CONTROLLER

ecoMAX860P3-C

FOR AUTOMATIC SOLID FUEL FIRED BOILERS

KIPI

eSTER_x80**

eSTER_x40**

ecoSTER TOUCH**

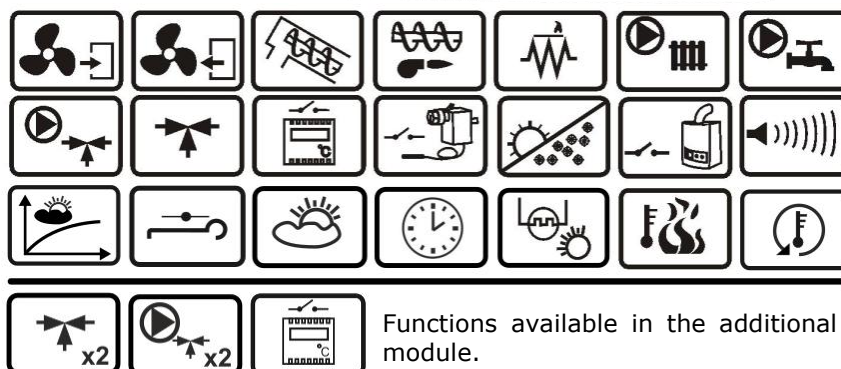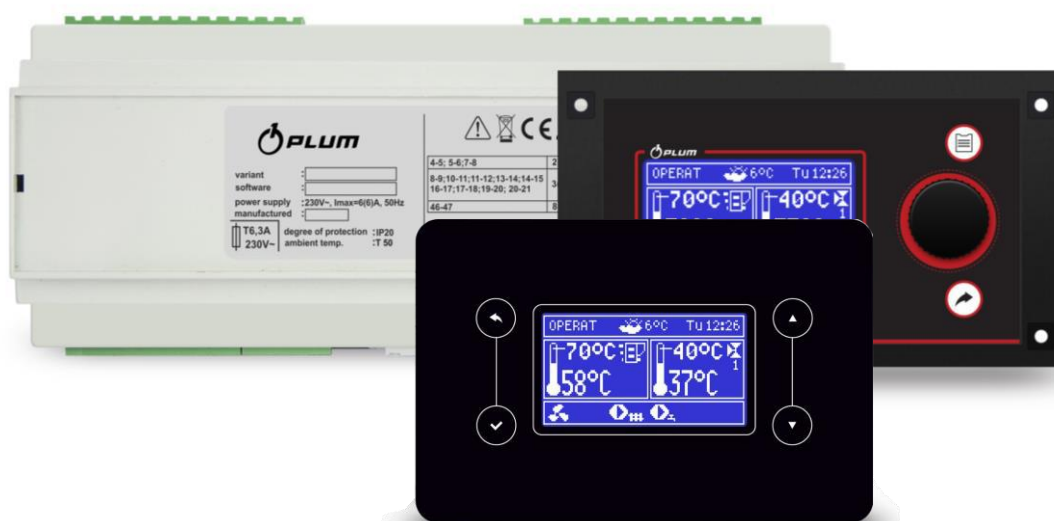ecoSTER200**

ecoNET300**
ecoNET.apk
ecoNET.app
www.econet24.com

Functions available in the additional B module.

** Devices are not standard equipment of the controller.

CE

INSTALLATION AND OPERATING MANUAL
ISSUE: 1.3_EN

ELECTRIC DEVICE UNDER VOLTAGE!

Before any action related to the power supply (cables connection, device installation etc.) check if the controller is not connected to the mains!

Installation should be done by a person with appropriate electrical qualifications. Improper cables connection could result in the controller damage.

The controller cannot be used in steam condensation conditions and cannot be exposed to water.

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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 controller is turned off, dangerous voltage still can occur on its terminals.

- The controller 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 controller, 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 controller is intended for boiler manufacturers. Before applying the controller, a boiler manufacturer should check if the controller's mating with the given boiler type is proper, and whether it can cause danger.

- The controller 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 controller should be separated from flammable dusts and gases, e.g. by means of an appropriate body.

- The controller 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 controller operates must be protected by means of a fuse, selected appropriately to the applied loads.

- The controller cannot be used if its casing is damaged.

- In no circumstances can the design of the controller be modified.

- Electronic isolation of the connected devices is applied in this controller.

- The controller is equipped with internal overcurrent protection, one-polar, which have an impact on the safety of use. The condition of its correct operation is the proper connection of the power cable to the electrical network. It is absolutely necessary to ensure that the L phase wire is not changed with the N neutral wire. Ensure that the polarity of the L and N wires is correct by measuring at their terminals.

- Keep the controller out of reach of children.

2   General information

The controller ecoMAX860P3-C is a device designed to control the operation of a boiler with automatic feeding of solid fuel with a igniter. Flame detection is performed with the use of an optical flame brightness sensor. It can control the work of central heating and hot water circuits and also control the work of 5 mixing heating circuits. The required temperature of heating circuits can be set on the basis of data obtained from the main sensor. The possibility of cooperation with room thermostats, separate for each heating circuit is beneficial for maintaining comfortable temperature in heating rooms. Moreover, the device turns on the spare boiler (-gas or –oil).

The controller may operate in connection with additional wire room thermostat/panel ecoSTER200, ecoSTER TOUCH and wireless room thermostat/panel eSTER_x80 or eSTER_x40 installed in rooms and ecoNET300 Internet module. Additionally it cooperates with ecoLAMBDA module and extension modules B and C.

The controller may be used in households and other similar premises and in light industry facilities.

3   Information about documentation

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

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

4   Storage of documentation

This assembly and operation manual, as well as any other applicable documentation, should be stored diligently, so that it was available at any time. In the case of removal or sale of the device, the attached documentation should be handed over to the new user / owner.

5   Applied symbols

In this manual the following graphic symbols are used:

☞ - useful information and tips,

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

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

6   Directive WEEE 2012/19/UE

Purchased product is designed and made of materials of highest quality.

The product meets the requirements of the **Directive 2012/19/EU of 4 July 2012 on waste electrical and electronic equipment (WEEE)**, according to which it is marked by the symbol of crossed-out wheeled bin (like below), meaning that product is subjected to separate collection.

Responsibilities after finishing a period of using product:

●   dispose of the packaging and product at the end of their period of use in an appropriate recycling facility,

●   do not dispose of the product with other unsorted waste,

●   do not burn the product.

By adhering obligations of waste electrical and electronic equipment controlled disposal mentioned above, you avoid harmful.

ecoMAX860P3-C

7 User menu - structure

Main menu
Information
Boiler settings
HUW settings*
Mixer 1-5 settings*
Night time decrease
Summer/Winter
Operation with schedule
• Off, Schedule
General settings
Manual control
Alarms
Service settings

Boiler settings
Preset boiler temp.
Weather contr.boiler*
Heating curve*
Curve shift*
Room temp.factor*
Output modulation
• MAX boiler output
• MAX blow-in output
• MAX exhaust fan
• MAX oxygen*
• Average hysteresis H2
• Aver. boiler output
• Average blow-in output
• Average exhaust fan
• Average oxygen*
• MIN hysteresis H1
• MIN boiler output
• MIN blow-in output
• MIN exhaust fan
• MIN oxygen*
• Boiler hysteresis
• Min. boiler output FL*
• Max. boiler output FL*
• Blow-in output-grate*
• Exh. fan – grate*
• Feeder:
Feeder test
Fuel dose from test
Efficiency test time
Feeder filling
• Feeder efficiency
Boiler oper. mode*
• Pellet, Grate
Regulation mode
• Standard, Fuzzy Logic
• Lambda Fuzzy Logic*
Fuel type

Fuel level
• Alarm level
• Fuel level calibration
Burner cleaning
Lambda sensor calibration*
Cleaning intensity
Exch. clean start
Exch. clean stop

HUW settings*
Preset HUW temp.
HUW pump mode
• Off, Priority, No priority
HUW cont. hysteresis
HUW disinfection

Night time decrease
Boiler
• Off
• Reduction value
• Schedule
Mixer 1-5
HUW tank
Circulation pump *

Sommer/Winter
SUMMER mode
• Summer, Winter, Auto*
Activ. temperature SUMMER
Deactv. temperature SUMMER

Mixer settings 1-5*
Preset mixer temp.
Mixer room thermostat
Weather control mixer*
Heating curve mixer*
Curve shift*
Room temp. factor*

General settings
Clock
Date
Screen brightness
Screen contrast
Sound
Language
WiFi*
Weather sensor
• Sensor correction
Radio module settings*
• Pairing mode, Delete paired devices

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

8

8 The controller support

Standard (STD) panel control.
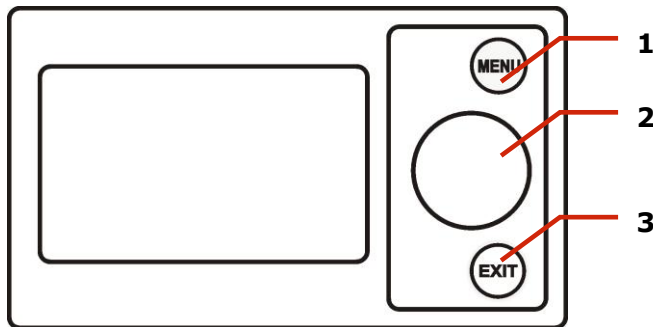
Buttons description:
1. MENU entry button.
2. ,,TOUCH and PLAY" knob.
3. EXIT button.

The „TOUCH and PLAY" knob turning cause increase or decrease of edited parameter. It is a part of fast handling of the controller. Pressing the knob causes enter edition mode of chosen parameter or selecting its volume. Pressing EXIT button causes exit selected menu level and also exit selected volume of a parameter.

The simTOUCH4 (ST4) panel control.
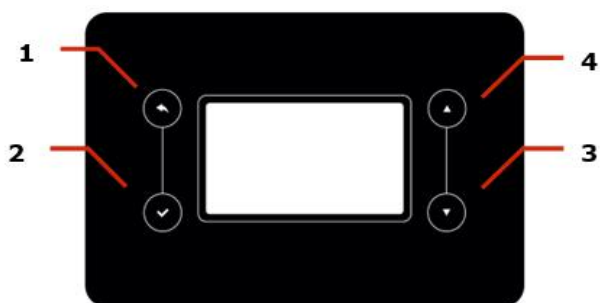
Buttons description:
1. Exit from the currently selected menu level as well as abandoning the set value.
2. Enter the MENU and confirm the setting of the selected parameter.
3. Reduce the edited value.
4. Increase the edited value.

8.1 Description of the main window
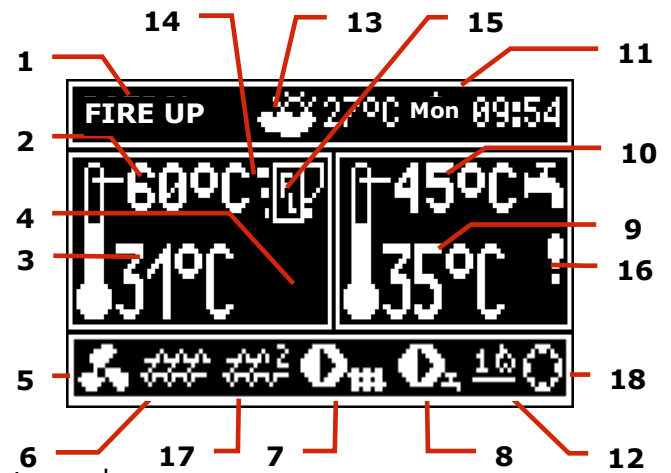
Legend:
1. Operation modes: FIRING-UP, OPERATION, SUPERVISION, BURNING OFF, CLEANING, STOP,
2. boiler preset temperature,
3. boiler measured temperature,
4. functions having influence on preset boiler temperature:

   ↓□ - preset boiler temperature decrease due to thermostat disconnection,

   ↓⊕ - preset boiler temperature decrease due to activated time spans,

   ↑🚰 - boiler preset temperature during loading the HUW tank,

   ↑✖ - boiler preset temperature increase from mixer circulation,

   ⌐ - activation of weather control for the boiler circuit,

   ⌒ - active return protection.

   ↑📦 - increasing the preset temperature to load the buffer.
5. blowing operation,
6. fuel feeder operation,
7. CH pump operation,
8. HUW pump operation,
9. HUW tank measured temperature,
10. preset HUW tank temperature,
11. clock and weekday,
12. part of the screen coshared between two icons:

– symbolizes operating heater, and the digit next to it stands for a number of Firing-up attempts,

– symbolizes activating automatics of furnace cleaning.

13. external (weather) temperature,
14. current boiler power level,
15. activating regulating mode *Individual Fuzzy Logic,*
16. disinfection of the HUW tank,
17. burner feeder operation,
18. symbol of active, rotary cleaning of the burner.

Right window on the main screen is configurable, allows on changing information displayed there. It is possible to choose a configuration displaying by twisting the "TOUCH and PLAY" knob or by pressing ⊙ or ⊙ button.

Right window on the main screen may also display the fuel level view, providing that this parameter is set correctly.

Tips: Fuel level may be displayed on room thermostat / panel.

8.2 The controller start up

After connecting the power the controller shows the settings put before connecting the electricity. If the controller has not operated before it will start up in „Stand-by" mode. In this mode the screen is dimmed, actual time and information: *Boiler Off* is displayed.

In „Stand-by" mode protecting pumps against going stale function is in operation. It is executed by temporary switching them on.

Therefore it is advised to keep the electrical power to the controller on when the boiler is not in use.

It is possible to start up the boiler by pressing the „TOUCH and PLAY" knob or by pressing ⊙ button and selecting „Switch on" or setting parameters of its operation (MENU button, ⊙ or ⊙ button) without connecting it to the electrical power.

After making sure that fuel is in the silo, and the hatch is closed the boiler can be switched on.

8.3 Preset temperature setting

The preset boiler temperature and preset HUW and preset circuits temperature can be set in the menu (possible temperatures are restricted with range of respective service parameters of the controller):

Boiler settings → Preset boiler temp.
Mixer settings 1-5 → Preset mixer temp.

The parameter value *Preset boiler temp.*, is by controller bypassed when the preset boiler temperature is controlled by weather sensor. Regardless of that, the preset boiler temp. is automatically increased to load the hot user water tank and power heating circuits of mixers.

8.4 FIRING-UP mode

The FIRING-UP mode is for automatic firing up of furnace in boiler. Total time of firing up proces is dependand on controller's settings and on boiler's condition before firing up. Parameters influencing firing up process are in the menu:

Service settings → Burner settings → Firing-up

In case of failed attempt of firing up the furnace another attempts are taken during which amount of fuel is reduced to 10% of first attempt's dose. Firing up attempts are signaled by the numbers next to the igniter symbol .

