Temperature Detection Based on Programmable Controller

Shijie Wu [a], Liqiang Liu [b], Jianqi Yin [c] and Zhenzhen Yu [d]

Shandong University of Science and Technology, Qingdao 266590, China.

[a]467180906@qq.com, [b]1059092508@163.com, [c]609929536@qq.com, [d]1534625860@qq.com

Abstract

Temperature control is an important observation in modern automatic production system. The stability and correctness of control parameters and temperature control have a direct impact on the quality of product production. In the past, relay control technology was mainly used in temperature control, and it was realized by external wiring logic control. However, this method made the system more complex and energy consuming high, and could not guarantee the efficiency of production. With the development of modern PLC technology, the temperature control system replaces the traditional logic control. Therefore, this paper mainly focuses on the application of PLC in temperature detection.

Keywords

Programmable logic controller(PLC);Temperature detection;PT100 module.

1. Introduction

PLC controller is mainly used in manufacturing and production of various industrial machinery. It is a new generation of integrated technology, expanding the function of the control system, and has a good application value. With the improvement of the level of industrial modernization in recent years, higher requirements for processing accuracy have been put forward. Temperature control is an important part of modern industrial processing, so it is necessary to improve the effectiveness of control to ensure the stability of production.

PLC temperature control module PT100 is the main module of temperature detection.PT100 whose resistance value varies with the temperature. The relationship between the resistance and temperature change is as follows: $R = R_o (1 + \alpha T)$, of which $\alpha = 0.00392$, R_o is 100 omega (at 0 C, the resistance value is 100 Omega, as the standard specification of the thermo resistance), and T is centigrade.

2. Characteristics of Delta Temperature Sensor

Platinum thermistor has high accuracy and stability, and has good linearity between -200 °C and 600°C. Generally speaking, the temperature coefficient of platinum PT100 resistor is larger at low temperature (-200 °C) -100 °C, good linearity at moderate temperature (100 °C) and low temperature (°C). Because the resistance of platinum PT100 is 100 Ω at 0 °C, it has been regarded as the standard specification of metal temperature resistance. Platinum PT100 temperature resistance should be used to avoid excessive operating current, to Reduce self-heating, thus limiting the rated current below 2 Ma. Since the autothermal 1mW dating of platinum PT100 results in a temperature change of 0.02 °C or 0.75 °C, the current of platinum PT100 can also be reduced. However, if the current is too small, it is easy to be disturbed by noise, so it is appropriate to limit the current of platinum PT100 to 0.5mA~2mA.

The DVP-04PT temperature measurement module can accept the external 4-point platinum temperature sensor. By applying a known excitation current to the thermal resistance, the resistance value is obtained by measuring the voltage at both ends of the sensor, and then the resistance value is converted to the temperature value.

Century Star configuration software communicates with I / O equipment through serial port RS232 interface, data exchange and set the same serial port parameters.

3. Temperature Detection Process

In the process of temperature measurement, the current temperature value is stored in the D40 register, the average value is stored in the D20 register, and an interval comparison instruction is set. The temperature can be estimated in a certain range by the light and shade of the indicator light.

The configuration software can accurately display the current measured value, which is more accurate than the value observed by the register. At the same time, the real-time curve of the average value and the present value is drawn. This also results in the program in the compilation process attention to channel selection, but also need to pay attention to the module number. Because the register registers the numeric value of temperature, a linear conversion is needed according to the temperature / digital characteristic curve.
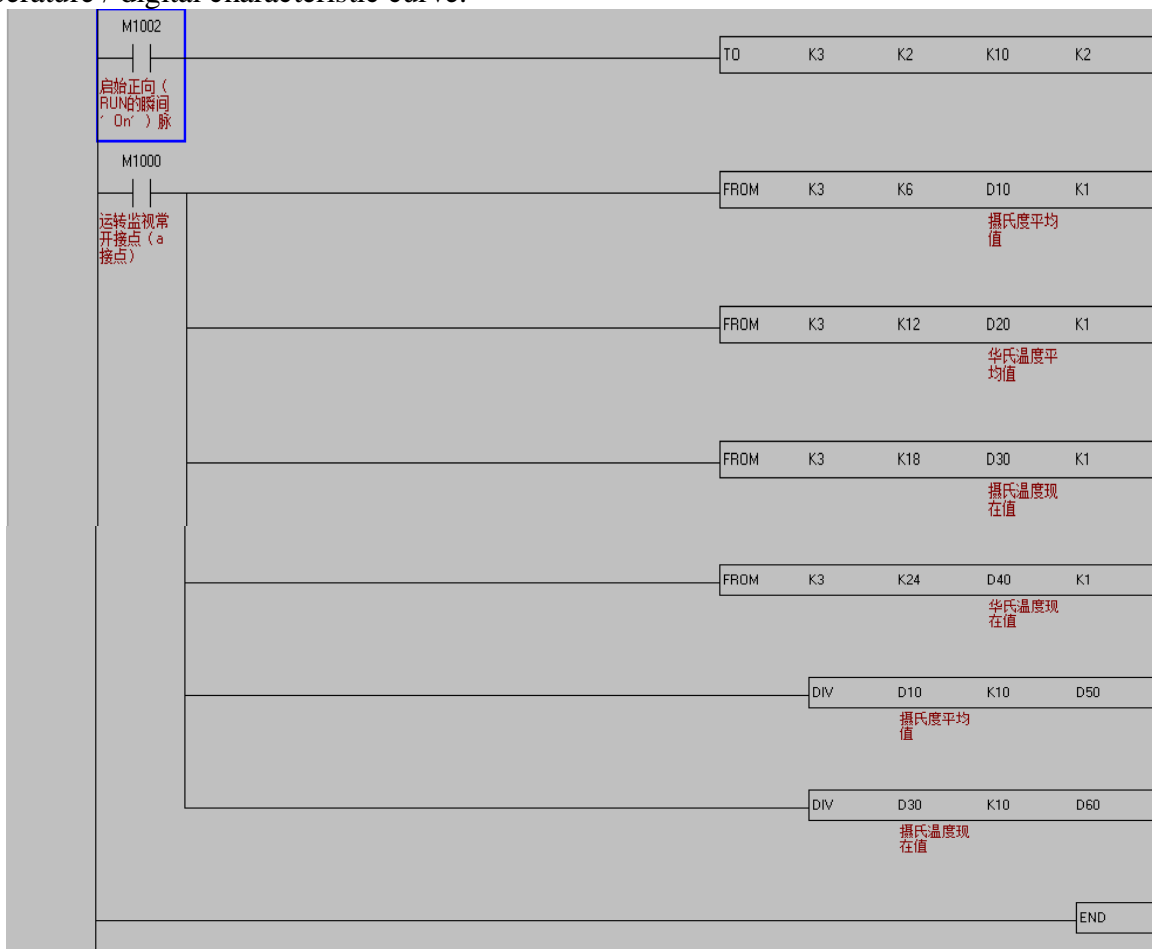

