BurnPell

**OPERATION AND
INSTALLATION MANUAL**

S.Control MK2 STANDARD
BURNER CONTROLLER
FOR BOILERS FUELLED WITH PELLETS

BurnPell

| OPERATION | ☀27°C | Su 03:07 |

70°
48°

45°
48°

100%

RoHS CE
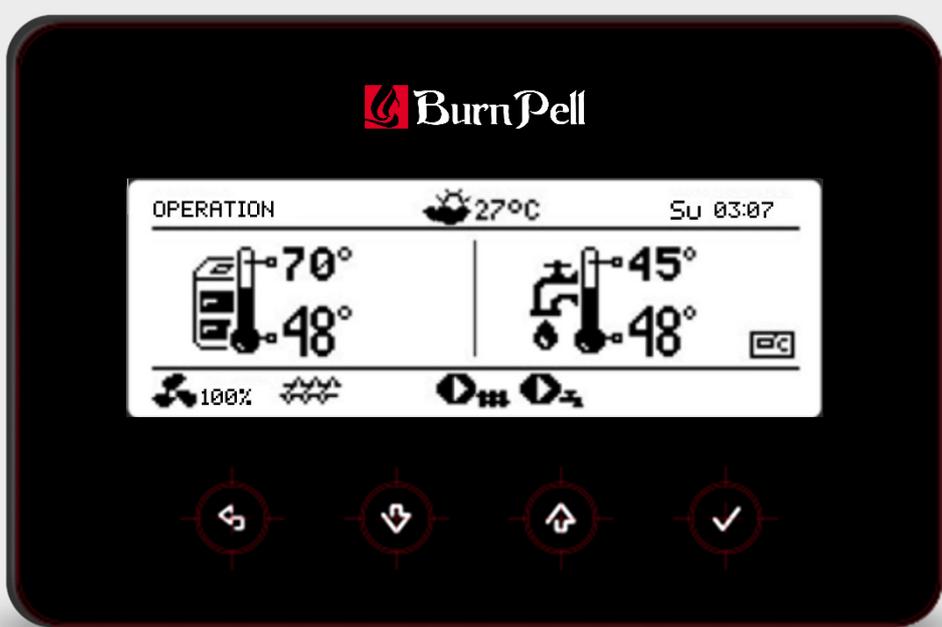
ELECTRIC DEVICE UNDER VOLTAGE!

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

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

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

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2 Recommendations regarding safety

Safety recommendations are specified in individual sections of this manual. Apart from them follow the recommendations below.

- Before installing, mending or maintenance and during any connecting works it is absolutely necessary to disconnect the network power and to make sure if the connections and wires are not electrically powered.

- After disengaging the controller, there may still be a dangerous electrical power on its connections.

- The controller must be used in accordance with its destination.

- The controller is designed for enclosure.

- Additional automatics protecting the boiler, central heating installation and hot utility water installation against controller malfunction or errors in its software must be used.

- The parameter values must be adjusted to the boiler and fuel type with the regard of all installation conditions. False parameters adjustment may result in boiler's emergency mode (boiler overheating, backfire to the fuel feeder etc.).

- The controller is designed for boiler producers. Before using the controller the boiler producer should check wether the controller can cooperate with a specific boiler and will not cause danger.

- The controller is not an intrinsically safe device, i.e. it may be a source of a spark or high temperature when in emergency mode, which together with flammable dusts or gases may result in fire or explosion.

- The controller must be installed by the boiler producer, in accordance with applicable standards and regulations.

- Modification of programmed parameters should only be carried by a person familiar with this manual.

- The controller can only be used in heating circuits made in accordance with applicable regulations.

- The electrical installation in which the controller operates should be protected with a fuse selected for the applied loads.

- The controller cannot be used with a damaged housing.

- Under no condition the controller's construction can be modified.

- The controller has electronic disconnection of connected devices (type 2Y operation according to PN-EN 60730-1) and micro disconnection (type 2B operation according to PN-EN 60730-1).

- Access of children to the controller should be prevented.

3 General information

The S.Control MK2 ST5 controller is intended to control the pellet boiler using the optical flame brightness sensor. The controller can control the operation of direct central heating circuit, hot utility water circuit and also operation of five heating mixer circuits. The circuits temperature can be set on the basis of weather sensor indications. The ability to cooperate with room thermostats, separate for each heating circuit, helps to maintain comfort temperature in heated rooms. Moreover, the device activates the auxiliary gas or oil boiler when necessary.

The controller can cooperate with additional room panel placed in living rooms and additional module Lambda Control and has ability to remotely control it via Internet using Net Control internet module.

The controller can be used within a household and similar, and in lightly industrialized buildings.

4 Information about documentation

The controller's manual is the supplement to the boiler's documentation. In particular, aside from the content of this manual, follow the boiler's documentation. The controller's manual has been divided into two parts: for user and for the installer. However in both parts essential information regarding safety have been included, that is why the user should get familiar with both parts of the manual.

We do not take responsibility for damages resulting from not following this manual.

5 Documentation storage

Please store this installation and operating manual and all other applicable documentation with diligence, so that they could be used in any case. In case of relocation or selling the device the attached documentation needs to be passed on to the new user or owner.

6 Symbols used

The following graphical symbols are used in this manual:

- the symbol indicates useful information and tips,

- this symbol indicates important information on which damage of property, danger to health and life of humans or domestic animals may depend,

Attention: essential information were indicated with these symbols to familiarize with this manual more easily. However it does not release the user and the installer from following the requirements indicated by the graphical symbols!

7 Directive WEEE 2012/19/EU

Purchased product has been designed and made of the highest quality materials and components, which are recyclable and reusable.

The product meets the requiremenrs of **Directive 2012/19/EU of the European Parliament and of the Council of 4 July 2012 on waste electrical and electronic equipment (WEEE),** according to which it is marked with a symbol of the crossed-out wheeled bin (like above), informing that the product is subjected to separate collection.

End of product life responsibilities:

- Dispose of packaging and product at end-of-life at an appropriate recycling company.
- Do not dispose of the product with normal household waste.
- Do not burn the product.

By complying with these obligations of controlled disposal of waste electrical and electronic equipment, you will avoid damaging the environment and endangering human health.

S.Control MK2 ST5

8   User menu - structure

Main menu
Information
Boiler settings
HUW settings*
Summer/Winter
Mixer 1-5 settings*
Night time decrease
CHIMNEY SWEEP mode
• On/Off mode, Preset boiler power, Operating time
General settings
Manual control
Alarms
Service settings
Exit

Boiler settings
Preset boiler temp.
Boiler weather control*
Boiler heating curve*
Parallel shift*
Room temp. coefficient*
Weather sensor*
• Sensor type: None, CT4-P, CT6-P
• Sensor correction
Thermostat selection
• Off, Universal, Room Control*
Power modulation
• Max. burner power
• Airflow correction – max. power
• Oxygen correction – max. power*
• H2 hysteresis
• Intermediate burner power
• Airflow correction – interm. power
• Oxygen correction – interm. power*
• H1 hysteresis
• Min. burner power
• Airflow correction – min. power
• Oxygen correction – min. power*
• Boiler hysteresis
• Airflow power - grate*
• Exhaust fan airflow power - grate*
• Absolute pressure - grate*
• Feeder efficiency
• Fuel calorific
Operation mode
• Pellet, Grate
Control mode
• Standard
• FuzzyLogic, Lambda Fuzzy Logic*
Fuel type
Cleaning level*
• Normal
• Increased

• Intensive
Fuel level
• Alarm level
• Fuel level calibration
Burner cleaning
Lambda probe calibration*
Cleaning schedule
• On, Schedule
Burner schedule
• On, Schedule

HUW settings
HUW preset temperature
HUW pump operation mode
• Off, Priority, Without priority
HUW tank hysteresis
HUW disinfection

Summer/Winter
SUMMER mode
• Winter, Summer, Auto*
Activation temperature SUMMER*
Deactivation temperature SUMMER*

Mixer settings 1-5*
Preset temperature
Thermostat selection
• Off, Universal, Room Control*
Reduction from thermostat
Weather control*
Heating curve*
Parallel shift*
Room temp. coefficient*

Night time decrease
Boiler, HUW tank*, Mixer 1-5, Circulation pump*
• Activation
• Decrease value
• Schedule

General settings
Clock
Screen brightness
Screen contrast
Sound
Language
Radio module*
• Pairing, Delete pairing
WiFi*

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

9 Controller operation

9.1 Controls description

The controller is operated using touch buttons, which allow selection of position in the menu and to edit parameters.
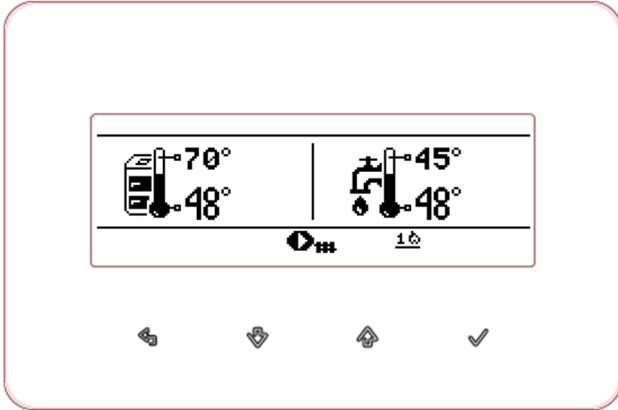
Buttons description:

🔙 - Exit from currently selected menu level, as well as cancelling value change.

🔽 - Decreasing edited value.

🔼 - Increasing edited value.

✓ - Entering into MENU and accepting the setting.

9.2 Display window description
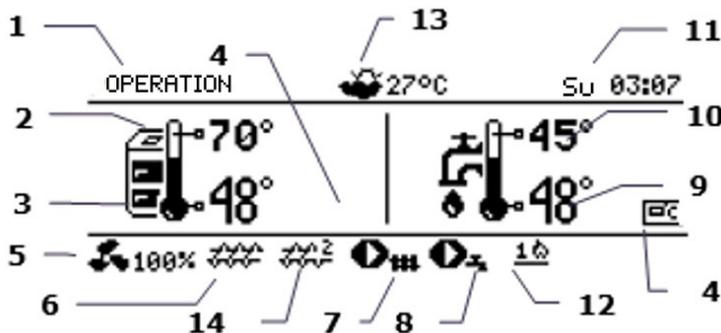
1. Controller operation modes: FIRING UP, STABILIZATION, OPERATION, SUPERVISION, BURNING OFF, CLEANING, PAUSE, CHIMNEY SWEEP
2. Boiler preset temperature value,
3. Boiler measured temperature value,
4. Functions field affecting boiler preset temperature. Individual symbols signal respectively:

↓▣ decrease of the preset boiler temperature after opening the contacts of the room thermostat,

↓🕐 decrease of the preset boiler temperature from active time intervals,

↑🔧 increase the boiler preset temperature for the time of loading the hot utility water tank (HUW),

↑🅟 increasing the preset boiler temperature from the mixer circuit,

🅴 activating weather control for boiler circuit,

↑🗃 increasing preset temperature to load the buffer.

5. Signalling of airflow operation,
6. Signalling of fuel feeer operation,
7. Signalling of central heating pump operation (CH),
8. Signalling of hot utility water pump operation (HUW),
9. Value of the measured temperature of the HUW tank,
10. Value of the preset temperature of the HUW tank,
11. Clock and weekday,
12. Match – symbolizes activated heater and a digit next to it indicates a number of fire up attempts,
13. Outside temperature value (weather),
14. Symbol of additional feeder (bunker feeder connected to module B).

Exemple information are presented in the window to the right of the main screen window:

Fuel level view is shown with proper fuel level parameter setting, section 9.22. Additional fuel level can be visible in room panel.
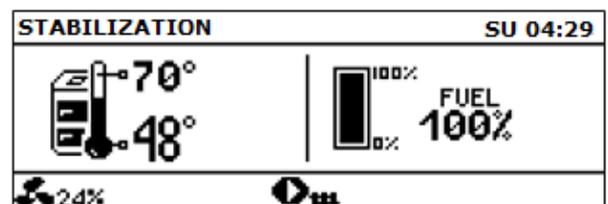
Auxiliary window with fuel level view.

9.3 Starting the controller

After turning the power on, the controller remembers the state it was in when the power was disconnected. If the controller was not

operating before it will start in "Controller turned off" mode.

After pressing the ✓ button the controller menu will be displayed. To start the boiler, select "*Turn on controller*".

In "*Controller turned off*" mode pumps stall protection function is performed, which enables them for a time period. That is why it is recommended to keep electrical supply of the controller when boiler is not operating and the controller to be in "*Controller turned off*" mode. It is possible to start the boiler or set its operating parameters without the need to turn it on. If there is a fuel in the fuel tank and the trapdoor is locked, the boiler can be turned on.

9.4 Setting preset temperature

Preset boiler temperature, similarly to preset mixer circuits temperature, can be set from the menu level (available values to set these values are limited with the range of corresponding controller service parameters):
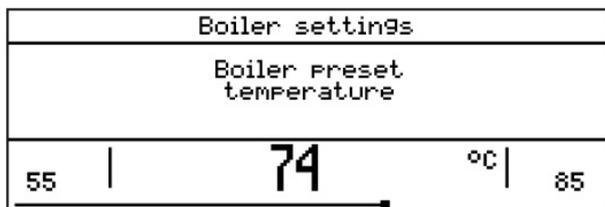
Boiler settings → Preset boiler temp.
and
Mixer 1-5 settings → Preset temp.

"*Preset boiler temperature*" parameter value is ignored by the controller when preset boiler temperature is controlled by weather sensor. Independently of this, the boiler preset temperature is automatically raised to load the hot utility water tank and feed the mixer heating circuits.

9.5 FIRING UP mode

The FIRING UP mode is for automatic firing up of furnace in boiler. The total time of firing up process is dependent on the controller settings (feeder operation time, heater operation time, etc.) and on the boiler's

condition before firing up. Parameters affecting the firing up process are in the menu:
Service settings →
Burner settings → Firing up

When firing up the furnance failed, another attempts of firing up are taken, during which fuel dose (dosage time) is reduced to 10% of the dose at first attempt.
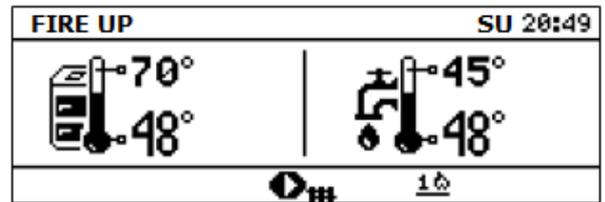
Signalling of FIRING UP mode and attempt number.

After three unsuccesful firing up attempts an alarm is reported "*Firing up attempt failed*". Boiler operation is stopped. There is no possibility to automatically continue boiler operation and the service intervention is required. After removing the cause of failed firing up boiler needs to be restarted.

9.6 OPERATION mode
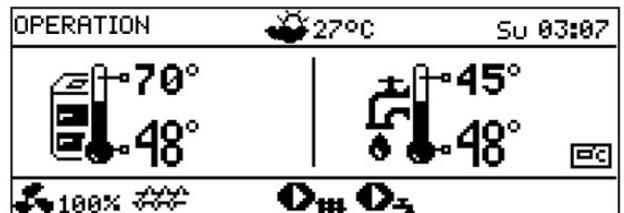
Controller main window view during operation.

In OPERATION mode the fan operates constantly and the fuel feeder is engaged periodically. The cycle consists of the feeder operation time and feeding pause time.
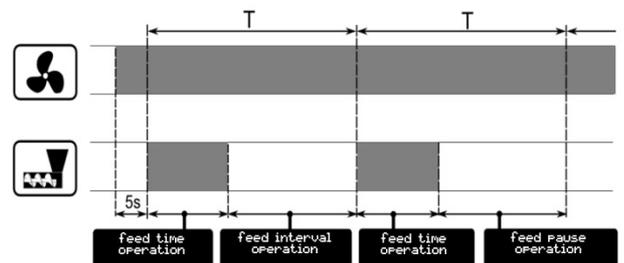
Fan and feeder operation cycles.

