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Allocation and the configuration analysis of the automation system control functions in perspective of PLC

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ABSTRACT

PLC became popular in the early 1960s, which belongs to the digital electronic operating system. It can be capable of efficient programming, with import, export and automatic logic control, and many other practical features. The current PLC mainly used in the production of machines and in the process of controlling functions for machine production. For specific application of PLC, its allocation and the configuration are important parts affect the use effect of PLC. PLC technology in the automation system can effectively solve the problem of the automation system efficiency, to enhance the control performance. From the perspective of the PLC, allocation and configuration of automation system control functions are the key steps for more widely applying in the field of automation systems. First, this study analyzes the main components of the PLC and deeply analyzed the PLC basic working procedure. Followed it explores the control function of PLC based automation system allocation, and further analyzes the configuration of PLC technology in the automation system.

KEYWORDS

Automation control system; Automatic logic control; Allocation; Configuration analysis.

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INTRODUCTION

In recent years, with the rapid development of information science and technology, information technology has penetrated into all areas of world development. The sustainable development of automation systems also rely heavily on information science and technology support[1]. Control function of the automation system is the key factor of promoting the development of automation system. Control functions are also directly determines the level of application of automation systems, so people began to more and more attention to the use of IT automation system, especially its control function gradually especially its control function gradually got the attention of academic and technical communities. In general, the automatic control system contains the two main aspects contents. One is the control terminal of automation system, and the other execution terminal of the automation system. Both in common is that all can with the help of automation control system for the computer and network to achieve it. The difference is the control terminal can also with the aid of optical communication with the outside world to try interactive links[2]. This study will focus on exploring the allocation and the configuration analysis of the automation system control functions in perspective of PLC.

PLC BASIC OPERATING PRINCIPLE

PLC chief component

Another name of PLC is programmable control, which belongs to the product development the control function of relay technology. It is the key link in the development of the automatic control system. Automated system control functions can be implemented with the help of a small processor to establish a control system interrupts. PLC is electronic technology, and has great similarities with the computer system. The main components include power supplies, memory, electrical interface and the central processor[3]. The main component of the PLC is shown in Figure 1:

In addition, PLC can also compile computer program, so the main part of PLC also includes related programming facilities and programming software. In particular, programming software is an important part of compiling and debugging a computer program, which can be said to be the key programming tool. It can effectively monitor and manage the status of the operation parameters of the PLC. Programming software is popular in the development of computers and electronics, or even able to perform the operation of the simulation system[4].

PLC workflow

Every link in the process of PLC work is in the monitoring and management of CPU conducted and completed. PLC programming control software in the state of power supply in the system can be turned uninterrupted achieve a variety of business processes[5]. All the work is shown in Figure 1 and described as follows:

(1)PLC in the case of electricity, to begin the initial processing of the automation system. This time on the system's internal components and other electrical equipment conduct a thorough clean-up activities. It can also undertake to the positioning of timer and reduction. In addition, PLC can also be continuous self-examination, carry out the relevant syntax checking for controls. In general, the most main detection components are related to the circuit or power supply.

(2)Scanning PLC is actually the exchange of information related to missing or PLC and other devices. First check the connections between the PLC and external devices to guarantee the success of the exchange of information. That means information scanner hint completed. In addition, the client application can also be started. The client can be scanned in accordance with the process, or a particular statement execution process in accordance with the established order. The last one to be executed under a specific statement. Finally, the result of the execution shall be completed preservation.

