MOTAN boilers running

The wall hung gas boiler represents a fuel gas-consuming appliance which has the role of turning the fuel gas power into heat energy through burning.

This appliance runs unsupervised due to its protection and control systems. These perform the conditioning between the different field elements of the boiler composition and providing the running in maximum safety conditions during the operation.

The starting is performed by exhausting an air volume from the inside of the boiler in the forced draft version. In natural draft version this exhaustion is performed permanently. The sensors on the water circuit are the air pressure switch, in the forced draft version and the fume sensor (a thermostat which puts the boiler out the service when the exhausting column is obturated from different reasons) in the natural draft version.

In case that an exhaust deficiency is detected by means of the sensor from the scavenging circuit, the pressure switch, in case of the forced draft version, and the temperature sensor, in case of the natural draft version, the boiler goes in the stand-by mode displaying E5.

If this doesn't occur, then the boiler keeps running achieving the flame initiation by means of the ignition electrode. The tension supplied to the electrodes is 15 kW at a frequency of 25 Hz.

The flame occurrence is detected by the ionization electrode. In case of the flame occurrence is not detected, the control circuit attempts another initiation of the flame after that it goes in the stand-by mode displaying E2 till a manual restarting.

If the flame is detected the boiler keeps running normally. The check and the control are performed through the pressure, temperature and over-temperature sensors on the central heating circuit. If the pressure is in the preset field, the boiler will run normally.

In case that the temperature sensor, a thermistor with R 25º = 10 KΩ c which sends information to the electrical control part ceaselessly, is not connected or is defective, the boiler goes into stand-by mode, displaying E3. The restart is performed automatically.

In case that, from different reasons, the temperature from the heat exchanger exceeds 95°C, there will go in the stand-by mode, displaying E2 due to the flame deficiency. The restart is performed only manually. The boiler protection in this case (over-temperature protection) is detected by a thermostat with bi-metal which puts the boiler out of service automatically, according to the above mentioned.

The check and the control are performed by means of the temperature sensor and the flow switch on the domestic water circuit.

In case that the temperature sensor, a thermistor with R 25º = 10 KΩ, is not connected or is defective, the boiler goes in the stand-by mode, displaying E4. The restart is performed automatically.

The flow switch has the role of sending the information by means of the electronic board to the 3-way valve. The 3-way valve performs the crossing from the central heating circuit to the main circuit of the plate heat exchanger, when a flow is detected on the domestic water circuit. This means the domestic water circuit has total priority. The electronic flow switch designed in C-MOS technology gives the signal to the electronic board for shutting down the pump.

Both on the domestic water circuit and the central heating circuit the gas valve setting is performed by means of the temperature information given by the sensors mounted on the two circuits. The gas valve is with continuous modulation, achieving the flame maintaining among the limits required by the setting. The gas valve of a low capacity is supplied from the electronic circuit by means of a triac supplied at 220 V.

The electronic control side of the boiler has an electronic display system of two digits which the set values or registered values occur on, both on the DHW circuit and the

central heating circuit. Also, the error signals above mentioned occur on this display (temperature increase-decrease, summer-winter running) or different errors which may occur during the running.

Design and running description of the boiler

The wall hung gas boiler represents a gas fuel consuming appliance which has the role of turning the fuel gas power into heat energy by means of burning.

The components and equipments of the MOTAN boilers

This device is made of the following components and equipments:

- The end plate – is made of plate cut up of 0,8 mm painted in the static field. It is detachable. Removing it you have the access to the other elements and components the boiler is made of.
- The pressurized chamber cover – is made of 1mm plate and together with the upper and lower cover form the pressurized chamber which is sealed.
- The combustion chamber – is made of 0,7 mm plate, it has a parallelepiped shape and it is isolated by the ceramics fibres on the inside.
- The gas valve – it has the role of discharging the gas quantity necessary for burning and it is controlled electronically to achieve the constant requested temperature by the means of the gas discharge modulation.
- The burner – it has the role of combining the gas with the air resulting in a fuel mixture and to control the flame. It is made of stainless steel with 12 inclines and 12 nozzles. The nozzles are of two types: one for natural gas Ø 1,25 mm and one for LPG Ø 0,77 mm.
- The safety valve – protects the boiler and the equipment opening out as soon as it exceeds 3 bars.
- The circulating pump – it has the role of carrying out the heat carrier through the central heating circuit.
- The expansion vessel – it takes over the thermal extension from the central heating circuit.
- The flow switch – it detects any flow occurrence on the domestic water circuit.
- The 3-way valve – it controls the heat carrier from the central heating circuit to the circuit which goes inside the plate heat exchanger, when a flow occurs in the domestic water circuit.
- The fan – it evacuates the exhaust gases and creates a fresh air constant supply. This occurs only in the boiler version with forced draft. For the version with natural draft the exhaust is performed by means of a scavenging hood, connected to the flue.
- The flue system – it helps for the scavenging and allowing the fresh air passing from outside into the combustion chamber.

