Controllers

USER'S MANUAL

ST-976

EN

TABLE OF CONTENTS

1 SAFETY

Before using the device for the first time the user should read the following regulations carefully. Not obeying the rules included in this manual may lead to personal injuries or controller damage. The user's manual should be stored in a safe place for further reference. In order to avoid accidents and errors it should be ensured that every person using the device has familiarized themselves with the principle of operation as well as security functions of the controller. If the device is to be sold or put in a different place, make sure that the user's manual is there with the device so that any potential user has access to essential information about the device.

The manufacturer does not accept responsibility for any injuries or damage resulting from negligence; therefore, users are obliged to take the necessary safety measures listed in this manual to protect their lives and property.

WARNING

- High voltage! Make sure the regulator is disconnected from the mains before performing any activities involving the power supply (plugging cables, installing the device etc.)
- The device should be installed by a qualified electrician.
- Before starting the controller, the user shoud measure earthing resistance of the electric motors as well as the insulation resistance of the cables.
- The regulator should not be operated by children.

WARNING

- The device may be damaged if struck by a lightning. Make sure the plug is disconnected from the power supply during storm.
- Any use other than specified by the manufacturer is forbidden.
- Before and during the heating season, the controller should be checked for condition of its cables. The user should also check if the controller is properly mounted and clean it if dusty or dirty.

Changes in the merchandise described in the manual may have been introduced subsequent to its completion on February 13th 2018. The manufacturer retains the right to introduce changes to the structure. The illustrations may include additional equipment. Print technology may result in differences in colours shown.

We are committed to protecting the environment. Manufacturing electronic devices imposes an obligation of providing for environmentally safe disposal of used electronic components and devices. Hence, we have been entered into a register kept by the Inspection For Environmental Protection. The crossed-out bin symbol on a product means that the product may not be disposed of to household waste containers. Recycling of wastes helps to protect the environment. The user is obliged to transfer their used equipment to a collection point where all electric and electronic components will be recycled.

2 DEVICE DESCRIPTION

ST-976 controller is intended for controlling pellet-fired CH boilers with a feeder, and a supply air fan. Due to advanced software, the controller offers a range of functions:

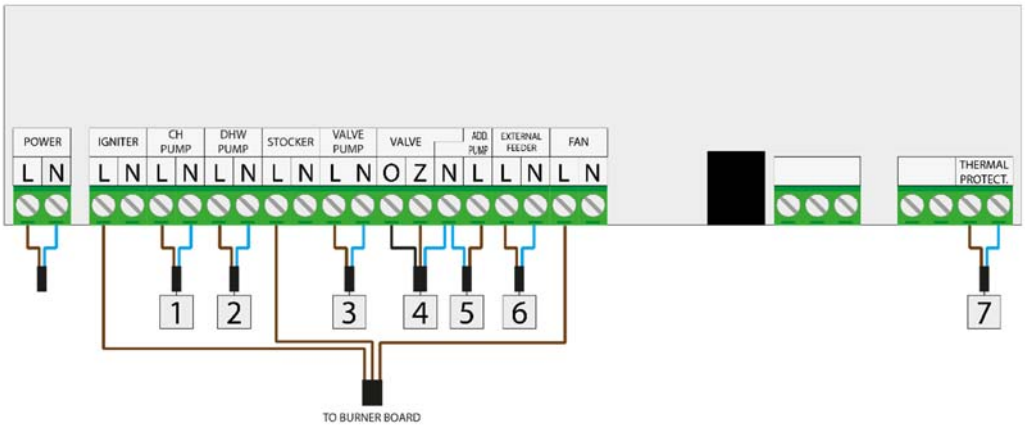
- Control of an igniter
- Control of a feeder
- Control of a burner-cleaning grate
- Control of a supply air fan
- Control of an exhaust fan (after connecting an additional ST-63 module)
- Control of central heating pump - CH
- Control of domestic hot water pump - DHW
- Smooth control of a mixing valve
- Control of additional pumps (max. 2) with the possibility of choosing the type of device (CH pump, DHW pump, circulating pump, floor pump, alarm)
- Built-in module controlling the valve
- Weather-based control of the valve
- Weekly control
- Cooperation with a room regulator using traditional (two-state) or RS communication
- Manual burning option with automatic transition
- Possibility of monitoring the level of fuel in the tank
- Software update via USB
- Docking station enabling both fixed and wireless use
- Possibility of connecting ST-65 GSM module, which enables the user to control certain functions via a mobile phone
- Possibility of connecting ST-505 Ethernet module, which enables the user to view certain parameters and control certain functions via the Internet
- Possibility of connecting a module controlling lambda sensor
- Possibility of connecting two additional valve-controlling modules (e.g. ST-61 or ST-431N)
- Buffer control

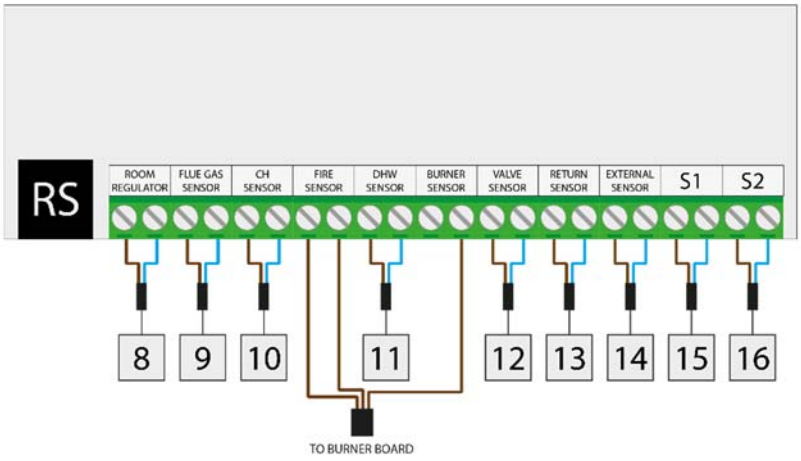
3 INSTALLATION

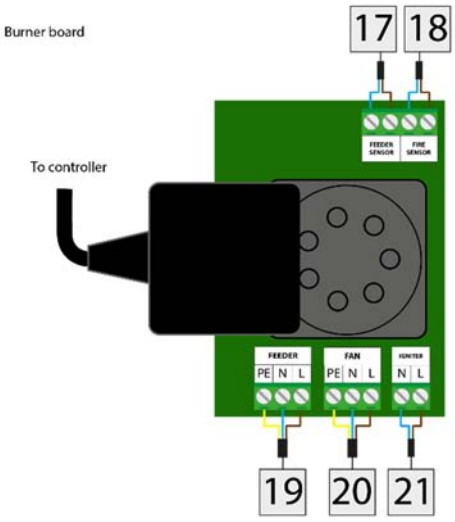
The controller should be installed by a qualified person.

WARNING

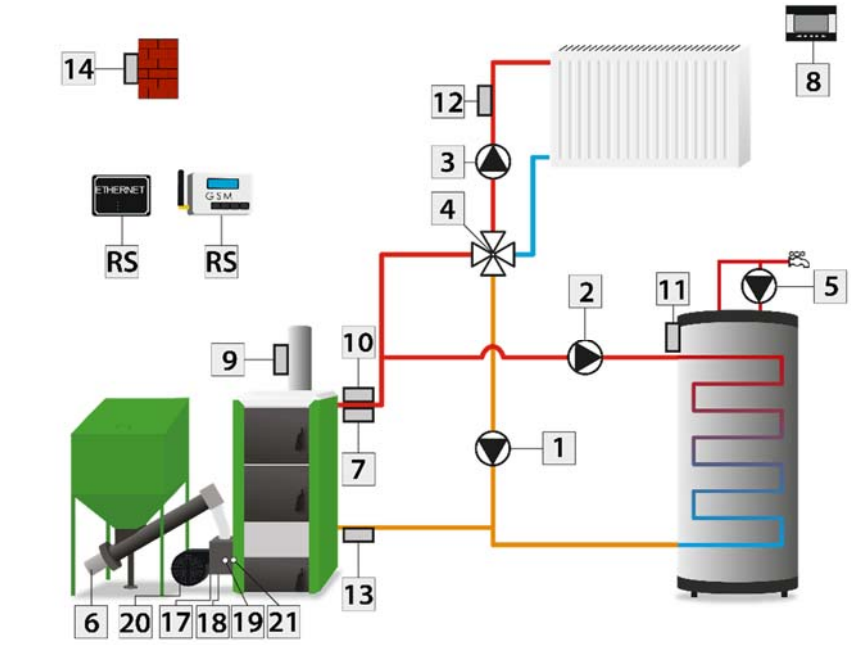
Risk of fatal electric shock from touching live connections. Before working on the controller switch off the power supply and prevent it from being accidentally switched on.

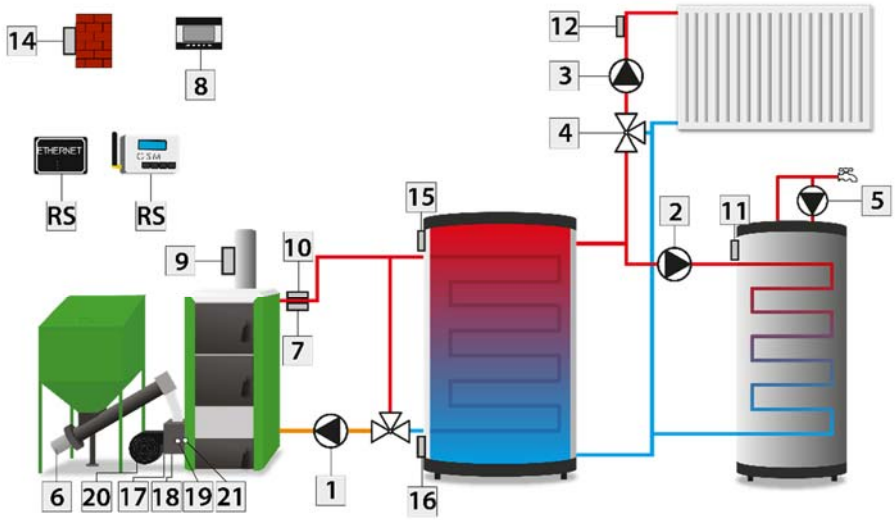






Example installation schemes:





1. CH pump
2. DHW pump
3. Additional pump 1
4. Valve
5. Additional pump 2
6. External feeder
7. Thermal protection
8. Room regulator
9. Flue gas sensor
10. CH sensor
11. DHW sensor
12. Valve sensor
13. Return sensor
14. External sensor
15. Additional sensor 1
16. Additional sensor 2
17. Feeder sensor
18. Fire sensor
19. Feeder
20. Blow
21. Ignite

4 HOW TO USE THE CONTROLLER

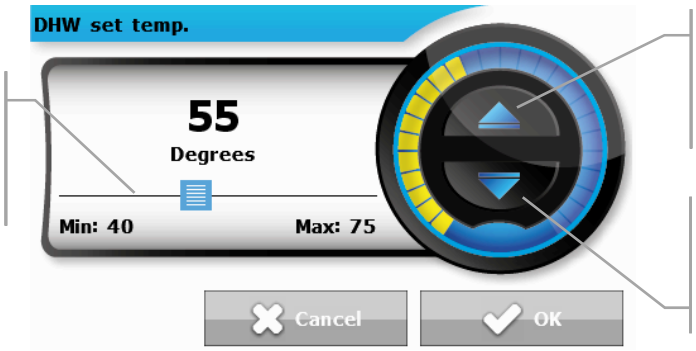
The device is operated by means of a touch screen, in the bottom part of which there are navigation icons. The main screen is divided into two areas which may be adjusted to individual user's needs using the arrows. The user may choose one of the following screen views: *CH boiler temperature, CH boiler temperature chart, Water tank temperature, Water tank temperature chart, Fire-up/Damping function, Fuel level, Parameters of built-in valve.*

The upper left-hand side of the screen displays current controller *operation mode* - touch the screen here to change the operation mode. The right-hand side of the screen displays current day of the week and time - touch here to edit time settings.

In order to change parameters, use the slider or the arrows as illustrated below.

Slider

right – increase
left - decrease



Increase value
tap once or hold

Decrease value
tap once or hold

4.1 PRINCIPLE OF OPERATION

The regulator controls the fan and the feeder with the aim of reaching the pre-set temperature value of water tank and CH boiler. Additionally, it controls CH pump and DHW pump, enabling them after the pre-defined CH boiler temperature has been reached.

Depending on the settings, the controller may operate according to standard algorithm, automatic algorithm or zPID algorithm. It may also use Lambda sensor. The menu layout may also differ depending on settings.

4.1.1 Lambda sensor

Additionally, the controller operation may depend on LAMBDA sensor readings, which provide the information about the proportion of oxygen in the flue gas. On the basis of this value, the efficiency of the burning process is assessed. If the amount of oxygen is different than the pre-set value, the regulator adjusts the fan speed as well as the amount of fuel fed to the boiler, in order to make the process more efficient.

4.2 WORKING PHASES OF THE CONTROLLER

Parameters of particular working phases of the CH boiler are configured by the user. Fire-up and damping are multi-stage processes described below. The remaining phases depend on the *Operation algorithm* selected by the user.

4.2.1 Fire-up

This phase is initialized by the user in the main menu, or by the controller software in certain situations (e.g. after periodical cleaning of the furnace during controller operation). There are four stages of the fire-up process:

1. Blow-by

In this stage the fan works at full speed in order to clean the furnace.

2. Initial fuel feeding

In this stage the blow force decreases to its minimum value - 1%. The feeder is enabled and operates throughout the whole stage. Fuel feeding time is set by the user in the service menu.

3. Heater

In the following stage of the fire-up process the heater is enabled. It remains active until the sensor detects flames. The feeder is inactive whereas the fan operates at the speed defined by the fitter in the fitter's menu.

4. Stabilization

Delay is the final stage of the fire-up process. It starts when the flames have been detected. During this stage the fire stabilizes. The feeder operates according to operation time and pause time settings. The fan operates at the speed defined in the service menu.

4.2.2 Standard operation

The feeder and fan operation depend on the user's settings and current CH boiler temperature. If current temperature is much lower than the pre-set value (e.g. after the fire-up), the feeder and the fan operate according to the settings described as *Maximum power.* When the CH boiler approaches the pre-set value, the controller switches to *Minimum power* settings.