(3)PLC completed the transmission of information, stored in each image formed in all aspects of the implementation results, and transferred to the external device control. PLC continuous scanning procedure, until the desired effect so far obtained.
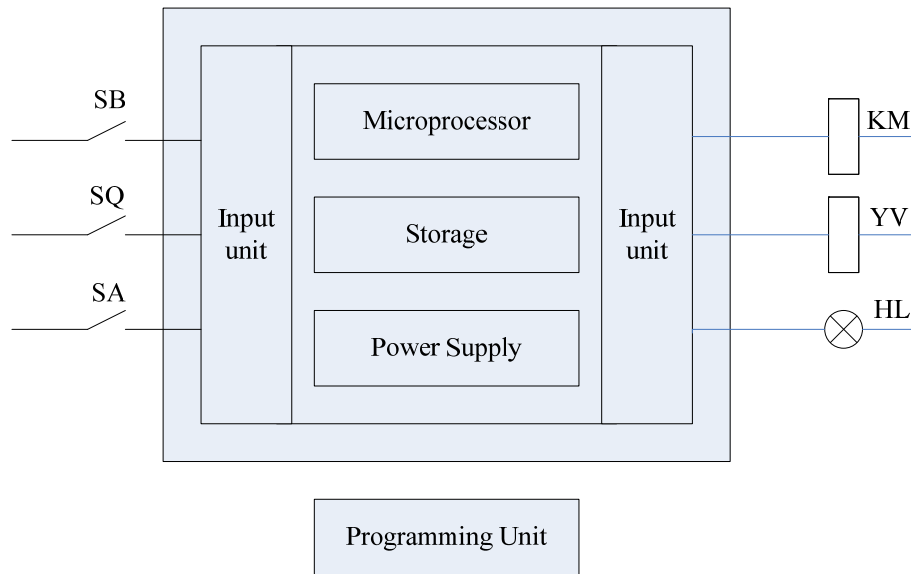
Figure 1 : The composition of the programmable control diagram

RELATED ALLOCATION RESEARCH AUTOMATION SYSTEM CONTROL FUNCTIONS IN PERSPECTIVE OF PLC

The allocation principle PLC automation system control functions

In general, most of the control functions configured PLC automation systems mainly follow the basic principles from the rough to detailed. When the control function of the allocation process is basically the end of the operation. It can implement the configuration again and again and configure updates, to speed up the process of constant configuration, enhance the effectiveness of configuration. Specific allocation principle is as follows:

(1) By analogy method to determine the selection of the basic appearance of the product and related models, the choice of products should comply with the genetic principle of inheritance, long development.

(2)Calculation module should follow the principle of honesty and trustworthiness, and to take full account of the number of relevant backup settings, improve reliability of the system.

(3)PLC application must be supported by the funds. PLC automation system control functions should follow the principle of cost-effective, when necessary, you can modify the allocation according to the actual economic conditions.

(4) To promote the principle of PLC automatic control system, improve the immunity of the control system can improve the anti-interference ability, to ensure the reliable operation of the whole system. In general, the arc interference is a major obstacle of PLC interference, the electromagnetic interference is often a common-mode interference four times of the associated road interference. Arc interference is instantly disconnect the load moment, buttons, contactors, relays and other electrical arcing contacts with the contacts generated, thereby causing the arc interference. Cut off the load current is larger, the higher the voltage, to cut off the arc by using time is longer, the interference caused by also becomes more obvious. Anti electrical interference refers contactors, relays and other inductive load. When the power is cut off, the phenomenon of counter electromotive force is generated in the excitation coil, causing interference solenoid valve. Common-mode interference is mainly to guide into and export signal lines and power cord as well as the formation of the potential difference between ground wire. It

can be capable of internal circuits and capacitor discharge between each line. Using the difference between charging and discharging, cause serious voltage fluctuations affect the internal voltage of the circuit. Norm-mode interference refers anti emf interference of inductive load is connected to the power system system to generate anti emf generated.

(5)PLC input and output circuits are optimized to improve the reliability of PLC automation control systems. Import PLC accepts input of the switch, analog and other analog signals, such as ports. The reliability of their advantages and disadvantages quality components, wiring and control systems are important factors affecting PLC automation system control functions. For example, an switch input, limit switch button contact points, which need to maintain a good performance status. The wiring should be strong and reliable. In terms of the output of the switch, the impact of PLC with relay output, transistor output and thyristor output in three ways. Depending select the output mode switch which should be determined according to load. If the improper selection system reliability will be reduced, or even serious adverse operating system. Therefore, it should be implemented according to different situations optimization activities.