There are two control modes available which are responsible for the stabilization of the preset boiler temperature: *Standard* and *Fuzzy Logic,* selcted in the menu:
Boiler settings → Operation mode

10

- **Operation in Standard mode**

If the boiler temperature reaches the preset value then the controller will enter into SUPERVISION mode.

The controller has a burner power modulation mechanism which allows togradually decrease its power as the boiler temperature reaches the preset temperature. There are three burner power levels defined: maximum, intermediate, minimum. The values of individual power levels are set in the menu:

Boiler settings → Power modulation

The controller selects the power with which it will operate at the current moment, depending on the boiler preset temperature and predefined hystereses, *Hysteresis H2, Hysteresis H1* and airflow settings in *Airflow correction – max./interm./min.*

It is possible to configure hystereses H1 and H2 values in a way, that the modulation will perform without intermediate state, i.e. moving from maximum power level to minimum, ignoring intermediate power.
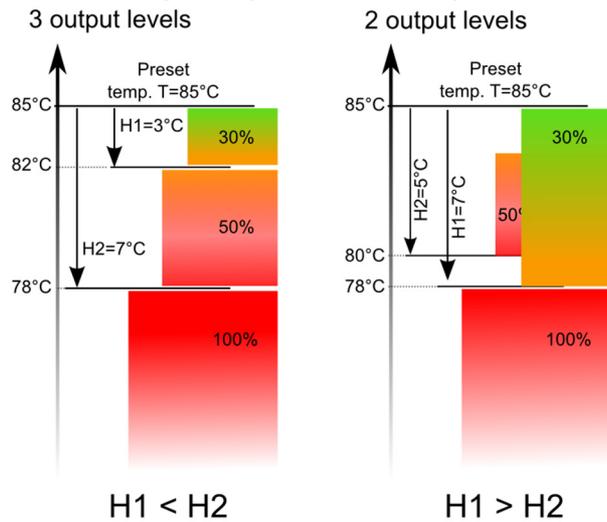
Power modulation hystereses H1 and H2.

- **Operation in Fuzzy Logic mode**

In Fuzzy Logic mode the controller adjusts the burner power with which the boiler will operate in a way to keep the boiler temperature on a preset level. The controller uses power levels as predefined in Standard mode. For this mode there is no need to set *Hysteresis H2* and *Hysteresis H1* parameters. Fuzzy Logic mode, unlike the Standard mode, does not have a flaw where preset boiler temperature will not be reached due to faulty

selection of H1 and H2 hystereses. Moreover, it allows faster reach of the preset temperature.

☞ Attention: if the boiler operates without a heating buffer and the controller will switch into SUMMER mode, then it is recommended to operate the controller in Standard mode.

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

9.7 SUPERVISION mode

The SUPERVISION mode is present in Standard and Fuzzy Logic mode.

The controller switches to SUPERVISION mode automatically, without user interference:

- in case of Standard mode – after reaching the boiler preset temperature,
- in Fuzzy Logic mode – after exceeding preset boiler temperature by 5°C.

In SUPERVISION mode the controller supervises the furnance, so it would not extinguish. In order to do so, the burner operates with low power, which with correctly adjusted parameters, does not increase the temperature. Burner power in SUPERVISION mode and other SUPERVISION mode parameters are in the menu:

Service settings → Burner settings → Supervision

Maximum boiler operation time in Supervision mode is defined in *Supervision time* parameter. If this time expires, from the moment of entering the controller into Supervision mode, restarting boiler operation is not be needed, then the controller will start Burning off process of the boiler.

☞ For *Supervision time = 0* setting the controller ignores SUPERVISION mode and immediately enters into BURNING OFF mode.

9.8 BURNING OFF mode

In BURNING OFF mode remains of pellet are burnt out and the boiler is prepared for pause or turning off.

All parameters affecting the burning off process are in the menu:

Service settings → Burner settings → Burning off

The controller stops feeding the fuel and performs cyclic blows to burn off the remaining fuel. When flame brightness decreases and maximum burning off time expires the controller enters into PAUSE mode.

9.9 PAUSE mode

In PAUSE mode the boiler is extinguished and awaits for the signal to start operation. Such signal can be:

- Boiler preset temperature drop below preset temperature decreased by the boiler hysteresis value (*Boiler* hysteresis),
- When configuring boiler operation with buffer a drop of upper buffer temperature below the preset value (*Buffer loading start temp.*).

9.10 CHIMNEY SWEEP mode

The controller has a special CHIMNEY SWEEP mode during which all heat receivers in the current installation are started simultaneously and the boiler starts to heat to a preset *MIN*, *INTERM.*, *MAX* power level in the menu:

CHIMNEY SWEEP mode → Preset boiler power

The function is intended for testing and controlling the boiler operation.

9.11 GRATE

Some boilers have an additional grate to burn off other types of fuel, e.g. wood waste, etc. To activate the operation with a grate mode the following parameter must be modified in the menu:

Boiler settings → Operation mode from Pellet to Grate.

In boiler operation with a grate the fuel feeder is disabled. Burning process is controlled only by the airflow and exhaust fan with parameters: *Airflow power – grate* and *Exhaust fan airflow power – grate* available in:

Boiler settings → Power modulation

Including the setting of acceptable pressure, created in parameter *Absolute pressure - grate*.

Value of parameters such as:

Boiler settings → Preset boiler temp.

Boiler settings → Power modulation → Boiler hysteresis

Service settings → Burner settings → Other → Fuel detection time

are individually set for Grate mode. It allows to define different boiler operation parameters for Grate and Pellet mode.

In operation with grate mode *„No fuel"* alarm might occur. The alarm will occur when boiler temperature drops below the value of the parameter:

Service settings → CH and HUW settings → CH activation temp.

and then it will not increase for the period of 10mins.

9.12 HUW settings

The device controls the temperature of hot utility water tank HUW, as long as the HUW temperature sensor is connected. When the sensor is disconnected an information that the sensor is not present is displayed in the main window. With the parameter:

HUW settings → HUW pump operation mode a user can:

- Disable tank loading - parameter *Off*,
- Set HUW priority, parameter *Priority* – then CH pump is turned off to load the HUW tank faster,
- Set the simultaneous operation of CH and HUW pump with a parameter *Without priority*.

9.13 HUW preset temperature settings

Preset HUW temperature is determined by the parameter:

HUW settings → Preset HUW temperature

9.14 HUW tank hysteresis

Below the temperature of *HUW preset temp.* minus *HUW tank hysteresis* the HUW pump will start in order to load the HUW tank.

☞ When setting small hysteresis value the HUW pump will start faster after HUW temperature drop.

9.15 Enabling SUMMER mode

To enable SUMMER mode, which allows loading HUW tank in the summer, without the need to heat the central heating installation, the Summer mode parameter must be set to *Summer* in the menu:

Summer/Winter → Summer mode

In Summer mode all heat receivers can be disabled, this is why before activating this mode make sure, that the boiler will not overheat.

If the weather sensor is connected the SUMMER mode can be switched on automatically using *Auto* parameter, considering additional settings, by which the function is enabled and disabled depending on the outside temperature value set in parameters: *Temperature to enable SUMMER, temperature to disable SUMMER*.

9.16 HUW tank disinfection

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

Disinfection function is activated in the menu:

HUW settings → HUW disinfection

It is essential to inform the residents when the disinfection function is activated as there is a danger of scalding from hot utility water.

Once a week, on Monday night at 2:00 a.m., the controller increases the temperature of the HUW tank. After 10 minutes of keeping the tank at 70°C, the HUW pump is deactivated and the boiler returns to normal operation. Do not enable the disinfection function if the HUW operation is disabled.

9.17 Mixer circuit settings

Settings of the first mixer circuit are in the menu:

Mixer 1 settings

Settings for the remaining mixers are in the following menu sections and are the same for each circuit.

Mixer settings without weather sensor

It is necessary to manually set the required temperature of water in the mixer heating circuit with the parameter *Preset mixer temp.*, e.g. to 50°C. The value should be such as to ensure obtaining the required room temperature. After connecting a room thermostat, set the value of decreasing the preset mixer temperature from the thermostat (parameter *Reduction from the mixer thermostat*), e.g. to 5°C. Select this value experimentally.

The room thermostat can be a traditional thermostat (normally open/closed), or a room panel. After activation of the thermostat, the preset mixer circuit temperature will be decreased, which, if the decrease value is properly selected, will cause halting of temperature increase in the heated room.

Mixer settings with weather sensor without room panel

Set parameter Weather control to on. Select the weather curve as in section 8.18. Using the parameter *Parallel shift*, set the desired room temperature, following the formula:

Preset room temperature = 20°C + parallel shift of the heating curve.

Example:

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

In this configuration, it is possible to connect a room thermostat, which will eliminate inaccuracy of the heating curve selection, if too high value of heating curve is selected. In such case, set the value of decrease in preset mixer temperature from thermostat, e.g. to 2°C. After opening the thermostat contacts, the preset mixer circuit temperature will be decreased, which, if the decrease value is correctly selected, will stop growth of temperature in the heated room.

Mixer settings with weather sensor and room panel

Set *Weather control* parameter to On. Select the weather curve in accordance with section 8.18. The room panel shifts the heating curve depending on the preset room temperature. The controller relates the setting to 20°C, e.g. for preset room temperature = 22°C, the controller will shift the heating curve by 2°C, and for preset room temperature = 18°C, the controller will shift the heating curve by -2°C. In some cases described in section. 8.18 it may be necessary to adjust the heating curve shift.

In this configuration, the room thermostat can:

- lower the heating circuit temperature by a fixed value when the preset room temperature is reached. Analogically, as described in the previous section (not recommended), or
- automatically, continuously correct the heating cycle temperature.
It is not recommended to use both of these options simultaneously.
The automatic room temperature correction occurs according to the formula:
Correction = (Preset room temperature - measured room temperature) x room temperature coefficient /10
Example:
Preset temperature in the heated room (set by the room panel) = 22°C. Temperature measured in the room (by the room panel) = 20°C. Room temperature coefficient = 15.
The preset mixer temperature will be increased by (22°C - 20°C) x15/10 = 3°C.
Find the correct value for the Room temp. coefficient parameter. The higher the value of the coefficient, the greater the correction of the preset boiler temperature. If the setting is "0", the preset mixer temperature is not corrected. Note: setting too high value of the room temperature coefficient can cause cyclical fluctuations of the room temperature.

9.18 Weather control

To control the boiler temperature from the temperature outside the building, a weather control can be enabled. Weather control requires the connection of an outdoor (weather) temperature sensor and activation of its support, as described in section 12.8
Depending on the temperature measured outside the building, the preset boiler temperature can be controlled, as well as the temperature of mixer circuits. If the heating curve is properly selected, the temperature of heating circuits is set depending on the value of outside temperature. Thus, if the heating curve appropriate for the building is selected, the room temperature remains approximately constant, regardless of the temperature outside.
When room panel is connected it is necessary to temporarily set the parameter *Room temperature coefficient =0.*
Guidelines for correct heating curve settings:

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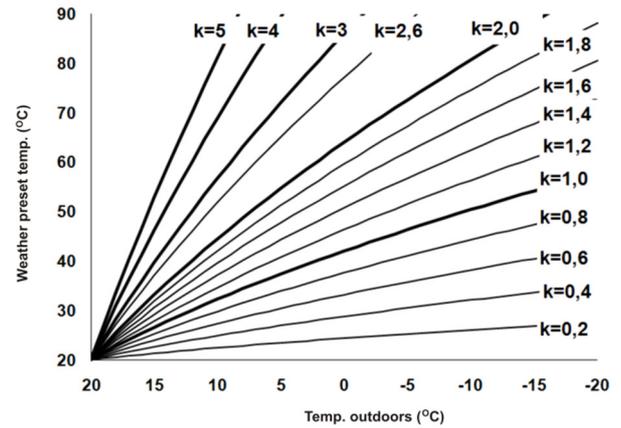
Heating curves.

Guidelines to select correct heating curve:
- if, with decreasing outdoor temperature, the room temperature rises, the value of the selected heating curve is too high,
- if, when the outdoor temperature drops, the room temperature drops as well, then the value of the selected heating curve is too low,
- if during the frosty weather the room temperature is appropriate and during warming up it is too low - it is recommended to increase the parameter *Parallel shift* and select a lower heating curve,
- if during the frosty weather the room temperature is too low and during warming up it is too high - it is recommended to decrease the parameter *Parallel shift* and select a higher heating curve.
Buildings with poor insulation require heating curves with higher values, while for buildings with good insulation the heating curve will have a lower value.
The preset temperature calculated in accordance with the heating curve can be decreased or increased by the controller, if it exceeds the temperature limits for the given circuit.

9.19 Night decrease settings description

The controller enables setting intervals for the boiler, heating circuits, HUW tank, and HUW circulation pump. The time intervals allow for decreasing the preset temperature in a specified period of time, e.g. at night, or when the user will leave the heated rooms. Thanks

to this the preset temperature can be lowered automatically, which increases thermal comfort and reduces fuel consumption.

To activate the intervals, set the parameter *Enable* for boiler and given heating circuit to Yes. Parameter *Value of decrease* will be used to set one decrease temperature for all intervals.

Night decreases can be defined separately for all days of the week in the *Schedule* setting. Select the desired temperature decrease for the time interval.

Daily time interval.
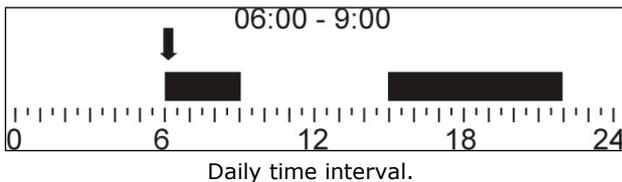
☞ Time interval is ignored when setting the decrease period to ,,0" value, even if the hour range was entered into it.

9.20 Operation according to schedule

The controller has an ability to enable and disable operation of the burner and cburner cleaning mechanism in predefined intervals. If there is no demand for heating, e.g. in summer, the burner operation can be disabled for a defined time period and thus reduce fuel consumption. The burner cleaning mechanism can be also disabled e.g. at night, so it would not generate noise. To activate intervals for schedules set the following in the menu:

Burner schedule → Enable to *Yes*
and
Cleaning schedule → Enable to *Yes*

Enabling and disabling burner in an interval can be defined separately for all weekdays in *Schedule* setting. Operation according to schedule is similar to night-time decreases.

9.21 Circulation pump control

The circulating pump functionality is available after connecting the controller's executive module or additional C module to Output H. Set the operation of Output H mod A or Output H mod B/C to circulation pump operation in the menu:

Service settings → Output H mod A or Output H mod B/C = Circulation pump

The parameters for setting the pump are located in the menu:
Night-time decreases → Circulation pump
and
Service settings → CH and HUW settings

Settings for timed control of circulation pump are similar to night-time decrease settings. In predefined intervals the circulation pump is disabled for *Circulation pause time.* In ignored intervals circulation pump is enabled for *Circulation operation time.*

9.22 Fuel level configuration

- **Enabling fuel level indicator**

To enable displaying of fuel level set the value of parameter:
Boiler settings → Fuel level → Emergency level
to a value higher than zero, e.g. 10%.

By pressing ✓ button in the main window another window with fuel level indication is displayed.

Tip: fuel level can also be visible in a room panel Room Control and Room Control TOUCH.
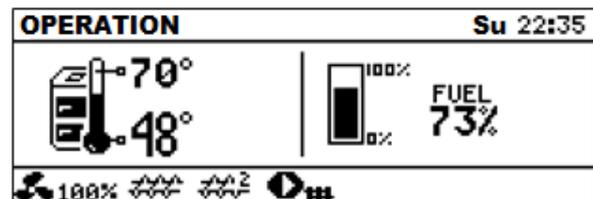
Auxiliary window with fuel level view.

- **Fuel level indicator operation**

Each time when the fuel tank is filled to the required level it is necessary to press and hold

✓ until the following prompt appears:

Fuel level handling.

After selecting and accepting by *YES* the fuel level will be set to 100%.

Attention: The fuel can be refilled at any moment, i.e. it is not needed to wait till the fuel tank is empty. However fuel should

always be filled up to the level corresponding to 100% and set this level in the controller.

