



MANUAL

*FOR ASSEMBLY AND OPERATION OF ELECTRIC FLOW-THROUGH
BOILER/MODULE WITH THREE STAGE CONTROL*

PASSPORT

*OF ELECTRIC BOILER WITH THREE STAGE CONTROL ECOTERMAL
MRT/MODULE-T 6, 8, 10, 12, 15, 18, 24, 30 kW*

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Dear clients! ECOTERMAL Company is thanking you for the good choice you made! Please get familiar in detail with the present manual in order to use the full scale of the advantages of the electric boilers with electronic control MRT that will secure for you comfortable, ecologic and economic heating through their quality, reliable and modern automation.

ELECTRICAL BOILER MRT 6 - 30 KW
MODULE T 6 - 30 KW

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1. RECOMMENDATIONS:

- It is necessary one to be familiar and to observe the safety operation and assembly manual.
- After unpacking the boiler, check delivery integrity and completeness.
- Check whether the boiler type corresponds to your needs.
- It is recommendable for each assembly a project to be drafted.
- Electrical boiler has IP 20 protection degree, which applies after an installation at place where it will be used.
- The assembly may be carried out only by and expert authorized for such activity.
- Boiler assembly should meet the effective prescriptions, norms and to the present manual.
- This Electrical Boiler is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the Electrical Boiler by a person responsible for their safety.
- Connection of the boiler to the power network (if necessary) should be harmonized with the local power supplier, which should be done by the consumer prior to the purchase of the boiler.
- Adjustment and commissioning should be carried out only by a service technician approved by the producer.
- Upon incorrect assembly, damages may occur and the producer shall not be liable thereof.
- In case of failure contact the service organization. Unprofessional intervention may damage the boiler.
- For correct functioning, safety and long-term operation secure prophylactics at least once a year.
- In case of damages incurred by unprofessional assembly, as well as upon noncompliance with the regulations and the operation manual, the producer is not liable and shall not provide guarantee service.
- The heating installation should have air bleeds at all necessary places.
- It is not allowed to make any changes whatsoever on the electrical diagram of the product, except for connection of the indoor temperature controller, the equithermal controller or at telephone control.
- Hydraulic and warm tests should be carried out of each heating installation upon commissioning.
- The electric boiler may operate at open system up to temperature of 95°C max and at closed system up to 110°C at pressure of 1.8 bar in a self-contained heating circuit.
- The assembly organization is obliged to get the client familiar with the operational rules of the heating system as a whole.
- Children should be supervised to ensure that they do not play with the Electrical boiler.

2. INTRODUCTION

The flow-through electric boiler ECOTERMAL – MRT is a modern ecological source of heat designated for story and central heating of small and average size houses and production facilities. The main advantages of heating with electric power are mostly cost effectiveness, high efficiency, environmental friendliness and compactness. Electric boiler can be used in

every system of central or story (local) heating in a direct, accumulating or hybrid system. It can be integrated also in existing heating systems parallel with solid fuel boiler (exemplary diagrams are shown on [Fig. 1 and 2, page 9](#)). It is recommended for safer operation the electric boilers to be mounted in systems operating with a pump securing enforced circulation of the heat medium.

3. DELIVERY SET

Boiler delivery contains: water filter, safety valve, assembly consoles.
Module delivery contains: assembly consoles

4. TECHNICAL DESCRIPTION OF THE BOILER

The electric boiler consists of heat insulated boiler body, electric control unit, circulation pump GRUNDFOS UPS/WILO, placed in metal hull, which is fixed to the wall. The boiler hull and the boiler body are electrostatic painted, which makes them extremely corrosion resistant. All models are equipped with boiler water filter, safety valve, boiler and emergency thermal controllers and pressure gauge, (Module doesn't contain water filter). [See Tables 1, 2 and 3 at page 12](#) for Technical data and characteristics of the boiler.

5. THREE STAGE CONTROL OF THE ELECTRICAL BOILER

The three stage control performs its functions by effecting on the heaters and the water pump of the boiler. It is proportionately control of the temperature of the water in the water container according to the difference between the set temperature and the current temperature in the heating place.

