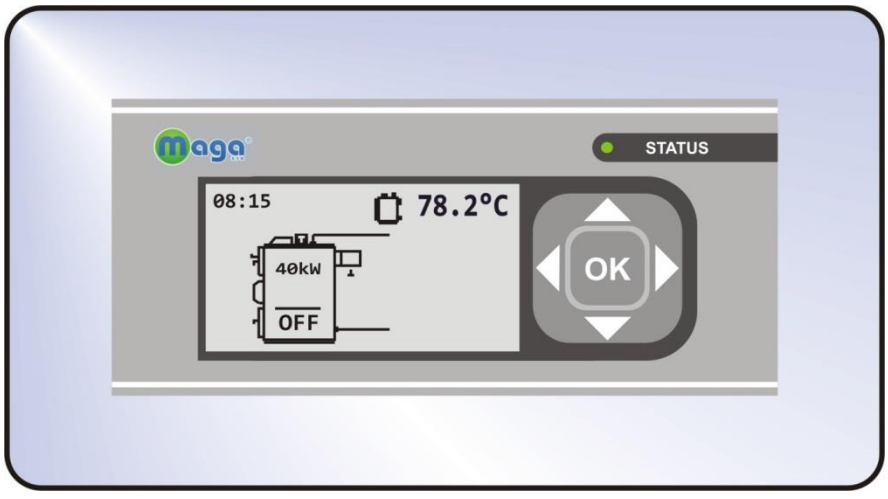
ELEKTRONICKÉ RIADIACE SYSTÉMY s.r.o.

AK 6000

Maga
Wood Gasifying Boilers
Control System

User Manual



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Specification

This document is intended for use with AK6000 – the electronic system for wood gasyfying boilers control.

Terminology

AK6000.X

The modular electronic control system for wood gasyfying heat-water or heat-air boilers. On the basis of the choosed program effectively optimizes combustion procesess so the boiler is able to generate appropriate medium in heating system. Indication .X means hardware version of the AK6000 where X may be within 0 ÷ 3.

DUOLED

Double color light emitting diode used to show main state of the boiler.

Display

Grafic LCD display with 128x64 pixel, LED backlight.

Flash memory

Electrically Erasable Programmable Read Only Memory to preserve data even after shutdown.

RWM

Read Write Memory is intended to save continuously processed data. They are erased after shutdown.

AKBUS

System Bus connects modules of the AK3000 and provides powering and communication by means of RS485 bus and other specialized signals.

Important Symbols

 Warning - danger or risk of injury

! Important note or statement

Safety Instructions

Please read these instructions carefully before using the AK6000 control unit

- ❑ Do not use the boiler until completely installed
- ❑ When the boiler is **ON** you can not do the following
  - o remove enclosure from the electrical parts - for example electronic modules, fans, sensors, thermostat etc.
  - o replace the fuses
  - o repair damaged cables and modules etc.
- ❑ Before removing the cover of the electrical parts or other apliances is important to disconect the power cord from the AC outlet.
- ❑ Do not operate the boiler unless all enclosure panels are properly in place
- ❑ In case of failure detection or damaging any part is important
  - o do not touch any part of boiler
  - o immediately disconect boiler out of the AC outlet
  - o refer all servicing to qualified service personnel
- ❑ This appliance is not suitable for person which were not instructed by the responsible operator for using the appliance or whose have physical and other disability which prevents from the safe operation on the apliances

 Improper connection of the equipment can result in risk of electric shock. Check with qualified electrician or service representative if you are in doubt whether the boiler is properly

CONTROL SYSTEM CONFIGURATION

Basic Configuration AK6000.0

This automatic system is intended to control the producing of heat-water or heat-air in wood gasyfying boilers. Basic principle of the function is regulation of the water temperature by means of setting the amount primary air in combustion fireplace of boiler.

