scheme adopts 20kV power supply, according to the same wiring form of the total power substation and the substation, the initial investment cost is relatively small, and the land can be saved to a certain extent, and the economic advantage is better. obvious. In addition, the device has been used in the Henan Electric Power Company's electricity information collection and operation skills competition, and has been adopted by the 10th China's power generation technology competition organized by the China Electricity Council.

4. Conclusion

The training object of the integrated fault simulator of the intelligent power information system in the low voltage distribution transformer area is entirely oriented to the front-line operators. It provides training for the operation experiment, equipment maintenance, typical fault simulation and fault detection of the power information acquisition system. It not only improves the technical and technical level of electric mining operation and maintenance personnel, but also seamlessly connects the theoretical knowledge and practical skills of the students, and further enhances the ability of operation and maintenance personnel to deal with and solve on-site problems. The existing maintenance means use software to achieve security isolation, which is unsafe. After using the communication simulator, the physical isolation of the maintenance equipment can be realized. The neutral point ungrounded system is suitable for systems with a capacitive current of less than 10A. The latter two grounding systems have more overhead lines. Therefore, the investment advantage of using 20kV power supply compared with the original substation with 35kV power supply is obvious. When the condition is limited, the grounding grid resistance value is less than 1Ω, and the contact voltage and stride voltage are verified according to the maximum ground current. At the same time, the device has good compatibility, effectively eliminates the technical barrier of the technology to be promoted nationwide, and greatly improves the feasibility of project promotion.

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