Automating Heating and Hot Water Systems with the MIK-51N Controller

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This article looks at one possible way of automating the units of a boiler plant, which, on the one hand, is an integral part of any enterprise and, on the other, offers wide scope for improving efficiency and cutting costs. For stable and economical operation of heating and hot water systems, Microl LLC (Ivano-Frankivsk) offers to automate them with the MIK-51N controller.



The MIK-51N controller handles not only the main control tasks (in particular, temperature control in the heating and hot water loops) but also protects the system against excessive return water temperature, operates in two modes (night and day) and logs data to a PC. The functional diagram is shown in Fig. 1. The MIK-51N provides:

- temperature control in the heating loop with the setpoint taken from a heating curve, where the "argument" is the outdoor air temperature;
- two ways of switching between "day" and "night" modes: by an external signal or at a user-defined time.

The heating curve and the return water curve are shown in Fig. 2.

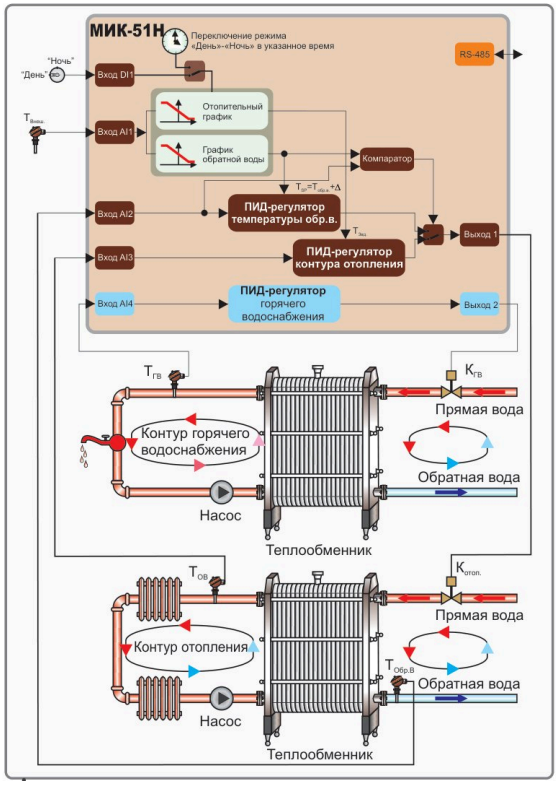


Fig. 1. Automation diagram

Additional features

The heating loop works as follows. The signal from the outdoor air temperature sensor is fed to the controller's first analog input. Based on this value and the user-defined heating curve, the controller generates the heat-carrier temperature setpoint for the heating system controller. The controller output can be either analog or pulse (depending on the actuator installed). This signal sets the position of the heat-carrier control valve. Changes in outdoor temperature change the controller setpoint.

For better control, setpoint balancing is provided. At a set time, for example after the end of the working day, the heating curve automatically switches to "Night" mode. In this mode, the temperature setpoint from the heating curve is lower than in day mode.

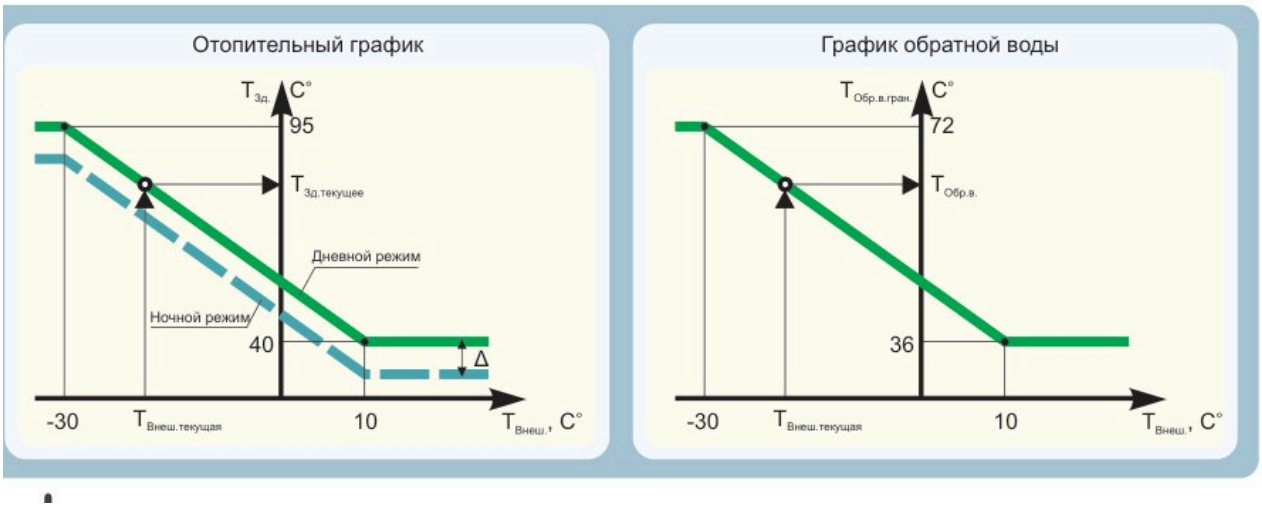


Fig. 2. Heating curve and return water curve

Economic efficiency can also be achieved by monitoring the return water temperature. The controller compares the maximum permissible temperature from the return water curve (depending on outdoor temperature) with the actual return water temperature. If the temperature is within the permissible range, the heat-carrier valve is controlled by the heating system controller. As soon as the return water temperature exceeds the permissible value (i.e. heat is not being given off to the heating loop), control of the valve passes to the return water controller until the temperature returns to normal.

The hot water loop is controlled by a PID controller that maintains the set temperature in the hot water system.

Benefits of automation with the MIK-51N

- more efficient boiler plant operation;
- prevention of equipment emergencies;
- remote data transmission via RS-485 or a GSM modem.

Using the Visual Intellect SCADA system (developed by Microl LLC) on operator PCs provides full remote control of the plant.

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