

论文题目：电阻冷规复合真空计的软硬件设计

摘 要

随着科技的不断发展，真空度的测量在当今的生产活动和科研中是及其重要的，尤其是高真空度的测量。而真空计就是用来测量真空度的，但真空度的范围太广，导致基于不同的真空环境，产生了各种各样的真空计，在本世纪之前只能是通过绝对真空计如 U 型管来测量低真空度，而随着近代电子科学的发展，精度更高，测量范围越广的真空计被研制出来。通过对近年来的真空计新产品分析可知，目前真空计具有小型化、集成化、一体化、系统化和智能化的发展趋势。所以学习真空计的相关原理以及设计简易的真空计对我们来说是及其必要的。而本文就是介绍电阻冷规复合真空计的设计。

本文的主要内容在于设计一个电阻规真空计和一个冷阴极电离规真空计的电路，以及简易单片机电路的设计。将规管中的不同的真空度而产生的不同的电流，通过设计的电路放大传送到单片机中，然后通过相应的电流和气压计算公式，将与之对应的真空度显示在屏幕上。设计的难点在于冷阴极电离规的高压电源模块和微小电流放大模块。

本文首先介绍了真空计的背景和研究意义，然后讲述了电阻规和冷规的工作原理，再通过对成都正华真空计电路的参考与研究，大致了解了电阻规和冷阴极电离规真空计的设计思路，之后进行自己的电路设计。同时还以 STC89C52 作为单片机的微处理器，设计了小型单片机电路系统。除了硬件部份外，还做了软件部分的编写，最后进行原理电路图的 pcd 制板，电路的焊接和调试工作，调试的结果与设计要求大致相同，完成了设计的要求。

关键词：真空测量；真空计；电阻规；冷阴极电离规；单片机

ABSTRACT

With the continuous development of technology, the measurement of vacuum is important in today's production activities and scientific research, especially the measurement of high vacuum. The vacuum gauge is used to measure the degree of vacuum, but the range of vacuum is too wide, resulting in a variety of vacuum gauges based on different vacuum environments. Before this century, it was only through an absolute vacuum gauge such as U-shaped. The tube measures the low vacuum, and with the development of modern electronic science, the vacuum gauge with higher precision and wider measurement range has been developed. According to the analysis of new products of vacuum gauges in recent years, the vacuum gauges have the trend of miniaturization, integration, integration, systemization and intelligence. So learning the principles of vacuum gauges and designing simple vacuum gauges is necessary for us. This article is to introduce the design of the resistance cold gauge composite vacuum gauge.

The main content of this paper is to design a circuit for a resistance gauge vacuum gauge and a cold cathode ionization gauge vacuum gauge, as well as the design of a simple single-chip circuit. Different currents generated by different vacuum degrees in the regulation are amplified and transmitted to the single-chip microcomputer through the designed circuit, and then the corresponding vacuum and liquid pressure calculation formulas are displayed, and the corresponding vacuum degree is displayed on the screen. The difficulty of the design lies in the high-voltage power supply module and the small current amplification module of the cold cathode ionization gauge.

This paper first introduces the background and research significance of the vacuum gauge, then describes the working principle of the resistance gauge and the cold gauge, and then through the reference and research of the Chengdu Zhenghua vacuum gauge circuit, roughly understands the resistance gauge and the cold cathode ionization gauge vacuum gauge. The design idea, after the implementation of their own circuit design. At the same time, STC89C52 is used as the microprocessor of the single chip microcomputer, and the small single chip circuit system is designed. In addition to the hardware part, the software part was also written. Finally, the pcb board of the principle circuit diagram, the circuit welding and debugging work were carried out. The results of the debugging were almost the same as the design requirements, and the design requirements were completed.

KEY WORDS: Vacuum measurement; Vacuum gauge ; Resistance vacuum gauge; Cold cathode gauges; Single chip microcomputer

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