The Development of Automated Testing Acquisition Terminal

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Abstract: With the mature of single phase intelligent electric meter automation detection technology, concentrator and shift acquisition terminal also need to implement automated testing. The current domestic reality for some measuring equipment in the production of automated verification or a link in the test, which still have some technical problems. It combined with the necessary human intervention, virtually increased the cost and certain security hidden danger, make the lost of the role of automation and automated verification or testing is true meaning. However, how to realize the automation of collection terminal detection is mainly to solve the problem. For intelligent electricity information collection system construction, the problems arising from the use and application, put forward to realize the automatic acquisition terminal detection scheme, for the domestic intelligent electricity information acquisition terminal test provide beneficial guidance and reference.

1. Introduction
As user electricity information collection system construction and the measurement of the electric power industry intensive work comprehensive advancement, and speed up the implementation of "complete collection, full coverage, full cost control" of the overall construction target, the provincial electricity metrological verification institutions to undertake a large number of collection terminal detection task, and the traditional way of manual detection is not only the presence of large amounts of artificial operation link, also increased the intensity of labor and fault rate, low work efficiency also difficult to meet the demand of the progress of the acquisition system construction[1-4]. At present, through the application of the automatic detection verification line system of the acquisition terminal, the production capacity of the terminal detection can be effectively improved, as well as the labor cost and labor intensity can be reduced [5-6]. However, there are still some technical problems in the realization of the automatic detection of the acquisition terminal, so the solution of the realization of the automatic detection of the acquisition terminal is discussed.

2. Necessity of realizing automatic detection

2.1. Essence of automatic detection
In view of the increasingly mature automatic detection of single and three-phase watt-hour meters, as well as the substantial increase of labor costs and various unstable factors brought about by human intervention, it is imperative to realize automatic detection of the acquisition terminal. As the intermediate link of the electricity information acquisition system, the acquisition terminal is the bridge connecting the metering instrument and the main station, and plays an important role in
connecting the preceding and the following. In view of the huge usage of the current acquisition terminal, and involves nearly 100 manufacturers. Once such a large number of acquisition terminals have problems, it will affect the availability of the entire electricity information acquisition terminal system and the accuracy and reliability of information collection. At the same time, debugging and upgrading of the acquisition terminal installed in the thread is bound to cause a large amount of manpower and material waste. In addition, there are many manufacturers of acquisition terminals, and their technical level and production level are uneven. It is likely that product standards are not agreed, product forms are diverse, and the qualified rate of product quality is low. Therefore, it is imperative to build a fully automated, unified, efficient and comprehensive detection system.

2.2. How to realize automatic detection of acquisition terminal

The premise of realizing automatic detection is that users can design flexible and arbitrary reasonable detection scheme according to their actual needs, which is undoubtedly a big problem for the realization of system software. After fully understanding the actual needs of users and carefully analyzing each testing link, the system software can create a perfect testing process model. The model can be defined as steps for a specific performance or wind energy project according to the needs of the user, and the inspection process is any combination of steps. So as to realize the automatic detection of the acquisition terminal.

2.3. Practical significance of automatic detection

The construction of an automatic detection system for electricity information collection terminals in the metering center can realize the automated centralized verification, storage and distribution of various electricity information collection terminals in the province. To realize the automation of acquisition terminal, one is to optimize and improve the efficiency of verification, storage and distribution; The second is to bring the metering assets into the large assets management category of the provincial company, which can realize the centralized management, unified deployment and dynamic management of the metering instruments and the electricity information acquisition terminals of the whole province, and optimize the assets. Third, it greatly reduces the labor cost and various adverse factors brought by manual intervention, greatly improves the efficiency of measurement and detection, and realizes the real full automatic detection. Fourth, it is conducive to the establishment of a sound quality assurance control system.

3. The difference between the acquisition terminal and the automatic detection of electricity meter

3.1. Differences in appearance

In terms of appearance, the three-phase watt-hour meter produced in accordance with 《QGDW 1356-2013》 is compared with the special transformer acquisition terminal produced in accordance with 《QG-DW1375.1-2013》. The main difference between the acquisition terminal and three-phase watt-hour meter lies in the LED display and remote communication terminal.

