



Boiler regulator

ecoMAX860P3-C

FOR AUTOMATIC SOLID FUEL FIRED BOILERS



ecoSTER TOUCH**



ecoSTER200**

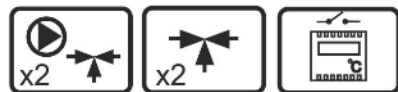
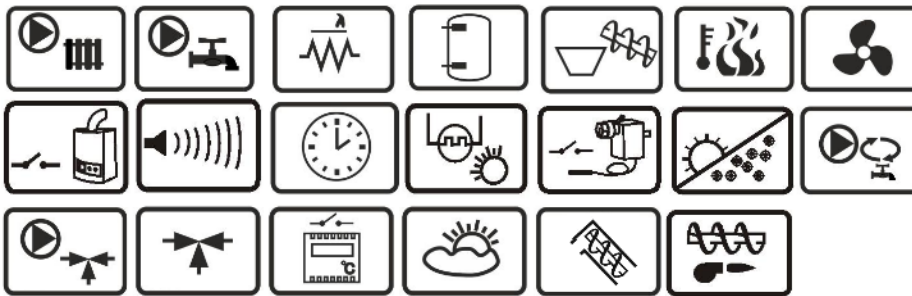


ecoNET300**



ecoNET.apk

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* functions available in the additional module B

** - room panel ecoSTER200/ecoSTER TOUCH and internet module ecoNET300 - not the standard equipment of the controller.



INSTRUCTION INSTALLATION AND OPERATING MANUAL

ISSUE: 1.0

APPLIES TO SOFTWARE:

MODULE	PANEL
A/B	
v01.XX.XX	v01.XX.XX

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1 RECOMMENDATIONS REGARDING SAFETY

Requirements concerning safety are described in detail in individual chapters of this manual. Apart from them, the following requirements should in particular be observed.



- Before starting assembly, repairs or maintenance, as well as during any connection works, please make sure that the mains power supply is disconnected and that terminals and electric wires are devoid of voltage.
- After the regulator is turned off using the keyboard, dangerous voltage still can occur on its terminals.
- The regulator cannot be used at variance with its purpose.
- Additional automatics which protect the boiler, central heating (CH) system, and domestic hot water system against results of malfunction of the regulator, or of errors in its software, should be applied.
- Choose the value of the programmed parameters accordingly to the given type of boiler and fuel, taking into consideration all the operational conditions of the system. Incorrect selection of the parameters can cause malfunction of the boiler (e.g. overheating of the boiler, the flame going back to the fuel feeder, etc.),
- The regulator is intended for boiler manufacturers. Before applying the regulator, a boiler manufacturer should check if the regulator's mating with the given boiler type is proper, and whether it can cause danger.
- The regulator is not an intrinsically safe device, which means that in the case of malfunction it can be the source of a spark or high temperature, which in the presence of flammable dusts or liquids can cause fire or explosion. Thus, the regulator should be separated from flammable dusts and gases, e.g. by means of an appropriate body.
- The regulator must be installed by a boiler manufacturer in accordance with the applicable safety standards.
- The programmed parameters should only be altered by a person familiarized with this manual.
- The device should only be used in heating systems in accordance with the applicable regulations.
- The electric system in which the regulator operates must be protected by means of a fuse, selected appropriately to the applied loads.
- The regulator cannot be used if its casing is damaged.
- In no circumstances can the design of the regulator be modified.
- Electronic isolation of the connected devices is applied in this regulator.
- Keep the regulator out of reach of children.

2 General information

The regulator is a modern electronic device designed to control automatic solid fuel fired boilers with ignition. Flame detection occurs with an optical flame brightness sensor.

The regulator can be used to control the operation of an unregulated central heating circuit, HUW circuit and regulated heating circuits. Preset temperature of heating circuits may be set on the basis of weather sensor read-out. A possibility to work together with room thermostats helps to maintain comfortable temperature in heated rooms. Moreover, if needed, the equipment switches on gas -or oil fired reserve boiler.

The regulator may operate in connection with additional control panel ecoSTER200/ecoSTER TOUCH installed in rooms and internet module ecoNET300.

Regulator is easy to operate in an intuitive manner. It may be used in households and other similar premises and in light industry facilities.

3 Information about documentation

The regulator manual is a supplement for the boiler manual. In particular, except for this manual, the boiler manual should also be observed. The regulator manual is divided into two parts: for user and fitter. Yet, both parts contain important information, significant for safety issues, hence the user should read both parts of the manual.

We are not responsible for any damages caused by failure to observe these instructions.

4 Storage of documentation

This assembly and operation manual, as well as any other applicable documentation, should be stored diligently, so that it was available at any time. In the case of removal

or sale of the device, the attached documentation should be handed over to the new user / owner.

5 Applied symbols

In this manual the following graphic symbols are used:



- useful information and tips,



- important information, failure to observe these can cause damage of property, threat for human and household animal health and life.

Caution: the symbols indicate important information, in order to make the manual more lucid. Yet, this does not exempt the user from the obligation to comply with requirements which are not marked with a graphic symbol.

6 Directive WEEE 2012/19/UE

Act on electrical and electronic equipment



- Recycle the product and the packaging at the end of the operational use period in an appropriate manner.
- Do not dispose of the product together with normal waste.
- Do not burn the product.

USER SETTINGS

ecoMAX860P3-C

7 USER MENU - STRUCTURE

Main menu
Information
Boiler settings
HUW settings*
Mixer 1-5 settings*
Night time decrease
Summer/Winter
General settings
Manual control
Alarms
Service settings

Boiler settings
Boiler preset temp.
Weather control the boiler*
Boiler heating curve*
Curve shift*
Room temp. factor*
Output modulation
<ul style="list-style-type: none"> MAX boiler output MAX blow-in output MAX oxygen* MED hysteresis H2 MED boiler output MED blow-in output MED oxygen * MIN hysteresis H1 MIN boiler output MIN blow-in output MIN oxygen* Boiler hysteresis Min boiler output FL Max boiler output FL Feeder efficiency Feeder test Fuel mass in the test
Operation mode*
<ul style="list-style-type: none"> Pellet Grate
Regulation mode
<ul style="list-style-type: none"> Standard Fuzzy Logic
Fuel type
Fuel level
<ul style="list-style-type: none"> Alarm level Fuel level calibration
Burner cleaning
Cleaning intensity
Lambda calibration*

HUW settings *
HUW preset temp.
HUW operat. mode

<ul style="list-style-type: none"> Off Priority No priority
HUW hysteresis
HUW disinfection

Night time decrease
Boiler / Mixer / HUW container / Circulation pump*
<ul style="list-style-type: none"> Off Reduction value Schedule

Summer/Winter
SUMMER mode
<ul style="list-style-type: none"> Summer Winter Auto*
Activ. temperature SUMMER*
Deactiv. temperature SUMMER*

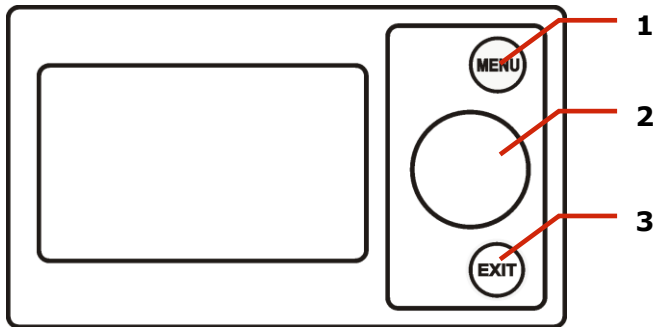
Mixer 1-5 settings*
Mixer preset temp.
Mixer room thermostat
Mixer weather control *
Heating curve. mixer *
Curve translation*
Room temp. factor*

General settings
Clock
Date
Brightness
Sound
Language
WiFi *

* not available if proper sensor or additional module not connected or the parameter is hidden.

8 Operating the regulator

8.1 Buttons description

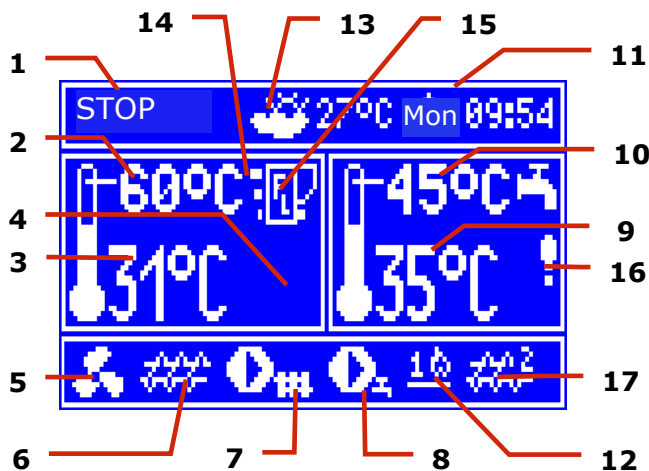


1. MENU entry button
2. „TOUCH and PLAY“ knob
3. EXIT button

„TOUCH and PLAY“ turning cause increase or decrease of edited parameter. It is a part of fast handling of the controller. Pressing the knob causes enter edition mode of chosen parameter or selecting its volume.

Pressing EXIT button causes exit selected menu level and also exit selected volume of a parameter.

8.2 Mani window



1. Mode of regulator operation: FIRING-UP, OPERATION, SUPERVISION, BURNING OFF, CLEANING, STOP
2. Boiler preset temperature
3. Boiler measured temperature
4. Functions having influence on preset boiler temperature. Following symbols signal respectively:
 - „T“ Preset boiler temperature decrease due to thermostat disconnection,
 - „S“ Preset boiler temperature decrease due to activated time intervals,
 - „C“ Boiler preset temperature during loading the hot water (HUW),

- „M“ Boiler preset temperature increase from mixer circulation,
- „P“ Weather control switch on for boiler circulation,
- „R“ Active return protection,
- „B“ Preset temperature increase to load the buffer.

5. Symbol signalling blowing operation
6. Symbol signalling fuel feeder operation
7. Symbol signalling central heating (CH) pump operation
8. Symbol signalling central heating pump operation (HUW)
9. Measured temperature of hot water boiler (HUW)
10. Preset hot water (HUW) boiler temperature
11. Clock and weekday
12. Part of the screen coshared between two icons: match – symbolizes operating heater, and the digit next to it stands for a number of Firing-up attempts; Rake – symbolizes activating automatics of furnace cleaning,
13. External (weather) temperature
14. Current boiler power level
15. Symbol signalling activating regulating mode *Individual Fuzzy Logic*
16. Symbol signalling disinfection of the hot water boiler
17. Additional feeder (connected to module B).

Right window on the main screen is configurable, allows on changing information displayed there. It is possible to choose a configuration displaying: mixer circuit (1-5), info or HUW by twisting the „TOUCH and PLAY“ knob. Right window on the main screen may also display the fuel level view, providing that this parameter is set correctly. Fuel level can be seen in room panel ecoSTER200/ecoSTER TOUCH.



8.3 Controller start up

After connecting the power the controller shows the settings put before connecting the

electricity. If the controller has not operated before – it will start up in „stand by“ mode. In this mode the screen is dimmed, actual time and information: „Boiler on“ is displayed.

In this mode protecting pumps against going stale function is in operation. It is executed by temporary switching them on. Therefore it is advised to keep the electrical power to the controller on when the boiler is not in use. And the controller should be in „Stand-by“ mode. It is possible to start up the boiler (pressing the encoder knob and selecting „switch on“) or setting parameters of its operation (MENU button) without connecting it to the electrical power. After making sure that fuel is in the silo, and the hatch is closed – the boiler can be switched on.

8.4 Settings preset temperature

Preset boiler temperature or preset HUW temperature, just like the preset mixer circuit temperature, can be set in the menu:

Boiler settings → **Boiler preset temp.**

HUW settings → **HUW preset temp.**

Mixer 1-5 settings → **Mixer preset temp.**

The value set as *Boiler preset temp.* is ignored by the regulator if the preset boiler temperature is controlled by weather sensor. Regardless of that, the preset boiler temperature is automatically increased in order to fill the hot utility water tank and feed heating mixer cycles.


8.5 FIRING-UP

The FIRING-UP mode is used for automatic firing-up of furnace in the boiler.

All parameters which influence the firing-up process can be found in menu:

Service settings → **Burner settings** → **Firing-up**

If firing up the furnace fails, further attempts are carried out during which the fuel dose (feeding time) is reduced to 10% of the dose in the first attempt.

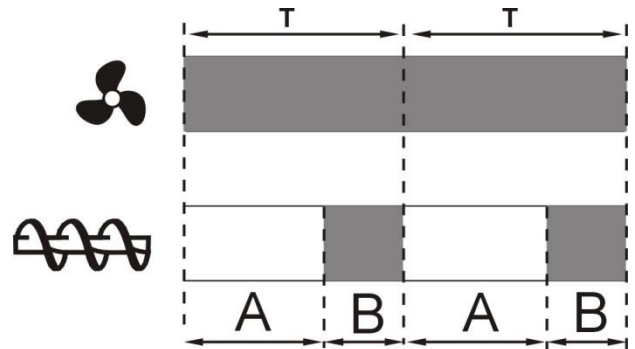
Consecutive attempts are visualised by numbers next to the lighter symbol .

After three unsuccessful attempts, an alarm *Failed firing-up attempt* is reported. In such case, the boiler operation is halted. Boiler

operation cannot be continued automatically - service crew must intervene. After removing causes of impossibility to fire-up, the boiler must be restarted.