4.2.3 Automatic operation

Once the fire-up process has been completed, the controller enters automatic mode. In this mode, the controller operation is based on the user-defined parameters concerning the weight and calorific value of fuel and fan speed before and after reaching the pre-set temperature value.

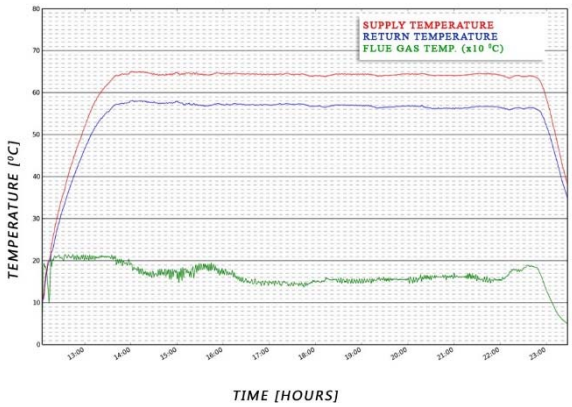
4.2.4 PID operation algorithm

If PID control function is active, the fan and feeder operation depend on current CH boiler temperature and the flue gas temperature.

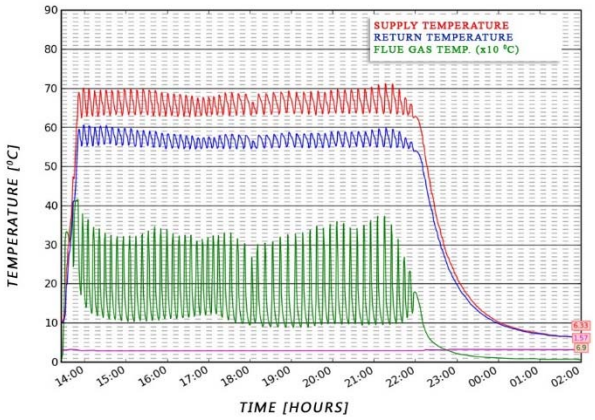
This type of controller calculates the blow force on the basis of CH boiler temperature and the flue gas temperature measured at the CH boiler outlet. The fan operates continuously and the blow force depends on the CH boiler temperature, the flue gas temperature as well as the difference between these parameters and their pre-set values. One of the greatest advantages of PID regulators is their ability to maintain a stable pre-set temperature without unnecessary overregulation and oscillations.

Using this type of regulator with a flue gas sensor helps to reduce fuel costs by up to several percent. Moreover, it ensures stable temperature of output water thus prolonging the life of the heat exchanger (of the CH boiler). Flue gas temperature control at the outlet results in low emission of dust and environmentally harmful gases. Flue gas heat is not disposed of through the chimney, but it is utilised for heating purposes.

Test results: TECH controller with PID control



***Test results: TECH controller without PID* control**



4.2.5 Damping

It may be activated by the user in the main menu or by the software in certain circumstances (e.g. before automatic cleaning procedure, after a sudden temperature increase of 5°C or after flame loss in operation mode).

Damping is a two-stage process. The duration of these stages may be adjusted in the fitter's menu.

1. Damping protection

The feeder is disabled and the fan operates at the speed defined by the fitter in the fitter's menu. This phase lasts until the sensor detects flame loss.

2. Damping delay

The fan operates at full speed.

4.3 CONTROLLER FUNCTIONS - MAIN MENU

In the main menu the user may configure basic controller options:

4.3.1 Fire-up / Damping

Once this function has been selected, the fire-up process starts.

The user is asked to confirm the fire-up process activation.

The next stages of fire-up process are described in section:

➔ ***Błąd! Nie można odnaleźć źródła odwołania.*** *Fire-up, page: 10*

It is a dependent feature - it depends on the operation mode. Fire-up function is different operation modes is described in the following section:

➔ *4.4.12 Eco mode, page: 39*

Once the fire-up process has been activated in the controller menu, this option changes into *Damping*, which enables the user to start CH boiler damping process.

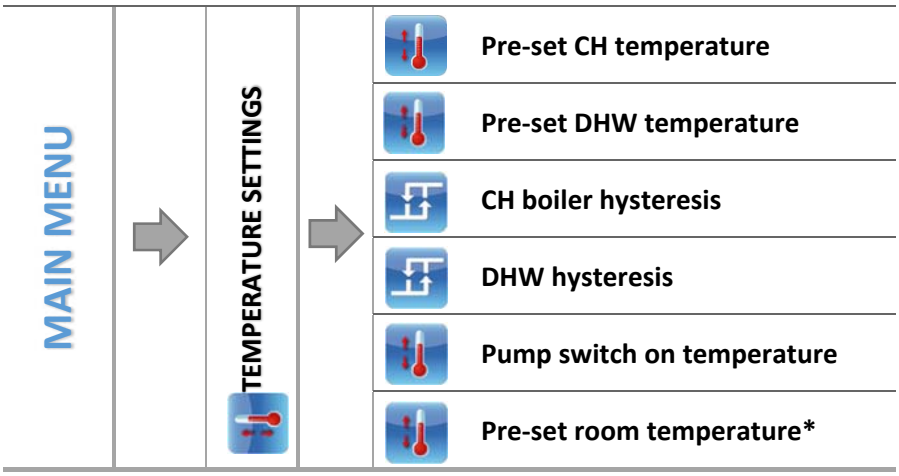
4.3.2 Fuel tank full

This function should be used after the fuel tank has been fully filled, in order to reset the fuel level to 100%.

NOTE
Before using this function for the first time it is necessary to calibrate the fuel feeder operation.

➔ *4.4.10 Fuel level calibration, page: 38*

4.3.3 Temperature settings



**When room regulator is connected, with RS communication*

⇨ After selecting a given icon, the display shows a panel enabling the user to change the setting using a slider or arrows.

4.3.3.1 *Pre-set CH temperature*

This option is used to define the pre-set temperature of the CH boiler. The setting range available is 55°C-80°C (the setting range may be changed by the manufacturer or fitter in the service menu).

4.3.3.2 *Pre-set DHW temperature*

This function is used to define the pre-set temperature of the domestic water. After the water in the tank reaches this temperature, DHW pump is disabled. The pump will be enabled again when the temperature drops below the pre-set temperature minus the value of *DHW hysteresis* (read from the DHW sensor). DHW temperature range: 40°C-60°C.

4.3.3.3 *CH boiler hysteresis*

This option is used to set the hysteresis of the pre-set temperature. It is the difference between the temperature of entering the sustain mode and the temperature of restoring operation mode.

Example:

Pre-set CH temperature	*60°C*
Hysteresis	*3°C*
Entering sustain mode	*60°C*
Return to operation mode	*57°C*

When the pre-set temperature is 60 ºC, the hysteresis is 3ºC, the device will be disabled at the temperature of 60 ºC whereas returning to the operation mode takes place at 57 ºC.

4.3.3.4 *DHW hysteresis*

This option is used to set the hysteresis of the pre-set water tank temperature. It is the difference between the pre-set temperature (desired temperature of the water tank) and the temperature of returning to operation mode.

Example:

Pre-set DHW temperature	*55°C*
Hysteresis	*5°C*
Pump deactivation	*55°C*
Pump activation	*50°C*

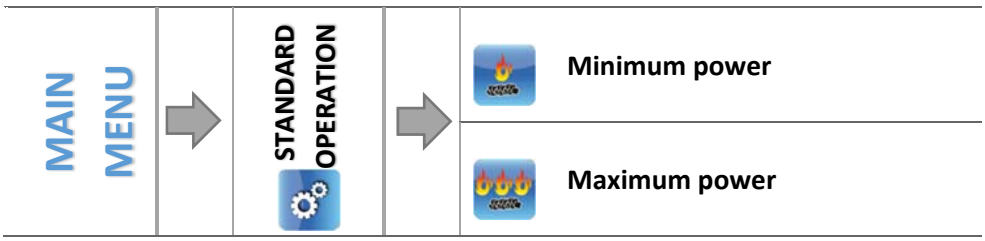
When the pre-set temperature is 55 ºC, the hysteresis is 5ºC, the device is disabled when the pre-set temperature of 55 ºC is reached. It is activated again when the temperature drops to 50 ºC.

4.3.3.5 *Pump switch on temperature*

This option is used to define the temperature of CH pump and DHW pump activation (temperature measured on the CH boiler). Below this temperature value both pumps remain inactive whereas above this value the pumps are enabled and operate according to the operation mode.

4.3.4 Work algorithm

4.3.4.1 *Standard operation*

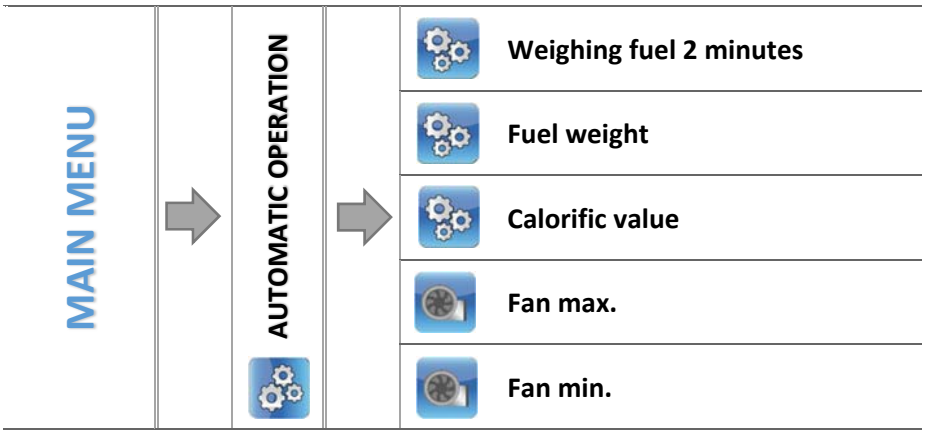


- ⇨ Decide if you want to adjust standard operation parameters for *Maximum power* or *Minimum power*
- ⇨ Tap on the icon of the parameter to be edited and define the parameter values using a slider or arrows.

This option enables the user to configure operation time, frequency of feeder activation and blow force for a given power level.

If the controller cooperates with Lambda sensor, the user may also configure the pre-set amount of oxygen in flue gas for each power level. Then, the feeder and fan operation will also be controlled on the basis of Lambda sensor readings.

4.3.4.2 *Automatic operation*



4.3.4.2.1 Weighing fuel 2 minutes

This function enables the user to check the weight of the fuel fed by the feeder within 2 minutes. Before activating this function, it is necessary to disconnect the feeder from the burner and provide a suitable container. Next, wait until the feeding process finishes and weigh the fuel.

4.3.4.2.2 Fuel weight

Enter the weight of the fuel fed within 2 minutes.

4.3.4.2.3 Calorific value

Enter the calorific value of pellet fuel (given on the packaging).

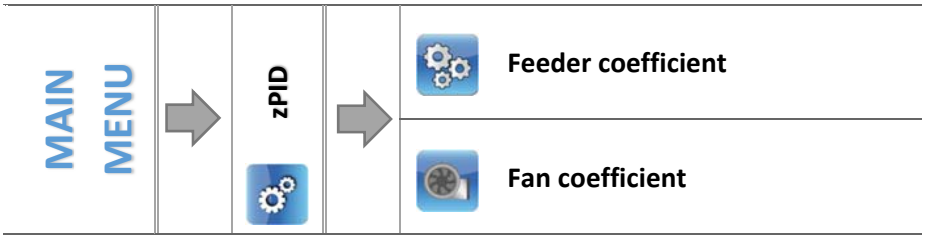
4.3.4.2.4 Fan max.

This option is used to define the fan speed until the pre-set temperature is reached.

4.3.4.2.5 Fan min.

This option is used to define the fan speed in sustain mode, i.e. after the pre-set temperature has been reached.

4.3.4.3 *zPID operation*



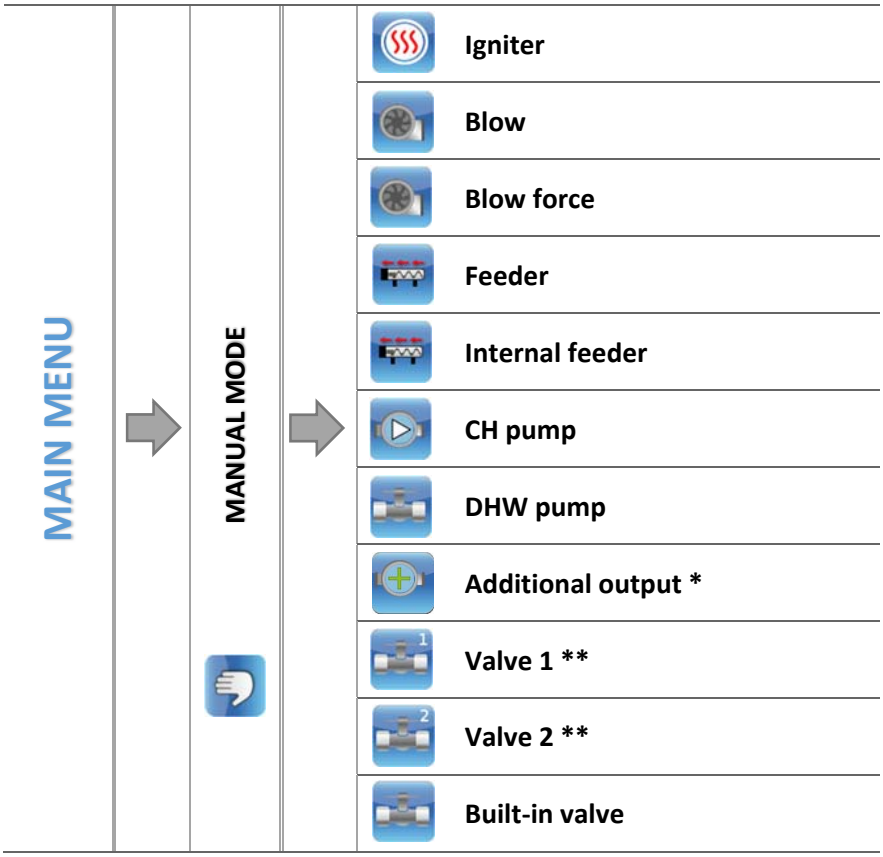
4.3.4.3.1 Feeder coefficient

Feeder coefficient serves to optimize the feeder operation so that it supplies an appropriate amount of fuel. Using this function the user may increase or decrease the amount of fuel fed to the CH boiler.