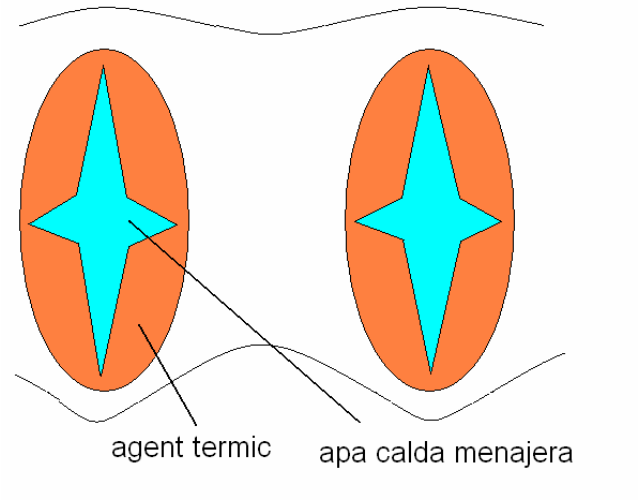
Description of the heat exchangers running

The main heat exchanger

The main heat exchanger may be bithermal or monothermal. Further on we describe the two types of heat exchangers.

The heat exchanger BT

Description and running: it is copper-made with compact sizes. It has two courses (pipe within pipe) as a coil with paddles which have the role of extending the surface of the heat exchange. The course of the DHW preparation goes inside the heating course of the heat carrier and its section is a star-like for a larger surface of thermal transmission.



The bithermal heat exchanger provides the thermal transmission from the exhaust gases to the heat carrier from the heating installation and in case of going in the DHW heating mode, the transfer is performed further on to the course where the water is from the preparation circuit of DHW.

On this equipment there are mounted temperature sensors immersed into the heat carrier and the domestic prepared water and the safety thermostat of contact set by the exchanger by means of a contact jaw.

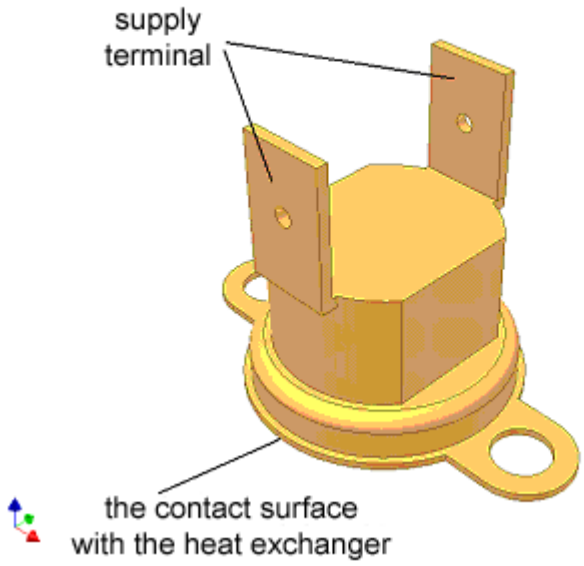
Temperature sensors

Description and running: the temperature sensors (thermistors, NTC) have the role of “reading” the temperature on the central heating system respectively on the domestic water system. These are mounted on the heat exchanger on the exchanger outlet having the active part immersed in the heat carrier on the central heating circuit respectively into the water in the system of the DHW preparation. The temperature sensors modify their resistance depending on the room temperature. Thus the control and the check systems will register the afferent temperature to those value. The dependence of the temperature wasteful resistance is described in the following table:

T(°C)	0	1	2	3	4	5	6	7	8	9
-10						33.89	32.42	31.02	29.68	28.42
0	27.21	26.07	24.98	23.95	22.96	22.02	21.12	20.26	19.44	18.67
10	17.92	17.21	16.53	15.88	15.26	14.67	14.10	13.56	13.04	12.55
20	12.08	11.62	11.19	10.77	10.38	10.00	9.63	9.28	8.94	8.62
30	8.31	8.01	7.73	7.46	7.19	6.94	6.70	6.47	6.25	6.03
40	5.83	5.63	5.44	5.26	5.08	4.91	4.75	4.59	4.44	4.30
50	4.16	4.02	3.89	3.77	3.65	3.53	3.42	3.31	3.21	3.11
60	3.01	2.92	2.83	2.74	2.66	2.58	2.50	2.43	2.36	2.29
70	2.22	2.16	2.10	2.04	1.98	1.92	1.87	1.81	1.76	1.71
80	1.69	1.62	1.57	1.53	1.49	1.45	1.41	1.37	1.33	1.30
90	1.26	1.23	1.20	1.17	1.13	1.11	1.08	1.05	1.02	0.99
100	0.97	0.94	0.92	0.90	0.88	0.85				

Safety thermostat

The safety thermostat is a safety element which will shut down the boiler running if the temperature from the exchanger exceeds 85°. The thermostat has a normal closed contact which in case of exceeding the temperature value in the exchanger it opens and shuts down the boiler running by means of the electric de-energizing of the massive coil from the gas valve. This thermostat has an automatic resetting.



The monothermal heat exchanger MT

Description and running: the monothermal heat exchanger is copper-made and it takes over the thermal energy of the exhaust gases and sends it to the heat carrier from the heating installation. For the DHW preparation the heat carrier has to go inside the short circuit where it is the plate heat exchanger. The contact safety thermostat is fixed on this equipment by means of two parker screws (3,9 x9,5) . It is the same as the one described in the previous chapter.

The secondary heat exchanger (plate)

It is a plate heat exchanger where the moving of the primary agent (the heat carrier from the central heating installation) is performed in distorted meaning with the secondary agent (the running water), to obtain a better exchange efficiency.