5.1. PRINCIPLE OF OPERATION

The Boiler Control System consists of main board - pos.1, room thermo regulator - pos.2, display - pos.4, and other components mounted on the boiler's body. The power relays, power supply and the electrical terminals for connection with the other components are placed on the main board. The room thermostat measures the room temperature and sends an electrical signal to the main board which corresponds to the difference between the set and the measured temperature. This signal is in the 4 - 20 mA range. Because both the controllers (room and boiler) are interconnected in cascade system, this signal goes as a setpoint at the boiler controller's input which in turn controls the temperature of the water in the boiler, therefore the more the room temperature approaches the set point of the room temperature controller, the less the setpoint of the boiler temperature controller will be. In order to maintain the water temperature in the boiler a three stage proportional controller is implemented. This provides smooth load of the electrical grid and also eliminates the possibility for temperature overshoot. The purpose of this is saving electrical energy /that is the temperature of the water in the boiler is maintained at such level that it only covers the heat loss in the premises.

The Display consists of button - pos.10, LED - pos.11 and LED for the boiler condition - pos. 5,6,7

The LED indication at position two temperatures are shown. If the button from position 10 is pressed the set temperature of the water in the water container is shown. If the button is not pressed the current temperature of the water in the water container is shown. If the LED from pos. 9 is switched on this means that the water pump is working. When the heating is over the pump switches off after 3 minutes period.

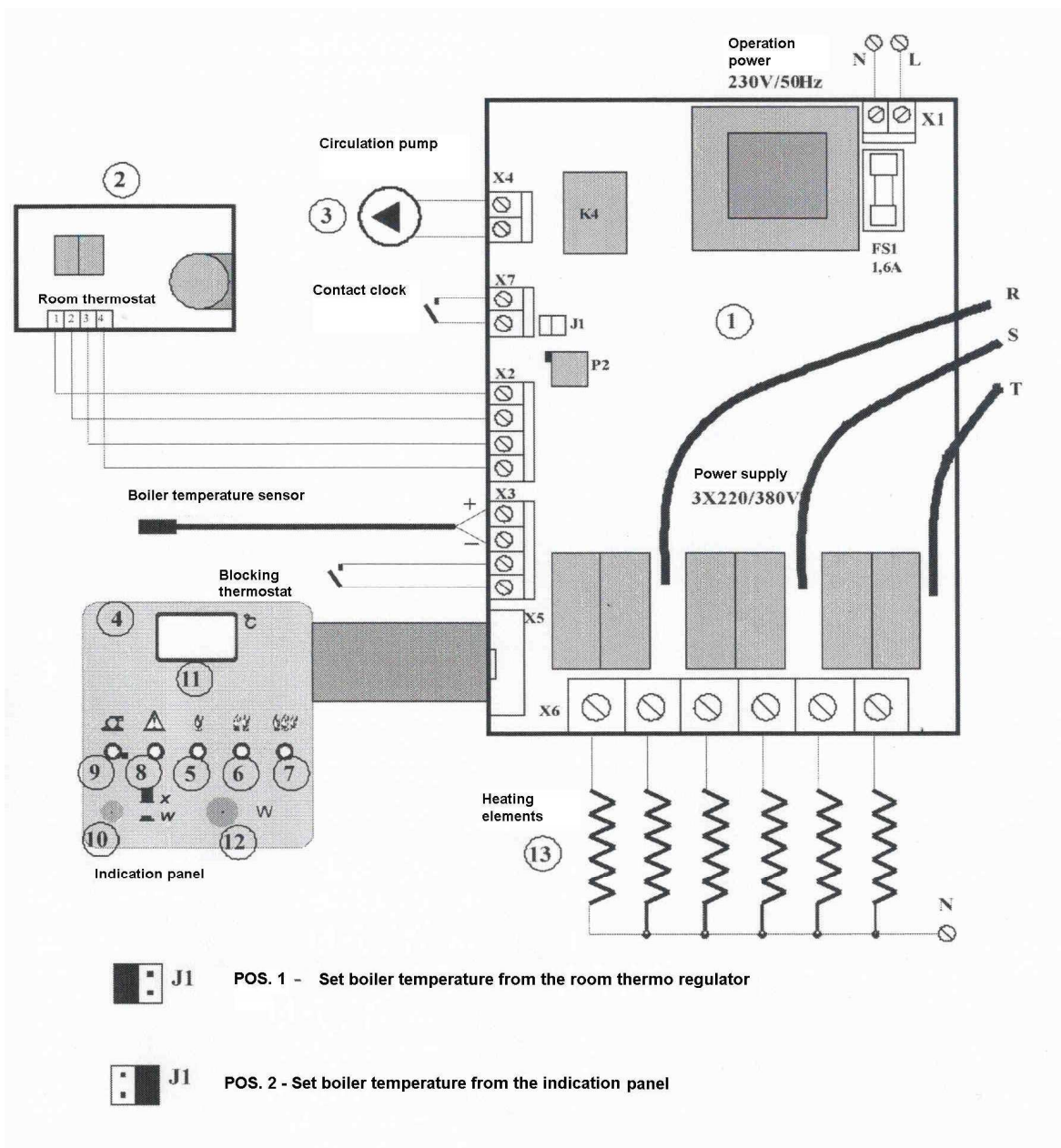
The LED from pos 8 shows that blocking thermostat switched on. When the cause is eliminated, the block system is recovered manually.