After three failed firing up attempts an alarm "*Failed firing up attempt*" is reported. Boiler's operation is then stopped. It is not possible to automatically continue boiler's operation. Service intervention is required. After finding

and solving the cause of firing up failure the boiler should be fired up again.

8.5 OPERATION mode

In the OPERATION modes the burner fan operates constantly, fuel feeder is engaged periodically, where period consists of feeder operating time and pause in fuel feeding time.
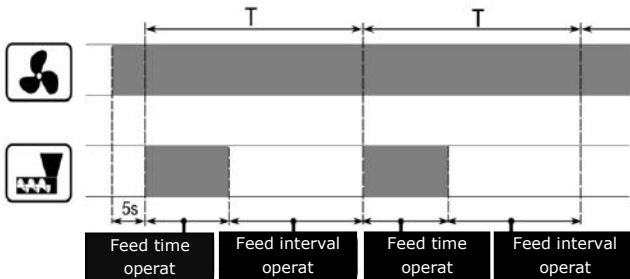
The *Cycle time OPERAT* parameter is located in the menu:

Service settings → Burner settings → Operation

Feeder operation time is calculated automatically depending on the required current power of the burner, *Feed efficiency* and *Calorific value* of the fuel.

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

Boiler settings → Output modulation

8.6 Regulation modes

Can choose between two adjustment modes responsible for stabilizing the boiler preset temperature Standard and Fuzzy Logic. This mode changes in the menu:

Boiler settings → Regulation mode

- **Standard mode operation**

If the boiler's temperature reach preset one then the controller switches off to the SUPERVISION mode.

The controller is equipped with boiler's power modulation mechanism which allows for gradual power reduction when approaching the preset temperature. There are three power boiler levels: MAX, Average, MIN. Current power level is displayed on the screen as 3 segmented indicato rat the left side of boiler's icon.

Each level can be allocated with seperate blow-in output and exhaust output which influence on actual boiler's power level. Power levels parameters are available in the menu:

Boiler settings → Output modulation

The controller regulates burner's power with which it operates depending on preset temperature and defined hysteresis *Average hysteresis H2* and *MIN hysteresis H1*. It is possible to configure volumes hysteresis H1 and H2 in such a way that modulation is done without intermediate position. That means switching from MAX to MIN with omission of Aver. power.
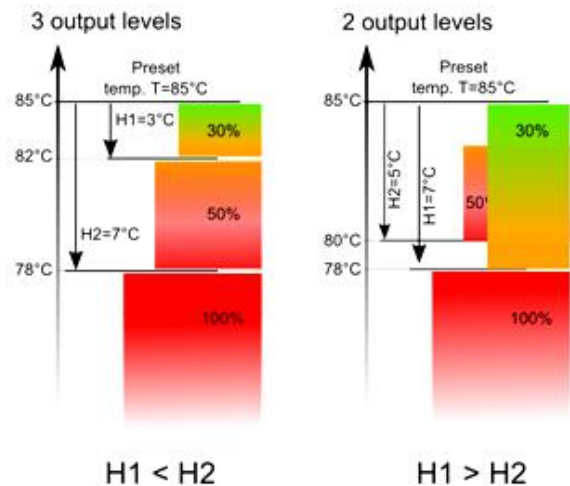
- **Operation in Fuzzy Logic mode**

In Fuzzy Logic mode the controller automatically regulates burner power to allow boiler operation in such a way to maintain its temperature on preset level. The controller uses power levels defined in Standard mode. In this mode the parameters *Average hysteresis H2* and *MIN hysteresis H1* do not have to be set. The Fuzzy Logic mode unlike the Standard mode is not faulty in respect of failing to reach the preset boiler temperature due to incorrect adjustement of H2 and H1 hysteresis. It also allows for quicker reach the preset temperature. In addition, you can adjust the boiler output in FL mode by the parameters *Min* and *Max boiler output FL*.

Attention: If the boiler operates without heat buffer and controller is switched into SUMMER mode than Standard mode operation of the controller is recommended.

After exceeding the preset temperature by 5ºC the controller switches into SUPERVISION mode.

8.7 SUPERVISION mode

The SUPERVISION mode is applicable either in regulation in STANDARD and Fuzzy Logic mode. The controller switches into SUPERVISION mode automatically without user's intervention:

- in Standard regulation mode – after reaching the boiler preset temperature,
- in Fuzzy Logic steering – after exceeding boiler preset temperature by 5ºC.

In SUPERVISION mode the controller oversees the furnace, keeping it from burning off. To do so, the burner operates with very low power, what together with properly adjusted parameters do not cause further increase in temperature. Burner's power in SUPERVISION mode and other parameters of Supervision are grouped in the menu:

Service settings → Burner settings → Supervision

Parameters of SUPERVISION mode are to be set in accordance to burner/boiler producer's recommendations. They should be so chosen to prevent the furnace from burning off during boiler's pauses (the furnace should not at the same fire up to too high a temperature, because it will cause too high a temperature of the boiler). Operation and pause time of the feeder in SUPERVISION mode is set using following parameters: *Boiler output*, *Cycle time* and *Blow-in output*.

The parameters in this mode must be so chosen as to make the boiler temperature gradually decreasing. Incorrect settings can cause boiler overheating.

Maximum time of boiler's operating in supervision mode is defined in service parameter *Supervision time*. If after this time (in Supervision mode) there is no need to restart the boiler then the controller starts the process of boiler's burning off.

For setting *Supervision time* = 0 the controller omits SUPERVISION mode and goes directly to BURNING OFF.

8.8 BURNING OFF mode

In BURNING OFF mode the leftovers of pellet are burnt and the boiler is prepared to pause or deactivation. All the parameters influencing burning off process are grouped in the menu:

Service settings → Burner settings → Burning off

The controller stops feeding fuel and makes periodical blowings to burn off remnants of fuel. After decrease of flame brightness or maximum time of burning off expiration the controller turns into STOP mode.

8.9 STOP mode

In the STOP mode the boiler is being burnt off and awaits the signal to start operation. The following can be a signal to start operation:

- decrease of preset boiler temperature below preset temperature diminished by boiler hysteresis (*Boiler hysteresis*),
- by boiler operation configuration with the buffer decrease of top buffer temperature below preset value (*Loading start temperature*).

8.10 GRATE

Some boilers have an additional grate to burn other fuels such as wood waste, etc. To activate the grid, move the parameters available in the menu:

Boiler settings → Boiler oper. mode
from "pellet" to "grate".

Can also press the "TOUCH and PLAY" knob or pressing ⊘ button in the main window and set the *Boiler operation mode* to *Grate*.

In the grate mode fuel feeder is turned off. The combustion process is regulated by the blow-in fan and exhaust fan. Fans power, when working with grate, is set in the menu:

Boiler settings → Output modulation → Blow-in output – grate and **Exhaust fan - grate**

The values of parameters such as: *Preset boiler temp., Boiler hysteresis* and

Service settings → Burner settings → Fuel detection time

are individually adjusted for the "grate". This allows you to define different properties of boiler operation for operation modes "grate" and "pellets".

When using the grid an alarm "No fuel" can appear. This alarm occurs when a temperature drops below the value of the parameter:

Service settings → CH and HUW settings → CH activation temp. and then for a period of 10 minutes there has been no growth.

8.11 Burner cleaning

The controller is used for cleaning the furnace of ashes generated in the combustion process. For this purpose, the controller uses the work of the blow-in and exhaust fan with power set in the *Cleaning intensity* parameter. In the parameter *Burner cleaning*, in the menu **Boiler settings** menu, set the time of the burner operation without cleaning after which the boiler will enter the BURNING OFF mode, in which the mechanism for rotary cleaning of the burner will be started and then firing-up the burner. Purification of the furnace is made during FIRING UP and BURNING OFF. Parameter *Exch. clean start* and *Exch. clean stop* set the start and end time of the heat exchanger cleaning. Additional parameters responsible for cleaning are in the menu:

Service settings → Burner settings → Cleaning

8.12 HUW settings

The controller regulates temperature of the HUW tank, providing that the temperature sensor is connected. When the sensor is disconnected – the information about it is displayed in the main window. By selecting:

HUW settings → HUW Pump mode the user is able to:

- deactivate feeding the HUW tank, parameter *Off*,

- setting HUW priority, by parameter *Priority* – then CH pump is deactivated to feed the HUW boiler quicker,
- set simultaneous operation of CH and HUW pump with the parameter *No priority*.

8.13 HUW preset temperature settings

Preset temperature HUW is defined by parameter:

HUW settings → Preset HUW temp.

8.14 Hysteresis of HUW

Below temperature *Preset HUW temp.* minus *HUW hysteresis* the HUW pump will activate to feed the HUW tank.

☞ By small hysteresis value HUW pump will activate faster after HUW temperature decrease.

8.15 SUMMER function start up

To activate SUMMER function which allows feeding the silo during summer, without necessity to activate CH installation and mixers periods, it is required to set the menu:

Summer/Winter → SUMMER mode for *Summer*

☞ Attention: when boiler operates without heating buffer and the controller is switched into SUMMER mode, than Standard mode operation is recommended.

⚠ It is not allowed to activate function summer when HW pump is disconnected or damaged.

Function SUMMER can be activated automatically, on the basis of readings from weather sensor. Use following parameters to activate this function:

Summer/Winter → SUMMER Mode → Auto

If the automatic detection of summer mode is switched on, user can set the parameters: *Activ. temperature SUMMER*, so outdoor temp. above which the summer mode will be switched on and *Deactv. temperature SUMMER* , so outdoor temp. below which the SUMMER mode will be switched off.

8.16 HUW tank disinfection

The controller can automatically, periodically make HUW tank warm up to 70ºC. It is done to remove bacterial flora.

⚠ It is absolutely important to inform all the inmates about activating the disinfection function. There is a danger of scalding with hot water.

Once a week at night, in Monday at 2 a.m. the controller increases temperature of HUW tank. After 10 minutes of keeping the silo at 70ºC the HUW pump is deactivated and the silo returns to its normal operation. It is not advisable to activate disinfection function while the service of HUW is deactivated.

8.17 Mixer circle settings

Settings of first mixer circle are in the menu: **Mixer 1 settings**
Settings for other mixers are in following sections of the menu and are identical in each cycle.

- **Mixer settings without weather sensor**

It is required to set manually desired temperature in mixer's heating cycle using parameter *Preset mixer temp.,* e.g. 50ºC. Such should be a value to provide required room temperature.
After connecting a room thermostat, value of decline in preset mixer temperature from thermostat should be set. (parameters *Mixer room thermostat*, e.g. 5ºC. This value should be chosen experimentally. A room thermostat can be a traditional one or a room panel. After activating the thermostat, mixer preset temperature will be reduced. When this value is reduced correctly then room temperature increase will be stopped.

- **Mixer settings with weather sensor setting**

Set parameter *Weather mixer control* in position on. Adjust weather curve according to point 8.18. Using parameter *Curve shift* set required room temperature according to formula:
Required room temperature = 20°C + heating curve shift.
Example:

To reach room temperature 25°C value of heating curve shift must be set for 5°C. To reach room temperature 18°C value of heating curve shift must be set for -2°C.
In this configuration a thermostat can be connected. It will level inaccuracy of heating curve adjustement in case when its value will be too big. In such case value of decrease of preset mixer room temperature from thermostat should be set i.e. for 2°C. After discontecting thermostat plugs preset mixer cycle temperature will be reduced. By correct adjustement of this reduction will stop temperature increase of temperature in heated room.

- **Mixer settings with weather sensor and room panel settings**

Set parameter *Weather mixer control*. In position off. Adjust weather curve according to point 8.18. Room panel automatically moves the heating curve depending on preset room temperature. The controller relates adjustements to 20ºC, i.e. for preset room temperature = 22ºC the controller will move heating curve by 2ºC, for preset room temperature = 18ºC the controller will move heating curve by -2ºC. In some cases described in point 8.18 it can be necessary to adjust heating curve movement.
In this configuration room thermostat is able to:
- reduce temperature of heating cycle by a constant value, when preset temperature in a room will be reached. Similarly like it was described in previous point (not recommended), or
- automatically, constantly correct heating cycle temperature.
It is not recommended to use both these possibilities at the same time.
Automatic correction of room temperature is done according to formula:
Correction = (preset room temperature – measured room temperature) x room temperature factor / 10.
Example:
Preset temperature in heating room (set in room panel) = 22ºC. Measured temperature in room (using room panel) = 20ºC. *Room temperature factor* = 15

Preset mixer temperature will be increased by (22ºC – 20ºC) x 15/10 = 3ºC. Correct value of parameter must be found room temperature factor. The bigger value of factor the bigger correction of preset boiler temperature factor. When set on value "0" preset mixer temperature is not corrected. Attention: setting too high value of room temperature factor may cause cyclic room temperature fluctuations.

8.18   Weather control

Depending on measured outside temperature, automatically controlled can be either preset boiler temperature and mixer cycles temperatures. By correct adjustment of heating curve temperature of heating circuits is counted automatically depending on value of external temperature. Thanks to that by choosing proper heating curve for given building, room temperature remains approximately the same – no matter what outside temperature.

Attention: in the process of experimental adjustement of proper heating curve it is necessary to exlude influence of room thermostat on controller work (irrespectively if room thermostat is connected or not), by adjusting parameter:

Service settings → Boiler settings → Thermostat select on *OFF*.

In case of connected room panel set additionally *Room temp. factor* = 0.

Guidelines for correct heating curve settings:

- Floor heating   0,2 -0,6
- Radiator heating   1,0 - 1,6
- Boiler   1,8 - 4
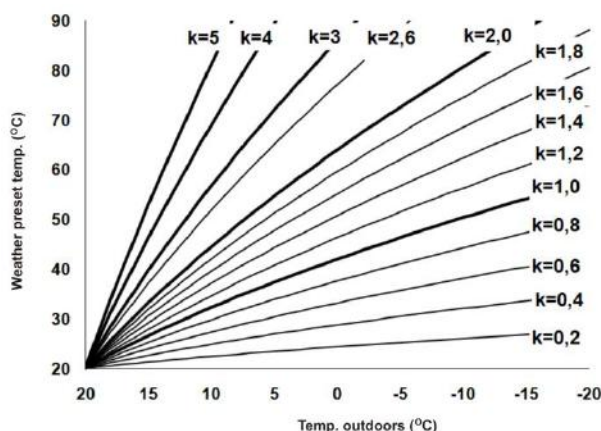
Tips for choosing proper heating curve:

- If by falling outer temperature room temperature is increasing, then value of chosen heating curve is too big,
- If by decreasing outer temperature, room temperature is also decreasing, then value of chosen heating curve is too low,
- by frosty weather room temperature is appropriate and in warmer time is too low – it is recommended to increase parameter *Curve shift* and then choose lower heating curve
- If by frosty weather room temperature is too low and in warmer time too high – it is recommended to reduce parameter *Curve shift* and choose higher heating curve.

Buildings which are poorly isolated require setting heating curve with higher values, and for better isolated buildings heating curve will have lower value.