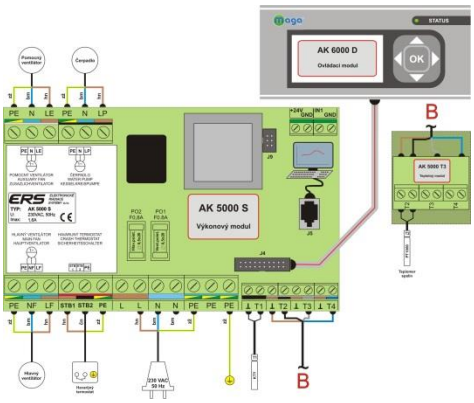
Supply of air is controlled by continous influence to the suction fan operating speed.

Two electronic modules create basic composition of the AK6000.0

AK6000D – Control Unit	AK5000S – Power Board
Grafic LCD display, 128x64 pixel, LED backligt	Two level power source 230VAC / 24 and 9 VDC
Five point touch-button	Two fan outputs - main fan and auxiliary fan
Duo LED (red / green)	Water-pump output
20 pin connector to connect power board	Four temperature sensors T1..T4

! Two independent fuses F1,2/0,8A save system parts and fans in malfunction

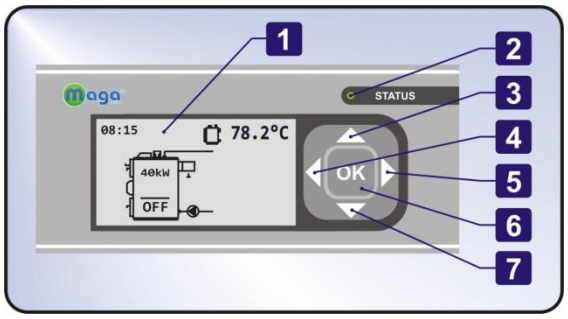
Basic Configuration Functions AK6000.0



- ❑ Adjusting boiler by means of the LCD display, signal DuoLED and five arrow button
- ❑ Water temperature PID control in adjustable range 60 ÷ 85 °C by means of the continuous regulation of the fan
- ❑ Water pump switching in pulse mode provides suppresion of the low-temperature corrosion
- ❑ Two temperature sensors connection option: T1 (water sensor) and T2 (combustion sensor)
- ❑ Emergency heat thermostat conecting option
- ❑ It is possible to expand the basic configuration by Lambda-probe board or Ethernet board for remote control.

GUIDE TO THE CONTROL UNIT

Operating Points AK6000.X



1 - graphic display, 128 x 64 pixels, LED backlight for getting information

2 - duoLED – total status OK (green) / Err (red)

3 - button ▲ - increasing adjusted value or switching depiction of the measured values

4 button ◀ - auxiliary fan power down or move the selection left

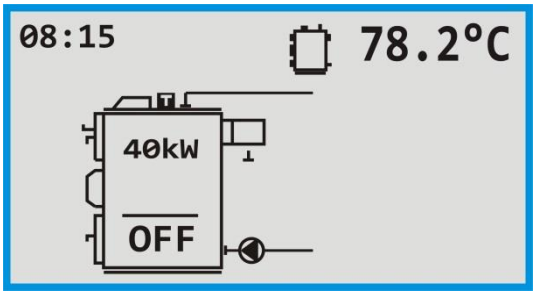
5 - button ▶ - choice back (ESC) or move the selection right

6 - button **ENTER**

- short pressing
  - power on the boiler, five arrow button depiction and subsequently you can power off boiler or supply fuel (suction fan goes to 100%)
  - fuel suply ending - after fuel suply is passed by
  - menu level or choice confirmation, data storage
- long (2 sec) pressing – entrance to user operation settings

7 - button ▼ - decreasing adjusted value or switching depiction of the measured values

Operating Screen AK6000.X



06:12 - current time

T - boiler thermometer is installed

40kW - power value of the boiler (16 – 80kW)

OFF - actual status of the boiler OFF/ON/END/boiler temp.

