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COMPARISON OF RELAY AND PID REGULATORY CONTROL PRINCIPLES

Most of modern developments and researches of engineers and scientific staff of the productions are conducted with controllers. Controllers are used to collect and process signals received from sensors subsequent adjustment of a certain parameter. Depending on the destination, each controller is configured to control one or more laws. The commonest control principles used nowadays are relay (positional) and PID control principles. Let's consider some information about these control principles in different categories. Both control principles were tested on the same device (controller MT-48 production FOTEK).

Speed of response and delivery of results

The same temperature values were put into the controller and the time during which the regulating devices in both laws warm up to the predetermined temperature was compared. Time of the heating in the oven, running on the relay control law was less than during the work on the PID law. Time difference was about one and a half minutes at the expense of low-margin predetermined temperature and ambient temperature.

Accuracy

Overshoot time and value were researched for both control principles. In relay control principle this characteristics were less than in PID principle. It means that relay control principle less accurate than PID principle. The reason is one feature of relay principle. In this principle we have only two control points. They are maximal and minimal values of controlled function or physical quantity. When, for example, temperature in the oven becomes lower than the minimal value programmed in the controller, the controller gives a command to turn on a heating element. When the temperature becomes higher than maximal value, the command is to turn off. But we cannot control values of the characteristics when they are between maximal and minimal. This is the reason of higher speed of response and lower time of overshoot. In PID law we cannot get rid of overshoot, because at every moment of time the characteristic value is collected and compared with the input value. Depending on the difference between the checked and input characteristic values the time of turning on of the heating element will change with linear law.

Conclusion

Taking into consideration all above mentioned we can state that the choice of the control principle depends on the type of the task. If you need quick results and needn't control your process every moment with high accuracy you would better choose the relay control principle, on the contrary – PID law will be your best choice.