Preset temperature, counted according to heating curve can be decreased or increased by controller when it goes beyond scope of limits of temperatures for given cycle.

8.19 Night decrease settings description

In the controller it is possible to set time periods of silo temperature reduction, heating cycles, hot water silo, circular pump and boiler. Time periods allow setting temperature reduction in given time period – i.e. at night or when user leaves the heated room. Thanks to it preset temperature can be reduced automatically, without loss of heating comfort by reducing fuel consumption. Decrease of preset temperature in selected time intervals is indicated by the symbol ↓🕐 on the main screen.

To activate time intervals, set the parameter *Night time decrease* for the given heating circuit to *ON*. The parameter *Reduction value* set the temperature reduction, one for all time intervals. Night time decreases can be defined separately for every day of the week set *Schedule*. Select temperature reduction and beginning and end of respective time interval. The time intervals for 24 hours are fixed at 30 min.

06:00 - 9:00
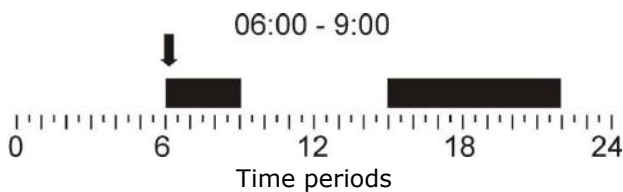
Time periods

Above are examples of night-time decrease the preset temperature lasting from 22:00 till 06:00 and the reduction from 09:00 to 15:00.

☞ Attention, defining time periods during one day must be started at 00:00.

☞ Time period is omitted by setting period reduction for value "0" even if scope of hours is set in it.

8.20 Working according to schedule

In the controller is possible to switch on and switch off the boiler at defined intervals. In the absence of demand for heat, e.g. in summer, one can disable the operation of the boiler at a certain time and thus reduce fuel consumption.

To activate the time intervals must set the parameter Off, in menu **Work acc. schedule** at *YES*.

Switching on and off the boiler in the time interval can be set for all on separate days of the week in the *Schedule*.

Work according to the schedule is the same as that night time decrease.

8.21 Circular pump control

Functionality of circular pump is available in the menu:

Night time decrease → Circular pump.
and
Service settings → CH and HUW settings
Settings of time control of circular pump are analogical to settings of night reductions. In defined time periods circular pump is deactivated. In omitted periods the circular pump is switched into position *Circulating operation time,* what *Circulating standstill time*.

8.22 Fuel level configuration

To operate the fuel level in the silo, the controller uses a fuel level sensor. After burning fuel below the minimum level set in

the sensor by the boiler manufacturer, the controller will display a reminder: "*CAUTION! Low fuel level*" and it will continue to supply fuel. If the user does not add fuel, the controller burns all the fuel and switches off the boiler.

If the fuel level sensor is not used, the fuel level will be operated in accordance with the following description.

• Fuel level indicator activating

To activate displaying fuel level following parameters are to be set:
Boiler setting → Fuel level → Alarm level
On value bigger than "0", i.e. 10%
Twisting "TOUCH and PLAY" knob or by pressing ⊙ or ⊙ button in main window fuel level is displayed in main window. Fuel level can also be seen in room panel.

• Fuel level indicator service

Each time when fuel silo is filled to required level it is necessary to press and keep the knob in main window. Following info will appear:
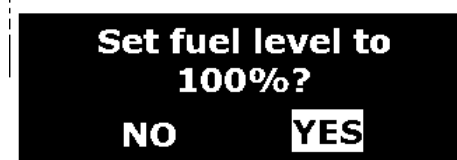
After choosing and accepting „YES" fuel level will be set for 100%.

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

• Description of activity

The controller measured fuel level on the basis of its current consumption. Factory settings will not always correspond to actual fuel consumption , so to work correctly this method needs level calibration by controller's user. No additional fuel sensors are required.

- **Calibration**

Fill the silo to the level which corresponds to full level of fuel, then set value of parameter: **Boiler settings → Fuel level → Fuel level calibration → Fuel level 100%**

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

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

8.23 Feeder test

The controller allows to test the efficiency of the burner feeder, which has a significant impact on the operation of the burner. The test is started with the *Feeder test* parameter in the menu:

Boiler settings → Feeder

During the test, a necessarily filled feeder feeds fuel to an additional tank for the time set in the *Efficiency test time*. After this time, weigh the fuel in an additional tank and enter the value obtained in the parameter *Fuel dose from test*.

In case of emptying the main fuel silo and restarting the boiler / burner, the filling function of the burner feeder should be enabled by the parameter *Feeder filling*.

8.24 Information

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

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

8.25 Manual control

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

☞ Entering manual control is possible only in "stand-by" mode, when silo is switched off.

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

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

⚠ Long lasting activating of fan, feeder or other device may cause danger.

8.26 Room thermostat and panel

The controller can cooperate with wired (ecoSTER200, ecoSTER TOUCH) room panels or (eSTER_x40, eSTER_x80) wireless room panels - two-way ISM radio transmission. All panels has a built-in room thermostat. This room panels shows useful information such as: fuel level, alarm indication etc.

8.27 Cooperation with the Internet module

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

ecoNET.apk (Android)

9   Hydraulic schemes
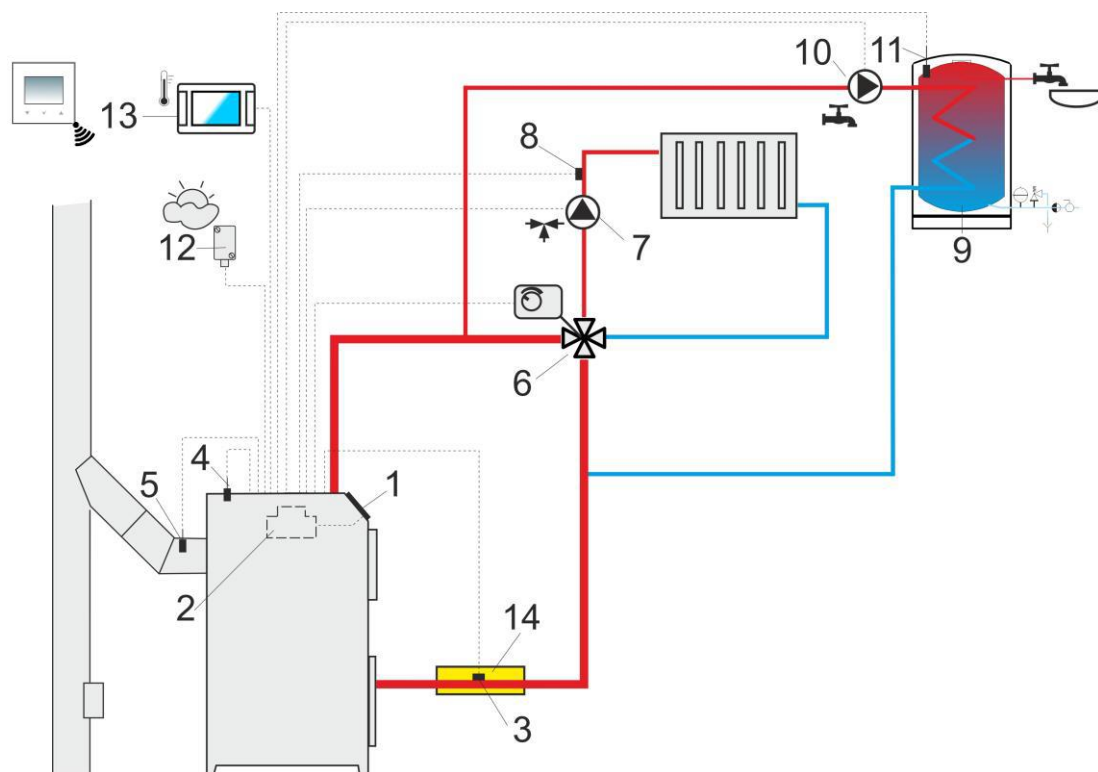
Scheme with 4 way steering valve controlling central heating circuit[1]: 1 – boiler with control panel, 2 – controller, 3 – return temperature sensor, 4 – boiler temperature sensor, 5 – exhaust temperature sensor, 6 – servomotor of 4-way valve, 7 – mixer cycle pump, 8 – mixer cycle temperature sensor, 9 – HUW tank, 10 – HUW pump, 11 – HUW temp. sensor, 12 – weather temperature sensor, 13 – standard room thermostat or room panel, 14 – thermal insulation.

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

RECOMMENDED SETTINGS:

Parameter	Setting	MENU
Preset boiler temp.	75-80°C	Boiler settings
Min. boiler temp.	65°C	Service settings→ Boiler settings
Boiler inc. by HUW and Mixer	5-20°C	Service settings→ CH and HUW settings
Mixer 1 support	CH ON	Service settings→ Mixer 1 settings
Max. mixer 1 preset temp.	70°C	Service settings→ Mixer 1 settings
Mixer 1 heating curve	0.8 – 1.4	Mixer 1 setting
Mixer 1 weather control	ON	Mixer 1 setting
Mixer 1 room thermostat	ecoSTER T1 eSTER T1	Service settings→ Mixer 1 settings

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[1] The presented hydraulic diagram does not replace central heating engineering design and may be used for information purposes only!
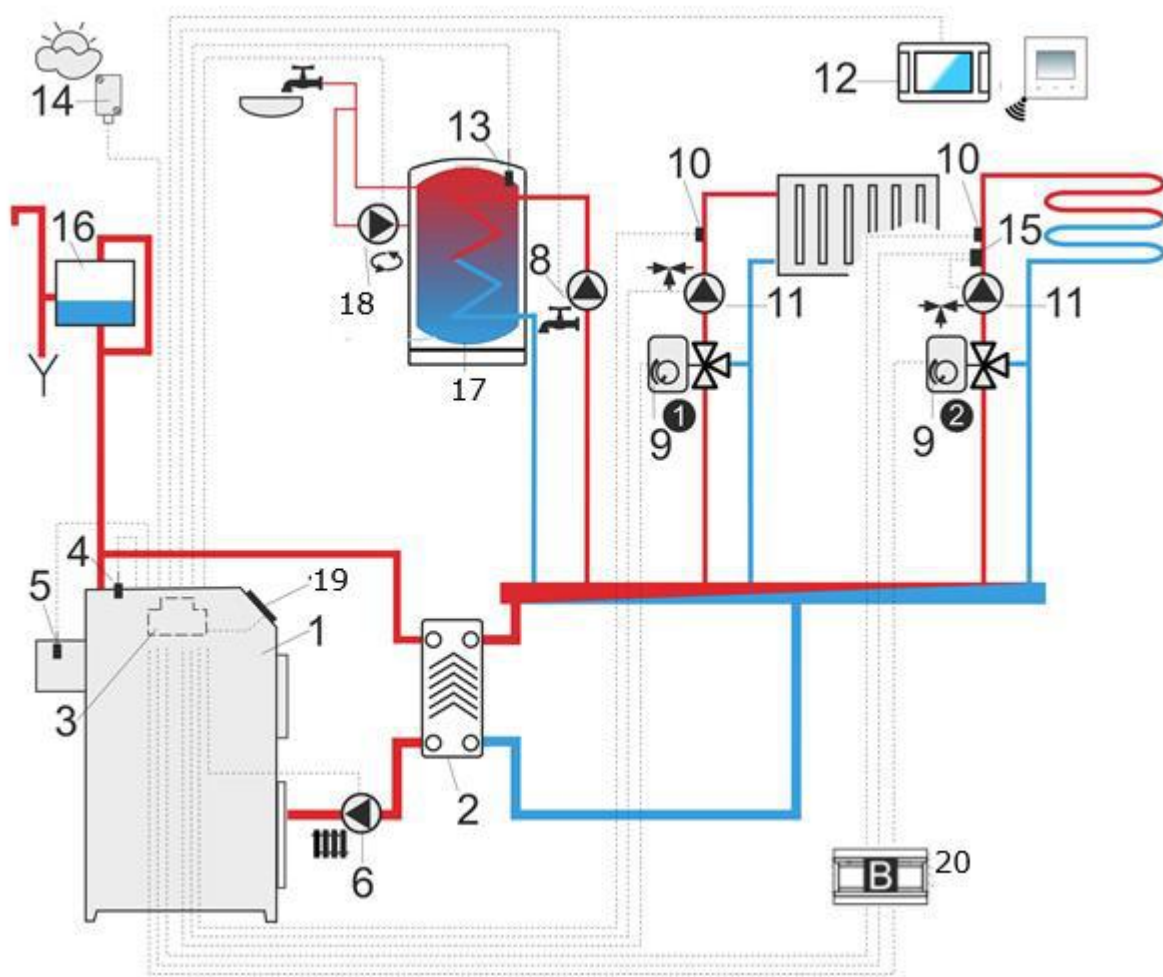
Scheme with two adjustable heating circuits and the HUW tank[2]: 1 – boiler, 2 – heat exchanger, 3 – controller, 4 – boiler temperature sensor, 5 – exhaust temperature sensor, 6 – boiler pump, 8 – HUW pump, 9 - mixer valve actuator, 10 – mixer temperature sensor, 11 – mixer pump, 12 – standard room thermostat or room panel, 13 – HUW temperature sensor, 14 - weather temperature sensor, 15 – safety thermostat off the underfloor heating pump, 16 – expansion tank, 17 – HUW tank, 18 - circulation pump, 19 – control panel, 20 – additional B module.

RECOMMENDED SETTINGS:

Parameter	Setting	MENU
CH activation temp.	55°C	Service settings → CH and HUW settings
Boiler pump	YES	Service settings → CH and HUW settings
Mixer 1 support	CH ON	Service settings → Mixer 1 settings
Max. mixer 1 temp.	70°C	Service settings → Mixer 1 settings
Mixer 1 heating curve	0.8 – 1.4	Mixer 1 settings
Mixer 1 weather control	ON	Mixer 1 settings
Mixer 1 room thermostat*	ecoSTER T1	Service settings → Mixer 1 settings
Mixer 2 support	Floor on	Service settings → Mixer 2 settings
Max. mixer 2 temp.	45°C	Service settings → Mixer 2 settings
Mixer 2 heating curve	0.3 – 0.8	Mixer 2 settings
Mixer 2 weather control	ON	Mixer 2 settings
Mixer 1 room thermostat	ecoSTER T1 eSTER T1	Service settings → Mixer 2 settings

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[2] The presented hydraulic diagram does not replace central heating engineering design and may be used for information purposes only!

