Electric boilers 50 ÷ 60kW

Electric boilers TK-24 with a power of 50, 60kW are compact devices designed for heating large residential or commercial buildings. The boiler is made of steel sheet, and the steel and other components are (flanges, hamburbs, muffs, pins, etc.).

It was tested at a pressure of 4.5bar, and max. operating pressure is 3bar. The flanges by which the boiler is connected to the heating installation are located on the back of the boiler. On the return tube of the boiler (bottom) there is a tap for charging and discharging, and on the pressure pipe (upper) 3bar safety valve and an automatic bleed valve.

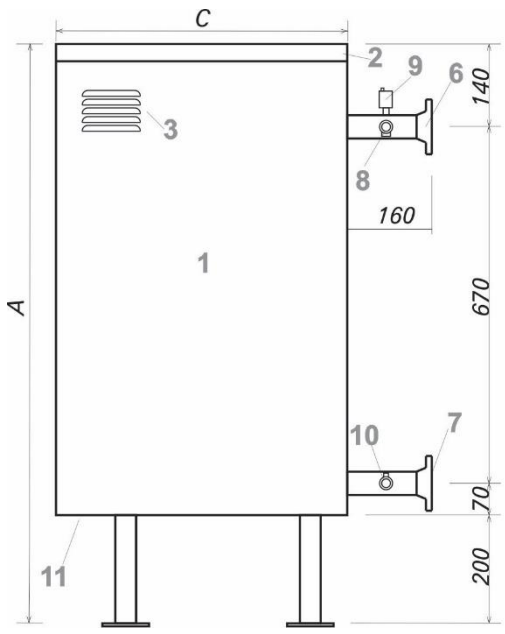
The outer shell of the boiler is made of decapitated sheet, protected by the electrostatic plasticization process. On the front there is a control panel of the boiler and the doors covering the distribution board.

On the dashboard there is a main switch for the boiler and a microprocessor thermoregulator with LCD display on which the given and current values of the parameters of the system are constantly displayed. The microprocessor thermoregulator provides precise measurement and maintenance of the temperature during operation, as well as intelligent control of the operation of the heaters.

The distribution boards cover the complete boiler control as well as the regular terminals to which the power cable and the auxiliary terminals are connected to connect the circulation pump and operating conditions (room thermostat or the like). Doors must be closed during operation of the boiler, and the access to the complete automation covered by it is permitted only to a professional person.

Protective elements: The boilers are equipped with a " Multistage protection " protection system that permanently monitors the temperature and pressure in the system, in case of approaching the pressure or temperature of the unauthorized values, the corresponding warnings are displayed in the display and in the event of exceeding the limit values of the pressure or temperature off all heaters, or in the third degree of protection, excludes the complete power supply of the device using voltage triggers, which guarantees safety.

