Boiler regulator
ecoMAX 800, model P1
Version: L
FOR PELLET BOILERS

SERVICE AND ASSEMBLY MANUAL
ISSUE: 1.3

APPLICABLE TO SOFTWARE:

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15.07.2011

* - functions available with additional extension module
*** - room panel ecoSTER200 - is not part of standard equipment
PRINCIPLES FOR USAGE OF Individual Fuzzy Logic CONTROLLED BOILER:

- The regulator must be programmed individually for the given type of boiler and fuel, p. 23.1!

- It is inadmissible to change the type of gear-motor, fan, and to make other changes in the boiler fittings which can influence the burning process. The fittings should correspond to the components installed by the manufacturer, p. 23!

- It is recommended to operate boiler with maximally-opened fan flap.

- Activation of the fuzzy logic mode does not eliminate the necessity of regulating the SUPERVISION parameters, p. 8.9.

- In some cases, the fuzzy logic mode may require additional adjustment, as per p. 8.7.
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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.

- The regulator consists of two subassemblies. In the case of replacing one subassembly, make sure to maintain compatibility with the other one. More information on that issue can be found in the documentation intended for fitters.

- Keep the regulator out of reach of children.
2 General information
Boiler regulator ecoMAX 800 model P1, version L, is a modern electronic device intended to control pellet boiler operation. The regulator is a multipurpose device:
- it automatically maintains a preset boiler temperature by controlling the fuel combustion process,
- it controls timing of feeding screw and fan,
- it automatically stabilizes a preset temperature of the domestic hot water tank,
- it automatically maintains preset temperature of several independent mixer heating cycles.
The preset temperature of heating cycles and boiler can be set on the basis of a weather sensor readouts.
The regulator features an Individual Fuzzy Logic function. It allows to optimize the combustion process, which is in favour of natural preservation, decreases fuel consumption and relieves the user of the necessity of adjusting the burner parameters.
Possibility of cooperation with room thermostats, separate for each heating cycles, facilitates maintaining comfortable temperature in the heated rooms. Moreover, if need arises, the device enables a reserve boiler (gas- or oil-fired).
The device has modular construction, consisting of control panel, main boiler control module (A), and module controlling mixer cycles and HUW (B).
The device is operated in an easy and intuitive way.
Regulator can cooperate with an additional control panel situated in living quarters. It can be used in a household and similar facilities, as well as in light industrialized 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 2002/96/EG
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.
## Structure – main menu

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### 2 Boiler settings

| 1. Preset boiler temp. |
| 2. Weather cont. boiler |
| 3. Heating curve |
| 4. Curve translation |
| 5. Room temp. factor |
| 6. Output modulation |
| 7. Burner cleaning |

### 3 Output modulation

| 1. 100% Blow-in output |
| 2. 100% Feeder operation |
| 3. 100% Feeder interval |
| 4. 50% H2 hysteresis |
| 5. 50% Blow-in output |
| 6. 50% Feeder operation |
| 7. 50% Feeder interval |
| 8. 30% H1 hysteresis |
| 9. 30% Blow-in output |
| 10. 30% Feeder operation |
| 11. 30% Feeder interval |
| 12. Boiler hysteresis Hk |
| 13. Blow-in out. correct. FL |
| 14. Min boiler output FL |
| 15. Max boiler output FL |

### 4 HUW settings

| 1. HUW preset temp. |
| 2. HUW operation mode |
| 3. HUW tank hysteresis |
| 4. HUW disinfection |
| 5. Auto detect. SUMMER |

### 6 Activ.temp.SUMMER

### 7 Deactiv.temp.SUMMER

### 3 2 HUW operation mode

| Off |
| Priority |
| No priority |
| Summer |

### 4 Mixer settings

| 1. Preset mixer temp. |
| 2. Mixer room therm. |
| 3. Weather cont. mixer |
| 4. Heating curve mixer |
| 5. Curve translation |
| 6. Room temperature coefficient |

*) menu for all mixer cycles is identical

### 8 Night-time decrease

| 1. Boiler |
| 2. Mixer 1 |
| 3. Mixer 2 |
| 4. Mixer 3 |
| 5. Mixer 4 |
| 6. HUW tank |
| 7. Circ. Pump |

### 9 Regulation mode

| 1. Standard |
| 2. FuzzyLogic |
| 3. Lambda FL |

### 14 Manual control

| Fan |
| Feeder pump |
| Feeder 2 |
| HUW pump |
| Mixer1 Pump |
| Mixer1 Open |
| Mixer1 Close |
| Mixer2 Pump |
| Mixer2 Open |
| Mixer1 Close |
| Res.boiler |

### 15 Fuel level

| 1. Alarm level |
| 2. Fuel level calibration |
8 Operating the regulator
This section briefly describes how the regulator should be operated.

8.1 Description of buttons

Legend:
1. MENU button
2. “TOUCH and PLAY” knob
3. EXIT button

Turning the “TOUCH and PLAY” knob increases or decreases the edited parameter. This is an element of quick operation of the regulator. Pushing this knob allows to enter the given parameter, or to confirm the selected value.

8.2 Description of display main window

Legend:
1. regulator operation modes: FIRING-UP, OPERATION, SUPERVISION, PUTTING OUT, PUTTING OUT ON DEMAND, STANDSTILL,
2. preset boiler temperature,
3. measured boiler temperature,
4. field of factors influencing preset boiler temperature: „T” - symbol of decreasing preset boiler temperature from opening of room thermostat contacts; „S” - symbol of decreasing preset boiler temperature according to decrease schedule; „C” - symbol of increasing preset boiler temperature for the time of filling hot utility water tank HUW; „M” symbol of increasing the preset boiler temperature to fulfill mixer circuit demands; „P” - weather control for boiler cycle is active, „R” - indicates active return protection, „B” - increase in preset temperature in order to fill the buffer,
5. fan operation symbol,
6. fuel feeder operation symbol,
7. central heating pump operation symbol,
8. domestic hot water pump operation symbol,
9. measured temperature of domestic hot water tank,
10. preset temperature of domestic hot water tank,
11. clock and day of the week
12. screen section shared by two icons: match - indicates active lighter, the digit next to it means the number of attempt to fire-up; poker - means that poker is active;
13. outside (weather) temperature,
14. current boiler output level,
15. Individual Fuzzy Logic activity,
16. warning symbol - disinfection of the hot utility water tank is enabled,
17. symbol of secondary (2) feeder activity.

Right window on the main screen is customizable, the user can decide what information is to be presented there. It is possible to choose setup presenting: mixer circuit monitor (1, 2, 3 or 4) or info of HUW by rotating the TOUCH and PLAY knob.

1 This symbol is displayed not only during active HUW disinfection, but it also appears at the moment of enabling the HUW function.
The right window on the main screen can also present fuel level view, provided that the fuel level parameter is set properly. Details can be found in section 8.21. Note: the fuel level can be viewed also on room panel ecoSTER200.

8.3 Activating the regulator

After enabling power supply, the regulator recalls its status at the moment of disconnecting the power supply. If the regulator was not active before, it will start in the “stand-by” mode. In this mode, the display is dimmed, and displays the current time, weather sensor temperature and information: “Boiler off”

In this mode, the function of protecting the pumps against stagnation is carried out by activating the pumps periodically. Therefore, it is recommended for the power supply to be active during interruptions to boiler use, and the regulator should be in the “stand-by” mode described herein.

It is possible to activate the boiler (press encoder knob and select setting), or to set its operation parameters (MENU button) without the need for turning it on. After making sure that there is fuel in the bin and that the bin flap is closed, you can turn the boiler on.

8.4 Setting preset boiler temperature

Preset boiler temperature, just like the preset mixer circuit temperature, can be set in the menu (possible settings of these temperatures are limited by the scope of their corresponding regulator service parameters).

Boiler settings > Preset boiler temp.
Mixer 1 settings > Preset mixer temp.
Mixer 2 settings > Preset mixer temp.
Mixer 3 settings > Preset mixer temp.
Mixer 4 settings > Preset mixer temp.

The value set as Preset boiler 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. Total duration of the firing-up process depends on regulator settings (feeder operation time, heater operation time, etc.) and on the boiler’s status before firing-up. All parameters which influence the firing-up process can be found in menu:

Service settings >
Boiler settings > Firing-up

Detailed description of the firing-up cycle:
- Fan is activated, with power specified by parameter Airflow firing-up,
Small dose of fuel - 20% of the main dose is supplied, Furnace status is checked – i.e. if within the time specified by parameter Ignition test time from the time of activating the fan, the exhaust temperature reaches the value Ex.temp.for fired-up or increases by Ex.temp.delta, the firing-up process will end. This means, that firing-up has been successful and the regulator switches into the OPERATION mode. If the firing-up criteria are not met, the regulator will attempt to clean and fire-up the furnace: Poker is activated for Poker cycle time, Fuel is supplied for Feeding time, Fan is activated with power Airflow firing-up, Lighter is activated for Firing-up time. Within that time, the regulator checks whether the fuel in the furnace has flamed up. A condition of firing-up is increase in temperature read by exhaust temperature sensor by value of Ex.temp.delta or increase in emission temperature exceeding Ex.temp.for fired-up. If firing-up is successful, the lighter is deactivated and the regulator goes into OPERATION mode.

If firing-up is unsuccessful, another attempts to fire the furnace up are made, during which the fuel dose (feeding time) is reduced to 10% of the first attempt dose.

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
In this mode, the regulator operates automatically, according to STANDARD, or Individual Fuzzy Logic algorithm.