If the the control is used for a water-heater, then the room thermostat is not required. In this case jumper J1 is switched to pos 2 and by the knob from pos 12 the temperature is set. In all other cases jumper J1 is in pos. 1

5.2. TECHNICAL CHARACTERISTICS

- Power Supply 220V/AC
- Maximum permissible operating current of the power relays 16A / 250V
- The output current of the room temperature controller corresponding to the set temperature of the water in the boiler 20 to 90 C 4 до 20mA
- Thermal cut-out. Digital display for the set and the current temperature.
- Temperature measurement accuracy +-3° C

5.3. DIAGRAM



5.4. DIFFERENT CONFIGURATIONS AND SPECIFIC RULES TO BE FOLLOWED DURING INSTALLATION AND USE.

- By Boiler Controller.

The set point of the controller is set by the potentiometer for manual adjustment located on the front control panel. In this case an installation of thermostatic valves at each household radiator will make it possible to control the temperature in each room individually. The water temperature in the boiler is set manually by the user and doesn't depend on the ambient temperature, whereas the thermostatic valves affect the boiler

controller and electrical power by dosing the consumed heat power. In operating mode the boiler is in steady state and maintains constant water temperature while the power varies.

It is a shortcoming that because of the manual adjustment the water temperature may be lower or higher than what is really necessary to maintain the set points of the thermostatic valves in the different rooms.

- By the external weekly programmable temperature controller.

The controller should be mounted in the heated rooms. It determines the duration of operation and rest of the boiler, depending on the program entered and the temperature in the premises. In operating mode the set point of the controller is determined by the manual adjustment unit located on the front panel and is constant. In this case thermostatic valves can be installed at the radiators in all the heated rooms except the room where the programmable controller is placed. If a thermostatic valve is installed in the same room, it should be fully open in order not to prevent the normal operation of the programmable controller. The water temperature in the boiler is adjusted manually by the user and doesn't depend on the ambient temperature. The thermostatic valves influence the boiler controller by dosing the consumed heat power and the room temperature influences the duration of the boiler operating time. An advantage of this method is the convenient control of the boiler directly from the room, disadvantage is the frequent switching between on and off state, in order to maintain the room temperature. **The boiler doesn't work in steady state mode and there are large temperature oscillations.**

- By room temperature controller

The proportional temperature controller is mounted in any of the heated rooms. While in operation the set point of the boiler temperature controller varies, it is determined by the signal from the room temperature controller and depends on the difference between the set and the measured temperature value. The thermostatic valves can be installed at the radiators in each room, except the room where the room temperature controller is installed. If the temperature controller and a thermostatic valve are installed in the same room the valve must be fully open. During the operation the boiler is in steady state mode having the water temperature optimally adapted for maintaining the temperature set at the room temperature controller. When the room temperature changes the set point for the boiler controller will also change correspondingly. Over-consumption of energy is eliminated and this method is also economical in terms of protection of the electrical installation.

6. OPERATION MANUAL

- Boiler should be serviced only by persons familiar with the operation and the control of the boiler.
- In case of power failure, the boiler stops. After recovery of power supply, the boiler switches on automatically.
- Any interference with the electrical section of the boiler is forbidden, except for operation, control and replacement of the operative chain fuse. During such change, the main switch should be off.
- Boiler should not be switched on in case there is no water in the heating system (a hazard exists of damaging the pump and heaters burning).

