CONTROLLER

ecoMAX920P1-S TOUCH

FOR AUTOMATIC SOLID FUEL FIRED BOILERS

Individual Fuzzy Logic

ecoSTER TOUCH**

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

eSTER_x80**

eSTER_x40**

* Functions available in additional module B

* Functions available in additional module C
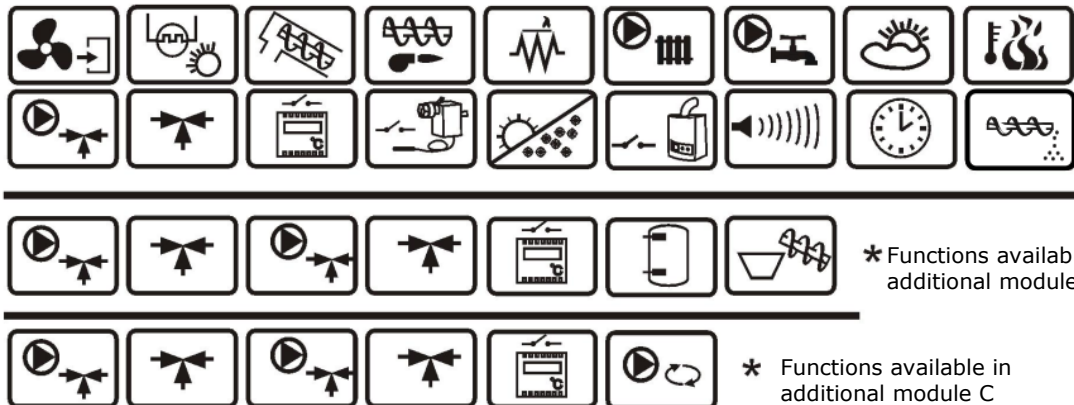
** Devices are not standard equipment of the controller.

CE

INSTALLATION AND OPERATING MANUAL
ISSUE: 1.0_EN

11-2020

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.

Due to fire hazard it is forbidden to use the controller in explosive gas and dust atmospheres.

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

MAIN PRINCIPLES OF PROPER BOILER OPERATION WITH INDIVIDUAL FUZZY LOGIC.

The controller must be programmed individually for a given boiler and fuel type.

It is not allowed to change the type of gear motor, type of fan and make other changes in boiler equipment affecting the combustion process. The equipment should correspond to the factory components installed by the boiler manufacturer.

It is recommended to operate with fan shutter maximally open.

Enabling Fuzzy Logic mode does not exempt from obligation to adjust the SUPERVISION parameters.

Fuzzy Logic mode may require additional adjustment.

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1 Recommendations regarding safety

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

- 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.

- The controller is designed for development.

- Additional automatics which protect the boiler, central heating 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 matching 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. The controller's surroundings should be kept clean.

- 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 disconnection for connected devices is applied in the controller (type 2Y operation according to PN-EN 60730-1) and micro-disconnection (type 2B operation according to PN-EN 60730-1).

- Prevent access to the controller of people who do not know the content of this manual, especially children.

2   General information

The controller ecoMAX920P1-S TOUCH is designed to control the operation of a solid fuel boiler using an optical flame brightness sensor. The controller can control the operation of direct central heating circuit, HUW circuit and operation of five mixing heating circuits. The preset temperature of circuits can be set on the basis of weather sensor indications. 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 auxiliary gas or oil boiler if necessary. The controller may operate with additional room panel or room thermostat placed in a living room and λ probe module, additional expansion modules B, C and internet module ecoNET300 to operate the controller on-line.

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

3   Information about documentation

The controller's manual is a supplement for the boiler manual. In particular, except for this manual, the boiler manual should also be observed. The controller's 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/EU

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 effects on the natural environment and risks to human health.

5

USER SETTINGS

ecoMAX920P1-S TOUCH

7   User menu - structure

Main menu
Information
Boiler settings
HUW settings*
Mixer 1-5 settings*
Summer/Winter
General settings
Alarms
Outputs test
Service settings

Boiler settings
CH preset temperature - grate**
Boiler weather control*
• Boiler heating curve*
• Heating curve paralel shift*
• Room temp. factor*
Output modulation
• Limitation of boiler power
• Fan output correction
• Fan output in grate mode*
• Fan in grate mode*
Operation mode*
• Pellet
• Grate
Regulation mode
• Standard
• Fuzzy Logic
Fuel level
• Alarm level
• Fuel level calibration
• Fuel calorific
• Capacity of tank
Lambda probe calibration*
Night time boiler decrease
• On
• Decrease value
• Schedule

HUW settings*
HUW preset temperature
HUW pump operation mode
• Off
• Priority
• No priority
HUW container hysteresis
HUW disinfection
HUW night time decrease
• On
• Decrease value
• Schedule
Night time circ. pump decrease*

Summer/Winter

SUMMER mode
• Summer
• Winter
• Auto*
SUMMER mode activation temp.
SUMMER mode deactivation temp.

Mixer 1-5 settings*
Preset mixer temperature
Mixer room thermostat
Mixer weather control*
• Mixer heating curve
• Parallel curve shift
• Room temperature factor
Mixer night decrease
• On
• Decrease value
• Schedule

General settings
Clock
Date
Screen brightness
Sound
Language
Firmware update
Wi-Fi settings*: SSID, Securities, Select security type, Password

* not available if proper sensor or additional module not connected or the parameter is hidden and available only after selecting relevant setting.
** parameter available only after activation in advanced menu.

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8 Controller operation

8.1 Description of the main window
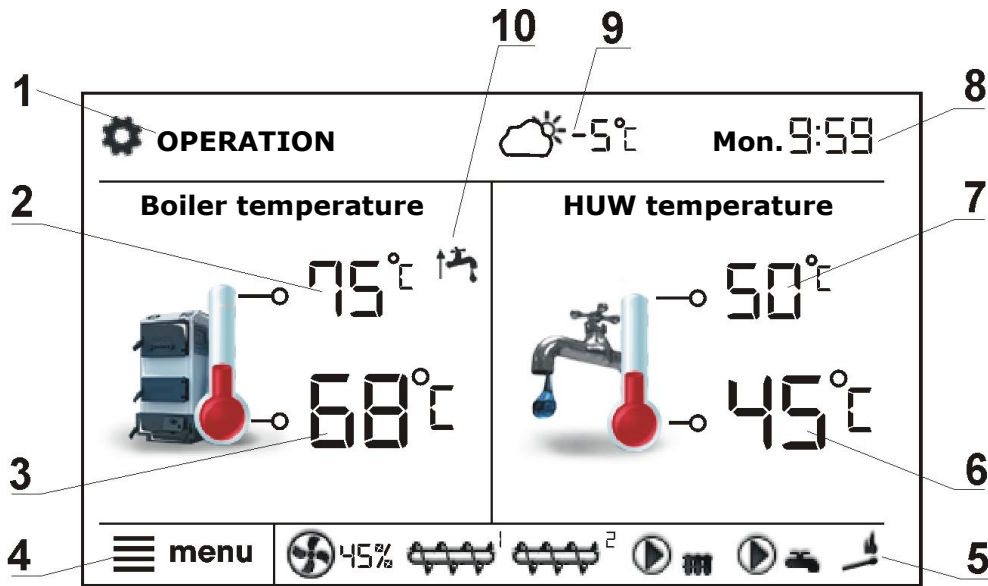
Display main window.

Legend:

1. Controller operation modes: FIRE UP, STABILIZATION, OPERATION, SUPERVISION, BURNING OUT, BURNING OFF, CLEANING, STOP
2. preset boiler temperature,
3. boiler measured temperature,
4. menu entering button
5. information field:

   ⊛ - airflow fan,

   - fuel feeder

   - burner feeder

   ⦾ - HUW and CH pump,

   - lighter,

   - grate.

6. Measured HUW container temperature,
7. Preset HUW container temperature value,
8. Clock and day of the week,
9. Outside temperature value (weather),

10. Functions affecting preset boiler temperature. Following symbols signal respectively:

    - room thermostat contacts open – preset room temperature reached,

    - preset boiler temperature decrease due to activated time spans,

    - increasing preset boiler temperature during loading of HUW container,

    - boiler preset temperature increase from mixer circuit,

    - active return protection,

    - preset temperature increase to load the buffer.

Right and left window on the main screen may represent different information, e.g. mixer circuits, basic information about HUW, fuel level, flame intensity, that can be changed by touching the selected window. Tip: fuel level may also be displayed in room panel.

8.1 Switching the boiler on and off

Make sure fuel is present in the tank and tank hatch is closed. Now boiler may be switched on. To start the boiler, press "*Boiler Off*" at any place on the screen. The message "*Active controller?*" appears.
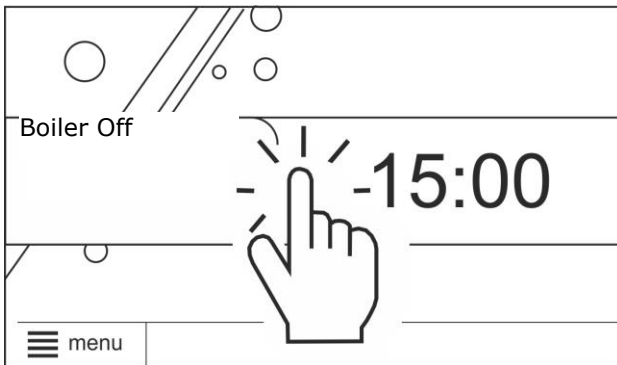
Screen with boiler off.

After accepting the boiler goes into Firing-up phase. There is a second method of integration of the boiler. Press the menu button, then press in the menu button [image].

To turn off the boiler, press the menu button, then press in the menu button [image], then the controller will go to the process of burning off. Only after burning off completion will be information "*Boiler Off*".

8.2 Preset temperature setting

The preset boiler temperature, mixer circuits temperature and grate preset temperature can be set from the menu:
Boiler settings → CH preset temp. - grate Mixer 1-5 settings →Preset mixer temp.
The parameter value: *CH preset temp. - grate*, is bypassed by the controller 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.

8.3 FIRE UP mode

The FIRE UP mode is for automatic firing up of furnace in boiler. Total time of firing up process depends on controller's settings and on boiler's condition before firing up. The

parameters affecting the firing up process are in the menu:
Service settings → Burner settings → Fire up
Firing up phase cycles:
Phase 1 is the ignition test time. It does not appear on first fire up, only after e.g. boiler inactivity period in STOP mode. Fan is switched on with the power set by *Firing up airflow* parameter. Small fuel dosage is given, 20% of basic dosage. If during period set by *Ignition test time* parameter, from switching the fan on, the flame does not reach the value from *Flame detection* including *No fuel detection time,* firing up process will end – the controller enters into OPERATION mode. If the fire up detection criteria are not met the controller will try to clean and fire up the furnace.

Phase 2 is firing up. The furnace is cleaned using fan with the power of *Cleaning airflow* and operation of movable grate. In some cases the controller extends the cleaning time before firing up to make sure that there are no smoldering fuel particles in the burner, e.g. after power failure. This is to minimize the risk of fuel gasification in the boiler chamber and the possibility of ignition of accumulated gases. Along with the furnace the heat exchanger is also cleaned mechanically.

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. Further attempts of firing up are signaled by numbers next to the igniter [image]. After three failed firing up attempts an alarm "*Unsuccessful boiler 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 STABILIZATION mode

Additional indirect operation mode between FIRE UP and OPERATION mode. In this mode the controller tries to stabilize the flame,

thereby to fire up the furnace most effectively.

Service parameter *Stabilization time* determines the time to reach flame stability during firing up by the controller. After reaching flame stabilization the controller enters OPERATION mode.

8.6   OPERATION mode

In the OPERATION mode the burner fan operates constantly. Fuel feeder is engaged periodically. Period consists of feeder operating time and pause in fuel feeding time.
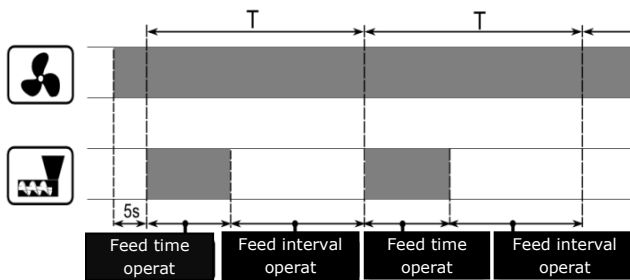
Feeder and fan operation cycles.

The *Feeding cycle time* parameter is located in the menu:

Service settings → Burner settings → Fuel

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 are available in the menu:

Service settings → Burner settings → Airflow

8.7   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

Operation in Standard mode.