Fig 1. Temperature detection program

The configuration software can display the temperature value directly, because the linear transformation relation has been selected in the process of setting the variable, only the corresponding register can be used. In the application of configuration software, we should pay attention to the consistency of serial communication parameters and plc serial communication parameters, so as to monitor normally. Based on the premise of improving the reliability of PLC temperature control system, it is necessary to guarantee the concrete embodiment of all aspects of the signal transmission process, and at the same time, to embody the long transmission time, and to display the various indexes on the system interface. At present, the automatic instrument control system mainly adopts PLC to carry on the automatic control. Self The application of the dynamic temperature control system not only breaks through the defects of the traditional manual equipment control, simultaneously improves the production efficiency , reduces the workload of the staff , and helps to improve the economic benefit.
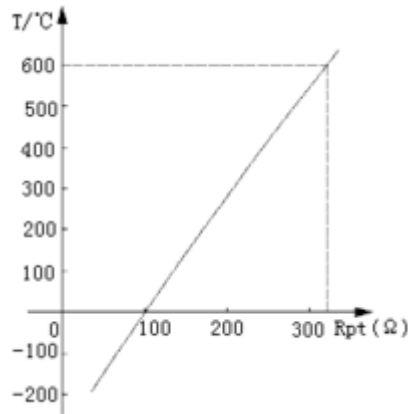
Fig 2. Temperature module characteristic curve

4. Construction of Temperature Detection Interface

Fig 3. Construction of temperature detection interface

Fig 4. Variable database

Fig 5. PLC temperature detection interface

After establishing the communication between century star configuration software and PLC, the temperature adjustment is carried out. As shown above Fig.5 PLC temperature detection interface.

By constantly changing the environment of the temperature sensor, it can be found that the temperature sign of the detection interface is also changing with it. As shown above Fig.6 Temperature at a certain time.
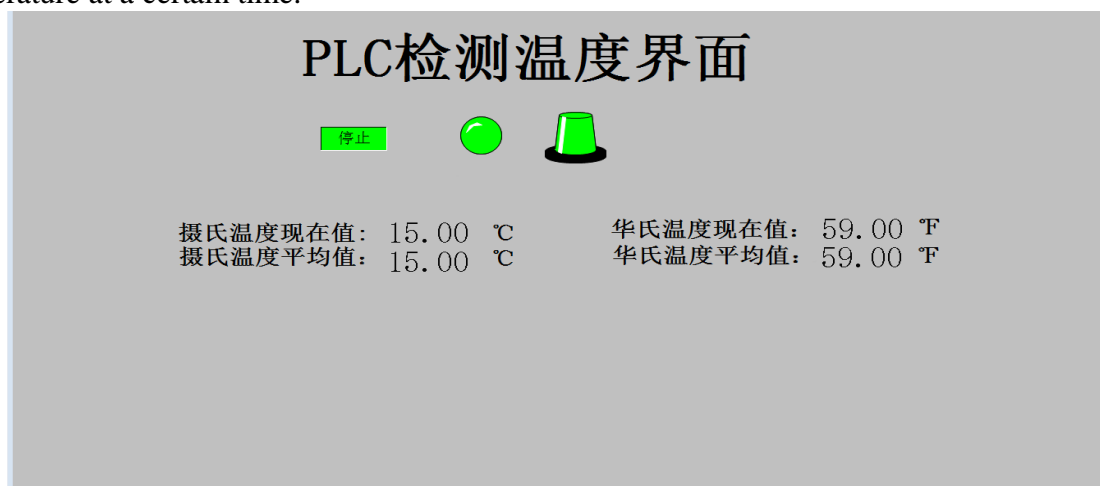

Fig 6. Temperature at a certain time

5. Analysis and Discussion of the Results

At present, PLC control technology is widely used in the temperature control system, which can effectively shorten the response time of the system, improve the precision and stability of the control, improve the automatic control level of production, and reduce the problems existing in the traditional control system. It is helpful to improve the economic benefit of enterprise production. But at the same time, we must pay attention to continuous optimization to meet the practical requirements of modern social life.

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