3.2. Purpose Difference

In terms of use, the electricity meter in accordance with 《QGDW 1827-2013》 is mainly used to measure the electricity consumption of a single user in different periods, while the special variable acquisition terminal in accordance with 《QGDW1374.1-2013》 and the concentrator in accordance with 《QG-DW1374.2-2013》 are mainly used to collect the electricity information of all the electricity meters under it and monitor the dynamic data of each electricity meter under it in real time.
By comparing the type design specification and technical specification of the acquisition terminal with the type specification and technical specification of the electricity meter, it can be seen that there are certain differences between the automatic detection of the acquisition terminal and the detection of the electricity meter. In addition, the detection environment is indoors, which increases the difficulty of deployment and transmission of acquisition terminals and the stability of communication. Current reality for some measuring equipment in the production of automated verification or testing on some link also there is a technical difficult problem, which brings to the automation of verification or testing some unreliable factors, make the production efficiency is greatly reduced, and sometimes need human intervention, virtually increased the cost and potential safety problems, make the lost of the role of automation and automated verification or testing. Automated testing communication connection, such as: collection terminal operations on a lot of technical difficulties in automatic production line, because the SIM card installed (a loose screw, two flip) operation is risky and unreliable and feasibility, and was conducted in indoor collection terminal detection to the production process of the communication not stability and continuity; In addition, the network communication environment (that is, the signal strength) directly affects the detection rate, making the whole detection process greatly reduced. In order to develop the technical problems in the communication connection, the feasibility, stability, security and sustainability of the acquisition terminal on the automatic detection line have important practical significance.

By drawing from single-phase intelligent watt-hour meter and three-phase intelligent watt-hour meter automatic verification RS-485 communication connection, combination of collection terminal local communication function of RS-232 and RS-485 meter reading terminal two road structure, through the development, and consultation with users, connects the RS-485 meter reading terminal of communication among them all the way to achieve similar to the local communication function of RS-232, collection terminal network communication module testing is made with the third party (i.e., place the main management system) acquisition of interactive communication terminal online status detection, the method that solves the difficulties of feeder automation communication, And the communication detection of GPRS/CDMA is realized.

5. Technical requirements for automatic detection of acquisition terminals
In terms of hardware, the acquisition terminal and the detection station are required to be connected automatically and stably to ensure the normal communication between the acquisition terminal and the station body. For the acquisition terminal, it is divided into the special variable acquisition terminal and the concentrator. The difference lies in the fact that the special variable has more cycle modules than the concentrator.

To solve the automatic connection between the automatic verification line system of the acquisition terminal and the terminal and realize the local communication and parameter setting, it is necessary to take into account the economy and maturity of the automatic connection of the communication port, as well as the reliability and security of the mode. At present, the domestic single and three-phase intelligent meter automatic verification line has realized the automatic connection of RS-485 port, which completes the automatic connection and information exchange between the pin and the RS485 terminal by electronically controlling the movement of the cylinder. The verification lines that have been put into operation by the metering centers of various provinces and many meter factories have almost adopted this method for automatic plugging. Especially after years of practical application verification and improvement, the success rate of connection has reached 99.8%. Therefore, it is more feasible to choose mature RS-485 automatic connection mode in the automatic detection line of acquisition terminal.

In view of the requirements of automatic detection software technology of the acquisition terminal, the master station program connects the RS485 terminal of the platform through the 2018 multi-channel server, and then connects and communicates with the acquisition terminal. In addition to realizing the communication between the master station program and the acquisition terminal, the master station program also has the function of real-time meter reading for the acquisition terminal.
through the RS485 terminal. The basic flow chart is shown in Figure 1. When the master station program is connected with the RS485 communication terminal through the 2018 multi-channel server, the various functions of the acquisition terminal are detected (such as state quantity acquisition test, electric energy acquisition test, daily timing test, etc.). The specific implementation architecture diagram of the master program is shown in Figure 2.

![Main program flow chart](image1)

**Fig.1 The flow chart of the communication**

![Main program structure](image2)

**Fig.2 The main program framework**

6. Conclusion
To sum up, the automatic detection of the acquisition terminal is an important means to ensure the reliability, rationality, consistency and security of the realization of the acquisition terminal function. At the same time, it reduces the labor cost and reduces the uncertainty of human factors to a certain extent. The productivity and detection pass rate are greatly improving for the electricity metering center in the automation of detection and collection terminal this aspect has made a significant contribution.

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