Temperature Indicator for Central Heating Furnace

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AVT 1830

ASSEMBLY DIFFICULTY

In addition to indicating the temperature, the thermometer monitors whether the temperature has exceeded the set upper limit value or fallen below the set lower limit value. It is ideal as a temperature indicator for the central heating furnace. - it will give an alarm when the temperature of the water in the system approaches the boiling point and, otherwise, it will signal that the temperature is falling and the furnace may go out.

Specifications

- temperature measuring range: -55°C to +125°C - accuracy of measurement: ±0.5°C (-10°C...+85°C),
- reading resolution: 0.1°C over the entire measuring range
- indication of exceeding set limit temperature
- optical and acoustic signal and relay output (8 A / 230 V)
- setting of upper and lower temperature limits with a resolution of 1°C
- supply 9...14 VDC / 0.2 A

Circuit description

The main screen displays the basic information (Figure 1). Its schematic can be seen in Figure 2, the key component of the circuit is the Atmega8 microcontroller and the programme stored in its memory. As user interface it provides 2×16 display and 4 buttons. Limit value alarms are signalled by controlling the backlight of the display and the buzzer. A relay is connected in parallel to the

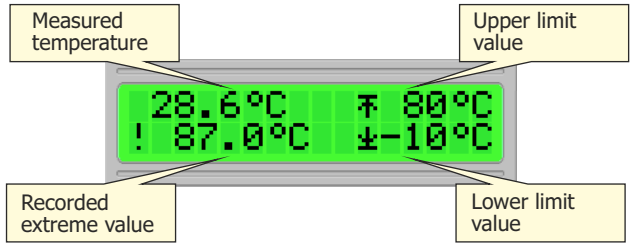


Fig. 1

signalling device, whose contacts can additionally switch on another unit. The circuit must be supplied with voltage of 9-14 VDC with a capacity of approximately 200 mA from plug-in power supply.