The fan operates continuously, which is presented in Drawing 9. Fuel feeder is activated cyclically. A cycle consists of feeder operation time and duration of feeding interval. Fan power and feeder operation cycle are determined by one of the following control algorithms.

If, in the OPERATION mode, it becomes necessary to fill the HUW tank at preset boiler temperature lower than temperature required to fill the tank, the regulator will automatically increase the preset boiler temperature for the time of filling the HUW tank.

8.7 OPERATION in the I.FuzzyLogic mode
This mode can be activated in the menu: Regulation mode
The Individual Fuzzy Logic function, the parameters of which are selected individually to the given boiler, allows to obtain optimal combustion process, which favours environmental protection, savings of consumed fuel and in most cases releases the user from the necessity of adjusting regulator parameters.

During operation with Individual Fuzzy Logic algorithm, there is no need to set up the feeder operation parameters (feeding times, feeding intervals), and airflow power for the each boiler output level. 3-phase modulation is inactive - the regulator automatically and
smoothly selects parameters for feeder and fan control.

In the Individual Fuzzy Logic mode, the regulator strives to avoid switching the boiler into the SUPERVISION mode, and to supply as much heat, as the CH system requires at the time. Switching into SUPERVISION is made only after exceeding the preset boiler temperature by 5°C.

One should bear in mind that the Individual Fuzzy Logic algorithm is selected individually to the given boiler and fuel type, and it can operate properly only with the specific fuel and boiler. For this reason, the Individual Fuzzy Logic mode must be activated by boiler manufacturer, in accordance with point 23.1. If this mode is not activated, attempt to change the mode will trigger message 'Function unavailable'.

Modifying parameters of the Individual Fuzzy Logic algorithm.
In some cases, depending on fuel quality, it may be necessary to fine-tune the airflow in the Individual Fuzzy Logic mode. The user can change:
Boiler settings > Output modulation > Blow-in out. correct. FL
Boiler settings > Output modulation > Min. boiler output in FL
Boiler settings > Power modulation > Max. boiler output in FL

The scope of settings adjustments is intentionally limited. It is not recommended to change the Airflow correction FL parameter if the combustion is proper, i.e. there are no underburnt fuel particles. If the fuel is of poor quality and there are underburnt particles, the provided amount of air can be increased. If the fuel is very dry, causing it to burn fast, and the furnace burns out too intensively, the value of FL airflow correction can be decreased.

When adjusting the Individual Fuzzy Logic, values of parameters concerning: airflow power, feeder operation and feeder intervals which can be found in the Boiler settings > Output modulation menu are not used in the regulator control algorithm. These settings are used only in STANDARD mode.

When using the Individual Fuzzy Logic control, the fan intake aperture should be open to the maximum and the boiler should be clean. Shall it be necessary to replace the fan or the feeder, use identical types thereof.

After exceeding the preset boiler temperature by 5 degrees, the regulator automatically switches into the SUPERVISION mode.

8.8 Operation in the Standard mode
The ecoMAX800P1-L boiler regulator is equipped with boiler output modulation mechanism, which allows to change its output gradually, as the boiler temperature approaches the preset value. In this mode, the controller uses an output modulation algorithm.

The currently selected output level - one of three available - is presented on the display in the form of a three-bar indicator on the left side of the boiler icon.

Parameters for all output levels are available in the menu:
Boiler settings > Output modulation

Each of the levels - referred to as 100%, 50% and 30% respectively - can be attributed with different fuel feeding time and airflow power, which translates into
actual boiler output level. When the boiler is supposed to operate at specific output level is determined by values called hysteresis, H1 and H2 respectively. Each of these values relates to measured boiler temperature relative to its preset value. The H1 and H2 values can be set in such a way that modulation will take place without intermediate stage, i.e. shift from 100% to 30%.

If the boiler temperature reaches the preset value, the regulator will switch into SUPERVISION mode.

8.9 SUPERVISION
The SUPERVISION mode occurs both during operation with STANDARD, as well as with Individual Fuzzy Logic control algorithm. The regulator switches into the SUPERVISION automatically, without the user's intervention:
- in the case of Standard control mode - upon reaching preset boiler temperature,
- during Individual Fuzzy Logic control - upon exceeding the preset boiler temperature by 5°C. In the Individual Fuzzy Logic mode, the regulator strives to avoid switching the boiler into the SUPERVISION mode, and to supply as much heat, as the CH system requires at the time.

In the SUPERVISION mode, the regulator supervises the furnace, so that it would not go out. For this purpose, the airflow and the feeder are activated only for a while, rarer than in the OPERATION mode. Without causing further temperature increase.

The airflow does not work continuously, it is activated cyclically together with the fuel feeder, which prevents the flame from going out during boiler standstill.

![Drawing 12 View of main window in the SUPERVISION mode.](image)

All parameters regarding boiler setup in the SUPERVISION can be found in the menu: Service settings > Boiler settings > Supervision

Parameters of the SUPERVISION mode should be set in accordance with boiler manufacturer’s recommendations. They should be chosen in such a way, that the furnace did not go out during boiler standstill (at the same time, it should not fire up too intensively, as this will trigger increase in the boiler temperature). Duration of the feeder operation and interval in the SUPERVISION mode are set using parameters:

... > Supervision > Supervision feeding time
... > Supervision > Supervision feeder interval

The time of extending the airflow in order to ignite fuel after feeding thereof is set in:

... > Supervision > Airflow operation extend.

Parameters should be selected in such a way, that boiler temperature would gradually decrease when this mode is active. Improper settings can cause the boiler to overheat.

Airflow in the SUPERVISION mode operates with power set in the power modulation parameter 30% Airflow power.

The regulator returns to the OPERATION mode automatically after boiler temperature
decreases by the value of *boiler hysteresis* in relation to the preset temperature. Maximum boiler operation time in the supervision mode is defined by parameter: ...

... > Supervision > Supervision time

If after lapse of this time from the moment of the regulator’s entering the supervision mode, there is no need to reactivate the boiler, the regulator will commence the process of putting the boiler out.

**8.10 Putting Out**

In the PUTTING OUT 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 > Boiler settings > Putting out

Detailed description of the putting out cycle:

- Feeder operation is halted,
- Fuel remains are burnt out - Fan is activated for *Putting out time* and with power specified by parameter *Putting out airflow*,
- The furnace is cleared - the poker is activated.

After automatic putting out, the regulator switches into STANDSTILL mode.

**8.11 Standstill**

In the STANDSTILL 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 Hot utility water settings HUW**

The device controls temperature of the hot utility 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 operation 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 tank.
- set simultaneous operation of the CH and HUW pump, using parameter no priority,
- enable the *summer* function.

**8.13 Setting preset HUW temperature**

Preset HUW temperature is defined by parameter:

HUW settings > HUW preset temp.

**8.14 HUW tank hysteresis**

Below temperature *HUW preset temp.* reduced by *HUW tank hysteresis*, the HUW pump is activated in order to fill the HUW tank.

When value of hysteresis is set too low, the HUW pump will start faster after decrease in HUW temperature.

**8.15 Enabling the SUMMER function**

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

The SUMMER function cannot be enabled if the HUW sensor is disconnected.

Do not enable the summer function if the HUW pump is disconnected or damaged.

The SUMMER function can be enabled automatically, on the basis of readouts from the weather sensor. This functionality is enabled with the following parameters:

HUW settings > Auto detect. SUMMER
HUW settings > Activ.temp.SUMMER
HUW settings > Deactiv.temp.SUMMER
8.16 HUW tank disinfection

The regulator has a function of automatic, periodic heating of the HUW tank to temperature of 70 °C. The purpose is to remove bacterial flora from the HUW tank.

The household members must definitely be informed about the fact of activating disinfection, as there is a hazard of scalding with hot utility water.

Once a week on Sunday night, at 02:00, the regulator increases the HUW tank temperature. After 10 minutes of keeping the tank at 70 °C, the HUW pump is deactivated and the boiler resumes normal operation. Do not enable the disinfection function if HUW support is deactivated.

8.17 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 Preset mixer 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. 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 ecoSTER200)

Set parameter Weather contr.mixer to on. Select weather curve as per point 8.18

Using parameter Curve translation, set preset room temperature following the formula:

Preset room temperature = 20°C + heating curve translation.

Example.

To obtain room temperature of 25°C, value of the heating curve translation must be set at 5°C. To obtain room temperature of 18°C, value of the heating curve translation must be set at -2°C.

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 ecoSTER200)

Set parameter Weather contr.mixer to on.

Select weather curve as per point 8.18

The ecoSTER200 regulator 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 described in point 8.18, it may be necessary to fine-tune the heating curve translation.

In this setup, the ecoSTER200 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:

\[
\text{Correction} = (\text{Preset room temperature} - \text{measured room temperature}) \times \text{room temperature coefficient} / 10
\]

Example.

Preset temperature in the heated room (set at ecoSTER200) = 22 °C. Temperature measured in the room (by ecoSTER200) = 20 °C. Room temp. coeff. = 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. coeff. Range: 0…50. 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!

8.18 Weather controlled operation

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.** to “0”.

If a room panel ecoSTER200 is connected, it is also necessary to set the parameter **Room temp. coeff.** to “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

![Drawing 13 Heating curves.](image)

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.
8.19 Description of settings for night-time decreases

The regulator allows to set intervals for decreasing preset temperature of boiler, heating curves, hot utility water tank, and operation time of the circulating pump.