If the boiler's temperature reach preset one then the controller switches off to SUPERVISION mode. For this mode the following parameters must be set respectively *50% H2 hysteresis H2* and *30% H1 hysteresis*.
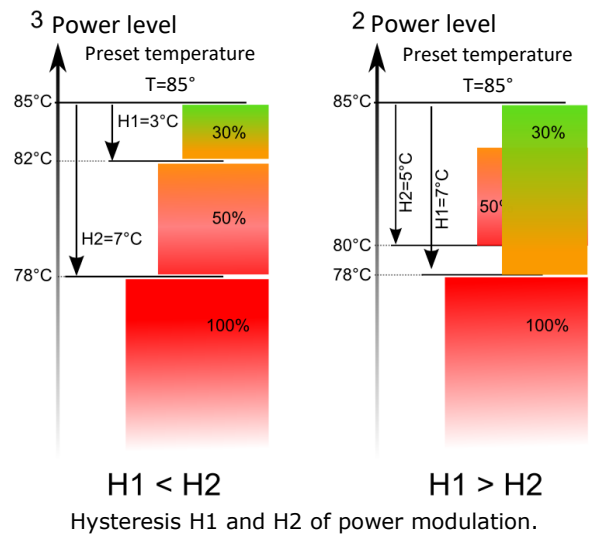
Hysteresis H1 and H2 of power modulation.

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 H2 and H1 hysteresis 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 adjustment of H2 and H1. It also allows for quicker reach the preset temperature. In addition, you can adjust the boiler output in FL mode by the parameters *Min. boiler output FL* 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.

8.8   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 regulation mode – 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

Mode parameters must be set according to recommendations of boiler/burner manufacturer. They should be selected in such a way that the furnace did not damp out during boiler pauses (it should not be fired up too much simultaneously as it will cause boiler temperature to increase).

⚠ 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.

8.9 BURNING OUT/BURNING OFF mode

In BURNING OUT mode the remaining fuel burns out and the boiler is prepared for burning off and next to enter STOP or CLEANING mode. All parameters affecting the burning out/burning off process are grouped in the menu:

Service settings → Burner settings → Burning out/Burning off

The controller stops feeding the fuel and performs cyclic blowing according to *Blowing time* and *Blowing pause* settings in order to burn the remaining fuel. After flame brightness dropping below *Burning out end threshold* value it enters into Burning off mode where after expiry of *Burning off time* the controller will shut down the boiler but still control the CH and HUW pumps.

8.10 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 (*Buffer loading start temperature*).

8.11 GRATE mode/CLEANING

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

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

In the grate mode fuel feeder is turned off. The combustion process is regulated by the fan. Fan power, when working with grate, is set in the parameters: *Fan in grate mode*, *Fan output in grate mode* and *Blowing power – supervision*, *Blowing pause - maintaining*. The parameters affecting the grate operation are set in the menu:

Boiler settings → Output modulation and

Service settings → Burner settings → Cleaning

Service settings → Burner settings → Grate

The values of parameters such as:

Boiler settings → CH preset temperature - grate

Service settings → Boiler settings → Boiler hysteresis - grate

are individually adjusted for the "grate". This allows to define different properties of boiler operation for operation modes "grate" and "pellets". When using the grate 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 pump activation temperature and then for a period of 10 minutes there has been no growth.

Cleaning from residual of spent fuel is carried out by operation modes of moving grate, in accordance with the set parameters in the menu:

Service settings → Burner settings → Cleaning

8.12 HUW settings

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

By setting: **HUW settings → HUW pump mode** user is able to:

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

8.13 HUW preset temperature setting

Preset temperature HUW is defined by parameter:

HUW settings → HUW preset temperature

8.14 Hysteresis of HUW container

Below temperature *HUW preset temp.* minus *HUW hysteresis* the HUW pump will activate to feed the HUW container.

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

8.15 Activation of the SUMMER function

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, you can set the parameters: *SUMMER mode act. temperature*, so outdoor temp. above which the summer mode will be switched on and *SUMMER mode deact. temperature*, so outdoor temp. below which the SUMMER mode will be switched off).

8.16 HUW container disinfection

The controller can automatically, periodically make HUW container warm up to 70ºC. It is done to remove bacterial flora. Function is activated in the menu:

HUW settings → HUW disinfection

⚠ 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 container. 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 circuit settings

Settings of first mixer circle are in the menu:
Mixer 1 settings

Settings for other mixers, after connecting additional module B and C are in the following positions of the menu and are identical for each circuit.

Mixer settings without weather sensor.

It is required to set manually desired temperature in mixer's heating cycle using parameter *Preset mixer temperature,* 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, without room panel.

Set parameter *Mixer weather 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. In this configuration a thermostat can be connected. It will level inaccuracy of heating curve adjustment 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 disconnecting thermostat plugs preset mixer cycle temperature will be reduced. By correct adjustment of this reduction will stop temperature increase of temperature in heated room.

Mixer settings with weather sensor and room panel.

Set parameter *Mixer weather 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 adjustments to 20°C, i.e. for preset room temperature = 22°C the controller will move heating curve by 2°C, for preset room temperature = 18°C the controller will move heating curve by -2°C. In some cases described in point 8.18 it can be necessary to adjust heating curve shift.

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 adjustment of proper heating curve it is necessary to temporarily exclude the influence of room thermostat on the controller's operation, irrespectively if room thermostat is connected or not, by setting parameter: **Mixer 1 settings → Mixer room**

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thermostat = 0. In case of connected room panel, set temporarily the following parameter: *Room temp. factor* = 0.

Guidelines for correct heating curve setting:
- floor heating   0,2 -0,6
- radiator heating   1,0 - 1,6
- boiler   1,8 - 4
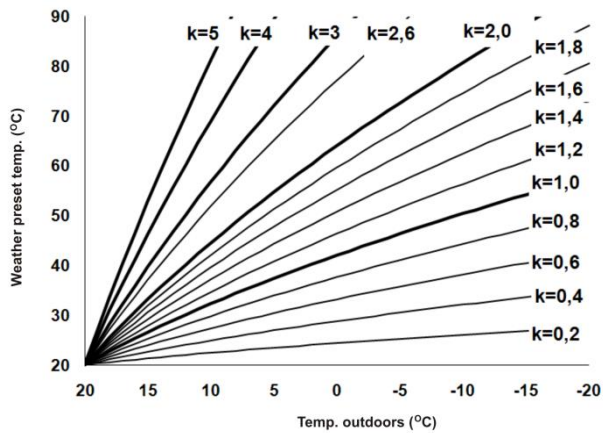
Heating curves.

Tips for choosing proper heating curve:
- If by decreasing 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,
- If 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

In the controller it is possible to set time periods of silo temperature reduction, heating cycles, HUW container, 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. To activate time intervals, set the parameter *Night time decrease* for the given heating circuit to *ON*. The parameter *Decrease* set the temperature reduction, one for all time intervals. Night time decreases can be defined separately for every day of the week set *Schedule*.
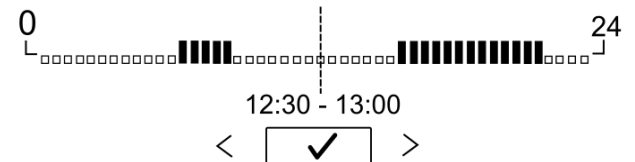
Daily time schedule with periods every 30 min.

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.

8.20 Circulation pump control

Attention: functionality of circulation pump is available only after connecting additional module C. Settings are in the menu:

HUW settings → Night time decrease circul. 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 pump operation time,* what *Circulating pump standstill time*.

8.21 Fuel level configuration

Fuel level indicator activating.
To activate displaying fuel level following parameters are to be set:
Boiler settings → Fuel level → Alarm level
on value bigger than "0", i.e. 10%.
By pressing on the left or right window of the main window you can select the fuel level indicator.

Fuel level indicator support.

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:
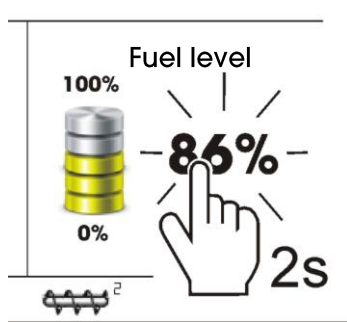
Obsługa poziomu paliwa.

"*Set fuel level to 100%?*". 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 to 100%.

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 to 100%. Calibration process in progress is marked with an on screen prompt "*Calibration*". The decreasing fuel level in the container must be under constant control. As soon as the level drops to the desired minimum set the following parameter to: **Boiler settings → Fuel level → Fuel level calibration → Fuel level 0%**

There is a possibility to skip the calibration process if the parameters are set correctly. *Feeder efficiency* and *Capacity of tank*, which are in: **Service settings → Burner settings → Operation**

8.22 Information

Menu **Information** enables view to measured temperatures and allows to check which of devices are currently activated.

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

8.23 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 "Boiler Off" mode, when silo is switched off.

Manual control	
Fan	ON
Feeder	OFF
Boiler pump	OFF
HUW pump	OFF
Lighter	OFF

Manual control window view: OFF – means that the device is turned off, ON – the device is turned on.

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

8.24 Menu favorites

In the menu bar at the bottom of the screen is visible button ⭐. After its selecting appears quick selection menu. Elements of this menu is added by hold for a moment the appropriate icon in the rotary menu.

To remove an item from the menu favorites being in the favorites menu hold the selected icon and then confirm the deletion.

8.25 Cooperation with room thermostat and room panel

The controller can cooperate with:
- wireless, battery-powered room thermostat eSTER_x40, via ISM communication,

- wireless room panel eSTER_x80 with thermostat function via bilateral ISM communication,
- wired room panel ecoSTER200 and ecoSTER TOUCH, with room thermostat function.

The room thermostat and room panel simultaneously transmit useful information, such as: fuel level information, burner operation status, alarms, allows to set controller parameters and its operation modes, it also serves as an additional panel controlling the boiler.

8.26 Cooperation with internet module

The controller can cooperate with ecoNET300 internet module. It allows view and control of the controller on-line via Wi-Fi or LAN network using **www.econet24.com** service, via WWW browser or ecoNET.apk, ecoNET.app mobile application. The application is downloadable free of charge under:

ecoNET.apk

9 Hydraulic schemes
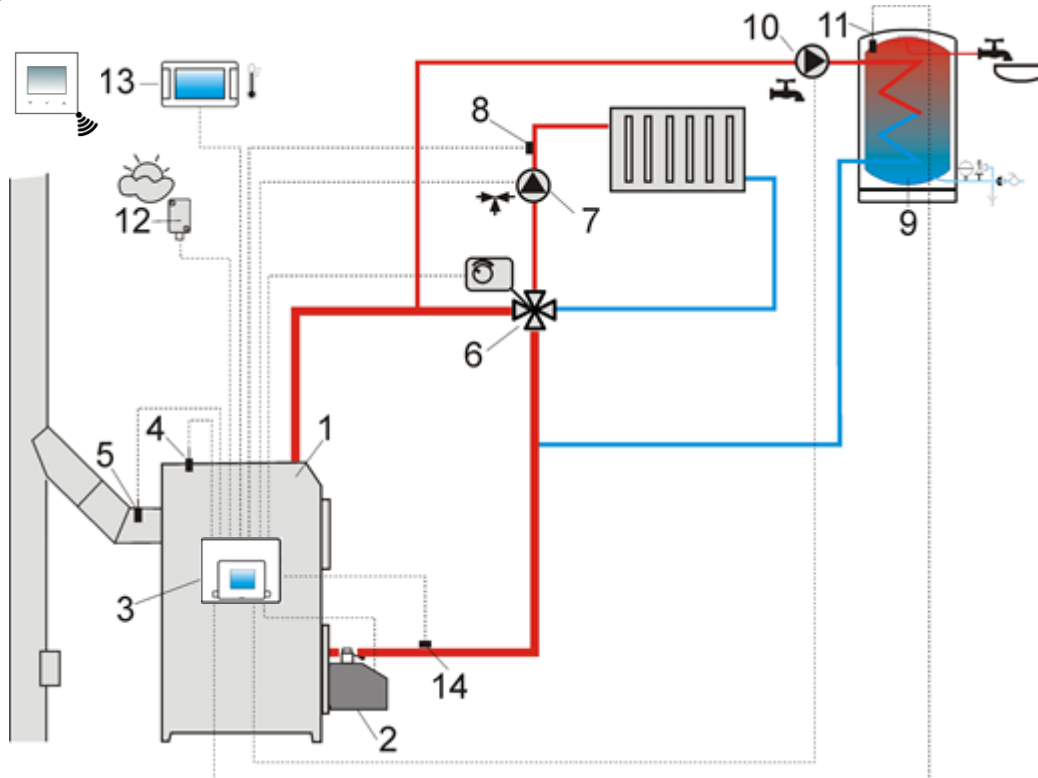
Scheme with 4-way steering valve controlling central heating circuit[1]: 1 – boiler, 2 – burner, 3 – controller, 4 – boiler temperature sensor, 5 – exhaust temperature sensor, 6 – servomotor of 4-way valve, 7 – mixer cycle pump, 8 – mixer cycle temperature sensor, 9 – HUW container, 10 – HUW pump, 11 – HUW temp. sensor, 12 – weather temperature sensor, 13 – room panel with room thermostat function or standard room panel, 14 – return temperature sensor (not necessary for system to operate).