• **Description of operation**

The controller calculates the fuel level based on its current consumption. Factory settings will not always correspond to actual fuel consumption of a given boiler, so this method requires level calibration by the controller user in order to work properly. No additional fuel level sensors are required.

• **Calibration**

Fill the fuel tank to a level that corresponds to a full load, then set the parameter value:
Boiler settings → Fuel level → Fuel level calibration → Fuel level 100%
The indicator will be set to 100% in the main window. Flashing fuel level indicator is a sign that the calibration process is in progress. The indicator will be blinking until the point corresponding to the minimum fuel level is programmed. Keep checking the decreasing level of fuel in the tank. When the level drops to the required minimum, set the parameter:
Boiler settings → Fuel level → Fuel level calibration → Fuel level 0%

9.23 Cooperation with additional feeder

After connecting additional module B, the controller can cooperate with a sensor of low fuel level in the tank (feeding fuel from the bunker). When the sensor is activated (opening), for the Additional feeder operation time the controller will switch on the additional feeder in order to refill the primary fuel tank. This parameter is located in menu:
Service settings → Burner settings → Others

9.24 Information

Graphical display of system operation, overview of parameters and operating modes, mixer settings, WiFi/Ethernet internet module parameters, service counters and controller firmware versions can be displayed in the menu **Information**.
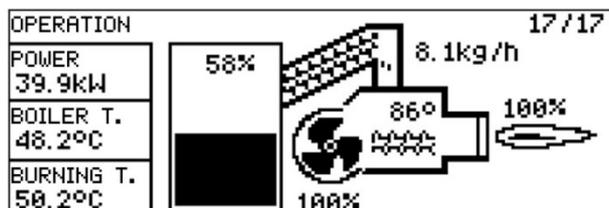
Visualization of the installation with current operating parameters.

9.25 Manual control

The controller is capable of manually activating executive devices, such as pumps, feeder motor or blower. This allows checking whether the devices in use are operational and properly connected.

☞ Entering the manual control menu is only possible when the boiler is turned off.

View of the manual control window: OFF - means that the device is disabled, ON - enabled.

⚠ Continuous operation of the fan, feeder or other executive device can result in danger.

9.26 Cooperation with room panel

The controller can cooperate with:
• Wireless, battery room thermostat Room Control Radio, via two-way ISM communication,
• Wireless room panel Room Control TOUCH Radio with room thermostat function, via two-way ISM communication,
• Wired room panel Room Control and Room Control TOUCH, with room thermostat function.

Thermostat and room panel simultaneously transmit useful information, such as: information about the fuel level, burner operation status, alarm signals, enables setting of the controller's parameters, operation modes, it also serves as an additional boiler control panel.

S.Control MK2 ST5
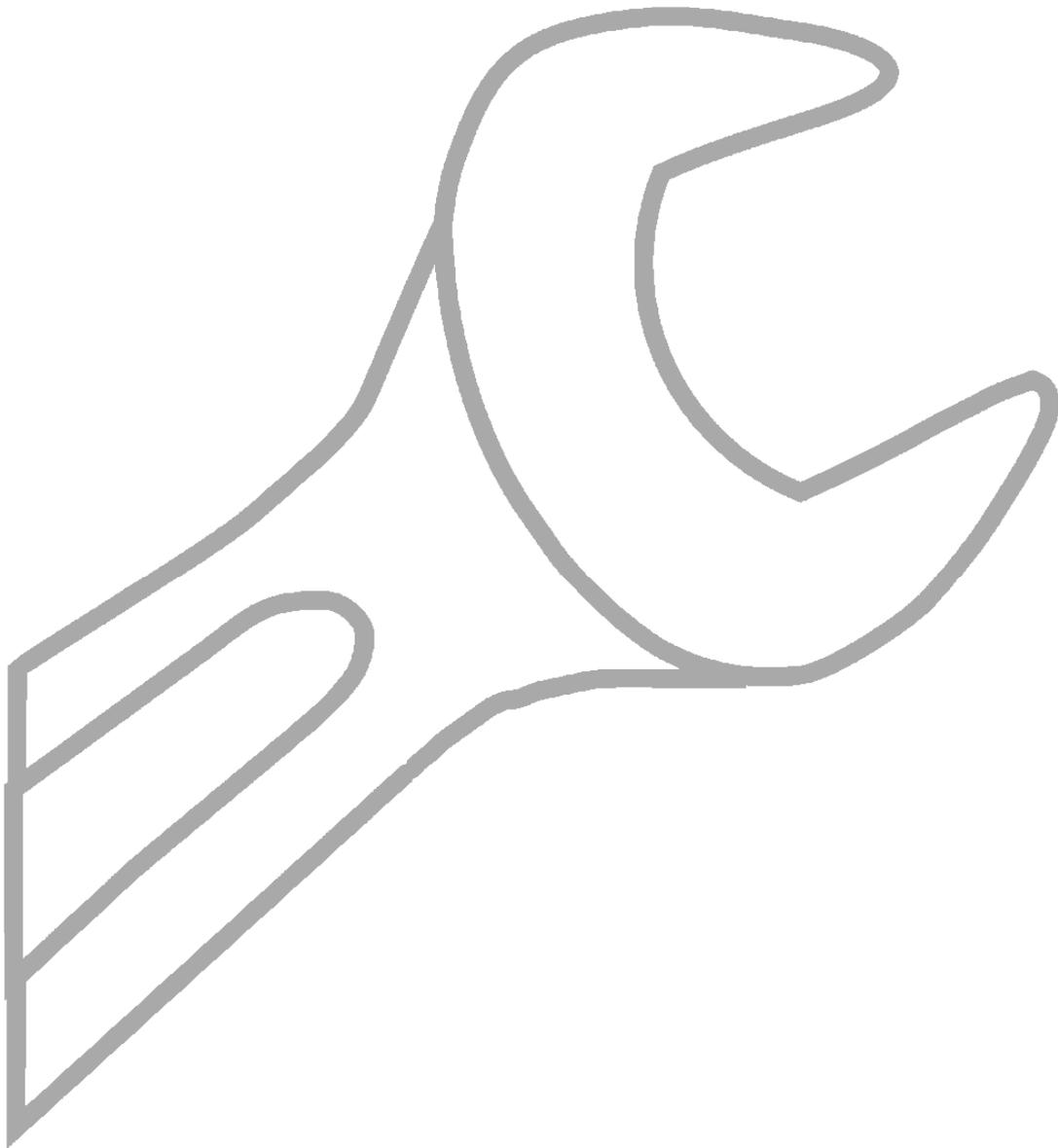
10 Hydraulic scheme

10.1 Scheme 1
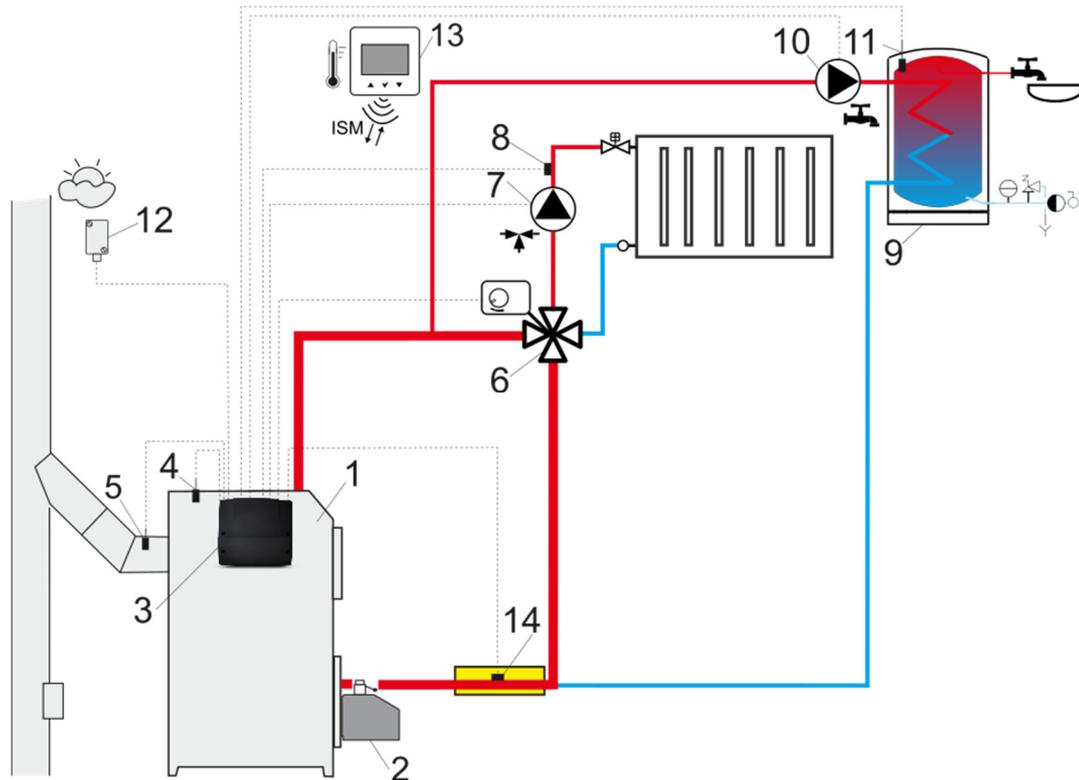
Scheme with 4-way valve controlling the central heating circuit [1]: 1 – boiler, 2 – burner, 3 – controller, 4 – boiler temperature sensor, 5 – exhaust temperature sensor, 6 – servomotor of 4-way valve, 7 – mixer circuit pump, 8 – mixer circuit temperature sensor, 9 – HUW tank, 10 – HUW pump, 11 – HUW temp. sensor, 12 – weather temperature sensor, 13 – room thermostat, 14 – return temperature sensor (not necessary for system operation).

> To improve water circulation in the boiler gravity circuit (bold circuit in the figure) it is necessary to: use large nominal cross-sections DN of the pipe and the four-way valve, avoid larger number of elbows and cross-sectional constrictions, apply other rules regarding construction of gravity systems, such as maintaining slopes, etc.
>
> If the return sensor is installed close to the surface, it must be thermally insulated from the surroundings and the thermal contact with the pipe must be improved by applying thermally conductive paste. The preset boiler temperature must be set high enough to ensure thermal output for the mixer circuit and simultaneous heating of the water returning to the boiler.

RECOMMENDED SETTINGS:

Parameter	Setting	MENU
Preset boiler temperature	75-80°C	boiler settings
Mixer 1 support	CH activated	service settings→ mixer 1 settings
Max. mixer 1 temperature	70°C	service settings→ mixer 1 settings
Mixer heating curve	0.8 – 1.4	mixer 1 settings
Mixer 1 weather control	Active	mixer 1 settings
Mixer 1 thermostat selection	Room Control Radio T1	service settings→ mixer 1 settings

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[1]Shown hydraulic scheme is not a substitute for the design of the central heating system and is only for illustrative purposes!

10.2 Scheme 2
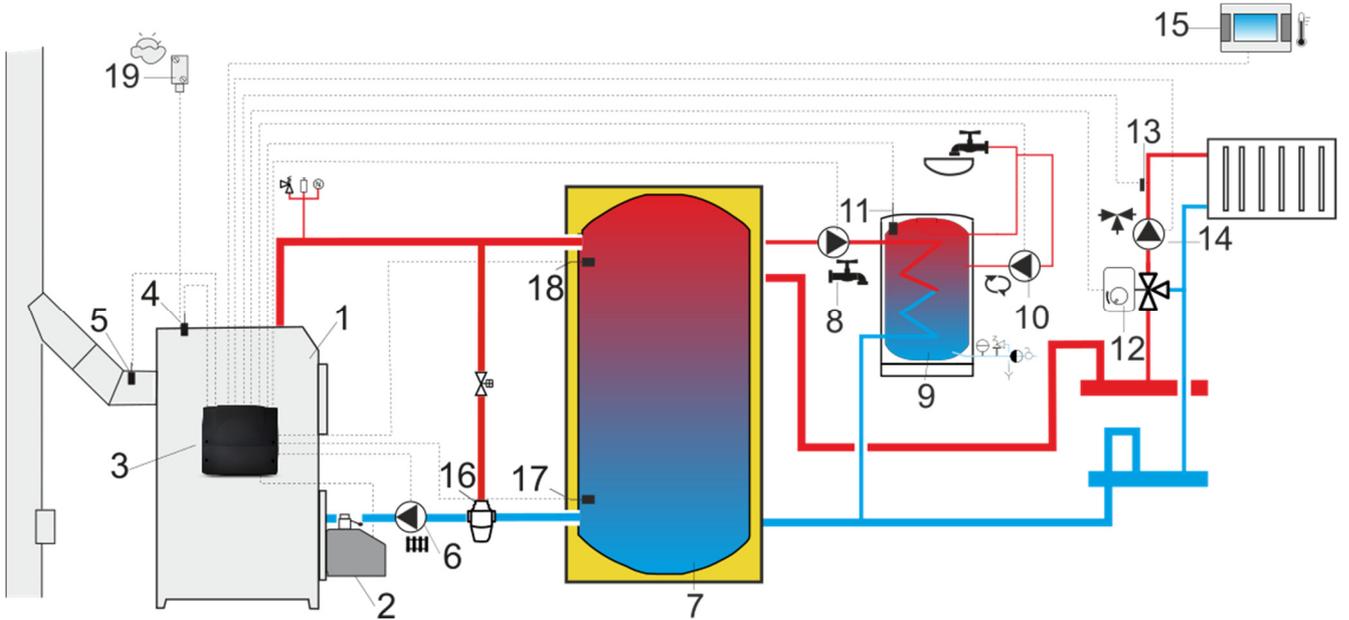
Scheme with heating buffer[2]:1 – boiler, 2 – burner, 3 – controller, 4 – boiler temperature sensor, 5 – exhaust temperature sensor, 6 – boiler pump, 7 – heating buffer, 8 – HUW pump, 9 - HUW tank, 10 – circulation pump, 11 – HUW temperature sensor, 12 – mixing valve servomotor, 13 – mixer circuit temperature sensor, 14 – mixer pump, 15 – room panel with room thermostat function, 16 – thermostatic 3-way valve for return protection, 17 – lower buffer temperature sensor, 18 – upper buffer temperature sensor, 19 – weather temperature sensor.

RECOMMENDED SETTINGS:

Parameter	Setting	MENU
Preset boiler temperature	80°C	boiler settings
CH pump activating temperature	55°C	service settings→ CH and HUW settings
Buffer support	Active	service settings→ buffer settings
Buffer loading start temperature	50°C	service settings→ buffer settings
Buffer loading stop temperature	75°C	service settings→ buffer settings
Mixer 1 support	CH Activated	service settings→mixer 1 settings
Max. mixer 1 preset temp.	70°C	service settings→mixer 1 settings
Mixer 1 heating curve	0.8 – 1.4	mixer 1 settings
Mixer 1 weather control	Active	mixer 1 settings
Mixer 1 thermostat selection	Room Control T1	service settings→ mixer 1 settings

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[2] Shown hydraulic scheme is not a substitute for the design of the central heating system and is only for illustrative purposes!