- Any heating system, prior to commissioning, should be tested for tightness and warm test should be carried out.

CONNECTION OF THE INSTALLATION FILLING VALVE

- Performed directly on the boiler back feed water pipeline.

7. CONNECTING TO THE POWER GRID

- Connecting the electric switchboard to the power supply network and the boiler electric installation assembly should be carried out only by an expert with the necessary qualification. The power supply is connected through not severable joint according to the connection diagram. The cross-section of the power supply cable should be selected in accordance with the boiler power (see Table 4, page 12).

8. COMMISSIONING

- Boiler startup is possible after performed control on the good working order of the connections to the heating system, checkup of the electrical connections and the external line.

- Check up whether the valves and taps of the heating circuit are open, check up also the water pressure in the system. Switch on the automatic fuse of the electric boiler and preset the desired temperature of the boiler and the indoor temperature controller or programmer. Servicing of the indoor temperature controller is done according to the instructions thereto. The heating systems may be filled in only by water or mixture of water and antifreeze. Oil should not be used.

9. CONDITIONS OF COMMISSIONING AND UNDERTAKING GUARANTEE MAINTENANCE – GENERAL TERMS:

The electric boiler is mounted with the help of consoles only on a wall that can bear its weight. The boiler location should be selected in a manner to secure access – technological tolerance from its all four sides is shown on Fig. 7 and 8, page 11 and Fig.11 at page 16, the distances being different for the various rated powers.

1. Boiler should be mounted at a place suitable for servicing (free access thereto) and possibility of opening the front lid.
2. Boiler should be mounted suspended on the wall at minimum height of 1 m off the floor.
3. Water filter should be mounted at the cold water intake before the pump by observing the direction marked on the filter itself (boiler fixture), in accordance with the attached manufacturer's instructions.
4. The boiler should not be contaminated with building materials.
5. Banjo fitting connections should be mounted on the boiler intake and the outlet.
6. Hydraulic test should be carried out at an index of 1.25 above the operating pressure.
7. Upon assembly, it is necessary the adjustments of the boiler and the blocking thermostats to be checked up. The actual control is done during the warm test.
8. The guarantee shall be effective as from the commissioning date, but not later than six months as from the date of the purchase.

Method of connecting the system to a solid fuel boiler

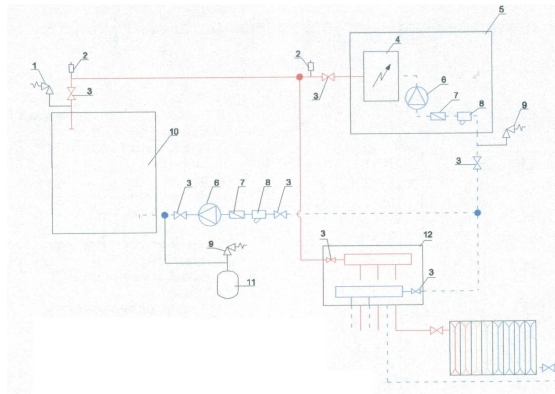


Fig. 1

- | | |
|--------------------------------|-----------------------------|
| 1. Safety valve by temperature | 7. Return valve |
| 2. Air bleeder | 8. Water filter |
| 3. Shut off valve | 9. Safety valve by pressure |
| 4. Electric heater | 10. Solid fuel boiler |
| 5. Electric boiler | 11. Expansion vessel |
| 6. Circulation pump | 12. Manifold Box |