> To improve water circulation in the boiler's gravity circuit: use large nominal cross-sections DN of the pipe and four-way valve, avoid more elbows and constrictions of the cross-section, apply other rules concerning construction of gravitational installations, such as keeping slopes, etc. If the return sensor is clip-on, insulate it thermally from the surroundings and improve thermal contact with the pipe by using thermal grease. Boiler's preset temperature must be set high enough to provide thermal power for the mixer circuit while heating up the water returning to the boiler.

RECOMMENDED SETTINGS:

Parameter	Setting	MENU
CH preset temperature - grate	75-80°C	Boiler settings
Min. preset boiler temperature	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 temperature	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 thermostat selection	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!
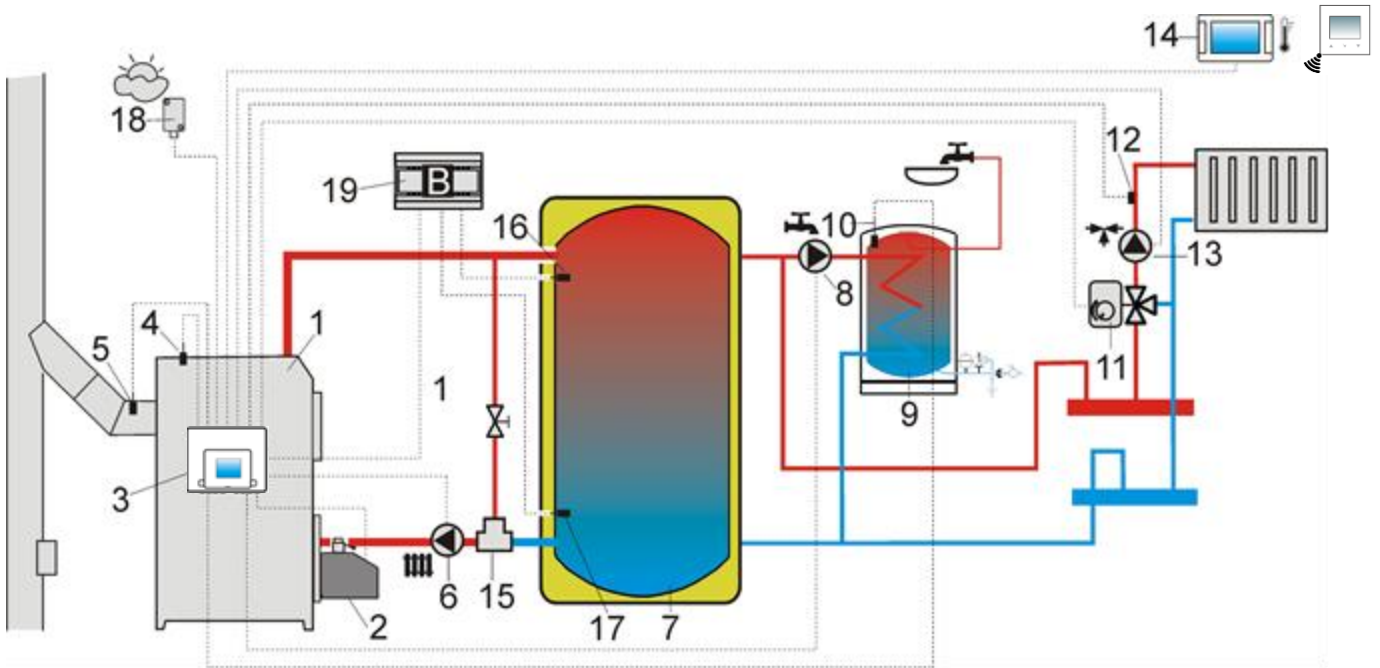
Scheme with heat buffer[2]: 1 – boiler, 2 – burner, 3 –controller, 4 – boiler temperature sensor, 5 – exhaust temperature sensor, 6 – boiler pump, 7 – heating buffer, 8 – HUW pump, 9 – HUW container, 10 – HUW temperature sensor, 11 - mixer valve servomotor, 12 – mixer circuit temperature sensor, 13 – mixer pump, 14 – room panel with thermostat function, 15 – thermostatic 3-way valve for return protection, 16 – protection, 16 - upper buffer temperature sensor, 17 - lower buffer temperature sensor, 18 – weather temperature sensor, 19 – additional module B.

RECOMMENDED SETTINGS:

Parameter	Setting	MENU
CH preset temperature - grate	80°C	Boiler settings
Minimum boiler temperature	75°C	Service settings → Boiler settings
CH pump activation temperature	55°C	Service settings → CH and HUW settings
Buffer support	Yes	Service settings → Buffer settings
Buffer loading start temperature	50°C	Service settings → Buffer settings
Buffer loading end temperature	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 thermostat selection	ecoSTER T1 eSTER T1	Service settings → Mixer 1 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!
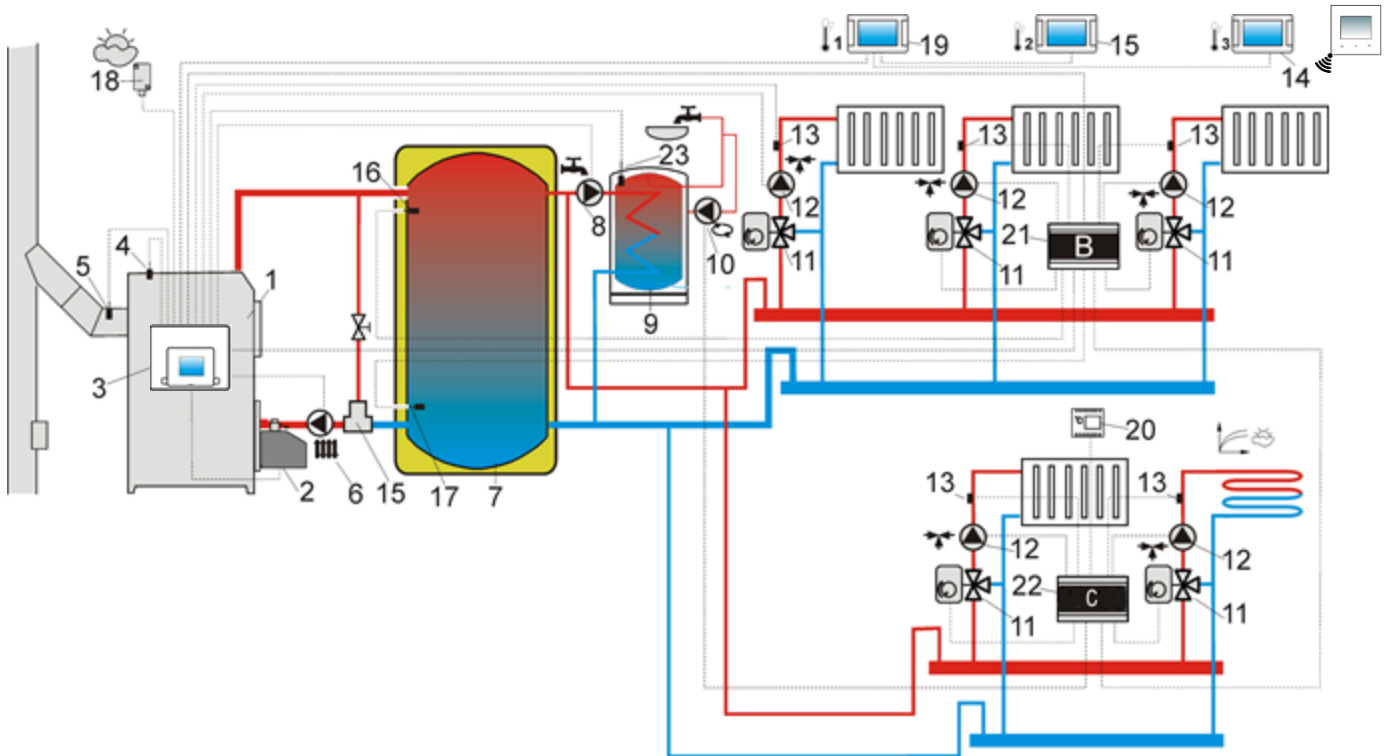
Scheme with heat buffer and five adjustable heating circuits [3]: 1 – boiler, 2 – burner, 3 – controller, 4 – boiler temperature sensor, 5 – exhaust temperature sensor, 6 – boiler pump, 7 – heat buffer, 8 – HUW pump , 9 – HUW container, 10 – circulation pump, 11 – three-way valve with servomotor, 12 – mixer circuit pump, 13 – mixer circuit temperature sensor, 14,15,19 – room panel with room thermostat function, 16 – buffer upper temperature sensor, 17 – buffer lower temperature sensor, 18 – weather temperature sensor, 20 – standard room thermostat, 21 – additional module B, 22 – additional module C, 23 – HUW temperature sensor.

RECOMMENDED SETTINGS:

Parameter	Setting	MENU
CH preset temperature - grate	80°C	Boiler settings
Minimum boiler temperature	75°C	Service settings → Boiler settings
CH pump activation temperature	55°C	Service settings → CH and HUW settings
Buffer support	Yes	Service settings → Buffer settings
Buffer loading start temperature	50°C	Service settings → Buffer settings
Buffer loading end temperature	75°C	Service settings → Buffer settings
Mixer 1,2,3,4 support	CH on	Service settings → Mixer 1…4 settings
Max. mixer 1,2,3,4 temp.	70°C	Service settings → Mixer 1…4 settings
Mixer 1,2,3,4 heating curve	0.8–1.4	Mixer 1…4 settings
Mixer 1,2,3,4 weather control	ON	Mixer 1…4 settings
Mixer 1 thermostat selection	ecoSTER T1 eSTER T1	Service settings → Mixer 1 settings
Mixer 2 thermostat selection	ecoSTER T2	Service settings → Mixer 2 settings
Mixer 3 thermostat selection	ecoSTER T3	Service settings → Mixer 3 settings
Mixer 4 thermostat selection	universal	Service settings → Mixer 4 settings
Mixer 5 support	Floor on	Service settings → Mixer 5 settings
Max. mixer 5 temp.	50°C	Service settings → Mixer 5 settings
Mixer 5 heating curve	0.2–0.6	Mixer 5 settings
Mixer 5 weather control	ON	Mixer 5 settings

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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	IP 20, IP 00[5]
Ambient temperature	0…50°C
Storage temperature	-15…+65°C
Relative humidity	5…85%, without steam condensation
Measuring range of temp. 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
Clamps	Screw terminals on the mains voltage side: 2.5 mm^2. Screw terminals on the control side: 1.5 mm^2
Display (TOUCH)	Color, graphic, with touch panel: 480x272 pix.
Dimensions	340x225x60 mm
Weight	1,6 kg
Standards	PN-EN 60730-2-9 PN-EN 60730-1
Software class	A
Protection class	For installing to devices class I
Level of contamination	2 level according to PN-EN 60730-1

11 Storage and transport conditions

The controller cannot be exposed to direct effects of atmospheric conditions i.e. rain or sunrays. The storage and transport temperature should not exceed the range -15…+65°C. During transport it cannot be exposed to vibrations higher than typical for wheeled transport conditions and direct pressure on the terminal cover to protect against damage to the STB capillary placed in the terminal box.

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

[5] IP20 - from the front side of the executive module, IP00 - from the side of the executive module cover.

12 Controller installation

12.1 Environmental conditions

Due to fire risk it is forbidden to use the controller in explosive gases atmosphere or dusts (e.g. coal dust). Moreover the controller cannot be used under water condensation conditions and be exposed to the effects of water.

12.2 Installation requirements

The controller should be installed by a qualified and authorized installer, in accordance with current norms and regulations. The producer is not responsible for damages caused by failing to observe valid law and this user manual. The environment temperature should not exceed the range 0…50ºC. The device has a single-module structure, which includes a control panel and an executive module.

12.3 Module installation

The controller installation consists in screwing it to the flat installation surface, vertical or horizontal (boiler housing, room wall). To fix the controller use the mounting holes in the controller's casing and relevant screws. The arrangement of mounting holes in the casing is shown on the figure below. The controller cannot be used as a free-standing device.
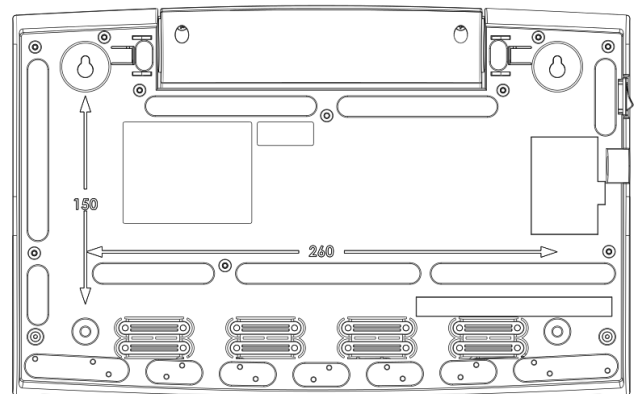
After installation make sure that the device is properly mounted and it is impossible to detach it from the mounting surface.