Scheme with heat buffer[3]: 1 – boiler, 2 – control panel, 3 –controller, 4 – boiler temperature sensor, 5 – exhaust temperature sensor, 6 – boiler pump, 7 – heating buffer, 8 – HUW pump, 9 - mixer valve actuator, 10 – mixer temperature sensor, 11 – mixer pump, 12 – upper buffer temperature sensor, 13 – lower buffer temperature sensor, 1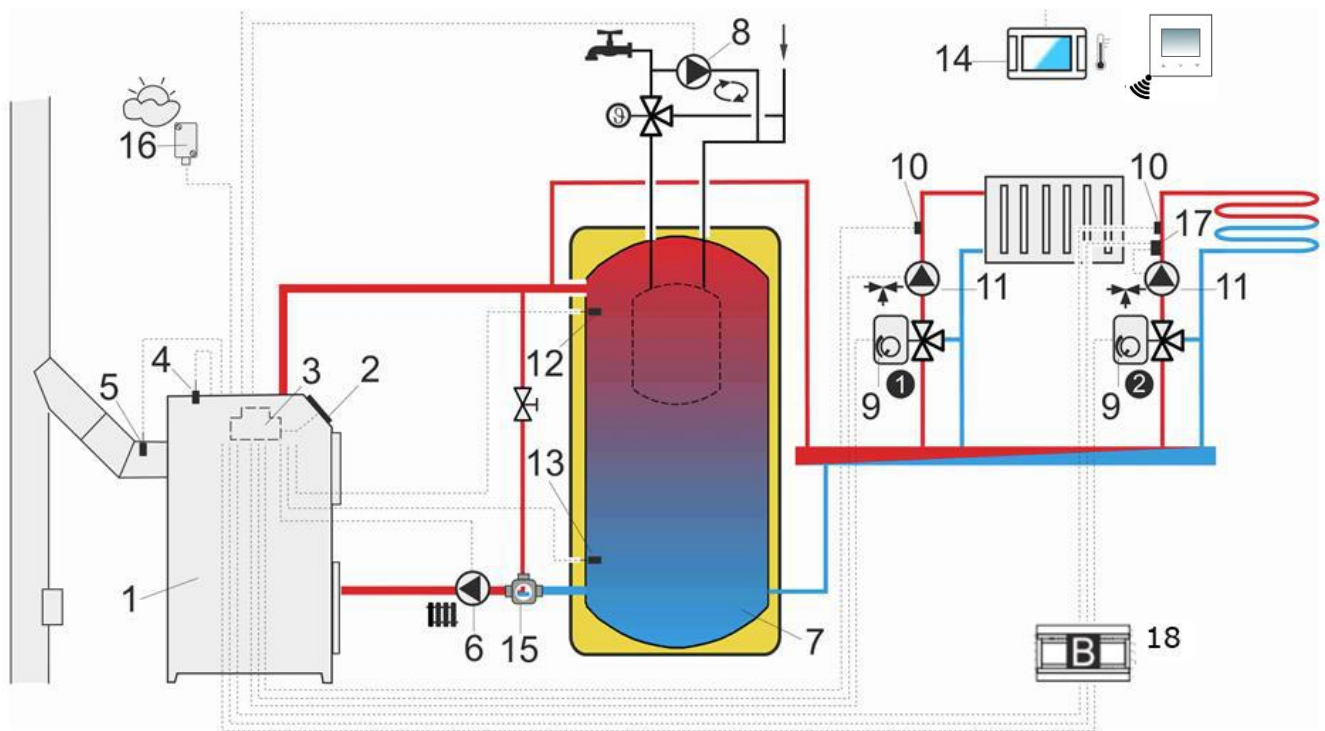4 – standard room thermostat or room panel, 15 – thermostatic 3-way valve for return protection, 16 – weather temperature sensor, 17 – thermostat to turn off the pump, 18 – additional B module.

RECOMMENDED SETTINGS:

Parameter	Setting	MENU
Preset boiler temp.	80°C	Boiler settings
Min. boiler temp.	75°C	Service settings → Boiler settings
CH activation temp.	55°C	Service settings → CH and HUW settings
Buffer support	ON	Service settings → Buffer settings
Loading start temp.	50°C	Service settings → Buffer settings
Loading end temp.	75°C	Service settings → Buffer settings
Mixer 1 support	CH ON	Service settings → Mixer 1 settings
Max. mixer 1 temp.	70°C	Service settings → Mixer 1 settings
Mixer 1 heating curve	0.8 – 1.4	Mixer 1 settings
Mixer 1 weather control	ON	Mixer 1 settings
Mixer 1 room thermostat*	ecoSTER T1	Service settings → Mixer 1 settings
Mixer 2 support	Floor on	Service settings → Mixer 2 settings
Max. mixer 2 temp.	45°C	Service settings → Mixer 2 settings
Mixer 2 heating curve	0.3 – 0.8	Mixer 2 settings
Mixer 2 weather control	ON	Mixer 2 settings
Mixer 2 room thermostat*	ecoSTER T1 eSTER T1	Service settings → Mixer 2 settings

* when a standard room thermostat with ON-OFF contacts is connected instead of the room panel, select the option for the thermostat=*Universal* or, if the setting is hidden, do not need to select any option for the thermostat.

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[3] The presented hydraulic diagram does not replace central heating engineering design and may be used for information purposes only!

10 Technical data

Power supply		230 VAC, 50 Hz
Current consumed by controller		0,04[4] A
Maximum rated current		6 (6) A
Controller protection rating		IP20
Ambient temperature		0...50°C
Storage temperature		0...65°C
Relative humidity		5…85%, without steam condensation
Measuring range of temperature sensors CT4/CT2S		0..100°C/0..300°C
Measuring range of temperature sensors CT6-P		-35..+40°C
Accuracy of temperature measurements with sensors CT4 and CT6-P		±2°C
Terminals	network	screw terminals, wire cross-section area 0.75 mm^2 through 1.5 mm^2, screwing torque 0.4 Nm, insulation removed: 6 mm
	communication	screw terminals, wire cross-section area up to 0.75 mm^2, screwing torque 0.3 Nm, insulation removed: 6 mm
Display		128x64 pix.
Dimensions		Main module: 210x115x60 mm ST4 panel: 144x97x17 mm
Total weight		2 kg
Standards		PN-EN 60730-2-9 PN-EN 60730-1
Software class		A
Protection class		Suitable to build into Class I devices
Pollution degree		2nd pollution degree acc. to PN-EN 60730-1

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[4] This is the current consumed by the controller itself. The total current consumption depends on the devices connected to the controller.

11 Conditions of storage and transport

The controller cannot be exposed to direct effects of weather, i.e. rain and sunlight. Storage and transport temperature cannot exceed the range of -15…+65°C. During transport, the device cannot be exposed to vibrations greater than those typical of normal road transport.

12 Controller installation

12.1 Environmental conditions

Due to the risk of fire is prohibited to use the controller in explosive gas and dust enviroment (e.g. coal). Controller should be separated using appropriate enclosure. In addition, controller cannot be used in the presence of water vapor condensation and be exposed to water.

12.2 Installation requirements

The controller 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 controller is to be built-in. The controller cannot be used as a stand-alone device. The temperature of the ambient and the fitting surface cannot exceed the range of 0…50°C. The device consists of two modules: control panel and working module. Both elements are connected with electric wire.

12.3 Installation of control panel

The control panel is to be enclosed on a mounting plate.

During installation, follow the guidelines below.

Installation of control panel.
Step 1:
A hole must be made in the mounting plate, in accordance with the drawing below.
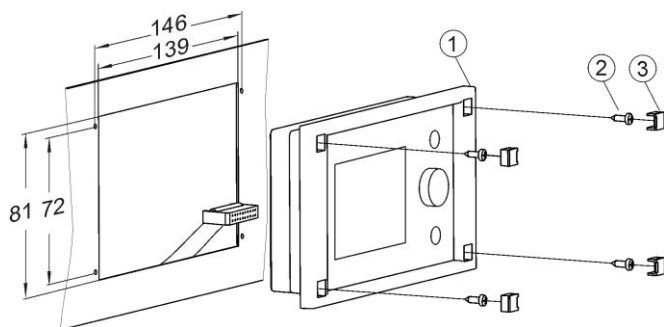
Installing the STD panel in a mounting plate: 1 – control panel, 2 – sheet metal screw 2.9x13, 3 – hole plug.
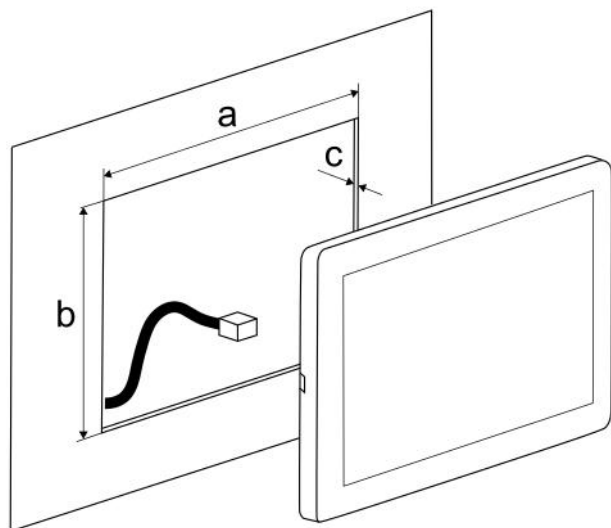
$$a = 128{,}7^{+0{,}2}_{-0{,}0}$$
$$b = 82{,}4^{+0{,}2}_{-0{,}0}$$
$$c = 0{,}8\text{-}1{,}5 \text{ (with paint thickness)}$$

Installing the ST4 panel in a mounting plate.

Step 2:

Remove the lid (5), plug the cable (6) and put the lid (5) back on, securing it with screws (4). The cable should be lead out through the round groove in the enclosure.
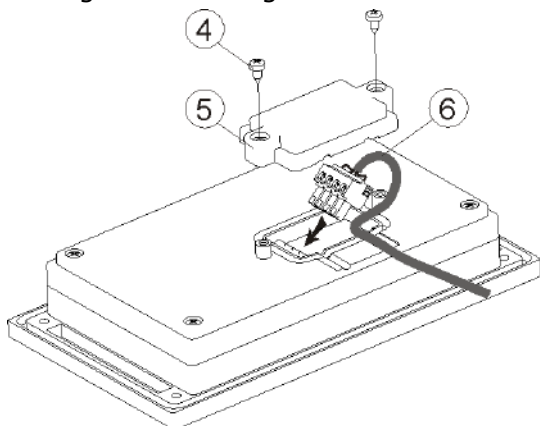
Connecting lead to the STD panel: 4- B3x6 screw for thermoplastic materials, 5 – lid, 6 – lead connecting the control panel with the executive panel.

⚠ Maximum length of the lead (6) is 5 m with gauge of 0.5 mm^2.

Step 3:

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

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 below drawing.
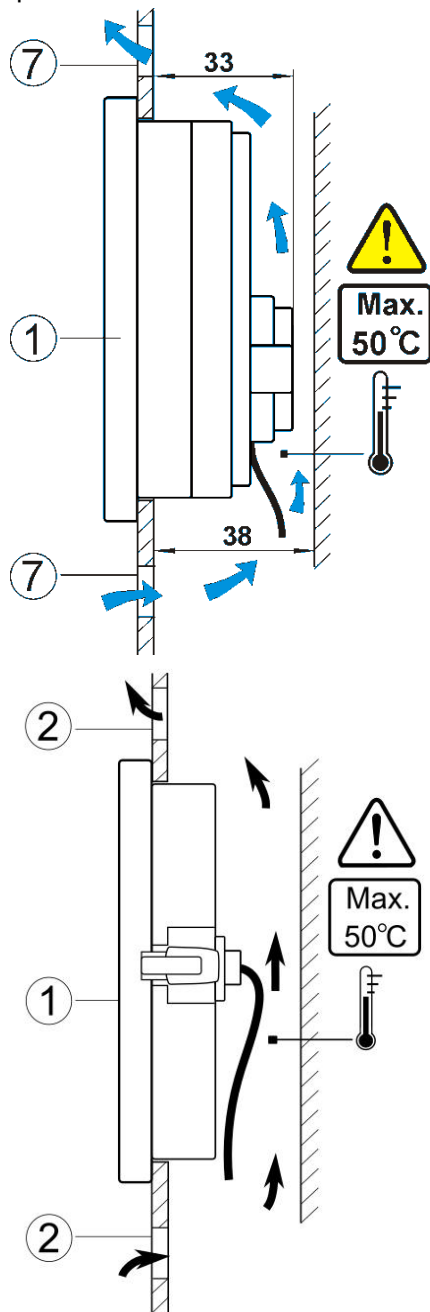
Conditions of enclosing the STD and ST4 panel: 1 – control panel, 2 –ventilation holes for air circulation (note: the holes cannot decrease the required IP protection rate; ventilation holes are not required if the limiting temperature of the panel surroundings is not exceeded; the ventilation holes do not always guarantee

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that the temperature of the panel surroundings will be lowered, in such case use other methods).

Disassembly of ST4 control panel.
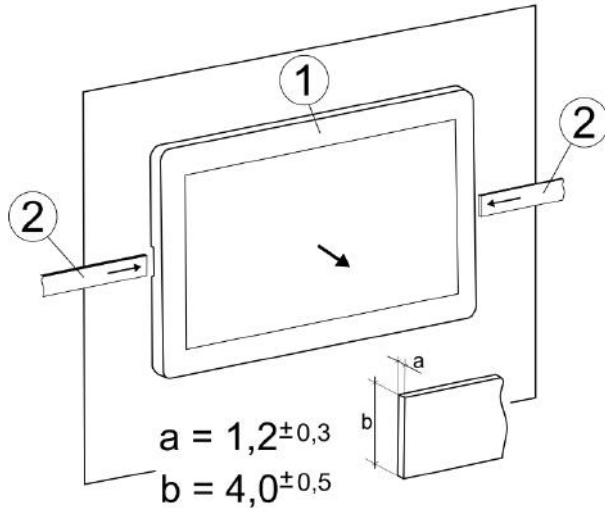
To remove the control panel (1) from the housing - insert flat elements (2) into indicated slots to release housing catches and remove the panel (1).

12.4 Mounting of module

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

The working module is designed to be mounted on a standard DIN TS35 rail. Fasten the rail firmly to a rigid surface. Prior to placing the module on the rail, lift up the catch. Now, place the module on the rail and press the catch to bring it to the original position. Make sure the device is firmly fastened and cannot be easily removed from the rail without use of tools.

