

5 - 3 Application of PLC in Magnet Coil Temperature Measurement and Monitoring System

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Magnets plays a key role in accelerator. The temperature of the magnet coil can reflect the running state of the magnet . This temperature measurement and monitoring system is designed to monitor the performance of the magnet system. The old temperature monitoring system in CSR was designed based on single-chip (AT89C51). In order to improve the performance and meet the latest requirements in recent years, a new temperature monitoring system based on PLC was designed.

The system is a distributed control system including the front server, PLC and temperature sensors. Its structure diagram is shown in Fig. 1.

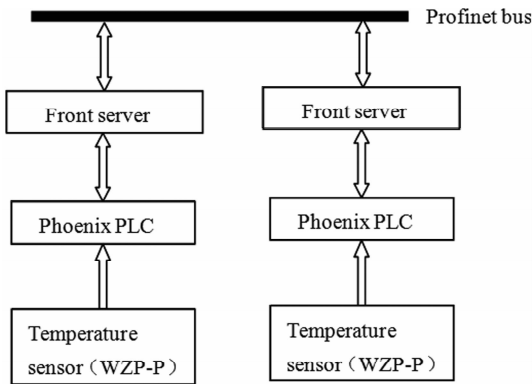


Fig. 1 Structure diagram.

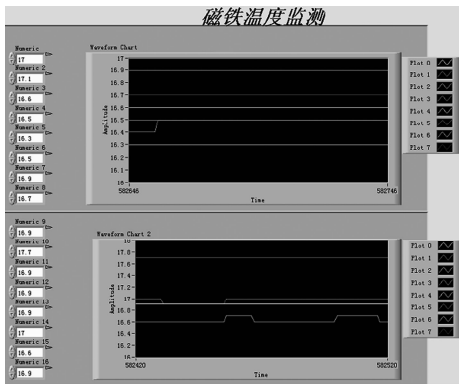


Fig. 2 UI of software.

Industrial control computer is used as front server, preloading Windows 7 operating system and OPC Server application program. This system is able to display and analyze the temperature data, and transfer them to the database. Its interface, programming by LabVIEW 2012, is shown in Fig. 2. Phoenix PLC is selected as I/O controller and PROFINET is perfectly integrated in . Platinum resistance (Pt100) is connected to PLC via a connection mode of four-wire to eliminate lead resistance completely, ensuring the accuracy of the measurement system.

OPC (OLE of Process Control) defines a standard for real-time object data communication between the control device and the human-machine interface (HMI). Using LabVIEW DSC module, the system creates network publishing shared variables that connected to I/O server. At the same time, the variables are bound to the OPC items, so that we can adds recording data, alarming and event functions for the database directly. With shared variables, we are capable of achieving a remote and local access to PLC. The design makes the LabVIEW and PLC have a seamless connection.

The system has been tested in the HIRFL-CSR. The results show that it has a high accuracy of 0.1℃. Furthermore, the anti-interference ability and the stability is greatly improved.