Opening of the boiler door or chimney duct leakage must not expose the controller to direct contact with hot gases and fire from

the furnace.

Before installation and wires connection it is necessary to lead out STB capillary from the inside of the terminal box to the outside of the controller's casing through a cable hole, according to the figure below.

Attention! Capillaries cannot be crushed or bend at sharp angle!
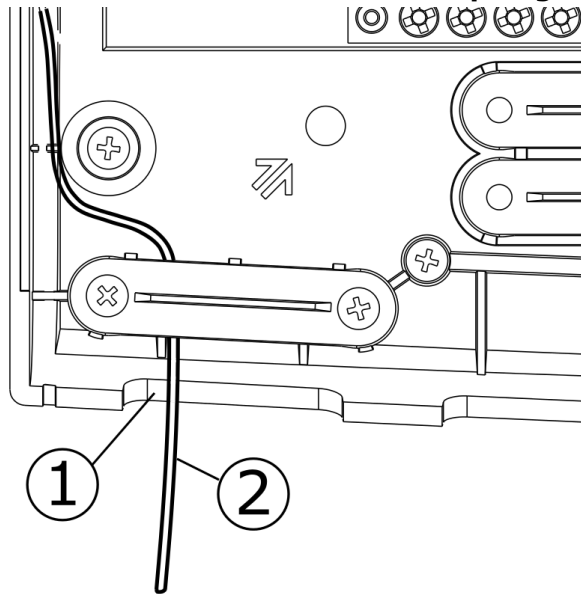
Proper STB capillary lead out: 1 – cable hole, 2 – properly lead out capillary cable.

12.4 IP protection level

The controller's casing provides the IP20 protection rating. The casing on the connectors cover side provides IP00 rating, and because of that connectors must be unconditionally covered with the cover.

If there is a need to gain an access to the terminals side, it is a must to disconnect the mains voltage and make sure there is no dangerous voltage on controller terminals.

12.5 Electric connection

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

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

the effects of the regulator, 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.

Connection cables should not have contact with surfaces which temperature exceeds cables nominal operating temperature. Terminals L, N, 1-22 are intended to connect devices with mains voltage 230 VAC. Terminals 23–48, G1, G2, G3 are intended to cooperate with low-voltage devices (below 12 VDC).

Connection of the 230 VAC mains voltage to terminals 25-48 or to transmission terminals G2, G3, B and USB results in the regulator damage and poses a threat of electrocution.

Tips of connection cables, especially mains voltage cables should be secured from splitting by e. g. insulated clamp sleeves. The terminals of the protection strip must be tightened, even if no cable is connected to the terminal.
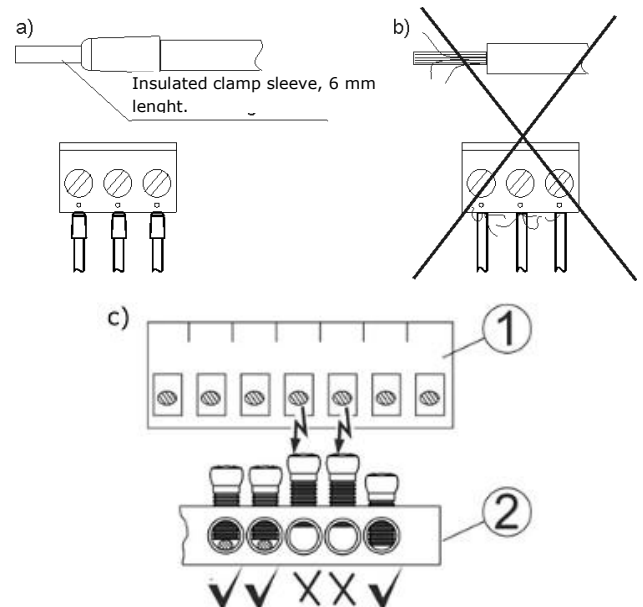
Wire protection: a) – properly secured, b) – improperly secured, c) - requirement to tighten the protective list screws, where: 1 – connector, 2 – protective strip.

⚠ It is absolutely necessary to check that no wire of an isolated cable or cable itself has no electrical contact with the metal ground strip of the controller placed near to its voltage terminals.

The feeder cable should be connected to the terminals marked with ⬆ symbol.

⚠ For safety reasons, the controller must be implicitly connected 230 VAC mains power supply in order of priority of cables, phase (L) and neutral (N). Make sure that the cables L and N were not switched within the electrical installation of the building, e.g. in an electrical socket or a distribution box!

⚠ The connection of all peripheral devices may only be made by a qualified person in accordance to applicable regulations. An example of such devices are pumps or a relay marked as "RE" and receivers connected to it. While doing so safety rules considering electrocution must be respected. The controller must be equipped with a set of connectors inserted into terminals to supply the devices with 230 VAC voltage.

To the grounding strip marked with symbol ⏚ the following should be connected:

• protective cables of devices connected to the controller,
• protective wire of supply cable,
• metal mounting surface on which the controller is mounted.

Before making any connections remove the cover from the casing of the controller as shown below.
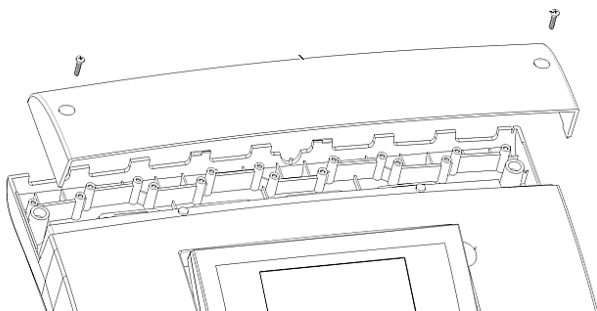
Cables secured from splitting should be connected to screw terminals of the (6) connector. Cables should be put through cable outlets in the casing (1) and secured from ripping or loosening by a holdfast (5 – break it out from the casing). Cables insulation should be stripped by the minimum possible, max. 60mm. If there is a necessity to strip cable insulation more than 60mm, cable leads should be fasten together or with other leads near the connector – in order to prevent contact with unsafe parts in the case of falling out the lead from the connector. It is not allowed to coil excess of the cable and to leave not connected leads inside the casing of the controller.
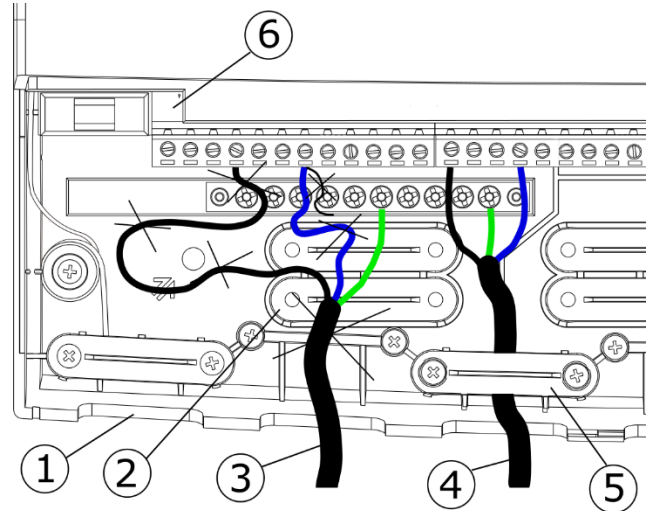
Wires installation: 1 – wire outlets, 2 – holdfasts placing (should be broken out for the casing), 3 - improper cable connection (it is not allowed to coil excess of the cable inside the device and to leave cables with stripped insulation), 4 – proper cable connection, 5 – holdfast of the cable, 6 – connector.

⚠ Electrical cables should be separated from hot parts of the boiler, especially from flues.

When the cables connection is done the cover of the connectors has to be put in place.

⚠ The connectors cover should be always screwed on to the casing of the regulator. Apart from providing safety for the user, the connectors cover also protects the interior of the regulator from hazardous environmental conditions providing a proper level of the IP protection.

25

12.6 Electric scheme
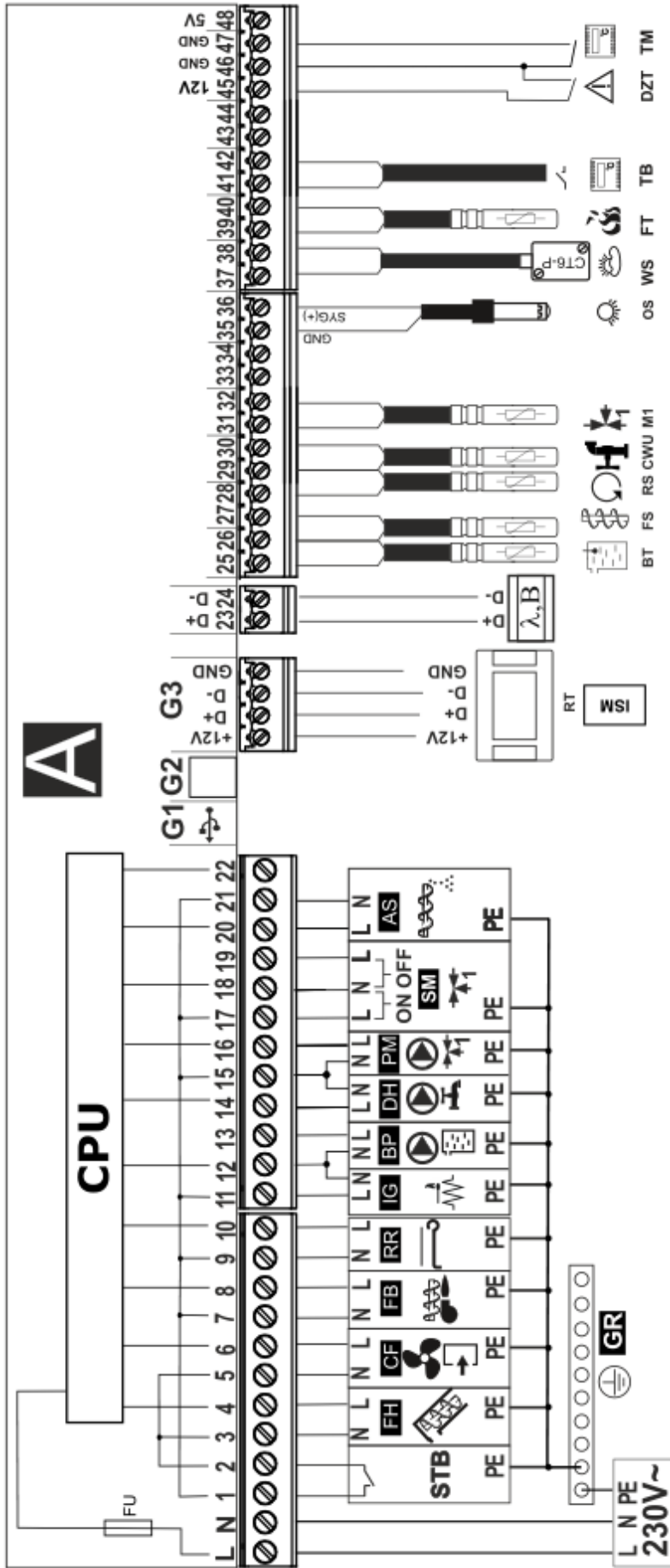
Scheme of electrical connections to the controller: L N PE - electrical power 230 VAC, **CPU** – controlling, **FU** – mains fuse, **STB** – connection to limiter of safety temperature, **FH** – main feeder, **CF** – burner airflow fan, **FB** – burner feeder, **RR** – motor of moving burner grate, **IG** – lighter, **BP** – boiler pump, **DH** – HUW pump, **PM** – mixer 1 pump, **SM** – mixer 1 servomotor, **AS** – ash removal servomotor, **RT** – room panel or **ISM** radio module, **λ** – Lambda probe module, **B** – module to support additional heating circuits, **BT** – boiler temp. sensor type CT4, **FS** – feeder temp. sensor type CT4, **RS** - boiler water return temperature sensor type CT4, **CWU** – HUW temp. sensor type CT6-P, **M1** – mixer 1 regulated circuit temp. sensor type CT4, **OS** – flame brightness sensor type OCP, **WS** – weather temperature sensor type CT2-S, **TB** – standard boiler thermostat, **DZT** – additional thermal protection DZT-1, **TM** – standard mixer 1 room thermostat.
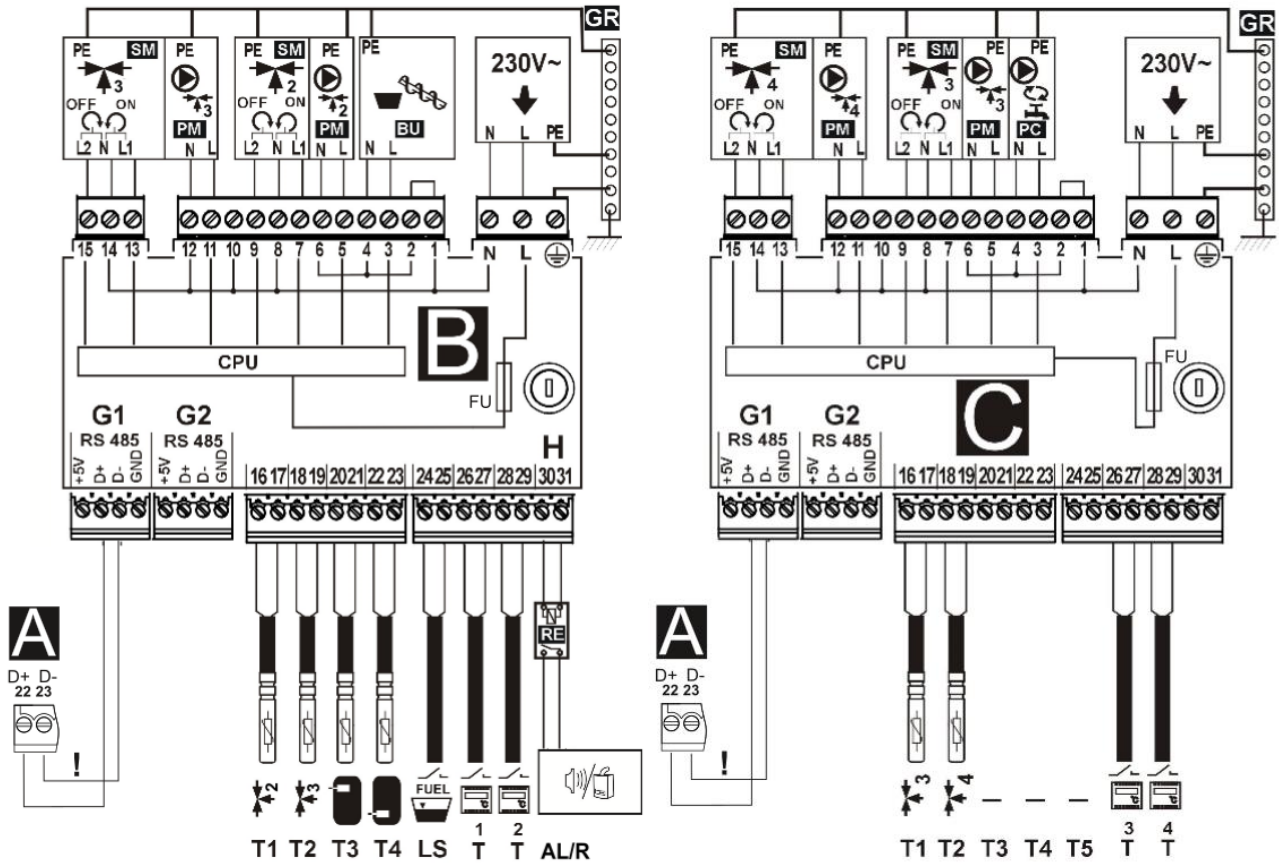
Scheme of electrical connections – additional module B and C: **G1** – transmission socket to connect module A, **!** – <u>connect only with two wires</u> (do not connect with four wires as it may damage the controller and additional module), **T1, T2** – mixer circuit temp. sensor type CT4, **T3** – buffer upper temp. sensor type CT4, **T4** – buffer lower temp. sensor type CT4, **LS** – fuel level sensor cooperating with bunker feeder, **T** – standard mixer room thermostat, **H** – voltage output, **RE** - relay (5-6V, max. 80mA), **R** – auxiliary boiler, **AL** –alarms signaling, **A** – main controller, **230V~** - mains supply, **FU** – mains fuse, **SM** – mixer servomotor, **PM** – mixer pump, **BU** – fuel feeder from bunker, **GR** – grounding strip, **PC** – circulation pumps, **CPU** – controlling.