For safety reasons, assure the safe distance between live parts of working module terminals and conductive (metallic) elements of housing (min. 10 mm) is kept.
Protect connecting wires from tearing, loosening and tensioning or built them in in such a way that no load is exerted on them.
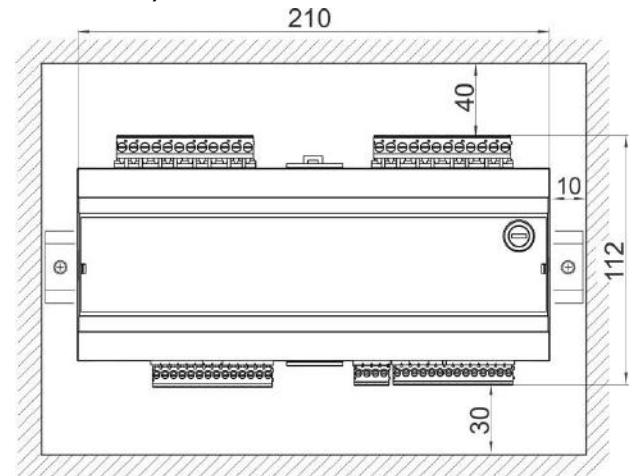
Space requirements for working module mounting.
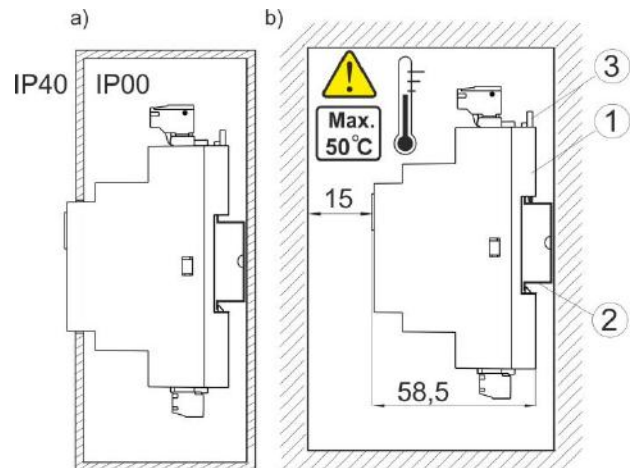
Methods of module installation: a) – in modular housing with access to front surface, b) – in the cover without access to front surface, 1- working module, 2 – DIN TS35 rail, 3 – catch.

12.5 IP protection rate

Enclosure of the controller's executive module provides various IP protection rates, depending on the method of installation. After enclosing in accordance with this drawing, the device has protection rate IP20 from the front side of the executive module enclosure (specified on the rating plate). From the side of the terminals, the casing has protection rate IP00, thus the terminals of the executive module must unconditionally be enclosed, in order to prevent access to this part of the casing.

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

12.6 Connecting electrical system

Controller is designed to be fed with 230 VAC, 50 Hz voltage. The electrical system should be:

- three core, with protective wire PE,
- in accordance with applicable regulations,
- equipped with a residual current protection device (RCD) with inrush current IΔn≤ 30mA, protecting against the effects of electric shock and limiting damage to the controller, including protection against fire.

⚠ After deactivating the controller, there still can be a dangerous voltage on the connections. Before starting assembly works it is obligatory to disconnect the electrical power and make sure that there is no danger electrical power on claps and wires.

The connection wires should not have contact with surfaces of temperature exceeding the nominal temperature of their operation. Terminals number 1-21 are intended only for connecting devices with mains supply 230 VAC. Terminals 22-49 are intended for cooperation with low voltage devices (below 12 VDC).

⚠ Connecting mains supply 230 VAC to terminals 22-49 and to transmission connectors will damage the controller and creates risk of an electric shock!

Connect power supply wires to terminals indicated with an arrow ⬆.

⚠ For safety reasons, the controller must be absolutely connected to the 230 VAC power grid, with the sequence of connecting the phase (L) and neutral (N) wires. Make sure that the L and N conductors are not exchanged within the building's electrical system, e.g. in an electrical socket or in an electrical socket junction box!

⚠ All peripherals (such like: pumps, RE-marked relays and connected recipients) may be connected only by qualified persons in accordance with applicable regulations. Safety precautions to prevent electrocution should be observed. Controller should be equipped with a set of pins connected to the 230V AC mains.

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

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

Insulated clamp sleeve, 6mm lenght.
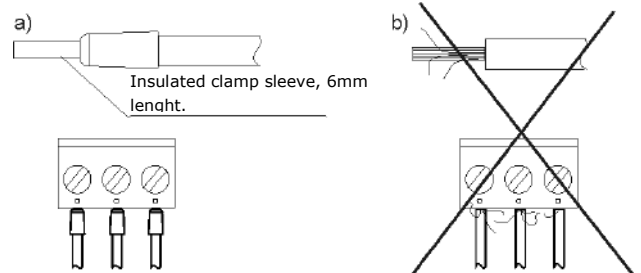
12.7 Electric scheme
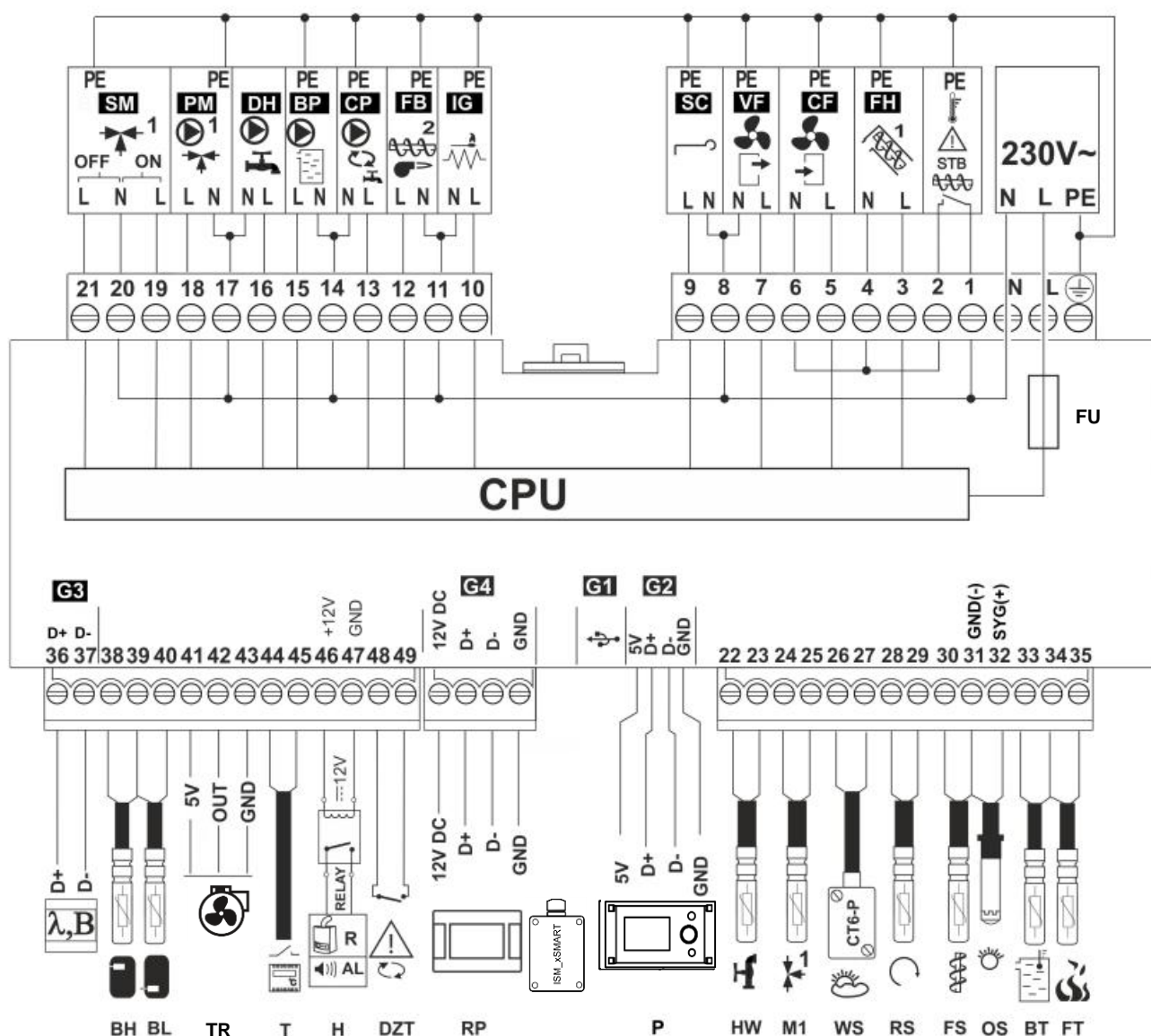
Scheme of electrical connections of the controller: **λ** –Lambda module, **B** – additional module, **BH** – upper buffer temp. sensor type CT4, **BL** – lower buffer temp. sensor type CT4, **PLS** - fuel level sensor, **TR** - rotation fan sensor (turbine), **T** – standard room thermostat type NO-NC, **H** – voltage output for **AL** alarm device or **R** reserve boiler, **RELAY** – relay 12 VDC, **DZT** - boiler door or fuel silo door opening sensor, **RP** – room panel with room thermostat feature or radio module, **P** – control panel, **HW** – HUW temp. sensor type CT4, **M1** – mixer 1 temp. sensor type CT4, **WS** – weather temp. sensor type CT6-P, **RS** - boiler water return temperature sensor type CT4, **FS** – feeder temp. sensor type CT4, **OS** – flame optical sensor, **BT** – boiler temp. sensor type CT4, **FT** – exhaust temp. sensor type CT2S, **L N PE** - electrical power 230 VAC, **CPU** – controlling, **FU** – main fuse, **STB** – connection to limiter of safety temperature, **FH** – main feeder, **CF** – burner airflow fan, **VF** – exhaust fan, **SC** – rotary burner cleaning motor, **IG** – igniter, **FB** – burner feeder, **CP** – HUW circulation pump, **BP** – boiler pump, **DH** – HUW pump, **PM** – mixer 1 pump, **SM** – mixer 1 servomotor.
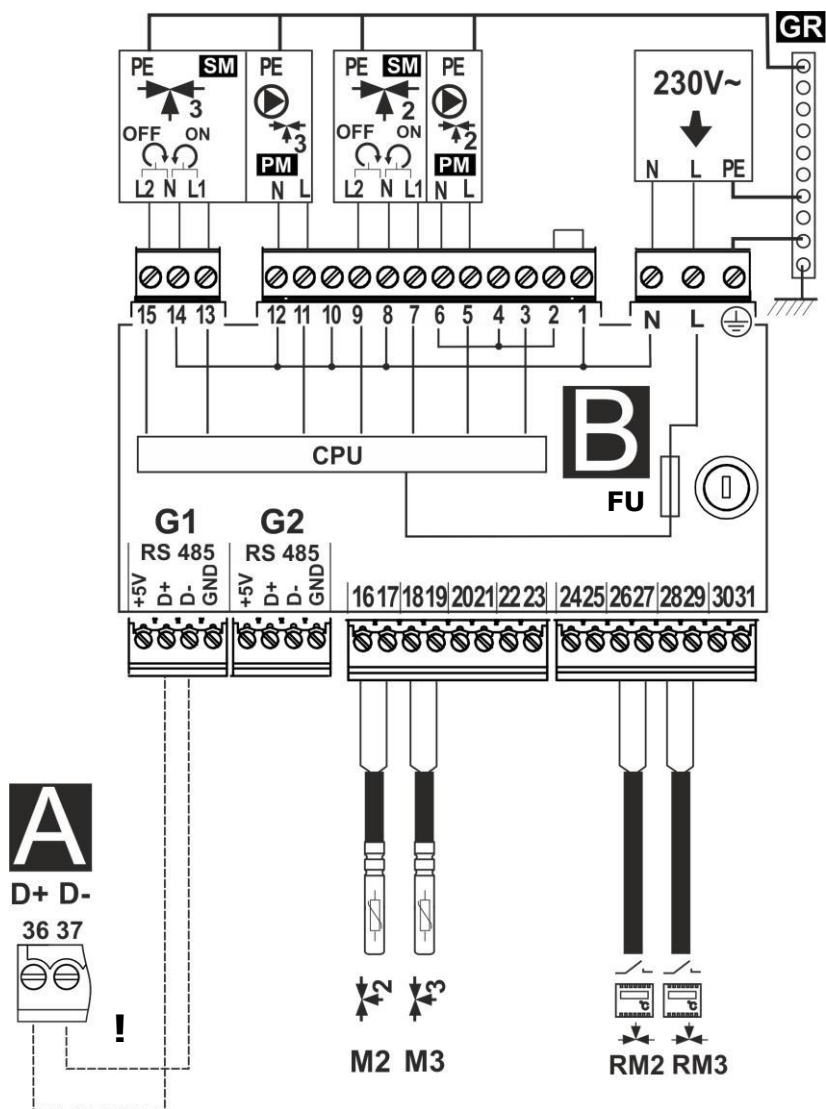
Scheme of electrical connections of the additional B module: **M2, M3** – mixer temp. sensor type CT4, **RM2, RM3** – mixer room thermostat, **L N PE** - electrical power 230 VAC, **FU** – main fuse, **GR** – grounding strip, **PM2, PM3** – mixer pump, **SM2, SM3** – mixer servomotor, **CPU** – controlling, **A** – main controller, **!** - connect only with two wires (four-wire connection may damage the controller).

12.8 Connection of temperature sensors

The controller cooperates only with temperature sensors of the CT4 type. The use of other types of temp. sensors is prohibited.

Sensor wires may be extended using wires of cross-section area not less than 0.5 mm^2. Total length of wires of each sensor should not exceed 15 m.

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

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

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

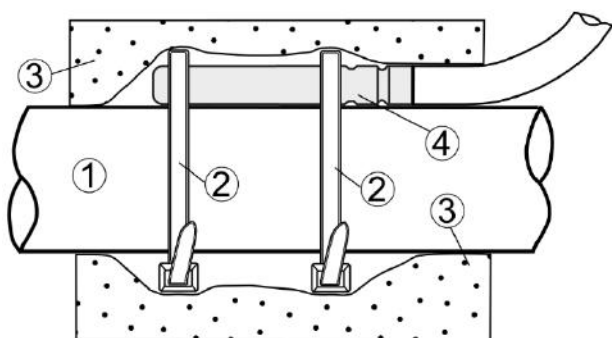Make sure thermal contact between the sensors and the surface which temperature is measured is good. Apply thermal paste to improve the contact. Pouring sensors with oil or water is not allowed. Sensor wires should be separated from power supply wires. Otherwise, temperature indications may be erroneous. Min. distance between these wires should be 100 mm.

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

12.9 Connecting weather sensor

The controller cooperates only with a weather sensor of the CT6-P type. The sensor should be installed on the coolest wall of the building. Usually it is the northern wall, under the roof. The sensor should not be exposed to direct sunrays and rain. The sensor should be installed at least 2 m above the ground far away from windows, chimneys and other sources of heat which could disturb the temperature measurement.

To connect use wire with diameter at least 0.5 mm^2 up to 25 m long. Polarization of wires is not essential. Second end should be connected to terminals of controller or properly to used kind of controller.