8.6 OPERATION

The fan operates continuously. Fuel feeder is activated cyclically. A cycle consists of feeder operation time and duration of feeding interval.



A - feeder interval, B – feeding cycle time.

Parameter *Cycle time-OPERAT.* can be found in menu:

Service settings → **Burner settings** → **Operation**

Feeder cycle time is calculated according to the required current power of the burner, capacity of tank and feeder efficiency.

Parameters blow-in output for different power levels of the burner are available in the menu:

Boiler settings → **Output modulation**

8.7 Regulation mode

There are two regulation modes for stabilizing the set temperature of the boiler: Standard and FuzzyLogic.

Boiler settings → **Regulation mode**

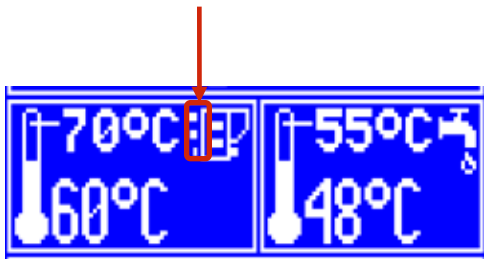
- **Operating in Standard mode**

When the boiler temperature reaches its set value, the regulator switches to SUPERVISION mode.

The regulator has a boiler output modulation mechanism allowing it to gradually reduce the output as the boiler temperature nears its set value.

Three boiler output levels can be set: *MAX*, *MED*, *MIN*.

Current power level is displayed on the screen as 3 segmented indicator at the left side of boiler's icon.

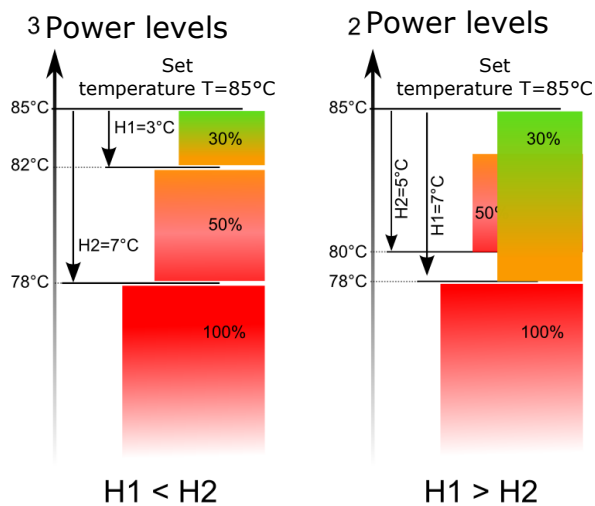


Each level can be additionally adjusted with individual fuel feeding times and fan speeds, affecting the actual output of the boiler. The output level parameters are accessible through the menu:

Boiler Settings → Output modulation

The regulator sets the current output of the burner depending on the set temperature of the boiler and H1 and H2 hysteresis settings.

It is possible to configure the value H1 and H2 that modulation will take place without the intermediate power - transition from *Max.* to *Min.* without *MED.* boiler output.



• **Operating in Fuzzy Logic mode**

In FuzzyLogic mode, the regulator automatically sets the output of the burner in order to maintain the set boiler temperature. The regulator uses the output settings predefined in Standard mode. This mode does not require setting the H1 and H2 hysteresis.

If only the HUW is heated (summer mode), it is recommended to set the regulator to Standard mode.



After the set temperature is exceeded by 5°C, the boiler switches to SUPERVISION mode.

8.8 SUPERVISION

The SUPERVISION mode is available for both modes of regulation: with manual and automatic settings (*Fuzzy Logic*). Regulator automatically enters SUPERVISION mode without any user's intervention, namely:

- in case of *Standard* mode of regulation – upon achievement of boiler preset temperature,
- in case of *Fuzzy logic* – once actual temperature has exceeded the boiler preset temperature by 5°C.

In the SUPERVISION mode, the regulator supervises the fire in the furnace so that it does not burn off. To achieve that, the burner power is kept low which together with correctly adjusted parameters prevents any increase of the temperature. Burner power in the SUPERVISION mode and other SUPERVISION parameters can be found in:

Service Settings → Burner Settings → Supervision

The SUPERVISION mode parameters should be set in accordance with the recommendations of the boiler or burner manufacturer. They should be such values so that the fire in the furnace does not burn off during boiler standstills (and it should not burn too intensely as the boiler temperature may increase).



Parameters should be so selected that the boiler temperature in this mode gradually drops. Incorrect settings may lead to boiler overheating.

The maximum boiler operation time in the SUPERVISION mode is defined by *Supervision time*. If, after this time, the boiler does not have to operate again after it entered the SUPERVISION mode, the regulator initiates boiler burn-off.

The controller exits the Supervision mode without user intervention after exceeding the preset boiler temperature of 10°C.



For the setting *Supervision time* = 0, the regulator skips the SUPERVISION mode and enters the BURNING-OFF

mode.

8.9 BURNING OFF

In the BURNING OFF mode, remains of the pellet are burnt out and the boiler is prepared for standstill or deactivation.

All parameters which influence the process of putting out can be found in menu:

Service settings → **Burner settings** → **Burning off**

The regulator stops fuel feeding and performs periodical air flushes to burn fuel residues. When the flame brightness decreases or the maximum burning-off time elapses, the regulator enters the STOP mode.

8.10 CLEANING

The controller enables cleaning the burner from the ashes generated in the combustion process. For this purpose, the controller uses a fan. The parameters affecting the cleaning are on the menu: **Boiler settings** and

Service settings → **Burner settings** → **Cleaning**

Cleaning the burner is mode during Firing-up and Burning off. In the event that the boiler stays for a long time in Operation mode or SUPERVISION mode it is possible to start cleaning the firebox with adjustable intensity parameter *Cleaning intensity*.

8.11 STOP

In the STOP mode, the boiler is put out and awaits signal to resume heating.

A signal to start heating can be:

- decrease in preset boiler temperature below the preset temperature minus the value of boiler hysteresis (*Boiler hysteresis*),
- if the boiler is set to work with a buffer - decrease in upper buffer temperature below the preset value (*Loading start temperature*).

8.12 GRATE

The controller has the function of grate where fuel loading is done manually, fuel feeder is switched off while the combustion process is controlled by fan. Switching between the work on the burner - where fuel

is "Pellet" and work on the grate - where fuel is "Wood", can be made in:

Boiler settings → **Heat source**

The values of parameters, such as: *Boiler preset temp.*, *Boiler hysteresis*, *Fuel shortage detection time* are individually set for the grate mode. This allows to define different properties of the boiler operation for operation modes "grate" and "pellets". The parameters affecting the operation on the grate are in:

Service settings → **Burner settings** → **Grate**

The operation of the grate can be an alarm "No fuel".

Switching from grate on burner can it can be made by the ecoNET300 internet module, but only after burning the entire fuel loaded manually. To switch, user must to turn off then turn on the regulator by clicking on *Operation mode* in: *Current data*.



8.13 Domestic hot water settings

The device controls temperature of the domestic hot water - HUW - tank, provided that a HUW temperature sensor is connected. If the sensor is disconnected, an information about lack thereof is displayed in the main window. The parameter:

HUW settings → **HUW pump mode** allows the user to:

- disable filling of the tank, parameter *Off*,
- set HUW priority, using the *Priority* parameter - in this case, the CH pump is deactivated to speed up filling of the HUW container.
- set simultaneous operation of the CH and HUW pump, using parameter *No priority*.

8.14 Setting HUW preset temperature

Preset HUW temperature is defined by parameter:

HUW settings → **HUW preset temp.**

Below *HUW preset temp.* - *HUW hysteresis* starts HUW pump to load the HUW container.



After setting a low hysteresis value, HUW pump will run faster when HUW temperature falls.

8.15 Enabling the SUMMER function

In order to activate the SUMMER function, which enables to load the HUW container in the summer, without the need for activating the CH system and mixer cycles, set the parameter *SUMMER mode* to *Summer*.

Summer/Winter → SUMMER mode



In Summer mode, all heat receivers may be shut off, so before enabling it please make sure that the boiler does not overheat.

If the weather sensor is connected SUMMER function can be activated automatically with the *Auto* parameter including settings for *Act. temp. SUMMER*, *Deact. temp. SUMMER*.

8.16 Disinfection HUW container

The regulator has a function of automatic, periodic heating of HUW container to 70°C to eliminate bacterial flora from the HUW container.



Keep the tenants informed of activating the disinfection function as there is risk of being burnt with hot usable water.

The regulator increases the HUW container temperature once a week, at 2:00 a.m. Monday. After 10 minutes of maintaining the temperature at 70°C, the HUW pump is switched off and the boiler returns to normal operation. Do not activate the disinfection function when the HUW support is off.

8.17 HUW circulation

The settings can be found in:

Night time decrease → Circulation pump
and

Service settings → CH and HUW settings

Setting of circulating pump control is analogical to night decrease setting. Circulating pump switches on in selected time intervals. In disregarded time intervals circulating pump will start and remain in operation for the period of time set in *Circulating operation time*, then will stop and remain out of operation for the period of time set in *Circulating standstill time*. Additionally can set the HUW temperature threshold below which the circulation pump is switched

on in order to enforce its circulation, in the *Circulation start temp.*

8.18 Mixer circuits settings

Settings for the first mixer circuit can be found in the menu: **Mixer 1 settings**

Settings for other mixers can be accessed in next menu items and they are identical for each circuit.

- **Settings for mixer without weather sensor**

It is necessary to manually set the required water temperature in the heating mixer circuit using parameter *Mixer preset temp.*, e.g. at a value of 50°C. The value should allow to obtain the required room temperature.

After connecting room thermostat, it is necessary to set a value of decrease in preset mixer temperature by thermostat (parameters *Mixer room therm.*) e.g. at 5°C. This value should be selected by trial and error. The room thermostat can be a traditional thermostat (No/Nc), or room panel ecoSTER200/ecoSTER TOUCH. Upon activation of the thermostat, the preset mixer circuit temperature will be decreased, which, if proper decrease value is selected, will stop growth of temperature in the heated room.

- **Settings for mixer with weather sensor without room thermostat ecoSTER TOUCH**

Set parameter *Mixer weather control* to *On*. Select weather curve. Using parameter *Curve translation*, set preset room temperature following the formula:
Preset room temperature = 20°C + heating curve translation.

Example:

In this setup, it is possible to connect a room thermostat which will equalize the inaccuracy of selecting heating curve, if the selected heating curve value is too high. In such case, it is necessary to set the value of preset mixer temperature decrease by thermostat, e.g. at 2°C. After opening of the thermostat contacts, the preset mixer circuit temperature will be decreased, which, if

proper decrease value is selected, will stop growth of temperature in the heated room.

- **Settings for mixer with weather sensor and with room thermostat**

Set parameter *Mixer weather control* to *On*. Select weather curve.

The room panel automatically translates the heating curve, depending on the preset room temperature. The regulator relates the setting to 20°C, e.g. for preset room temperature = 22°C, the regulator will translate the heating curve by 2°C, for preset room temperature = 18°C, the regulator will translate the heating curve by -2°C. In some cases it may be necessary to fine-tune the heating curve translation.

In this setup, the ecoSTER200/ecoSTER TOUCH room thermostat can:

- decrease the heating cycle temperature by a constant value when the preset room temperature is reached. Analogously, as specified in the previous point (not recommended), or
- automatically, continuously correct the heating cycle temperature.

It is not recommended to use both options at the same time.

Automatic correction of room temperature is carried out in accordance with the following formula:

Correction = (Preset room temperature - measured room temperature) x room temperature coefficient / 10

Example:

Preset temperature in the heated room (set at ecoSTER200/ecoSTER TOUCH) = 22°C. Temperature measured in the room (by ecoSTER200/ecoSTER TOUCH) = 20°C.

Room temp. factor = 15.

Preset mixer temperature will be increased by $(22^{\circ}\text{C} - 20^{\circ}\text{C}) \times 15/10 = 3^{\circ}\text{C}$.

It is necessary to find appropriate value of the *Room temp. factor*. The higher the coefficient, the greater the correction of preset boiler temperature. If the setting is "0", the preset mixer temperature is not corrected. Note: setting a value of the room temperature coefficient too high may cause cyclical fluctuations of the room temperature!

8.19 Weather controlled

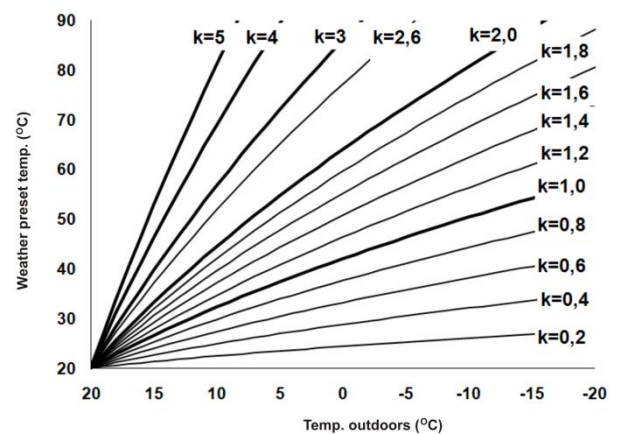
Depending on the temperature measured outside the building, both preset boiler temperature and temperatures of mixer circuits can be controlled automatically. If proper heating curve is selected, the temperature of the circuits is calculated automatically, depending on the outdoor temperature. Thus, if the selected heating curve is appropriate for the given building, the room temperature stays more or less the same, regardless of the temperature outside. Note: during trial and error selection of appropriate heating curve, it is necessary to exclude influence of the room thermostat on regulator operation (regardless of whether the room thermostat is connected or not), by setting the parameter:

Mixer 1 settings → **Mixer room therm.** = 0.