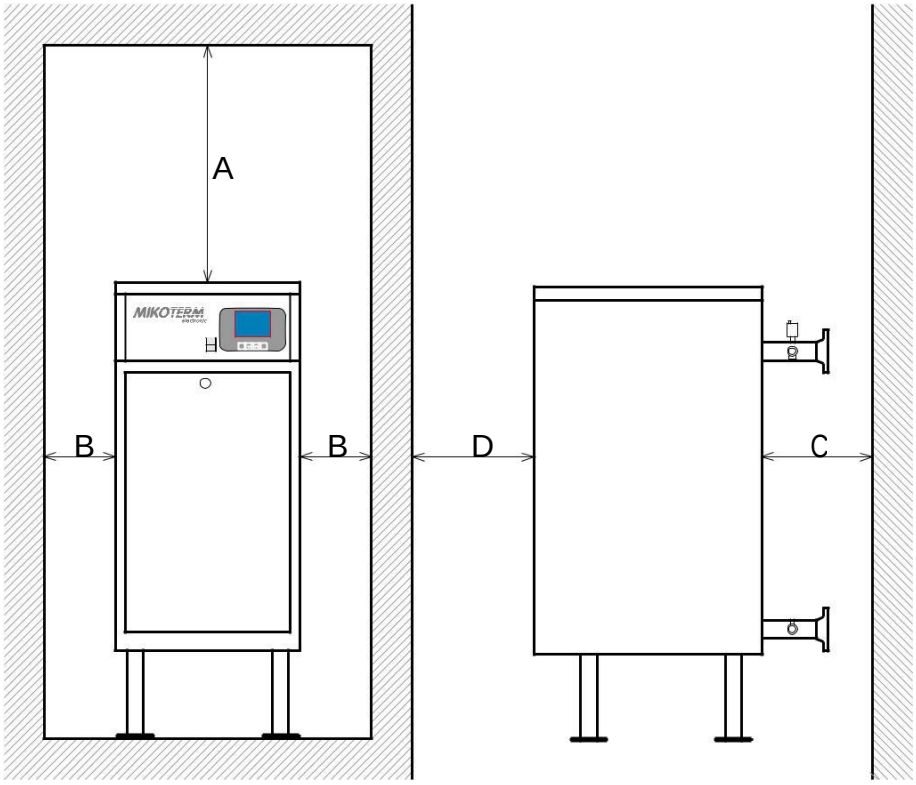
Tech. Spec.		**50kW**	**60kW**
Dimensions	**A**	1000mm	1000mm
	B	400mm	400mm
	C	550mm	550mm
Weight		72kg	75kg
Boiler (liters)		56ℓ	56ℓ
Heaters		5×10kW	6×10kW
Heat groups		6×10kW	6×10kW
Power supply		3N ~ 400/230V 50Hz	3N ~ 400/230V 50Hz
Connection to the hydraulic net		DN40 (6/4''); PN 16	DN40 (6/4''); PN 16
Pressure		0,4 bar - 3 bar	0,4 bar - 3 bar
Safety valve		1 × ½col 3 bar	1 × ½col 3 bar
Degree of protection		IP 20	IP 20
Working temperature		10 ÷ 80 (90) ºC	10 ÷ 80 (90) ºC
Security thermostat		95 ºC	95 ºC
Heater fuses		5 × 3P C25A	6 × 3P C25A
Max rated current		3 × 72,5A	3 × 87A
Required main fuses		3 × 80 A	3 × 100 A
Need a cable to connect		Cu 3 × 25 mm^2	Cu 3 × 35 mm^2
Required protective circuit		Cu 1 × 25 mm^2	Cu 1 × 35 mm^2



Legend:

1) Boiler wrapper
2) Boiler cover
3) Ventilation blinds
4) Dashboard
5) Door distribution panel
6) Pressure line: flange with a throat DN40; PN 16
7) Return line: flange with a throat DN40; PN 16
8) Safety valve ½˝ 3bar
9) Automatic odor valve ½˝
10) Taps for filling and discharge 1½
11) Cable glands

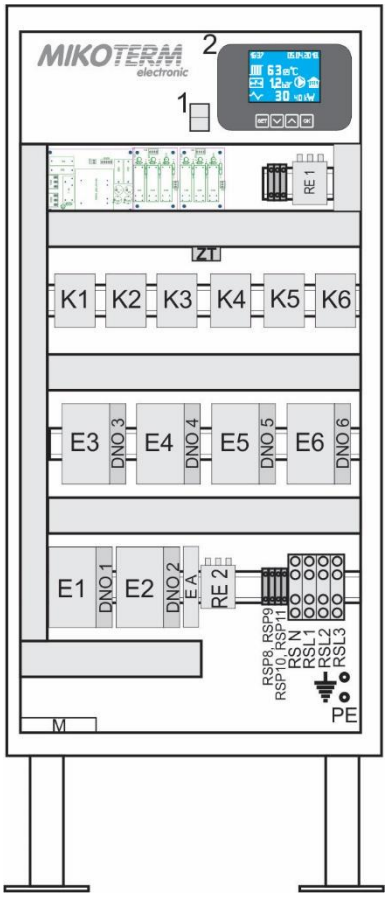
Minimum dimensions of free space for boiler installation