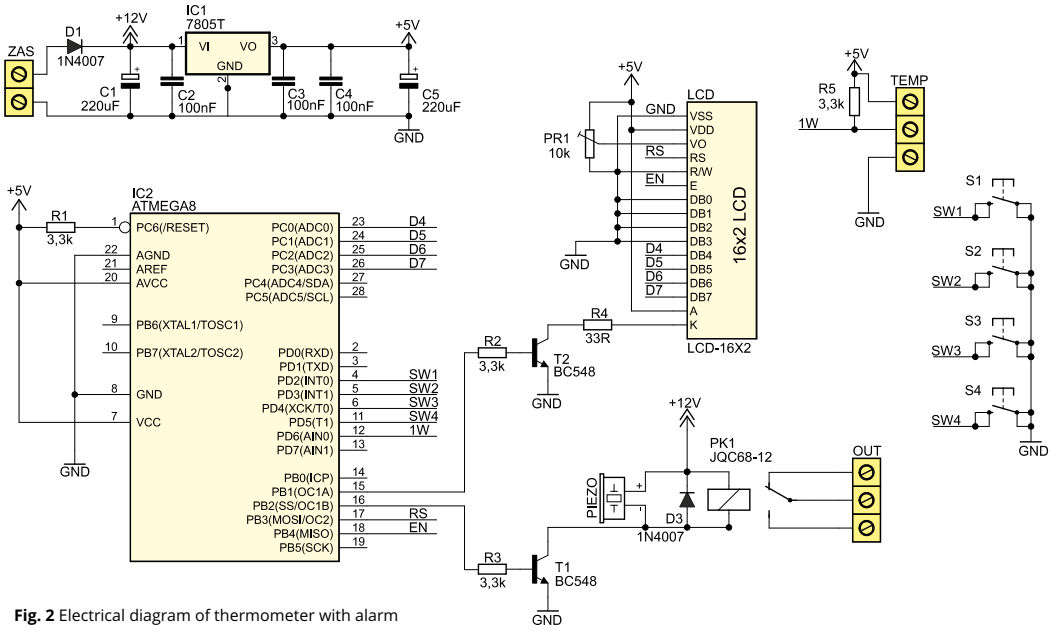


Fig. 2 Electrical diagram of thermometer with alarm

Operation

Press the button ▲ or ▼ to move between the menu screens in the order shown in Figure 3. Functions of the first three screens should be obvious. Press the **OK** button to change the value of the displayed parameter, then press ▲ or ▼ button to change the value and confirm by pressing **OK** again. All settings are stored in non-volatile memory and are restored on power-up. Exceeding a limit value can be signalled by an acoustic signal and/or by the illumination of the display. In the "Alarm" screen, you can select one of options - the value "off" means signalling off, "mod" means intermittent signalling, "on" is a continuous signal. If you press **OK** button during alarm, the acoustic signal will stop, but the light signalling will not. When the limit logging function is activated, then below the measured temperature you will the value of the extreme temperature last recorded, e.g., if the upper limit is set at 80°C, and the temperature has reached 87°C and then it has started to fall, the displayed value is "! 87°C" . This value will be visible until the next overrun or until the **ESC** is pressed.

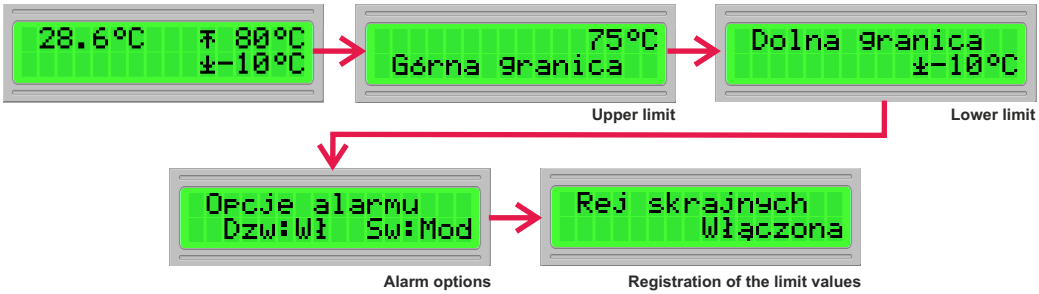


Fig. 3 Menu sequence

Mounting and start-up

Electrical diagram of the board is shown in Figure 4. The board has been manufactured using the through-hole technique, so the assembly should not cause any problems even for less experienced people. Once the board is assembled, and before it is placed in the housing, apply power and adjust the display contrast by turning potentiometer P1. If the display shows content with temperature indication, the start-up can be considered as completed. It is a good idea to attach a dedicated front panel to the board - solder the screws to the copper spots on the panel so that they go through the holes in the thermometer board and then screw on the nuts. You can now remove the KM50 housing front panel and use the prepared front panel in its place. As a sensor, it is recommended to use a professionally manufactured temperature sensor - DS18B20 MOD. Lead the connection cable through the rear panel of the enclosure; if the cable is too short, it can be extended using a twisted-pair cable or, better, an audio cable - two wires in the screen. Connected in this way, the sensor works properly even on a 30m cable. Also, the power cable should come out of the rear of the housing - note that the device requires a voltage of approx. 12 VDC, e.g. from a plug-in power supply unit.