The intervals allow to decrease the preset temperature at specified periods of time – e.g. at night, or when the users leave the heated rooms (e.g. when the household members got to work/school). This allows to decrease the preset temperature automatically, without losing thermal comfort and with decreased fuel consumption.

In order to activate the intervals, set parameter Night-time decrease for the given heating circuit to on. Night-time decreases can be defined separately for weekdays, Saturdays and Sundays.

It is necessary to specify beginning and end of the given interval, as well as the value by which the preset temperature is to be decreased. Three intervals per day are available.

Below is an example of night-time decrease in preset room temperature, lasting from 22:00 till 06:00, as well as another decrease between 09:00 and 15:00.

In the presented example, the regulator will decrease the preset boiler temperature by 3 °C between 00:00 and 06:00. Between 06:00 and 09:00, the regulator will be retaining the regular preset boiler temperature (no decrease). From 09:00 till 15:00, the regulator will keep the preset boiler temperature decreased by 5 °C. Between 15:00 and 22:00, the regulator will be retaining the regular preset boiler temperature (no decrease). From 22:00 till 23:59, the regulator will keep the preset boiler temperature decreased by 3 °C.

An interval is ignored if the decrease value is set to “0”, even if its range of hours was specified.

Decrease in the boiler preset temperature by interval is signalled with a letter “S” in the main display window.

8.20 Circulating pump control

Note: the circulating pump functionality is available only if an additional extension mixer module is attached to the ecoMAX800P1-L regulator.

The settings can be found in:
Night-time decrease > Circ. pump and Service settings>(Password)>CH & HUW settings

Setting for temporal control of the circulating pump are the same as for night-time decreases. At specified intervals, the circulating pump is off. Otherwise, the circulating pump is activated for circ. pump operation time every circ. pump standstill time. Detailed settings can be found in point 15.7.

8.21 Fuel level setup

Activating the fuel level gauge

In order to enable display of the fuel level, set value of parameter Fuel level > Alarm level to a value greater than zero, e.g. 10%

Rotate the TOUCH and PLAY knob in the main window to open the fuel level window.

Tip: the fuel level can be viewed in the room panel ecoSTER200. The room panel is not standard equipment of the regulator.

Calibration

Fill in the fuel bin to the level corresponding to full load, and set the parameter: Fuel level > Fuel level calibration > Fuel level 100%

The indicator in the main window will be set to 100%. On-going calibration process is signalled by flashing fuel level gauge. The gauge will flash until the time of marking the point corresponding to minimal fuel level. One must systematically control the decreasing level of fuel in the bin. When the level reaches the requested minimum, set the value of the parameter: Fuel level > Fuel level calibration > Fuel level 0%

8.22 Cooperation with secondary feeder

The regulator can cooperate with a fuel batch sensor, which is an element of the boiler equipment.

On the basis of secondary feeder operation schedule, specified in the menu: Extra feeder schedule and signals from fuel level sensor, the regulator controls fuel replenishment in the boiler bunker.

At the moment of activation specified by the scheduled interval, the secondary feeder starts operation in accordance with algorithms, specified by parameters referred to in point 14.18. During operation of secondary feeder, signal from bunker batch sensor is used.
8.23 Poker automatics service

The regulator supports poker automatics, which allows to improve conditions of burning fuel of worse quality, and to clean ash from the furnace.

The poker cleans the furnace in FIRING-UP and PUTTING OUT modes.

If the boiler remains in OPERATION and SUPERVISION mode for an extended period, it is possible to clean the boiler automatically, using parameter:

Boiler settings > Burner cleaning

Point 14.17 describes service parameters for the poker.

8.24 Information

The information menu allows to view measured temperatures and to check which devices are currently active.

You can switch between screens turning the TOUCH and PLAY knob

After connecting a mixer extension module, windows with information about secondary mixers are activated.

Sign “CAL” in the information window at valve opening value indicates that its calibration is active. Please wait until valve servo calibration is completed to see its current status.

8.25 Manual control

The regulator enables manual activation of executive devices, such as pumps, feeder motor or blower. This allows to check whether the given devices are operational and properly connected. The manual control menu can only be entered in the STOP mode, i.e. when the boiler is deactivated.

8.26 Restoring user settings

It is possible to restore default parameter of settings which are available in the main menu.

Note: service parameters will not be restored.
ecoMAX 800, model P1-L
### Structure – service menu

#### Service settings
1. Boiler settings
2. CH and HUW settings
3. Buffer settings
4. Mixer 1 settings
5. Mixer 2 settings
6. Mixer 3 settings
7. Mixer 4 settings
8. Restore service settings

#### 18 1 Boiler settings
1. Firing-up
2. Putting out
3. Supervision
4. Return protection
5. Thermostat selection
6. Min. boiler temp.
7. Max. boiler temp.
8. Min. airflow output
9. Fuel detection time
10. Ex. temp. w. no fuel
11. Max. feeder temp.
12. Poker cycle time
13. Feeder operation time 2
14. Feeder interval 2
15. Reserve boiler
16. Alarms
17. Boiler cooling temp.
18. Parameter A FL
19. Parameter B FL
20. Parameter C FL

#### 18 2 CH & HUW settings
1. CH activation temp.
2. CH standstill when filling HUW
3. Min. temp. HUW
4. Max. temp. HUW
5. Boiler increase from HUW and M.
6. HUW operation extend.
7. Circulation pump standstill time
8. Circulation pump operation time
9. Boiler pump

#### 18 3 Buffer settings
1. Activate operation
2. Loading start temperature
3. Loading stop temperature

#### 18 4 Mixer 1 settings
1. Mixer support
2. Thermostat selection
3. Min. mixer temp.
4. Max. mixer temp.
5. Proportionality range
6. Integration time constant
7. Valve opening time
8. Pump deact. by thermostat

*) menu for all mixer cycles is identical

#### 18 1 2 Putting out
1. Putting out time
2. Putting out airflow

#### 18 1 3 Supervision
1. Supervision time
2. Supervision feeding time
3. Supervision feeder interval
4. Airflow operation extend.

#### 18 1 4 Return protection
1. Operation mode
2. Min. return temp.
3. Return temp. hysteresis
4. Valve closing
10 Hydraulic diagrams

10.1 Schema 1


In order to improve water circulation in the boiler gravity circulation circuit (marked as bold in the drawing), do as follows: use large nominal sections DN of the pipe and the four-way valve, avoid numerous elbows and narrowings of the section, apply other rules regarding structure of gravity systems, such as observing drops, etc.

If the return sensor is clip-on, insulate it thermally from the surroundings and improve thermal contact with the pipe by using thermal grease. The boiler preset temperature must be high enough to provide thermal power for the mixer circuit, while heating the water which returns to the boiler.

### SUGGESTED SETTINGS:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Setting</th>
<th>MENU</th>
</tr>
</thead>
<tbody>
<tr>
<td>Return protection</td>
<td>on</td>
<td>service settings -&gt; boiler settings</td>
</tr>
<tr>
<td>Min. return temp.</td>
<td>42°C</td>
<td>service settings -&gt; boiler settings</td>
</tr>
<tr>
<td>Return temp. hysteresis</td>
<td>2°C</td>
<td>service settings -&gt; boiler settings</td>
</tr>
<tr>
<td>Valve closing</td>
<td>0%</td>
<td>service settings -&gt; boiler settings</td>
</tr>
<tr>
<td>Increasing pre-set boiler temp.</td>
<td>5-20°C</td>
<td>service settings -&gt; CH and HUW settings</td>
</tr>
<tr>
<td>Min. pre-set boiler temperature</td>
<td>65°C</td>
<td>service settings -&gt; boiler settings</td>
</tr>
<tr>
<td>Mixer support 1</td>
<td>CH on</td>
<td>service settings -&gt; mixer 1 settings</td>
</tr>
<tr>
<td>Max. preset mixer temp.</td>
<td>75°C</td>
<td>service settings -&gt; mixer 1 settings</td>
</tr>
<tr>
<td>Mixer heating curve</td>
<td>0.8 – 1.4</td>
<td>service settings -&gt; mixer 1 settings</td>
</tr>
<tr>
<td>Out. temp. control</td>
<td>on</td>
<td>service settings -&gt; boiler settings</td>
</tr>
</tbody>
</table>

\(^2\)The presented hydraulic diagram does not replace the central heating system design and is provided solely for the purposes of demonstration!
**Brief description:** The DHW pump (12) can start its operation only after the boiler exceeds the CH activation temp. (by default 40°C). Mixer pump (10) and servo (8) start operation regardless of the value of the parameter CH activation temp. The mixer servo (8) finds such valve opening stage at which the temperature at sensor (9) will be equal to the preset mixer temperature 1. When the temperature on sensor (5) drops below the value Min. return temp., the servo (8), closes to the value close valve for return protect. After the temperature on sensor (5) increased buy the value Return temp. hyst., the servo switches into stabilization of preset mixer temperature 1. The setting Mixer 1 operation = CH on guarantees that even in the case of the boiler (1) overheating, the mixer (8) will open maximally, and the mixer pump (10) will not be disabled at the moment of exceeding the Max.mixer temp. Return protection is available only for mixer 1 circuit.

