Design of the Control System of Automatic washing Machine Based on PLC

Feng Jiang

Changchun University of Science and Technology, Changchun, 130022, China

3106300@qq.com

Abstract

According to the working principle of automatic washing machine , the use of programmable logic controller on the automatic machine control system design, realization of the system's flexibility high stability and reliability.

Keywords

1. Introduction

Because of PLC having the function of the drive circuit, detection circuit ,protection circuit and network communication, so the control system of automatic washing machine based on PLC can improve the flexibility of the design of the control system and the reliability of the control system.

2. System composition

The working process of the automatic washing machine generally includes start-up, water, washing, drainage and dehydration, etc. In this paper, the control system of automatic washing machine with washing mode selection and water level selection is designed.

In actual control process, various sampling information is judged and choired through the control center judgment, then feed back to the washing machine control actuators through information lines, to decide the condition of the washing machine working.PLC in the system is in the center position, water level switch is control switch of PLC input signal, inlet valve, drain valve and the motor is the action of actuators of the washing machine. The working condition of Inlet valve and drain valve is determined a given signal given by PLC . So is the condition of the motor, which determines the washing machine is washing or dehydrating.

3. The hardware design

According to the requirements of the control system, we adopted the German Siemens company's S7-200 PLC CPU226 type. This type of PLC has such advantages: compact structure, high reliability, high universality, fully functional, easy to operate. It can control the specific work of full-automatic washing machine cycle, can also according to your own requirement and design some of the work cycle. Its application can be created or debugged by STEP7 Micro/Win on computer and will be loaded using Siemens special cable.

Water level is detected by zero water level detection switch ST1, low water level detection switch ST2, and high water level detection switch. ST3. Water level is selected by a selection button The water level is adjusted according to the set by PLC through controlling the inlet valve and drain action.

Motor drives the wave plate rotating or reverse rotating to wash. Motor in the process of rapid transformation, the potential can rapid transformation, but the internal magnetic field and electric

potential is not synchronous motor commentator, so in the process of design control again, want to consider the process of motor has a pause, so that the motor reliably convert potential direction, otherwise it will directly affect the washing and dewatering process of washing machine. According to wash clean degree to choose strong or weak, the choice of the ways of washing is controlled by a button SB2, Washing water level is selected by switch SB3 .the working status is indicated by 4 LEDS.

4. The software design

When Washing machine starts, PLC program set in accordance with choice of water, time and washing, washing clothes. rinsing process is after Cleaning process. Rinsing process is divided into four parts, namely the dehydration, water, rinse, automatic drainage.

Assumption the default rinse times is 3 times, at the beginning of the automatic drainage after rinsing process of dehydration, dehydration finished water, the water after reaching level to stop water, pulsated began, after to stop water forward 2 s after the inversion of 2 s, forward again, so cycle, run after a period of time automatic drainage, drainage after a rinsing process is over, then dehydration, again into the secondary rinsing process.

5. Conclution

Automatic washing machine control system adopts PLC as the control core, rational structure, reliable test method. This system has strong flexibility, and has high reliability. Taking PLC as control system, can shorten the product development cycle, guarantee the synchronicity of new products technical development to improve labor efficiency, achieved good economic results.

In addition, the PLC can be repeated use and reduce the test cost. The flexibility of PLC, the operation convenience also convenient for the tester input at any time, debug, and modify the program. PLC is equipped with communication interface, easy to connect with computers, measurement and control system, system maintenance and use to bring huge convenience.

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