⊥ - combustion thermometer is installed

- water pump status – sign is flashing when water pump is ON

75.4°C - boiler temperature – user depiction – it can be switched by ▲ or ▼ button to next value

www.ers.sk - boiler dealer

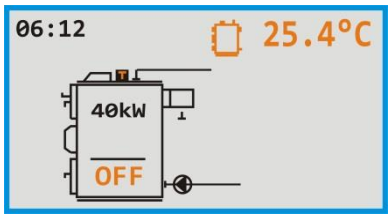
Tue 08/01/13 - current date

150.5°C - combustion temperature

100% - instant speed of the main fan

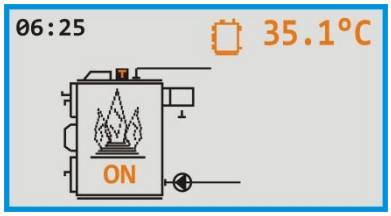
Basic Modes AK6000.X

Boiler is OFF



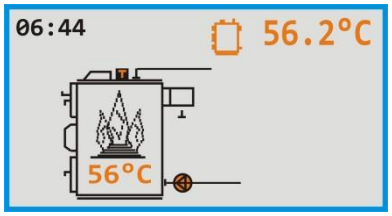
- Short pressing of the **ENTER** turns the boiler ON.
- Long pressing of the **ENTER** gets the operator into the parameter settings

Start of the heating



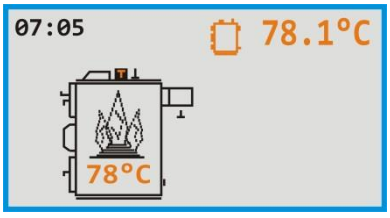
- Fan is working with 100% top speed
- We can turn OFF the boiler by pressing **ENTER** and ◀ subsequently
- After the combustion temperature reaches value **end+20°C** in 30 minutes long time interval the boiler is in combustion process otherwise the boiler turns off (END status)

Water pump power ON



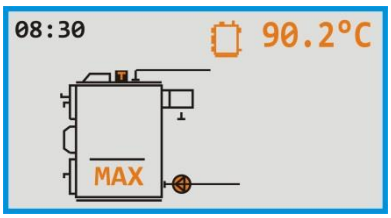
- Water pump is working in pulse status first and then in permanent status
- Boiler is prepared to fuel supply by means of the double pressing of the **ENTER** ( function) – main fan goes to 100% top speed in suction version or to 0% in blower version

Combustion



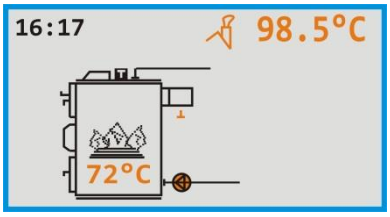
- Continuous regulation of the fan keeps the boiler temperature on the acquired value
- Critical values of temperatures and thermostat automatic monitoring

Boiler maximal temperature overrun



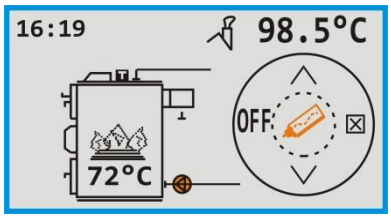
- Capture of the boiler max. temperature overrun (**T max = T requested + 10°C**) or at **Tmax = 90°C**
- Fan power OFF. Back from MAX state gets boiler after decreasing under the requested temperature.

Heating gets weaker



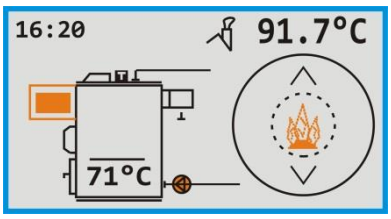
- Top speed of the fan (100%) cannot reach requested temperature for long time
- Combustion temperature falls despite the top speed (100%) of the fan for long time
- Fuel supply is necessary

Fuel supply



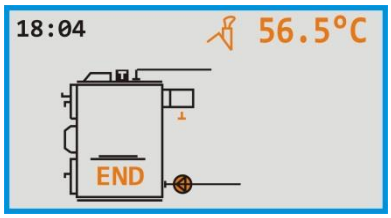
Double click of the button **ENTER** (function ) prepares the boiler to fuel supply– main fan goes to 100% top speed in suction version or to 0% in blower version