12.7 Connection of temperature sensors

The controller cooperates only with sensors of type CT4 and CT2S. 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 container into thermometer well welded to the container. The best way to mount mixer temperature sensor is to insert it into a sleeve located in the stream of flowing water, however, it is also allowed to fasten the sensor in a contact manner provided that the sensor and the pipe are properly heat-insulated.
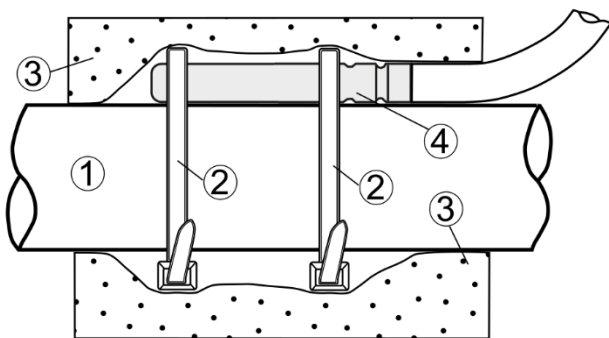
Mounting temperature sensor: 1 - pipe, 2 – clamps, 3 - thermal insulation, 4 - temperature sensor.

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

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

12.8 Connecting the weather temp. sensor

The regulator cooperates only with a weather temp. 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.
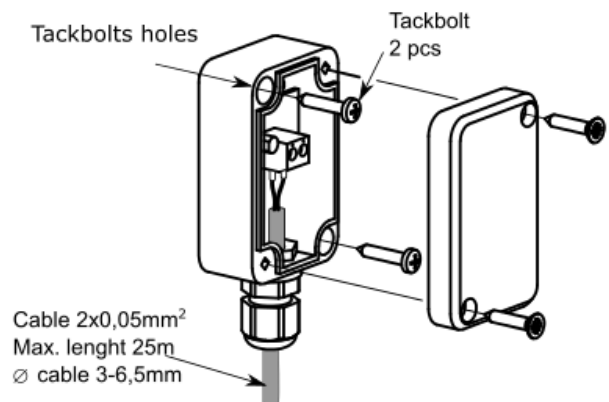
Weather sensor connection.

12.9 Connecting the exhaust temperature sensor

The exhaust temp. 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.
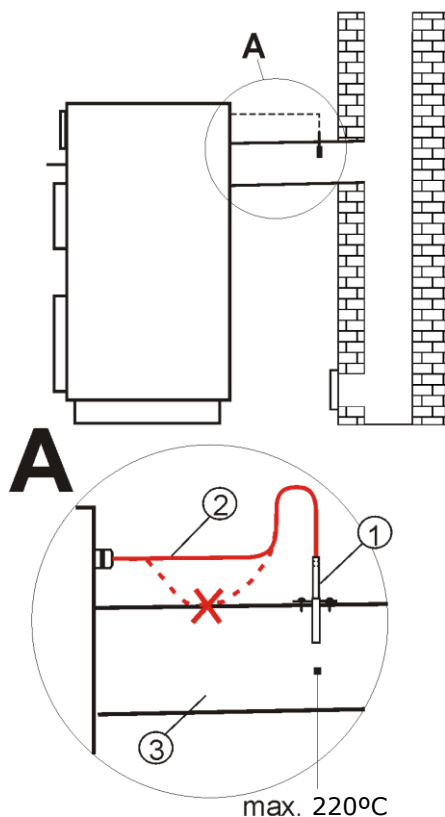
Installing the exhaust temp. sensor: 1 – exhaust temp. sensor type CT2S, 2 – sensor lead, 3 – flue.

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

12.10 Temperature 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 (KTY81)			
Ambient 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

CT6-P (PT1000) - weather			
Temp. °C	Min. Ω	Nom. Ω	Max. Ω
-25	901,6	**901.9**	1000,2
-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 (Pt1000) - 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

12.11 Optical sensor connection

The controller cooperates only with sensor of type OCP. The sensor must be connected accordingly to the electrical scheme. Indications reading from optical flame sensor is enabled in the menu:

Information → Flame

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

12.12 Mixers room thermostat 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 1-5 settings → Mixer room thermostat

Parameter value should be chosen in such a way, that after activating the room thermostat (opening contacts), the temperature in the room was dropping. In case of connecting room panel make sure, that the parameter *Thermostat selection* is properly set in the menu:

Service settings → Mixer 1-5 settings → Thermostat selection

12.13 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 selection

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

Service settings → Boiler settings → Off by thermostat

12.14 Connecting auxiliary boiler

The controller may control the operation of auxiliary boiler (gas or oil). Then it is not necessary to manually switch on or off the boiler. Auxiliary boiler will be switched on when main boiler temperature drops and will switch off when main boiler reaches relevant temperature. Connection to auxiliary boiler, e.g. gas, should be done by qualified installer, according to the technical documentation of the boiler. Auxiliary boiler should be connected using a relay to the terminals 30-31 of additional module B.
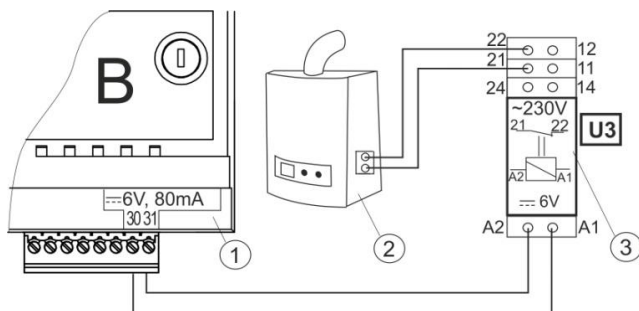
Exemplary wiring diagram for connecting auxiliary boiler to the controller: 1 – additional module B, 2 – auxiliary boiler (gas or oil), 3 –relay RM 84-2012-35-1006 and base GZT80 RELPOL.

By standard the controller is not equipped with a relay.

⚠ Relay installation should be commissioned to a qualified person, accordingly to applicable regulations.

To enable control of auxiliary boiler the parameter *Temperature of reserve boiler activation* should be set to zero in the menu:
Service settings → Boiler settings → Auxiliary boiler
Switching off the auxiliary boiler control is done by setting a zero value for the parameter of switch off.

⚠ The control output of the auxiliary boiler is also shared with the alarm output. Switching off the auxiliary boiler control will result in controlling this output by alarm control module.

When boiler is fired-up and its temperature exceeds the preset value, e.g. 25°C, then the controller will switch off the auxiliary boiler – provide constant voltage of 6 VDC to terminals 30-31. After boiler temperature drops below 25°C the controller will stop providing voltage to terminals 30-31 which should switch on the auxiliary boiler.

☞ Switching the controller off will switch on the auxiliary boiler.
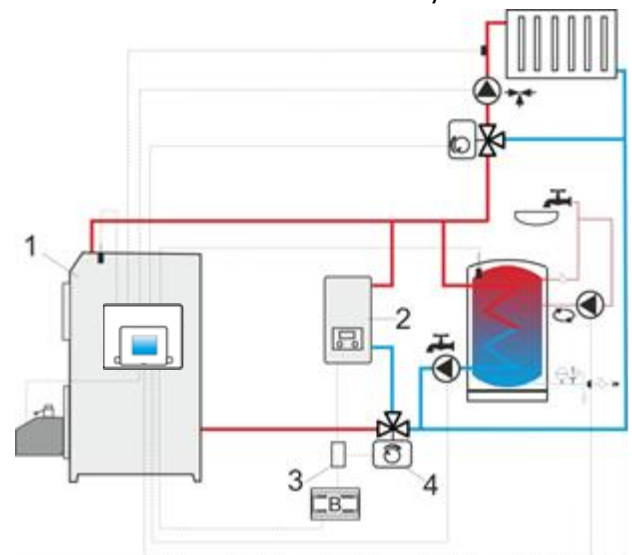
Exemplary hydraulic scheme with auxiliary boiler in closed circuit: 1 – boiler with control panel, 2 – auxiliary boiler, 3 – relay, 4 – switching valve (with limit switches).
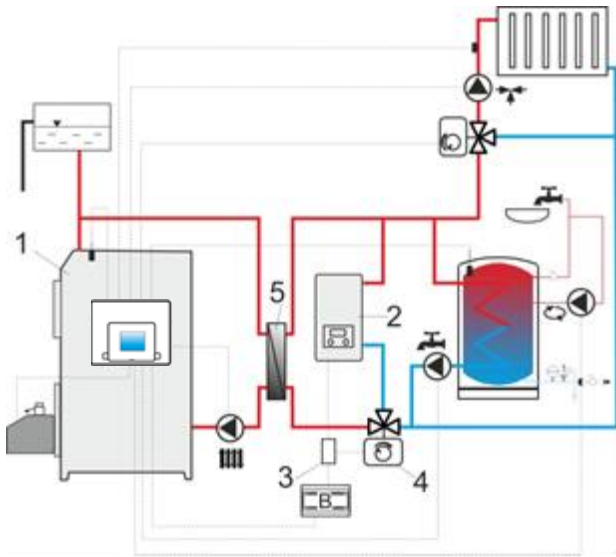
Exemplary hydraulic scheme with auxiliary boiler in open-closed circuit: 1 – boiler with control panel, 2 – auxiliary boiler, 3 – relay, 4 – switching valve (with limit switches), 5 – heat exchanger, recommended setting: *HUW priority = Off, Heat exchanger = YES*.
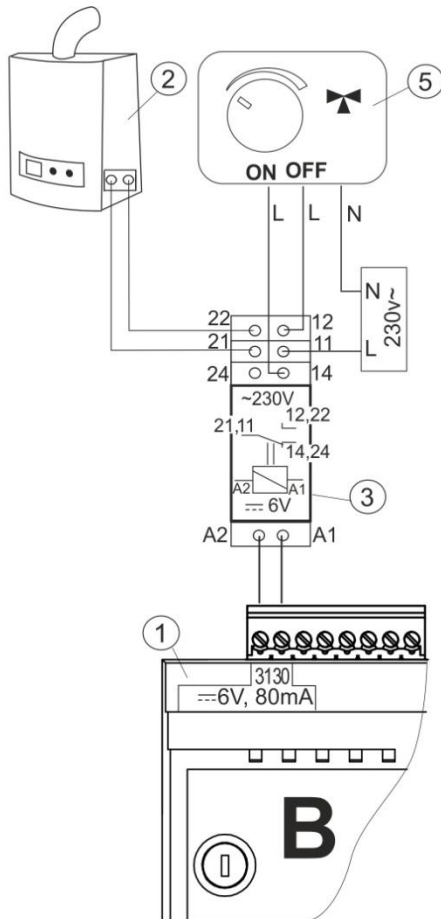
Exemplary electrical scheme of auxiliary boiler switching valve control: 1 – controller, 2 – auxiliary boiler, 3 – relay, 5 – switching valve servomotor (with limit switches). Attention: terminals 22,21,24 must be galvanically separated from terminals 12,11,14.