The sensor should be screw to the wall. Access to assembly holes is possible after unscrewing the cover of the sensor.
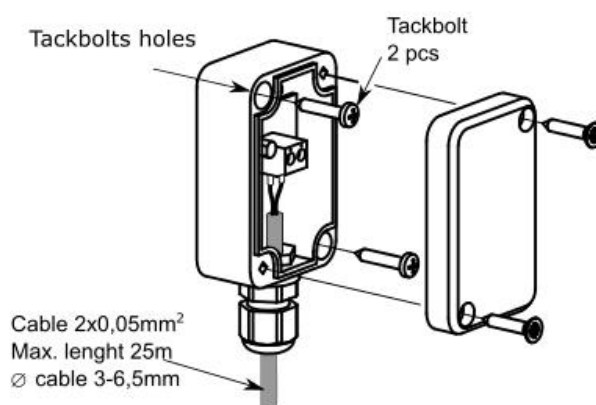
It is possible to additionally set correction of the sensor indications in the menu:

General settings → Weather sensor → Sensor correction

12.10 Connecting exhaust sensor

The exhaust sensor should be fitted in the boiler flue. The gap between the sensor and the flue should be sealed. The sensor should be installed by a qualified fitter, while observing regulations applicable for chimney systems. The emission sensor should be connected to the sensor terminals acc. to The emission sensor lead cannot touch hot elements of the boiler and the flue, the temperature of which exceeds 220°C.
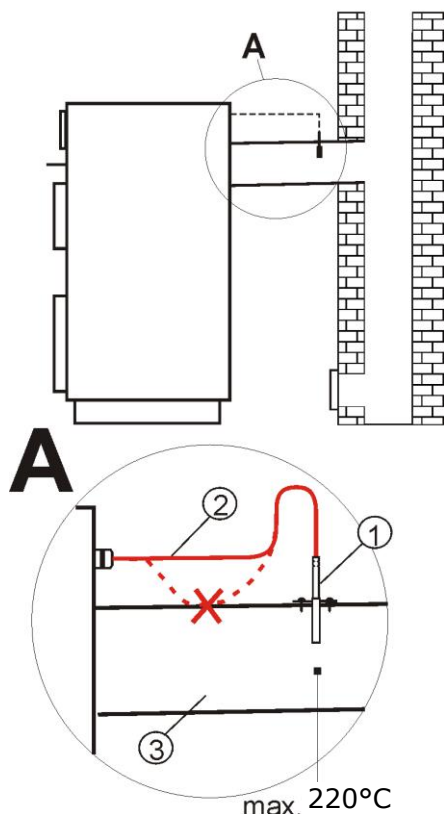
Connecting emission sensor: 1 – exhaust temp. sensor type CT2S, 2 – sensor lead, 3 – flue.

CT6-P (weather)			
Temp. °C	Min. Ω	Nom. Ω	Max. Ω
-25	901,6	**901,9**	902,2
-20	921,3	**921,6**	921,9
-10	960,6	**960,9**	961,2
0	999,7	**1000,0**	1000,3
25	1096,9	**1097,3**	1097,7
50	1193,4	**1194,0**	1194,6
100	1384,2	**1385,0**	1385,8
125	1478,5	**1479,4**	1480,3
150	1572,0	**1573,1**	1574,2

CT2S-2 (exhaust)			
Temp. °C	Min. Ω	Nom. Ω	Max. Ω
0	999,7	**1000,0**	1000,3
25	1096,9	**1097,3**	1097,7
50	1193,4	**1194,0**	1194,6
100	1384,2	**1385,0**	1385,8
125	1478,5	**1479,4**	1480,3
150	1572,0	**1573,1**	1574,2

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

12.11 Weather sensors checking

Temperature sensors can be checked by measuring their resistance in given temperature. In case of big differences between measured resistance value and values in table below, the sensor should be replaced with a new one.

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

12.12 Optical sensor connection

The optical sensor should be connected in accordance with point 12.7, be sure to observe the polarization of the (+) and (-) sensor signals. Readings of data from optical sensor is possible in the menu:

Information → Flame

☞ Incorrect connection of the optical sensor will not damage the controller or the sensor itself, but the burner flame detection will be incorrect.

12.13 Mixers room temperature connection

Room thermostat after disconnecting wires reduces preset temperature of the value of reduction the preset temperature of the mixer from the thermostat. Parameter is in the menu:

Mixer settings 1-5 → Mixer room temperature

Value of parameter should be chosen in such a way that after activating room thermostat, temperature in the room should decrease.

In case of room panel make sure that this parameter *Thermostat select.* is correctly chosen in the menu:

Service settings → Mixer settings 1-5

12.14 Boiler room thermostat connection

Boiler circuit room thermostat may activate the burner or deactivate CH boiler pump. In order for the room thermostat to control boiler operation, set the *Thermostat select* value to *Standard* or *ecoSTER T1* or *eSTER T1* (if the ecoSTER TOUCH or eSTER_x80 room control panel is connected):

Service settings → Boiler settings → Thermostat select

In order for the room thermostat to control CH pump operation (without deactivating the boiler), set the *Turn off pump from thermostat* value to *YES* in the menu:

Service settings → Boiler settings

12.15 Connection of reserve boiler

The controller can control a reserve boiler (gas- or oil-fired), eliminating the necessity of enabling or disabling this boiler manually. 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 46-47.
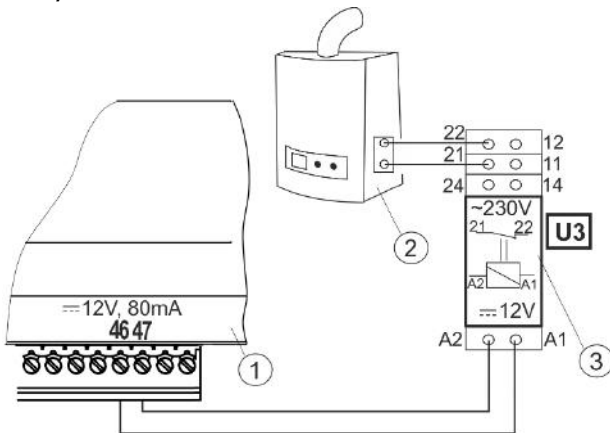
Example wiring diagram of layout for connecting a reserve boiler to the controller: 1 - controller, 2 – reserve boiler (gas- or oil-), 3 – relay 12VDC, consisting of relay RM 84-2012-35-1012 and base GZT80 RELPOL.

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

⚠ Assembly of relay should be done by a person with proper qualifications. According to valid norms and regulations.

To enable the control of reserve boiler, set the H output to operate the reserve boiler in the menu:

Service settings → Output H

and then set the parameter *Temperature of reserve boiler activation* on value different than zero, in the menu:

Service settings → Boiler settings → Reserve boiler

Deactivating control over additional boiler is done after setting zero value of switching off for this parameter.

⚠ Controlling extension of the boiler is coshared with alarm extension. Deactivating additional boiler control will cause that this extension will be controlled by module of controlling alarms.

When pellet boiler is fired-up, and its temperature exceedes preset value i.e. 25ºC, then controller switches off additional boiler (it will give constant voltage 12 VDC for terminals 46-47) It will power the coil of transmitter and disconnecting its joints. After decreasing boiler temperature below parameter temperature of additional boiler switching off the controller stops giving voltage to joints 46-47 which should activate the additional boiler.

☞ Switching the controller into "STAND-BY" mode causes deactivating the additional boiler.
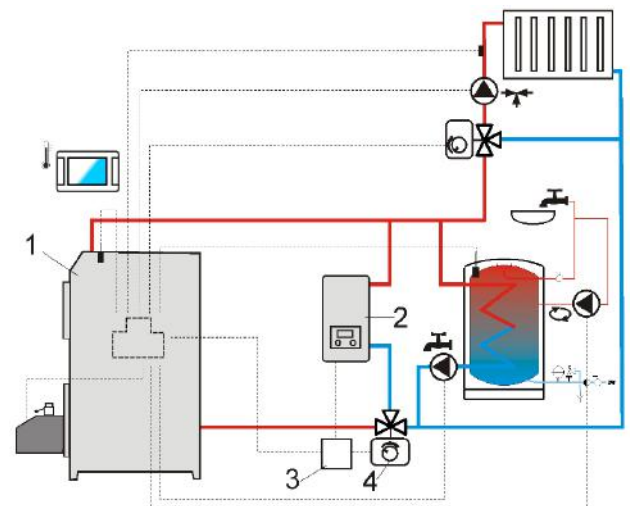
Example hydraulic scheme with reserve boiler, where: 1 – controller, 2 – reserve boiler, 3 – relay, 4 – switching valve (with limit switches).
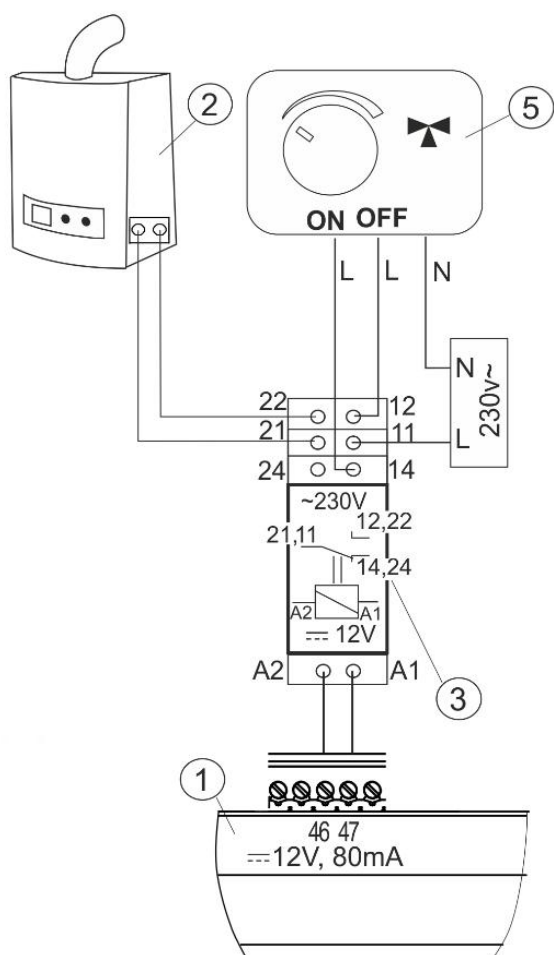
Example wiring diagram of control of the switching valve in the reserve boiler: 1 – controller, 2 – reserve boiler, 3 – relay, 5 – switching valve servo (with limit switches). Note: terminals 22,21,24 have to be galvanically insulated from terminals 12,11,14.

12.16 Connection of alarm signalling

The controller can report alarms by activating external devices like ring or GSM device to short messages SMS sending. Alarm signaling device must be connected through a relay. On the matter that output is shared with reserve boiler control output, in order to activate the output for alarm function, you must first disable the reserve boiler control. To do this you should in the menu:

Service settings → Boiler settings → Reserve boiler

set zero value of its deactivating temperature and then set the H output to alarm in the menu:

Service settings → Output H
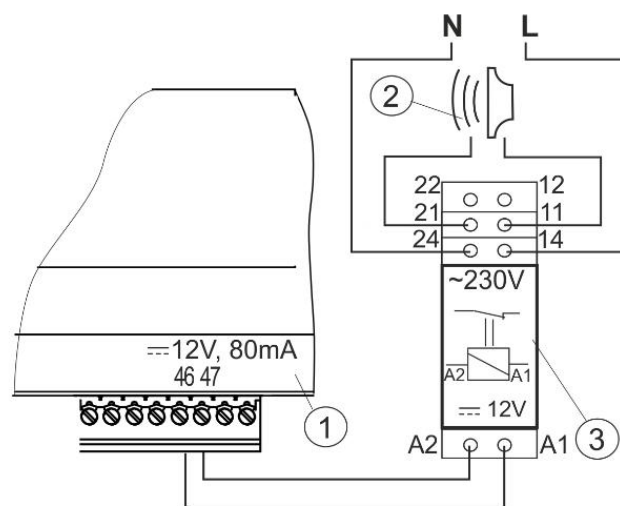
Example connection of an external alarm annunciator. 1 - controller , 2 – external alarm annunciator, 3 – relay.

12.17 Mixer connection

During assembly works for mixer servomotor pay attention not to overheat the boiler. This may happen when there is a limited flow of water from the boiler. It is recommended to check the location of valve in maximum opening before starting work, to ascertain heat acceptance from the boiler by opening the valve to maximum.

The controller cooperates only with servomotors of mixing valves equipped with end switchers. Using other servomotors is forbidden. Servomotors with full circle scope of 30 to 255 sec. can be used.

Connecting mixer description:

- Connect mixer temperature sensor.
- Connect electrical mixer pump.
- Activate the controller and select in service menu proper *Mixer support:* **Service settings → Mixer 1 settings**.
- set in mixer service settings proper time of valve opening (time should be written on data plate of servomotor, i.e. 120 sec.).
- Connect electrical power of the controller and activate it so the mixer pump is working.
- Choose the direction in which servomotor opens and closes. To do so, switch the button to manual control and find position in which temperature in mixer

circuit is maximal (in controller it is position 100% ON) and value position when temperature of mixer circuit is minimal (in controller it is position 0% OFF). Remember the position in order to later verification of proper connection.

- Disconnect the electrical power to the controller.
- Connect electrical power to mixer servomotor with the controller and value servomotor producer's documentation. Do not confuse opening direction with closing direction.
- Connect electrical power to the controller and switch it into "STAND-BY" mode.
- Check if wires for mixer opening and closing are not swapped. Go into: **Menu → Manual control** and open mixer by selecting *Mixer 1 Opening = ON*. By opening servomotor temperature on the mixer sensor should increase. If not, disconnect the power and swap wires. (attention: another cause may be incorrectly connected valve – check the producer's documentation if it is properly connected).
- Set other parameters of the mixer.

12.18 Connecting temperature limiter

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

After exceeding the boiler water temperature above 95°C, the feeder and fan power supply is cut off. Restarting fan and feeder power supply requires resetting the STB limiter. To do this, press the reset button (1). The button can be pressed only after the boiler water temperature drops.
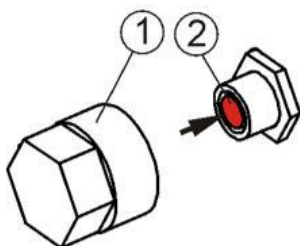
Resetting the STB safety temperature limiter: 1 - protection nut, 2 - reset button.

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

⚠ Dangerous voltage exists at terminals 1-2.

12.19 Connecting of room panel

The controller can be equipped with room panel ecoSTER200 or ecoSTER TOUCH, which can serve as: room thermostat (supporting up to 3 thermostats), boiler control panel, alarm signaling device and fuel level indicator.

⚠ Cross-section area of wires used to connect room panel should be 0.75 mm^2.

Max. length of wires should not exceed 30 m. This length may be longer if the wires used have cross-section area larger than 0.75 mm^2.

Four-wire connection - see electric scheme.

Two-wire connection - power supply of 5 VDC or 12 VDC and rated current of min. 200 mA is required. Points to supply: GND and +12 V to external source of supply. Connect lines D+ and D- acc. electric scheme.