**10.2 Schema 2**

![Diagram with thermostatic three-way valve which protects the temperature of return water](image)


**SUGGESTED SETTINGS:**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Setting</th>
<th>MENU</th>
</tr>
</thead>
<tbody>
<tr>
<td>Return protection</td>
<td>off</td>
<td>service settings -&gt; boiler settings</td>
</tr>
<tr>
<td>Mixer operation 1</td>
<td>off</td>
<td>service settings -&gt; mixer 1 settings</td>
</tr>
</tbody>
</table>

**Brief description:** The CH pump (6), and the DHW pump (12) can start their operation only after the boiler exceeds the CH activation temp. (by default 40°C). The thermostatic valve (7) closes at the initial stages of heating, when the water getting into the boiler is cold. This causes the boiler water to flow in a short cycle: boiler (1) – throttle valve (8) - thermostatic valve (7) – pump (6). The thermostatic valve (7) opens after the temperature returning to the boiler increases,

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3The presented hydraulic diagram does not replace the central heating system design and is provided solely for the purposes of demonstration!
directing the boiler water to the central heating system. When the temperature measured by sensor (13) drops below the preset DHW temperature, the DHW pump (12) is enabled. The DHW pump (12) will be disabled after the DHW tank (11) is filled, i.e. when the temperature on sensor (13) is equal to the preset DHW temperature.

10.3 Schema 3


⁴The presented hydraulic diagram does not replace the central heating system design and is provided solely for the purposes of demonstration!
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Setting</th>
<th>MENU</th>
</tr>
</thead>
<tbody>
<tr>
<td>Return protection</td>
<td>off</td>
<td>service settings -&gt; boiler settings</td>
</tr>
<tr>
<td>Mixer support 1</td>
<td>on, floor</td>
<td>service settings -&gt; mixer 1 settings</td>
</tr>
<tr>
<td>Max. pre-set mixer temp. 1</td>
<td>50 °C</td>
<td>service settings -&gt; mixer 1 settings</td>
</tr>
<tr>
<td>Mixer weather control 1, 2, 3, 4</td>
<td>on</td>
<td>menu -&gt; mixer settings 1, 2, 3, 4</td>
</tr>
<tr>
<td>Mixer heating curve 1</td>
<td>0.2 – 0.6</td>
<td>service settings -&gt; mixer 1 settings</td>
</tr>
<tr>
<td>Mixer support 2</td>
<td>on, floor</td>
<td>service settings -&gt; mixer 2 settings</td>
</tr>
<tr>
<td>Max. pre-set mixer temp. 2</td>
<td>50 °C</td>
<td>service settings -&gt; mixer 2 settings</td>
</tr>
<tr>
<td>Mixer heating curve 2</td>
<td>0.2 – 0.6</td>
<td>service settings -&gt; mixer 2 settings</td>
</tr>
<tr>
<td>Mixer support 3</td>
<td>on, floor</td>
<td>service settings -&gt; mixer 3 settings</td>
</tr>
<tr>
<td>Max. pre-set mixer temp. 3</td>
<td>50 °C</td>
<td>service settings -&gt; mixer 3 settings</td>
</tr>
<tr>
<td>Mixer heating curve 3</td>
<td>0.2 – 0.6</td>
<td>service settings -&gt; mixer 3 settings</td>
</tr>
<tr>
<td>Mixer support 4</td>
<td>CH on</td>
<td>service settings -&gt; mixer 4 settings</td>
</tr>
<tr>
<td>Max. pre-set mixer temp. 4</td>
<td>80 °C</td>
<td>service settings -&gt; mixer 4 settings</td>
</tr>
<tr>
<td>Mixer heating curve 4</td>
<td>0.8 – 1.4</td>
<td>service settings -&gt; mixer 4 settings</td>
</tr>
<tr>
<td>Boiler weather control</td>
<td>off</td>
<td>service settings -&gt; boiler settings</td>
</tr>
</tbody>
</table>
### 11 Technical data

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage</td>
<td>230V~; 50Hz</td>
</tr>
<tr>
<td>Current consumed by regulator</td>
<td>$I = 0.04 \text{ A}$</td>
</tr>
<tr>
<td>Maximum rated current</td>
<td>6 (6) A</td>
</tr>
<tr>
<td>Regulator protection rating</td>
<td>IP20, IP00</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>0...50 °C</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>0...65 °C</td>
</tr>
<tr>
<td>Relative humidity</td>
<td>5 - 85% without vapour condensation</td>
</tr>
<tr>
<td>Measuring range of temperature sensors CT4</td>
<td>0...100 °C</td>
</tr>
<tr>
<td>Measuring range of temperature sensors CT4-P</td>
<td>-35...40 °C</td>
</tr>
<tr>
<td>Accuracy of temperature measurements with sensors CT4 and CT4-P</td>
<td>2 °C</td>
</tr>
<tr>
<td>Temperature measure range for CT2S sensors</td>
<td>0...380 °C</td>
</tr>
<tr>
<td>Terminals</td>
<td>Screw terminal on the mains voltage side 2,5mm$^2$</td>
</tr>
<tr>
<td></td>
<td>Screw terminals on the control side 1,5mm$^2$</td>
</tr>
<tr>
<td>Display</td>
<td>Graphic 128x64</td>
</tr>
<tr>
<td>External dimensions</td>
<td>Control panel: 164x90x40 mm</td>
</tr>
<tr>
<td></td>
<td>Executive module: 140x90x65 mm</td>
</tr>
<tr>
<td>Total weight</td>
<td>1.0 kg</td>
</tr>
<tr>
<td>Norms</td>
<td>PN-EN 60730-2-9</td>
</tr>
<tr>
<td></td>
<td>PN-EN 60730-1</td>
</tr>
<tr>
<td>Software class</td>
<td>A</td>
</tr>
<tr>
<td>Protection class</td>
<td>To be built into class I devices</td>
</tr>
</tbody>
</table>

Basic set includes:
- boiler temperature sensor 1 piece
- feeder temperature sensor 1 piece
- DHW temperature sensor 1 piece
- return temperature sensor 1 piece

---

5 This is the current consumed by the regulator (after connecting 2 executive modules and panel). Total electricity consumption depends on devices connected to the regulator.

6 IP20 – from the front side of the executive module, IP00 – from the side of terminals of the executive module, detailed information presented in point 13.5.

### 12 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.

### 13 REGULATOR INSTALLATION

#### 13.1 Environmental conditions

On account of risk of shock, the regulator has been designed to be used in an environment in which dry conductive pollutants occur (pollution level 3, acc. to PN-EN 60730-1).

Due to the risk of fire, it is prohibited to operate the regulator in explosive gas and flammable dust atmosphere (e.g. coal dust). The regulator should be separated using appropriate enclosure.

Moreover, the regulator cannot be used in the presence of vapour condensation, and be exposed to water.

#### 13.2 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. In the basic version, the device consists of three modules, including control panel and two executive modules. All parts are electrically interconnected.
**13.3 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. The space required for the control panel is shown in Drawing 27. During installation, follow the guidelines below.

**STEP 1**
A hole must be made in the mounting plate, in accordance with the drawing below.

![Drawing 25](image)

*Drawing 25 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.

![Drawing 26](image)

*Drawing 26 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.

![Drawing 27](image)

*Drawing 27 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).*

**13.4 Executive module installation**

The casing must meet protection rate appropriate for the environmental conditions in which the regulator will be used. Moreover, it must prevent the user from accessing hazardous, live parts, e.g. terminals. Enclosing can be done using standard casing. In such case, the user can only access front surface of the executive module. Enclosing can also be made using elements of boiler which surround the entire module Drawing 30b. Space required for a single module is presented in Drawing 29 and Drawing 30.

The executive module is designed to be fitted on a standardised bus bar DIN TS35. The bus should be securely fixed to a rigid surface. Before placing the module on the bus (1) lift the taps (2) using a screwdriver, Drawing 28. After placing the module on the bus, push the taps (2) into their original position. Make sure that the device is tightly fixed and it cannot be removed from the bus without using a tool.
Due to safety requirements, a safe distance between active parts of the executive module terminals and the conductive (metal) elements of the enclosure must be kept (at least 10 mm).

Connecting wires must be protected against being torn out, loosened, or they must be enclosed in a way which prevents any tensions in relation to the wires.

**13.5 IP protection rate**

Enclosure of the regulator’s executive module provides various IP protection rates, depending on the method of installation. Drawing 30a 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.

**13.6 Connecting electrical system**

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

- three core (with protective wire),
- 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 1-15 are intended only for connecting devices with mains supply 230V~.

Terminals 16-31 are intended for cooperation with low voltage devices (below 12 V).

**Connecting mains supply 230V~ to terminals 16-31 and to transmission connectors RS485 will damage the regulator and creates risk of an electric shock!**
Tips of the connected wires, especially power leads, must be secured against splitting by means of insulated clamp sleeves, in accordance with the drawing below:

![Drawing 31 Securing wire tips: a) right, b) wrong.](image)

The feeder cable should be connected to the terminals marked with an arrow.

### 13.7 Protective connections

The protective conductor of the feeder cable should be connected to a neutral strip contacted with the metal casing of the regulator. The fitting should be connected to the regulator terminal marked with symbol 🙆 and with grounding terminals of the devices connected to the regulator.
Drawing 32 Diagram for electric connections with external devices and sensors.

The regulator must be equipped with a set of pins, inserted in the connectors for feeding 230V~ devices.
13.8 Connecting temperature sensors

The regulator cooperates only with CT4i and CT2S sensors. It is forbidden to use different sensors. Sensor leads can be extended with wires with section of at least 0.5 mm². Total length of the sensor leads cannot exceed 15 m.

The boiler temperature sensor should be fitted in the thermometric pipe, situated in the boiler shell. The feeder temperature sensor must be fitted on the surface of the feeder screw pipe. The domestic hot water temperature sensor - in the thermometric pipe welded into the tank. It is best to fit the mixer temperature sensor in a tube (sleeve) placed in the stream of water flowing in the pipe, but it is also possible to clip it onto the pipe, covering the sensor and the pipe with thermal insulation.