If a room panel is connected, it is also necessary to set the parameter *Room temp. factor* = 0.

Guidelines for proper setting of the heating curve:

- floor heating 0,2 - 0,6
- radiator heating 1,0 - 1,6
- boiler 1,8 - 4



Guidelines for selection of appropriate heating curve:

- if the outdoor temperature drops, and the room temperature increases, the selected heating curve value is too high,
- if the outdoor temperature drops, and the room temperature drops as well, the selected heating curve value is too low,
- if during frosty weather the room temperature is proper, but when it gets warmer - it is too low, it is recommended to

increase the *Curve translation* and to select a lower heating curve,

- if during frosty weather the room temperature is too low, and when it gets warmer - it is too high, it is recommended to decrease the *Curve translation* and to select a higher heating curve.

Buildings with poor thermal insulation require higher heating curves, whereas for buildings which have good thermal insulation, the heating curve can have lower value.

The regulator can increase or decrease the preset temperature, calculated in accordance with the heating curve, if it exceeds the temperature range for the given circuit.

8.20 Night decrease settings description

Night time decreases for boiler, heating circuits, HUW container and circulation pump operation.

The intervals can be used to define time periods at which lower preset temperature may be set e.g. for a night time or when the user is not at home. This feature enables automatic reduction of preset temperature without compromising the heat comfort and reduces fuel consumption.

Decrease of preset temperature in selected time intervals is indicated by the symbol "S" on the main screen.

To activate time intervals, set the parameter: *Night time decrease* for the given heating circuit to *ON*.

The parameter *Reduction value* set the temperature reduction, one for all time intervals.

Night time decreases can be defined separately for every day of the week set *Schedule*.

Set the start and end of the time interval for a reduction value in the range 1..24 hours.



8.21 Fuel level setup

To operate the fuel level in the fuel tank regulator uses the fuel level sensor. After burning the fuel below the minimum level

(set in the sensor by the manufacturer of the boiler) the regulator displayed in the screen: "WARNING !!! Low fuel level" and will continue to be fed fuel. If user not control the feeding of fuel then regulator burning off all the fuel in the tank and turn off the boiler.

Note: When there is no fuel level sensor, fuel level service will take place as described below.

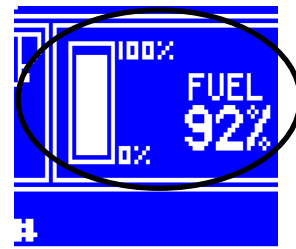
- **Fuel level indicator activating**

To activate displaying fuel level following parameters are to be set

Boiler setting → **Fuel level** → **Alarm level** on value bigger than "0", i.e. 10%

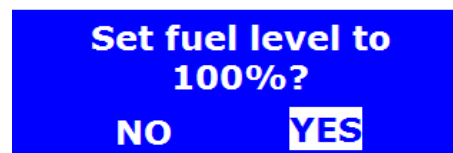
Twisting "TOUCH and PLAY" knob in main window fuel level is displayed in main window.

Tip: fuel level can also be seen in room panel ecoSTER200/ecoSTER TOUCH.



- **Fuel level indicator service**

Each time when fuel silo is filled to required level it is necessary to press and keep the knob in main window. Following info will appear:



After choosing and accepting „YES“ fuel level will be set for 100%.

Fuel can be refilled anytime, that means it is not needed to wait till the silo is empty. However fuel should be filled up to the level corresponding to 100% and set the controller level by pressing knob.

- **Description of activity**

The controller measured fuel level on the basis of its current consumption. Factory settings will not always correspond to actual fuel consumption, so to work correctly this

method needs level calibration by controller's user. No additional fuel sensors are required.

• Calibration

Fill the silo to the level which corresponds to full level of fuel, then set value of parameter:

Boiler settings → Fuel level → Fuel level calibration → Fuel level 100%

In main window the indicator will be set on 100%. The calibration process is marked with a pulsating fuel level indicator. The indicator will pulsate until programming point referring to minimum fuel level. Decreasing level of fuel in the silo should be monitored constantly. When fuel level reaches expected minimum, parameter value should be set this way:

Boiler settings → Fuel level → Fuel level calibration → Fuel level 0%

Can skip the calibration process, if done properly will set the parameters *Feeder efficiency* and *Fuel mass in test*.

8.22 Feeder efficiency test

It is possible to carry out the *Feeder efficiency test* and set the duration of this test on *Efficiency test time*. With the data obtained make it easier to set the parameters associated with the feeding of fuel. After efficiency test time, user should weigh given fuel and set the parameter: *Fuel mass in test*.

8.23 Operation with additional feeder

The regulator may be used with low tank fuel level sensor. After the sensor is activated (contacts open) the regulator activates the additional tank for the *External feeder operat. time* to refill the main fuel tank. This parameter can be found in:

Service settings → Burner settings

If the *External feeder operat. time* is set to "0", the additional tank is switched off.

8.24 Information

Menu information enables view to measured temperatures and allows to check which of devices are currently activated. Switching between following screens is done by twisting "TOUCH and PLAY" knob.



After connecting extension module of mixers information about auxiliary mixers are displayed.

8.25 Manual control

In the controller it is possible to manual activate devices like i.e. pumps, feeder engine, or blower engine. It enables to check if the device is operating correctly and if it is connected properly.

Manual control	
Fan	ON
Feeder	OFF
Boiler pump	OFF
Lighter	ON
Feeder 2	OFF
Serv.supply	OFF

OFF – the device is turned off, ON – the device is turned on.



Entering manual control is possible only in STAND-BY mode, when silo is switched off.



Attention: long lasting activating of fan, feeder or other device may cause danger.

8.26 Room panel

The controller can work together with ecoSTER200/ecoSTER TOUCH remote control device, which have a built-in room thermostat. This room panel shows useful information such as: fuel level, alarm indication etc.

8.27 Internet module

The controller can work together with ecoNET300 internet module. It enables online control and supervision over the controller for the help of the website www.econet24.com. You can use the convenient mobile application **ecoNET.apk**. Mobile application can be downloaded free of charge from the website:



INSTRUKCJA SERWISOWA

ecoMAX860P3-C

9 Hydraulic diagrams



The presented hydraulic diagrams does not replace central heating engineering design and may be used for information purposes only!.

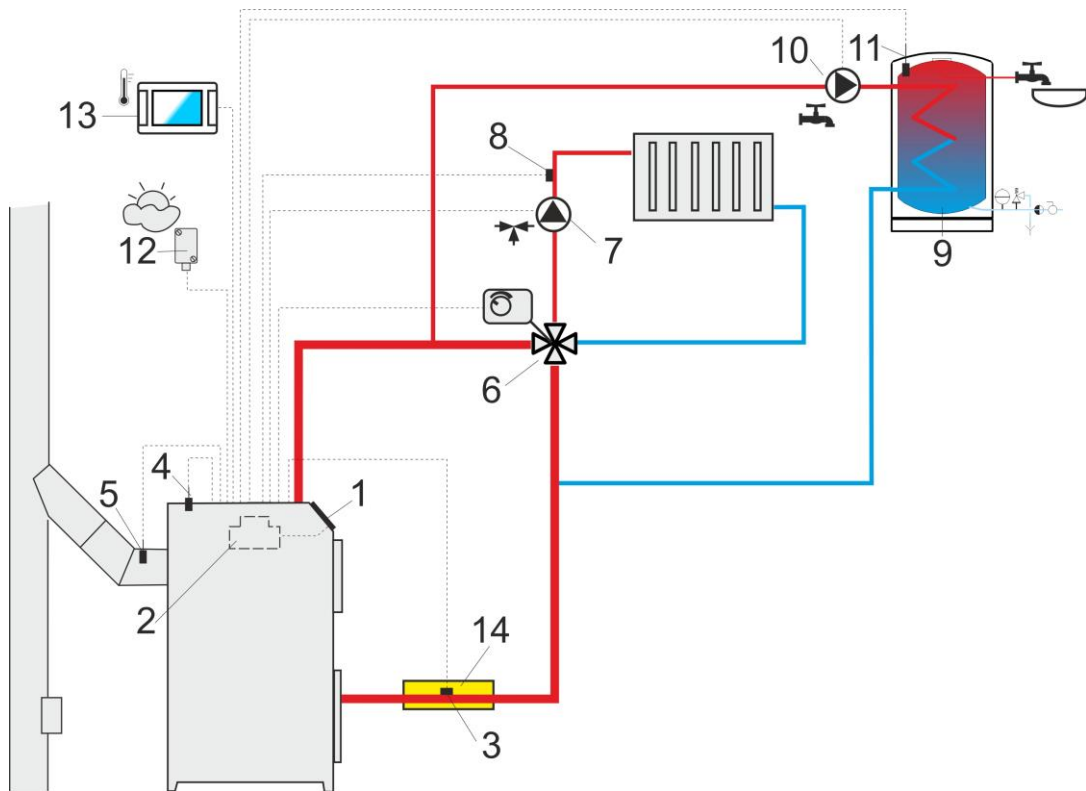


Diagram with 4-way control valve for central heating circuit: 1 – boiler, 2 – controller, 3 - water temperature sensor returning to the boiler, 4 – boiler temperature sensor, 5 – exhaust temperature sensor (temperature monitoring only), 6 – 4-way valve servo, 7 – mixer circuit pump, 8 – mixer circuit temperature sensor, 9 – HUW container, 10 – HUW pump, 11 – HUW sensor, 12 – weather temperature sensor, 13 – room panel ecoSTER200/ecoSTER TOUCH or standard thermostat, 14 – thermal isolation.



In order for the valve (6) to be able to effectively increase the return water temperature, set a high set temperature of the boiler. In order to improve the water circulation in natural systems (highlighted circuit in the figure): use large nominal diameter pipes and four-way valve, avoid unnecessary angles and reductions, maintain a min. 2° horizontal pipe slope, etc. If the sensor (3) is attached to the pipe, isolate it with foam surrounding the pipe and sensor.

RECOMMENDED SETTINGS:

Parameter	Setting	MENU
Preset boiler temperature	70-80°C	Boiler settings
Min. preset boiler temperature	65°C	Service settings→ Boiler settings
Boiler inc. by HUW, Mixer	5-20°C	Service settings→ CH and HUW settings
Mixer 1 support	CH ON	Service settings→ Mixer 1 settings
Max. mixer 1 temperature	70°C	Service settings→ Mixer 1 settings
Mixer 1 heating curve	0.8 – 1.4	Mixer 1 settings
Mixer 1 weather control	ON	Mixer 1 settings
Room thermostat mixer 1	ecoSTER T1	Service settings→ Mixer 1 settings

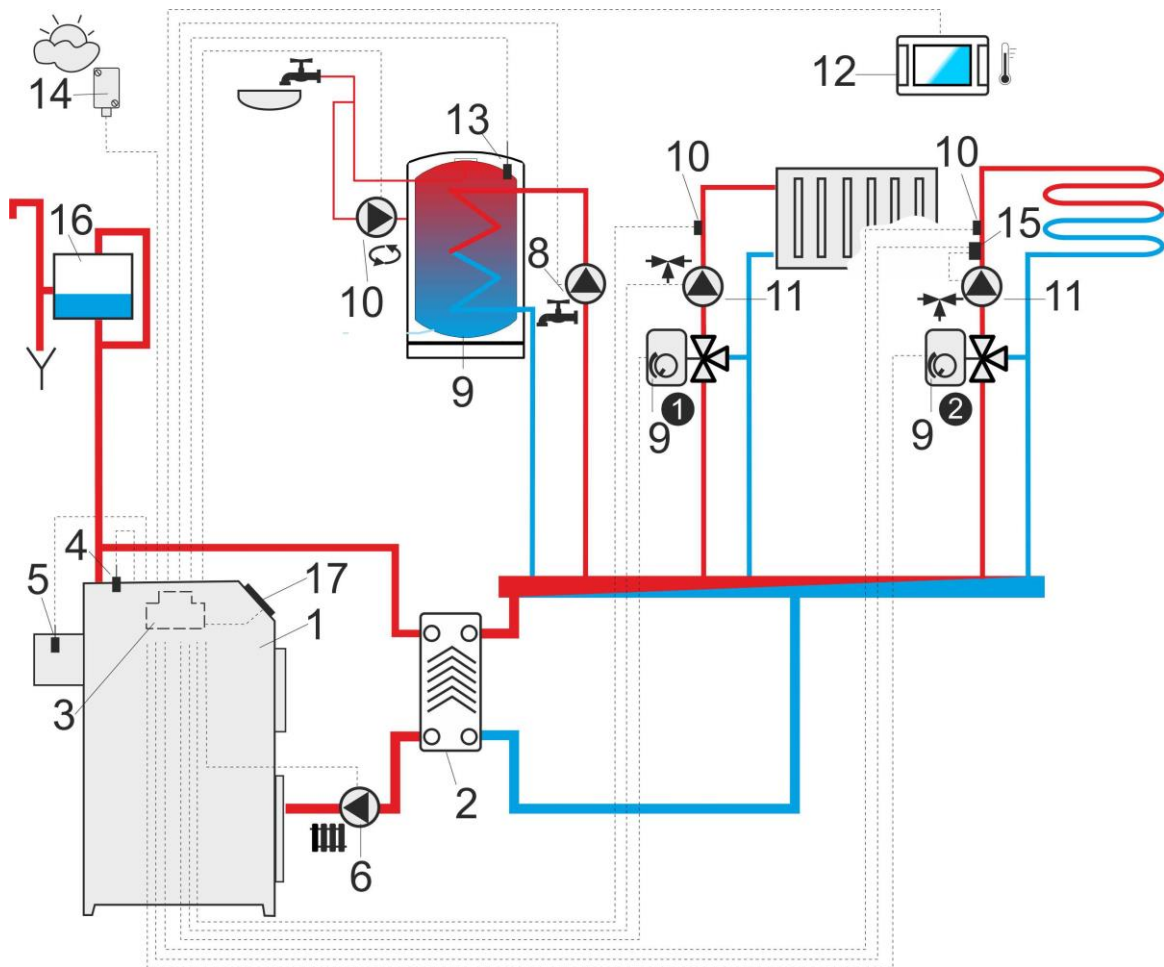


Diagram with two adjustable heating circuits and the HUW container: 1 – boiler, 2 – heat exchanger, 3 – controller, 4 – boiler temperature sensor, 5 – exhaust temperature sensor (temperature monitoring only), 6 – boiler pump, 8 – HUW pump, 9 – HUW container, 10 – HUW temperature sensor, 11 – mixer pump, 12 – room panel ecoSTER200/ecoSTER TOUCH with room thermostat feature, 13 – HUW container temperature sensor, 14 - weather temperature sensor, 15 - safety thermostat off the underfloor heating pump, 16 - expansion tank, 17 – panel controller.