10.3   Scheme 3
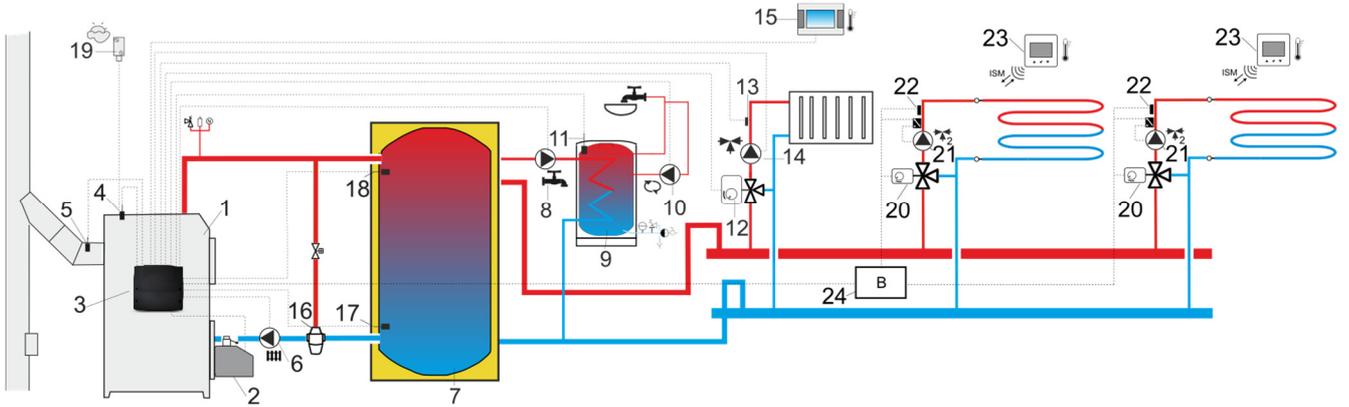
Scheme with heating buffer and 5 mixer heating circuits[3]:1 – boiler, 2 – burner, 3 – controller, 4 – boiler temperature sensor, 5 – exhaust temperature sensor, 6 – boiler pump, 7 – heating buffer, 8 – HUW pump, 9 – HUW tank, 10 – circulation pump, 11 - HUW temperature sensor, 12 – mixer servomotor, 13 – mixer circuit temperature sensor, 14 – mixer circuit pump, 15 – room panel with thermostat function, 16 - 3-way valve with servomotor, 17 - lower buffer temperature sensor, 18 – upper buffer temperature sensor, 19 – weather temperature sensor, 20 – mixer servomotor, 21 – mixer circuit pump, 22 – mixer circuit temperature sensor, 23 – room thermostat, 24 – additional module B.

RECOMMENDED SETTINGS:

Parameter	Settings	MENU
Preset boiler temperature	80°C	boiler settings
CH pump start temperature	55°C	service settings→ HUW and CH settings
Buffer support	Active	service settings→ buffer settings
Buffer loading start temperature	50°C	service settings→ buffer settings
Buffer loading stop temperature	75°C	service settings→ buffer settings
Mixer 1 support	CH Activated	service settings →mixer 1…3 settings
Max. 1 mixer temperature	70°C	service settings →mixer 1…3 settings
Mixer 1 heating curve	0.8 – 1.4	mixer 1…3 settings
Mixer 1 weather control	Active	mixer 1…3 settings
Mixer 1 thermostat selection	Room Control T1	service settings → mixer 1…2 settings
Mixer 2, 3 support	Floor on	service settings → mxer 5 settings
Max. mixer 2,3 temperature	50°C	service settings → mxer 5 settings
Mixer 2,3 heating curve	0.2 – 0.6	mixer 5 settings
Mixer 2,3 weather control	Active	mixer 5 settings
Mixer 1,2 thermostat selection	Room Control Radio T2	service settings → mxier 1..2 settings

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[3]Shown hydraulic scheme is not a substitute for the design of the central heating system and is only for illustrative purposes!

11 Technical data

Supply power	230 V~, 50Hz
Current consumed by controller	0,04 A[4]
Maximum nominal current	6 (6) A
Controller protection level	IP20
Ambient temperature	0...50°C
Storage temperature	0...65°C
Relative humidity	5...85%, without water steam condensation
Measuring range of CT4 temperature sensor	0...100°C
Measuring range of CT2S temperature sensor	0...300°C
Measuring range of CT4-P, CT6-P temperature sensor	-35...+40°C
Measuring range of CT10 temperature sensor	-40...+60°C
Accuracy of temperature measurement with CT4, CT10, CT4-P, CT6-P, CT2S sensors	±2°C
Terminals	Screw terminals on the mains voltage side 2,5 mm^2. Screw terminals on the control side 1,0 mm^2
Display	Graphic LCD display with backlight
Dimensions	Module: 234 x 225 x 64 mm ST5 Panel: 144,4 x 97,5 x 13,3 mm
Weight	1,0 kg
Standards	PN-EN 60730-2-9 PN-EN 60730-1
Software class	A
Protection class	Class I
Type of disconnection according to PN-EN 60730-2-9	-electronic disconnect type 2Y, terminals: 3-4, 4-5; -micro-disconnection type 2B, terminals: 6-7, 7-8, 9-7, 10-7, 11-12, 12-13.
Contamination degree	2nd degree according to PN-EN 60730-2-9

12 Storage and transport conditions

The regulator cannot be exposed to direct weather conditions, i.e. rain or sunrays. Storage and transport temperature should not exceed the range of -15...+65°C.

During transport, the controller cannot be subjected to vibrations greater than those corresponding to typical wheeled transport conditions.

13 Controller installation

13.1 Environmental conditions

Due to the risk of fire, it is forbidden to use the controller in explosive gas and dust atmospheres. Furthermore, the controller cannot be used in water steam conditions condensation or exposed to water.

13.2 Installation requirements

The controller should be installed by a qualified installer, in accordance with the applicable standards and regulations. The manufacturer of the controller is not liable for any damage caused by failure to follow these instructions. The ambient and mounting surface temperatures should not exceed the range of 0...50°C. The device can have a two-module construction consisting of a control panel ST5 and an executive module. Both parts are connected by an electric wire.

13.3 Control panel installation

The ST5 control panel is designed for installation in the boiler mounting plate.
During installation follow the instructions below.

Panel assembly:
Drill a hole in the boiler mounting plate as shown below.

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[4] This is the current consumed by the controller itself (when connecting 2 executive modules and a panel). The total current consumption depends on the devices connected to the controller.
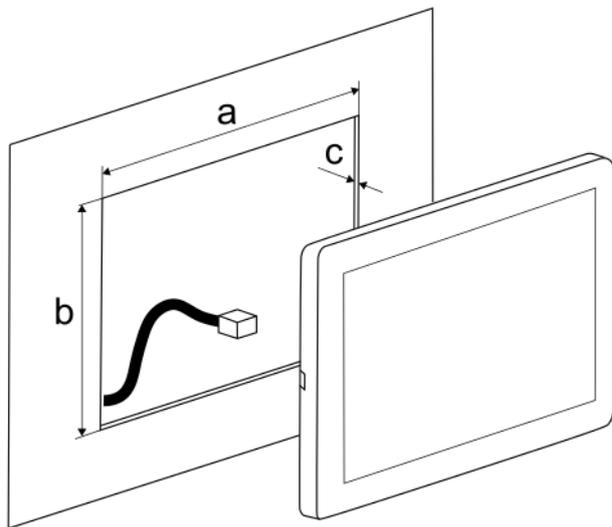
$$a = 128{,}7^{+0{,}2}_{-0{,}0}$$
$$b = 82{,}4^{+0{,}2}_{-0{,}0}$$
$$c = 0{,}8\text{-}1{,}5 \text{ (with paint thickness)}$$

Installation of control panel in boiler mounting plate.

Provide adequate thermal insulation between the hot boiler walls and the panel and connection tape.

Max. 50°C
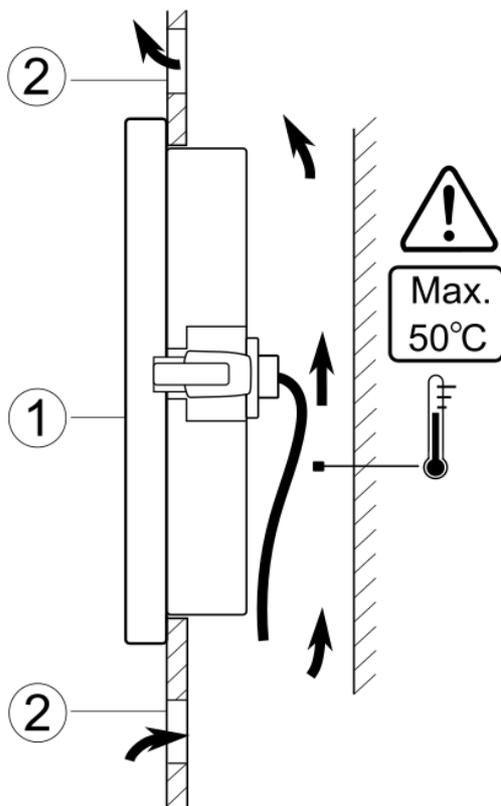
Panel enclosure requirements: 1 – panel, 7 – ventilation holes for air circulation (Note: the holes must not reduce the required IP degree of protection. Ventilation holes are not required if the ambient temperature limit of the panel is not exceeded. Ventilation holes cannot always guarantee that the ambient temperature of the panel will be lowered, in which case other methods must be used).

Panel disassembly.

$$a = 1{,}2^{\pm 0{,}3}$$
$$b = 4{,}0^{\pm 0{,}5}$$
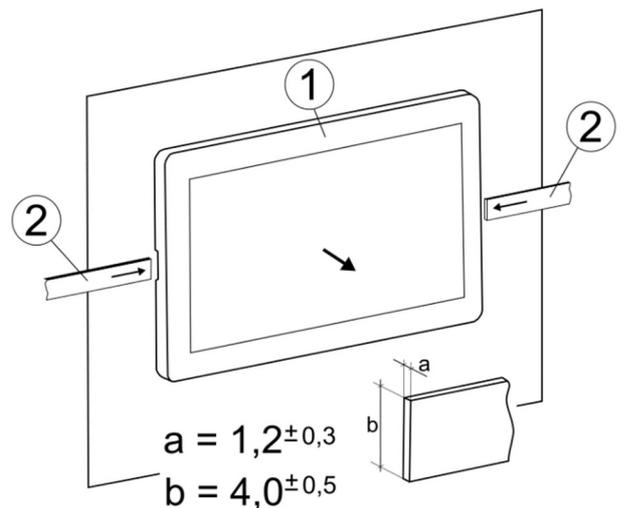
To remove the control panel (1) from the housing - insert flat elements (2) into indicated slots to release housing catches and remove the panel (1).

13.4 Controller installation

The controller is to be enclosed – which means the controller should be screwed on to the flat (horizontal or vertical) surface e.g. boiler housing, room wall. To screw on the controller use mounting holes and proper screws. Location and spacing of mounting holes are shown in the picture below.
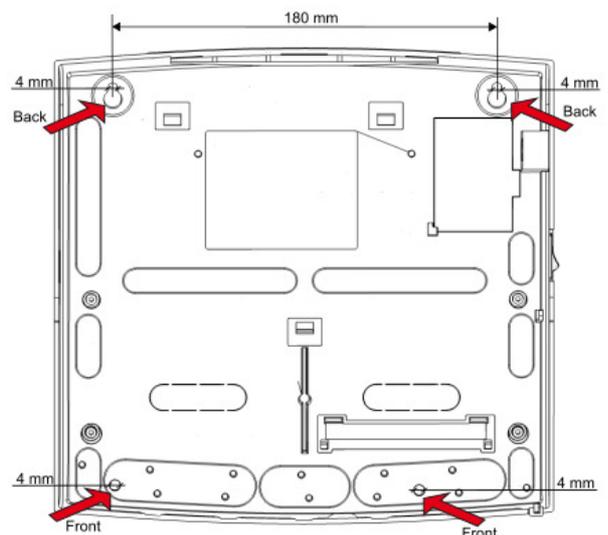
The controller cannot be used as a free-standing device.

After installation, make sure that the device is attached properly and that it cannot be detached from the mounting surface.

⚠ Opening the boiler door or flue leakage cannot expose the controller to direct contact with hot gases and fire from the furnace.

13.5 Electrical connection

⚠ Before unscrewing the terminals cover, it is necessary to disconnect the power supply.
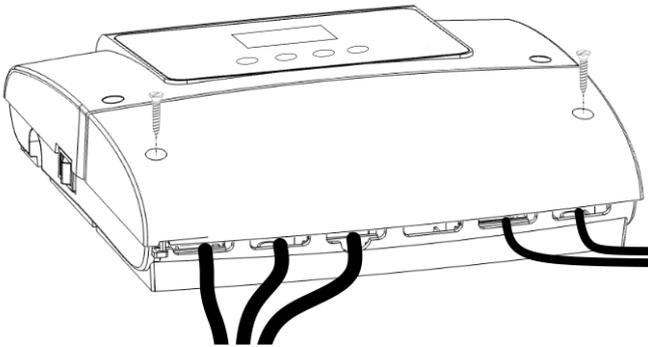
Controller terminals cover.

The controller is designed to be supplied with voltage of 230 VAC, 50 Hz. The electrical installation should be:

- three-wire (with PE protective wire),
- in accordance with applicable regulations,
- equipped with residual current device (RCD) with tripping current IΔn≤30mA protecting against electric shock and limiting device damage, including protection against fire.

Terminals L, N, 1-20 are designed for connecting devices with mains voltage 230 VAC. Terminals 21-48 and connector G1, G2 are designed for signal cables (maximum voltage 15 VDC).

⚠ Connecting mains voltage to terminals 21-48 and socket G will result in damage to the controller and poses a risk of electric shock.

⚠ Due to safety reasons, it is imperative that the regulator be connected to the 230 VAC mains in the order in which the L phase and N neutral wires are connected. Make sure that the L and N wires have not been switched within the electrical installation of the building, e.g. in the electrical socket or distribution box!

The following should be connected to the protective connector (7) of the controller marked with the ⏚ symbol:

- protective wires of devices connected to the controller,
- protective wire of the power supply cable.

⚠ Separate electrical cables from hot boiler components, especially from flue pipes.

The wires should be secured against pulling out with cable clamps (1). Tighten the screws of the cable clamp (2) with such force that the mechanical stresses on the cables do not cause them to be pulled out or loosen from the terminals.

⚠ Due to the IP20 protection level, install all the cable clamps (1) even if there is no need to use all the clamps.

The controller terminals box:
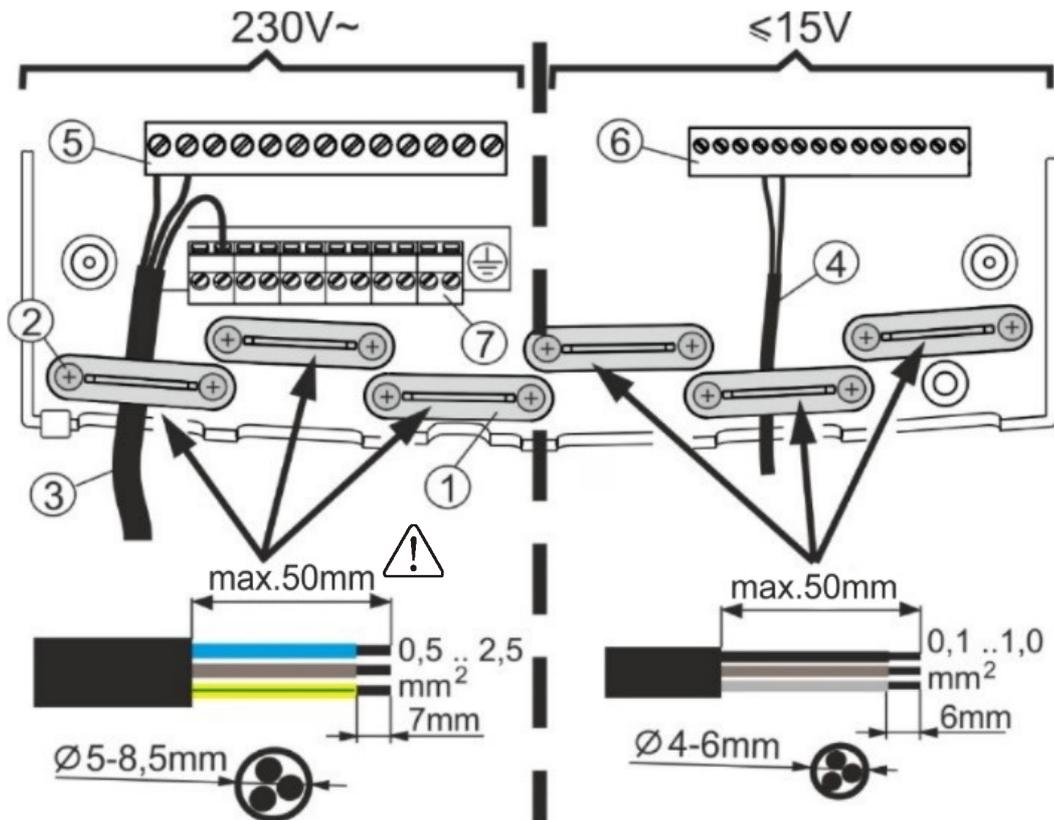
Connecting cables to the controller: 1 - cable clamps, 2 - cable clamp screws, 3 – dangerous voltage cables (mains 230 VAC), 4 - safe voltage cables (signal, below 15 VDC), 5 - mains cable connector 230 VAC, 6 - signal wires connector, 7 - protective wires connector.