Door opening



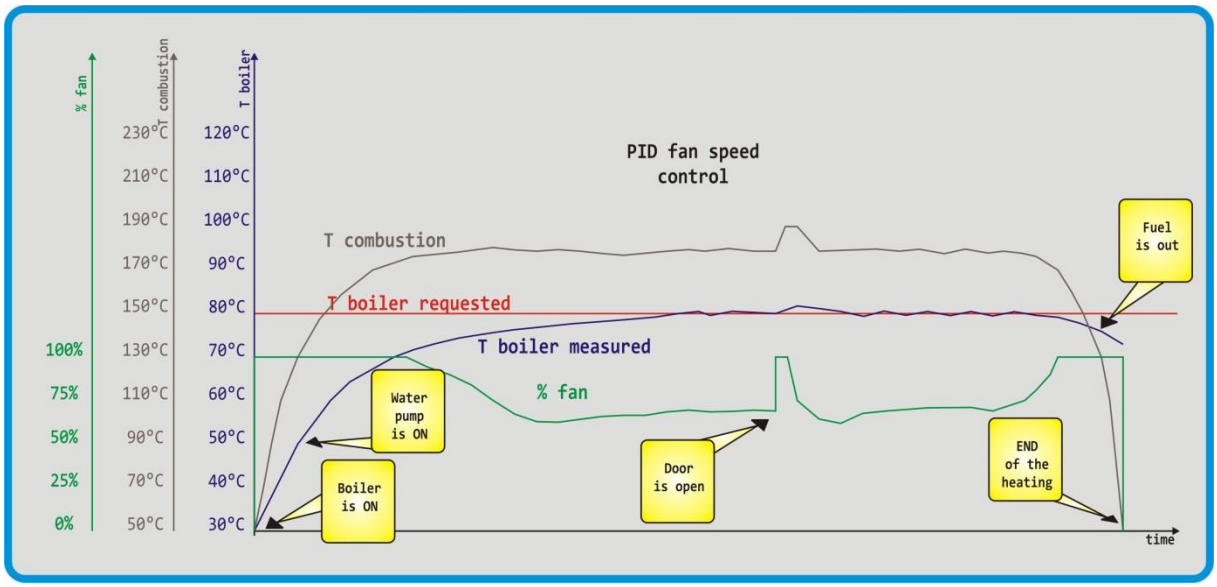
- ❑ Wait 10 seconds after door is depicted on the display - fan will absorb the combustion
- ❑ Open the door and make all required action
- ❑ Short press the **ENTER** – boiler gets in original state again

End of the combustion



- ❑ Combustion temperature decreases under the minimal value – boiler is automatically turned OFF
- ❑ Fuel supply and boiler turning ON is necessary
- ❑ Water pump is OFF

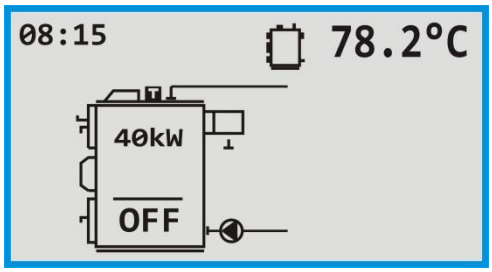
Basic Characteristics AK6000.X



OPERATING

Starting AK6000.X

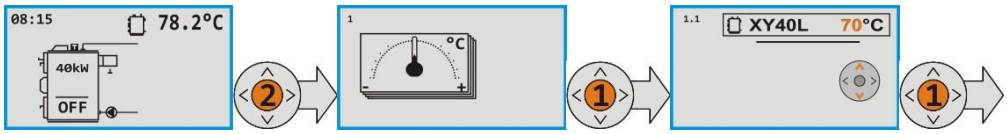
Boiler is turned ON by connecting the power cord into the AC outlet. In 10 seconds will the basic view displayed



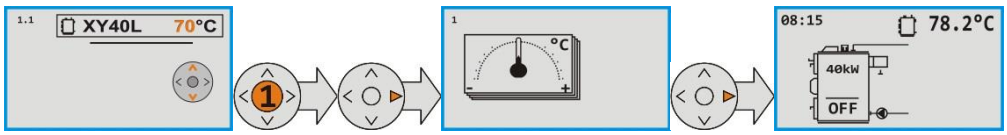
Basic view

Required Boiler Temperature Setup AK6000.X

Starting at basic view we must hold the button **ENTER** two seconds long:

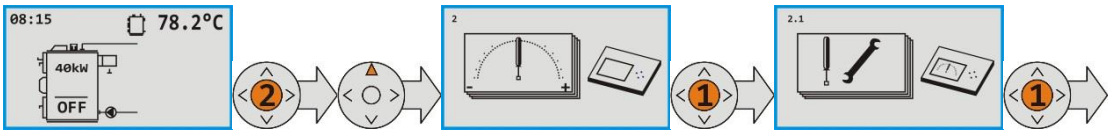


Basic view goes to the frame 1 where we use short click on the **ENTER** and we are in the frame 1.1. Short click of the **ENTER** and we can set required temperature by buttons ▲ or ▼ in **70 – 85 °C** range. Short click of the **ENTER** confirms choosed value and frame 1.1 we leave by double click of the ▶ (ESC).

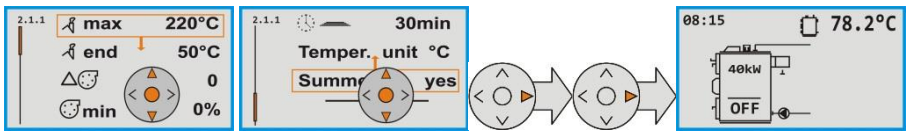


User Parameter Setup AK6000.X

Starting at basic view we must hold the button **ENTER** two seconds long:



Basic view goes to the frame 1 where we use button ▲ till we get to the frame 2. Short click on the **ENTER** and we are in the frame 2.1. One more time click on the **ENTER** and we get to the frame 2.1.1. Using buttons ▲ or ▼ we can choose required parameter:



Frame 2.1.1 we can leave by double click of the ▶ (ESC).

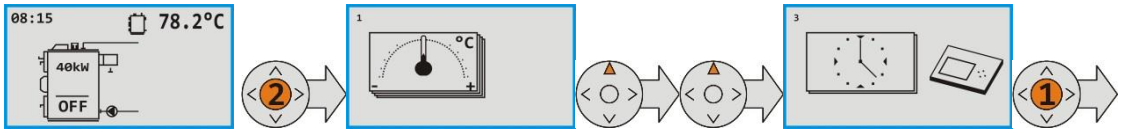
max 220°C	Combustion upper temperature – increase over of this value limits speed of the fan. It provides chimney protection.	130 - 280°C
end 50°C	Combustion lower temperature – decrease under of this value activates boiler status **END** – fuel burnout. It keeps the embers waiting.	50 - 130°C
0	Main fan power change. For example: value -3 decreases fan speed in 30%	-3, -2, ... 2, 3

min 0%	Fan minimal speed. This value is limit for speed decrease of the fan after reaching requested boiler temperature.	0 – 70%
60	LCD display brightness	0 - 128
Roll no	Roling of the values in user depiction on the basic view of the display.	yes / no
Help 0s	Time to display help of five arrrov button in frame 2.1.1	0 – 10 s

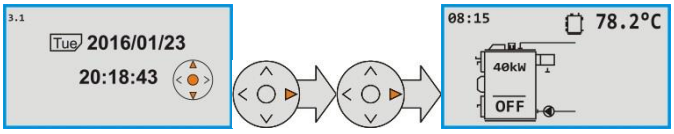
10s	Ventilation in combustion chamber – this time interval of the 100% fan speed is switched every 60 seconds after overrun the required boiler temperature	0 – 300 s
30min	Time to reach END status after decreasing the combustion temperature below **end** value	0 – 60 min
Temper. unit °C	Temperature scale set up.	°C (Celsius) / °F (Fahrenheit)
Summer yes	Automatic change of winter and summer time.	yes / no

Current Time Setup AK6000.X

Starting at basic view we must hold the button **ENTER** two seconds long:



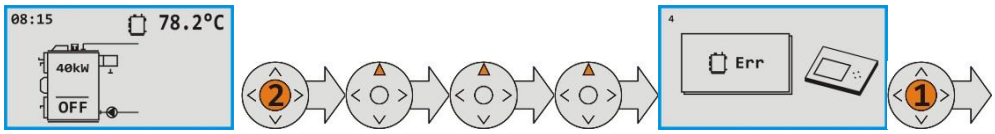
Basic view goes to the frame 1 where we double use button ▲ till we get to the frame 3. Short click on the **ENTER** and we are in the frame 3.1. Using buttons ▲ or ▼ or **ENTER** we can make required parameter to flash. Using buttons ▲or▼ we set flashed value to required time or date. Choice is stored by the **ENTER** and so we move to next position we want to change. Frame 3.1 we can leave by double click of the ► (ESC).



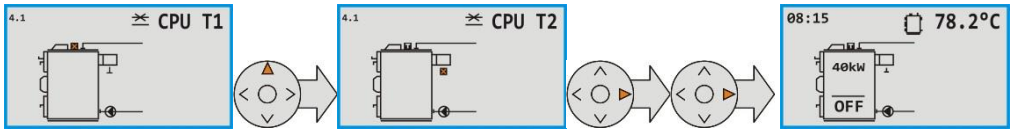
Error messages AK6000.X

All the connected accsesories are monitored by system. Common error status is displayed by red color of the LED. More exactly is error message displayed on the LCD display in the failure frame 4.

Starting at basic view we must hold the button **ENTER** two seconds long. Triple click on the buttons ▲or▼ will get us to the frame 4. One click on the **ENTER** displays first failure, if any. Next failures we can display by the button ▲.



Disconnecting of thermometers T1 (boiler temperature) or T2 (combustion temperature) is on the next views:



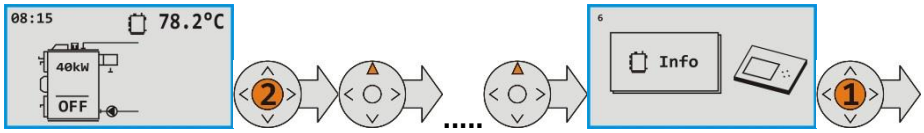
Frame 4.1 we can leave by double click of the ► (ESC).

Version of software AK6000.X

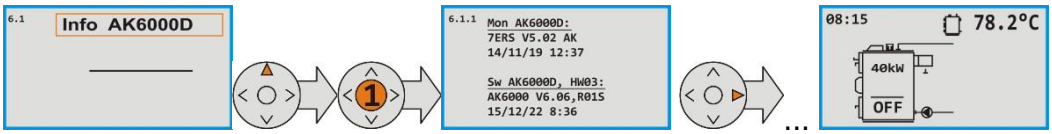
Sotware implemented in hardware modules we can verify in frame 6 „Info“. We can see a version and date with exact time of software generation here.

Starting at basic view we must hold the button **ENTER** two seconds long. One click on the button ▼ will get us to the frame 6.

By means of the **ENTER** button we can enter into the version display:



By means of the **ENTER** button we can display the current software version of the AK6000D module:



Frame 6.1.1 we can leave by triple click of the ▶ (ESC).

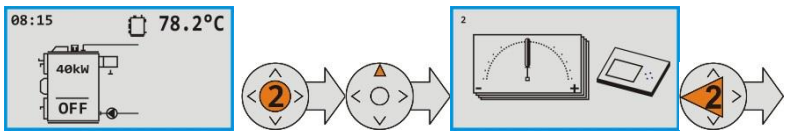
Service Parameter Setup 1 AK6000.X

We can use service parameter setup 1 to configurate basic properties of the connected components.

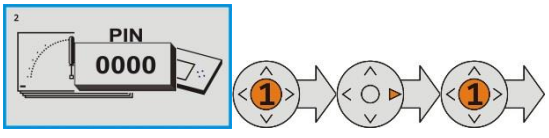
Improper setup of service parameters can result in risk of boiler incorrect behaviour or damaging some amount of boiler. Just the qualified service representative can properly act in this area.

You need to TURN OFF the boiler before setting in this area.