Method of connecting of story (local) heating

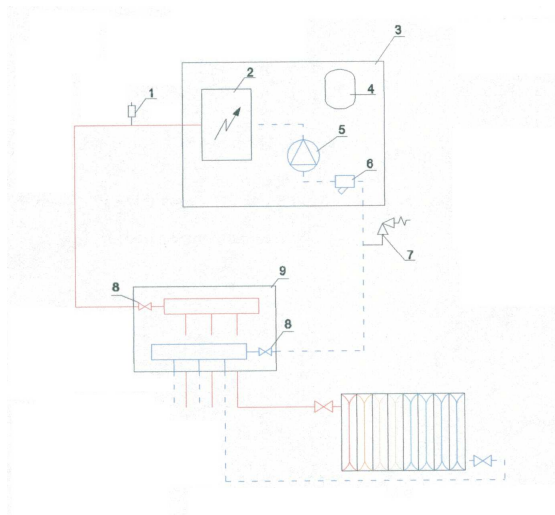
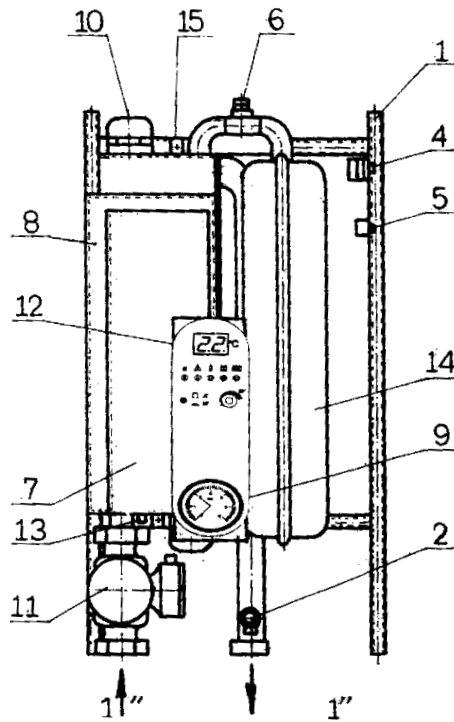


Fig. 2

- | | |
|---------------------|-------------------|
| 1. Air bleeder | 7. Safety valve |
| 2. Electric heater | 8. Shut off valve |
| 3. Electric boiler | 9. Manifold Box |
| 4. Expansion vessel | |
| 5. Circulation pump | |
| 6. Water filter | |

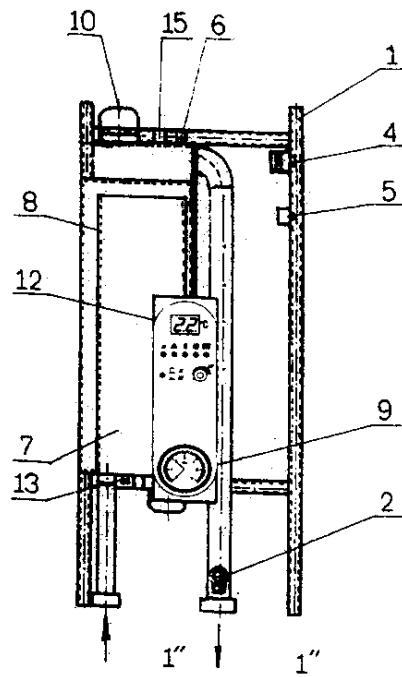
MRT 6 - 30 kW



- | | |
|------------------------------|--------------------------|
| 1. Frame | 9. Pressure-gauge |
| 2. Safety Valve 2.5 bar-1/2" | 10. Heaters |
| 4. Automatic Breaker | 11. Circulation Pump |
| 5. Blocking Thermostat | 12. Control Panel |
| 6. Air Bleeder | 13. Pressure-gauge valve |
| 7. Control Module | 14. Expansion Tank |
| 8. Water Container | 15. Thermostat Pocket |

Fig.3

MODULE T 6 – 30 KW



- | | |
|------------------------------|--------------------------|
| 1. Frame | 8. Water Container |
| 2. Safety Valve 2.5 bar-1/2" | 9. Pressure-gauge |
| 4. Automatic Breaker | 10. Heaters |
| 5. Blocking Thermostat | 12. Control Panel |
| 6. Air Bleeder | 13. Pressure-gauge Valve |
| 7. Control Module | 15. Thermostat Pocket |