⚠ The maximum stripping length of the outer insulation tire is 50 mm!

⚠ Before screwing on the terminal cover, organize the wires to prevent their insulation from being damaged by cutting with the edge of the cover or by the screws holding the cover. It is not permitted to coil up excess leads in the terminal box!

Before installing the controller and connecting the wires, it is necessary to route the STB capillary (2) from inside the terminal box to outside the controller housing via the indicated latch (1).
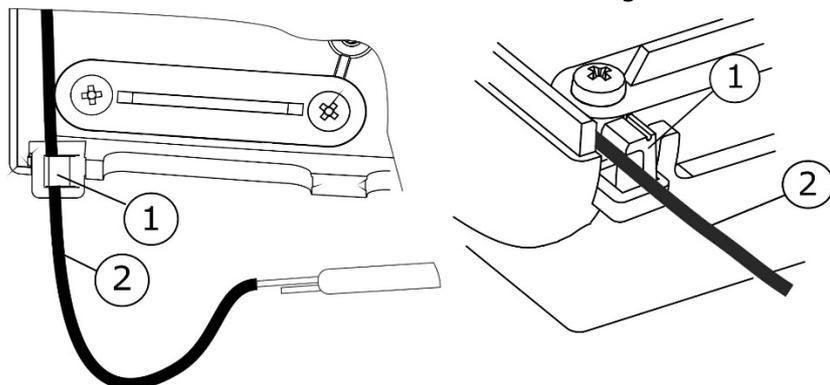
STB capillary outflow from the terminal box: 1 - latch, 2 - capillary of STB safety temperature limiter.

⚠ Attention. Capillaries must not be crushed or bent at an acute angle!

13.6   Electrical diagram
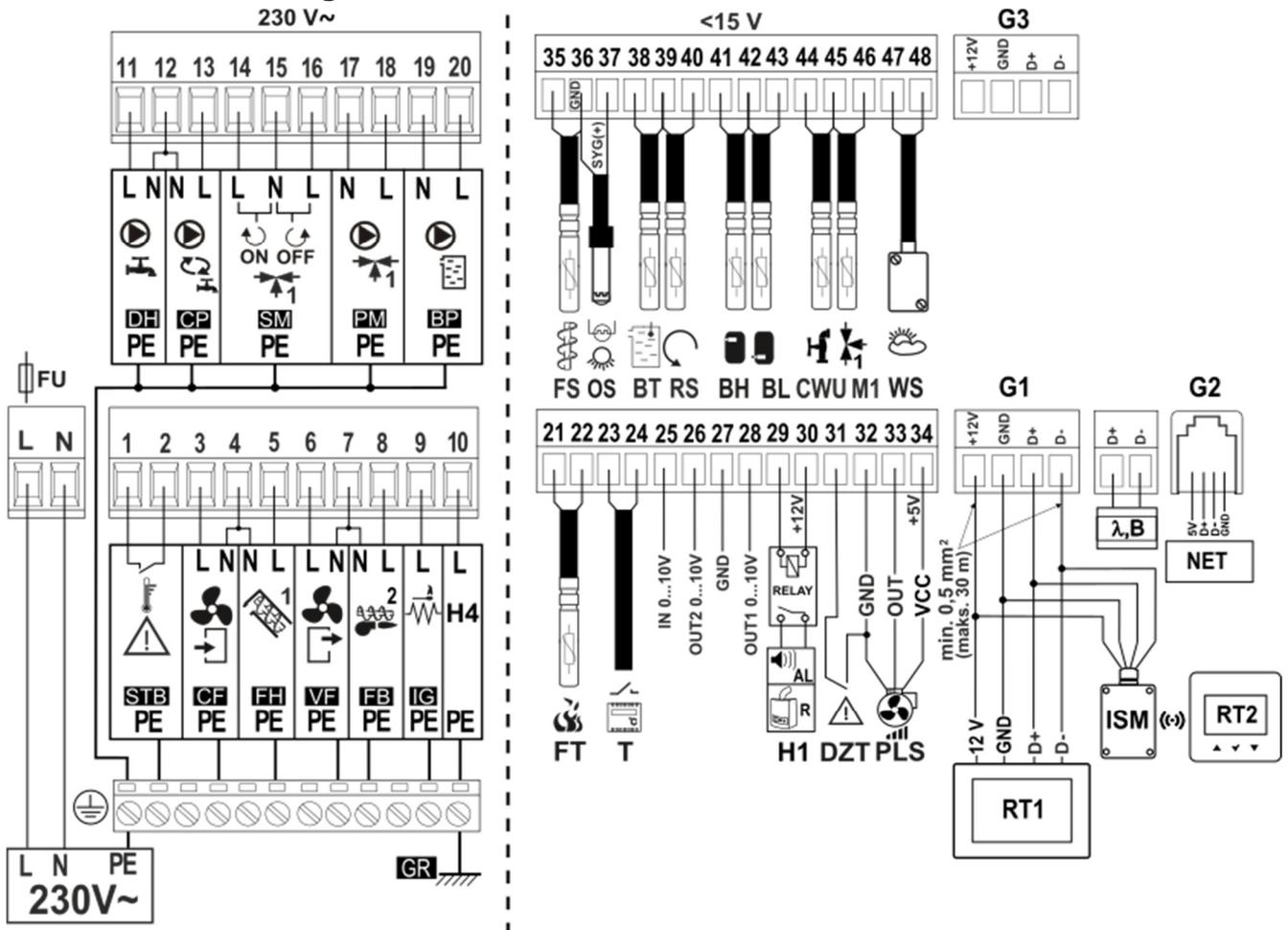
Controller wiring diagram.

L N PE – 230VAC mains supply,

FU – mains fuse,

STB – input for safety temperature limiter,

CF – burner airflow fan,

FH – main fuel feeder,

VF – boiler exhaust fan,

FB – burner feeder,

IG – igniter,

H4 – versatile voltage output,

DH – HUW pump,

CP – circulation pump,

SM – mixer 1 servo,

PM – mixer 1 pump,

BP – pompa kotła,

FS – feeder temperature sensor type CT10,

OS – optical flame brightness sensor type OCP,

BT – boiler temperature sensor type CT10,

RS - return temperature sensor type CT10,

BH – upper buffer temperature sensor type CT10,

BL – lower buffer temperature sensor type CT10,

CWU – HUW temperature sensor type CT10,

M1 – mixer 1 temperature sensor type CT10,

WS – outside temperature sensor (weather) type CT4-P or CT6-P,

FT – fumes temperature sensor type CT2S,

T – standard boiler thermostat,

H1 – voltage output to control auxiliary boiler R or alarms signalling AL,

RELAY – 12V relay,

DZT – boiler door opening sensor,

PLS - fan rotation sensor,

RT1 - room panel with thermostat function or ISM radio module,

RT2 – wireless room thermostat,

NET – internet module,

B – additional module, expands by support of additional two mixer circuits,

λ – Lambda probe module.
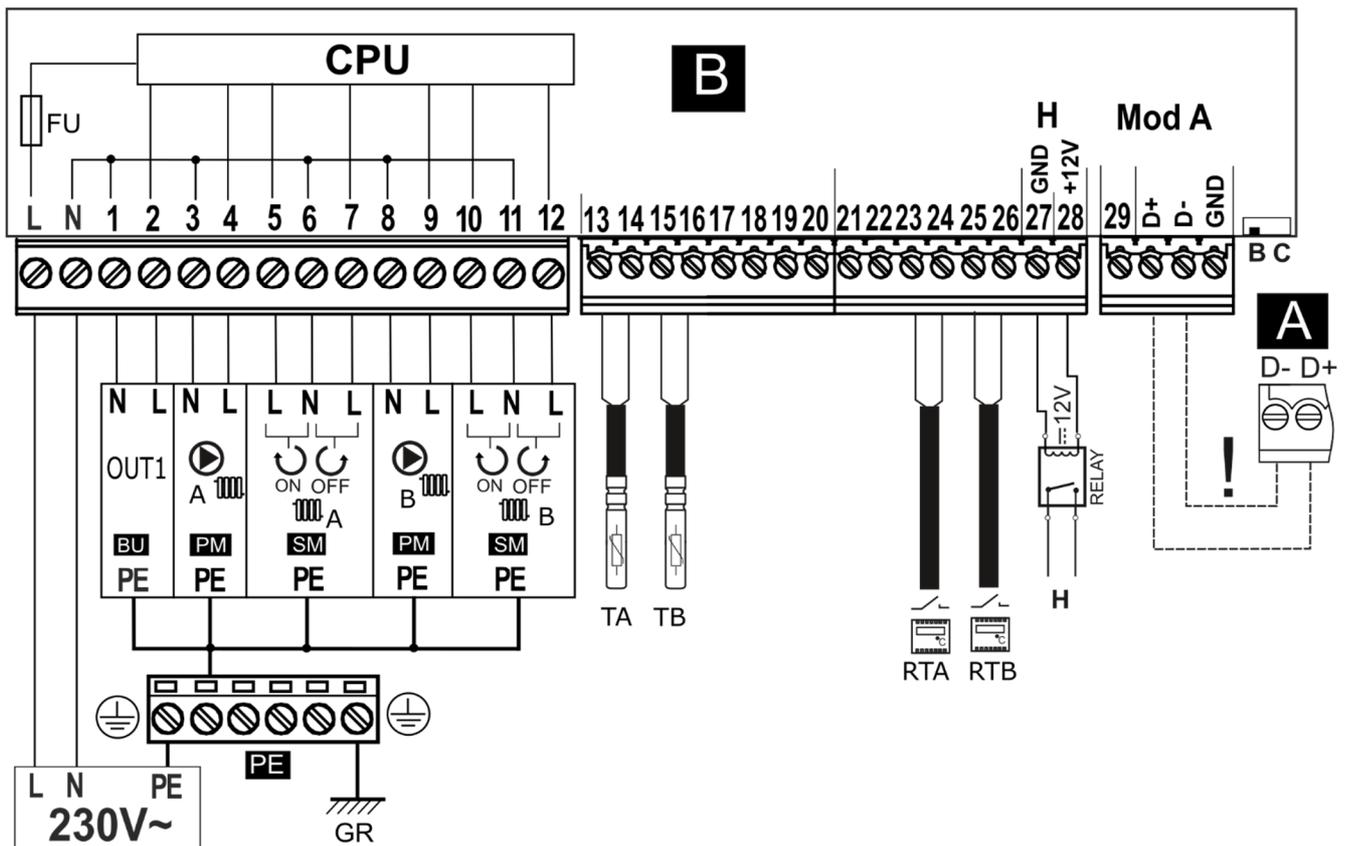
Wiring diagram for additional module B:

L N PE - 230VAC mains supply,

CPU – control,

FU – main fuse,

GR – grounding,

OUT1 – versatile 230 VAC output – function is module A dependent,

PM – mixer 2 and 3 pump,

SM – mixer 2 and 3 mixer servo,

TA, **TB** – mixer 2 and 3 temperature sensor type CT4,

RTA, **RTB** – standard mixer 2 and 3 thermostat type (normally open/closed),

RELAY – 12V relay,

H – versatile 12VDC output – function is module A dependent (max. load 80 mA),

A – main controller,

! – <u>connect only with two wires</u> (do ont connect with four wires as it may damage the main controller).

Switch on position **B** – expansion module is used as module B, on position **C** – expansion module is used as module C.

13.7 Connecting temperature sensors

The controller cooperates only with CT4, CT10 type sensors. It is not prohibited to use other types of sensors.

Sensor wires can be extended with wires of cross-section not smaller than 0,5 mm². However, the total length of each sensor cable should not exceed 15m.

The boiler temperature sensor should be installed in a thermometric pipe placed in the boiler jacket. Domestic hot water tank temperature sensor in a thermometric pipe welded into the tank. It is best to install the mixer temperature sensor in a thimble (sleeve) placed in the stream of running water in the pipe, but it is also possible to install the sensor on the pipe, on condition that thermal insulation is used to shield the sensor together with the pipe
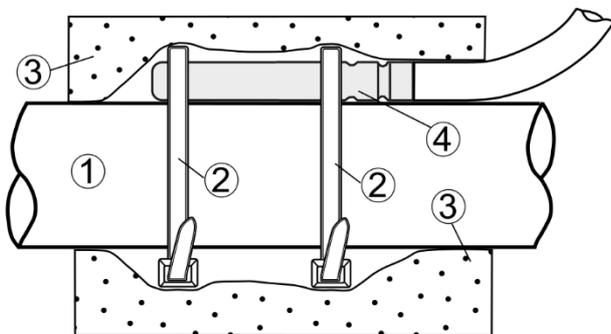
Mounting of the sensor "with a cling": 1 - pipe, 2 - clamp, 3 - thermal insulation (insulation lagging), 4 - temperature sensor.

⚠ Sensors must be secured against loosening from the surfaces to which they are attached.

Ensure good thermal contact between the sensors and the surface to be measured. Use thermal conductive paste for this purpose. It is not allowed to flood the sensors with oil or water.

The sensor cables should be separated from the network cables. Otherwise, incorrect temperature readings can occur. The minimum distance between these wires should be 10cm.

Do not allow the sensor cables to come into contact with hot boiler elements and the heating system. Temperature sensor wires are resistant to temperature not exceeding 100°C.

13.8 Connecting weather sensor

The controller cooperates only with a weather sensor of the CT4-P or CT6-P type.

The sensor type is selected in the menu:
Boiler settings → Weather sensor → Sensor type

☞ With factory settings, weather sensor support is disabled by setting *Sensor type = None*.

The sensor should be mounted on the coldest wall of the building, usually the north side, in a sheltered place. The sensor should not be exposed to direct sunlight or rain. Mount the sensor at least 2m above the ground, away from windows, chimneys, and other heat sources that can disturb the temperature measurement (at least 1,5m).

To connect, use a wire with a wire cross-section of at least 0.5mm2 and a length of up to 25m. The polarity of the wires is not important. Connect the other end to the regulator's terminals.

The sensor should be screwed to the wall using mounting screws. The holes for mounting screws can be accessed after unscrewing the cover of the sensor enclosure.
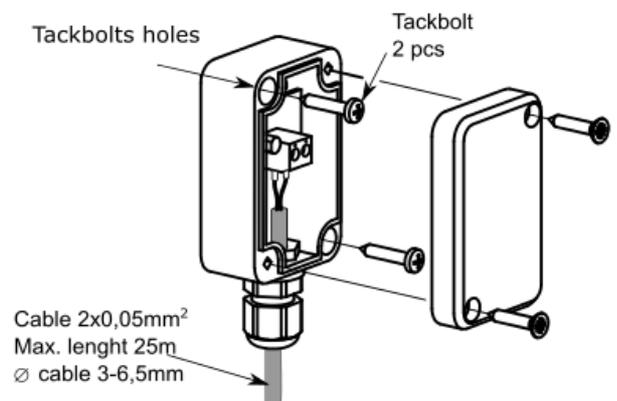
Weather sensor connection.