12.15 Alarms signaling connection

The controller may report alarms by activating external device, e.g. bell or GSM device to send SMS. The device for alarms signaling should be connected via terminals 30-31 of additional module B. As this output is shared with the output controlling auxiliary boiler, to activate alarm functions on this output the auxiliary control must be switched on first. To do that enter the following menu: **Service settings → Boiler settings → Auxiliary boiler**
and set zero value for its switching on temperature.
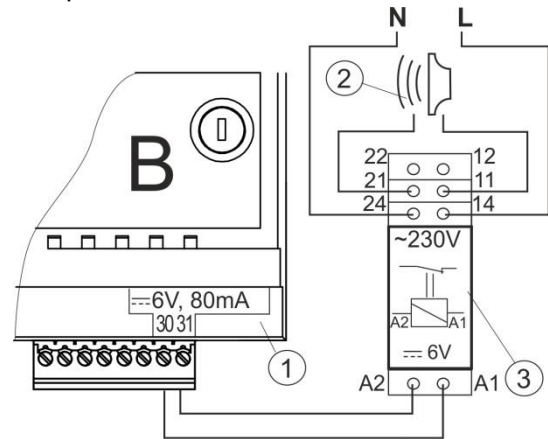
Exemplary external alarm device connection: 1 – additional module B, 2 – external alarm device, 3 – relay.

⚠ Relay installation must be done by a qualified person according to the applicable regulations.

12.16 Mixer servomotor connection

The controller cooperates only with mixing valve servomotors equipped with limit switches. Using different servomotors is forbidden. Servomotors with full circulation time range from 30 to 255 sec. can be used. Mixer connection method:

- connect mixer temperature sensor,
- electrically connect mixer pump,
- start the controller and select proper *Mixer support* in the menu: **Service settings → Mixer 1 settings**
- enter into service settings proper *Valve opening time* (the time value should be given on servomotor nameplate, e.g. 120 sec.).
- connect the electrical power to the controller and switch on the controller so the mixer pump was activated,
- choose the direction in which the servomotor closes/opens. To do so, switch the manual control on servomotor's housing and find the position in which the

temperature in mixer circuit is maximum (in the controller it is position 100% ON) and the valve position where mixer circuit temperature is minimum (in the controller it is position 0% OFF). Remember the position for further verification of proper connection,

- disconnect electrical power of the controller,

- connect electronically mixer servomotor with the controller accordingly to the electrical scheme and manufacturer documentation of the valve servomotor. Do not mix the direction of opening with closing,

- connect the electrical power of the controller and switch controller into ready mode (the controller in *Controller off"* mode),

- check whether mixer opening ang closing cables are not switched, to do so enter *Inputs test* and open mixer by selecting *Mixer 1 Opening = ON.* When opening the servomotor the temperature on mixer sensor should increase. If not, switch off the electrical power of the controller and switch the cables (attention, the other cause might be falsely mechanically connected valve! – check in valve manufacturer's documentation if it is correctly connected),

- set other mixer parameters.

Description of calibration of valve position indicator.

For mixer 1 after some time it will calibrate automatically. In order for the valve position indicator to show the correct value more quickly, disconnect the electrical power from the controller, then switch manual control on servomotor's housing. Turn the valve plug to the fully closed position, then switch back the switch on servomotor's housing to AUTO. Switch on the controller's power – % indicator of valve opening has been calibrated. Attention: in mixers 2,3,4,5 the calibration is automatic after switching on the mains power. In case of these mixers wait until % indicator of valve opening is calibrated. During calibration the servomotor is closed by the *Valve opening time.*

12.17 Circulation pump connection

Circulation pump may be connected to the boiler's controller only after buying extension executive module C.

12.18 Connecting STB temperature limiter

In case of exceeding water temperature in the boiler over 95°C the electrical power of the feeder and airflow fan is shut off by temperature safety limiter. Again switch on requires limiter to reset. To do so, unscrew the nut (1) covering the reset button (2) and press the button.
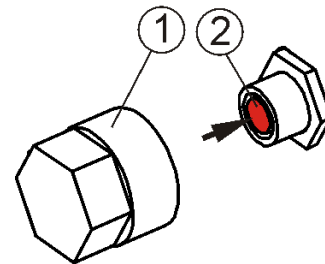
Resetting STB temperature limiter: 1 – covering nut, 2 – reset button.

The button can be pressed only after water temperature in the boiler drops. Fan and feeder power will be brought back. If the controller is not factory equipped with the temperature safety limiter, then it should be connected to terminals 1-2 of the controller as an external device.

The STB temperature safety limiter must have rated voltage of at least 230 VAC and should have valid approvals.

There is a hazardous voltage on terminals 1-2!

In case of not installing the limiter terminals 1-2 are to be connected by a bridge. The bridge must be made with insulated wire, with diameter at least 0,75 mm². With insulation which is thick enough to meet safety standards of the boiler.

Regulations require using STB limiter.

12.19 Connecting room panel

The controller can be equipped with ecoSTER200 or ecoSTER TOUCH room panel, that can serve as: room thermostat, panel controlling boiler, alarm signaling, fuel level indicator.

⚠ Cross-section of 12 V and GND wires to connect room panel should be at least 0,5 mm^2.

Maximum cables length should not exceed 30m. This length cannot be higher when cables with cross-section higher than 0,5 mm^2 are used.

Four-wires connection.
Connect according to electrical scheme.

Two-wire connection.
Two wire connection requires using additional +12 V power supply with min. current of 200 mA. Re-connect GND and +12 V wires to external supply, which is not the controller's equipment. Connect D+, D- wires to G3 socket in the controller. Maximum cables length to room panel depends on wires cross-section and for 0,25 mm^2 wire it should not exceed 30 m. Cross-section should not be however lower than 0,25 mm^2.
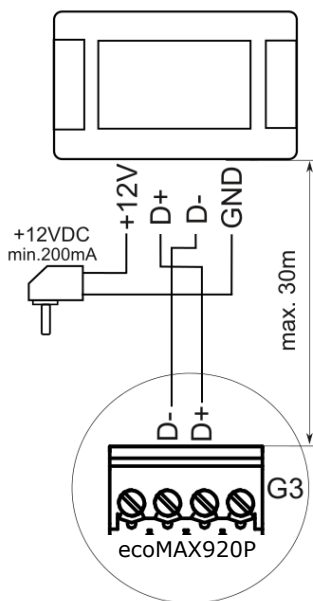
12.20 Wireless room panel connection
Wireless radio connection of eSTER_x80 panel and eSTER_x40 thermostat requires connecting ISM_xSMART radio module to the controller, accordingly to the electrical scheme and performing pairing between panel/thermostat and radio module. Further description of wireless panel and thermostat operation is in relevant manual for these devices.

13   Service menu - structure

Menu available only after entering service password.

Service settings
Burner settings
Boiler settings
CH and HUW settings
Buffer settings*
Mixer 1-5 settings*
Other
Save service settings
Restore default settings
Restore service settings
Touch panel calibration

Burner settings
Airflow
Airflow for maximum power
Airflow for medium power
Airflow for minimum power
Airflow power in sustain
Firing-up airflow
Stabilization airflow
Cleaning airflow
Maximum blow in burning out
Minimum airflow power
Revolutions scaling
Fuel
Boiler rating power
Medium boiler power
Minimum boiler power
Starting dosage
Supplement dosage
Cycle operation time
Feeder 2 minimum operation time
Feeder 2 operation time
Feeder calibration:
- Calibration time
- Feeder calibration
- Tank capacity
- Fuel calorific
Firing-up
Lighter test time
Flame detection
Fire-up time
Firing-up attempts
Heating up time
Stabilization time
Vanishing flame delay
Cleaning
• Grate support mode:
➢ **None** – Stoker emptying time*
➢ **VIP** – Poker operation time*, Poker pause*, Grate operation time in burning off*, Fan power increasing*, Stoker

emptying time*
- ➢ **Cycle** – Poker operation time*, Poker pause*, Stoker emptying time*
- ➢ **Roto** – Poker operation time*, Poker pause*, Stoker emptying time*
- ➢ **Cycle x K** – Poker operation time*, Poker pause*, Poker cycles*, Deslagging time*, Stoker emptying time*
- ➢ **Perfect constant** – Poker operation time*, Poker emptying*, Poker cycles*, Deslagging time*, Stoker emptying time*
- ➢ **Intermittent perfect** – Poker operation time*, Poker emptying*, Deslagging time*, Stoker emptying time*

Burner settings (cont.)
• Poker operation*
• Poker pause*
• Grate operation time in burning off*
• Fan power increase*
• Stoker delay time*
Burning out/Burning off
• Burning off end threshold
• Blowing time
• Blowing pause
• Burning off time
Grate*
• Blowing operation – supervision
• Blowing time - sustain
Lambda probe*
• Operation with Lambda probe
• Maximum oxygen power
• Medium oxygen power
• Minimum oxygen power
• Blowing correction range
• Amplification
• Integration constant

Boiler settings
50 % H2 hysteresis
30 % H1 hysteresis
Boiler hysteresis – grate
Thermostat selection
Return protection*
Minimum boiler temperature
Maximum boiler temperature
Boiler cooling temperature
Auxiliary boiler*
• Auxiliary boiler switching on temperature
Boiler thermostat function
• Turn off burner, Turn off pump, Turn off burner and pump
A,B,C FL parameter*

CH and HUW settings
CH pump switching on temperature

| CH pump standstill when loading HUW |
| Minimum HUW temperature |
| Maximum HUW temperature |
| Boiler temp. increase from HUW and mixer |
| Extending HUW pump operation time |
| Circulating pump standstill time* |
| Circulating pump operation time* |
| Heat exchanger* |

| Buffer settings* |
| Buffer support |
| Buffer loading start temperature |
| Buffer loading end temperature |

| Mixer 1-5 settings* |
| Thermostat selection* |
| Mixer support |
| • OFF |
| • CH ON |
| • Floor ON |
| • Only pump |
| Minimum mixer temperature |
| Maximum mixer temperature |
| Proportional range* |
| Integration time constant* |
| Valve opening time |
| Switching off pump from thermostat |
| Mixer dead zone* |

| Other |
| Maximum feeder temperature |
| Maximum exhaust temperature |
| Outputs test time |
| Show advanced |

* unavailable if a relevant sensor, additional module is connected or parameter is hidden.