Allocation method of PLC automation system control functions

(1)The import and export of PLC automation system control functions. The import of PLC automation system control function can press type (1) configured

$$N_i = \sum^I E_i \times (P_i - 1) \tag{1}$$

Where,PLC input the number of pieces of automation control system is represented by. Import device operating status to be represented by. The number of imported device type is to be represented by the I parameter.

PLC control function of the automation system of outport can press type (2) configured

$$N_0 = \sum^I E_i \times (P_i - 1) \tag{2}$$

Where,PLC input the number of pieces of automation control system is represented by. Import device operating status to be represented by. The number of imported device type is to be represented by the I parameter.

(2)PLC control functions of the automation system allocation, the first to determine the best location to import and export location systems, and determining module style automation system allocation. For the import location, it must be specific to a certain point, but also to ensure that the voltage used is not the same. The main thing is to see the voltage to a DC or AC, as well as between the signal voltage can meet the needs of the isolated state. For export position should be specific to a certain point, clearly derived by the use of allocation mode. In general, export allocation involving multiple export models, such as loops, semiconductors and relays. Finally, after the finalization of the number of modules, choose the most appropriate slot, and according to the frame of slot to determine the appropriate number.

(3)PLC communication network allocation. PLC network type is its unique characteristics, but also the development needs of the times. PLC communications related to the development of all corners of the world, different locations in the world can make use of information communications networks to convert between different media. In general, PLC communication equipment mainly includes three major aspects of the network, namely, equipment control and information related to the network. Engraved with the realization of equipment, PLC communication with the management of mutual information, respectively.

(4)Carefully select the correct connection location, thereby ensuring PLC automation system control functions of the device perfect design. High quality ground is a prerequisite to ensure the normal operation of PLC regulation. The perfect grounding system is one of the main conditions for PLC automation system control functions to achieve anti-electromagnetic interference, in addition to be able to effectively avoid the impact of hazards voltage. According to the concrete practice, PLC automation system control functions of grounding the ground as much as possible use the series in the form of a little ground, and another point. In setting the PLC automation system control functions to be centralized arrangement and layout, and set a little ground suitable for parallel form. Each cabinet center grounding device is in the form of a separate grounding grounding. However, adding the device is relatively large distance between point grounding, the best way to use the series is to select a relatively large cross-section of insulated copper cable or busbar connection cabinet center ground of different devices. Finally ground strap is connected directly to ground pole. Copper wire cross-section of the ground wire is greater than 23 m, while the total copper busbar cross-section greater than 60mm. Ground resistance of grounding pole is less than $2\,\Omega$, while more recent ground as much as possible with the PLC device arrangements, try to be less than the distance between the 50m. Ground wire need to avoid strong electrical circuit, if not avoid, but also need a ground wire vertical intersection, and then shorten the length of parallel lines.