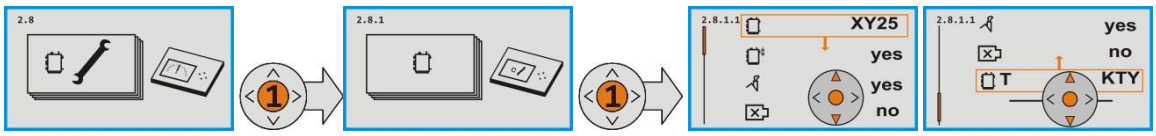
Starting at basic view we must hold the button **ENTER** two seconds long. One click on the button ▲ will get us to the frame2.



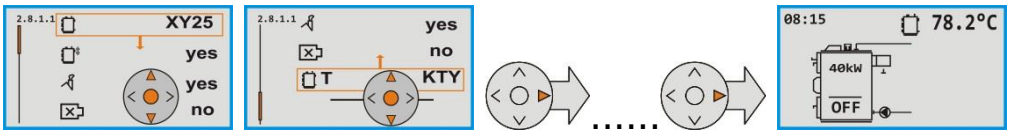
We can hold the ◀ button for two seconds and more now. A frame with request for service PIN will be displayed:



By means of the ▲or▼ we can set the first flashing digit of the **PIN xxxx** and by **ENTER** button we confirm it. So we can enter rest of the PIN. With **ENTER** button we can get to the frame 2.8.1.1. :



Using buttons ▲ or ▼ we can choose required parameter then by means of **ENTER** button confirm and flashing parameter is able to change by ▲ or ▼ buttons:



Frame 2.8.1.1 we can leave by click of the ▶ (ESC). Parameter is set now.

XY25L	Boiler type. Numeric value represents power of the boiler and L character is for Lambda module connected. **Caution! Parameter setup can change related parameters.**	XY16, XY16L,....XY100, XY100L etc.

yes	Main fan is suction type. We can change it to the blower type.	or
yes	Combustion thermometer is installed. Boiler reaches END status after decreasing the combustion temperature below **end** value.	yes / no
no	Auxiliary fan is not connected.	yes / no
T KTY	Boiler thermometer is installed with KTY type. You can change it to the Pt1000.	KTY / Pt1000

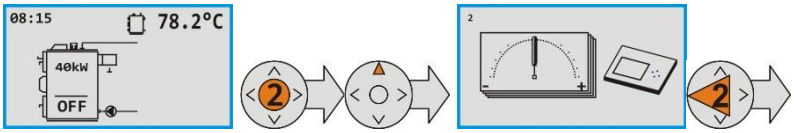
Service Parameter Setup 2 AK6000.X

We can use service parameter setup 2 to configurate chosen „hardware“ properties of control unit.

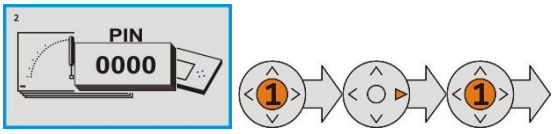
Improper setup of service parameters can result in risk of boiler incorrect behaviour or damaging some amount of boiler. Just the qualified service can properly act in this area.

You need to TURN OFF the boiler before setting in this area.

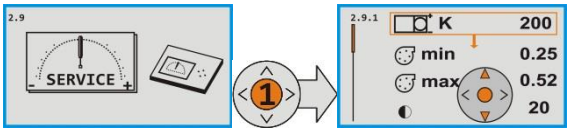
Starting at basic view we must hold the button **ENTER** two seconds long. One click on the button ▲ will get us to the frame2.



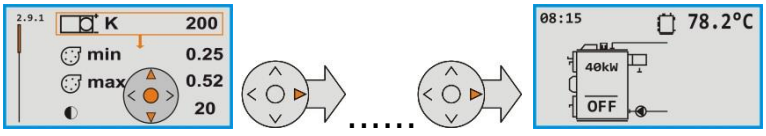
We can hold the ◀ button for two seconds and more now. A frame with request for service PIN will be displayed:



By means of the ▲or▼ we can set the first flashing digit of the **PIN yyyy** and by **ENTER** button we confirm it. So we can enter rest of the PIN. With **ENTER** button we can get to the frame 2.9.1. :



Using buttons ▲ or ▼ we can choose required parameter then by means of **ENTER** button confirm and flashing parameter is able to change by ▲ or ▼ buttons:



Frame 2.9.1 we can leave by click of the ▶ (ESC). Parameter is set now.