14 Description of service parameters

14.1 Burner

Parameter	Description
Airflow	
Airflow for maximum power	% of airflow from maximum value in Operation mode. Parameter related to Power modulation.
Airflow for medium power	% of airflow from medium power in Operation mode. Parameter related to Power modulation.
Airflow for minimum power	% of airflow from minimum power in Operation mode. Parameter related to Power modulation.
Airflow power in sustain	% of airflow fan power in Sustain mode.
Firing-up airflow	% of airflow when firing-up. Too high value extends firing-up process or causes failed attempt of firing-up.
Stabilization airflow	% of airflow fan power in Stabilization mode.
Cleaning airflow	% of airflow fan power in Cleaning mode. Furnace is cleaned using fan.
Airflow power in burning out	% of airflow fan power in Burning out mode.
Minimum airflow power	Minimum airflow fan power that user can set. It is used only to limit the available fan power range. It is not used for algorithm controlling fan. It should be as low as possible, so that the fan was rotating slowly and freely without "rumbling".
Revolutions scaling	The value of rescaling the power of airflow fan in range of 22-100% max airflow power, which affects its rotational speed and thereby output power of the fan.
Fuel	
Boiler rated power	Boiler rated power in kW which is allowed in Standard regulation mode, in Operation mode.
Medium boiler power	Level of medium boiler power in kW which is allowed in Standard regulation mode, in Operation mode.
Minimum boiler power	Level of minimum boiler power in kW which is allowed in Standard regulation mode, in Operation mode.
Starting dosage	Feeding time of fuel dosage while firing-up. Relates first firing-up attempt.
Supplement dosage	After starting dosage a supplement dosage is provided in % of starting dosage.
Operation cycle time	Time of full feeder operation cycle in Stabilization mode. Cycle is the feeder operation time and pause time in feeding the fuel.
Feeder 2 minimum time	Minimum operation time for feeder placed in burner.
Feeder 2 operation time	Determines operation time of additional feeder (bunker feeder). The feeder is connected to additional module B. After that time the additional feeder operation is paused regardless open contacts of fuel level sensor. Contacts of fuel level sensor are in additional module B.
Calibration	The purpose of feeder calibration is calculation of real efficiency value of the feeder, which is necessary for proper burner operation. • *Calibration time* – duration time of calibration process. • *Feeder calibration* – turning on the calibration for the time set in *Calibration time*. • *Tank capacity* – capacity of fuel tank in kg. • *Fuel calorific* – fuel calorific in MJ/kg.
Firing-up	
Lighter test time	Time to check whether the furnace is already fired-up. Only fan operates.
Flame detection	Flame detection threshold in %, at which the controller detects, that the furnace is fired-up. It is also used to detect lack of fuel and end of burning off.
Fire-up time	Time of subsequent firing-up attempts. After that time the controller makes another attempt of firing-up.
Heating up time	Time of heating up the lighter before switching on the fan. It should not be too long in order not to damage the heater. After this time the heater still operates until detecting the flame.
Firing-up attempts	Maximum number of attempts made by the controller to effectively fire-up the furnace. Exceeding this number will cause an alarm.
Stabilization time	Time necessary to achieve flame stability during firing-up.
Vanishing flame delay	Detection time of no fuel basing on intensity of the flame. After exceeding this time, when flame intensity is still lower than preset, then the controller will enter from Operation into Firing-up mode. If there is no fuel in the container, firing-up will end with notification of no possibility to fire-up the furnace.
Cleaning	
Grate support mode	*Stoker emptying time* parameter determines how much time is needed to remove the whole fuel from stoker. Emptying the stoker is performer while feeding the starting dosage of fuel and during burning off the burner.

	Available burner cleaning modes:
	None – the grate mechanism operation is not included in Cleaning mode. **VIP** - the grate mechanism connected to output 1 in controller's module operates continuously and is on/off cyclically according to the settings of following parameters *Poker operation, Poker pause.* In Burning out and Burning off mode the grate operates for a preset *Grate operation time in burning off* and cleaning is done with fan ON, which increases its power for given burner power level, for a preset time, by a parameter *Increasing fan power* with switching on the grate. **Cycle** – the grate mechanism connected to output 1 in controller's module starts in Operation mode for each boiler power level. In Firing-up and Stabilization mode the grate stops and is on/off cyclically according to the settings of following parameters *Poker operation* and *Poker pause.* In Burning out and Burning off mode the grate mechanism operates continuously until boiler is off, activating itself with *Poker operation.* Setting *Poker pause=0* means, that the grate operates continuously in reverse mode. Here output 2 is inactive. **Roto** – the grate mechanism connected to output 1 operates the same as in Cycle in Operation and Burning out mode. During Burning off mode the mechanism is switched on continuously for the duration of this mode. Mechanism on output 2 is activated only during burning off simultaneously with mechanism on output 1. **Cycle x K** – mechanism 1 of the grate operates the same as in Cycle. In Operation mode mechanism 2 operates cyclically activating itself for the time of *Poker operation,* after this time the mechanism returns and the subsequent activations are done by every K-factor of the mechanism on output 1 (of K=3 then the mechanism will activate with third activation of mechanism on output 1, for K=1 both mechanisms will operate in parallel mode). Two mechanisms use parameter settings for the mechanism on output 1. **Perfect constant** – mechanism 1 operates the same as in Cycle. In Operation mode the mechanism 2 is off. After *Maximum burner operation time* it will put the burner into incremental power decreasing mode to the minimum power of the burner and activate mechanism 2 in Cycle mode, including the K multiplication factor (it indicates how many times the mechanism 2 will be activated), after finishing of which it will start operation again increasing the device's power to preset operation conditions. Mechanism 2, when the burner finishes its operation in Burning out/Burning off mode, the Cycle mode for mechanism 2 will start. **Intermittent perfect** – mechanism 1 operates the same as in Cycle. In Operation mode mechanism 2 is off. After *Maximum burner operation time* it will put the burner into operation finishing mode, which is Burning out/Burning off mode, during which mechanism 2 operates the same as in Cycle with parameters the same as for mechanism 2.
- Poker operation - Poker pause - Grate operation time in burning off - Increasing fan power - Stoker emptying time	Additional parameter settings independent from grate ode selection in parameter *Grate support mode.* The parameters serve the same function as in *Grate support mode.*
Burning out/Burning off	
Burning out end threshold	% of flame brightness. Below this value is a sign of ending burning out. Burning out process may start again when the flam eis back. After burning out the boiler burning off starts.
Blowing time	Duration of blowing while burning out fuel in burning off.
Blowing pause	Pause between blowing when burning out fuel in burning off.
Burning off time	Duration time of furnace burning out below which the controller recognizes, that the burning out is ended and enters into pause or cleaning mode.
Grate	
Blowing operation – supervision	Duration time of fan blowing in sustain, while the Grate operates. The value should not be too high in order not to cause too much water heating in the boiler.
Blowing pause – sustain	Pause time between blowing in sustain, when operating in Grate mode. The value should not be too high in order not to cause too much water heating in the boiler.
Lambda probe Description in section 18	

14.2 Boiler

Parametr	Description
50% H2 hysteresis	Temperature transition threshold between maximum and half power of the burner.
30% H1 hysteresis	Temperature transition threshold between half and minimum power of the burner.
Boiler hysteresis – grate	Value decreased from preset boiler and grate temp. Additional lower threshold for preset boiler and grate temp.
Thermostat selection	Available options: - Off – turns off the room thermostat influence on boiler operation, - Universal – turns on standard room thermostat for the boiler, - ecoSTER T1…T3, eSTER T1…T3 – option available after connecting room panel and makes boiler operation dependent on the thermostat in room panel. If room panel is not connected,

	the controller operates only with a standard room thermostat.
Return protection	A set of parameters available after connecting return sensor, responsible for return protection of the boiler with hydraulic installation with four-way valve equipped with mixer servomotor. It is not recommended to turn on return protection function as it may cause often supply pauses in mixer circuit. Instead of that it is recommended to use higher preset boiler temperatures (70-75°C) which will cause, in installation with four-way valve (with servomotor) automatic return temperature increase.
Minimum boiler temperature	Minimum preset boiler temperature that user can set in the user menu and minimum that the controller can set automatically, e.g. from night decreases, floor control etc.
Maximum boiler temperature	Maximum preset boiler temperature that user can set in user menu and maximum that can be automatically set by the controller, e.g. from night decreases, floor control etc.
Auxiliary boiler	Description in section 12.14
A,B,C FL parameter	Applicable to FuzzyLogic mode. They affect speed at which boiler temperature reaches preset value and stability of sustaining this temperature. It is not recommended to change these parameters if the control speed and stability of sustaining value of preset temperature is at the desired level.
Boiler cooling temperature	Temperature of preventive boiler cooling. Above this temperature the controller switches on the HUW pump and opens mixer circuits to cool down the boiler. The controller will switch off HUW pump if the water temperature exceeds maximum value. The controller will not open the mixer circuit when *Mixer support = Floor on.*
Boiler thermostat function	Available options: • *Turn off boiler* – after activation of boiler thermostat the burner is off, only boiler pump operates. • *Turn off pump* – boiler pump will be off when boiler thermostat activates. Burner still operates. • *Turn off burner and pump* – after boiler thermostat activates the burner and pump of the boiler will be turned off.

14.3 CH and HUW

Parameter	Description
CH pump activation temperature	Parameter determines temperature at which the CH pump of the boiler will switch on. It prevents retting of the boiler due to cooling it with cold water returning from the installation. Attention: switching only pump off does not guarantee boiler protection against retting and, as a result, corrosion. Additional automatics should be used, e.g. four-way valve or thermostatic three-way valve.
CH pump standstill during HUW loading	Available after connecting HUW sensor. Extended HUW container loading with HUW priority on may result in excessive CH installation cooling, since with such settings CH pump is off. CH pump standstill parameter during HUW loading prevents it by enabling periodical CH pump activation during loading of HUW container. CH pump will activate after that time for constant programmed time of 30 sec.
Minimum HUW temperature	Available after connecting HUW sensor. It is a parameter with which user can be limited to set too low preset HUW temperature.
Maximum HUW temperature	Available after connecting HUW sensor. The parameter determines till what maximum temperature HUW container will be heated during discharging of excess heat from the boiler during alarms. It is a very important parameter, since setting its value too high might result in risk of scalding users with utility water. Too low value of this parameter might result in that during boiler overheat it will be impossible to discharge excess of the heat to HUW container. When designing HUW installation a risk of damaging the controller must be considered. Due to controller's malfunction water in HUW container might be heated up to dangerous temperature, causing scalding of users. Additional protection in a form of thermostatic valves should be used.
Increasing boiler temp. from HUW and mixer	The parameter determines by how many degrees the preset boiler temperature is increased to load the HUW container, buffer and mixer circuit. Increasing the temperature is done only when necessary. When preset boiler temperature is at sufficient level the controller will not change it due to necessity of loading HUW container, buffer or mixer circuit.
Extending HUW pump operation time	Available after connecting HUW sensor. After HUW container is loaded and HUW pump is off there can be a danger of boiler overheat. It happens when the preset HUW temperature is set to higher than preset boiler temperature. This problem especially concerns HUW pump operation in SUMMER mode, where CH pump is off. To cool down the boiler, HUW pump operation can be extended by the time of *Extending HUW pump operation time*.
Circulation pump standstill time **Circulation pump operation time**	Parameters are available after connecting additional module C. Standstill time between the periods of circulating pump operation is defined by the value of the *Circulating pump standstill time* parameter (recommended setting 15-40 min.). Circulating pump operates cyclically for *Circulating pump operation time* (recommended setting 60-120 sec.)
Heat exchanger	Parameter is available after setting *Show advanced* parameter to *YES.* Applies only to hydraulic installations with heat exchanger between open and closed circuit. Available options: • YES – boiler pump operates continuously in short circuit boiler – exchanger, it is not turned off, e.g. from SUMMER mode or HUW priority • NO – boiler pump operates normally.

14.4 Buffer

Parameter	Description
Buffer support	Parameter serves to activate buffer operating mode. It is available after connecting additional module B and buffer temperature sensors.
Buffer loading start temperature **Buffer loading end temperature**	Parameter *Buffer loading start temperature* defines the upper temperature of the buffer below which the buffer loading process starts. Buffer loading process is ended when lower buffer temperature reaches value defined by parameter *Buffer loading end temperature*.

14.5 Mixer

Parameter	Description
Thermostat selection	Parameter available only after connecting room panel. Option enables changing room thermostat for mixer circuit. Available options: • Off – turns off the influence of room thermostat on mixer circuit operation, • Universal – turns on standard room thermostat for mixer circuit, • ecoSTER T1..T3, eSTER T1…T3 – option available after connecting room panel and makes mixer circuit operation dependent on the thermostat in room panel. If room panel is disconnected the controller operates only with standard room panel.
Mixer support
• Off	Mixer servomotor and mixer pump are not operating.
• CH on	It applies when mixer circuit supplies CH heating installation. Maximum mixer circuit temperature is not limited, mixer is fully open during alarms, e.g. boiler overheat. Attention: do not enable this option when installation is made of pipes sensitive to high temperature. In such situations it is recommended to set *Mixer support* to *Floor on*.
• Floor on	It applies when mixer circuit supplies floor installation. Maximum mixer circuit temperature is limited to the value of *Max. preset mixer temp.* parameter. Attention: after selecting option *Floor on* the parameter *Max. mixer temp.* must be set to such value, so that the floor was not damaged and there was no risk of scalding.
• Pump only	When mixer circuit temperature exceeds temperature set in *Mixer preset temperature* the supply of mixer pump will be off. After decreasing circuit temperature by 2°C – pump is switched on again. This option is usually used to control floor heating pump when it cooperates with thermostatic valve without servomotor. However, such action is not recommended. It is recommended to use standard heating circuit for floor heating, consisting in valve, servomotor and mixer pump.
Minimum mixer temperature	It is a parameter with which user can be limited from setting too low preset mixer circuit temperature. Automatic regulation (e.g. temporary temperature decrease) also will not cause decreasing of preset temperature value below value set in this parameter.
Maximum mixer temperature	The parameter has two functions: - enables limiting setting too high preset mixer temperature by the user. Automatic regulation (correction according to heating curve from outside temperature) also will not cause exceeding preset temperature over the value set in this parameter. - with parameter *Mixer support = Floor on* is at the same time the limit temperature of mixer sensor at which mixer pump will be off. For floor heating set the value not greater than 45-50°C or other if the manufacturer of materials used to construct the floor or CH installation designer specified otherwise.
Valve opening time	Enter *Full valve opening time* value read from servomotor's nameplate, e.g. 140 sec.
Pump off by thermostat	Setting parameter to *YES* will close the mixer servomotor and switch off mixer pump after opening room thermostat contacts (room heated). However this action is not recommended as the heated room may be still cold.
Mixer dead zone	Parameter setting determining temperature dead zone value for the mixer control system. The controller controls the mixer so that the temperature value measured by the mixer circuit sensor was equal to the preset value. However to avoid too frequent servomotor movement, that can shorten its lifetime, the control is initiated only when the measured mixer circuit temperature is higher or lower from the preset by the value greater than *Mizer dead zone*.