The sensors must be secured against coming loose from the measured surfaces.

Good thermal contact between the sensors and the measured surface must be ensured. For this purpose, use thermally conductive paste. Do not pour oil or water over the sensors.

The sensor cables should be separated from mains leads. Otherwise, the temperature indications can be incorrect. Minimum distance between these leads should be at least 10 cm.

The sensor leads cannot have contact with hot elements of the boiler and heating system. The temperature sensors’ leads are resistant to temperature up to 100 °C.

13.9 Connecting weather sensor

The regulator cooperates only with a weather sensor of the CT4-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, as shown in Drawing 32.

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

13.10 Checking temperature sensors

Temperature sensors CT4/CT4-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.

The regulator cooperates only with an exhaust temperature sensor type CT2S. In order to inspect the sensor, it is necessary to use a very precise multimeter – otherwise, the sensor can only be checked roughly.
### 13.12 Connecting reserve boiler

The regulator can control a reserve boiler (gas- or oil-fired), eliminating the necessity of enabling or disabling this boiler manually. The reserve boiler will be enabled if the temperature of the pellet boiler drops, and disabled when the pellet boiler reaches an appropriate temperature. Connection to a reserve boiler, e.g. oil-fired one, 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 30-31 of regulator executive module B, as per Drawing 32 and Drawing 34.

#### Drawing 34
Model diagram of layout for connecting a reserve boiler to the ecoMAX800P1-L regulator, where:
1. regulator ecoMAX800P1-L module B
2. reserve boiler (gas- or oil-fired)
3. Module U3, consisting of relay RM 84-2012-35-1006 and base GZT80 RELPOL.

In a standard version, the regulator is not equipped with the U3 module. Components necessary for assembly of the U3 module can be purchased from the manufacturer of the ecoMAX800P1-L regulator.

You have to perform assembly and installation of the module by yourself, in conformity with the applicable standards.

To enable control of a reserve boiler, set the temperature of the CH system at which the reserve boiler is to be disabled:

---

### 13.11 Connecting room thermostat for mixer circuits

Room thermostats connected to executive module B as per Drawing 32 influences mixer 1 and mixer 2 circuits. If the entire building heating system is fed by the mixer circuit, all room thermostat settings for boiler should be disabled.

After opening of the contacts, the room thermostat decreases the preset mixer circuit temperature by the value of preset mixer temperature decrease from thermostat. This parameter can be found in:

**Mixer 1 settings > Mixer room therm.**

The value of this parameter should be chosen in such a way, that after activation of room thermostat (opening of contacts), the temperature in the room decreased.

---

### Table: CT4

<table>
<thead>
<tr>
<th>Temp. °C</th>
<th>Min. Ω</th>
<th>Nom. Ω</th>
<th>Max. Ω</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>802</td>
<td>815</td>
<td>828</td>
</tr>
<tr>
<td>10</td>
<td>874</td>
<td>886</td>
<td>898</td>
</tr>
<tr>
<td>20</td>
<td>950</td>
<td>961</td>
<td>972</td>
</tr>
<tr>
<td>25</td>
<td>990</td>
<td>1000</td>
<td>1010</td>
</tr>
<tr>
<td>30</td>
<td>1029</td>
<td>1040</td>
<td>1051</td>
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<td>1108</td>
<td>1122</td>
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<tr>
<td>50</td>
<td>1192</td>
<td>1209</td>
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<td>1369</td>
<td>1392</td>
<td>1416</td>
</tr>
<tr>
<td>80</td>
<td>1462</td>
<td>1490</td>
<td>1518</td>
</tr>
<tr>
<td>90</td>
<td>1559</td>
<td>1591</td>
<td>1623</td>
</tr>
<tr>
<td>100</td>
<td>1659</td>
<td>1696</td>
<td>1733</td>
</tr>
</tbody>
</table>

### Table: CT4-P

<table>
<thead>
<tr>
<th>Temp. °C</th>
<th>Min. Ω</th>
<th>Nom. Ω</th>
<th>Max. Ω</th>
</tr>
</thead>
<tbody>
<tr>
<td>-30</td>
<td>609</td>
<td>624</td>
<td>638</td>
</tr>
<tr>
<td>-20</td>
<td>669</td>
<td>684</td>
<td>698</td>
</tr>
<tr>
<td>-10</td>
<td>733</td>
<td>747</td>
<td>761</td>
</tr>
<tr>
<td>0</td>
<td>802</td>
<td>815</td>
<td>828</td>
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<tr>
<td>10</td>
<td>874</td>
<td>886</td>
<td>898</td>
</tr>
<tr>
<td>20</td>
<td>950</td>
<td>961</td>
<td>972</td>
</tr>
</tbody>
</table>

### Table: CT2S

<table>
<thead>
<tr>
<th>Temp. °C</th>
<th>Min. Ω</th>
<th>Nom. Ω</th>
<th>Max. Ω</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>999.7</td>
<td>1000.0</td>
<td>1000.3</td>
</tr>
<tr>
<td>25</td>
<td>1096.9</td>
<td>1097.3</td>
<td>1097.7</td>
</tr>
<tr>
<td>50</td>
<td>1193.4</td>
<td>1194.0</td>
<td>1194.6</td>
</tr>
<tr>
<td>100</td>
<td>1384.2</td>
<td>1385.0</td>
<td>1385.8</td>
</tr>
<tr>
<td>125</td>
<td>1478.5</td>
<td>1479.4</td>
<td>1480.3</td>
</tr>
<tr>
<td>150</td>
<td>1572.0</td>
<td>1573.1</td>
<td>1574.2</td>
</tr>
</tbody>
</table>

Other settings as per 8.17
Service settings > Boiler settings > Reserve boiler

Reserve boiler control is deactivated by setting value of its deactivation temperature to zero.

When the pellet boiler is fired up, and its temperature exceeds a preset value, e.g. 25°C, the ecoMAX800P1-L regulator will disable the reserve boiler (will feed constant 6V to terminals 30-31 of module B). This will cause release of the U3 module relay coil, and its contacts will be disconnected. After the boiler temperature drops below the parameter auxiliary boiler off temperature, the regulator ceases to supply voltage to the terminals 30-31, which will activate the reserve boiler.

Switching the ecoMAX800P1-L regulator into OFF mode causes activation of reserve boiler.

It is recommended to switch the ecoMAX800P1-L regulator in the OFF mode, if the pellet boiler gets damaged and there is a need of operation with reserve boiler. In the OFF mode, CH system control is inactive (mixer HUW and boiler pumps, as well as mixer control - are inactive).
13.13 Connecting alarm signalling

The regulator can signal alarm states by activating a peripheral device, e.g. a buzzer or a GSM device for sending an SMS - short messages.

The alarm signalling device should be connected in accordance with Drawing 39, via an U3 module, to the ecoMAX800P1-L regulator, module A.

![Drawing 39 Connecting an external alarming device](image)


In order to provide proper operation, set appropriate value of code for signalling active alarms in the menu:

**Service settings > Boiler settings > Alarms**

Selecting a value of “127” will cause occurrence of voltage between terminals 30-31 (alarm output activation) if any alarm occurs. Setting this value to “0” will prevent the boiler from activating the output in the case of alarm.

It is also possible to set up the alarm output in such a way, that it was activated when one or several selected alarms occur. The value to which this parameter should be set for individual alarms is presented in the following table:

<table>
<thead>
<tr>
<th>Emission sensor damage</th>
<th>Boiler overheated</th>
<th>Exceeding feeder temp.</th>
<th>CH boiler temperature sensor damage</th>
<th>Feeder temperature sensor damage</th>
<th>Unsuccessful firing-up attempt</th>
<th>Boiler unsealed</th>
</tr>
</thead>
<tbody>
<tr>
<td>AL 1</td>
<td>AL 2</td>
<td>AL 3</td>
<td>AL 4</td>
<td>AL 5</td>
<td>AL6</td>
<td>AL7</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>4</td>
<td>8</td>
<td>16</td>
<td>32</td>
<td>64</td>
</tr>
</tbody>
</table>

Example: if you set the value of the parameter to „8“, the voltage will be supplied to the contact only if alarm AL4 occurs. Setting “1” will cause the contact to signalize only alarm AL1. If the output is to signal activity of several, freely selected alarm states, e.g. alarms AL2 or AL4, set this parameter as value which is the sum of the table-listed values for individual alarms (2+8=10). If any of alarms AL1, AL2, AL3 is to be signalled, set the value to “7”.

13.14 Connecting mixer

The regulator cooperates only with servos of mixing valves equipped with limit switches. It is prohibited to use different servos. Permitted servos are those which make a full revolution in 30 - 255 s.

Description of connecting a mixer:
- disable power supply to the regulator,
- determine the direction in which the servo opens/closes and make an electric connection between the mixer and the regulator, in accordance with Drawing 32 and with the documentation provided by the valve servo manufacturer (do not confuse the valve direction of opening with the direction of closing),
- connect mixer temperature sensor and mixer pump,
- activate the regulator and specify appropriate valve opening time in the mixer service settings, in accordance with the servo documentation. **Service settings > Mixer 1 settings > Valve opening time**,  
- disable and enable power supply to the regulator, wait until the servo is calibrated. During the calibration, the servo is closed by the valve opening time. Calibration is signalled in the menu **Information** in individual mixers’ tab, with message „CAL”,  
- make sure that the servo opens in the correct direction (to do so, open menu **Information** and go to tab info-mixer or enable manual control of devices connected to the regulator).