A=700mm / B=500mm / C=700mm / D=1000mm

Distribution of components on the switchboard

Example: Electric boiler power of 60kW (The number of contactors and automatic fuses depends on the power of the boiler)



Legend:

-1 - Main switch

-2 - Microprocessor thermoregulator EK_CPU_1_3

-ZT - Protection thermostat for boiler control

-K1, ..., K6 - Contactor

-E1 + DNO1, ..., E6 + DNO6- Safety circuit

-EA - Control circuit fuse

-RE 2 - Safety Relay

-RS L 1 - RS L 3 - Straight terminal terminals of the power cable phase conductors (35mm²)

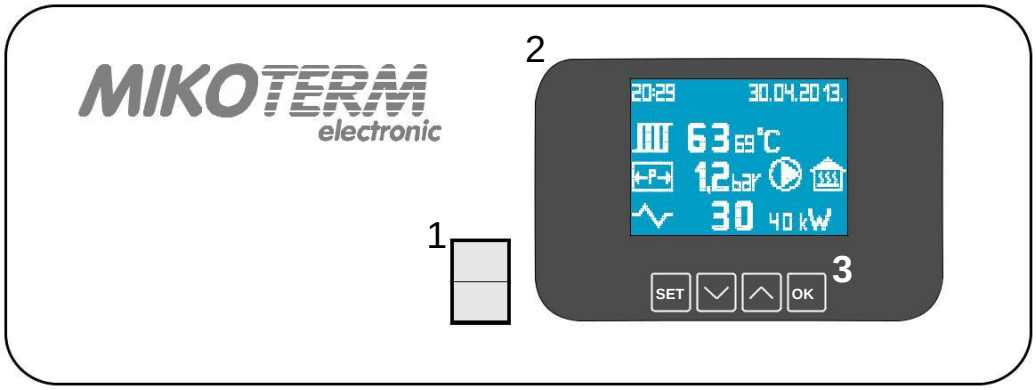
-RS N - Regular Nozzle Clamp (35mm²)

-RSP **8**, RSP **9** - Connection terminals of the pump control

-RSP **10**, RSP **11** - Connection clamps for external conditions for boiler operation

- M - Ventilator

Boiler boards



1 - Main switch - Includes boiler and provides a condition for switching on heating groups.
2 - Microprocessor thermoregulator - it is used to set the operating temperature and power of the boiler, monitor the current and current values of the temperature and power, as well as the current system pressure, the circulation pump status (on / off) and the condition of the external operating conditions (allowed operation of the boiler / no boiler operation is allowed). Communication with a microprocessor thermoregulator with 4 buttons.

The working principle

Temperature and hydraulic pressure sensors monitor changes in the system and send information to the microcontroller that processes them and controls the operation of the boiler.

Communication of the user with the device is facilitated and improved by displaying all the parameters of the system on the graphic LCD display and simple commanding with the four keys.
The operating temperature is set in steps of 1 ° C, it is possible to set the value in the range of 10 ÷ 90 ° C.

The power of the boiler is set in steps of 10kW, or the heaters are arranged in several heating groups (depending on the nominal boiler power). Heating and switching off of the heating groups is successive, with a 3 sec spacing with a 3-stage engaged power divided by a temperature of 3 ° C. The heating groups do not have a certain order of inclusion, but the microprocessor makes a decision on their inclusion and exclusion based on the time of each heating group operation. This ensures a uniform distribution of the heating time of each heating group, resulting in a longer lifetime of the appliance.

The thermoregulator can also control the operation of the circulation pump. The pump is switched on when the external condition for the operation of the boiler (which is connected to the auxiliary terminals RSP 10 and RSP 11) is active. This is also a condition for the operation of heating groups. The pump stays on for 2 minutes after switching off the external operating conditions due to the heat dissipated from the heater after the switch off. The control voltage for the circulation pump (230V 50Hz) is sent to the auxiliary terminals RSP 8 and RSP 9. Also, the thermoregulator includes the pump regardless of the external operating condition if the temperature of the boiler exceeds 90 ° C, in order to reduce the temperature in the boiler.