It is possible to additionally set the correction of the weather sensor indications. To do this, measure the outdoor temperature with a thermometer and enter the temperature difference between the measured and indicated by the weather sensor in the menu:
Boiler settings → Weather sensor → Sensor correction

13.9 Connecting fumes sensor

Flue gas sensor CT2S should be installed in the flue pipe of the boiler. The gap between the sensor and the flue must be sealed. The sensor should be installed by a qualified installer, following chimney installation regulations. The flue gas sensor cable must not touch hot boiler parts and the flue. The flue gas sensor should be installed in such a distance from the boiler, where it will not be exposed to direct impact of fire flames, and the temperature of flue gas will not exceed 220°C.
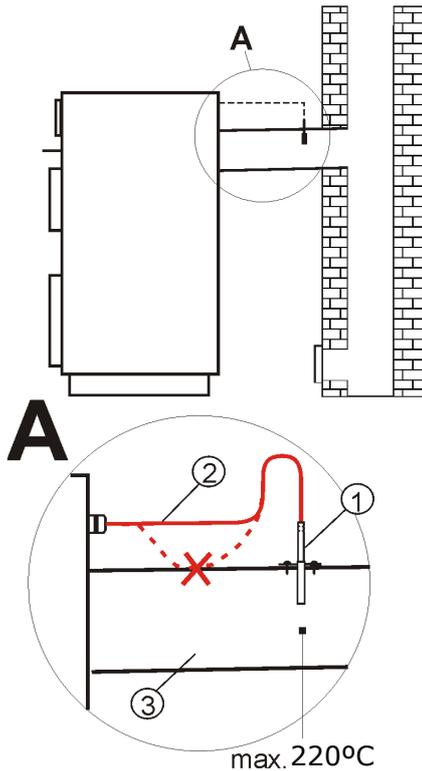
Connection of fumes sensor: 1 - flue gas temperature sensor type CT2S, 2 - sensor cable, 3 - flue.

Opening the bottom boiler door may cause the flue gas temperature to rise above the sensor's thermal resistance, this may result in burning out the sensor.

13.10 Temperature sensors check

CT4/CT4-P temperature sensors can be tested by measuring their resistance at a given temperature. In the case of finding significant differences between the measured resistance value and the values in the table below, the sensor must be replaced.

CT4 (PT1000)			
Ambient temperature °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

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

CT4-P (weather)			
Temp. °C	Min. Ω	Nom. Ω	Max. Ω
-30	609	**624**	638
-20	669	**684**	698
-10	733	**747**	761
0	802	**815**	828
10	874	**886**	898
20	950	**961**	972

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

CT10 (NTC10K)	
Ambient temp. °C	Nom. Ω
0	33620
10	20174
20	12535
30	8037
40	5301
50	3588
60	2486
70	1759
80	1270
90	933
100	697
110	529
120	407

13.11 Connecting optical sensor

The optical sensor must be connected in accordance with the wiring diagram, respecting the polarity of the signals SYG(+) and GND(-) of the sensor. The flame optical sensor can be read in the menu item:

Information → Flame

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

13.12 Connecting mixers room thermostat

Mixer room thermostat, connected to additional module B, after opening the contacts, reduces the preset mixer circuit temperature by the value of the parameter *Reduction from the mixer thermostat*. Value of this parameter should be chosen in such a way that after activating room thermostat, temperature in the room should decrease. In case of room panel make sure that this parameter is correctly chosen *Thermostat selection* in the menu:

Service settings – Mixer 1-5 settings – Mixer room thermostat

13.13 Connecting boiler room thermostat

Room thermostat for boiler circuit can switch off the burner operation or switch off the CH boiler pump. In order to thermostat switch off

boiler operation select *Thermostat selection* for *Universal* or *Room Control* (if room panel Room Control/Room Control TOUCH is connected) in the menu:

Service settings → Boiler settings → Thermostat selection

For thermostat switch on the CH boiler pump (without switching off the boiler) set the parameter *Thermostat pump deactivating* on *YES* in the menu.

Service settings → Boiler settings → Thermostat pump deactivation

13.14 Connecting reserve boiler

The controller can control reserve boiler (gas- or oil-fired) operation. It is then not necessary to switch this boiler on or off manually. The reserve boiler will be switched on when the temperature of the pellet boiler drops, and will be switched off if the pellet boiler reaches the appropriate temperature. The connection to a reserve boiler, e.g. a gas-fired boiler, should be made by a qualified installer in accordance with the technical documentation of that boiler. The reserve boiler should be connected via a relay to terminals 39-40.
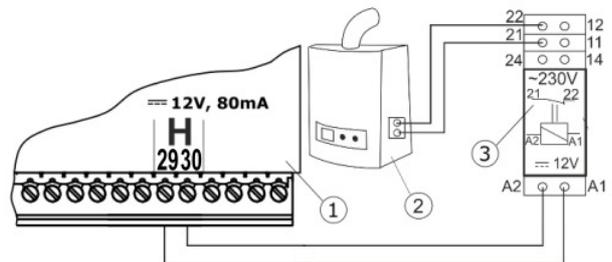
Example scheme of a system for connecting a reserve boiler to the controller: 1 - controller module, 2 - reserve boiler (gas or oil), 3 -relay RM 84-2012-35-1012 and stand GZT80 RELPOL.

As standard, the controller is not equipped with a relay.

⚠ Have the relay assembled by a qualified person in accordance with applicable regulations.

Control of the reserve boiler occurs when Output H mod A is set to *Reserve boiler* in the menu:

Service settings → Output H mod A

Set the CH installation temperature, below which the reserve boiler is to be turned on in parameter:

Service settings → Boiler settings → Reserver boiler

Disabling control of reserve boiler takes place after setting zero value of this parameter's temp.

⚠️ The reserve boiler control output is also shared with the alarm output. Disabling the reserve boiler control will cause this output to be controlled by the alarm control module.

If the pellet boiler is fired up and its temperature exceeds a preset value, e.g. 25°C, the controller will switch the reserve boiler off (it will supply constant voltage +12V to terminals 29-30). This will cause powering up the relay coil and disconnecting its working contacts. After the boiler temperature drops below the parameter Reserve boiler off temperature, the regulator will stop supplying voltage to the contacts 29-30, which should activate the reserve boiler.

☞ Switching the controller into the boiler is off state, causes activation of the reserve boiler.

Example hydraulic scheme with a reserve boiler in a closed circuit: 1 - controller, 2 - reserve boiler, 3 - relay, 4 - switching valve with limit switches.

Example hydraulic scheme with a reserve boiler in an open-closed circuit: 1 - controller, 2 - reserve boiler, 3 - relay, 4 - switching valve with limit switches, 5 - heat exchanger, recommended setting: *Priority HUW = Off*, *Heat exchanger = YES*.

Example electrical diagram of reserve boiler switching valve control: 1 - controller, 2 - reserve boiler, 3 - relay, 5 - switching valve servomotor (with limit switches), note: terminals 22,21,24 must be galvanically separated from terminals 12,11,14.

13.15 Connecting alarms signaling

The controller can report alarms by activating an external devices such as a bell or a GSM device for sending SMS messages. The alarm signaling device should be connected via a relay. Due to the fact that this output is shared with the reserve boiler control output, in order to activate alarm functions on this output, you must first disable the reserve boiler control. To do so, select the menu:

Service settings → Boiler settings → Reserve boiler
set its shutdown temperature to zero.

Connecting an external alarm device: 1 - controller , 2 - external alarm device, 3 - relay.

The alarm signaling is enabled when the H mod A output is set to *Alarms*:

Service settings → Output H mod A

Then, for proper operation, set the alarm output to be activated in the event of the occurrence of one or more selected alarms (AL.1-AL.9) in the menu:

Service settings → Boiler settings → Alarm signaling

13.16 Connecting mixer

⚠️ During connection of the mixer servo, pay attention not to overheat the boiler, which can happen with limited flow of boiler water. Before starting work, it is recommended to know the valve position corresponding to its maximum opening, in order to be able to ensure heat extraction from the boiler at any time by its maximum opening.

The controller cooperates only with mixing valve servos equipped with limit switches. Using other servos is prohibited. It is possible to use servos with time range of full rotation from 30 to 255 s.

Connecting mixer description:

- connect mixer temperature sensor,
- electrically connect mixer pump,
- activate the controller and select proper *Mixer support* in the menu:

Service settings → Mixer 1 settings

- in service mixer settings enter proper *Valve opening time* (time should be provided on servo nameplate, e.g. 120 s).

- connect electrical power to the controller and turn on the controller so that the mixer pump is running,
- set the direction in which the servo closes/opens. To do so, switch the button on the servo housing to manual control and find the valve position where the mixer circuit temperature is maximal (in the controller it corresponds to 100% ON position) as well as the valve position where the mixer circuit temperature is minimal (in the controller it corresponds to 0% OFF position). Remember the positions in order to verify later the correct connection
- disconnect the electrical supply to the controller,
- electrically connect the mixer servo to the controller according to the documentation of the valve servo manufacturer. Do not mix up the opening and closing direction,
- connect electrical power supply to the controller and put the controller into the " Controller off" status,
- verify if the mixer closing and opening wires are not swapped; to do so, enter the **Manual control** menu and open the mixer by selecting *Mixer 1 Open = ON*. While the servo is opening, the temperature on the mixer sensor should increase. If it is differently, switch off electric power supply to the controller and reswap the wires. (Attention: other cause can be mechanical misconnection of the valve - check in the valve manufacturer's documentation whether the valve is correctly connected
- set remaining mixer parameters.

Description of calibrating valve position indicator

The valve position indicator is located in the menu: **Information**. For mixer no. 1, it will calibrate itself after some time. In order to make the valve position indicator show the correct value faster, disconnect electric power supply of the controller, and then switch the button in the servo housing to manual control. Turn the valve plug to completely closed position, then switch the button in the servo housing back to AUTO. Switch on controller power supply - valve opening % indicator has been calibrated.

Attention: for mixers no. 2,3,4,5, calibration is performed automatically, after switching on mains supply. In case of those mixers, wait until valve open % indicator is calibrated. During calibration, the servo is closed by the *Valve opening time.*

13.17 Connecting circulation pump

The circulation pump can be connected to the boiler controller, via a relay, when an additional mod C is connected, or to Output H of the main module. Once connected, set the operation of **Output H1** or **Output H2 (mod B)** and **H3 (mod C)** to *Circulation Pump.*

13.18 Connecting shunt pump

The shunt pump for protecting boiler return can be connected via a relay to the H output of main module. Once connected, set the operation of **Output H1** to Shunt Pump. The shunt pump operates based on indications of the return temperature sensor. The shunt pump starts when the temperature at the boiler return sensor drops below the parameter *Temperature of activating the CH pump*. It is recommended to set this parameter to at least 50°C.

The condition of proper operation of the hydraulic system with the shunt pump is the installation and adjustment of a flow limiting control valve.

⚠ It is suggested to connect the controller and the shunt pump to a common power supply. This will cause that disconnection from the power supply of both receivers will occur simultaneously.

13.19 Connecting STB temperature limiter

In order to avoid boiler overheating due to the controller failure, it is essential to use a safety temperature limiter STB, or another suitable for the given boiler. The STB limiter should be connected to terminals 1-2. When the limiter is activated, the airflow and the fuel feeder motor are disconnected.
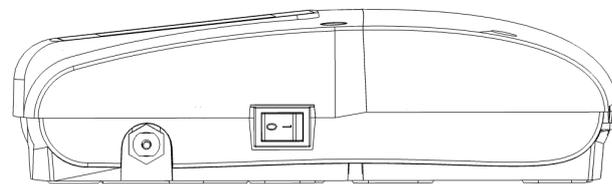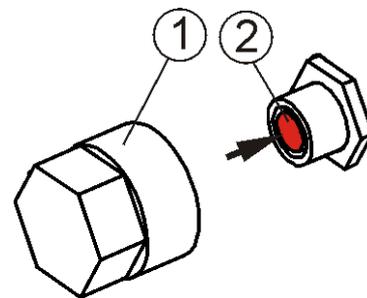
Resetting the STB temperature limiter: 1 - protection nut, 2 - reset button.

⚠ The safety temperature limiter must have a rated operating voltage of at least ~230 V and must have the applicable approvals.

If the limiter will not be installed, terminals 1-2 should be connected by a bridge. The bridge should be made with insulated wire of cross-section at least 0,75 mm^2 with insulation of such thickness that safety requirements for boiler are kept.

13.20 Connecting room panel

It is possible to equip the controller with a Room Control and Room Control TOUCH panel, which can then perform the following functions: room thermostat (supports up to 3 thermostats), boiler control panel, alarm signaling, fuel level indicator.

⚠ The wire cross section for Room Control TOUCH panel connection should be at least 0,5mm^2

The maximum cable length for Room Control TOUCH panel should not exceed 30m. This length may be greater when using wires with a larger cross-section than 0,5mm^2.

- **Four-wire connection**

Connect in accordance with wiring diagram.

- **Two-wire connection**

A two-wire connection requires an external +5V or +12V DC power supply with min. 400 mA current. Connect GND and VCC points of the Room Control power supply to an external

power supply unit, which is not a part of the controller equipment. Connect D+ and D- lines as shown in the wiring diagram.

13.21 Connecting wireless room panel

Wireless radio connection of the Room Control TOUCH Radio panel and the Room Control Radio thermostat requires connecting the ISM radio module to the controller according to the wiring diagram below and performing a pairing between the panel/thermostat and the ISM radio module. In order to do that, enter the menu:

General settings → Radio module settings → Pairing mode and by confiriming with *YES* start the pairing function.

Further description of the wireless panel and thermostat operation can be found in the respective user manuals for these devices.

13.22 Access to the controller parameters via internet network

When an additional Net Control internet module is used, the device enables online remote access to the data contained in the device via Wi-Fi network. The controller can then be operated using a standard web browser, via **www.econet24.com** or via a convenient mobile application **ecoNET.apk** and **ecoNET.app**, which can be downloaded free of charge from the following QR code.

(Android)

(iOS)

Connection of the Internet module and controller configuration for WiFi operation is described in the manual for the NetControl module.

14   Service menu - structure

☞ Entering the menu requires providing a service password.

Service settings
Burner settings
Boiler settings
CH and HUW settings
Buffer settings*
Mixer 1-5 settings*
Output H mod A
Output H mod B/C*
Show advanced
Service counters
Restore the default settings

Burner settings
Fire-up
• Ignition test time
• Flame detection
• Firing-up airflow
• Firing-up time
• Blowing after firing-up
• Blowing period after firing-up
• Heating-up time
• Stabilization time
• Correction starting dose
Operation
• Operation mode ON/OFF
• Airflow increase *
• Feeder 2 operation*
• Feeder 2 min. operation time*
• Tank capacity
Burning off
• Burning off max. time
• Burning off min. time
• Blowing power
• Blowing time
• Blowing pause
• Blowing start
• Blowing stop
Cleaning
• Cleaning time before firing up
• Cleaning time after burning off
• Cleaning blowing
• Fumes exhaust fan power*
• Absolute pressure
Supervision
• Burner power in supervision
• Supervision time
Grate*
• Grate mode
• Fan-GRATE
• Blowing operation
• Blowing pause
Lambda probe*
• Operation with Lambda probe

• Dynamics
• Reaction time
• Range of blowing correction
Other
• Minimum blowing power
• Fuel detection time
• Maximum burner temperature
• Maximum temperature of fumes
• Additional feeder operating time
Exhaust fan
• No, Standard, Inverter
• Min. exhaust power
• 15% exhaust power
• 40% exhaust power
• 60% exhaust power
• 80% exhaust power
• 100% exhaust power
• Absolute pressure sensor: No/Huba 401.93000/DPT250-R8-AZ/ecoPRESS
- Min. abs. press.
- Max. abs. press.
- Abs. pressure correction
- Airflow correction
• Feeder calibration

Boiler settings
Return protection*
• Operation mode
• Min. return temp.
• Return hysteresis
• Closing the valve
Min. boiler temp.
Max. boiler temp.
Reserve boiler*
Alarm signaling
Boiler cooling temp.
Parameter A,B,C FL*
Deactivation of thermostat pump
Boiler efficiency
Heat yield

CH and HUW settings
CH activation temperature
CH pause while loading HUW*
Min. HUW temp.*
Max. HUW temp.*
Increase from HUW and mixer
Extending HUW operation*
Circulation pause time
Circulaton operating time*
Heat exchanger*
HUW heat source*
• Boiler
• Buffer

Buffer settings*
Starting operation
Buffer loading start temperature*
Buffer loading end temperature*
Start heating installation

Mixer 1-5 settings*
Thermostat selection
Mixer support
• Switched off
• CH switched on
• Floor switched on
• Only pump
Min. mixer temperature
Max. mixer temperature
Range of proportionality*
Valve opening time*
Thermostat pump deactivation*
Mixer indifference*

Output H (mod A)
Output H (mod B/C)*
Reserve boiler
Alarms
Circulation pump
Signaling operation
Shunt pump

* not available if no suitable sensor, additional module is connected the parameter is hidden and if the corresponding setting is missing.