4.3.4.3.2 Fan coefficient

This function is used to adjust the fan speed. If the blow force is too low/high, the coefficient should be adequately increased/decreased in order to ensure efficiency.

4.3.5 Manual mode



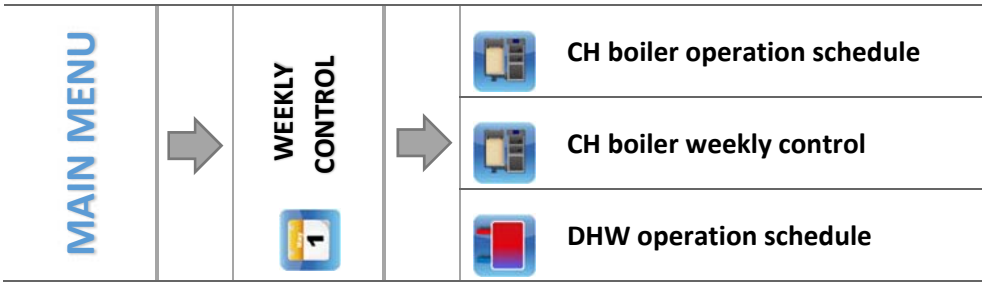
** This parameter is displayed after activating the additional device in the fitter's menu.*

***These parameters are displayed after activating the additional valve in the fitter's menu (it is necessary to use an additional valve-controlling module e.g. ST-431N).*

For the user's convenience, the regulator offers *Manual mode* function. In this function, each executive device may be activated and deactivated independently of others. It allows the user to check if the following devices work correctly:igniter, blow (fan), feeder, grate, CH pump, DHW pump, additional pumps, built-in valve and optionally the additional valves (this mode may activate valve opening and closing) and valve pumps. Blow force function enables the user to adjust the fan speed.

NOTE
When the user enables the igniter, the blow function is enabled as well.

4.3.6 Weekly control



This function enables the user to configure weekly control of the CH boiler and the water tank as well as program the changes of CH boiler pre-set temperatures.

NOTE
It is necessary to set time and date for this option to function properly.

4.3.6.1 *CH boiler operation schedule*

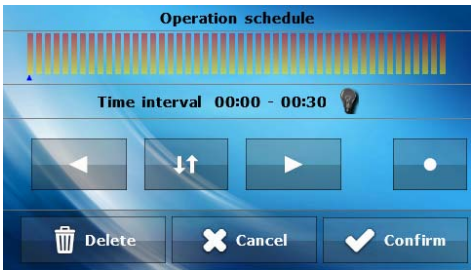
Once this option has been selected, the displays shows icons indicating days of the week. Select a given day to adjust the operation schedule to individual needs.

This type of weekly control enables the user to configure the periods of CH boiler operation on particular days of the week, with the accuracy of 30 minutes. During the periods of inactivity, the CH boiler remains damped regardless of other factors (e.g. signal from the room regulator).

⇨ WEEKLY CONTROL SETTING – CH BOILER OPERATION SCHEDULE

How to configure CH boiler operation schedule:

⇨ Activate this option.
⇨ Select the day of the week to be edited.
⇨ The display shows the following content:



⇨ First, use the icons  to select the time period in which you want to enable or disable the CH boiler.
⇨ Once the hour has been selected, use the icon  to enable or disable the CH boiler at a given time.
⇨ In order to save the setting for another time period, tap on the icon  . When it is highlighted in red  , use the icons  to copy the setting into the next or the previous time period.
⇨ Once the operation schedule for each day has been configured, select  .
⇨ The display shows a panel enabling the user to copy the setting into another day of the week.
⇨ If you want the CH boiler to operate according to these setting on other days of the week, select these days and tap  .

⇨ In order to reset all settings, tap on  and confirm.

4.3.6.2 *CH boiler weekly control*

Weekly control function enables the user to program changes of the pre-set CH boiler temperature for particular hours and days of the week. The setting range for the temperature differences is +/-10°C.

In order to activate this function, select Mode 1 or Mode 2. Detailed settings of each mode are available further in the submenu: Set mode 1 and Set mode 2.

Once a given mode is selected, the main screen displays the value of current temperature deviation (below the pre-set CH temperature, alternately with Pre-set) informing the user that the function is active.

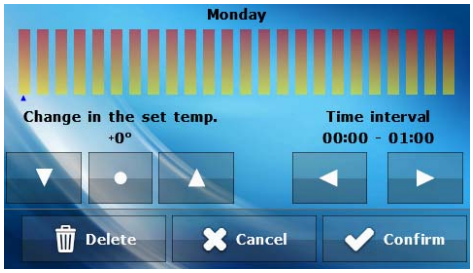
- HOW TO SET WEEKLY CONTROL

Weekly control may be programmed in two different modes:

MODE 1 – the user sets the temperature deviations for each day of the week separately

Configuring mode 1:

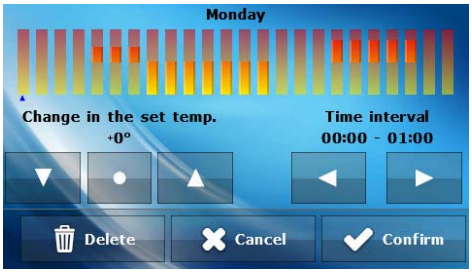
- ⇨ Select: Set mode 1.
- ⇨ Select the day of the week to be edited
- ⇨ The following screen appears on the display



- ⇨ Use ◄ ► to select the hour to be edited
- ⇨ Use ▲ ▼ to increase or decrease the corresponding temperature value as needed
- ⇨ The range of pre-set temperature change is -10°C to 10°C.
- ⇨ If you want to copy the temperature change value for the next hours, tap on ● - it will be highlighted in red: ● Then, use ◄ ► to copy the settings into the previous or the following hour.
- ⇨ Once all temperature changes for a given day are ready, select Confirm.
- ⇨ The display shows a screen enabling the user to copy the settings for the next day.
- ⇨ If you want the CH boiler to operate according to these settings also on other days of the week, select them and confirm by tapping on OK .

- ⇨ All settings may be deleted by selecting Delete and confirming it.

Example:



	Hour	Temperature - **weekly control setting** (+/-)
Monday		
PRE-SET	4^{00} - 7^{00}	+5°C
	7^{00} - 14^{00}	-10°C
	17^{00} - 22^{00}	+7°C

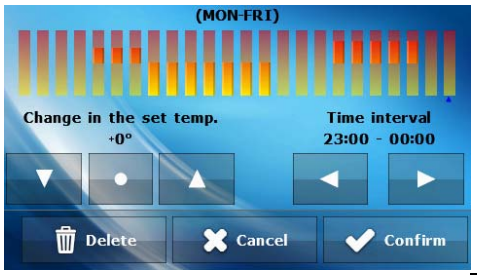
If the pre-set CH boiler temperature is 50°C, on Mondays between 4^{00} and 7^{00} the CH boiler will increase by 5°C to reach 55°C; between 7^{00} and 14^{00} it will drop by 10°C, to reach 40°C, and between 17^{00} and 22^{00} it will increase to reach 57°C.

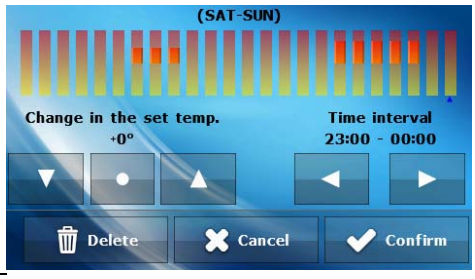
MODE 2 – the user sets the temperature deviations for all working days (Monday-Friday) and for the weekend (Saturday-Sunday) separately.

Configuring mode 2:

- ⇨ Select: Set mode 2.
- ⇨ Select the part of the week to be edited.
- ⇨ Follow the same procedure as in the case of Mode 1.

Example:





	Hour	Temperature - **weekly control setting** (+/-)
Monday - Friday		
PRE-SET	4^{00} - 7^{00} 7^{00} - 14^{00} 17^{00} - 22^{00}	+5°C -10°C +7°C
Saturday - Sunday		
PRE-SET	6^{00} - 9^{00} 17^{00} - 22^{00}	+5°C +7°C

If the pre-set CH boiler temperature is 50°C, from Monday to Friday between 4^{00} and 7^{00} the CH boiler will increase by 5°C to reach 55°C; between 7^{00} and 14^{00} it will drop by 10°C, to reach 40°C, and between 17^{00} and 22^{00} it will increase to reach 57°C.

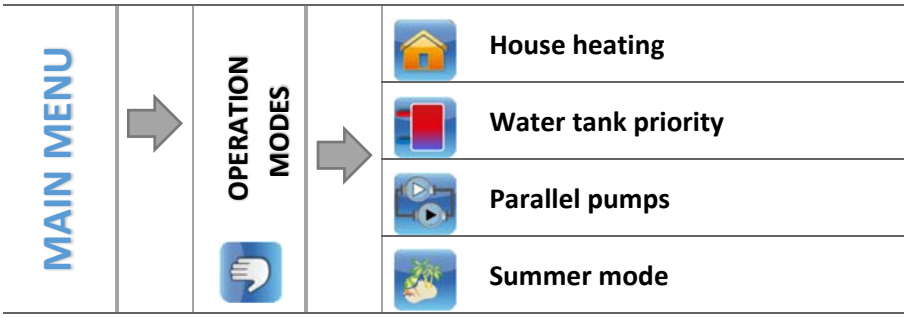
Th the weekend, between 6^{00} and 9^{00} the temperature will increase by 5°C to reach 55°C, and between 17^{00} and 22^{00} it will increase to reach 57°C.

4.3.6.3 *DHW operation schedule*

This function enables the user to configure the periods of DHW tank activity on particular days of the week, with the accuracy of 30 minutes.

➔ *4.3.6.1 CH boiler schedule, page: 17*

4.3.7 Operation modes



In this function the user activates one of the operation mode,s depending on current needs.

4.3.7.1 *House heating*

When this function is selected, only the house is heated. CH pump is activated when the temperature is above the pump activation threshold. Below this temperature value (minus hysteresis) the pump is disabled.

4.3.7.2 *Water tank priority*

In this mode, the water tank (DHW) pump operates until the pre-set DHW temperature is reached (the valves close to the maximum and the valve pumps are switched off). After the pre-set temperature has been reached, the pump is disabled and the controller activates the CH pump and the mixing valves. When the water tank temperature drops below the pre-set value minus hysteresis, DHW pump is enabled again and the valves are disabled.

NOTE
If the pre-set water tank temperature is higher than the pre-set CH boiler temperature, the pump will not be activated in order not to cool down the water.

4.3.7.3 *Parallel pumps*

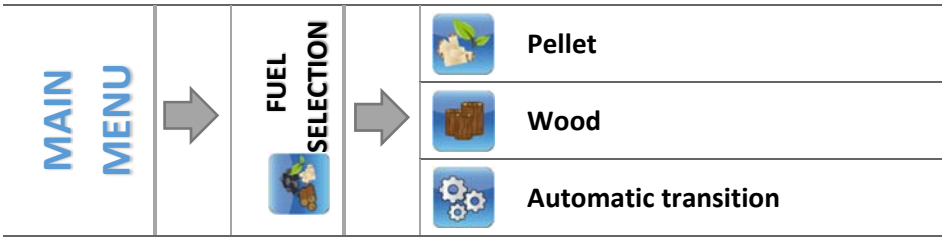
In this mode the CH pump operates above the pump activation threshold. DHW pump is activated at the same time in order to heat the water tank. Once DHW pre-set temperature has been reached, DHW pump is disabled. It is enabled again when the temperature drops by DHW hysteresis value.

NOTE
If current CH boiler temperature is lower than current water tank temperature, DHW pump will not be activated to prevent the water in the tank from cooling down.

4.3.7.4 *Summer mode*

In this mode only DHW pump is active (enabled when the pump switch-on threshold is reached) and the **CH valves** are closed in order not to heat the house unnecessarily. If the CH boiler temperature is too high (when *return protection* function is enabled), the valve will be open in an emergency procedure.

4.3.8 Fuel selection



This function is used to select the type of fuel used - pellet or wood. Depending on user's choice, certain factory settings change.

4.3.8.1 *Automatic transition*

This function involves automatic fuel change. If the CH boiler is fired with wood, once the wood has been burnt up, it is possible to change the fuel type into pellet without the necessity of using *Fire-up* function. When the CH boiler is in operation mode and CH sensor detects that the temperature is lower than the pre-set threshold, the controller will empty the grate and start pellet fire up, after the time defined in *Waiting time* function.

4.3.9 Thermal disinfection

Thermal disinfection involves DHW and it may be activated only in *Water tank priority mode, Parallel pumps mode* or *Summer mode.*

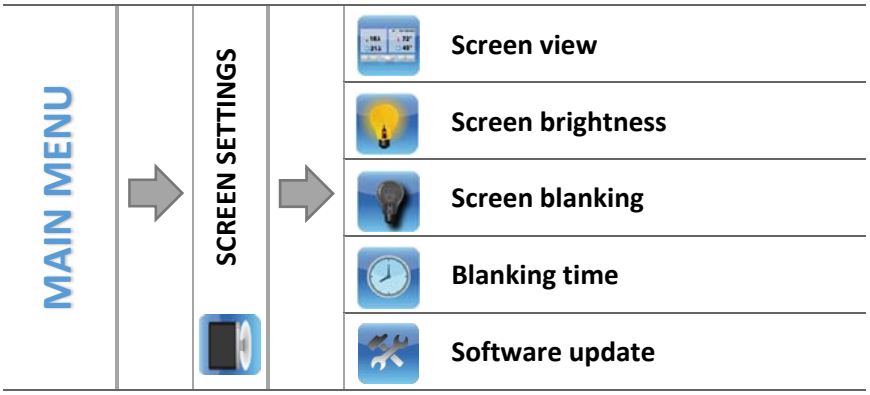
It involves raising the temperature of water in the DHW circuit to the minimum of 60 °C. Current regulations require adjusting the DHW installation to enable thermal disinfection carried out in the temperature of at least 60°C (recommended temperature: 70°C). Piping, fittings and technological design of the DHW system need to meet this requirement.

DHW disinfection aims to eradicate Legionella pneumophila – bacteria which lower the cell-mediated immunity. The bacteria often multiplies in hot water reservoirs (optimum temperature: 35°C), which often happens in water tanks.

Once this function has been activated, the water boiler is heated until the pre-set temperature reached. The temperature is maintained for the whole disinfection time (e.g. 10 minutes). Next, the standard operation mode is restored. Disinfection temperature needs to be reached within 60 minutes from its activation (default setting) Otherwise, the function will be automatically deactivated.