RECOMMENDED SETTINGS:

Parameter	Setting	MENU
Preset boiler temperature	80°C	Boiler Settings
Min. boiler temperature	75°C	Service settings→ Boiler settings
CH pump activation temperature	55°C	Service settings→ CH and HUW settings
Buffer support	ON	Service settings→ Buffer settings
Buffer loading start temp.	50	Service settings→ Buffer settings
Buffer loading end temp.	75°C	Service settings→ Buffer settings
Mixer 1 support	CH ON	Service settings→ Mixer 1 settings
Max. mixer 1 temperature	70°C	Service settings→ Mixer 1 settings
Max. mixer 2 temperature	45°C	Service settings→ Mixer 2 settings
Mixer 1 heating curve	0.8 - 1.4	Mixer 1 settings
Mixer 2 heating curve	0.3 - 0.8	Mixer 1 settings
Weather mixer 1 control	ON	Mixer 1 settings
Room thermostat mixer 1	ecoSTER T1	Service settings→ Mixer 1 settings

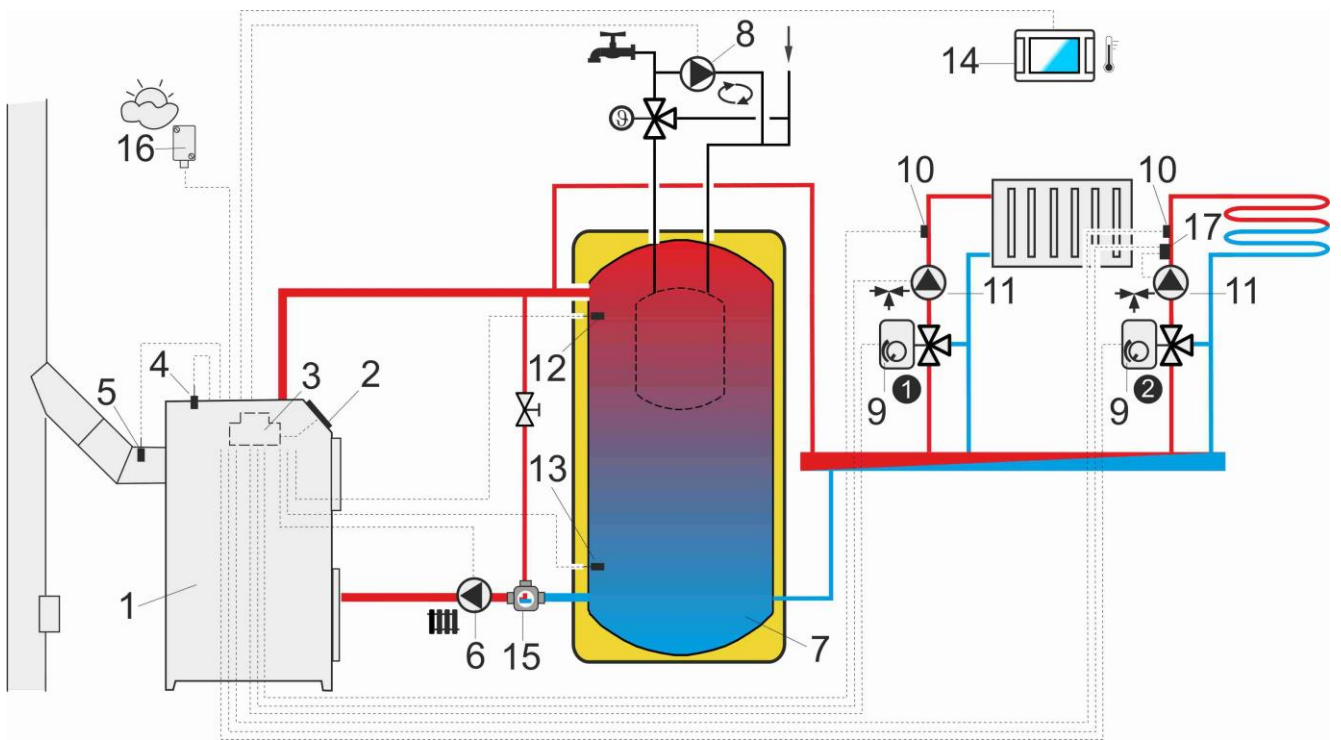


Diagram with heat buffer: 1 - boiler, 2 - burner, 3 - controller, 4 - boiler temperature sensor, 5 - exhaust temperature sensor, 6 - boiler pump, 7 - heat buffer, 8 - HUW pump , 9 - mixing valve actuator, 10 - mixer temperature sensor, 11 - mixer pump, 12 - upper sensor of buffer temperature, 13 - lower sensor of buffer temperature, 14 - room panel ecoSTER200/ecoSTER TOUCH with room thermostat feature, 15 - thermostatic three-way valve to the return protection, 16 - weather temp. sensor, 17 - thermostat to turn off the pump.

RECOMMENDED SETTINGS:

Parameter	Setting	MENU
Boiler preset temperature	80°C	Boiler settings
Min. boiler preset temperature	75°C	Service settings→Boiler settings
CH pump activation temperature	55°C	Service settings→CH and HUW settings
Buffer support	Yes	Service settings→Buffer settings
Loading start temperature	50°C	Service settings→Buffer settings
Loading stop temperature	75°C	Service settings→Buffer settings
Mixer 1 support	CH ON	Service settings→Mixer 1 settings
Max. preset temp. of mixer 1	70°C	Service settings→Mixer 1 settings
Mixer 1 heating curve	0.8 - 1.4	Mixer 1 settings
Mixer 1 weather control	Yes	Mixer 1 settings
Mixer 1 thermostat selection*	ecoSTER T1	Service settings→Mixer 1 settings
Mixer 2 support	Floor ON	Service settings→Mixer 2 settings
Max. preset temp. of mixer 2	45°C	Service settings→Mixer 2 settings
Mixer 2 heating curve	0.3 - 0.8	Mixer 2 settings
Mixer 2 weather control	Yes	Mixer 2 settings
Mixer 2 thermostat selection*	ecoSTER T1	Service settings→Mixer 2 settings

* When using a standard room thermostat with ON/OFF terminals instead of the ecoSTER TOUCH (14), select the *Universal* option, or when the setting is hidden, do not choose anything.

10 Technical data

Voltage	230V~, 50Hz	
Current consumed by regulator	0,04A	
Maximum rated current	6(6)A	
Regulator protection rating	IP20	
Ambient temperature	0..50°C	
Storage temperature	0..65°C	
Relative humidity	5 - 85% without steam condensation	
Measuring range of temperature sensors CT4/CT2S	0..100°C/0..300°C	
Measuring range of temperature sensors CT6-P	-35...+150°C	
Accuracy of temperature measurements with sensors CT4 and CT6-P	2°C	
Terminals	network	screw terminals, wire cross-section area 0.75 mm ² through 1.5mm ² , screwing torque 0.4Nm, insulation removed: 6mm
	communication	screw terminals, wire cross-section area up to 0.75mm ² , screwing torque 0.3 Nm, insulation removed: 6 mm
Display	128x64 pix.	
External dimensions	210x115x60 mm	
Total weight	2 kg	
Standards	PN-EN 60730-2-9 PN-EN 60730-1	
Software class	A	
Protection class	Suitable to build into Class I devices	
Pollution degree	2nd pollution degree	

11 Conditions of storage and transport

The regulator cannot be exposed to direct effects of weather, i.e. rain and sunlight.

Storage and transport temperature cannot exceed the range of -15...+65°C.

During transport, the device cannot be exposed to vibrations greater than those typical of normal road transport.

12 REGULATOR INSTALLATION

12.1 Environmental conditions

Due to the risk of fire is prohibited to use the controller in explosive gas and dust environment (eg coal). Regulator should be separated using appropriate enclosure.

In addition, controller cannot be used in the presence of water vapor condensation and be exposed to water.

12.2 Installation requirements

The regulator should be installed by a qualified and authorised fitter, in accordance with the applicable norms and regulations.

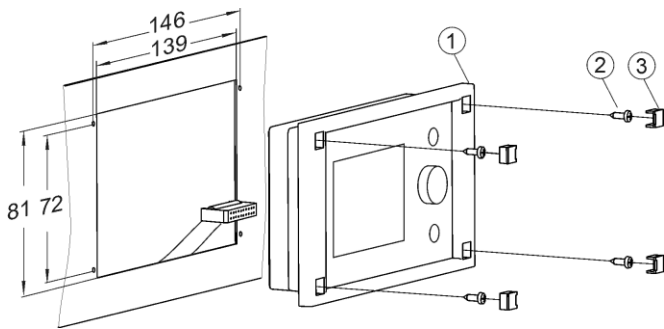
The manufacturer bears no responsibility for damages caused by failure to observe this manual. The regulator is to be built-in. The regulator cannot be used as a stand-alone device. The temperature of the ambient and the fitting surface cannot exceed the range of 0...+50°C. The device consists of two modules: control panel and working module. Both elements are connected with electric wire.

12.3 Installation of control panel

The control panel is to be enclosed on a mounting plate. Proper thermal insulation between hot boiler walls and the panel and the connecting tape must be provided. During installation, follow the guidelines below.

STEP 1

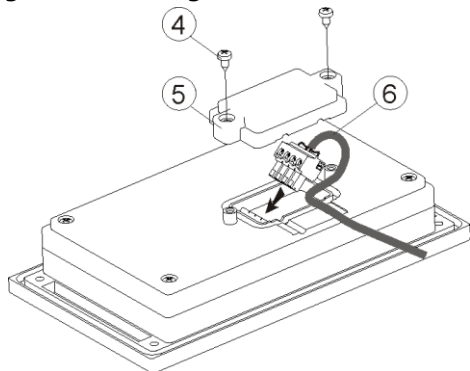
A hole must be made in the mounting plate, in accordance with the drawing below.



Fitting the regulator in a mounting plate, where: 1 – control panel, 2 – sheet metal screw 2.9x13, 3 – hole plug.

STEP 2

Remove the lid (5), plug the cable (6) and put the lid (5) back on, securing it with screws (4). The cable should be lead out through the round groove in the enclosure.



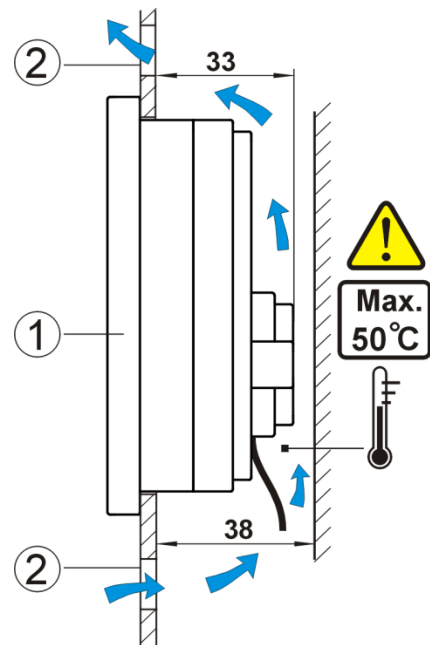
Connecting lead to the panel, where: 4- B3x6 screw for thermoplastic materials, 5 – lid, 6 – lead connecting the control panel with the executive panel.



Maximum length of the lead (6) is 5m with gauge of 0,5mm².

STEP 3

Screw the panel to the mounting plate using sheet metal screws, insert the hole plugs.



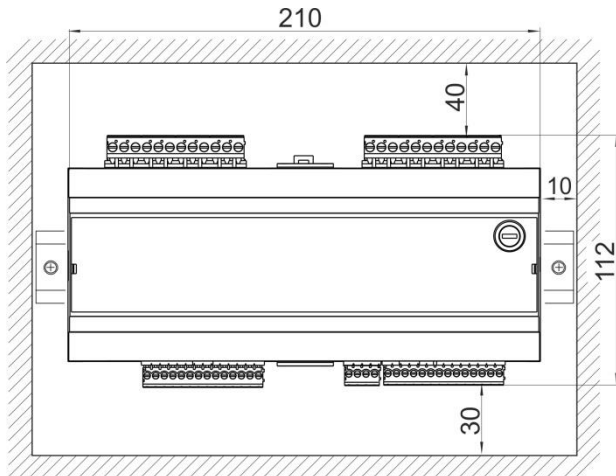
Conditions of enclosing the panel, where 1 – panel, 2 –ventilation holes for air circulation (note: the holes cannot decrease the required IP protection rate; ventilation holes are not required if the limiting temperature of the panel surroundings is not exceeded; the ventilation holes do not always guarantee that the temperature of the panel surroundings will be lowered, in such case use other methods).