12.20 Connecting of wireless room panel

The controller can be equipped with wireless room panel eSTER_x80 or eSTER_x40, which can serve as: room thermostat, boiler control panel, alarm signaling device and fuel level indicator. Wireless radio connection of the room panel requires connection to the ISM_xSMART radio module controller according to the electric scheme.

The description of the wireless panels' operation is given in the appropriate operating manual dedicated to these devices.

13 Service menu – structure

Entering the menu requires entering the service password.

Service settings
Burner settings
Boiler settings
CH and HUW settings
Buffer settings*
Mixer settings 1-5*
Show advanced setup
Service counters
Restore service settings
Save serv.set.
Log out
Output H

Burner settings
Firing-up
• Ignition test time
• Fuel dose
• Flame detection
• Firing-up airflow
• Extraction airflow
• Firing-up time
• Blowing after firing up
• Extraction after firing up
• Incandescence time.
• Heating up time
• Worktime with minimal power
• Fan pulsation
Operation
• Thermostat mode
• Cycle time OPERAT.
• Fuel calorific
• Capacity of tank
• Feeder 2 extended operation
• Rotation sensor (correction)
• Maximum power - blowing
• Average power - blowing
• Minimum power - blowing
• Fan operation detection
• Fan speed multiplier
• Starting power reduction threshold
• The threshold power reduction end
Burning off
• Burning off max time
• Burning off min time
• Air flush intensity
• Exh.fan intensity
• Air flush period
• Air flush interval
• Air flush start
• Air flush stop

Cleaning
• Poker p.before inflame
• Poker p.after bur.off
• Cleaning airflow
• Cleaning exh.fan
• Rotary cleaning cycle
Supervision
• Supervision time
• Boiler output
• Cycle time
• Blow-in output
• Exh.fan output
Grate *
• Flush time Superv.
• Flush period Sup.
• Auto switch to pellet
Lambda sensor*
• Lambda mode
• Dynamics
• Response time
• Airflow corr.range
Min. airflow output
Min.exh.fan output
Fuel detection time
Max. burner temp.

Boiler settings
Thermostat select.
• Off
• Universal
• ecoSTER T1..T3
Return protection*
• Operation mode
• Min.return temp.
• Return temp.hyst.
• Valve closing
Min. boiler temp.
Max. boiler temp.
Reserve boiler
Thermostat function
• Off burner
• Off pump
• Off all
Exch.clean alarm
Boiler cooling temperature
Parameter A,B,C FL*
Turn off pump from thermostat

CH and HUW settings
CH activation temp.
Antifreeze temp.
CH stand.load.HUW*
Min. HUW temp. *
Max. HUW temp. *
Boiler inc. by HUWandM
HUW operation extension*

HUW heat source
Circul. standstill time *
Circul. operation time *
Circul. activation temp.*
Exchanger *
Pump hysteresis

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

Mixer settings 1-5*
Mixer support
• Off
• CH on
• Floor on
• Pump only
Thermostat selected*
• Off
• Universal
• ecoSTER T1..T3
Min. mixer temp.
Max. mixer temp.
Proportional range
Integration time constant
Valve opening time
Pump off by therm.
Mixer input dead zone *

Output H
Heat exchanger cleaning
• Heat exchanger cleaning time
• Heat exchanger cleaning pause
Alarm
Reserve boiler

* not available if proper sensor not attached, extension module or parameter is hidden.

14 Description of service settings

14.1 Burner

Parameter	Description
Firing-up	
• Ignition test time	Time to check whether the burner is already firing up. Only fan is operating. If the flame has sufficient brightness, it switches to the OERATION mode without the BURNING OFF mode.
• Fuel dose	Fuel dose during firing up. Concerns first testing firing up. Next tests fuel dose is reduced.
• Flame detection	Threshold of flame detection in % of light, when the controller deems the furnace as hot. It is also used for detection of lack of fuel and end of burning off.
• Firing-up airflow	% of airflow when firing up. Too big value prolongs the firing up process or causes failed attempt of firing up.
• Extraction airflow	% of exhaust when firing up. Too big value prolongs the firing up process or causes failed attempt of firing up.
• Firing-up time	The time of a single fire-up attempt. After this time the controller goes to the next ignition attempt. After unsuccessful attempts of ignition, an alarm is given *Failed firing up attempt*.
• Blowing after firing up	% of blowing fan after flame detection.
• Extraction after firing up	% of exhaust fan after flame detection.
• Incandescence time	Incandescence time after firing-up. When the flame is detected during the firing-up phase, the furnace lights up before giving an additional portion of fuel within the time specified by the *Incandescence time* parameter and increasing the blowing power.
• Heating up time	Igniter warming up time before engaging the blow fan. It should not be too long as to not damage the heater. After this time the heater works still until detecting the flame.
• Worktime with min. power	Burner operation time with minimum power after firing up. Power is determined by parameter *Min blow-in output*.
• Fan pulsation	Pulsation of the blowing fan in firing up.
Operation	
• Thermostat mode	Switches the burner into thermostat mode, i.e. for working in bakery. The burner operates with maximum power without modulation of power. The burner deactivates with disconnecting thermostat joints. Boiler temperature sensor does not influence feeder operation.
• Cycle time OPERAT.	Time of whole fuel feeding cycle in OPERATION mode, where: *Cycle time OPERAT.* = feeding time + feeder pause time in OPERATION mode. The work of the burner feeder is always extended compared to the work of the main fuel feeder.
• Fuel calorific	Fuel calorific in kWh/kg.
• Feeder efficiency	Fuel feeding speed of the main feeder in kg/h.
• Capacity of tank	Fuel silo capacity for counting fuel level. When correct amount is put, the user is not obliged to calibrate fuel level. The controller process this data if calibration process of fuel level was not done. After successful calibration of fuel level the controller does not process this value.
• Feeder 2 extended operation	Extension of the burner feeder operation time for the time of the feeder of the fuel hopper.
• Rotation sensor (correction)	The range of the fan correction from the set rotations for a given burner power.
• Maximum power - blowing • Average power - blowing • Minimum power - blowing	Set rotations for the maximum, average, minimum burner power.
• Fan operation detection	Operating detection threshold below which the fan failure alarm is reported.
• Fan speed multiplier	By how much will the value of the blowing fan speed setting be multiplied.
• Starting power reduction threshold	If during the controller operation the flame value falls below the threshold, the algorithm of the burner power reduction is activated.
• The threshold power reduction end	After exceeding the threshold flame, the burner power reduction algorithm is switched off.
Burning off	
• Burning off max time	After this time the controller goes to STOP mode, in spite of the fact that the controller detects flame.
• Burning off min time	Burning off will last at least this time in spite of the fact that flame sensor indicated lack of flame.
• Air flush intensity	Blow fan power during blowing while burning off.
• Exh.fan intensity	Exhaust fan power while burning off.
• Air flush period	Duration of blowing when burning off fuel and burning off.
• Air flush interval	Break between airflows while burning off the fuel in burning off process.

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• Air flush start	Flame brightness with which airflow starts while burning off the fuel.
• Air flush stop	Flame brightness with which airflow starts when burning off the fuel in burning off process
Cleaning	
• Poker p.before inflame	Fan operation time during cleaning the furnace while firing up.
• Poker p.after bur.off	Fan operation time during furnace burning off.
• Cleaning airflow	Blowing fan power during furnace cleaning in burning off and firing up.
• Cleaning exh.fan	Exhaust fan power during furnace cleaning in burning off and firing up.
• Rotary cleaning cycle	Time work rotary output during cleaning the burner and the time break of rotary cycle during cleaning the burner.
Supervision	
• Supervision time	It is the maximum time of the controller residence in the SUPERVISION mode. After this time, when the controller is in SUPERVISION mode, the controller automatically starts burner burning off. By settings *Supervision time*= 0, the SUPERVISION mode is deactivated. By settings *Supervision time*= 255, the SUPERVISION mode is not deactivated.
• Boiler output	Boiler power in Supervision mode.
• Cycle time	Feeder operation time in SUPERVISION mode. *Cycle time* = feeding time + feeder pause in Supervision mode.
• Blow-in output	Blowing fan power during operation in Supervision mode. Adjust value in such a way to burn feeding fuel in Supervision mode with low fumes emission.
• Exh.fan output	Exhaust fan power during operation in Supervision mode. Adjust value in such a way to burn feeding fuel in Supervision mode with low fumes emission.
Grate	In this mode automatic fuel feeding is off.
• Flush time Superv.	The duration of the fan blow in the supervision in grate mode. The value should not be too high so as not to cause excessive water heating in the boiler.
• Flush period Sup.	Interval between blows in the supervision in grate mode. The value should not be too high so as not to cause excessive water heating in the boiler.
• Auto switch to pellet	After burning the fuel on the grate, the temperature of the water in the boiler's circulation will drop. When this drop is detected, below the preset temperature there will be an automatic transition from "grate" to "pellet" mode. Note: the transition to the "pellet" mode will be possible only with the cleaned burner from the ash formed after burning on the grate.
Lambda sensor	The description in point 17
Min. airflow output	Minimum airflow fan power which can be chosen by the user. It is only used to limit the accessible scope of fan power. It is not used in algorithm of controlling the fan. It should be possibly small to allow the fan to rotate slowly, without buzzing.
Min.exh.fan output	Minimum exhaust fan power which can be chosen by the user. It is only used to limit the accessible scope of fan power. It is not used in algorithm of controlling the fan. It should be possibly small to allow the fan to rotate slowly, without buzzing.
Fuel detection time	Time is measured after decrease in brightness of flame below value *Flame detection*. After deducting this time the controller switches into firing up attempt. After another failed attempts, it reports alarm: "Failed firing up attempt"
Max. burner temp.	Max temperature of the burner by which the alarm of exceeding the max. temp of burner will be switched on.

14.2 Boiler

Parameter	Description
Thermostat select.	The parameter is available only after connecting a room thermostat. The option allows you to select a boiler room thermostat. Options to choose from: • *Off* - deactivates room thermostat influence on boiler operation. • *Universal* - activates room thermostat for boiler. • *ecoSTER T1…T3* - option available after connecting room panel, boiler operation is dependant on room thermostat. • *eSTER T1…T3* - option available after connecting wireless room panel, boiler operation is dependant on wireless room thermostat. If the room panel is not connected, the controller works only with a standard room thermostat (NO-NC).
Return protection	Group of parameters available after connecting return sensor, responsible for protection of boiler return in hydraulic installation with 4 way valve equipped in mixer servomotor. It is not advised to activate functions of return protection because it may cause frequent stops in power of mixer cycle. Instead this it is recommended to use bigger preset temperatures of boiler (70…75ºC) what in combination with installation with 4-way valve (with servomotor) it will cause automatic increase return temperature.
Min. boiler temp.	Minimum preset boiler temperature which can be set in user menu and minimum temp. which can be set automatically by controller, i.e. from night reductions etc.

Max. boiler temp.	Maximum preset boiler temperature which can be set in user menu and minimum temp. which can be set automatically by controller, i.e. from night reductions etc.
Reserve boiler	Description in point 12.15
Thermostat function	The parameter is available only after connecting a room thermostat. Options available: • *Off burner* - the burner will be turned off when the room thermostat of the boiler operates, without switching off the boiler pump, • *Off pump* - the boiler pump will be turned off when the room thermostat of the boiler operates, without switching the boiler off, • *Off all* - the boiler and boiler pump will be switched off when the room thermostat of the boiler is activated.
Exch.clean alarm	The parameter determines after what amount of fuel burned will be prompted to *Clear exchanger*.
Boiler cooling temperature	Temperature of boiler cooling off. Above this temperature the controller activates HUW pump and opens mixer cycles to allow boiler cooling off. The controller activates HUW pump if this temperature exceeds maximum value. The controller will not open mixer cycle when *Mixer support = Floor ON*.
Parameter A,B,C FL	Applicable to FuzzyLogic mode. It has an impact on the time necessary for the boiler to reach the preset value and the stability of the boiler temperature. It is not recommended to modify the parameters if the adjustment time and the stability of the preset temperature are as required.
Turn off pump from thermostat	Options available: • *NO* - CH boiler pump is not activated when room thermostat starts operation, • *YES* - CH boiler pump is deactivated when room thermostat starts operating.

14.3 CH and HUW

Parameter	Description
CH activation temp.	Parameters determines the temperature at which CH boiler pump is activated. It protects the boiler against watering due to cooling off with cold water returning from installation. Attention: Deactivating boiler pump only does not guarantee boiler protection against watering and consequently corrosion. Additional automatics should be used, i.e. 4-way valve or 3-way thermostatic valve.
Antifreeze temp.	The parameter is used during a long absence from home or outside the heating season and is intended to prevent freezing of water in the central heating system. The controller switches on the CH pump or mixer pump when the temperature on the boiler or the temperature measured on the mixer drops below the *Antifreeze temperature*.
CH stand. load. HUW	Available after connecting HUW sensor. Prolonged feeding of HUW silo during priority HUW deactivated may cause to overcooling of the CH installation, because CH pump is deactivated. Parameter CH pump pause during feeding HUW prevents against periodical activating CH pump during feeding HUW silo. CH pump after this time will activate on constant, programmed time of 30 sec.
Min. HUW temp.	Available after CH sensor connecting. It is a parameter by which it can be reduced setting too low preset HUW temperature.
Max. HUW temp.	Available after connecting HUW sensor. Parameter determines to what maximum temperature HUW tank will be heated during cooling the boiler in alarm situations. It is a very important parameter, because setting too high value of it may cause risk of scalding with HUW. Too low value of parameter will cause that during boiler overheating it will not be possible to cool off the boiler to the HUW tank. During design of HUW installation, it is necessary to take into account risk of damaging the controller. Due to breakdown of the controller water in the tank can heat up to dangerous temperature. It is necessary to use additional protection in the form of thermostatic valves.
Boiler inc. by HUW and Mixer	Parameter determines how high the boiler temperature will be increased to load HUW tank, buffer and mixer cycle. Temperature increase is only realizing when it is necessary. When preset boiler temperature is at sufficient level then controller will not change it due to the fact of feeding the HUW tank, buffer or mixer cycle. Increasing preset boiler temperature during feeding HUW tank is signaled in main window.
HUW operation extension	Available after connecting HUW sensor. After feeding HUW tank and deactivating HUW pump may be a risk of boiler overheating. It happens in case when preset HW temperature was higher than boiler preset temperature. This issue is exceptionally important in HUW pump operation in SUMMER mode, when pump is deactivated. To cool off the boiler HUW pump operation can be prolonged by *HUW operation extension*.
HUW heat source	Specifies the source of energy for HUW: *Boiler* or *Buffer*.
Circu. standstill time	Pausing time between periods of circulation pump operation is defined with value of parameter *Circulation standstill time* (recommended setting 15-40 min.)
Circul. operation time	Circular pump operates constantly during *Circul. operation time* (recommended setting 60-120 sec.).