Any changes concerning this function may be introduced only in service mode.

4.3.10 Screen settings



4.3.10.1 *Screen view*

The user may change the main screen view choosing between the panel screen which displays current parameters of the controller operation and manufacturer's screen (intended for authorised person, secured with a code) which offers more details.

4.3.10.2 *Screen brightness*

This function is used to adjust screen brightness within the range of 10 to 100%.

4.3.10.3 *Screen blanking*

This function is used to adjust blank screen brightness within the range of 0 do 50%.

4.3.10.4 *Blanking time*

This function is used to set the screen blanking time.

4.3.10.5 *Software update*

This function is used to update/change the software version installed in the controller.

NOTE

- Software update should be conducted when the CH boiler is damped.
- The memory stick which is going to be used to save the setup file should be empty (preferably formatted)
- Make sure that the file saved on the memory stick has exactly the same name as the downloaded file so that it is not overwritten.

- Mode 1:

⇨ Insert the memory stick with the software into the controller USB port.
⇨ Select *Software update* (in screen settings).
⇨ Confirm controller restart

- The controller restarts
- Software update starts automatically.
- Once restarted, the controller display shows the starting screen with module and screen software version
- Screen and module software versions must match
- Once the installation process is completed, the display shows the main screen.

⇨ When software update has been completed, remove the memory stick from USB port.

- Mode 2:

⇨ Insert the memory stick with the software into the controller USB port.
⇨ Reset the device by unplugging it and plugging it back in.
⇨ When the controller starts again, wait until the software update process starts.

- The following part of software update is the same as in *Mode 1*.

4.3.11 Fitter's menu

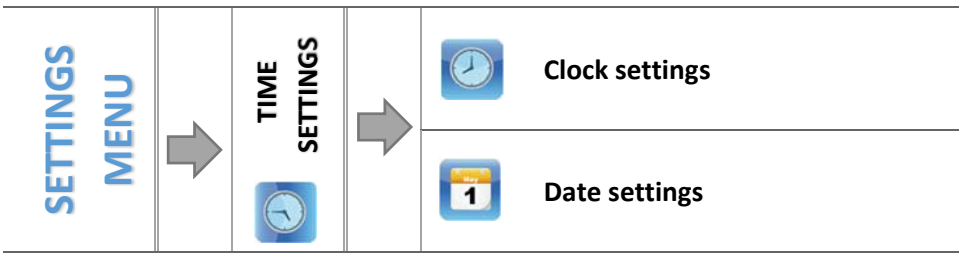
Fitter's menu is intended to be accessed by the person installing the CH boiler or service staff. It includes additional controller functions such as CH boiler parameters, additional valves, additional pumps as well as advanced settings of basic functions.

➔ *4.4 Fitter's menu, page: 24*

4.3.12 Service menu

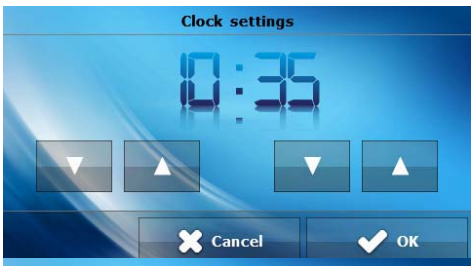
Service menu should be accessed only by qualified service staff. In order to access service setting, it is necessary to enter a 4-digit code provided by TECH Company.

4.3.13 Time settings



This function is used to set time.

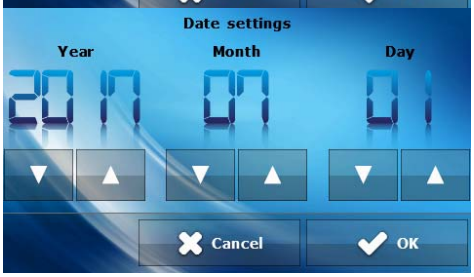
4.3.13.1 *Clock settings*



This parameter is used to set current time.

⇨ Use the icons ▼ ▲ to set the hour and minutes separately.

4.3.13.2 *Date settings*



This parameter is used to set current date.

⇨ Use the icons ▼ ▲ to set the year, month and day separately.

4.3.14 Language selection

This option is used to select the language version of the controller menu.

4.3.15 Software version

This function enables the user obtain basic information about the software version.

4.3.16 Factory settings

The controller is pre-configured for operation. However, the settings should be customized to the user's needs. Return to factory settings is possible at any time. When the factory settings option is activated, all customized settings of the CH boiler (saved in user's menu) are lost and replaced with the manufacturer's settings. Then, the parameters may be customized anew

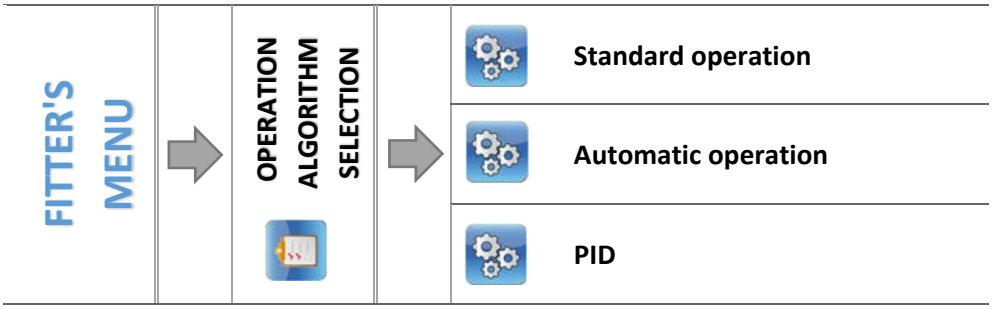
4.4 CONTROLLER FUNCTIONS – FITTER'S MENU

Settings menu is intended to be accessed by a qualified person. It includes additional controller functions such as CH boiler parameters, additional valves, additional pumps as well as advanced settings of basic functions (e.g. parameters of built-in valves).

MAIN MENU → FITTER'S MENU →

4.4.1 Operation algorithm selection

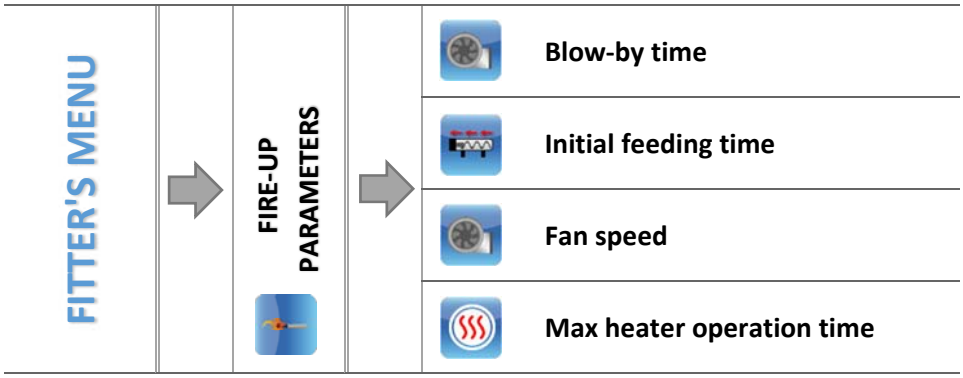
Access to this submenu is secured with a password.



This function is used to select operation algorithm. Depending on selected mode, the CH boiler operation phases will change.

➔ *4.2 Controller operation phases, page: 10*

4.4.2 Fire-up parameters



Fire-up parameters concern detailed fire-up settings. The settings should be adjusted according to the type of fuel used.

4.4.2.1 *Blow-by time*

This function is used to configure blow-by time in Fire-up mode.

4.4.2.2 *Initial feeding time*

This parameter defines the time of the second fire-up phase. During this phase the fuel is fed to the furnace.

4.4.2.3 *Fan speed*

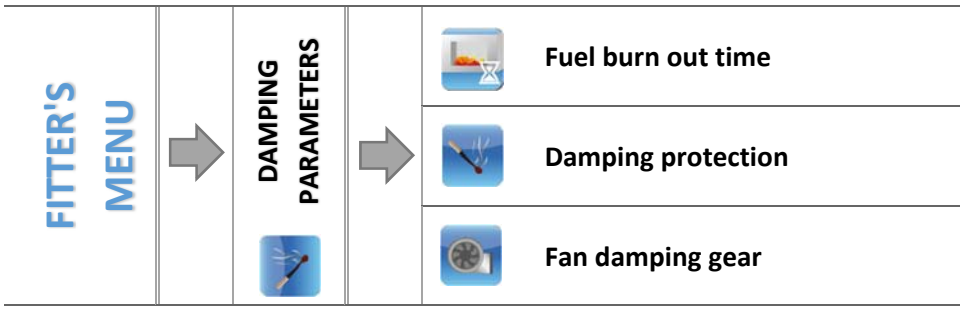
This function is used to configure fan speed in the third fire-up phase. In the remaining phases the speed is adjusted by the controller.

4.4.2.4 *Max heater operation time*

This parameter concerns the third phase of the fire-up process. During this stage, the heater (igniter) is enabled and remains active until the sensor detects fire. If the flame fails to appear for a long time, the igniter is disabled and the fuel feeding is activated again (lasting half of the time set by the user in *Initial fuel feeding time*). Next, the heater is enabled again. If the sensor detects fire, the controller switches to the last phase - Stabilization.

If the fire does not appear after the second fire-up attempt, after the heater protection time the fire-up process will be stopped and the display will inform about fire-up failure.

4.4.3 Damping parameters



Damping parameters concern controller settings in damping mode.

4.4.3.1 *Fuel burn out time*

This parameter defines the duration time of the last damping phase. In this phase the fan operates at maximum speed. The aim of this phase is to clean the furnace.

4.4.3.2 *Damping protection*

This parameter defines the duration time of the first damping phase. In this phase the feeder is disabled and the fan operates at a user-defined speed. The aim of this phase is to burn the remaining fuel.

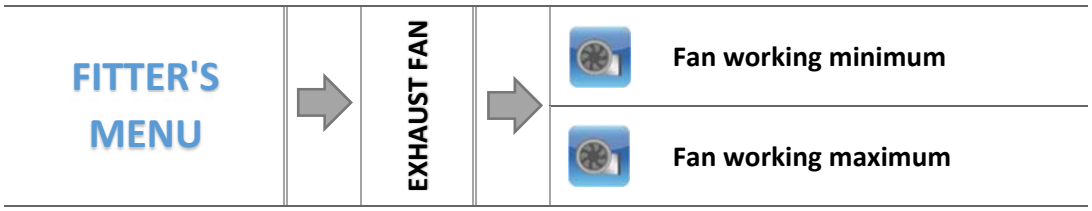
4.4.3.3 *Fan damping gear*

This function is used to configure the blow force of the fans for the first damping phase.

4.4.4 Internal feeder coefficient

This value defines how much longer (%) the internal fan will operate in comparison to the external fan.

4.4.5 Exhaust fan



NOTE
The controller may optionally be equipped with an additional module SWW-1 using RS communication.

The aim of the additional device is to improve the chimney draught. The device is controlled by the additional module **SWW-1** using RS communication. It adjusts its rotational speed to the burner power. The fan operates in all CH boiler operation modes, i.e. *Fire-up, Operation* and *Damping.*

4.4.5.1 *Fan working minimum*

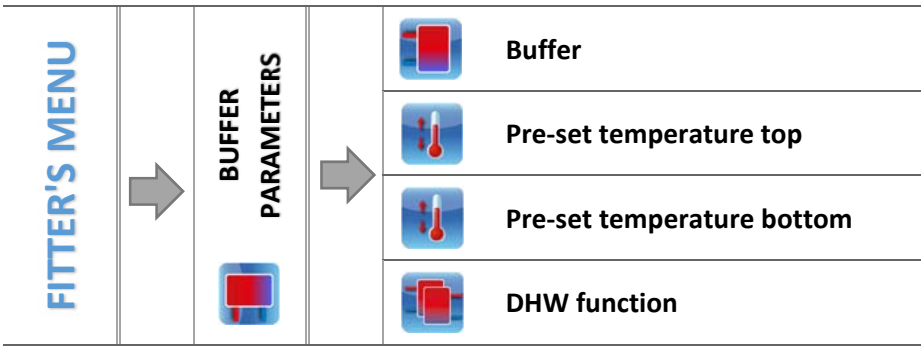
The minimum exhaust fan speed for the minimum burner power.

4.4.5.2 *Fan working maximum*

The maximum exhaust fan speed for the maximum burner power.

NOTE
The working range of Maximum may not be lower than the Minimum. Once the module has been connected, the range update may take a few minutes.

4.4.6 Buffer parameters



These parameters are used to adjust the controller operation in the case of heating system with a buffer.

4.4.6.1 *Buffer*

Once buffer function has been activated in the controller menu (by selecting ON) , CH pump serves as pump of the buffer in which two sensors are installed: upper (C1) and lower (C2). The pump remains active until the pre-set parameters are reached. When the temperature drops below the pre-set buffer top temperature, the pump is activated again. When the buffer is active, activating the fire-up function results in buffer temperature adjustment.

Selecting *ON* option will result in changing the CH sensor for the valve - additional sensor 1 will serve this function.

4.4.6.2 *Pre-set temperature top*

This function enables the user to define the pre-set temperature of buffer top (C1 sensor should be placed in the upper part of the tank). It is the desired temperature of the buffer.

4.4.6.3 *Pre-set temperature bottom*

This function enables the user to define the pre-set temperature of buffer bottom (C2 sensor should be placed in the lower part of the tank).

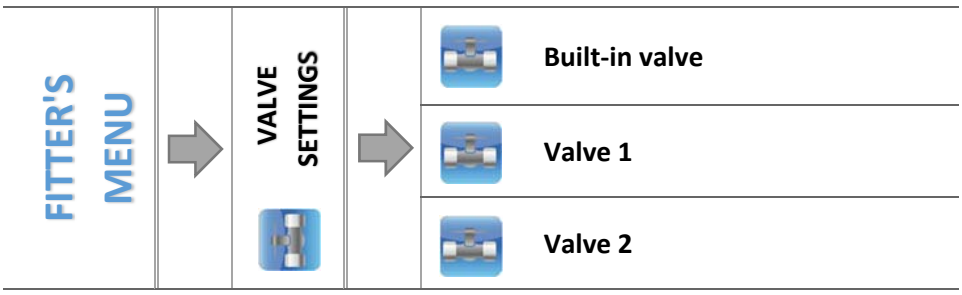
4.4.6.4 *DHW function*

In the case of heating systems with a buffer, this function is used to select the type of DHW tank connection

-from CH boiler – select if DHW tank is connected directly to the CH boiler (its own circulation separate from the buffer). When this option is selected, DHW pump uses the readings from the CH sensor.