15 Description of service settings

15.1 BURNER

Parameter	Description
Firing-up	
• Ignition test time	Time for checking if furnace is hot. Only fan is operating.
• Flame detection	Threshold of flame detection in % of light, when the controller deems the furnace as hot. It is also used for detection of lack of fuel and end of burning off.
• Firing-up airflow	% of blowing when firing up. Too big value prolongs the firing up process or causes failed attempt of firing up.
• Firing-up time	Time of following firing up attempts (3 attempts). After that time the controller goes to another firing up attempt.
• Blowing after ignition	% of fan blowing after flame detection.
• Blowing period after ignition	Fan operation time with *Blowing after ignition* power. Allows better furnace ignition before entering the STABILIZATION mode.
• Heating-up time	Igniter warming up time before engaging the fan. It should not be too long as to not damage the heater. After this time the heater works still until detecting the flame.
• Stabilization time	Duration of the STABILIZATION operating mode.
• Start dose correction	Value of fuel start dose during firing-up.
Operation	
• Operation mode ON/OFF	Switches the burner into THERMOSTAT mode, e.g. for working in bakery. The burner operates with maximum power without modulation of power. The burner deactivates with disconnecting thermostat joints. Boiler temperature sensor does not influence burner operation.
• Airflow increase	Value of the increase of the airflow power at a time when feeder is working in the burner.
• Operation of feeder 2 / Min. operation time of feeder 2	Additional possibility to run the second fuel feeder. *Min. operation time of feeder 2* - time after which the feeder operation is stopped despite the fact that the fuel level sensor contacts are open.
• Tank capacity	Fuel tank capacity for calculating fuel level. When the correct amount is entered, the user does not need to perform the fuel calibration procedure. The controller uses these data if fuel calibration process was not performed. After successful calibration of fuel level the controller does not use this value.
Burning off	
• Burning off maximum time	After this time the controller enters into PAUSE mode, regardless the flame indication by sensor.
• Burning off minimum time	The burning off will last at least for this time regardless the indication of no flame by sensor.
• Air flush intensity	Fan power during blowing while burning off in %.
• Air flush time	Air flush duration for fuel burnout in burning off.
• Air flush pause	Pause between air flushes while fuel burnout in burning off.
• Air flush start	Flame brightness at which the air flush starts while fuel burnout in burning off.
• Air flush stop	Flame brightness at which the fan is turned off while fuel burnout in burning off.
Cleaning	
• Cleaning time before firing up	Fan operating time while firing up the furnace.
• Cleaning time after burning off	Fan operating time while burning off the furnace.
• Cleaning air flow	Fan power in % while cleaning the furnace during burning off and fire-up.
• Exhaust fan	% of exhaust fan while cleaning.
• Absolute pressure	Preset value of absolute pressure in fuel combustion chamber while cleaning.
Supervision	
• Burner power	Burner power in kW while operating in SUPERVISION mode.
• Supervision time	After this time when the controller enters Supervision mode the automatic burner burning off is started. With 0 setting the Supervision mode is disabled.
Grate	
• Grate mode	Enables controller operation with grate and disables automatic fuel feeding.
• Fan-GRATE	Airflow fan power while operating on grate.
• Air flush operation	Air flush duration time in supervision while operating in grate mode. Value should not be to high in order not to cause water overheating in boiler.
• Air flush pause	Pause time between air flushes in supervision while operating in grate mode. Value should not be too low in order not to cause water overheating in boiler.
Lambda probe	
• Operation with Lambda probe	If the parameter is set to *ON* then the controller will operate using indications of Lambda probe. The amount of air supplied to the furnace will be adjusted automatically to gain the preset oxygen value in fumes. If this parameter is set to *OFF* the indications of Lambda probe will not affect the controller operation.
• Dynamics	Affects the speed of adjusting the amount of oxygen in fumes to the preset value and stability of keeping the amount of oxygen in fumes. It is not recommended to change

	this parameter if the adjustment speed and stability of keeping the preset oxygen value is at desired level.
• Reaction time	Affects the speed of adjusting the amount of oxygen in fumes to the preset value and stability of keeping the amount of oxygen in fumes. It is not recommended to change this parameter if the adjustment speed and stability of keeping the preset oxygen value is at desired level.
• Airflow correction range	Sets the acceptable airflow power modification range while operating using Lambda probe.
Other	
• Min. airflow power	Minimum airflow fan power in % which user of the controller can select. It is used only to limit available fan power range. It is not used for fan control algorithm. It should be as low as possible, so that the fan was rotating slowly and freely without "humming".
• Fuel detection time	Countdown time after flame brightness drops below *Flame detection* value. After finishing the countdown the controller attempts to fire-up the burner and after 3 unsuccessful attempts reports an alarm "fire-up attempt unsuccessful".
• Max. burner temperature	Determines the maximum feeder temperature at which the alarm of exceeding maximum burner temperature is reported.
• Max. fumes temperature	Determines the maximum fumes temperature at which the alarm of exceeding maximum fumes temperature is reported.
• Additional feeder operating time	Determines the operation time of additional feeder (bunker feeder). The feeder is connected to the additional module B. After that time the additional feeder operation is stopped regardless opening the contacts of fuel level sensor. Contacts of fuel level sensor are placed in additional module B.
Exhaust fan	Allows operation of exhaust fan.
• Exhaust fan	Enabling or disabling exhaust fan support. Available selections: • *No* – disabling fan support, • *Standard* – standard fan support, • *Inverter* – fan inverter support.
• Min. exhaust power	Minimum exhaust fan power which can be selected by user. It is used only to limit available fan power range. It is not used for fan control algorithm. It should be as low as possible, so that the fan was rotating slowly, but ensuring free fumes exhaust.
• 15%...100% Exhaust power	Selected % of exhaust fan power.
Absolute pressure sensor	Enables operating with absolute pressure sensor. Then exhaust fan rotation speed is adjusted by the controller to reach the required absolute pressure value in combustion chamber.
• Minimum abs. pressure	Determines minimum absolute pressure value in combustion chamber at which the alarm of exceeding absolute pressure is reported.
• Maximum abs. pressure	Determines maximum absolute pressure value in combustion chamber at which the alarm of exceeding absolute pressure is reported.
• Abs pressure correction	Allows correction of absolute pressure sensor indications.
• Airflow correction	Determines acceptable airflow power range of exhaust fan using absolute pressure sensor.
Feeder calibration	Allows calibration of feeder efficienct. Requires switching off the boiler.

15.2 BOILER

Parameter	Description
Return protection	A group of parameters available after connecting the return sensor, responsible for boiler return protection in hydraulic installation with four-way valve equipped with mixer servomotor. It is not recommended to enable return protection function as it may cause frequent blackouts in mixer circuit. Instead of this it is recommended to use higher preset boiler temperatures (70-75°C), which will cause automatic return temperature increase in installation equipped with four-way valve (with servo motor).
• Operation mode	Enabling or disabling the mode. Enabling causes the 4D valve to be closed when return temperature is too low.
• Return hysteresis	4D valve returns to normal operation with return temperature ≥ *min. return temperature* + *return hysteresis*.
• Min. return temperature	Boiler return temperature below which the electric servomotor will close the mixing valve.
• Closing the valve	It is the % of mixing valve opening while return protection function is active. Set a value, so the return temperature could increase. Attention: Return protection function will work only when preset boiler temperature is set high enough. Otherwise the servomotor will be frequently closed. Note: the valve closes with the accurracy of +-1%.
Min. boiler temp.	Minimum preset boiler temperature that can be set by user in the menu and minimum that can be set by the controller, e.g. from night decreases, weather control etc.
Max. boiler temp.	Maximum preset boiler temperature that can be set by user in the menu and minimum that can be set by the controller, e.g. from night decreases, weather control etc.
Reserve boiler	Description in section 0

Signaling alarms	Configuration of alarm output, so that it was enabled while one or more selected alarms are reported. AL1 – max. fumes temperature exceeded, AL2 – max. boiler temp. exceeded, AL3 – max. burner temp. exceeded, AL4 – max. boiler temp. sensor damage, AL5 – burner temp. sensor damage, AL6 – boiler fire-up attempt unsuccessful, AL7 – fan damaged, AL8 – min. absolute pressure exceeded, AL9 – max. absolute pressure exceeded.
Boiler cooling temp.	Temperature of preventive boiler cooling. Above this temperature the controller switches off the HUW pump and opens mixer circuits to cool the boiler. The controller will disable HUW pump if its temperature exceeds the maximum value. The controller will not open the mixer circuit if the *Mixer support = floor on.*
Parameter A FuzzyLogic **Parameter B FuzzyLogic** **Parameter C FuzzyLogic**	These refer to FuzzyLogic mode. They affect the speed of reaching preset value by the boiler temperature and stability of keeping this temperature. It is not recommended to change these settings if the adjustment speed and stability of keeping the preset temperature value is at desired level.
Thermostat pump deactivation	Available options: • *No* – CH boiler pump is not disabled when room thermostat activates, • *YES* – CH boiler pump will be disabled when room thermostat activates
Boiler efficiency	% determination of boiler operating efficiency.
Heat yield	Method of calculating heat yield. Available options: • *None* – without calculation. • *Heat meter* – calculation based on heat meter pulses. • *Estimation* – calculation based on estimation.
Heat meter pulse weight	Weight of single pulse from heat meter in kWh.

15.3 CH AND HUW

Parameter	Description
CH activation temperature	The parameter determines the temperature at which the boiler CH pump will switch on. It protects the boiler against retting due to cooling it with cold water returning from the installation. Attention: by only disabling boiler pump the protection against retting and corrosion, as a result, is not guaranteed. Additional automatics must be used, e.g. a four-way valve or thermostatic three-way valve.
CH pause while loading HUW	Available after connecting HUW sensor. Extended HUW tank loading with HUW priority enabled may result in excessive cooling of CH installation, as with such settings the CH pump is disabled. The CH pump pause parameter while loading HUW prevents it by allowing periodical enabling of CH pump while loading the HUW tank. The CH pump will start after that time for a fixed programmed time of 30s.
Min. HUW temp.	Available after connecting the HUW sensor. It is a parameter with which setting too low preset HUW temperature by user can be limited.
Max. HUW temp.	Available after connecting the HUW sensor. The parameter determines the maximum temperature to which the HUW tank is heated during dropping the excess heat from the boiler during alarms. It is a very important parameter, as setting its value too high may cause a risk of scalding the users with utility water. Too low value of this parameter will cause, that when boiler is overheated the heat excess could not be taken to the HUW tank. When designing the HUW installation damage to the controller should be considered. Due to the controller malfunction the water in HUW tank can heat up to a dangerous temperature putting a risk of scalding the users. Attention: additional protection in form of thermostatic valves should be applied.
Boiler temp. increase from HUW and mixer	The parameter determines by how many degreees the preset boiler temperature will be increased in order to load the HUW tank, buffer and mixer circuit. Increasing the temperature is done only when necessary. When preset boiler temperature is at the desired level the controller will not change it due to necessity of loding the HUW tank, buffer or mixer circuit.
Extending HUW operation	Available after connecting the HUW sensor. After loading the HUW tank and switching off the HUW pump the risk of boiler overheat may occur. It occurrs when the preset HUW temperature is set higher than the preset boiler temperature. The problem concerns in particular HUW pump operation in *SUMMER* mode, where the CH pump is disabled. To cool the boiler the HUW pump operation can be extended by the time of *Extending HUW pump operation*.
Circulation pause time **Circulation operation time**	Pause time between the periods of circulation pump operation is defined with the value of *Circulation pause time* parameter (recommended setting 15-40 min.). The circulation pump operates periodically by the *Circulation operation time* (recommended setting is 60 -120 s.).
Heat exchanger	The parameter is available after setting *Show advanced = YES* option. It concerns inly hydraulic installations with heat exchanger between the open and closed system. Available options: • *YES* – boiler pump operates constantly in short circuit boiler – exchanger, it is not disabled, e.g. by SUMMER mode or priority of hot utility water, • *NO* – boiler pump operates normally.
HUW heat source	Possibility to select the heat source for the HUW tank – boiler or buffer.

15.4 BUFFER

Parameter	Description
Enable buffer operation	Parameter serves to enable opearation with buffer. Available after connecting additional module B and buffer temperature sensors.
Buffer loading start temperature	Parameter *Buffer loading start temperature* defines upper buffer temperature. The buffer loading process is ended when lower buffer temperature reaches the value defined in *Buffer loading end temperature* parameter.
Buffer loading end temperature	
Start of heating installation	Temperature below which the heating installation is disabled, measured ion upper part of the buffer.

15.5 MIXER

Parameter	Description
Thermostat selection	Parameter available only after connecting additional module B. The option allows to change room thermostat for mixer circuit. Available options: • *Versatile* – standard mixer circuit thermostat. • *Room Control T1…T3*, *Room Control Radio T1…T3* – option available after connecting room panel and makes mixer circuit operation dependent on this panel. If the room panel is disconnected then the controller cooperates only with the standard room thermostat.
Mixer support	
• Disabled	Mixer servo and mixer pump are not operating.
• CH switched on	It is used when the mixer circuit feeds radiator system of central heating. The maximum temperature of the mixer circuit is not limited, the mixer is fully opened during alarms, e.g. boiler overheating. Note: do not enable this option if the system is made of pipes sensitive to high temperature. In such situations, it is recommended to set mixer operation to *Floor on*
• Floor switched on	It is used when the mixer circuit feeds floor installation. Maximum mixer circuit temperature is limited to the value of max. preset mixer temp. parameter. Note: after selecting *Floor on* option set max. preset mixer temp. parameter to a value, so that the floor was not damaged and to eliminate the risk of scalding.
• Pump only	When mixer circuit temperature exceeds a value set in *Mixer preset temperature* the mixer pump supply will be disabled. After temperature drop by 2ºC the pump will be enabled once again. The option is usually used to control the thermostatic valve without servo. However such action is not recommended. It is recommended to use standard heating circuit for floor heating, consisting of a valve, servo and mixer pump.
Min. mixer temperature	It is a parameter which can limit user's ability to set too low preset temperature of the mixer circuit. Manual adjustment (e.g. time temperature decreasing) will not cause preset temperature decrease below the value set in this parameter.
Max. mixer temperature	The parameter has two functions: - allows to limit setting too high preset temperature of mixer by user. Automatic adjustment (correction according to the heating curve from outside temperature) will not cause exceeding the preset temperature above the value set in this parameter. - with *Mixer support = Floor on* parameter it is also the limit mixer sensor temperature at which the mixer pump will be disabled. For floor heating set the value not higher than 45…50°C or other if the producer of floor materials or designed of CH installation states otherwise.
Range of proportionality	The parameter affects the size of mixer servo movement. Increasing its value speeds up reaching the preset mixer temperature, however too low value of the parameter causes over-regulation of temperature and unnecessary servo movement. The correct value is adjusted experimentally. It is recommended to set the parameter value within the range of 2 – 6 [3].
Valve opening time	Set *Full valve opening time* provided on the servomotor nameplate, e.g. 140 s.
Thermostat pump deactivation	Setting the parameter to *YES* closes mixer servomotor and disables mixer pump after opening the room thermostat contacts (heated room). This action however is not recommended, because the heated room can be too cold.
Mixer indifference	The parameter setting defining temprature indifference value (dead zone) for mixer control system. The controller controls mixer in a way, that the temperature measured by the mixer circuit sensor was equal to the preset value. Nevertheless, to avoid too often servo movement, that can shorten its lifetime, the adjustment is started only when the measured mixer circuit temperature is higher or lower from the preset, by the value higher from *Mixer indifference*.