K 200	Secondary servodrive S1 valve in Lambda module. It means end position of close movement.	0-100%
min 0.25	Min. switching value for triac of the main fan.	0,25 – 0,99
max 0.52	Max. switching value for triac of the main fan.	0,25 – 0,99
◐ 20	Display contrast	0 - 40

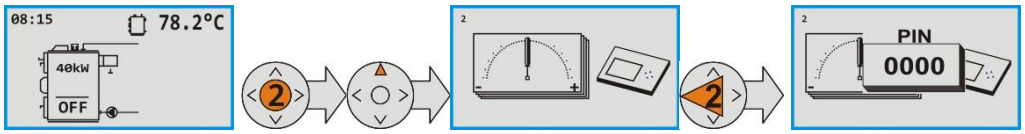
Component Service Activation AK6000.X

In this section we can manually activate connected components as fans or water pump for service purpose.

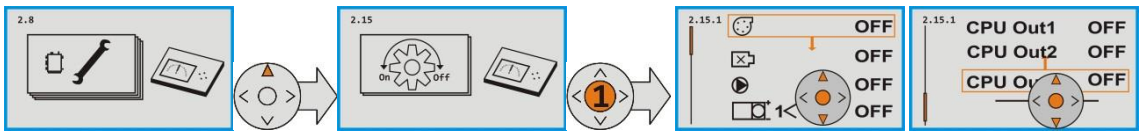
⚠ Improper setup of service parameters can result in risk of boiler incorrect behaviour or damaging some amount of boiler. Just the qualified service can properly act in this area.

You need to TURN OFF the boiler before setting in this area.

Starting at basic view we must hold the button **ENTER** two seconds long. One click on the button ▲ will get us to the frame2.



By means of the ▲or▼ we can set the first flashing digit of the **PIN xxxx** and by **ENTER** button we confirm it. So we can enter rest of the PIN. With **ENTER** button we can get to the frame 2.8. Subsequently by means of the ▲ and **ENTER** button we can depict frame 2.8.15 with set of outputs:



Using buttons ▲ or ▼ we can choose required output then by means of **ENTER** button to turn it ON or OFF:

OFF	Output – main fan is OFF	ON / OFF
OFF	Output – auxiliary fan is OFF	ON / OFF
OFF	Output – water pump is OFF	ON / OFF
1< OFF	Output – OPEN secondary servodrive is OFF	ON / OFF
1> OFF	Output – CLOSE secondary servodrive is OFF	ON / OFF
Inic 1 OFF	Inicialization secondary servodrive is OFF	ON / OFF
CPU Out1 OFF	Output – expander relay 1 is OFF	ON / OFF
CPU Out2 OFF	Output – expander relay 2 is OFF.	ON / OFF
CPU Out3 OFF	Output – expander relay 3 is OFF	ON / OFF

Electric Parameters AK6000.X

AK6000D

Input voltage	7,5VDC
Input current	0,06A
Operating temperature	max 45°C
Case	IP20
Connection with AK5000S	20-pin conector PFL

AK5000S

Input voltage	230VAC, 50Hz ±10% cord 3m, H05VV-F 3Gx0,75, PVC, temperature range -15 až +70**°C**
Full load	1,6A
Temperature range	max 45°C
Case	IP00
Component terminals	Fan / Pump : 0,75mm², T1-T4 : 0,5 mm²

Maximum number of inputs	3
Boiler thermometer	KTY (PTC / polovodič, R=2kOhm/20°C)
Combustion thermometer	PT1000
Crash thermostat	Contact Normally Closed

Maximum number of outputs	3
Main fan	230VAC / 0,4 A
Auxiliary fan	230VAC / 0,4 A
Water pump	230VAC / 0,8 A

Fuse F1 – Main and auxiliary fan	0,8 A, T 5x20mm
Fuse F2 – Control unit and water pump	0,8 A, T 5x20mm

BLOCK DIAGRAM AK6000.X