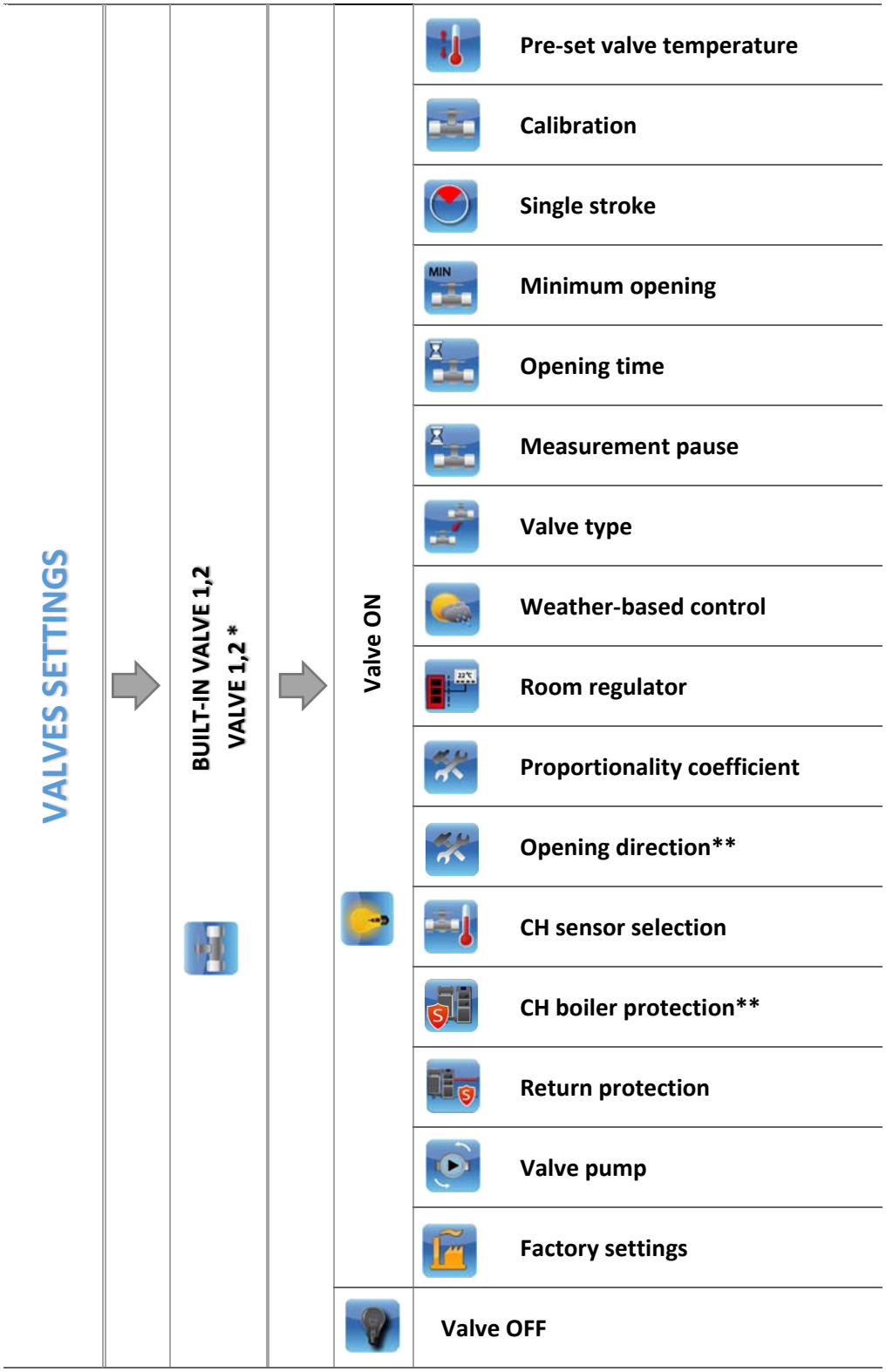
-from buffer – select if DHW tank is built in the buffer or directly connected to it. When this option is selected, DHW pump uses the readings from the buffer sensor.

4.4.7 Valve settings



ST-976 controller has a built-in module controlling the mixing valve. It is possible to connect two additional modules for controlling valves (e.g. ST-431N). There is a range of parameters allowing the user to adjust the valve operation to the individual needs. After a given valve is activated, the display shows an additional menu offering a range of valve parameters to be configured.

Built-in valve, Additional valves



** Additional valves menu is available after the module has been registered*

*** This option is available only for the built-in valve.*

4.4.7.1 *Registration*

In the case of using additional valves, it is necessary to register the valve by entering the module number in order to configure the parameters.
The registration code may be found on the back of the casing or in software version submenu (*MENU -> software version*).

The remaining settings of the additional valve may be found in *Service menu*. Valve controller should be set as subordinate and the user should select the sensors depending on use.

4.4.7.2 *Valve ON/OFF*

This function is used to disable valve control temporarily.

4.4.7.3 *Pre-set valve temperature*

This parameter defines the desired temperature which the valve should maintain. During proper operation the temperature of water downstream of the valve approaches the pre-set value.

4.4.7.4 *Calibration*

This function enables the user to calibrate the built-in valve at any time. During this process the valve is restored to its safe position – in the case of CH valve it is fully opened whereas in the case of floor valve it is closed.

4.4.7.5 *Single stroke*

This is a maximum single stroke (opening or closing) that the valve may make during one temperature sampling. If the temperature is near the pre-set value, the stroke is calculated on the basis of *proportionality coefficient* parameter value. The smaller the single stroke, the more precisely the set temperature can be achieved. However, it takes longer for the set temperature to be reached.

4.4.7.6 *Minimum opening*

The parameter determines the smallest valve opening. Thanks to this parameter, the valve may be opened minimally, to maintain the smallest flow.

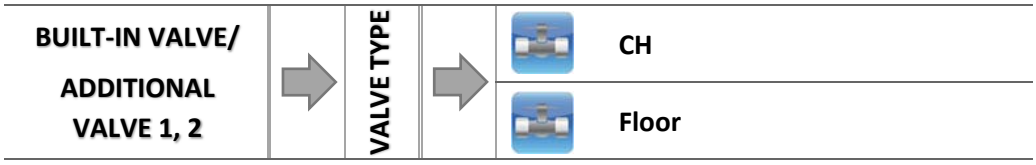
4.4.7.7 *Opening time*

This parameter defines the time needed for the valve to open from 0% to 100% position. This value should be set in accordance with the specification given on the actuator rating plate.

4.4.7.8 *Measurement pause*

This parameter determines the frequency of water temperature measurement (control) downstream of the CH valve. If the sensor indicates a change in temperature (deviation from the pre-set value), the electric valve will open or close by the pre-set stroke, in order to return to the pre-set temperature.

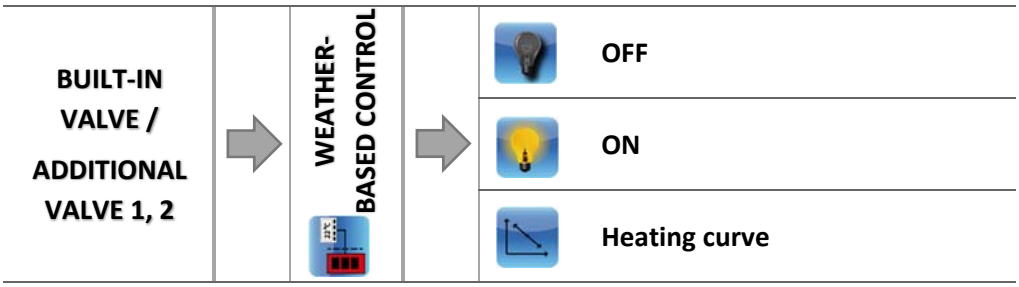
4.4.7.9 *Valve type*



With this option the user chooses the type of valve to be controlled:

- **CH** - select if you want to control the temperature of the CH circuit using the valve sensor. The valve sensor should be installed downstream of the mixing valve on the supply pipe.
- **FLOOR** - select if you want to control the temperature of the underfloor heating circuit. It protects the underfloor heating system against dangerous temperature. If the user selects CH as the valve type and connects it to the underfloor heating system, the fragile floor installation may be damaged.

4.4.7.10 *Weather-based control*



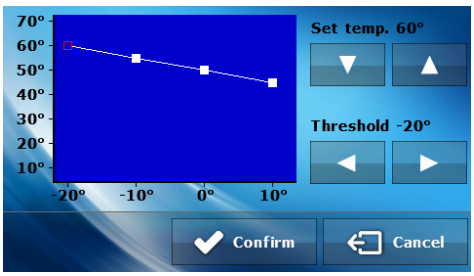
For the function of weather control to be active, the external sensor mustn't be exposed to sunlight or influenced by weather conditions. After it has been installed and connected, *weather-based control* function needs to be activated in the controller menu.

4.4.7.10.1 Heating curve

Heating curve – a curve according to which the pre-set controller temperature is determined, on the basis of external temperature. In order for the valve to operate properly, the user defines the pre-set temperature value (downstream of the valve) for respective values of external temperatures -20°C, -10°C, 0°C and 10°C.

How to program the heating curve:

⇨ Select *Heating curve* option.

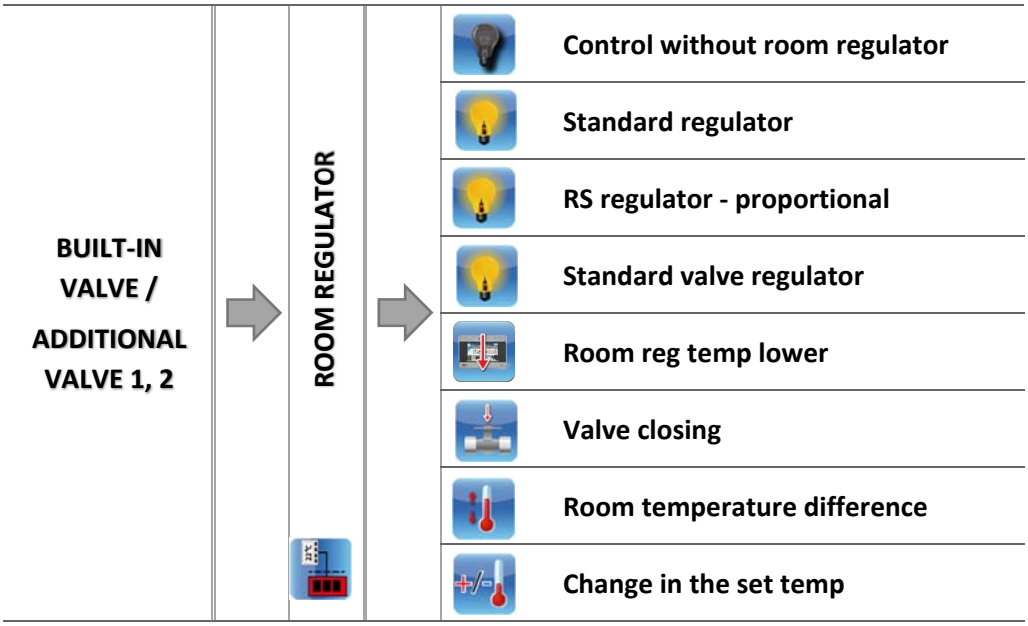


⇨ Use the icons to select the external temperature threshold.

⇨ Define the pre-set temperature for a given threshold using the icons: .

⇨ Once all values have been configured, select .

4.4.7.11 *Room regulator*



This function enables the user to select and configure the operation of the room regulator which will control the valve.

4.4.7.11.1 Control without room regulator

This option should be selected if the user does not want the room regulator to influence the valve operation.

4.4.7.11.2 Standard regulator

Select this option if the valve is controlled by a room regulator with RS communication, decreasing the pre-set valve temperature by a pre-defined value.

4.4.7.11.1 RS regulator - proportional

Activating this room regulator enables the user to monitor current temperature of CH boiler, water tank and the valves. The regulator should be connected to RS socket of ST-976 controller.

When this type of room regulator is selected, the valve is controlled according to *Change of pre-set valve temp* and *Room temperature difference* parameters (these parameters appear in the menu when this option is selected).

4.4.7.11.1 Standard valve regulator

This option should be selected if the valve will be controlled by a two-state room regulator (without RS communication).
Once this function is selected, a new option appears in the menu: *Room reg temp lower*.

4.4.7.11.2 Room reg temp lower

NOTE
This function is available only if RS regulator - decrease, standard regulator or TECH RS regulator is selected.

The user defines the value of valve temperature reduction which will be performed when the room regulator reaches the pre-set temperature.

4.4.7.11.1 Valve closing

This function is used to close the valve.

4.4.7.11.2 Room temperature difference

NOTE
This function is available only if RS regulator - proportional or TECH RS regulator is selected.

This setting is used to define the single unit change in the current room temperature (with the accuracy of 0.1°C) at which a predefined change in the pre-set temperature of the valve will be introduced .

4.4.7.11.3 Change in the set temp.

NOTE
This function is available only if RS regulator - proportional regulator is selected.

This setting determines by how many degrees the valve temperature is to increase or decrease with a single unit change in room temperature (see: *Room temperature difference*) This function is active only with TECH room regulator and it is closely related to the *Room temperature difference* parameter.

Example:

SETTINGS:	
Room temperature difference	*0,5°C*
Change in the set temp	*1°C*
Pre-set valve temp.	*40°C*
Pre-set room regulator temp.	*23°C*

Case 1:

If the room temperature rises to 23.5°C (0.5°C above the pre-set room temp.), the valve closes to such an extent as to have 39°C as the pre-set value (temp. reduction of 1°C).

Case 2:

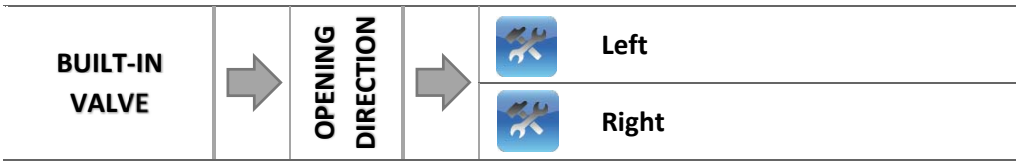
If the room temperature drops to 22°C (1°C below the pre-set room temp.), the valve opens to such an extent as to have 42°C as a pre-set value (temp. increase of 2°C).