Fig.4

ON/OFF STATE AND PHONE CONTROLL

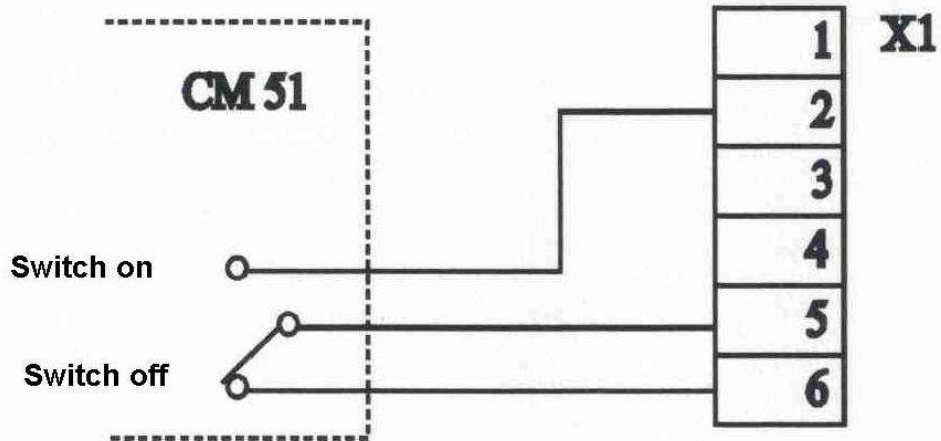


Fig.5

MRT /MODULE-T 6÷30 KW

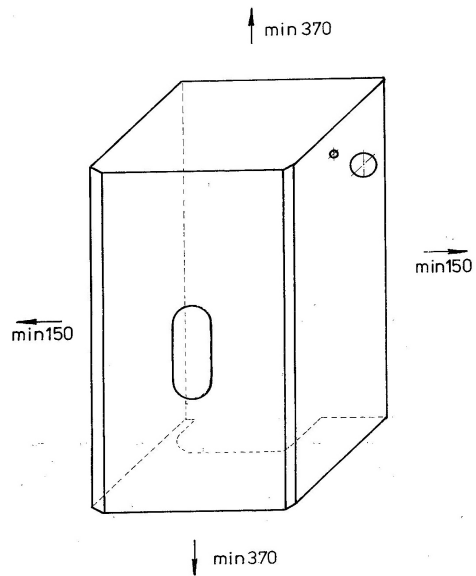


Fig.6

Dimensions of electric boilers/module with three stage control

MRT 6 - 30	kW	6 - 30
height	mm.	700
length	mm.	385
width	mm.	260
Module-T 6 – 30	kW	6 - 30
height	mm.	645
length	mm.	315
width	mm.	270

Tab. 1

Technical characteristics of electric boilers/Module with three stage control

Maximum operating pressure	MPa	0,25
Test pressure	MPa	0,40
Regulation of heat medium temperature	°C	30–90
Room temperature control	°C	5–30
Connection pipes dimensions	G	1”
Efficiency index	%	99,30

Tab. 2

Technical characteristics of electric boilers/Module with three stage control

Maximum power	kW	6, 8	10,12	15	18	24,30
Comutations level	N	3	3	3	3	3
Boiler body volume	dm ³	8,9	8,9	8,9	8,9	8,9
Supply voltage	V	240/400	240/400	240/400	400	400

Tab. 3

Cross-section of power supply cables to electric network

P [kW]	I _{heater} [A]	Cross-section [mm ²]	I _{fuse} [A]
6	8,7	5 x 2,5	10
8	11,6	5 x 2,5	16
10	14,5	(3 x 2,5 + 1,5) + 1 x 4	20
12	17,4	(3 x 4 + 2,5) + 1 x 4	25
15	21,8	(3 x 4 + 2,5) + 1 x 6	32
18	26,1	(3 x 6 + 4) + 1 x 6	40
24	34,8	(3 x 6 + 4) + 1 x 10	50
30	43,5	(3 x 10 + 6) + 1 x 10	63

Tab. 4

Control Panel

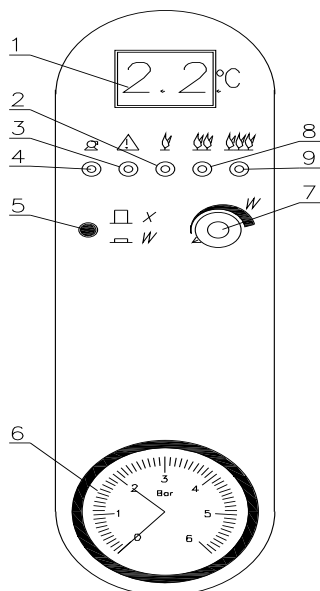


Fig. 7

1. Digital Display
2. LED – First Stage ON
3. LED – Thermal Cut-out
4. LED – Circulation Pump
5. LED – set/current temperature
6. Pressure-gauge
7. Knob for the boiler's temperature
8. LED – Second Stage ON
9. LED – Third Stage ON