14.6 Other parameters

Parameter	Description
Maximum feeder temperature	Determines maximum feeder temperature at which the alarm of exceeding maximum feeder temp. trips.
Maximum exhaust temperature	Determines max. exhaust temp. at which the alarm of exceeding max. exhaust temp. trips. The alarm is sustained when the temperature sustains over 1min. above the indicated level. Setting value to „0" switches alarm off.
Outputs test time	After this time all devices, that were switched *ON* in *Manual control* menu, will be switched off automatically.
Show advanced	Available options: • YES – displays hidden parameters edit of which is not recommended, • NO – hides hidden parameters.
Restore default settings	By restoring factory settings user settings from main menu will also be restored.
Save service settings	Save all service parameters set by user to internal memory of the controller.
Touch panel calibration	Setting the precision of panel display response to the selected touch point.

15 Alarms description

Alarm numbers displayed by the wireless eSTER_x40 room thermostat.

01	Max. boiler temp. exceeded
02	Max. feeder temp. exceeded
03	Boiler temperature sensor damaged
04	Exhaust temp. sensor damaged
05	Feeder temp. sensor damaged
06	Fan damaged
07	Unsuccessful boiler firing-up attempt

15.1 Maximum boiler temperature exceeded

After exceeding *Boiler cooling temperature* the controller tries to lower boiler temperature by discharging excess heat to the HUW container and opening mixers servomotors (only when *Mixer support = CH on)*. If the temperature measured by HUW sensor exceeds *Maximum HUW temperature* value, then HUW pump will be shut down in order to protect users against scalding. If boiler temperature drops, then the controller will get back to normal operation. However, if the temperature keeps increasing (reaches 95°C), then the boiler overheat alarm will trip.

The alarm can be erased after confirmation or by restarting electrical supply.

Placing temperature sensor outside the boiler's water jacket, e.g. on the outlet pipe, is unfavorable, as it may result in a delay in detecting boiler's overheating status.

15.2 Maximum feeder temperature exceeded

Alarm trips after exceeding feeder temperature over *Max. feeder temp.* parameter, then the controller will start burning off of the boiler.

Setting *Max. feeder temp.=0* enables disconnecting feeder sensor and controller's operation without this sensor. However, such settings are not recommended, as function protecting against flame striking back will be off in this case.

Protective function against flame strike back does not work when feeder sensor is disconnected or when it's damaged, or when the controller is not supplied.

The controller cannot be used as the only boiler protection against flame strike back. The additional protective automatics should be applied.

Alarm erase is done by resetting the controller, prior to checking the alarm cause.

15.3 Boiler temperature sensor damage

The alarm will occur if boiler temp. sensor is damaged and when measuring range of this sensor is exceeded. When the alarm trips the boiler is burned off. Check the sensor and replace it if necessary. The alarm can be erased after confirmation or by resetting the electrical supply.

Temperature sensor checking is described in section 12.10

15.4 Exhaust temperature sensor damage

The alarm will occur if exhaust temperature sensor is damaged and when its measuring range is exceeded. Check the sensor and replace it if necessary.

The alarm can be erased after confirmation or by resetting the electrical supply.

Temperature sensor checking is described in section12.10

15.5 Feeder temperature sensor damage

The alarm will occur when feeder temperature sensor is damaged and its measuring range is exceeded. Check the sensor and replace it if necessary.

The alarm can be erased after confirmation or by resetting the electrical supply.

Temperature sensor checking is described in section 12.10

15.6 Fan damaged

The alarm will occur when fan is damaged basing on voltage capacity on the output controlling the fan. Then the controller switches the fan off.

The alarm can be erased after confirmation or by resetting the electrical supply.

15.7 No communication

The control panel is connected with executive module via RS485 cable. In case of cable damage the alarm is displayed. The controller does not switch off the regulation and operates normally with previously programmed parameters.

Check the cable connecting control panel with the module and replace or repair it if necessary.

15.8 No supply

In case of no supply the controller will return to operation mode in which it operated before power failure.

15.9 Unsuccessful boiler firing-up attempt

The alarm will occur after unsuccessful attempt of automatic boiler furnace firing-up. After the alarm trips all pumps will be off in order not to cause excessive boiler cooling. Causes of this alarm can be e.g. damaged lighter or no fuel in the container.
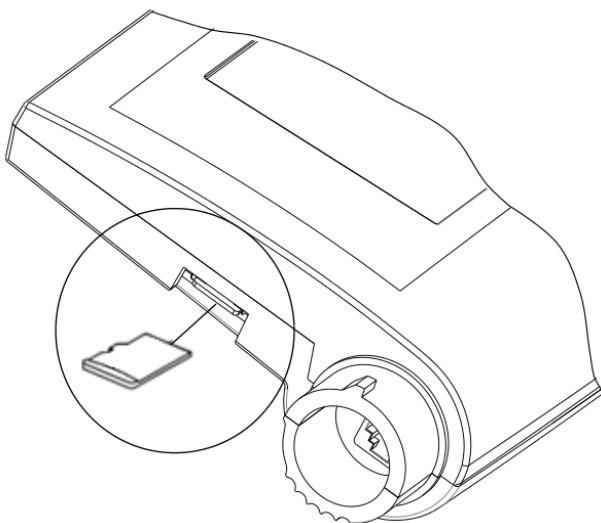
Alarm is erased by resetting the controller.

16 Firmware update

Simultaneous replacement of firmware in module and controller's panel can be done using memory card.

⚠ Firmware update can be done only by an authorized person, keeping all precautions against electric shock!.

To replace firmware:
- Disconnect controller's electrical supply,

- Insert microSD HC memory card (other card type is not supported) into indicated slot, placed in a movable panel housing. New software should be written on the card in *.pfc format in the form of two files: file with panel program and a file with program for module A of the controller,
- Place new firmware directly on the memory card, do not place data in a folder,
- Then connected electrical supply to the controller and enter menu: **Service settings → Firmware update** – replace firmware first in main A module of the controller, next in controller's panel, then in other devices.

17 Other controller functions

17.1 Power failure

In case of power failure the controller will return to the mode in which it operated before power failure.

17.2 Anti-freeze protection

When boiler temperature drops below 5°C, the boiler pump will be switched on overriding circulation of boiler's water. If water temperature will not increase, then the boiler's burner switches on.

⚠ This function cannot be the only protection against installation freezing! Other methods should be applied. The controller's producer is not responsible for damages related to this.

17.3 Pumps standstill protection function

The controller performs the CH, HUW pump and mixers protection function against standstill. It switches them on periodically)every 167h for a few seconds). It protects pumps against immobilization due to boiler scale build-up. Therefore, during pause in using boiler, the controller's supply should be connected. The function is performer also with controller off (the controller in "Boiler off" mode).

18 Lambda probe

The burner efficiency can be increased by connecting additional Lambda probe module.

Connect the model according to electrical scheme. Probe should be enabled in the menu:

Service settings → Burner settings → Lambda probe → Operation with Lambda probe

If *Operation with Lambda probe* parameter is set to *On,* then the controller will operate using indications from Lambda probe. The amount of air provided to the furnace will be automatically adjusted to achieve preset oxygen content in exhausts. If this parameter is set to *Off* then Lambda probe indications will not affect the controller's operation. Preset oxygen values for individual burner powers are entered in the parameters: *Maximum, Medium, Minimum oxygen power. Airflow correction range* parameter determines the permissible range of airflow power variation when operating using Lambda probe. It may be necessary to periodically calibrate Lambda probe indications. To calibrate the probe it is necessary to completely burn off the furnace in boiler. To start calibration enter:

Boiler settings → Lambda probe calibration

Calibration takes approximately 8 mins

19   Replacement of parts and components

When ordering spare parts and components provide necessary information read from nameplates. In case of the controller it is essential to know its serial number. If the serial number is unknown provide its model, design and year of production.

☞ Controller's serial number is placed on the nameplate of each executive module.

19.1   Replacement of control panel

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

Examples of software numbers:

Control panel	Executive module
01.xx.xxx.	**01**.xx.xxx.xx
↑	↑

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

19.2   Replacement of module controller

The requirements are the same as those for replacement of the control panel.

19.3   Mains fuse replacement

Mains fuse is located under the housing cover, near mains terminals and protects the controller and the devices supplied by it. Porcelain fuses 5x20 mm and time-lag fuses with nominal current 6.3 A/ 230 VAC should be used.
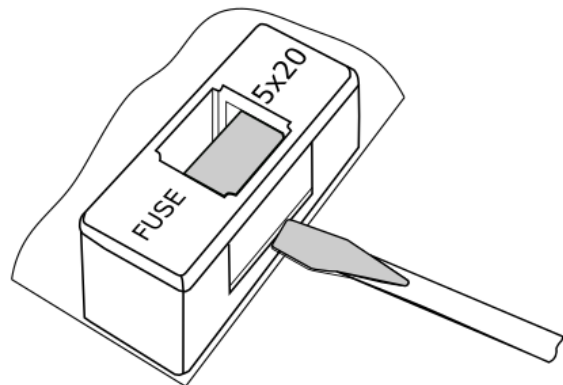
In order to remove the fuse lift the fuse holder with a flat screwdriver and pull out the fuse.

20 Description of possible malfunctions

Malfunction symptoms	Tips
No signs of operation visible on device's display despite of connecting to the network.	Check whether mains fuses are not burned out and replace if necessary.
Preset boiler temperature on display is different than programmed.	Check: ▪ whether during that time HUW container is not loaded and preset HUW temperature is set above boiler preset temperature, if yes then the difference in indications will disappear after heating the HUW container or decrease preset HUW temperature, ▪ whether time periods are on – switch off time periods.
CH pump not operating	Check: ▪ whether the boiler exceeded temperature above *CH pump activation temperature* parameter – wait or decrease value of this parameter. ▪ whether *HUW priority* is on, that blocks CH pump – switch off the priority setting *HUW pump operation mode* to *Without priority,* ▪ whether the CH pump is not damaged or blocked.
Fan not operating	▪ Check whether the input jumper of STB safety temp. limiter is on terminals 1-2, (jumper should be put on only when temperature limiter is disconnected). ▪ If boiler's producer equipped it with STB temperature limiter with manual return to original position, unlock it by unscrewing the lid and press the button according to the boiler's producer documentation. ▪ Check and replace fan if necessary.
Additional feeder not operating (module B)	Check: ▪ whether the feeder wires are correctly connected to the terminals, ▪ whether the jumper is put on terminals 1-2 of additional module B, ▪ whether the feeder's motor is not damaged, ▪ in case when running motor can be heard and the fuel is not provided check the feeder according to its manual.
Fuel feeder not operating / does not provide fuel	▪ Check if feeder wires are correctly connected to terminals. ▪ If STB temperature limiter is connected to terminals 1-2, then check if the circuit was not cut off due to boiler overheat. ▪ Check if the feeder's motor is not damaged. ▪ In case when running motor can be heard and the fuel is not provided check the feeder according to its manual.
Temperature is nor measured properly	Check: ▪ whether there is good thermal contact between temperature sensor and measured surface, ▪ whether the sensor's wire is not too close the mains cable, ▪ whether the sensor is connected to the terminal, ▪ whether the sensor is not damaged.
In HUW pump mode = SUMMER heaters are hot, boiler overheats	Increase *Extending HUW pump operation time* to cool down the boiler.
HUW pump operates even if HUW container is loaded	Set *Extending HUW pump operation time = 0.*
In hydraulic installation with mixing valve and servomotor – mixer is not opening	▪ The cause can be activation of return protection function. If the return protection function is on – check whether the water return to boiler sensor is thermically separated from environment. Improve thermal contact of sensor with pipe by applying thermal conductive paste. Increase preset boiler temperature to provide power for heating returning water. Check whether the hydraulic installation is properly made, i.e. after closing the valve the return temperature must increase above *Min. return temperature* parameter. ▪ The cause may be loading HUW container with HUW priority on. Wait until HUW container is loaded or switch off *HUW priority*. ▪ The cause can be active SUMMER mode. ▪ The cause may be ongoing calibration of mixing valve, wait until calibration ends.

Registry changes: