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## **Development of a Measurement and Control System for a 40L/h Helium Liquefier Based on the Siemens PLC S7-300**

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**Abstract.** A 40L/h Helium Liquefier is established at the Technical Institute of Physics and Chemistry, Chinese Academy of Sciences. A measurement and control system based on Siemens PLC S7-300 for this Helium Liquefier is developed. Proper sensors are selected, for example, three types of transmitters are adopted respectively according to detailed temperature measurement requirements. Siemens S7-300 PLC CPU315-2PN/DP is as master station and two sets of ET200M DP remote expand I/O is as slave station. Profibus-DP field communication is established between the master station and the slave stations. The upper computer Human Machine Interface (HMI) is compiled using Siemens configuration software WinCC V7.0. The upper computer communicates with PLC by means of industrial Ethernet. A specific control logic for this Helium Liquefier is developed. The control of the inlet and outlet pressures for the compressor and the control of the turbine loop are discussed in this paper. After several months' commissioning, the temperature before the throttle valve has reached to conversion temperature.

**Keywords:** 40L/h Helium Liquefier, Measurement and control system, PLC, control logic

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