4.4.7.12 *Proportionality coefficient*

Proportionality coefficient is used for defining *valve stroke*. The closer to the pre-set temperature, the smaller the stroke. If the coefficient value is high, the valve takes less time to open but at the same time the opening degree is less accurate. The following formula is used to calculate the percent of a single opening:

$$percent\ of\ a\ single\ opening = (set\ temperature - sensor\ temperature) \cdot \frac{proportionality\ coefficient}{10}$$

4.4.7.13 *Opening direction*



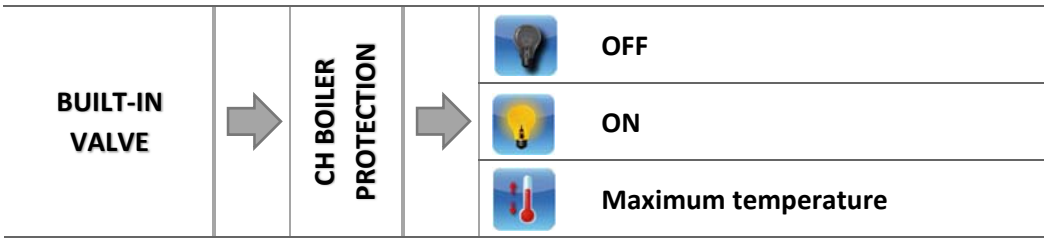
If, after connecting the valve to the controller, it turns out that it is connected the other way round, then the power supply cables do not have to be switched. Instead, it is enough to change the opening direction in this parameter: LEFT or RIGHT.

4.4.7.14 *CH sensor selection*

This options enables the user to choose the sensor which will serve as CH sensor. It may be CH sensor or additional sensor 1.

NOTE
CH sensor is selected by default, but it will change into *additional sensor 1* once buffer has been activated.

4.4.7.15 *CH boiler protection*



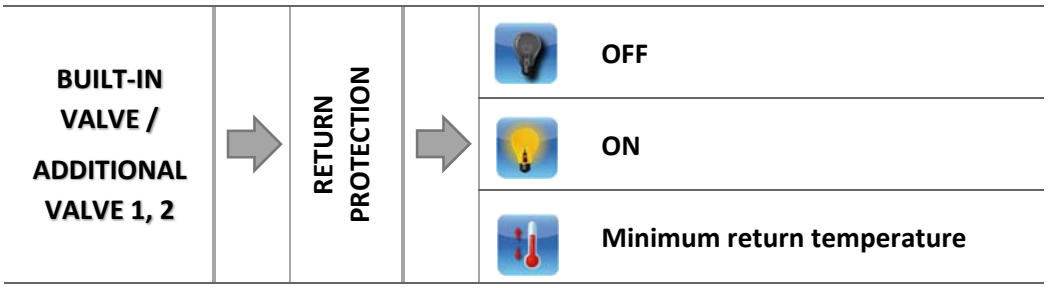
The protection against too high CH temperature serves to prevent the hazardous growth in CH boiler temperature. The user sets the maximum acceptable return temperature.

In the event of a hazardous growth in temperature, the valve begins to open to house heating system in order to cool the CH boiler down. This function is enabled permanently.

4.4.7.15.1 Maximum temperature

The user defines the minimum acceptable CH temperature at which the valve will close.

4.4.7.16 *Return protection*

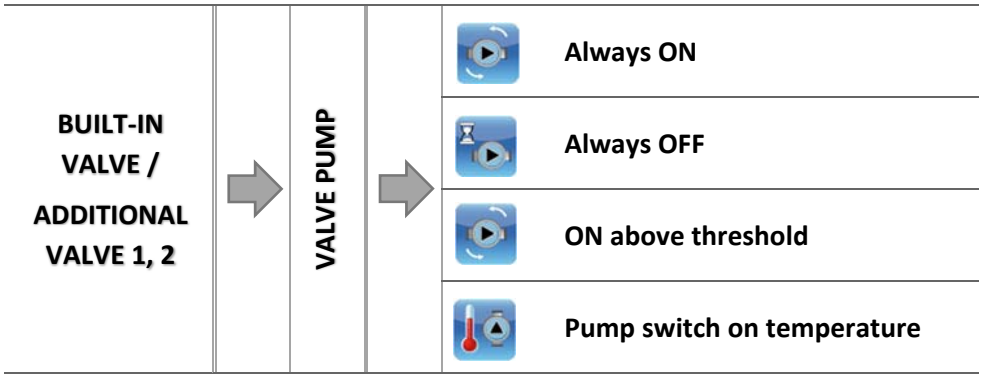


This function allows setting up CH boiler protection against too cool water returning from the main circulation, which could cause low-temperature boiler corrosion. The return protection involves closing the valve when the temperature is too low, until the short circulation of the boiler reaches the appropriate temperature.

4.4.7.16.1 Minimum return temperature

The user defines the minimum acceptable return temperature at which the valve will close.

4.4.7.17 *Valve pump*



This option enables the user to select the pump operation mode:

- *Always ON* - the pump operates all the time, regardless of temperatures.
- Always OFF - the pump is permanently deactivated and the regulator controls only valve operation
- ON above threshold - the pump is activated above the pre-set switch-on temperature. If the pump is to be activated above the threshold, the user should also define the *pump switch on temperature*. The temperature is read from CH sensor.

4.4.7.18 *Factory settings*

This function enables the user to restore the factory settings for a particular valve. Restoring factory settings does not change the type of valve selected (CH or floor).

4.4.7.19 *Valve removal*

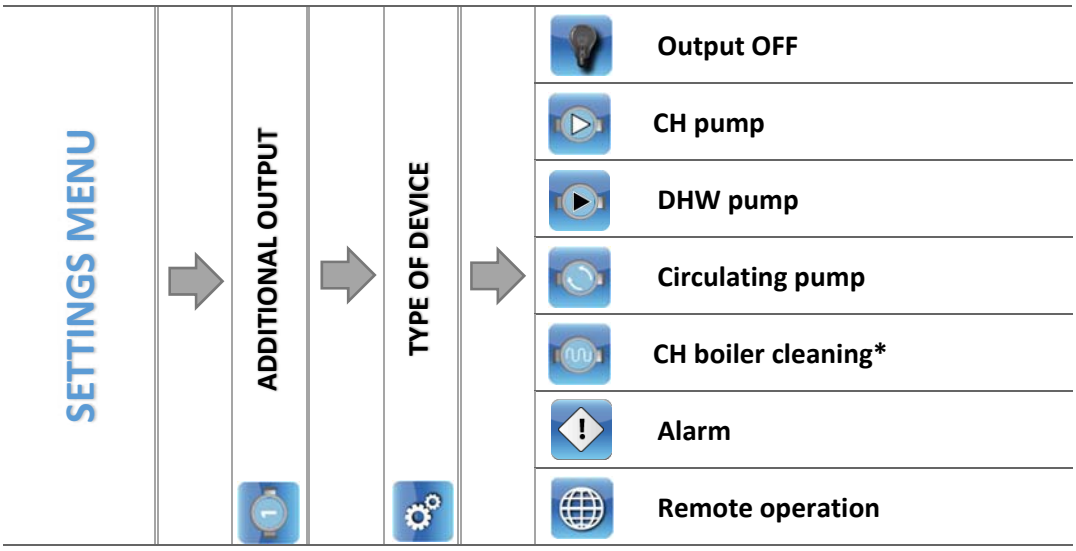
NOTE

This option is available only for an additional valve (using an external module).

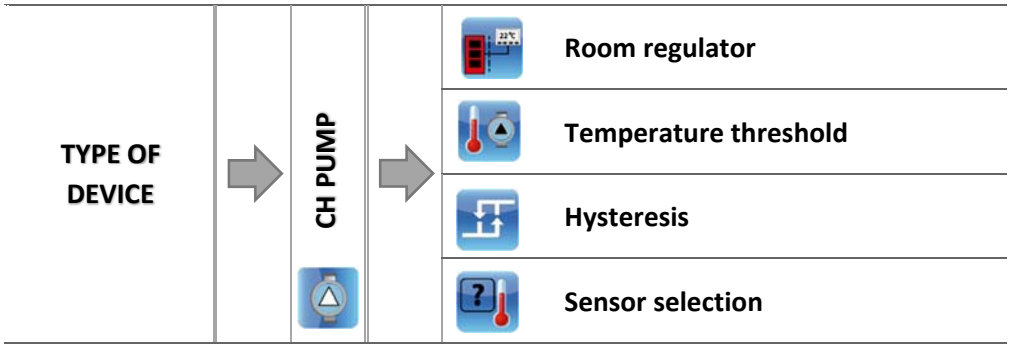
This option is used to remove the valve from the controller memory. Valve removal is used e.g. at disassembling the valve or module replacement (re-registration of a new module is necessary).

4.4.8 Additional output 1, 2

This submenu includes parameters used to configure the operation of the additional device connected to the additional output of the controller. After the type of device has been selected, the display shows an additional menu with a range of parameters of the additional pump to be configured.



4.4.8.1 *Pompa C.O.*



When this function is active, the additional pump serves as the CH pump. The pump is activated when the sensor temperature exceeds the temperature threshold. The following parameters need to be configured for this function to work correctly:

4.4.8.1.1 Room regulator

When this option is selected and the pre-set room temperature is reached, the CH pump operation is based on *Operation time* and *Pause time* parameters.

4.4.8.1.2 Temperature threshold

This parameter defines the activation time of the additional pump which serves as the CH pump. When a selected sensor reaches this temperature, the pump is activated.

4.4.8.1.3 Hysteresis

This parameter defines the hysteresis of the additional CH pump threshold temperature. It is the difference between the threshold temperature and the temperature of deactivation.

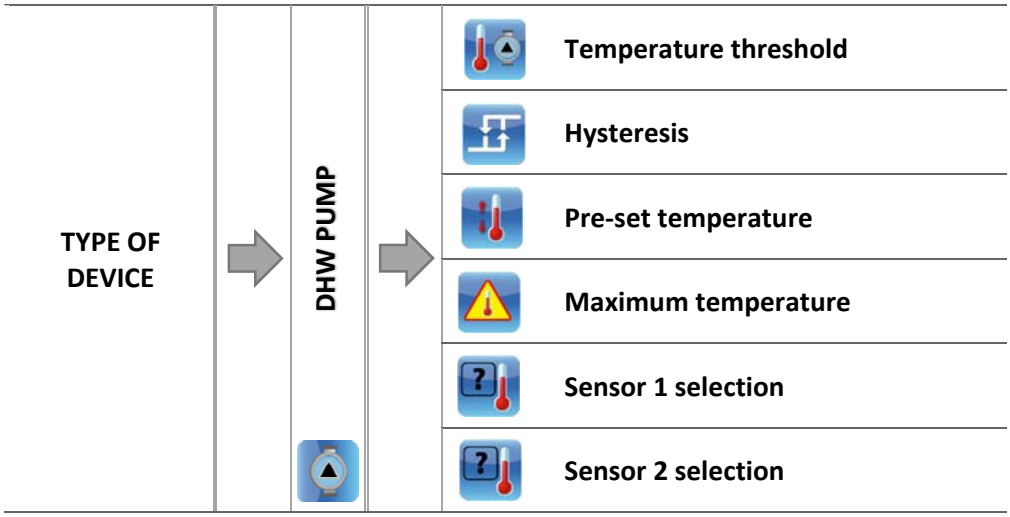
Example:

The threshold temperature is 40°C and hysteresis is 5°C: When the threshold temperature is reached, CH pump is activated. It is switched off when the temperature drops to 35°C).

4.4.8.1.4 Select sensor

It allows the user to decide which sensor should provide data for activation of the additional CH pump (CH sensor, DHW sensor, valve 1 sensor, return sensor, weather sensor or additional sensor).

4.4.8.2 *DHW pump*



When this function is active, the additional pump serves as the DHW pump. The pump is activated when the sensor 1 temperature exceeds the temperature threshold. It remains active until the temperature measured by sensor 2 reaches the pre-set value. Additionally, it is possible to set the alarm temperature for sensor 2. When this value is reached, an emergency procedure is activated.

The following parameters need to be configured for DHW pump to work correctly:

4.4.8.2.1 Activation threshold

This option is used to set the DHW pump activation temperature (the temperature measured by sensor 1 which reads the temperature of the heat source – the CH boiler). Below this temperature the pump remains inactive whereas above this temperature it is enabled and operates until the pre-set temperature is reached.

4.4.8.2.2 Hysteresis

This option is used to define the hysteresis of the pre-set temperature. When the pre-set temperature is reached, the device is switched off. It will be switched on again when the sensor temperature drops below the pre-set value minus hysteresis.

Example:

If the pre-set temperature is 60°C and the hysteresis value is 3 °C, the DHW pump is switched off when the set temperature of 60°C is reached, and it is activated again when the temperature drops to 57 °C.

4.4.8.2.3 Pre-set temperature

This option is used to set the pre-set temperature of the device. When the temperature is reached, the device is switched off. The temperature is measured by sensor 2.

4.4.8.2.4 Maximum temperature

This option is used to set the maximum temperature of sensor 1 (it reads the temperature from the heat source). When the temperature is reached, the device is switched off regardless of the current temperature on the sensor 2. It protects the installation against overheating.

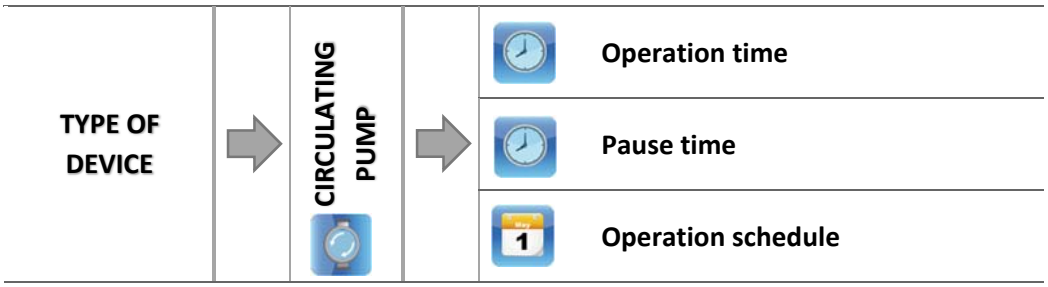
4.4.8.2.5 Sensor 1 selection

This option is used to select which temperature sensor should be used to provide data for controlling the operation of the device connected to the additional contact – the heat source (activation threshold).