12.4 Mounting of working module

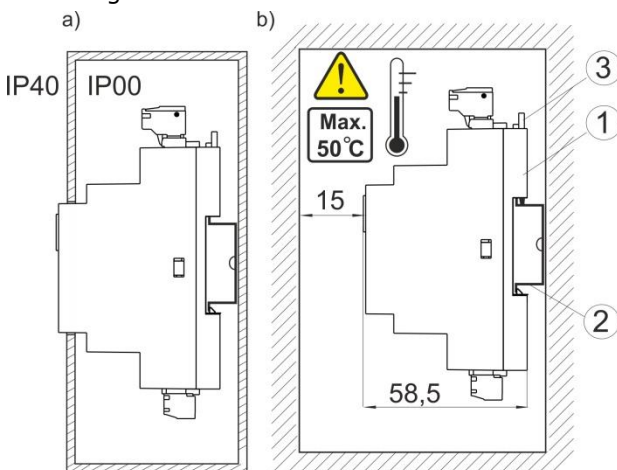
Working module has to be built-into the master equipment. Assembly should assure IP rating appropriate to the environment conditions, in which the regulator will operate. Moreover, access of the user to live parts under hazardous voltage (e.g. terminals) should be prevented. In such case the user will have access to front surface of working module. Housing may be also formed by boiler elements surrounding the whole module. Module housing does not guarantee dust- or-waterproofness. To provide the required protection, appropriate module cover should be provided.

The working module is designed to be mounted on a standard DIN TS35 rail. Fasten the rail firmly to a rigid surface. Prior to placing the module on the rail (2), lift up the catch (3). Now, place the module on the rail and press the catch (3) to bring it to the original position. Make sure the device is

firmly fastened and cannot be easily removed from the rail without use of tools. For safety reasons, assure the safe distance between live parts of working module terminals and conductive (metallic) elements of housing (min.10mm) is kept. Protect connecting wires from tearing, loosening and tensioning or built them in in such a way that no load is exerted on them.



Space requirements for working module mounting.



Methods of module installation: a – in modular housing with access to front surface, b – in the cover without access to front surface, 1- working module, 2 – DIN TS35 rail, 3 – catch.

12.5 IP protection rate

Enclosure of the regulator's executive module provides various IP protection rates, depending on the method of installation. provides and explanation. After enclosing in accordance with this drawing, the device has protection rate IP 20 from the front side of the executive module enclosure (specified on the rating plate). From the side of the terminals, the casing has protection rate

IP00, thus the terminals of the executive module must unconditionally be enclosed, in order to prevent access to this part of the casing.

If it is necessary to access the part with the terminals, disconnect the mains supply, make sure that there is no voltage on terminals and leads, and remove the executive module enclosure.

12.6 Connecting electrical system

Regulator is designed to be fed with 230V~, 50Hz voltage. The electrical system should be:

- three core (with protective wire PE),
- in accordance with applicable regulations.

Caution: After the regulator is turned off using the keyboard, dangerous voltage can occur on the terminals. Before starting any assembly works, you must disconnect the mains supply and make sure that there is no dangerous voltage on the terminals and the leads.



The connection wires should not have contact with surfaces of temperature exceeding the nominal temperature of their operation.

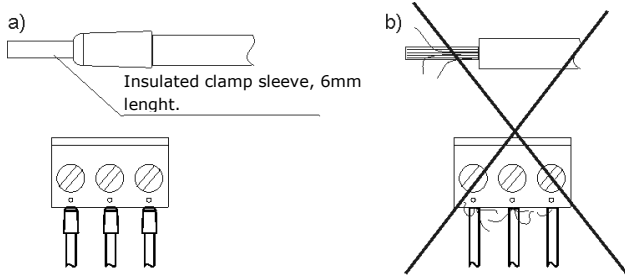
Terminals number 1-21 are intended only for connecting devices with mains supply 230V~.

Terminals 22-49 are intended for cooperation with low voltage devices (below 12V).

Connecting mains supply 230V~ to terminals 22-49 and to transmission connectors G1-G4 will damage the regulator and creates risk of an electric shock.



Tips of connection cables, especially mains voltage cables should be secured from splitting by e. g. insulated clamp sleeves in accordance with the picture below: a – properly secured, b – improperly secured.



Connect power supply wires to terminals indicated with an arrow.

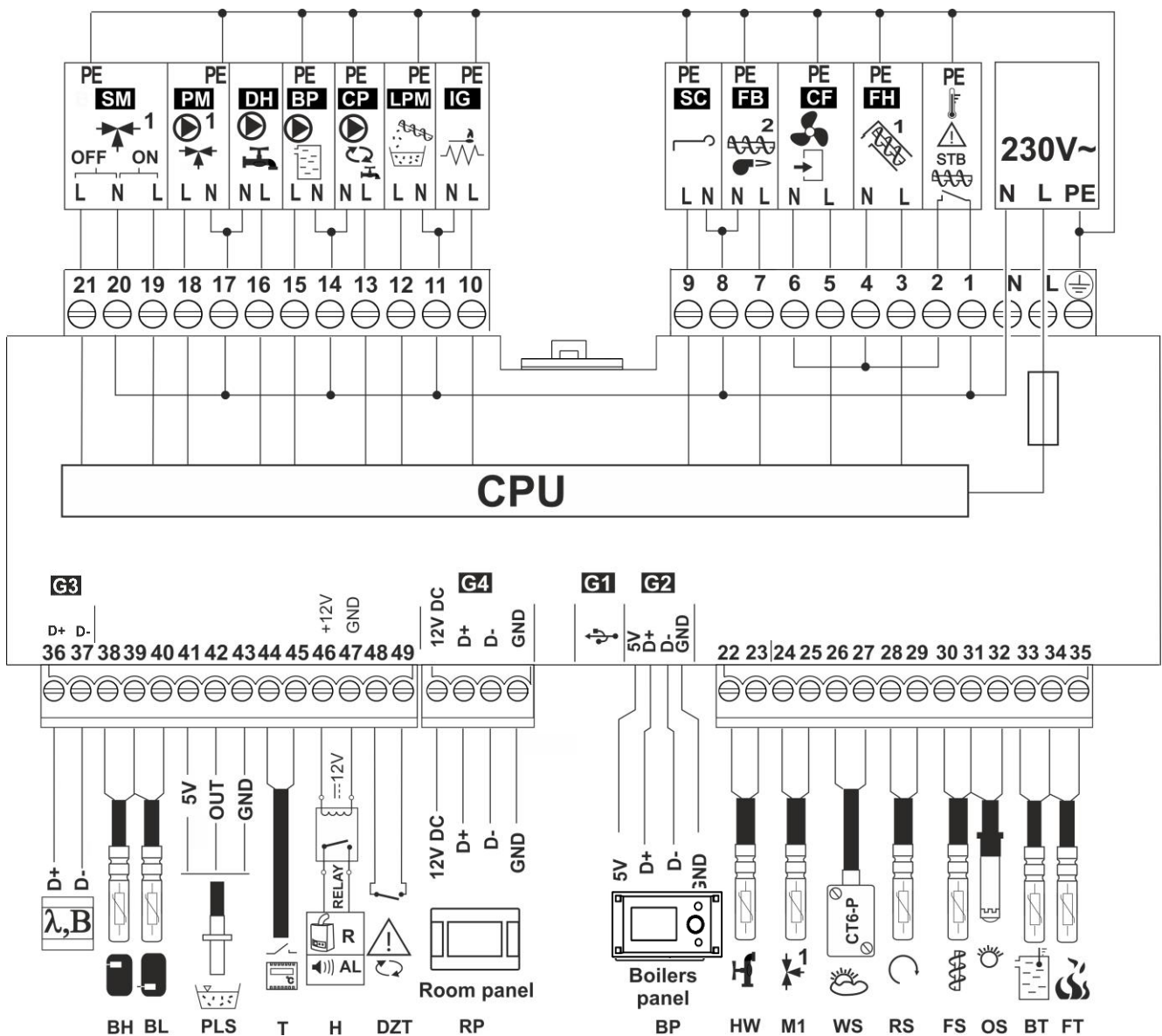
All peripherals (such like: pumps, RE-marked relays and connected recipients) may be connected only by qualified persons in accordance with applicable regulations. Safety precautions to prevent electrocution should be observed.



Regulator should be equipped with a set of pins connected to the 230V AC mains.

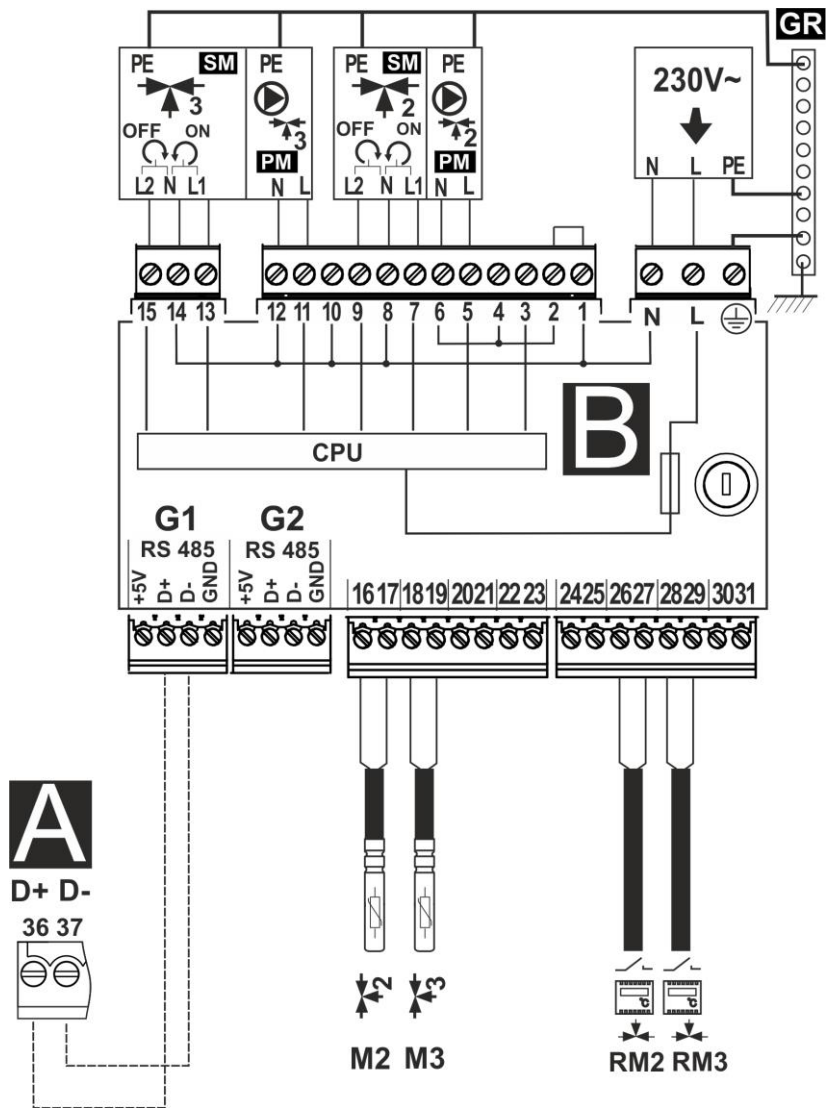
Connect protective wire of power supply cable to ground strip linked with metal boiler housing. Connect coupling to the terminal of the regulator indicated with a sign \oplus and to earthing terminals of devices connected to the regulator. Mistake! Not possible to find an information cradle.

12.7 Electric scheme



Wiring diagram controller ecoMAX860P3-C: **λ** – Lambda module, **B** – module B to support additional heat circuits, **BH** – upper buffer temperature sensor type CT4, **BL** – lower buffer temperature sensor type CT4, **PLS** – fuel level sensor, **T** – standard room thermostat (No/Nc), **H** – output for alarm device or reserve boiler, **RELAY** – relay 12V, **DZT** – open boiler door sensor, **RP** – room panel ecoSTER TOUCH with room thermostat function, **BP** – control panel, **HW** – HUW temperature sensor type CT4, **M1** – regulated circuit (mixer 1) sensor temperature type CT4, **WS** – weather temperature sensor type CT6-P, **RS** – sensor temperature of the water returning to the boiler type CT4, **FS** – feeder temperature sensor type CT4, **OS** – optical flame sensor, **BT** – boiler temperature sensor type CT4, **FT** – exhaust temp. sensor type CT2S.

L N PE – power supply 230V~, **CPU** – controller, **STB** – input for STB device, **FH** – main feeder, **CF** – blowing burner fan, **FB** – burner feeder, **SC** – rotary engine burner cleaning, **IG** – igniter, **LPM** – external feeder, **CP** – HUW circulation pump, **BP** – boiler pump, **DH** – HUW pump, **PM** – mixer pump, **SM** – mixer servo.



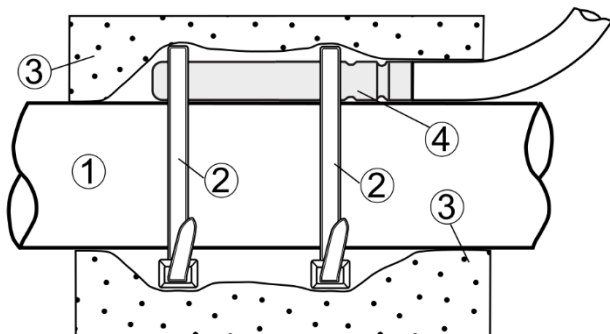
Wiring diagram – additional B module: **M1** – regulated circuit (mixer 2) sensor temperature type CT4, **M2** – regulated circuit (mixer 3) sensor temperature type CT4, **RM2** – mixer 2 room thermostat, **RM3** – mixer 3 room thermostat.

L N PE - power supply 230V~, **GR** – grounding bar, **PM2/PM3** – mixer 2/3 pump, **SM2/SM3** – mixer 2/3 servo, **CPU** – controller, **A** – ecoMAX860P3-C regulator module A.

12.8 Connection of temperature sensors

Sensor wires may be extended using wires of cross-section area not less than 0.5mm². Total length of wires of each sensor should not exceed 15m.

Insert boiler temperature sensor into thermometer well fastened to boiler shell. Fasten feeder temperature sensor to the surface of feeder screw tube. Insert temperature sensor of HUW container into thermometer well welded to the container. The best way to mount mixer temperature sensor is to insert it into a sleeve located in the stream of flowing water, however, it is also allowed to fasten the sensor in a contact manner provided that the sensor and the pipe are properly heat-insulated.



Mounting temperature sensor: 1 - pipe, 2 - clamps, 3 - thermal insulation, 4 - temperature sensor.



Sensors shall be protected against loosening from surfaces they are mounted to.

Make sure thermal contact between the sensors and the surface which temperature is measured is good. Apply thermal paste to improve the contact. Pouring sensors with oil or water is not allowed. Sensor wires should be separated from power supply wires. Otherwise, temperature indications may be erroneous. Min. distance between these wires should be 10 cm.

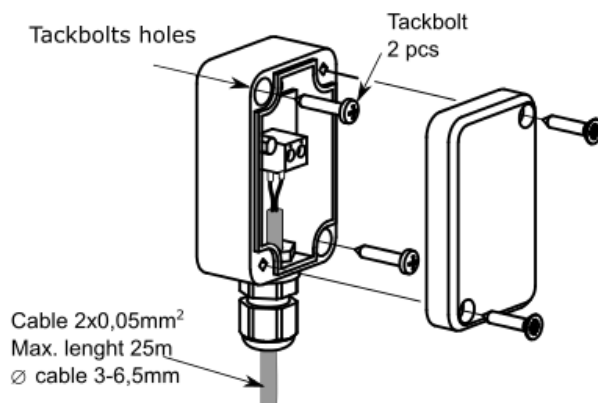
Do not allow sensor wires to contact hot parts of the boiler and heating system. Wires of temperature sensors are heat resistant to the temperature not exceeding 100°C.

12.9 Connecting weather sensor

The regulator cooperates only with a weather sensor of the CT6-P type. The sensor should be installed on the coldest wall of the building, usually this is the northern wall,

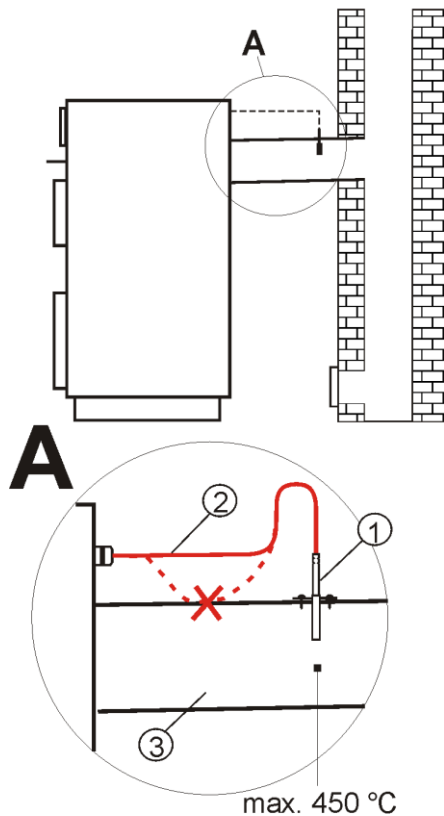
under a roof. The sensor should not be exposed to direct sunlight and rain. The sensor should be fitted at least 2 m above the ground, far from windows, chimneys and other heat sources which could disturb the temperature measurement (at least 1,5 m). Connect the sensor using cable of 0,5 mm² cross-section, up to 25 m long. Polarity of the leads is insignificant. Connect the other end of the cable to the regulator.

Attach the sensor to the wall using tackbolts. To access the tackbolts holes, unscrew the sensor lid.



12.10 Connecting exhaust sensor

The exhaust sensor should be fitted in the boiler flue. The gap between the sensor and the flue should be sealed. The sensor should be installed by a qualified fitter, while observing regulations applicable for chimney systems. The emission sensor should be connected to the sensor terminals acc. to The emission sensor lead cannot touch hot elements of the boiler and the flue, the temperature of which exceeds 350°C. The emission sensor should be installed in such distance from the boiler at which it is not directly exposed to flames, and where the emission temperature does not exceed 450°C.



Connecting emission sensor: 1 – exhaust temp. sensor type CT2S, 2 – sensor lead, 3 – flue.



Caution: Opening the boiler door can cause the emission temperature to exceed the sensor's thermal resistance, which can burn the sensor out.

12.11 Checking temperature sensors

Temperature sensors CT4/CT6-P/CT2S can be checked by measuring their resistance at the given temperature. In the case of finding significant differences between the value of measured resistance and the values presented in the table below, the sensor must be changed.

CT4			
Ambient temp. °C	Min. Ω	Rated Ω	Max. Ω
0	802	815	828
10	874	886	898
20	950	961	972
25	990	1000	1010
30	1029	1040	1051
40	1108	1122	1136
50	1192	1209	1225
60	1278	1299	1319
70	1369	1392	1416
80	1462	1490	1518
90	1559	1591	1623
100	1659	1696	1733

CT2S-2 (exhaust)			
Temp. °C	Min. Ω	Rated Ω	Max. Ω
0	999.7	1000.0	1000.3
25	1096.9	1097.3	1097.7
50	1193.4	1194.0	1194.6
100	1384.2	1385.0	1385.8
125	1478.5	1479.4	1480.3
150	1572.0	1573.1	1574.2
CT6-P (weathers)			
Temp. °C	Min. Ω	Nom. Ω	Max. Ω
-25	901,6	901,9	902,2
-20	921,3	921,6	921,9
-10	960,6	960,9	961,2
0	999,7	1000,0	1000,3
25	1096,9	1097,3	1097,7
50	1193,4	1194,0	1194,6
100	1384,2	1385,0	1385,8
125	1478,5	1479,4	1480,3
150	1572,0	1573,1	1574,2

12.12 Connection of mixers room thermostat

Room thermostat with open contacts reduces preset temperature of mixer circuit by the decrement set in:

Mixer 1-5 settings, → Mixer room thermostat

Select the value of this parameter so that once the room thermostat has responded (its contacts have opened), the temperature in the room drops.

When connecting the ecoSTER200/ecoSTER TOUCH room control panel, make sure the *Thermostat select* parameter is set to a correct value.

Service settings → Mixer 1-5 settings → Thermostat select

12.13 Connection of boiler's room thermostat

Boiler circuit room thermostat may activate the burner or deactivate CH boiler pump. In order for the room thermostat to control boiler operation, set the *Thermostat select* value to *Universal* or *ecoSTER T1* (if the ecoSTER200/ecoSTER TOUCH room control panel is connected)

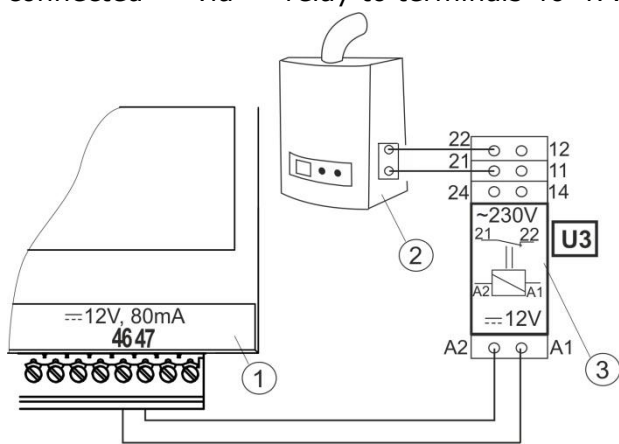
Service settings → Boiler settings → Thermostat select

In order for the room thermostat to control CH pump operation (without deactivating the boiler), set the *Pump Off by therm.* value to YES.

Service settings → **Boiler settings** → **Pump Off by therm.**

12.14 Connection of reserve boiler

The regulator can control a reserve boiler (gas- or oil-), eliminating the necessity of enabling or disabling this boiler manually. Connection to a reserve boiler, should only be made by a qualified fitter, in accordance with the technical documentation of this boiler. The reserve boiler should be connected via relay to terminals 46-47.



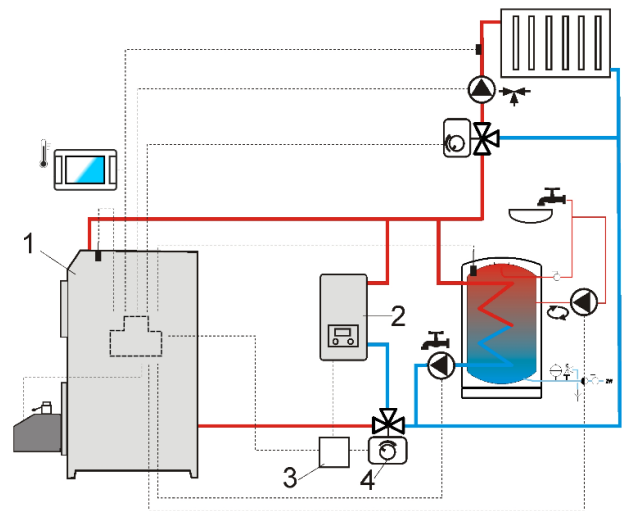
Model diagram of layout for connecting a reserve boiler to the regulator: 1- regulator, 2 - reserve boiler (gas- or oil-), 3 - relay RM 84-2012-35-1012 and base GZT80 RELPOL.

Standard version of the regulator is not equipped with a relay.

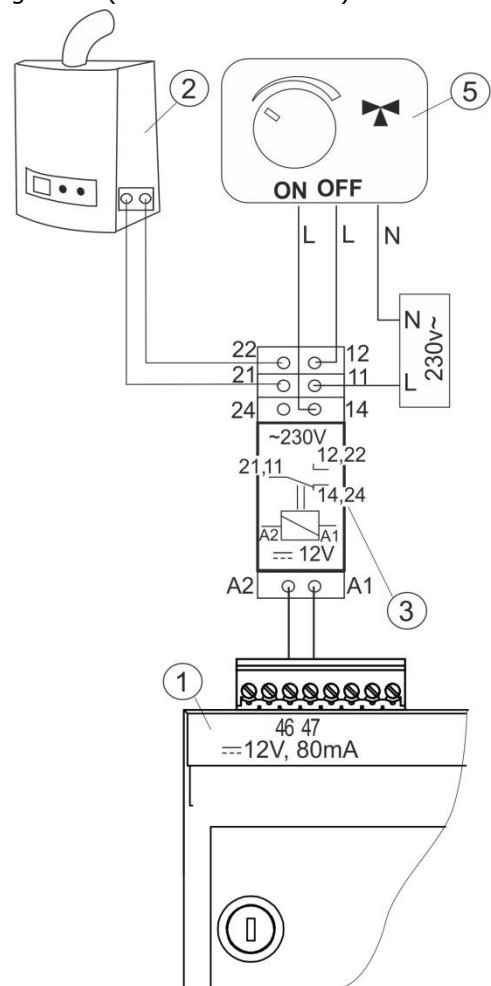
Reserve boiler control is switched off upon setting the *Output H (Output H mod B/C)* function to the *Reserve boiler*.

Service settings → **Boiler settings** → **Output H**

The reserve boiler is switched on when there is no voltage on terminals 46-47. The reserve boiler is switched off when there is voltage on terminals 46-47.



Hydraulic diagram with reserve boiler: 1 - regulator, 2 - reserve boiler, 3 - relay, 4 - switching valve (with limit switches).



Wiring diagram of control of the switching valve in the reserve boiler: 1 - regulator, 2 - reserve boiler, 3 - relay, 5 - switching valve servo (with limit switches). Note: terminals 22,21,24 have to be galvanically insulated from terminals 12,11,14.

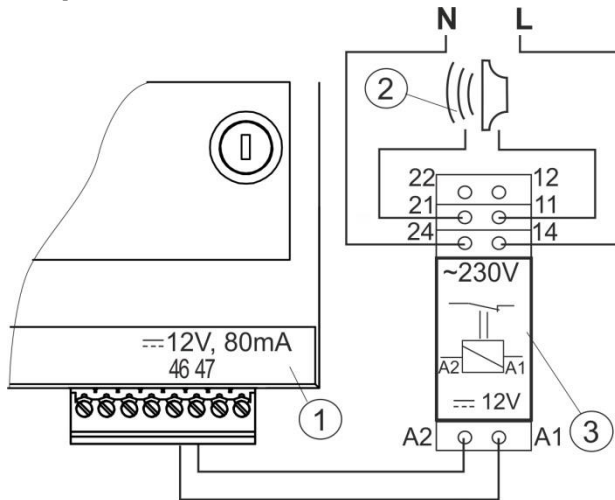
12.15 Connection of alarm signalling

Regulator may announce alarm conditions by activating an external device (e.g. a bell or GSM device to send a text message).

Connect alarm annunciator as shown in below fig. through the relay.

Alarm signalling may be deactivated by setting the *Output H* function to *Alarms*.

Service settings → **Boiler settings** → **Output H**



Connection of an external alarm annunciator. 1- regulator , 2 - external alarm annunciator, 3 - relay.

12.16 Connection of mixer

When connecting mixer servo, take due care to prevent boiler overheating, which may occur when the flow of boiler water is limited. You are advised to get familiar with the position of the valve corresponding to its maximum opening before commencement of work so that you may ensure heat collection from the boiler at any time it is required by opening it completely.



The regulator works only with mixing valve servos equipped with limit switches. Use of other servos is not allowed. The servos of full turn time from 30 to 255 s may be used.

Description of mixer connection:

- connect mixer temperature sensor, -
- connect mixer pump wiring,
- switch on the regulator and select proper *Mixer support* in the service menu

Service settings → **Mixer 1 settings**

- enter the proper *Valve opening time* in (this time should be indicated on servo rating plate e.g. 120 s).

- connect power supply to the regulator and switch on the regulator to start the mixer pump,

- determine direction of servo closing/opening. For this purpose, set the selector located on the housing of the servo to manual control and find the positions in which the temperature in mixer circuit is maximum and minimum (it corresponds to the setting of the regulator of "100% ON" and "0% OFF, respectively). Note the position to verify the connections later,

- disconnect power supply to the regulator,
 - connect mixer servo and regulator wiring according to valve servo manufacturer's technical documentation. Do not mistake direction of valve opening with its closing,
 - connect regulator power supply and put it in the STAND-BY mode,

- check whether wires to mixer closing and opening are not interchanged. To do this, enter MENU **Manual control** and open the mixer by selecting *Mix1 Open = ON*. When opening the servo, the temperature on mixer sensor should increase. If not, disconnect regulator power supply and switch the wires. Note: Other reason may be incorrect mechanical connection of the valve! – refer to the documentation of valve manufacturer and check whether the valve is properly connected.

12.17 Connecting temperature limiter STB

In order to prevent the boiler from overheating due to the regulator malfunction, an STB safety temperature limiter, or any other appropriate for the given boiler and heating system, should be fitted. When the STB is activated, the fan and fuel feeder motors are disabled.



The STB must have nominal operating voltage of at least ~230V, and have the applicable certifications.

12.18 Connecting room panel

The regulator can be equipped with room panel ecoSTER TOUCH, which can serve as:

- room thermostat,
- boiler control panel,

- alarm signalling device,
- fuel level indicator.



Cross-section area of wires used to connect ecoSTER TOUCH control panel should be 0,5mm².

Max. length of wires should not exceed 30 m. This length may be longer if the wires used have cross-section area larger than 0,5mm².

- **Four-wire connection**

Connection – see Electric scheme.

- **Two-wire connection**

For two-wire connection apply power supply of 5 V or 12V DC and rated current of min. 400 mA. GND and VCC connect to external source of supply. Connect lines D+ and D- - acc. Electric scheme.

13 SERVICE MENU

Service settings
Burner settings
Boiler settings
CH and HUW settings
Buffer settings *
Mixer 1-5 settings*
Show advanced setup
Service counters
Restore default settings

Burner settings
Firing-up
<ul style="list-style-type: none"> Ignition test time Fuel dose Flame detection Firing-up airflow Firing-up time Blow-in after firing up Incandescence time Heating up time Worktime with min. power
Operation
<ul style="list-style-type: none"> Thermostat mode Cycle time OPERATION Fuel calorific Feeder efficiency Capacity of tank Ext. feeder 2 oper. time*
Burning off
<ul style="list-style-type: none"> Max time burning off Min. time burning off Air flush intensity Blowing time Blowing pause Blowing start Blowing stop
Cleaning
<ul style="list-style-type: none"> Cleaning time Firing-up Cleaning time Burning off Cleaning blowing Rotary cleaning cycle
Supervision
<ul style="list-style-type: none"> Supervision time Boiler output Cycle time Fan output
Grate*
<ul style="list-style-type: none"> Blowing power – Superv. Blowing pause – Superv.
Lambda sensor*
<ul style="list-style-type: none"> Operation Lambda sensor Airflow correction range Parameter A,B,C Lambda

Min. airflow output
Fuel detection time
Max. burner temp.
External feeder oper. time

Boiler settings
Thermostat select
<ul style="list-style-type: none"> Off Universal ecoSTER T1-T3*
Return protection
<ul style="list-style-type: none"> Return protection 4D Min. return temperature Histeresis return Closing the valve
Min. boiler temp.
Max. boiler temp.
Output H
<ul style="list-style-type: none"> Reserve boiler Alarms
Output H mod. B/C*
Boiler cooling temp.
Parameter A,B,C FL*
Pump Off by therm.

CH and HUW settings
CH activ. temp.
CH stand. load. HUW*
Min HUW temp.*
Max HUW temp.*
Boil. inc. by HUW, Mixer
HUW operat. extension
Circulating standstill time*
Circulating operation time*
CH activation temp.
Exchanger*

Buffer settings*
Buffer support
Loading start temp.
Loading stop temp.

Mixer 1-5 settings*
Mixer support
<ul style="list-style-type: none"> Off CH ON Floor ON Pump only
Thermostat select*
Min. mixer temp.
Max. mixer temp.
Proportional range*
Integration time constant*
Valve full opening time
Pump Off by therm.
Mixer dead zone*

* unavailable if no adequate sensor or additional module is connected or the parameter is hidden.

14 SERVICE SETTINGS

14.1 BURNER

Firing-up	
• Ignition test time	It is a verification time to check, if the furnace is burning or not. In this time only ventilator is working.
• Fuel dose	Fuel dose during firing up. Concerns first testing firing up. Next tests fuel dose is reduced (10% of basic dose).
• Flame detection	Threshold of flame detection in % of light, when the controller deems the furnace as hot. It is also used for detection of lack of fuel and end of burning off.
• Firing-up airflow	% of blowing when firing up. Too big value prolongs the firing up process or causes failed attempt of firing up.
• Firing-up time	It is a time for additional firing attempts. After this time the controller goes to another firing attempt (there is max. 3 such attempts).
• Blow-in after firing up	% of fan blowing after flame detection.
• Incandescence time	The incandescence time after the flame is detected in the firing-up phase.
• Heating up time	Igniter heating up time before activating the fan. It should not be too long in order to not damage the igniter. After this time the igniter works still, until detecting flame.
• Worktime with min. power	Burner operation time with minimum power after firing up. Power is determined by parameter <i>Min. blow-in output</i> .
Operation	
• Thermostat mode	Switches the burner into Thermostat mode, i.e. for working in bakery. The burner operates with maximum power without modulation of power. The burner deactivates with disconnecting thermostat joints. Boiler temperature sensor does not influence feeder operation.
• Cycle time OPERATION	Time of whole fuel feeding cycle in Operation mode. <i>Feeding cycle time</i> = feeding time + feeder interval.
• Fuel calorific	Fuel calorific value in kWh/kg
• Feeder efficiency	Efficiency of the fuel feeder in kg/h. Entered a measured amount of fuel in constant feed (feeder working constantly). The parameter does not affect the work of the burner and is used for calculating the fuel level and current boiler output.
• Capacity of tank	Fuel tank capacity used for calculation of fuel level. Setting the right value releases the user from necessity of carry out a fuel calibration procedure. The controller is using the data if the calibration process was not being done. After successful fuel level calibration the controller is no longer using this value.
Burning off	Burning off mode does not occur when coal is the fuel.
• Max time burning off	After this time the controller goes into STOP mode although the flame sensor is detecting the flame.
• Min time burning off	The burning off mode will durate at least for this time although the flame sensor will be detecting anymore flame.
• Air flush intensity	Fan power during blowing while burning off in %.
• Blowing time	Blowing time in burning off. Air flushes time during fuel burnout Burning off.
• Blowing pause	Blowing pause in burning off. Pause between blowings while burning up fuel in Burning off.
• Blowing start	Flame brightness by which blowings start while burning up fuel in Burning off.
• Blowing stop	Flame brightness by which blowings stop by burning up fuel in Burning off.
Cleaning	
• Cleaning time Firing-up	Fan operation time during cleaning the furnace while firing up.
• Cleaning time Burning off	Fan operation time during furnace burning off.

• Cleaning blowing	Fan power in % during furnace cleaning in Burning off mode and Firing-up mode.
• Rotary cleaning cycle	Time work rotary output during cleaning the burner and the time break of rotary cycle during cleaning the burner.
Supervision	
• Supervision time	When the time of supervision will pass by, the controller then goes into BURNING OFF mode and then into STOP mode. When the parameter <i>Supervision time</i> = 0, then the controller skip the SUPERVISION mode and goes directly to BURNING OFF mode. When the parameter <i>Supervision time</i> = 255, then the controller stays in SUPERVISION mode until the boiler temperature drops down up to the level, by which the controller returns to OPERATION mode.
• Boiler power – Superv.	It influences the boiler power in Supervision mode. Note: the value should be as low as possible just to maintain the flame. Too high a value can lead to overheating the boiler.
• Cycle time	Feeder operation time in SUPERVISION mode. $Cycle\ time\ OPERATION = Feeding\ time\ OPERATION + Feeder\ standstill\ time.$
• Fan output	Airflow output in % during operation in SUPERVISION mode. Adjust value in such a way to burn feeding fuel in Supervision mode with low fumes emission.
Grate	
• Blowing power – Superv.	Blowing time in supervision in grate mode. Fan blowing time in SUPERVISION while work in grate mode. The value should not be too big in order not to cause water overheating in boiler.
• Blowing pause – Superv.	Blowing pause time in supervision in grate mode. Pause time between blowings in SUPERVISION mode, during work in grate mode. The value should not be too small in order not to cause water overheating in boiler.
Lambda sensor	
• Operat. with Lambda sensor	When the parameter will be set on ON then the controller will operate using the Lambda sensor measurements. The air quantity delivered to the furnace will be automatically set on in order to get a preset value of oxygen inside the fumes. When this parameter will be set on OFF, then the Lambda sensor readings will have no influence on controller operation.
• Airflow correction range	Established an acceptable level of variation of airflow power when the Lambda sensor is in operation.
• Parameter A,B,C Lambda	Affects the adjustment speed of oxygen value present in exhaust to present oxygen value; it also affects the stability to keep the oxygen in exhaust. It is not recommended to change this value.
Min. airflow output	Minimum airflow output in % selectable by the controller user. It is used only to limit the available airflow output range. It is not used for the airflow control algorithm and should be as low as possible to ensure slow and smooth airflow rotation without "buzzing".
Fuel detection time	The time countdown starts after the flame brightness has dropped below the value of the <i>Flame detection</i> parameter. After the countdown is finished, the controller attempts to ignite the burner and should it fail three times, an alarm message of "ignition failure" is indicated.
Max. burner temp.	Defines the maximum burner temperature. Should the value be exceeded, the "maximum burner temperature exceeded" alarm is generated.
External feeder operat. time	Defines the external feeder operation time. After that time, the external feeder operation is stopped despite the fuel level sensor contacts are open.

14.2 BOILER

Thermostat select	<p>The following options are available:</p> <ul style="list-style-type: none"> • Off - deactivates the effect of the room thermostat on the boiler's operation. • Universal - enables the No-Nc room thermostat to the boiler. • ecoSTER T1-T3 - this option is available when the ecoSTER TOUCH room panel is connected, the signals on the status of the thermostat are sent from the room panel.
Return protection	

<ul style="list-style-type: none"> Return protection 4D 	This parameter turns on/off the boiler return protection function, which is being done by mixing valve together with electric actuator. Attention: do not activate this function when there is no actuator installed on the valve!
<ul style="list-style-type: none"> Histeresis return 	The electric actuator will return to its normal operation with <i>Return temperature</i> \geq <i>Min. return temperature</i> + <i>Return hysteresis</i> .
<ul style="list-style-type: none"> Min. return temp. 	The boiler return temperature below which the electric actuator will close the mixing valve.
<ul style="list-style-type: none"> Closing the valve 	It is a value for opening the mixing valve during active return protection function. This value is given in percentage. This value should be set in such way, that the return temperature can raise. Attention: the return protection function will work only in case when the set boiler temperature will be set on sufficiently high value, otherwise there will be too many lock ups of the actuator. Attention: The valve is locking up with the $\pm 1\%$ of precision.
Min. boiler temp.	Minimal set temperature for the boiler, that can be edited by the user in user menu and also a minimal temperature, that can be automatically set by a controller e.g. from night decrease, weather control etc.
Max. bolier temp.	Maximal set temperature for the boiler, that can be edited by the user in user menu and also a maximal temperature, that can be automatically set by a controller e.g. from night decrease, weather control etc.
Output H Output H mod B/C	Functions performed at the module regulator, output 46-47 and output 30-31 additional module B/C. There are option to choose from: <ul style="list-style-type: none"> Reserve boiler – output H controls the reserve boiler. Alarms – when an alarm occurs, output H is being activated. Operation alarms when the parameter <i>Reserve boiler</i> set to zero.
Boiler cooling temp.	Preventive boiler cooldown temperature. When this temperature is exceeded, the regulator switches on the hot usable water pump and opens the mixer circuits in order to cool the boiler down. The regulator will turn the hot usable water pump when the temperature of this water exceeds the maximum value. The regulator will not open the mixer circuit when <i>mixer control</i> = <i>Floor on</i> .
Pump Off by therm.	Available options: <ul style="list-style-type: none"> No - the CH boiler pump is not switched off when the room thermostat is activated. YES - the CH boiler pump is switched off when the room thermostat is activated.