15.6   OTHER PARAMETERS

Parameter	Description
Show advanced	Available options: • YES – displays hidden parameters not recommended for editing, • NO – hides hidden parameters.
Output H **Output H (mod B/C)**	Output H configuration: • *Reserve boiler* – output H disables reserve boiler, • *Alarms* – when selected alarm is reported with *Alarms signaling* parameter output H is enabled. Select the alarm or alarms to which the output should react. • *Circulation pump* - output H controls the circulation pump. • *Operation signaling* – on output H the voltage is constantly provided for in all operation modes. The voltage is out only when the controller is disabled. • *Shunt pump* – output H controls the shunt pump to protect boiler return. Output H configuration (mod B/C) is available only with additional modules B or C connected.
Restore service settings	By restoring service settings the main mennu (user) settings are also restored.

16   Alarms description

Alarm numbers displayed by a wireless room thermostat Room Control Radio.

01	Max. fumes temp. exceeded
02	Max. boiler temp. exceeded
03	Max. burner temp. exceeded
04	Feeder control system failure
05	Boiler temp. sensor damage
06	Burner temp. sensor damage
07	STB contact open
08	Fan damage
09	Min. absolute pressure exceeded
10	Max. absolute pressure exceeded
11	Boiler fire-up attempt failed

16.1 Max. fumes temp. exceeded

The alarm occurs after the maximum fumes temperature is exceeded. It disables the fan. Its purpose is to protect the exhaust temperature sensor against damage due to exceeding the sensor's durability temperature. After the temperature drops, the controller returns to normal operation.

16.2 Max. boiler temp. exceeded

Protection against boiler overheating is a two-stage process. First, after exceeding the Boiler cooling temperature, the controller attempts to decrease the boiler temperature by dropping the excess heat to the HUW tank and by opening the mixer servo (only if *mixer support = CH on*). If the temperature measured by the HUW sensor exceeds the value of Max. HUW temp., the HUW pump will be disabled to protect the users from scalding. If the boiler temperature drops, the controller returns to normal operation. However, if the temperature continues to rise (reaches 95°C), a permanent boiler overheating alarm will be activated, accompanied by sound signaling.

The alarm can be erased by � button or restarting the controller's supply.

Attention: placing the temperature sensor outside the boiler water jacket, e.g. on the outlet pipe, is not recommended as it may cause a delay in detection of the boiler overheating condition!

16.3 Max. burner temp. exceeded

The alarm will occur after the burner temperature exceeds the service parameter Max. burner temp. If the burner temperature rises above this value, the controller will start the burning off procedure.

The alarm is erased automatically after the burner temperature drops by 10°C.

The backfire protection function does not work if the controller is not supplied.

The controller cannot be used as a sole boiler protection against the flame backfire. Use additional protective automatics.

16.4 Feeder control system failure - prompt

The controller has an additional protection which prevents continuous fuel feeding. Thanks to this protection, the user is informed, in the form of so called silent prompt, about a failure of the electric system controlling the fuel feeder.

If the alarm occurs, stop the boiler operation and repair the controller immediately. However, the controller can emergency continue further operation, but it is necessary to check whether there is no large accumulation of unburnt fuel in the combustion chamber. If so, remove the excess fuel. Ignition with excess fuel can result in explosion of flammable gases!

Operation on the emergency system is allowed only under supervision of the user until the service arrives and the malfunction is removed. If user supervision is not possible, the boiler should be burned off. When operating in the emergency mode, it is necessary to prevent the fuel feeder from operating incorrectly (continuous operation or no feeder operation).

16.5 Feeder control system failure

The alarm will occur in the event of a permanent fuel feeder control failure. The controller immediately stops the boiler and its further operation is not possible until the malfunction is removed by the service.

16.6 Boiler temp. sensor damage

The alarm occurs when the boiler sensor is damaged and when the measurement range of the sensor is exceeded. When the alarm occurs, the boiler is burned off. Check the sensor and replace it if necessary.

Deleting the alarm is done by pressing ✅ button or by resetting the controller.

👉 Checking the temperature sensor is described in section 13.10

16.7 Burner temp. sensor damage

The alarm occurs when the boiler sensor is damaged and when the measurement range of the sensor is exceeded. When the alarm occurs, the boiler is burned off. Check the sensor and replace it if necessary.

Deleting the alarm is done by pressing ✅ button or by resetting the controller.

👉 Checking the temperature sensor is described in section. 13.10

👉 The controller can operate with burner temperature sensor disconnected, after setting *Max. burner temperature = 0* parameter. However such action is not recommended as it enables a function protecting boiler against the flame backfire to the fuel tank.

16.8 No communication

The control panel is connected to the rest of the electronics via an RS485 digital communication connection. If the cable of this connection is damaged, an alarm "*No communication*" is displayed. The controller does not switch off the regulation and operates normally with the previously programmed parameters. If an alarm occurs, it will take action in accordance with the given alarm.
Check the cable connecting the control panel with the module, and replace or repair it.

16.9 STB contact open

The alarm occurs when an independent safety thermostat is tripped to protect the boiler against overheating. The fans are switched off. After the boiler temperature drops, unscrew the round cover of the limiter and press the reset button.

16.10　Fan damage

The alarm will occur when rotation sensor or fan itself is damaged.

Deleting the alarm is done by pressing ✅ button or by resetting the controller.

16.11　Min. or max. absolute pressure exceeded

The alarm will occur when a predefined threshold of min. or max. absolute pressure in the combustion chamber is exceeded with the absolute pressure sensor operation activated.

Deleting the alarm is done by pressing ✅ button or by resetting the controller.

16.12　Fire-up attempt failed

The alarm will occur after the third failed attempt to automatically ignite the furnace. When the alarm occurs, all pumps are turned off so as not to cause excessive cooling of the boiler. The causes of this alarm can be, i.a.: faulty igniter or no fuel in the tank.

Deleting the alarm is done by pressing ✅ button or by resetting the controller.

17　Other controller functions

17.1 Blackout

In case of blackout the controller will restart in mode in which it was operating before.

17.2 Anti-freeze protection

When boiler temperature drops below 5°C, the CH pump will be switched on overriding boiler water circulation. It will delay freezing the water, however at very low temperatures or with no electricity it may not protect the installation against freezing.

17.3 Pumps standstill protection function

The controller has CH, HUW and mixer pumps standstill protection function. It periodically enables them (every 167 h for a few seconds). It protects the pumps against imoobilizing due to limescale. That is why during the pause in boiler operation the controller's supply should be connected. The function is also performed when the controller is off using buttons (the controller in *"Boiler off"* mode).

17.4 Mains fuse replacement

The mains fuse is located inside the controller housing. The fuse can be only replaced by a

qualified person, after disconnecting the mains supply. Use porcelain, slow-blow fuses 5x20 mm with nominal burnout current 6,3 A and 230 VAC voltage.
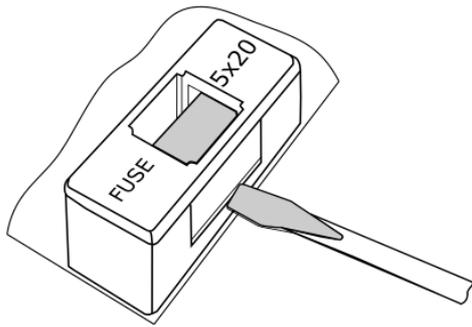
Mains fuse replacement.

To remove the fuse, lift the fuse holder with a flathead screwdriver and slide out the fuse.

17.5 Control panel replacement

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

18   Lambda probe

The burner efficiency can be increased by connecting additional module, Lambda probe. Connect the module according to the electrical diagram. Probe operation must be enabled in the menu:

Service settings → Burner settings → Lambda probe

If the *Operation with Lambda probe* parameter is set to *Enable* then the controler will operate using indications from Lambda probe. The amount of air supplied to the furnace will be adjusted automatically in a way to achieve the preset amount of oxygen in fumes. If this parameter is set to *Disable* then Lambda probe indications will not affect the controller operation. Corrections of preset oxygen values for individual burner power are input in the menu:

Boiler settings → Power modulation

Description of other parameters refering to Lambda probe: *Correction range* parameter sets the accepted airflow adjustment range when operating using Lambda probe. Parameters *Dynamics* and *Reaction time* affect the speed of oxygen amount adjustment in the fumes to a preset value stability of maintaining the amount of oxygen

in fumes. It is not recommended to change these parameters if the adjustment speed and stability of maintaining the preset oxygen amount is at desired level.

The controller automatically, periodically after expiry of defined burner operation time, calibrates the Lambda probe. It is also possible to calibrate on request. To calibrate the probe first burn off the boiler. For proper calibration the furnace in the boiler must be completely burned off. To start the calibration use parameter:

Boiler   settings   →   Lambda   probe calibration

Calibration process takes around 8 minutes.

19   Controller configuration by boiler manufacturer

Boiler/burner manufacturer should adjust the parameters in the controller for a given type or given power of the burner. The most important parameters are parameters related to Firing-up, Operation and Burning off. The controller has possibility to change the default settings depending on the power or type of the boiler. Default settings for individual boilers/burners must be agreed with PellasX company. In order to load new parameters enter:

Service settings → [special password] and select relevant boiler/burner. Default settings can also be loaded using software provided by producer.

20   Description of possible malfunctions

Malfunction symptoms	Guides
There are no signs of operation of device despite connection to the network.	Check: ▪ If line fuses are not blown, replace if necessary. ▪ If the wire connecting panel with the executive module is plugged in correctly and if module is not damaged.
Preset boiler temperature on the display is different than the programmed one.	Check: ▪ If the HUW tank is not loaded at the moment and the preset HUW temperature is set above the preset boiler temperature. If so, then the difference in readings will disappear after heating the HUW tank or decrease the preset HUW temperature. ▪ If time intervals are activate –deactivate time intervals.
CH pump is not operating.	Check: ▪ If boiler exceeded temperature above *Temperature of activating CH pump* parameter – wait or reduce value of this parameter. ▪ If *HUW priority* is enabled, blocking CH pump – disable the priority by setting *HUW pump operation mode* to *No priority,* ▪ If CH pump is damaged or blocked.
Fan is not operating.	▪ Check if the jumper of STB safety temperature limiter is placed on terminals 1-2, (the jumper should be placed only when temperature limiter is disconnected). ▪ If the boiler manufacturer equipped the boiler with an STB temperature limiter with manual return to initial position, unlock it by unscrewing the lid and pressing button according to the boiler manufacturer documentation. ▪ Check and replace fan if necessary.
Additional feeder is not operating (module B).	▪ Check if feeder wires are correctly connected to terminals. ▪ Check if the jumper is placed on terminals 1-2 of module B. ▪ Check if the feeder motor is not damaged. ▪ In case of hearing the running motor and the fuel is not dosed check the feeder according to its manual.
Fuel feeder is not operating / does not feed the fuel	▪ Check whether the feeder wires are correctly connected to terminals. ▪ If the STB temperature limiter is connected on terminals 1-2, if yes then check if the circuit was not cut off due to boiler overheating. ▪ Check if feeder motor is not damaged. ▪ In case of hearing the running motor and the fuel is not dosed check the feeder according to its manual.
Fuel is not burned, there are unburned fuel particles in ash. Fuel burns with a lot of smoke, burner fades	▪ Check settings in *Power modulation* menu.
Temperature is not measured correctly.	▪ Check if there is a good thermal contact between the temperature sensor and measured surface. ▪ If the sensor wire is not routed too close to the mains cable. ▪ If the sensor is connected to the terminal. ▪ If the sensor is not damaged – check according to section 13.10
In HUW pump mode = SUMMER heaters are hot, boiler is overheating.	▪ Increase the value of *Extend HUW operation* parameter to cool the boiler.
HUW pump is not operating, even if HUW tank is loaded	▪ Set *Extend HUW operation = 0* parameter.
In a hydraulic installation with a mixing valve and servo - the mixer does not open	▪ The reason might be HUW tank loading with HUW priority enabled. Wait until the HUW is loaded or disable *HUW priority*. ▪ The reason might be active SUMMER mode. ▪ The reason might be tripping of return protection function. If the return protection function is enabled – check if the water return to boiler sensor is thermally insulated from the surroundings. Immprove the contact with the pipe by using thermal paste. Increase the preset boiler temperature to ensure power reserve to heat the returning water. Check if the hydraulic installation is properly made, i.e. after closing the valve the return temperature must increase above the value of *Min. return temperature* parameter.

Changes register:

180 mm

35 mm

Ø3 mm

Ø3 mm

190 mm

185 mm

Ø3 mm

Ø3 mm

142 mm
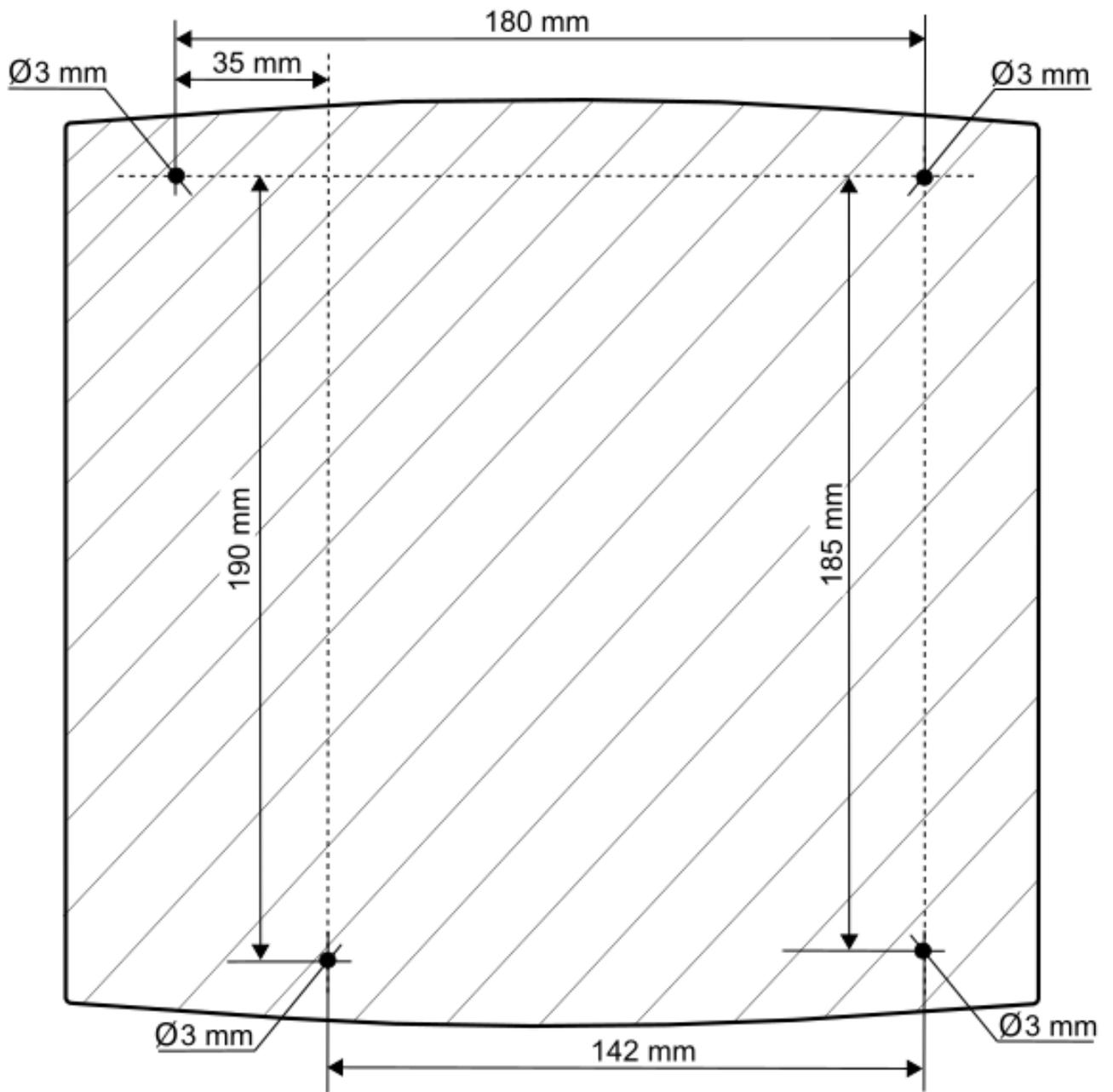
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