If the mixer does not open in the right direction, change electrical connection (prior to that - remember to disconnect the mains supply to the regulator).
13.15 Connecting circulating pump

The circulating pump can be connected to the ecoMAX800P1-L boiler regulator only after purchasing an extension executive module.

13.16 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.

The STB limiter is to be connected to terminals 1-2 of executive module A (as shown in Drawing 32). 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.

If the STB is not installed, terminals 1-2 of module A must be shorted. The connection should be made of wire the section of which is at least 0,75 mm², with insulation thick enough to comply with the boiler safety requirements.

Regulations demand STB usage!

13.17 Connecting room panel

The regulator can be equipped with room panel ecoSTER200, which can serve as:
- room thermostat (supporting up to 3 thermostats),
- boiler control panel,
- alarm signalling device,
- fuel level indicator.

Four-conductor connection:

Two-conductor connection:

The two-conductor connection requires a 5V DC power supply with rated current of at least 200 mA. ecoSTER200 supply points:
connect GND and +V to external power supply.
The power supply is not included with the regulator.
Connect lines D+ and D- as shown in the diagram.
Maximum length of leads to the additional panel should not exceed 30 m, whereas their gauge should be at least 0,5 mm².
14 BOILER SERVICE SETTINGS

14.1 Firing-up
All parameters which influence the firing-up process can be found in menu:
Service settings >
Boiler settings > Firing-up
Detailed information about parameters responsible for the firing-up process can be found in point 8.5.

14.2 Putting out
All parameters which influence the process of putting out can be found in menu:
Service settings >
Boiler settings > Putting out
Detailed information about parameters responsible for the putting out process can be found in point 8.10.

14.3 Supervision time
This is the maximum time in which the regulator remains in the SUPERVISION mode. If after lapse of this time from the moment of initiating supervision, there is no need to resume heating, the regulator automatically switches into the putting out mode (point 8.9).

14.4 SUPERVISION feeding time
This is the time of feeding fuel and airflow operation in the SUPERVISION mode (point 8.9).

14.5 SUPERVISION feeding interval
This is the duration of fuel feeding interval in the SUPERVISION mode (point 8.9).

14.6 Airflow operation extension time (SUPERVISION)
In the SUPERVISION mode of boiler operation, after feeding a dose of fuel and disabling the feeder, the fan continues to work for a time of airflow operation extension time, in order to light up the provided dose of fuel.

14.7 Return protection
Caution: the return protection function protects the boiler against operation with cold return water. This function will not work properly if the hydraulic system is faulty. The system should be designed in such a way, that at the time of closing the mixing valve, the boiler return temperature can exceed the preset threshold.

If the boiler cooperates with a mixing valve and valve servo, and if return temperature
sensor is connected, the function of protection against return of cold water to the boiler can be enabled. To do so, activate protection in the menu: 

**Service settings > Boiler settings > Return protection > Operation mode**

Note: the return protection function is active only for mixer 1 circuit.

![Drawing 41 Enabling return protection.](image)

If the return temperature sensor is disconnected or damaged, the regulator will automatically disable the return protection. In order to operate properly, the clip-on return sensor must be thermally insulated from the surroundings.

**14.8 Min. return temperature**

This parameter specifies temperature of water returning to the boiler, below which the four-way valve servo is closed. After the return temperature exceeds the value of this parameter + return temperature hysteresis, the servo resumes normal operation.

**14.9 Return temperature hysteresis**

This parameter defines the return temperature hysteresis.

**14.10 Valve closing**

This parameter specifies percentage of closing the four-way valve after drop in temperature of water returning to the boiler below the set value. Set such closing extent, at which the boiler return temperature increases the fastest. Recommended value: 0%.

**14.11 Thermostat selection**

**Service settings > Boiler settings > Thermostat selection**

This option allows to select room thermostat for boiler circuit if a room panel ecoSTER200 is connected, or if mechanical thermostats connected to executive module B are used. Available options:

- Off,
- *Universal 1* - standard no/nc thermostat connected to terminals 26-27 of module B,
- *Universal 2* - standard no/nc thermostat connected to terminals 28-29 of module B,
- *ecoSTER1* – thermostat 1 in ecoSTER 200,
- *ecoSTER2* – thermostat 2 in ecoSTER 200,
- *ecoSTER3* – thermostat 3 in ecoSTER 200,

If ecoSTER200 is not connected, the menu features only options for cooperation with universal room thermostats.

**14.12 Minimum preset boiler temperature**

This parameter can be used to prevent the user from setting too low preset boiler temperature. If the boiler operates at too low temperature, it can cause its accelerated degradation, corrosion, soiling, etc. Algorithms which automatically decrease temperature will also not cause decrease in preset boiler temperature below its minimum value, specified with this parameter.

Set the value in accordance with the boiler manufacturer’s recommendations.

**14.13 Maximum preset boiler temperature**

This parameter can be used to prevent the user from setting too high preset boiler temperature. Algorithms which automatically increase temperature (correction in accordance with heating curve or from required HUW temperature) will also not cause increase in preset boiler temperature above its maximum value, specified with this parameter.
Set the value in accordance with the boiler manufacturer’s recommendations

14.14 Minimum fan power
When the regulator is turned on for the first time, it is necessary to set the user-defined parameter Minimum fan power.

Service settings > Boiler settings > Min. airflow output
This parameter prevents the fan against being damaged due to too low rotary speed. The minimum fan power should be determined with some reserve after observing the fan behaviour. After setting a value of e.g. 20%, the user will not be able to set fan speed lower than 20%.

14.15 Fuel detection time
The regulator can detect lack of fuel in the main tank of the boiler on the basis of exhaust gases temperature. If, for a time exceeding one programmed in parameter: Service settings > Boiler settings > Fuel detection time, the emission temperature is lower than one set in parameter: Service settings > Boiler settings > Ex.temp.w.no fuel, the regulator will switch from OPERATION mode into FIRING-UP mode. If there is no fuel in the bunker, the firing-up will end with a message of impossibility to fire the furnace up.

14.16 Maximum feeder temperature
This is the temperature at which the function which prevents the flame from going back to the fuel feeder is activated. This function is described in point 19.3.

Setting the max. feeder temp. to „0” allows to disconnect the feeder sensor and lets the regulator operate without it. Nonetheless, such settings are not recommended, as they will disable the function of preventing flame recession.

14.17 Poker cycle time
Operation of the poker is defined by parameter:
Service settings > Boiler settings > Poker cycle time
This parameter specifies the time required to move the poker away, whereas the full poker cycle is twice as long, as its operation is concluded with the poker’s automatic return to the initial position.

14.18 Feeder operation time 2
When adding fuel from the auxiliary feeder, the feeder’s engine operates cyclically. It is activated for a time specified in parameter feeder operation time 2, and then the feeder operation is halted for time specified in parameter feeder interval 2. Operation of the secondary feeder is described in point 8.22.

14.19 Reserve boiler
Use this parameter to specify the temperature of the retort boiler at which a reserve boiler (e.g. a gas-fired one) is turned off. Detailed information can be found in point 13.12.

14.20 Boiler cooling temperature
Defines, the temperature at which the boiler is preventatively cooled down. Detailed description can be found in point 19.2.
It is suggested to set the boiler cooling temp. below the value of activating the STB safety temperature limiter, which will prevent interruptions in the boiler work due to overheating.

14.21 Parameter A, B and C Individual Fuzzy Logic
Parameters A, B and C Individual Fuzzy Logic influence the rate of controlling the boiler temperature to the preset value and stability of maintaining the preset boiler temperature in the Individual Fuzzy Logic mode. These parameters do not influence quality of burning in the Individual Fuzzy Logic mode, as this is controlled automatically.
It is not recommended to change these parameters if the rate of boiler power change is at the required level.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A</strong></td>
<td>Increasing its value speeds up increment in the boiler output. The higher the value, the faster the boiler reaches the pre-set temperature. Value too high can destabilize maintenance of the pre-set boiler temperature. Settings range 6...8, recommended value: 6.</td>
</tr>
<tr>
<td><strong>B</strong></td>
<td>Increasing its value slows down increment in the boiler output. The higher the value, the slower the boiler reaches the pre-set temperature. Setting higher value guarantees that the pre-set boiler temperature will not fluctuate. Value too low can destabilize maintenance of the pre-set boiler temperature. Settings range 20...30, recommended value: 30.</td>
</tr>
<tr>
<td><strong>C</strong></td>
<td>Proper selection of this parameter will allow to increase stability of maintaining the preset boiler temperature. Nonetheless, too high value thereof can cause high fluctuation of boiler temperature. It is not recommended to change the default setting.</td>
</tr>
</tbody>
</table>

15 **CH and DHW SERVICE SETTINGS**

15.1 **CH activation temperature**

This parameter specifies the temperature at which the central heating pump is activated. After reaching the temperature equal to the CH activation temp. parameter, the central heating pump is activated. This protects the boiler against retting caused by its being cooled down by hot water returning from the system.

Disabling the CH pump on its own does not guarantee protecting the boiler against retting, and the resulting corrosion of the boiler. Use additional automatics, e.g. a four-way valve.

15.2 **CH pump standstill during HUW filling**

Prolonged filling of the HUW tank when HUW priority is enabled can cause excessive cooling of the CH system, because with these settings, the CH pump is disabled. The parameter CH standstill when filling HUW prevents this by enabling periodic activation of the CH pump during filling of the HUW tank. After this time, the CH pump will be activated for constant, pre-programmed time of 30 s.