14.3 CH and HUW

CH activation temp.	This parameter decides on the temperature of boiler pump activation. It secures the boiler against retting, that can occur when the boiler is being cooled down with cold water from the installation. Attention: deactivation of boiler pump doesn't guaranteed, that the boiler is secure against retting and therefore corrosion. It is recommended to apply additional automatics e.g. 4-way valve or 3-way thermostatic valve.
CH stand. load. HUW	It requires a HUW sensor to be plugged in. A prolonged HUW container loading can, with HUW priority activated, lead to excessive cooling down of CH installation, because with these kind of settings the CH pump is switched off. The parameter of pause time of CH pump preventing this by periodic operation of CH pump while HUW container loading. The CH pump will after this time activate for fixed set time of 30s.
Min. HUW temp.	It requires a HUW sensor to be plugged in. This parameter can be used for limitation of possibility to choose too low value of HUW set temperature.
Max. HUW temp.	It requires a HUW sensor to be plugged in. This parameter decides on which maximum temperature will the HUW container be heated during dropping down excessive heat in alarm states. It is a crucial parameter because setting this for too high value can lead to the risk of users scalding with utility water. On the other hand, too low value of this parameter can lead to a situation, when during boiler overheating there will be no possibility to drop down excessive heat into the HUW container. When projecting the HUW installation, there should be an assumption of controller malfunction. This situation can lead to dangerous level of HUW temperature, leading to user scalding. It is advised to use additional security precautions in form of thermostatic values.
Boil. inc. by HUW, Mixer	This parameter specifies how much grads Celsius will the buffer set temperature be raised in order to load the HUW container. Buffer and mixer circuit. The temperature raising is being only made when it is

	indeed needed. When the boiler set temperature is on expected level, than the controller will not change this temperature with the necessity of loading the HUW container, buffer or mixer circuit.
HUW operat. extension	Available after connecting HUW sensor. After feeding HUW silo and deactivating HUW pump may be a risk of boiler overheating. It happens in case when preset HUW temperature was higher than boiler preset temperature. This issue is exceptionally important in HUW pump operation in SUMMER mode, when pump is deactivated. To cool off the boiler HUW pump operation can be prolonged by <i>HUW operation extension</i> .
Circulation pump standstill time	It is the time between periods of circulation pump operation and it is defined by the parameter <i>Circulation standstill time</i> (recommended setting is between 15-40 min.) The circulation pump is operating in cycles for the time of <i>Circulation operation time</i> (recommended setting is between 60 and 120s.)
Circulation pump operation time	
Exchanger	It comes only for hydraulic installations with heat exchanger between open and closed circuit. Available options are: <ul style="list-style-type: none"> • YES (the boiler pump is operating constantly in short circuit boiler – heat exchanger, it is not excluded e.g. from “SUMMER” function or HUW priority) • NO (standard operation of boiler pump)

14.4 BUFFER

Buffer support	This parameter is used for enabling buffer operation.
Loading start temp.	The parameter <i>Loading start temp.</i> defines the upper buffer temperature below which the process of buffer loading is being started. This process will then be finish when the bottom buffer temperature will reach defined temperature in the parameter <i>Loading stop temp.</i>
Loading stop temp.	

14.5 MIXER

Mixer support	
• Off	The mixer actuator and pump are not in operation.
• CH On	It is being used when a mixing circuit is loading a heat installation of CH. The maximum mixing circuit temperature is not being limited, the mixer is fully opened during alarms e.g. with boiler overheating. Attention: do not use this option when the heat installation is made with pipes not resistant for high temperatures. In such cases it is recommended to set the mixer operation for FLOOR switched on.
• Floor On	It is being used when the mixer circuit is loading floor heating installation. The maximum mixer circuit temperature is limited to the value of max. mixer set temperature. Attention: after choosing the option – FLOOR switched on the parameter of max. mixer set temperature should be so edited, that the floor heating will be not damaged and there would be no danger of scalding.
• Pump only	By the moment when the mixer circuit temperature exceeds the set temperature in the parameter mixer set temperature, the mixer pump supply will be shut down. When the circuit temperature will drop by 2°C then the pump will again be switched on. This option is usually be used for control of floor heating pump in situation, when this pump is operating together with thermostatic valve without actuator.
Thermostat select	This parameter is available only when the room panel. This option allows you to select room thermostat for mixer. Options to choose from: <ul style="list-style-type: none"> • OFF - disables the thermostat. • Universal - standard thermostat, connected to terminals 44-45 for mixer 1, for 2 mixers are suitable terminals in additional modules B. • ecoSTER T1-T3 - thermostat in the room panel ecoSTER200/ecoSTER TOUCH. If the room panel series ecoSTER is not connected to the controller only works with standard thermostat.
Min. mixer temp.	It is the parameter used for limitation of choosing too low value of set mixer circuit temperature by the user. Automatic regulation (e.g. periodic temperature reduction) also does not cause the reduction of set temperature value below the value given in this parameter.
Max. mixer temp.	This parameter has two functions: <ul style="list-style-type: none"> - it enables the limitation of choosing too high value of set mixer

	<p>temperature by the user. Automatic regulation (correction upon heating curve, that comes from outside temperature) also does not cause crossing the set temperature above the value given for this parameter.</p> <ul style="list-style-type: none"> - when the <i>Mixer support = Floor ON</i>, then the mixer pump will shut down by max. mixer temperature, which protects the floor against destruction. For the floor heating it should be set for the value below 45-50 °C or even lower, when the thermal resistance of this floor is lower. Attention: setting too lower value of this parameter can lead to unnecessary shut down of the pump.
Proportional range	<p>This parameter has the influence upon the scale of movement of the mixer actuator. Raising the value of this parameter leads to faster mixer reaction thus leading to faster reaching of set mixer temperature. Too high value of this parameter leads however to temperature overregulation and unnecessary actuator movements. The right value is being edited according to research results. It is recommended to set this value between 2 and 6 [3].</p>
Integration time constant	<p>The greater the value of this parameter, the slower is the actuator reaction for temperature deviation. Setting too lower values can lead to unnecessary actuator movements, too high value extending the time needed to find set value of the temperature. The right value is being edited according to research results. It is recommended to set this parameter value between 100 and 180 [160].</p>
Valve full opening time	<p>The time of valve full opening should be entered – this time can be read from the nameplate of valve actuator, e.g. 140s.</p>
Pump Off by therm.	<p>Setting this parameter for YES value lead to close the mixer actuator and shutting down the mixer pump after thermostat contacts divergence (the room is being heated). This activity is however not recommended, because a heated room can be significantly cooled down.</p>
Mixer dead zone	<p>A set value of this parameter determines the temperature insensitivity (dead zone) for the mixer control system. The controller operates the mixer in such way, that the value of measured temperature (from the mixer circuit sensor) will be the same as set value. However in order to avoid too many actuator moves, leading to unnecessary cutting down its longevity, the regulation is being used only when the measured mixer circuit temperature will be higher or lower from set value increased by the mixer insensitivity.</p>

14.6 OTHTRS

Show advanced setup	<p>Available options:</p> <ul style="list-style-type: none"> • YES - shows hidden parameters, which edition is not recommended. • NO - hides hidden parameters.
Restore default settings	<p>Restoring service settings will also restore the settings from the main menu (the user).</p>

15 DESCRIPTION OF ALARMS

15.1 Exceeding max. boiler temp.

There is a two-stage safety precaution for boiler overheating. First of all, i.e. after exceeding *Boiler cooling temperature* the controller is trying to lower the temperature by directing overheated water to the HUW container and also by opening mixer actuators (only when *Mixer support = CH On*). When the temperature, measured by HUW sensor, will exceed the value of *Maximum HUW temperature* than the HUW pump will be shut down in order to protect the users against scalding. If the boiler temperature drops down, so the controller will return to its normal operation. However if the temperature will continue to increase (and it will reach 95°C) so the constant alarm of boiler overheating and corresponding signaling sound will be activated.



Installation of temperature sensor outside boiler water mantle, e.g. on the exhaust pipe is potentially dangerous, because it can lead to a delay in boiler overheating detection!.

15.2 Exceeding max. burner temp.

This alarm will occur after the feeder temperature exceeds the service parameter:

Service setting → **Burner settings** → **Max. feeder temp.**

In such cases, the regulator will attempt to push out the burning fuel from the feeder by switching it on for a short time. If three consecutive attempts to switch the feeder on do not reduce the temperature, the feeder will be switched on for a longer time and report a constant alarm. Before returning to regular operation, remove the excess fuel from the combustion chamber.



The flame return protection function will not work if there is no power supply to the regulator.



The regulator cannot be used as the only flame return protection. Use additional automatic protection.

15.3 Boiler temperature sensor damage

An alarm occurs with the damages of boiler temperature sensor as well with exceeding measurement range of this sensor.

It is necessary to check the sensor and eventually replace it with a new one.



For description of checking temperature sensor procedure please see point 12.11.

15.4 Bournner temperature sensor damage

The alarm occurs when damage to the burner temperature sensor, and after exceeding its measuring range.

It is necessary to check the sensor and eventually replace it with a new one.



For description of checking temperature sensor procedure please see point 12.11.

15.1 Exhaust temperature sensor damage

This alarm occurs in case of damage of exhaust temperature sensor and excess of its measurement range.

It is necessary to check the sensor and eventually replace it with a new one.



For description of checking temperature sensor procedure please see point 12.11.

15.2 Feeder control system failuer

The regulator has an additional protection preventing it from feeding fuel constantly. This informs the user about failures in the electrical system controlling the fuel feeder. In case of alarm, **stop the boiler and repair the regulator as soon as possible.**

It is also possible to continue operation in emergency mode. Before continuing operation, sure that the combustion chamber does not contain excessive unburnt fuel. If so, remove the excess fuel. Ignition with excessive fuel may lead to explosion of combustion gasses!



Note: operating in emergency mode is allowed only under user supervision and until the arrival of the service team to remove the failure. If user supervision is not

possible, extinguish the boiler. When operating in emergency mode, prevent the consequences of improper feeder work (feeder working constantly or not at all).

15.3 Boiler overheating STB, open contact

An alarm occurs after activation of independent safety thermostat that secures the boiler against overheating. The burner will then be deactivated. After the boiler temperature will drop down it is required to unscrew an oval STB lid and then press the Reset button.

15.4 Unsuccessful boiler firing-up attempt

An alarm occurs after the third unsuccessful automatic furnace firing attempt. The reason behind this alarm occurrence can be among other things: malfunctioning igniter or ventilator, malfunction of fuel feeder system, incorrect parameter setting, insufficient fuel quality or lack of fuel in the container.

15.5 Lack of communication

The control panel is being linked with the rest of the electronics with RS485 digital communication link. In case a cable of this link will be damaged, an alarm will occur on the screen with the information "*Attention! No communication*".

The controller doesn't stop to operate and works normally with before preset parameters. It is required to check the connection cable between control panel and the module and replaced it with a new one or repair it.

15.6 Unsuccessful attempt to load the container

This is so called silent alarm reminder. It will take place by failed attempt of feeding fuel from additional silo. In case when through configured time of feeding the silo, installed sensor not detects increase of fuel the reminder is displayed. This signalization does not cause activating automatic boiler operation, there is only a warning displayed.

16 OTHERS

16.1 Power supply decay

In the cases of power supply failure, the regulator will resume the operation mode in which it was before the failure.

16.2 Anti-freezing protection

In case the boiler temperature has fallen below 5°C, CH pump is activated to force boiler water circulation. It delays water freezing process, but in case of very low temperature or lack of power it may not be sufficient to protect the equipment from freezing.

Note: This function must not be the only anti-freezing protective measure! Apply other methods too. Regulator manufacturer is not liable for anti-freezing related damages.



16.3 Function of protecting pumps against stagnation

The regulator protects the CH, HUW and mixer circuit pumps against stagnation. It does so by activating them periodically (every 167h for several seconds). This protects the pumps against immobilization due to sedimentation of boiler scale. For this reason, the regulator power supply should be connected also when in the boiler is not in use. This function can be enabled also when the regulator is turned off, via keyboard.

16.4 Replacement of mains fuse

Mains fuses are located in each working module. They protect the regulator and other connected equipment. In case of replacement, use 6.3A, 5x20mm ceramic time fuse. To remove the fuse, press down fuse holder using flat screwdriver and turn it in CCW direction.

16.5 Replacement of control panel

It is not recommended to replace only the control panel as the software in the panel must be compatible with the software in the rest of the regulator.

17 Lambda sensor

Burner efficiency can be increased by connecting additional Lambda sensor module. Connect the module according to electric scheme. Lambda sensor is to be activated in:

Service settings → Burner settings → Lambda sensor

If parameter *Operation with Lambda sensor* is set on *ON* then the controller will operate using Lambda sensor readings. The amount of air provided to the furnace will be automatically set in such a way to obtain preset amount of air in fumes. If this parameter is set on *OFF* then Lambda sensor readings will not have influence on controller's operation. Amounts of air for given burner power are set in:

Boiler settings → Output modulation

Periodical calibration of Lambda sensor readings can be necessary. To conduct Lambda sensor calibration it is necessary to extinguish the boiler. To make a successful calibration the furnace in boiler must be completely extinguished. To start up the calibration use the parameter:

Boiler settings → Lambda calibration

Calibration process lasts approximately 8 minutes.

CHANGES REGISTER:



ul. Wspólna 19, Ignatki

16-001 Kleosin

Poland

plum@plum.pl

www.pum.pl

www.plumelectronics.eu