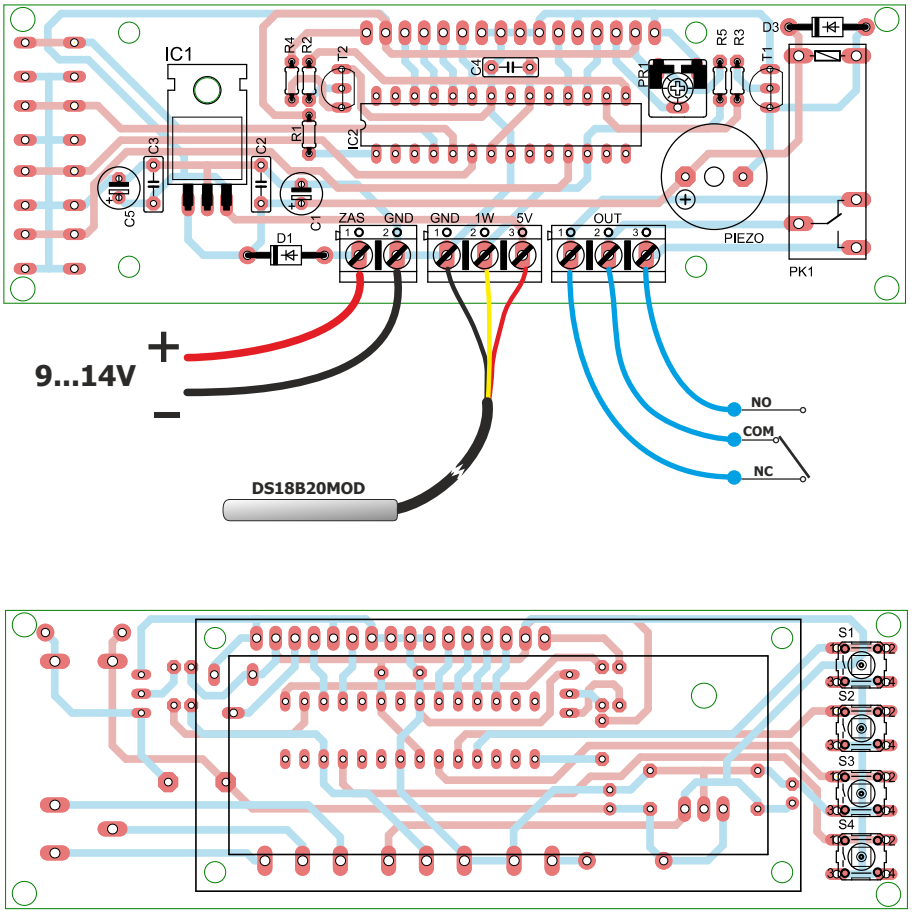


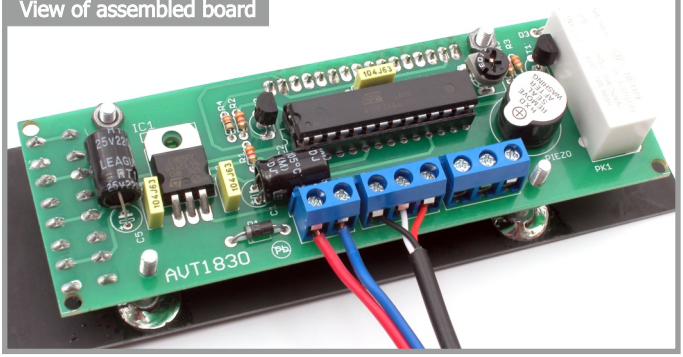
Fig. 4 Mounting diagram

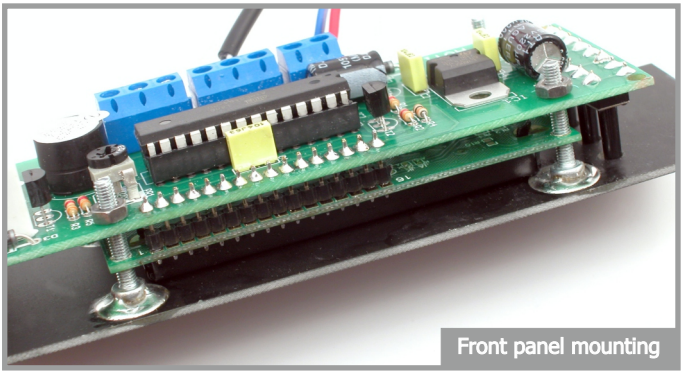
List of elements

Resistors:
R1, R2, R3, R5: .....3,3 kΩ MINI
R4:.....33 Ω MINI
PR1:.....mounting potentiometer 10 kΩ
Capacitors:
C1, C5:.....220 µF
C2, C3, C4:.....100 nF
Semiconductors:
D1, D2:.....1N4007
T1, T2:.....BC547 (or similar)
IC1:.....7805
IC2:.....ATMEGA8
TEMP:.....DS18B20 MOD
LCD:.....2×16 LCD display

Other:
PIEZO:.....buzzer with 12V generator
PK1:.....12V relay
S1-S4:.....microswitch 17mm
ZAS, OUT, TEMP: ARK500
KM50 housing
Power socket attached to housing
Front panel
Mounting elements

View of assembled board





Front panel mounting

DS8B20 MOD sensor

AVT SPV Sp. z o.o.

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