15.3 **Minimum HUW temperature**

This parameter allows to prevent the user from setting too low a preset temperature of HUW.

15.4 **Maximum HUW temperature**

This parameter specifies the maximum temperature of heating the HUW tank when dropping excessive heat from the boiler during emergencies. This parameter is of great significance, as setting it at too high can put the users at risk of being scalded with the utility water. Too low a value thereof will make it impossible to carry excessive heat away to the HUW tank if the boiler overheats.

When designing the hot utility water system, it is necessary to provide for the possibility of regulator failure. As a result of the regulator failure, the water in the hot utility water tank can overheat to a dangerous temperature, putting the users at risk of being scalded.

ALWAYS APPLY ADDITIONAL SAFEGUARD IN THE FORM OF THERMOSTATIC VALVES.

15.5 **Increase in boiler temperature from HUW, mixer circuit and buffer status**

This parameter specifies the number of degrees by which the preset boiler temperature can be increased in order to fill the HUW tank, supply buffer and mixer circuit. The temperature is increased only if necessary. If the preset boiler temperature is sufficient, the regulator will not change it due...
to necessity of filling the HUW tank, supplying buffer, or mixer circuit.

Increasing the preset boiler temperature during filling of the HUW tank is signalled by letter “C” displayed in the main window.

15.6 Extending HUW pump operation
After filling the HUW tank and disabling the HUW pump, there is often a problem of the boiler overheating. It occurs if the preset domestic hot water temperature is higher than the preset boiler temperature. In particular, this problem occurs in the HUW pump mode: “SUMMER”, when the CH pump is disabled. In order to cool the boiler down, operation of the HUW pump can be extended by the time of HUW operation extend.

It is not recommended to set the time of HUW operation extend to a value different than zero if the preset HUW temperature is higher than the preset boiler temperature.

15.7 Circulation standstill and operation time
Circulating pump operates cyclically for circulation pump operation time. The interval between its period of operation is defined by the value of parameter circulation pump standstill time (recommended setting: 15-40 min.).

15.8 Boiler pump
If the CH pump = boiler pump parameter is set to "YES", the CH pump is not stopped with HUW priority and in the HUW SUMMER mode. This parameter is intended only for hydraulic systems with a heat exchanger, where the HUW tank is installed on the closed system side, and the heat exchanger separates the boiler open system from the CH closed system. Thanks to continuous operation of the pump, the heat can be exchanged from the boiler through the heat exchanger to the HUW tank.

16 BUFFER SERVICE SETTINGS

16.1 Activate operation
This parameter is used to activate the mode of operation with the buffer.

16.2 Loading start and stop temperatures
This parameter defines the upper buffer temperature, below which the buffer filling process starts. The buffer filling process is concluded at the moment when the lower buffer temperature reaches the value defined in parameter Buffer filling stop temperature.

17 MIXER SERVICE SETTINGS

17.1 MIXER OPERATION
The following options are available:

OFF – mixer servo and mixer pump are inoperative

CH ON - choose this option if the mixer circuit feeds radiator system of central heating. The maximum temperature of mixer circuit is unlimited, the mixer is fully opened during alarms, e.g. boiler overheat.

Caution: Do not enable this option if the system is made of pipes vulnerable to high temperature; in such case, it is recommend to set the mixer to FLOOR h.ON setting.

FLOOR h.ON - choose this option if the mixer cycle feeds a floor system. The maximum temperature of the mixer circuit is limited to the parameter max. mixer temp.

Caution: after choosing the option on FLOOR, set the parameter max. mixer temp. to such value that the floor would not be damaged, and the floor heating users would not be burned.

Pump only – upon exceeding the pre-set mixer temperature, supply of the mixer pump is disabled. When the temperature drops by 2 °C, it is enabled again. Usually, this option is used to control the floor heating pump if it cooperates with a thermostatic valves without a servo. Nonetheless, such action is not recommended. It is recommended to provide floor heating with a standard heating cycle,
consisting of a valve, a servo, and a mixer pump. Another application can be to use the mixer pump to protect the return temperature, using a pump connecting the feeding with the boiler return. In such case, it is impossible to use the mixer control.

17.2 Thermostat selection
This option allows to change room thermostat for the mixer cycle, provided that room panel ecoSTER200 is connected. The following options are available:
- universal - standard no/nc thermostat, connected to terminals 26-27 for mixer 1 or 28-29 for mixer 2,
- ecoSTER1 - thermostat 1 in ecoSTER 200,
- ecoSTER2 - thermostat 2 in ecoSTER 200,
- ecoSTER3 - thermostat 3 in ecoSTER 200.
If the ecoSTER200 is not connected, the regulator cooperates with a standard room thermostat.

17.3 Min. preset mixer temperature
This parameter can be used to prevent the user from setting too low preset mixer temperature. Automatic regulation (e.g. temporary temperature decrease) will also no cause decrease in the preset temperature value below the value of this parameter.

17.4 Max. preset mixer temperature
This parameter serves two purposes:
- can be used to prevent the user from setting too high preset mixer temperature. Automatic regulation (correction in accordance with heating curve) also will not cause increase in the preset temperature value above the value of this parameter,
- if the parameter mixer operation = FLOOR h.ON is enabled, it is additionally the limit temperature of the mixer circuit, at which the mixer pump is disabled.

For floor heating, set the value within the range of 45°C - 50°C, unless the manufacturer of the floor materials or the designer of the CH system specified otherwise.

17.5 Range of proportionality
Caution: it is recommended not to modify this parameter.
This is the mixer step value. Increasing its value will speed up reaching of the preset mixer temperature, yet too high a value of this parameter will cause over-regulation of temperature and unnecessary movement of the servo, thus shortening its life-span.
It is recommended to set this parameter within the range of 2 – 6 [by default: 3].

17.6 Integration time constant
Caution: it is recommended not to modify this parameter.
This parameter influences the mixer standstill time if the temperature measured by the mixer sensor is close to the preset mixer temperature. Greater value will cause longer standstills of the servo. Too high a value extends the time by which the servo can find the preset temperature. Setting too low values can cause over-regulation of temperature and faster wear of the servo.
It is recommended to set this parameter within the range of 80 – 140 [by default: 110].

17.7 Valve opening time
Enter the time of full valve opening, which can be found on the rating plate of the valve servo, e.g. 140 s.

17.8 Pump deactivation by thermostat
Setting this value to “YES” will cause closing of the mixer servo and deactivation of the mixer pump when contacts of the room thermostat open (the room is heated). Nonetheless, this is not recommended, as the heated room will be excessively cooled.

18 RESTORING SERVICE SETTINGS

![Service menu]

Restoration of the factory settings will also restore user settings!
19 DESCRIPTION OF ALARMS

19.1 Exhaust temperature sensor damage
This alarm will be triggered in the case of damaging the exhaust temperature sensor, or upon exceeding this sensor’s measurement range. If this alarm occurs, automatic boiler operation is disabled, only the CH pump is active. Cancel this alarm by pressing the TOUCH and PLAY button, or by restarting the regulator. Inspect the sensor and replace it if necessary.

See how to check the temperature sensor in point 13.10.

19.2 Exceeding max. boiler temperature
Protection against boiler overheating is twofold. First, after exceeding the boiler cooling temp, the regulator tries to decrease the boiler temperature by dropping the excessive heat to the HUW tank and by opening the mixer servo (only if mixer cycle = on CH).
If the temperature measured by the HUW sensor exceeds the value of Max. HUW temp., the HUW pump will be disabled in order to protect the users against scalding. If the boiler temperature drops, the regulator will resume normal operation. Whereas is the temperature continues to rise (reaches 95 °C), fuel feeder and fan are disabled and a permanent boiler overheating alarm – with sound signalling – is activated.
Cancel this alarm by pressing the TOUCH and PLAY button, or by restarting the regulator.

Caution: placing the sensor beyond the boiler water jacket is not recommended, as it can delay detection of the boiler overheating!

19.3 Exceeding max. feeder temperature
This alarm will occur after the feeder temperature exceeds the service parameter:
Service settings> Boiler settings> Max. feeder temperature
If the feeder temperature exceeds this value, the regulator will enable the feeder for a constant, programmed time and will activate the poker. The airflow is disabled and the pumps are enabled. After „pushing the fuel out‖, the regulator disables the feeder and does not activate it again, even if the feeder temperature is still high.
This alarm can be cancelled only after the feeder temperature decreases, by pressing the encoder knob or by restarting the regulator.

The function of protection against flame recession is inoperative if the feeder sensor is disconnected or damaged.

The function of protection against flame recession is inoperative if the regulator is not powered.

The ecoMAX800P1-L regulator cannot be used as the only protection against flame recession in a boiler. Use additional protective automatics.

The function of protection against flame recession can be disabled, see point 14.16.
19.4 Damage to boiler temp. sensor

This alarm will be produced in the case of damage to the boiler sensor, or after exceeding its measuring range. The alarm activates the CH and HUW pumps, as well as the mixer pump, in order to cool the boiler down. Cancel the alarm by pressing the TOUCH and PLAY button, or by restarting the regulator. Check the sensor, and possibly replace it.

The method of checking the temperature sensor is described in point 13.10.

19.5 Feeder temperature sensor damage

This alarm will occur in the case of damage to the feeder sensor, or after exceeding its measuring range. The alarm causes activation of the CH and DHW pumps in order to cool the boiler down. Cancel the alarm by pressing the TOUCH and PLAY button, or by restarting the regulator. Check the sensor, and possibly replace it.

