

# 基于 PLC 的多种液体混合控制系统设计

## 摘 要

随着当今社会电子、信息及控制技术的高速发展，使得自动化控制技术也有了较大的进步。相比于自动化控制而言，那些自动化程度低下，人工作业量大，精准度不高的传统液体混合控制系统已经不再深受到人们的追捧，因此对液体混合控制系统进行大规模的自动化改造，已然成为当下工厂急需解决的问题。

该系统所具备的主要功能是把三种不同液体参照特定比例注入到混合容器当中，使用电动机进行搅拌混合，搅拌直至满足相应的控制要求才对液体进行输出操作，并如此循环往复。在本次系统设计过程中，输入→搅拌→输出动作的连贯性是重点部分之一，因此如何有效实现各设备之间的协同动作尤为关键，确保各设备在不同工作状态下能够及时准确地完成相应的动作，从而使多种液体自动混合控制系统得以正常的运行。液体混合控制系统，选用西门子 S7 系统 PLC 为主控单元，从设计方案、硬件、软件、仿真调试四方面来介绍说明本系统的设计工作。其中硬件设计包括 PLC、接触器、搅拌电机、液位传感器、热继电器和电磁阀等主要设备的选型以及 I/O 通信设计，软件设计包括程序框图、梯形图设计，仿真调试则使用 Step7 软件来完成，仿真结果显示，本系统能够正常运行，并实现相应功能。

**关键词：**多种液体；PLC；混合装置；自动控制

# Design of liquid mixing control system based on PLC

## Abstract

With the rapid development of electronic technology, information technology, control technology, etc., the field of automation control has also made rapid progress. The traditional liquid mixing control system has become a problem that the factory needs to solve due to its low degree of automation, low ratio of precision, and poor labor and working environment. This paper has carried out a certain degree of research on the automation of various liquid automatic mixing control systems.

The main function of the system is to inject three different liquids into the mixing container with reference to a specific ratio, stir and mix using an electric motor, and stir until the corresponding control requirements are met before the liquid is outputted, and thus reciprocated. In the design process of this system, the consistency of input → stirring → output action is one of the key parts. Therefore, how to effectively realize the synergy between devices is especially important to ensure that each device can be completed in time and accurately under different working conditions. The corresponding action finally realizes the automatic operation of various liquid automatic mixing control systems. The design work center of this paper is the liquid mixing control system. The Siemens S7 system PLC is selected as the main control unit. The design work of the system is described from four aspects: design scheme, hardware, software and simulation debugging. The hardware design includes selection of main equipment such as PLC, liquid level sensor, stirring motor, solenoid valve, contactor and thermal relay, and I/O communication design. The software design includes block diagram, ladder diagram design, and simulation debugging uses Step7 software. To complete, the simulation results show that the system can run normally and achieve the corresponding functions.

**Key words:** Various liquids; PLC; Mixing device; automatic control

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