4.4.8.2.6 Sensor 2 selection

This option is used to select which temperature sensor should be used to provide data for controlling the operation of the device connected to the additional contact – (pre-set temperature).

4.4.8.3 *Circulating pump*



When this function is active, the additional pump serves as the circulating pump. The pump controls the vale which mixes the hot water between the CH boiler and the DHW receivers. The following parameters need to be configured for the circulating pump to work correctly:

4.4.8.3.1 Operation time

This parameters defines the time of pump operation during its activity.

4.4.8.3.2 Pause time

This parameter defines the period of time between circulating pump activations - the period of time when the pump remains inactive.

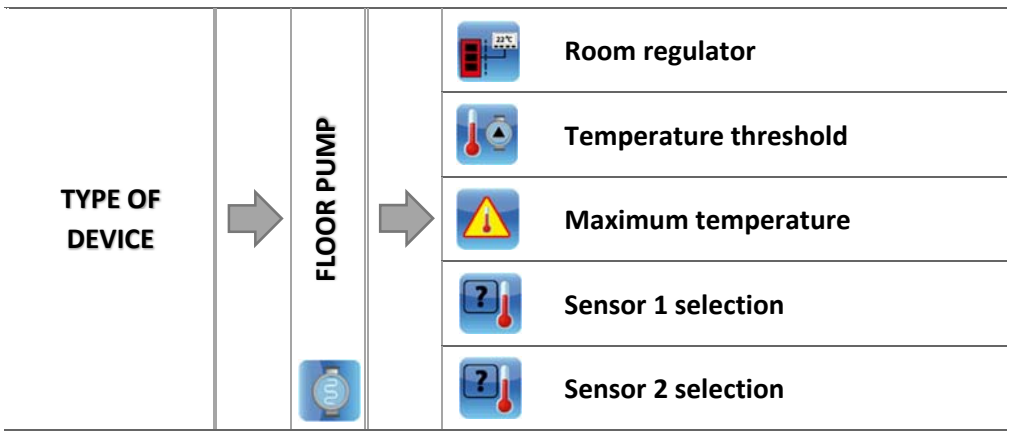
4.4.8.3.3 Operation schedule

The user may program a daily schedule of pump operation and inactivity, with the accuracy of 30 minutes. The pump will be enabled at the frequency defined in *Pause time* parameter and it will remain active for the time defined as *Operation time*.

To configure the operation schedule, follow the same steps as for CH boiler operation schedule:

➔ *4.3.6.1 CH boiler operation schedule, page: 17*

4.4.8.4 *Floor pump*



Once this option has been selected, the additional device will serve as floor pump. Po zaznaczeniu tej opcji urządzenie dodatkowe będzie pełnić funkcję pompy podłogowej - służącej do sterowania pompą obsługującą instalacje podłogową.

The following parameters are used to configure its operation:

4.4.8.4.1 Room regulator

This option is used to select the regulator which will inform if the pre-set temperature has been reached. Once the pre-set temperature has been reached, the pump will be disabled.

4.4.8.4.2 Temperature threshold

This parameter defines the temperature of floor pump activation. It is the temperature measured at the CH boiler.

4.4.8.4.1 Maximum temperature

This parameter is used to define the pump deactivation temperature.

4.4.8.4.1 Sensor 1 selection

This option is used to select which temperature sensor should be used to provide data for controlling the operation of the device connected to the additional contact – the heat source (activation threshold).

4.4.8.4.2 Sensor 2 selection 2

This option is used to select which temperature sensor should be used to provide data for controlling the operation of the device connected to the additional contact – (pre-set temperature).

4.4.8.5 *Alarm*

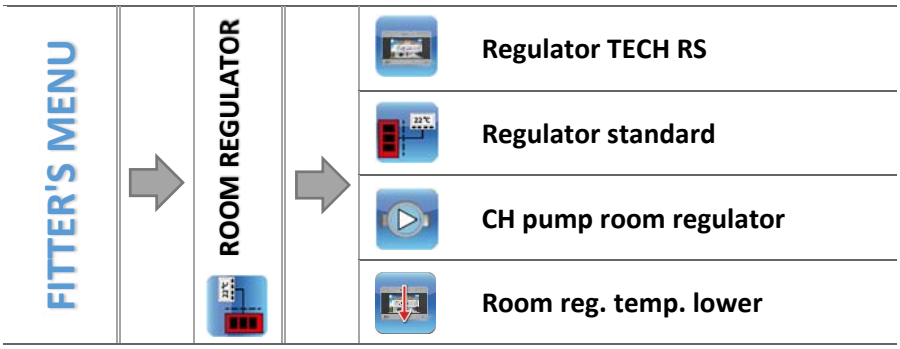
If the user has an alarm installed at home, after selecting this option and connecting it to the additional contact of the controller, it can synchronize with the alarms occurring in the device.

Example:
If the user has an alarm installed, with sound signal inside the building, the sound signal will be activated if any alarm occurs in the controller e.g. fire-up failure.

4.4.8.6 *Remote operation*

Once this option has been activated, the user may control the additional contact via Internet website.

4.4.9 Room regulator



This function enables the user to configure the operation parameters of the room regulator connected to the pellet-fired boiler controller. It is necessary to activate the cooperation with the room regulator after it has been connected, by selecting an appropriate type of room regulator. It is possible to connect up to two room regulators to the controller.

4.4.9.1 *TECH RS regulator*

Select this option if you connect a room regulator with RS communication. Such a regulator enables the user to view current CH boiler parameters and change certain settings e.g. pre-set CH boiler temperature, pre-set DHW temperature.

4.4.9.2 *Standard regulator*

Select this option if you connect a two-state regulator. Such a regulator sends a signal to the main controller informing if the pre-set room temperature has been reached or not.

4.4.9.3 *CH pump room regulator*

When this option is selected, the signal from room regulator informing that the pre-set room temperature has been reached disables the CH pump.

4.4.9.4 *Room reg. temp. lower*

NOTE

This parameter concerns *RS regulator - decrease* function and Standard regulator and TECH regulator with RS communication.

The user sets the value of pre-set valve temperature reduction which will be introduced when the pre-set room temperature is reached.

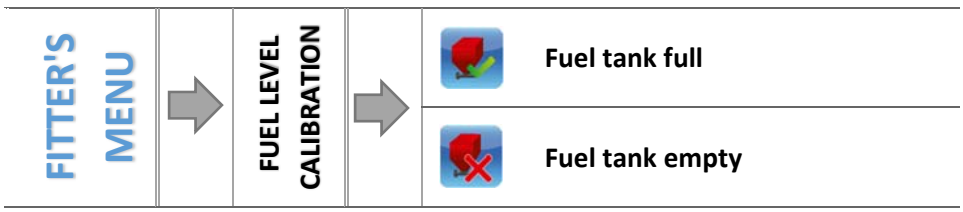
The temperature reduction will not be lower than the minimum pre-set CH temperature.

Example:

Pre-set CH boiler temperature	*55°C*
Room reg. temp. lower	*15°C*
Minimum pre-set CH boiler temperature	*45°C*
Pre-set CH boiler temperature after the pre-set temperature value has been reached	*45°C*

Once the pre-set room temperature has been reached in the building (signalised by the room regulator), the pre-set temperature at the CH boiler will be reduced to 45°C (10°C difference) although the value of Room reg. temp. lower *parameter is 15°C.*

4.4.10 Fuel level calibration



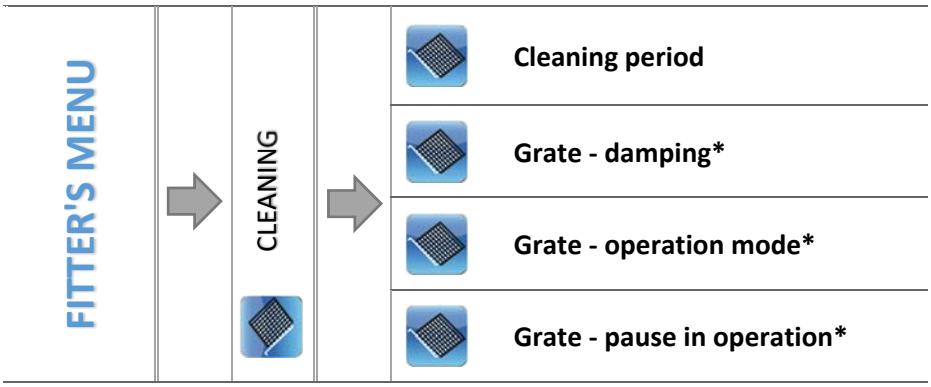
Conducting fuel level calibration properly enables the user to view the current level of fuel on the controller screen.

- ⇨ The first step involves filling the fuel tank up
- ⇨ Next, select the option *Fuel tank full.* The controller remembers the level as full (100%).
- ⇨ When there is no fuel left in the tank (after a period of CH boiler operation), select the option *Fuel tank empty*.

In this way the fuel tank is calibrated and the controller will automatically inform the user about the current fuel level. Such calibration is usually performed only once. When the fuel tank is filled again, it is enough to select the option *Fuel tank full* in the user's menu.

After a fuel level panel is selected in the main screen, the display shows the estimated amount of fuel left (%) and the expected time needed for the fuel to be used up (days and hours).

4.4.11 Cleaning



** This parameter is displayed only after the grate has been activated in the service menu.*

4.4.11.1 *Cleaning period*

This parameter is used to define the frequency of grate cleaning activation. The cleaning procedure involves damping the CH boiler and fire-up. If the time is set at 0, the cleaning process will be disabled.

4.4.11.2 *Grate - damping*

This function is used to activate the grate after damping. The operation time may be configured in service menu. When the time is over, the grate relay will be disconnected.

4.4.11.3 *Grate - operation mode*

This function is used to configure grate operation in operation mode. The grate is activated periodically according to *Grate - pause in operation* settings.

4.4.11.4 *Grate - pause in operation*

This parameter defines the time left before grate activation in operation mode. It is displayed when Grate - operation mode is active.

4.4.12 Eco mode

The user may decide if Eco mode should be active or not. Fire-up process depends on the selected operation mode:

- **House heating**
  - Without room regulator and buffer (Fire-up function):

    This option should not be selected because in such a case it will remain inactive.
  - Room regulator ON, without buffer (Fire-up function + Room regulator):

    When the fire-up function is selected, the room regulator controls the CH boiler operation. When the pre-set room temperature is reached, the CH boiler is disabled. It will be enabled again when the room temperature drops by the pre-set hysteresis value. When this function is inactive, the CH boiler operates according to pre-configured operation parameters.
  - Buffer ON (Fire-up function + Buffer + DHW function from CH boiler or buffer):

    When the fire-up function is selected, the buffer controls the CH boiler operation. When the pre-set buffer temperature is reached, the CH boiler is disabled. When this function is inactive, the CH boiler operates according to pre-configured operation parameters (damping and fire-up based on CH sensor). DHW function serves no role in this case, but it should be selected depending on the type of heating installation.
- **Water tank priority**
  - Without room regulator and buffer (Fire-up function):

    This option should not be selected because in such a case it will remain inactive.
  - Room regulator ON, without buffer (Fire-up function + Room regulator):

    The CH boiler is damped when the pre-set DHW temperature is reached and the room regulator informs that the pre-set room temperature has been reached. Emergency CH boiler damping will be carried out when the pre-set CH temperature is exceeded by 5°C.
  - Buffer ON (Fire-up function + Buffer + DHW function from buffer):

    When the pre-set temperature of buffer bottom is reached (C2 sensor), CH boiler damping will start regardless of CH and DHW temperature. The main screen displays 'Buffer pre-set temperature reached' below Fire-up/Damping touch buttons. Emergency damping will also start when the pre-set CH temperature is exceeded by 5°C.
  - Buffer ON (Fire-up function + Buffer + DHW function from from CH boiler):

    When the pre-set temperature of buffer bottom is reached (C2 sensor) as well as the pre-set water tank temperature is reached, CH boiler damping will start regardless of CH temperature. The main screen displays 'Buffer pre-set temperature reached and Pre-set DHW temperature reached' below Fire-up/Damping touch buttons. Emergency damping will also start when the pre-set CH temperature is exceeded by 5°C.
- **Parallel pumps**
  - Without room regulator and buffer (Fire-up function):

    This option should not be selected because in such a case it will remain inactive.
  - Room regulator ON, without buffer (Fire-up function+Room regulator):

    The CH boiler is damped when the pre-set DHW temperature is reached and the room regulator informs that the pre-set room temperature has been reached. Emergency CH boiler damping will be carried out when the pre-set CH temperature is exceeded by 5°C.
  - Buffer ON (Fire-up function + Buffer + DHW function from buffer):

    When the pre-set temperature of buffer bottom is reached (C2 sensor), CH boiler damping will start regardless of CH and DHW temperature. The main screen displays 'Buffer pre-set temperature reached' below Fire-up/Damping touch buttons. Emergency damping will also start when the pre-set CH temperature is exceeded by 5°C.
  - Buffer ON (Fire-up function + Buffer + DHW function from CH boiler):

    When the pre-set temperature of buffer bottom is reached (C2 sensor) as well as the pre-set water tank temperature is reached, CH boiler damping will start regardless of CH temperature. The main screen displays 'Buffer pre-set temperature reached and Pre-set DHW temperature reached' below Fire-up/Damping touch buttons. Emergency damping will also start when the pre-set CH temperature is exceeded by 5°C.

➢ **Summer mode**

- Without room regulator and buffer (Fire-up function):

  The CH boiler is damped when the pre-set DHW temperature is reached. Emergency CH boiler damping will be carried out when the pre-set CH temperature is exceeded by 5°C.

- Room regulator ON, without buffer (Fire-up function+Room regulator):

  Room regulator does not influence CH boiler operation. The CH boiler is damped when the pre-set DHW temperature is reached. Emergency CH boiler damping will be carried out when the pre-set CH temperature is exceeded by 5°C.

- Buffer ON (Fire-up function + Buffer + DHW function from buffer):

  When the pre-set temperature of buffer bottom is reached (C2 sensor), CH boiler damping will start regardless of CH and DHW temperature. The main screen displays 'Buffer pre-set temperature reached' below Fire-up/Damping touch buttons. Emergency damping will also start when the pre-set CH temperature is exceeded by 5°C.

