Operation details of ULTIMA and ULTIMA PLUS

Boiler room ventilation
According to the regulations each built-in boiler room must be equipped with both intake and exhaust ventilation in order to ensure proper boiler work and user safety. Incorrect boiler operation (e.g. letting out smoke, condensation, problems with reaching higher temperature) is usually a result of lack of intake ventilation or its blocking. The purpose of exhaust ventilation is to take stale air and hazardous gases out of the room.
Mechanical ventilation cannot be installed in boiler rooms equipped with stacks with a natural draught.

Intake ventilation
The area of the cross-section of the intake ventilation duct should be equal to 50 % of the area of the cross-section of the stack, not less than 20x20cm. The duct should be located 1m above the floor.

An air flow regulation device should be installed in the intake hole or in the duct; however it cannot reduce the duct diameter more than down to $1/5^{th}$. Ventilation ducts must be made of incombustible materials.

Exhaust ventilation
The duct should be made of brick with cross-section area equal to at least 25% of the cross-section area of the stack, but not less than 14x14cm. Inlets cannot be equipped with any air flow regulation devices. The outlet should be located just beneath the room's ceiling and it should terminate at least 1,5m above the roof. Ventilation ducts must be made of incombustible materials.

The minimum height of a boiler room is 2.2m.

Connecting a boiler to a stack.
The execution of stack ducts should meet the requirements set forth in Polish Standards PN-87/B-02411 and PN-89/B-10425 "Smoke, fumes and ventilation ducts made of bricks. Approval requirements and tests" and Ordinance of the Minister of Infrastructure dated 12.04.2002 (Journal of Laws no. 75).

The duct taking fumes from the boiler to the stack is called a "flue". In order to limit fumes flow resistance the flue should be straight and if a change of direction is necessary it should be provided by means of soft curves.

It is important to install the flue at the boiler room floor level as the fumes have to bounce. A washout hole should be located approximately 30cm above the floor. It should be tightly closed. The cross-section of the duct should be rectangular as this shape ensures minimum fumes flow resistance. The minimum diameter of the stack is 20x20cm. Brick partitions located between the duct and the brick wall cannot be less than 12cm thick (half of a brick).
Stacks should terminate above the roof. Position of stack outlet depends on roof slope and its flammability.
In case of roofs sloped at 12º or less, the stack should terminate 0.6m above the roof ridge. If the roof is sloped at more than 12º and covered with flammable material, stack outlet should be located 0.6m above the ridge; this distance can be reduced to 0,3m if the roof is covered with non-flammable or slow-burning material.
The manufacturer recommends the installation of a thrust terminator. In case of significant negative pressure inside the stack, the terminator opens and sucks in air from the boiler room, instead of sucking air through the boiler itself, which helps to avoid an uncontrolled increase of heating medium temperature. The setting of the thrust terminator is dependent on boiler capacity.

I. Boiler operation

Starting a boiler

Each boiler is equipped with a head charge, through which fuel is loaded.

Start the fire with dry firewood pieces and paper loaded through the fire grate door, and add the rest of the fuel when there is sufficient heat and flames. When the whole load is burnt out, the fire grate and ash box must be cleaned and then fire can be set again. If there is a need to add fuel while there is still heat, the grate must be cleaned and the ash box cover must be closed while adding fuel.

Installation of a furnace controller (available from the manufacturer) is recommended in order to improve the comfort of the device's operation and boiler efficiency (i.e. working time with a single fuel load).

In case of Ultima Plus boilers with air injection, the above procedure applies in case of using OI or OII hard coal, however MI and MII hard coal must be fired up with firewood placed on the top. Afterwards, close the door and push the "Start" button.

The manufacturer guarantees continuous work of the boiler with one fuel load (i.e.: hard coal) for at least 4 hours at rated capacity.

Chart of the approximate values of hot water temperature depending on outdoor temperature:

Outdoor temperature at 09:00 p.m. on the previous day	-25	-20	-15	-10	-5	0	+5	+10
Hot water temperature	93	90	82	74	66	58	49	40

Attention: due to the high fumes temperature and depending on fuel type some of the boiler elements can become extensively hot!

Maintenance

Boiler ducts and the loading chamber should be cleaned at least once a month. The ducts are cleaned through cleaning holes located on the boiler's top and back.

The air intake fan should be cleaned if there is dust on its blades. Remove the dust with a brush or compressed air.

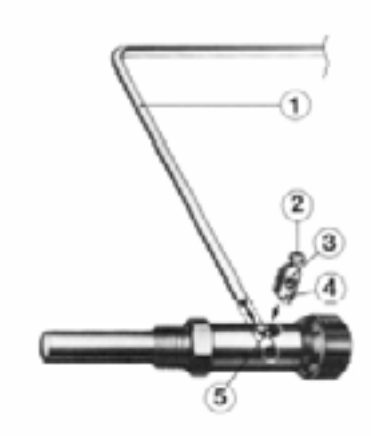
After the heating season, the boiler must be cleaned of black, which absorbs moisture and causes corrosion. Afterwards, all movable elements of the grate should be lubricated.

The heating medium must not be removed from the boiler even after the heating season, as this could result in excessive scale accumulation.

II. Boiler temperature control.

Mechanical furnace controller.

Boilers without air injection are equipped with furnace controllers (made in Germany or Sweden), which provide control of water temperature in the boiler by means of air intake damper control.



1. **lever**
2. **hexagonal bolt**
3. **hinged element**
4. **furrow**
5. **opening**

Installation

The submerged sleeve has to be firmly connected to the controller. Then bolt the whole set to the boiler. Install the lever and attach the chain. Connect the chain to the air damper.

Heat the boiler up to 60 ºC, set the controller to 60ºC and adjust chain length – it must nor be loose and the air damper must be closed.