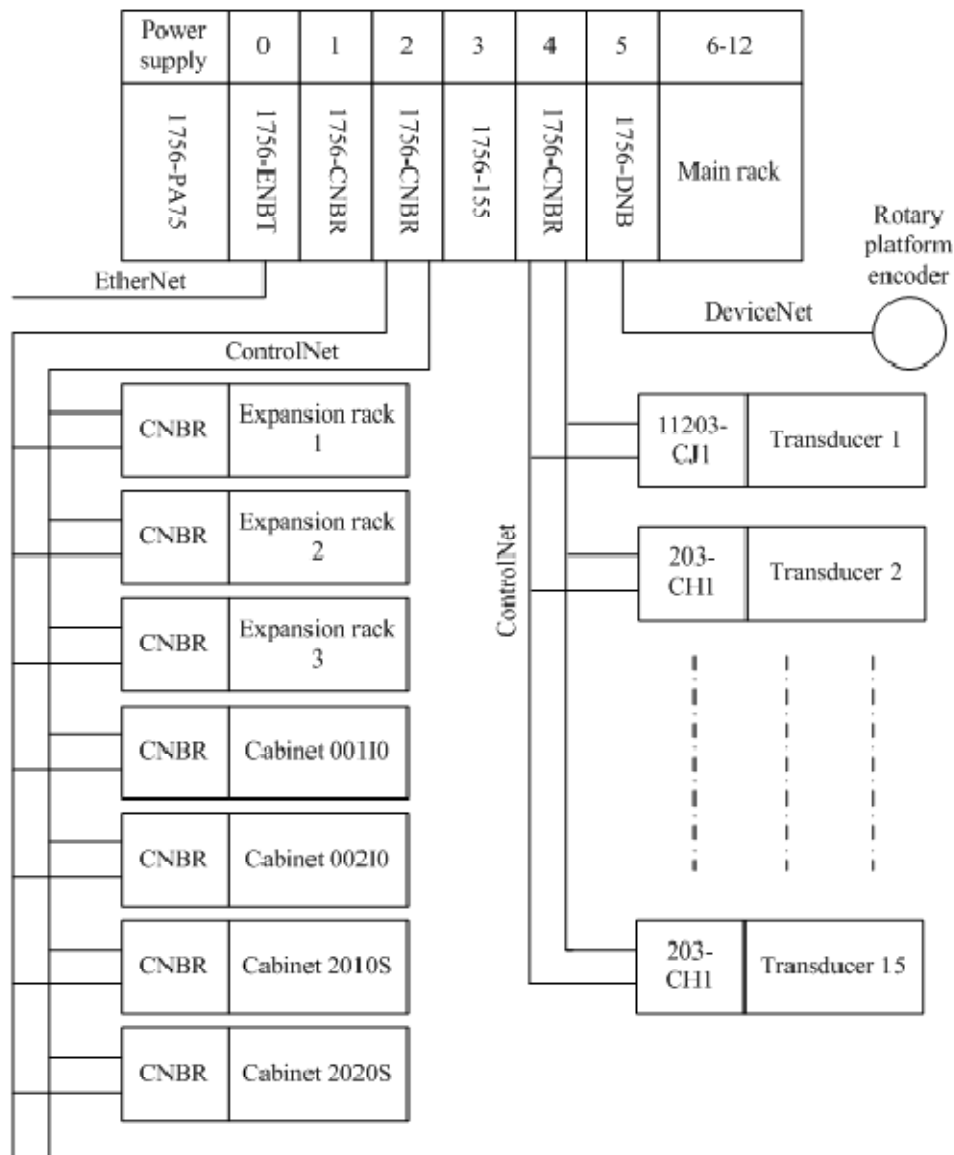## Specific allocation of public PLC automation system control functions

Figure 2 : Utility connection diagram of PLC automatic control system

Public PLC automation control system involves many control devices, and the installation point of the automation system are relatively scattered (Shown in Figure 2). From viewpoint of cost and reliability considerations, joint function controller PLC automation systems can be configured platform, which has two counters and two remote terminals. PLC statistics associated with the drive system may be installed in the room receives. Remote terminal cabinet can be mounted directly to the hydraulic station, detecting the completion of related processing equipment. The other can be mounted in the cutting station, and then the process control device is completed. In the workflow, you can borrow DNB module, PLC numerical editor reads and reactions. As shown in Figure 2, public PLC automatic control system input and output of the counter can use ControlNet times frequency communication equipment to help finish. Its layout is the distributed connection, which can effectively reduce the costs associated with cable installation. But it is also a very good automatic control system upgrade reliability and stability. Probability PLC frequency control devices effectively realized the goal using a cable, avoiding the installation of complex external cables, wiring and simplifies the use of the frequency of the device. While a certain extent, it may also reduce the frequency of device failure. In addition, the

same frequency stable operation of the process equipment, a communication network can be easily performed, and read out the data state information feedback, and thus can be a good flexibility.