The method of checking the temperature sensor is described in point 13.10.

The regulator can operate if the feeder temp. sensor is disconnected, after setting the parameter max. feeder temp. =0. Nonetheless, it is not recommended, as in this case the function of protection against the flame recession into the fuel hopper is disabled.

19.6 No communication

The control panel is connected with the executive module via digital communication link RS485. If this link is damaged, the following alarm will be displayed: „Caution! No communication.“ The regulator does not disable regulation and operates as usual, with the pre-programmed parameters. If any other alarm occur, it will take action in accordance with the given alarm. Check the connection the control panel and repair or replace it respectively.

19.7 Unsuccessful firing-up attempt

This alarm will occur after third unsuccessful attempt to automatically fire up the furnace. In the case of this alarm, all pumps are deactivated in order to avoid excessive cooling of the boiler. Cancel this alarm by pressing the TOUCH and PLAY button, or by restarting the regulator. This alarm can be caused by, e.g.: faulty lighter or lack of fuel in the tank.

19.8 Unsuccessful attempt to fill the tank

This is a so-called noiseless alarm prompt. It is triggered after second unsuccessful attempt to add fuel from the auxiliary tank (bunker). It is displayed if the boiler tank cannot be filled within an hour of the secondary feeder operation. This signal does not disable automatic boiler operation, merely display of a warning on the panel. Cancel this alarm by pressing the TOUCH and PLAY button, or by restarting the regulator.
OTHER ALARMS

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

20.2 Protection against freezing
If the boiler temperature drops below 5 °C, the CH pump will be enabled, thus forcing circulation of the boiler water. This will delay the process of water freezing, yet in the case of great frost or shortage of power, it will not protect the system against freezing.

20.3 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 167 h 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 (regulator in STAND-BY).

REPLACEMENT OF PARTS AND SUBASSEMBLIES
When ordering parts and subassemblies, please specify necessary information read off the rating plate. It is best to give the regulator serial number. If the serial number is not known, please specify the model and type of the regulation, as well as the year of its production.

21.1 Replacing mains fuse
The mains fuses are situated in the executive modules. It protects the regulator along with connected devices.

Please use time-delay fuses, porcelain, 5x20 mm, of nominal burnout current 6,3A.

In order to remove the fuse, push in its socket with a flat screwdriver and turn it counter clockwise.

21.2 Control panel replacement
When replacing the whole control panel, check compatibility of the new panel software with the executive panel A software. Compatibility is maintained if the first number of software in the control panel and in the executive module is identical. In the example below, the software versions are compatible, as the first number „01” is the same for both subassemblies.

The regulator serial number can be found on a rating plate of the executive module.
Examples of software numbers:

<table>
<thead>
<tr>
<th>Control panel</th>
<th>Executive module</th>
</tr>
</thead>
<tbody>
<tr>
<td>01.10.010.</td>
<td>01.11.026.R1</td>
</tr>
</tbody>
</table>

The software numbers can be read on the rating plates of the subassemblies, or in the menu Information.

![Software versions](image)

Drawing 48 Software versions in the Information menu.

The regulator can operate improperly if the control panel is incompatible with the executive module.

### 21.3 Executive module replacement

The requirements are the same as those for replacement of the control panel, point 21.2.
## Troubleshooting

<table>
<thead>
<tr>
<th>Faults</th>
<th>Hints</th>
</tr>
</thead>
</table>
| 1. The display is blank despite connection to power supply.          | Check:  
  - if the main fuse is burnt-out, replace if so,  
  - if the lead connecting the panel with the module is properly plugged in, and it's not damaged.                                      |
| 2. Preset CH temperature on the display is different than the programmed one. | Check:  
  - if the HUW tank is not being filled, and if the preset HUW temperature is set higher than the preset boiler temperature; if so, the difference in readings will disappear after filling the HUW tank alternatively - decrease the preset HUW temperature,  
  - if the time periods are on – disable Night-time decreases.                                                  |
| 3. CH pump is inoperative.                                           | Check:  
  - whether the boiler temperature exceeded the parameter \textit{CH activation temp}. - wait or decrease the \textit{CH activation temp}.  
  - if the HUW priority, which blocks the central heating pump, is enabled – disable the priority by setting the \textit{HUW mode} to \textit{No priority},  
  - whether the central heating pump is not damaged or clogged.                                                   |
| 4. The fan is inoperative.                                           | Check if the feeder leads are properly connected to terminals  
  - If temperature limiter STB is connected to terminals 1-2, check if the circuit is not cut off due to boiler overheating,  
  - Check if the feeder motor is in working order,  
  - If you can hear the motor running, but the fuel is not fed, check the feeder in accordance with the boiler manual. |
| 5. Fuel feeder inoperative/ fails to feed.                           | Increase Individual Fuzzy Logic airflow correction, point 8.7,  
  - See if the unburned fuel comes from operation in the \textit{SUPERVISION} mode - adjust the \textit{SUPERVISION} mode parameters,  
  - Check if the unburned fuel is caused by frequent switching from \textit{SUPERVISION} to \textit{OPERATION},  
  - Make sure if correct type of boiler is selected, point 23.1,  
  - Open the fan flap and/or fan return flap to the maximum,  
  - Check the ducts which feed air into the furnace,  
  - Unseal the window in the boiler room to provide sufficient amounts of air. |
| 6. When the Individual Fuzzy Logic mode is on, the fuel is not completely burned, there are unburned particles of fuel in the ash. | Decrease Fuzzy Logic airflow correction, point 8.7,  
  - See if the excessive burning of fuel comes from operation in the \textit{SUPERVISION} mode - adjust the \textit{SUPERVISION} mode as per point 8.9,  
  - Make sure if correct type of boiler is selected, point 23.1. |
| 7. When the Individual Fuzzy Logic mode is on, the fuel burns out too intensively. | Check if there is good thermal contact between the temperature sensor and the measured surface,  
  - Whether the sensor lead is not placed too close to the mains cable,  
  - If the sensor is connected to the terminal,  
  - Whether the sensor is not damaged – check it in accordance with point 13.10.  


<p>| | |</p>
<table>
<thead>
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<th></th>
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<tbody>
<tr>
<td>9. in the DHW=SUMMER mode, the radiators are hot and the boiler overheats.</td>
<td>▪ Increase the parameter <em>HUW operation extend</em>. in order to cool down the boiler.</td>
</tr>
<tr>
<td>10. the DHW pump is active even if the DHW tank has been filled.</td>
<td>▪ Set the parameter <em>HUW operation extend</em> to 0.</td>
</tr>
<tr>
<td>11. The boiler overheats despite disabled airflow.</td>
<td>▪ The reason can be faulty chimney installation (no protection against excessive chimney draught).</td>
</tr>
</tbody>
</table>
| 12. In a hydraulic system with a mixing valve and servo - the mixer fails to open. | ▪ The reason may be activity of the return protection function, point 14.7. If the return protection function is active, check if the sensor for water returning to the boiler is thermally insulated from its surroundings, and improve contact with the pipe by applying thermally conductive paste. Increase the pre-set boiler temperature in order to provide power reserve needed to heat the return water. Check if the hydraulic system is properly made, i.e. after closing the valve, the return temperature must be able to exceed the parameter *Min. return temp.* value.  
▪ The reason can be that the HUW tank is being filled with *HUW priority* enabled. Wait until the HUW is filled, or disable the *HUW priority*.  
▪ The reason can be active SUMMER function.  
▪ The reason can be an on-going calibration of the mixer valve, wait until the calibration is complete. Active calibration is signalled with a “CAL” message in the menu INFORMATION – MIXER INFO. |
23 Regulator setup by boiler manufacturer.

CAUTION: THE INDIVIDUAL FUZZY LOGIC PROGRAM IS SELECTED INDIVIDUALLY TO THE GIVEN BOILER TYPE. MAKE SURE THAT THE FITTINGS FOR BOILERS TESTED IN THE PLUM LABORATORIES ARE COMPATIBLE WITH FITTINGS FOR SOLD BOILERS. IT IS INADMISSIBLE TO REPLACE THE FEEDER AND FAN TO OTHER TYPES AS WELL AS MAKING OTHER CONSTRUCTIONAL MODIFICATIONS WHICH CAN HAVE IMPACT ON COMBUSTION PROCESS.

23.1 Activating Individual Fuzzy Logic and changing boiler type

In order to activate the Individual Fuzzy Logic mode, enter MENU:

**MENU > Regulation mode** In this menu, find and confirm Individual Fuzzy Logic mode. If the boiler operation modes list is unavailable, and clicking the aforementioned menu triggers a message “Function unavailable”, it means that the regulator operates only in the STANDARD mode, Individual Fuzzy Logic control is disabled and unavailable for the given setup of a boiler.

To change the type of boiler, furnace, enter hidden MENU:

**MENU> Service settings > (enter special password)**

The special password is made available only to boiler manufacturers and authorized fitters.

![Drawing 49 Selection of boiler type and output](image)

Caution: selecting an incorrect boiler type, which was not examined in the PLUM laboratories, can damage the boiler during its operation.

Settings for individual boilers require arrangements between the boiler manufacturer and the PLUM sp. z o.o. company.

In order to apply the changes, it is necessary to disconnect and reconnect the regulator mains supply.

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7 The regulator allows to select only those types of boilers and fuel, which were tested in the laboratory of PLUM sp. z o.o.