III. Control of Ultima Plus boiler with air injection

1. Use

RTCO-6 temperature controller is used to control temperature inside a boiler loaded with fine-sized fuel, and to switch on the circulation pump. The controller is an easy-to-operate, reliable device.

2. Technical data

Temperature regulation range .....35÷90^{o}C
Pre-set circulation pump switch-on temperature ...34^{o}C
Pump switch-on temperature setting range.....10÷70^{o}C
Air injection activation temperature.....>37^{o}C
Temperature range for automatic regulation of burning speed
.....from 2 to 10°C
Air injection control:
Duration .....0÷90s.
Intervals.....1÷15min.
Minimum unit of thermometer scale
and temperature setting scale .....1^{o}C
Air injection capacity setting range.....30÷100% of rated capacity

Power supply.....230V~50Hz
Maximum power supply requirement 180W
including the pump 100W
Acceptable range of ambient temperature.....0÷40^{o}C
Maximum capacity of the blowing fan .....320m^{3}/h
Maximum compression of the blowing fan .....320 Pa
Protection against excessive current .....2×1.25A

3. Operation

1. Switch on the controller ('I' position). After a while water temperature will be displayed.
2. Set the required temperature using the '+' and '-' buttons. Instead of the current temperature, previously set temperature will be displayed, and a new setting can be made. Release of the regulation button automatically confirms the change and the current temperature is displayed.
3. Switch on the boiler by pressing the **F** button (*'Work' diode is activated when the air fan starts and 'Start' diode when the boiler starts*). When the required temperature is reached, air injection is switched off automatically (*the diodes go out*) and the controller will enter stand by mode *(which will be signalled by a flashing dot on the display*). The **F** button works as an on/off switch only if the circulating water temperature is below 34ºC.
4. When the above instructions have been followed, the controller ensures:
    - Constant water temperature in the boiler by means of activating air injection to the furnace.

Programming the controller should be carried out by manufacturer's service staff or by the Client – strictly in accordance with manufacturer's instructions.

In order to change the default controller settings, enter the PROGRAM mode, and switch on the controller while pressing the **F** button several times until '**HI'** is displayed on the screen.

After a while the current temperature range for automatic regulation of burning speed will be displayed. Changes can be introduced using the '+' and '-' buttons.

Press the **F** button again to go to the air fan capacity setting mode indicated by displaying '**d.'** on the screen. After a while '**d.'** will be replaced with the current setting in decimal parts of percent of the maximum capacity. Changes can be introduced as above.

Press **F** button again to set the pump's switching-on temperature. This mode is indicated as '**Po.'** on the display. Changes can be introduced using the '+' and '-' buttons.

In order to confirm the changes and go back to displaying current temperature, press the **F** button again.

Any undesired changes may be deleted by switching off the device. In such case, changes will not be saved.

Installation recommendations

1. The controller should be installed by an authorized professional.
2. The controller should be installed in a place (on a surface) preventing its excessive heating (above 40ºC).
3. Before connecting the pump, unplug the power supply cable (220V).
4. Plug the power supply cable only into a 220V-50Hz socket with a **safety pin**.
5. The controller cannot be exposed to water or moisture (condensation), e.g. resulting from sudden changes of ambient temperature.

    !!! Attention !!!
    DO NOT FLOOD THE SENSOR WITH OIL during installation; carry out so called "dry installation".

Possible controller failures

In case of failure (*lack of indications*)

1. Check the power supply.
2. Check both fuses (*replace if necessary*).

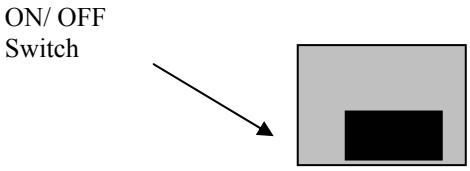
If other indications are displayed instead of temperature:

1. Turn the device off.
2. Turn the device on. If the problem persists, contact your service provider.

If the set (desired) temperature is exceeded by more than 15ºC:

1. Check the setting of the AIR INJECTION function – decrease the frequency and duration of air injection.
2. If the problem persists, contact your service provider – further operation without supervision could cause boiler failure.

3. Automatic switch on of water circulation pump (the '**Pump'** diode is activated) when boiler reaches the temperature of 34ºC or another temperature set by the user.
4. When all fuel in the boiler is used up, air injection and the circulating pump are automatically switched off (the '**Stop'** diode is activated).
   Attention: this function is activated when the boiler reaches the desired temperature and the '**Start**' diode goes off. If due to controller's settings the desired temperature cannot be reached, this function can be activated by switching the controller's power supply off and immediately on, when the boiler temperature has exceeded 40ºC. The '**Start**' diode will then go off.
5. Continuous display of water temperature with information that air injection and pump are switched on.
6. Access to desired temperature and AIR INJECTION function setting mode. This function is automatically activated when the boiler reaches the previously set temperature.



Programming AIR INJECTION

When this function is activated, air injection is switched on at regular intervals. Changes of the interval and duration of air injection may be introduced by means of entering the AIR INJECTION SETTING mode.

In order to activate the controller in this mode, press the **F** button several times until '**Pr'** is displayed on the screen. After a while the 'Interval diode will be activated, and the current setting will be shown on the screen. Changes may be introduced by pressing the '+' or '-' buttons.

Air injection duration setting mode may be entered by pressing the **F** button again. The "Air injection duration" diode will be activated and the current setting will be displayed. Changes may be introduced as above.

In order to confirm the changes and go back to displaying current temperature, press the **F** button again.

Description on scheme (legend) :
Boiler Temperature Controller

- **Stop**
- **Pump**
- **Work**
- **Start**
- **Interval (min)**
- **Air injection duration (sec)**

Sensor
Pump