Operating the boiler temperature to outdoor temperature - O.T.C. mode

Optionally, the devices in this series can be ordered with a version of a microprocessor thermoregulator that has the ability to control the temperature of the boiler according to the outdoor temperature - "Outdoor Temperature Compensation", hereinafter O.T.C. mode. In addition to the boiler, an external temperature sensor is also provided in the plastic protective box, which is mounted on the outside of the building and connects with a 2-core cable with a boiler.

In OTC mode it is possible to set two independent curves (set with 5 reference points) and one fixed temperature. In this mode, the operation of the boiler is programmed at 24-hour level, with one of the two operating curves or the fixed temperature value possible for each hour (Figure 1). In the example from Figure 1, in the period from 00 ÷ 06h, the temperature of the boiler will slip over the economic curve, during a period of 06-22h for a comfortable working curve, and in the period of 22 ÷ 24h will maintain the fixed value of the set temperature.

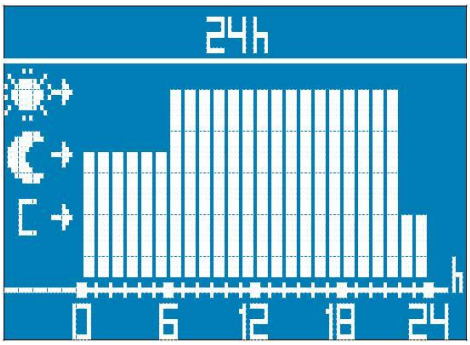


Image 1

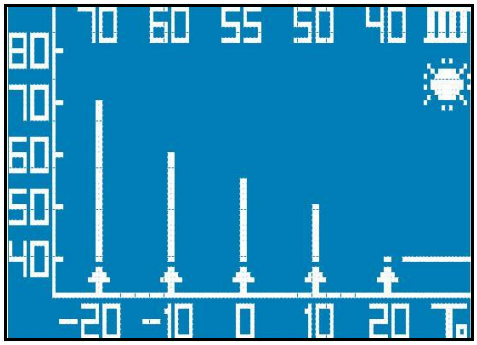


Image2

Comfortable working curve (indicated by the symbol of the sun) is foreseen for use during the day. The economic curve (indicated by the symbol of the month) for use overnight - when the outside temperatures are lower, or a lower room temperature is needed, the application of the same curve that was used during the day would be uneconomical. Of course, this is only the most commonly used logic, and depending on the characteristics of the facility, the type of heating system and other specific conditions, the periods of use of working curves can be arranged in any way - it is possible to switch to the use of another curve or fixed thermometer at any hour.

Pump curves can be formed as desired - the user is to choose the optimal shape of the working curves as well as the periods in which they will be used according to the specific object and the particular type of heating.

Figure 2 shows the adjustment of the comfort curve. The values are set to 5 reference points:

1) External temp. To = -20 ° C → temp. boiler 70 ° C
2) External temp. To = -10 ° C → temp. boiler 60 ° C
3) External temp. To = 0 ° C → temp. boiler 55 ° C
4) Outside temp. To = 10 ° C → temp. boiler 50 ° C
5) Outside temp. To = 20 ° C → temp. boiler 40 ° C

The microcontroller " merging " these 5 points generates a curve that will "slide" the boiler's boom temperature. In the same way, another (economical) working curve is given. The principle of forming the working curve is such that it is possible to set practically unlimited number of curves of different shapes. This way of guessing the working faults, as well as the possibility of combining them, makes the OTC regime applicable in every concrete situation, on objects different for their purpose, type of heating system, spatial orientation, etc. If necessary, the user can execute the corrections of the initially assigned working curves, as well as the 24h programming, in a simple and quick way, adjust the boiler, and thus the entire heating system to obtain the optimal heating comfort in the most economical manner.