CONFIGURATION ANALYSIS OF AUTOMATION SYSTEM CONTROL FUNCTIONS IN PERSPECTIVE OF P LC

An important part of configuration

PLC configuration allocation is main analog automatic control system. The central processor, power supply module and other power-related components are re-install. Set up and modify the parameter processing module. It must set the network communications, or connected to the main station via satellite. If the customer requirements change, it must configure the operation. PLC automatic control system, mainly through external devices connected to the main station, in order to extend shelf configuration and configure the application associated. At this moment need to automatic control functions of the system configuration for related operation. In general, the control functions of PLC automation system configuration settings mainly contains racks. Racks contain the main rack and the associated expansion rack. And the allocation of the rack should follow certain principles[6].

According to regulations, make sure to install the power slot, install a central processor that is installed interface module slots. Among them, the configuration of the main racks should be allocated in strict accordance with the provisions of the country to be configured and the stipulation of expansion racks. with the basis network, remote cabinet and transducer that three types of configuration section do configuration analysis[7]. First, clear the installation position of extension rack. And then follow the configuration module principle to add to the configuration.

Analysis module configuration parameters

The content on module configuration parameters are mainly involved in the name of the module, rack arrangement numbers and matching configuration mode. Signal type, quantity and timing offset filter are used to the input/output of the analog signal. In the automatic allocation process of PLC control system should be measured according to the calibration digital serious influence important parameters, such as the specific type of signal, the offset relevant number of values, and specific time for filtering and so on. Main purpose of this calibration is to achieve numerical settings after configuration converting[8]. If the value can be given an accurate calibration, the value of the associated module apparatus according to certain ratio of conversion, between the upper and lower limits to achieve the transformation of the completed device. If the device is set to a certain amount of equipment filtration time, the PLC processor automatically before the central system to get the value you want to scan cycle. The number of modules of the system to ensure that the value of accurate input parameters can be directly used as the average parameter values as a system parameter values[9]. If the PLC automatic control system is not set up to connect the filter parameters, then will not get the number of the previous corresponding import turnover module parameter values in the central processor, but when the user access operations, the implementation of direct channel access operations to obtain import values moment.

CONCLUSION

PLC control automation system has many advantages, not only can replace part of the relay system, but also to achieve a softening of the hardware, and thus enhance the stability and diversity of the automation system control functions. In addition, it also has a network connection, transfer news and adjusting the control specific functions. It can be said, PLC automation system has many advantages features a pair of industrial enterprises and even has a direct effect on the social system. Currently, the PLC-based control functions to other systems are also beginning to receive more attention. In short, PLC

began to be used in many fields of social development, especially in the field of control systems. It has become the main force in the development of the control system.

REFERENCES

[1] Cai Xiaoxia, Yu Lifeng; Measures to improve the reliability of PLC control system[J], Technology Market Economy, **7**, **(2011)**.

[2] Xu Weihua; Optimization design of PLC automation control system[J], Technology Innovation Herald, **30**, **(2012).**

[3] Luo Xianliang; The design of the automatic control system based on PLC[J], Management & Technology of SME (HEAD), **7**, **(2013)**.

[4] Dong Jicheng; Using PLC to realize automatic production process control[J], Electromechanical Product Development and Innovation, **1**, **(2013)**.

[5] Lin Lina; Select the control system programmable controller, Entrepreneurs World (Theory), **9, (2012).**

[6] Shi Lei, Chen Yana; Reliability of PLC Control System[J], Electromechanical Product Development and Innovation, **2, (2013)**.

[7] Fang Chengyuan; Factory electrical control technology [M], Machinery Industry Press, **(2012).**

[8] FX IN 240MR programmable controllers operation manual [Z], Japan's Mitsubishi Corporation, **(2013).**

[9] Chengyu; Programmable controller based and programming skills [M], South China University of Technology Press, **(2013).**