Circul. activation temp.	The temperature of the HUW tank, below which the circulation pump will start in order to force water circulation in the HUW circuit.
Exchanger	It only refers to hydraulic installation with heat exchanger between open and closed circuit. Available options: • *YES* - boiler pump operates constantly in short circuit boiler – exchanger, it is not excluded i.e. from SUMMER function or HUW priority, • *NO* - boiler pump operates normally.
Pump hysteresis	Hysteresis to prevent the pumps from constantly turning on and off, which extends their service life.

14.4 Buffer

Parameter	Description
Buffer support	Parameter serves to activating buffer operating mode. Available after connecting additional module B and buffer temperature sensors.
Loading start temp.	Parameter *Loading start temp.* defines high temperature below which buffer feeding starts. Buffer feeding process is finished when low temperature reaches value defined in parameter *Loading end temp.*
Loading end temp.	

14.5 Mixer

Parameter	Description
Mixer support	
• Off	Mixer servomotor and pump are not active.
• CH ON	Applicable when mixer cycle powers heating installation of CH. Maximum temperature of mixer cycle is not limited, mixer is fully opened during alarms i.e. boiler overheating. Attention: do not activate this option when installation is made of pipes sensitive to high temperature. In such situations it is recommended to set mixer service on Floor.
• Floor on	Is used when mixer cycle powers floor installation. Maximum power of mixer cycle is limited to value of parameter max preset mixer temperature. Attention: After choosing option Floor, it is necessary to set parameter max mixer preset temperature on such a value to not damage the floor and avoid scalding risk.
• Pump only	When mixer cycle temperature exceeds value set in parameter mixer preset temperature, feeding of mixer pump is stopped. After decreasing temperature of circuit by 2ºC – pump is reactivated. This option is normally used to control floor heating pump in situation when it cooperates with thermostatic valve without servomotor. By such action is not recommended. It is recommended to use standard heating cycle in floor heating, which consists of valve, servomotor and mixer pump.
Thermostat select.	Parameter available only after connecting to room thermostat. This option allows change of room thermostat for mixer cycle. Options available: • *Off* - deactivates room thermostat influence on mixer operation. • *Universal* – standard thermostat (NO-NC). • *ecoSTER T1…T3* – thermostat 1…3 in the ecoSTER200 or ecoSTER TOUCH. • *eSTER T1…T3* – thermostat 1…3 in the eSTER_x40 or eSTER_x80. If room panel is not connected then the controller cooperates with standard room thermostat (NO-NC).
Min. mixer temp.	Using this parameter it is possible to restrict Chance of setting to low preset mixer circuit temperature. Automatic control (i.e. periodical temperature reduction) also will not cause reduction in preset temperature below value set in this parameter.
Max. mixer temp.	Parameter serves two functions: - allows restricting setting too high mixer preset temperature. Automatic control also will not cause exceeding preset temperature above value set in this parameter. - with parameter *Mixer support = Floor ON* is also limit temperature of mixer sensor when mixer pump is deactivated. For floor heating set the value below 45…50ºC or other if producer of materials used for floor or CH installation designer state differently.
Proportional range	This parameter affects the movement of the mixer actuator. Increasing this value results in the mixer reaching the set temperature faster. Setting this parameter to excessive values causes deregulation of the temperature and unnecessary actuator movement. The proper values is set experimentally. It is recommended to set this parameter in the range of 2..6.
Integr. time const.	The greater the value of this parameter, the slower is the actuator reaction for temperature deviation. Setting too lower values can lead to unnecessary actuator movements, too high value extending the time needed to find set value of the temperature. The right value is being edited according to research results. It is

Parameter	Description
	recommended to set this parameter value between 100 and 180.
Valve opening time	Set full valve opening time given at the plate of valve servomotor, i.e. 140 sec.
Pump off by thermostat	Setting the parameter on *YES* value causes closing of mixer servomotor and deactivating mixer pump after disconnecting joints of room thermostat. This is not recommended because the heated room can be too cool.
Mixer input dead zone	Setting parameter determining value of temperature dead zone for mixer controlling circuit. The controller regulates mixer in such a way to keep the temperature of mixer cycle equal to preset value. However, avoid too frequent movements of servomotor, which can shorten its long-life usage. Regulation is undertaken only when measured temperature of mixer cycle will be higher or lower than preset value by the value bigger than *Mixer input dead zone*.

14.6 Other parameters

Parameter	Description
Show advanced setup	Options available: • *YES* - displays hidden parameters which edition is not recommended, • *NO* - hides hidden parameters.
Restore service settings	Restoring service settings settings from main menu are restored.
Service counters	Operating time counter of the controller and the connected devices.
Save serv.set.	Selecting Yes saves all service settings after changing the parameters in the service menu.
Log out	Setting to YES will exit the time mechanism of entering the service menu without using the service password.
Output H	The menu contains settings related to the configuration of output H for module A and output H for module B. Options available: • *Heat exchanger cleaning* - operation of the heat exchanger cleaning mechanism. Cleaning will be turned on by *Heat exchanger cleaning time* with a cleaning break in *Heat exchanger cleaning pause*, • *Alarm* - when an alarm occurs, the output is switched on, • *Reserve boiler* - the output controls the reserve boiler.

15 Alarms descriptions

Alarm numbers displayed on the eSTER_x40 wireless room thermostat.

01	Boiler max. temp. exceeding
02	Overheating of the burner
03	Boiler temp. sensor damage
04	Feeder temp. sensor damage
05	Feeder control system failure
06	Overheating boiler, STB open contact
07	Firing up failed attempt
08	Boiler door open

15.1 Boiler max. temp. exceeding

Protection against boiler overheating is done in 2 steps. In the first step , after exceeding *Boiler cooling temp.,* the controller tries to reduce boiler temperature by dropping excess of heat to the HUW tank and by opening mixer servomotors (only when *Mixer support = CH ON*). If temperature measured by HW sensor exceeds value *Max. HUW temp.* then HUW pump is deactivated, what is done to protect users against scalding. If boiler temperature decreases, then the controller returns to normal operation. If the temperature will still increase (reaches 95ºC) then constant alarm will be activated of boiler overheating joined with sound signal. The alarm can be deleted by alarm confirmation or activating and deactivating power to the controller.

⚠ Locating temperature sensor outside water coat of burner i.e. on exhaust pipe is not beneficial, because it may cause delay in detecting boiler overheating state!

15.2 Overheating of the burner

Alarm appears after exceeding feeder temperature above service parameter *Max. burner temp*. If the burner temperature increases above this value the controller will begin burning off procedure.

The alarm can be deleted by alarm confirmation or activating and deactivating power to the controller.

15.3 Boiler temp. sensor damage

Alarm appears by boiler sensor damage and by exceeding measuring scope of this sensor. When alarm appears the boiler is activated.

The sensor is to be checked and replaced if necessary.

The alarm can be deleted by alarm confirmation or activating and deactivating power to the controller.

☞ Checking the temperature sensor is described in point 12.11

15.4 Feeder temp. sensor damage

Alarm appears when feeder sensor is damaged or by exceeding measuring scope of this sensor. After alarm the boiler is burnt off. It is necessary to check the sensor and replace it if necessary.

The alarm can be deleted by alarm confirmation or activating and deactivating power to the controller.

☞ Checking the temperature sensor is described in point 12.11

15.1 Feeder control system failure

The controller has an additional protection preventing it from feeding fuel constantly. This informs the user about failures in the electrical system controlling the fuel feeder. In case of alarm, stop the boiler and repair the controller as soon as possible. It is also possible to continue operation in emergency mode. Before continuing operation, make sure that the combustion chamber does not contain excessive unburnt fuel.

⚠ Operating in emergency mode is allowed only under user supervision and until the arrival of the service team to remove the failure. If user supervision is not possible, extinguish the boiler. When operating in emergency mode, prevent the consequences of improper feeder work (feeder working constantly or not at all).

15.2 Overheating boiler, STB open contact

This alarm occurs after activation of independent safety thermostat that secures the boiler against overheating. The burner will then be deactivated. After the boiler temperature will drop down it is required to

unscrew an oval STB lid and then press the Reset button, point 12.18.

15.3 Firing up failed attempt

Alarm will appear after third failed attempt of automatic furnace firing up. In case of alarm all pumps are deactivated in order to not cause excessive cooling of the boiler. Deleting is done by activating or deactivating the controller. The cause of these alarms can be broken igniter or lack of fuel in the tank.

15.4 No communication

The control panel is being linked with the rest of the electronics with RS485 digital communication link. In case a cable of this link will be damaged, an alarm will occur on the screen with the information "Attention! No communication". The controller doesn't stop to operate and works normally with before preset parameters. It is required to check the connection cable between control panel and the module and replaced it with a new one or repair it.

15.5 Boiler door open

This is a so called silent alarm monitor, which will occur in case of activation of the boiler door opening sensor. Cancellation takes place by closing the boiler door or touching the screen.

15.6 Unsuccessful attempt to load the tank

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

16 Other controller function

16.1 Power stoppage

In case of power stoppage the controller returns to operation mode in which it was before stoppage.

### 16.2 Antifreezing protection

When temperature of the boiler decreases below 5ºC CH pump will be activated enforcing circulation of boiler water. It will delay the process of freezing water, however in case of very low temperatures or by lack of electrical power it may not protect the installation against freezing.

16.3 Pump anti standstill function

The controller does the function of CH, HUW and Mixer pumps protection against getting stale. It consists of a periodic switching on (each 167 h for several seconds). This protects the pump against immobilization due to scaling. Therefore, during a break in the use of the boiler, the controller power supply should be connected. This is accomplished even when turned off using the keyboard controller (controller in the OFF state).

16.4 Network fuse replacement

Mains fuses are located in each working module. They protect the controller and other connected equipment. In case of replacement, use 6.3A, 5x20mm ceramic time fuse. To remove the fuse, press down fuse holder using flat screwdriver and turn it in CCW direction.
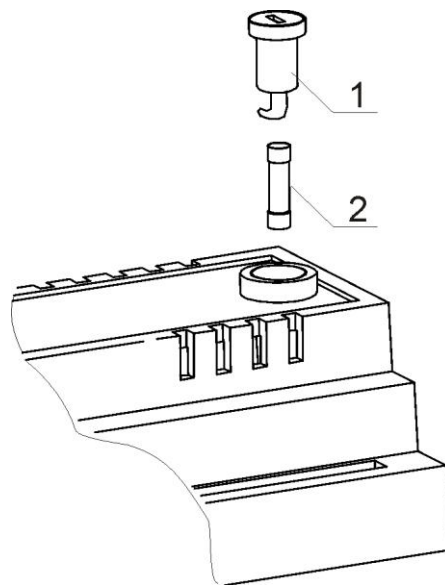
Replacing the fuse: 1 - fuse holder, 2 - fuse.

16.5 Replacement of control panel

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

17 Lambda sensor

Burner efficiency can be increased by connecting additional lambda sensor module. Lambda sensor is to be activated in the menu:

Service settings → Burner settings → Lambda sensor → Operation with Lambda sensor

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

Boiler settings → Output modulation

Description of remaining parameters relaed to Lambda sensor:

Pramrameter *Blow-in output scope* sets permissible scope of variability of airflow power by work using lambda sensor. Parameters *Dynamics* and *Reaction time* have influence on regulation time of air amount in fumes to preset amount and on stability of air in fumes. It is not recommended to change these parameters if regulation time and stability of keeping preset amount of air on required level.

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

Boiler settings → Lambda calibration

Calibration process lasts approximately 8 minutes.

18 The controller configuration by boiler producer

The producer of boiler / burner should adjust program parameters in controller to given type and power of the burner. The most important parameters are those related to Firing up, Operation and Burning off. The controller is able to change the default settings depending on power and type of the burner. Default settings for given boilers / burners should be consulted with Company Plum Sp. z o. o. In order to load new parameters go to:

Service settings → [special password] and choose proper boiler/burner. Default settings can also be loaded by special software provided by Company Plum Sp. z o. o.

19 Possible faults description

Symptoms	Tips
There are no signs of operation of device despite connection to the network.	Check: ▪ If line fuses are not blown, replace if necessary, ▪ If the wire connecting panel with the executive module is plugged correctly and if module is not damaged.
Preset boiler temperature on the display is different from the required one.	Check: ▪ If in this time the HUW tank is not loaded and if preset temperature is set above the preset boiler temperature. If so then the difference in readings will disappear after heating the HW tank or reduce the preset HUW temperature. ▪ If time periods are activated – then deactivate time periods.
CH pump is not working.	Check: ▪ If boiler exceeded temperature above parameter *CH activating temp.* – wait or reduce value of this parameter. ▪ If *HUW priority* is activated which blochs CH pump – deactivate priority be setting *HUW mode* on *No priority.* ▪ If CH pump is damaged or blocked.
Fan does is not working.	▪ Check if plug jumper is installed for the limiter of safety temperature STB on terminals 1-2, (the jumper should only be installed only in case when temperature limiter is not connected). ▪ If producer of the boiler has equipped it with temperature limiter STB with manual return to original position, it should be unlocked by untwisting the cover and twisting the button according to documentation of boiler producer, ▪ Check the fan and replace it if necessary.
Fuel feeder is not working / does not provide fuel	▪ Check if feeder wires are correctly connected to terminals, ▪ If temperature limiter STB is connected to terminals 1-2, then check if the circuit is not cut off due to boiler overheating, ▪ Check if feeder engine is not broken or damaged, ▪ In case when engine work can be heard and fuel is not provided check the feeder with its user manual.
Fuel is not burnt off completely, there are not burnt remnants in ashes. Fuel burns with big amount of smoke, burner fades	Check settings *Output modulation*.
Temperature is not measured correctly.	▪ Check if there is a good thermo contact between the temperature sensor and measured surface, ▪ Check if sensor wire not goes too closely to network wire, ▪ Check if sensor is connected to terminal, ▪ Check if sensor is not broken.
In HUW pumps mode = SUMMER heaters are hot, boiler is overheated.	Increase value of parameter *Extending HUW operation time* to cool off the boiler.
HUW pump is not working, even if HUW tank is loaded	Set the parameter *Extending HUW operation time = 0*
In hydraulic installation with mixing valve and servomotor – mixer is not opening.	▪ The cause may be HW silo loading when HW priority is activated. Wait until HUW tank loaded or activate the HUW priority. ▪ The cause may be active function SUMMER. ▪ The cause may be activation of function return protection. If function return protection is activated – check if return sensor of water return to silo is isolated thermically from surroundings. By usage thermoleading paste improve thermal contact of the sensor with pipe. Improve preset temperature of the boiler to ensure power for heating returning water. Check if hydraulic installation is correctly made, after closing the valve, return temperature must increase above value of parameter *Min. return temp*.

Changes register:

v1.3 – 08-2020 - added description of turbine operating

parameters, change of electric scheme.