- Buffer ON (Fire-up function + Buffer + DHW function from CH boiler):

  The CH boiler is damped when the pre-set DHW temperature is reached. Emergency CH boiler damping will be carried out when the pre-set CH temperature is exceeded by 5°C.

4.4.13 Alarm history

This option enables the user to view all the controller alarms. The user may check the type of alarm and the period of time in which it occurred (date and time). Tap on >> to view the previous alarms.

4.4.14 Moduł GSM

NOTE

This type of control is available only after purchasing and connecting an additional controlling module ST-65 which is not included in the standard controller set.

⇨ If the controller is equipped with additional GSM module, it is necessary to activate it by selecting *ON*.

GSM Module is an optional device which, cooperating with the controller, enables the user remote control of the CH boiler operation via mobile phone. The user is sent an SMS each time an alarm occurs. Moreover, after sending a certain text message, the user receives feedback on the current temperature of all the sensors. Remote change of the preset temperatures is also possible after entering the authorisation code.

GSM Module may operate independently of the CH boiler controller. It has two additional inputs with temperature sensors, one contact input to be used in any configuration (detecting closing/opening of contacts) and one controlled output (e.g. a possibility of connecting an additional contractor to control any electric circuit)

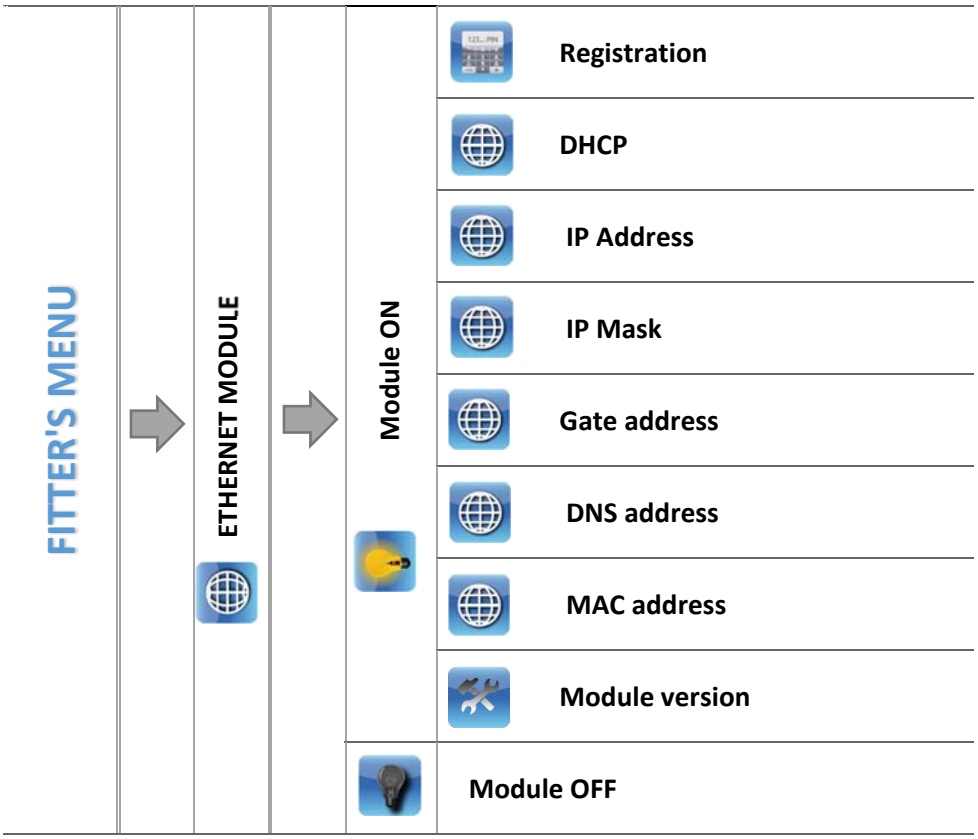
When any of the temperature sensors reaches the pre-set maximum or minimum temperature, the module automatically sends an SMS message with such information. A similar procedure is used in the case of opening or closing of the contact input, which may be used as a simple means of property protection.

If ST-912 controller is equipped with GSM module, it should be activated by selecting ON option (MENU>Fitter's menu>GSM Module>ON).

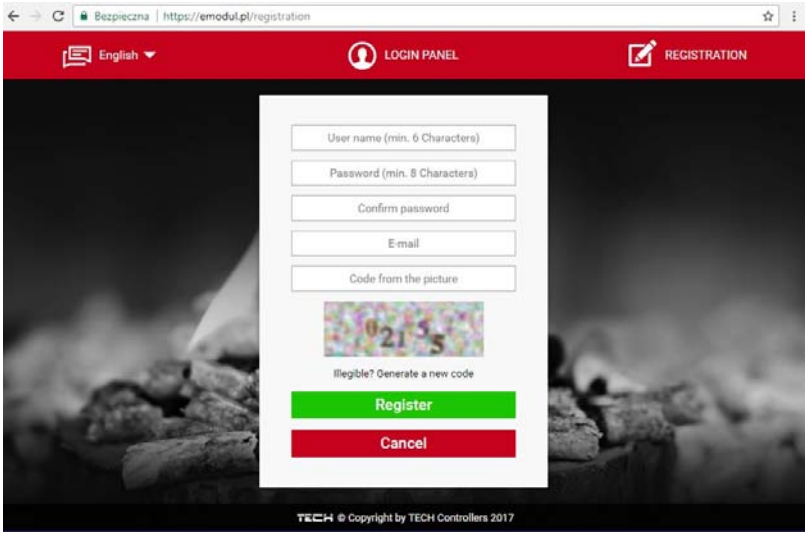
4.4.15 Ethernet module

NOTE

This type of control is available only after purchasing and connecting an additional controlling module ST-505 which is not included in the standard controller set.



⇨ Before registering the module, it is necessary to create user's account on emodul.pl (if you do not have one).

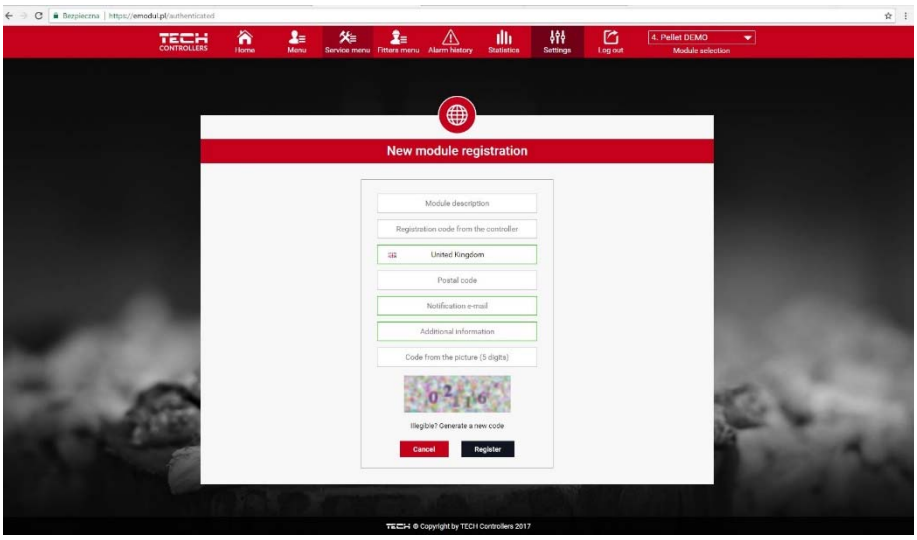


⇨ Once the module has been connected properly, select *Module ON*.

⇨ Next select *Registration*. The controller will generate a code.

⇨ Log on emodul.pl, go to Settings tab and enter the code which appeared on the controller screen.

- ⇨ It is possible to assign any name or description to the module as well as provide phone number and e-mail address to which the notifications will be sent.
- ⇨ Once generated, the code should be entered within an hour. Otherwise, it will become invalid and it will be necessary to generate a new one.



- ⇨ Internet module parameters such as IP address, IP mask, gate address enc. may be set manually or by selecting DHCP option.

Internet module is a device enabling the user remote control of the CH boiler via the Internet. Emodul.pl enables the user to control the status of all CH boiler system devices and temperature sensors on the home computer screen, tablet or smart phone. Tapping on corresponding icons, the user may adjust the operation parameters, pre-set temperatures for pumps and valves enc.

4.4.16 Factory settings

This option is used to restore the factory settings of the Settings menu.

5 PROTECTIONS

In order to ensure safe and failure-free operation, the regulator has been equipped with a range of safeguards. In case of alarm, a sound signal is activated and the display shows an appropriate message.

5.1 THERMAL PROTECTION OF THE CH BOILER

The controller is equipped with a bimetallic mini-sensor (placed next to CH boiler temperature sensor), which automatically disconnects the fan from the power supply when the alarm temperature of 90°C is exceeded. It prevents the water in the installation from boiling in case of CH boiler overheating or controller damage. After this protection has been activated and the temperature has dropped to a safe level, the sensor automatically unlocks itself. If this sensor is damaged or overheated, the fan is also disconnected.

In the case of CH boiler protection in a closed system, a STB type temperature limiter is used instead of a bimetallic mini-sensor.

5.2 AUTOMATIC SENSOR CONTROL

If one of the temperature sensors (CH, DHW) is damaged, an alarm sound is activated and the display message informs about the failure; e.g.: ***CH sensor damaged.*** The fan is disabled. The pump is enabled regardless of the current temperature.

If the CH sensor is damaged, the alarm is active until a new sensor is installed and the CH boiler is disabled.

In the case of DHW sensor damage, the alarm should be switched off by pressing 

– the controller will deactivate the alarm and restore operation (the modes involving DHW tank will not be available). A new sensor should be installed so that all modes of CH boiler operation could be available.

5.3 THERMAL PROTECTION OF THE CH BOILER (STB)

In a closed CH system, the controller is equipped with STB safety thermostat which protects the CH boiler against an excessive temperature increase. When the temperature exceeds the pre-set '*switch off*' value (default setting: 95°C), the contacts in the fan power supply circuit are opened. The fan may be activated again only manually by pressing '*reset*' on the safety thermostat casing after the sensor cools down.

5.4 FUSE

The regulator has a WT 6.3A tube fuse-link protecting the network.

WARNING
Higher amperage fuse should not be used as it may damage the controller.

6 ALARMS

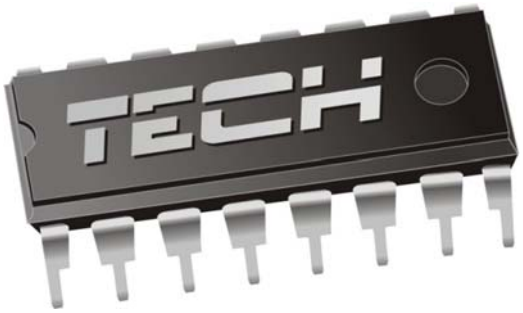
ALARM	*Possible cause*	*Solution*
CH SENSOR DAMAGED **DHW SENSOR DAMAGED** **C1 SENSOR DAMAGED (BUFFER)** **C2 SENSOR DAMAGED (BUFFER)** **FEEDER SENSOR DAMAGED** **VALVE SENSOR DAMAGED** **RETURN SENSOR DAMAGED** **EXTERNAL SENSOR DAMAGED**	· the device has been improperly configured with the sensor · the sensor is not connected · mechanical damage · the cable is too long or it has been connected improperly. · no contact or short circuit	· check the connections on the terminal block · make sure the connection cable is not damaged and there is no short circuit. · check the insulation · check if the sensor works properly (by connecting another sensor in its place and checking its readings) · restore factory settings · replace the sensor · if the alarm continues, contact the service staff.

**damage to the sensor which is not used (active) does not activate an alarm*

CH TEMPERATURE TOO HIGH	· CH sensor has not been installed properly	· Check if the sensor has been installed properly, in the right place
MOSFET TEMPERATURE TOO HIGH	· MOSFET may be damaged · The fan capacitor is wrong or damaged.	· Contact the service staff
FIRE-UP FAILURE	· Too little fuel in the tank · Incorrect initial feeding settings and fan (blow) settings · Possible damage of the igniter	· Check if there is fuel in the tank · Check if the charging pipe is positioned at the right angle · Check if the charging pipe is not obstructed (by activating it in manual mode) · Check if the initial feeding settings and fan settings are configured properly. · Check the blow force in fire-up mode · Check if the igniter works properly

7 TECHNICAL DATA

L.p	**Specification**	**Unit**	
1	Supply voltage	V	230 +/-10% /50Hz
2	Power consumption	W	9
3	Ambient temperature	^{O}C	5÷50
4	Circulating pump output load	A	0,5
5	Fan output load	A	0,6
6	Range of temperature measurement	^{O}C	0÷85
7	Accuracy of measurement	^{O}C	1
8	Range of temperature setting	^{O}C	45÷80
9	Thermal resistance of the sensor	^{O}C	-25÷99
10	Fuse link	A	6,3



EU DECLARATION OF CONFORMITY

Hereby, we declare under our sole responsibility that **ST-976** manufactured by TECH, headquartered in Wieprz Biała Droga 31, 34-122 Wieprz, is compliant with:

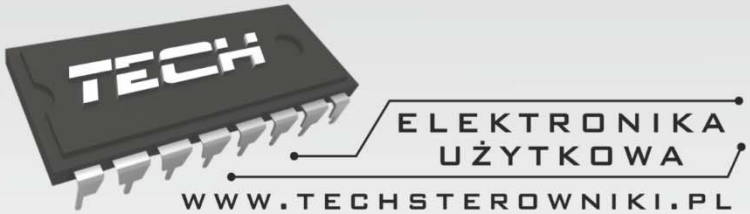
- Directive 2014/35/EU of the European Parliament and of the Council of February 26, 2014 on the harmonisation of the laws of Member States relating to **the making available on the market of electrical equipment designed for use within certain voltage limits (EU Journal of Laws L 96, of 29.03.2014, p. 357),**
- Directive 2014/30/EU of the European Parliament and of the Council of February 26, 2014 on the harmonisation of the laws of Member States relating to **electromagnetic compatibility** (EU Journal of Laws L 96 of 29.03.2014, p.79),
- Directive **2009/125/EC** establishing a framework for the setting of ecodesign requirements for energy-related products,
- the regulation by the Ministry of Economy of May 8, 2013 concerning the essential requirements as regards *the restriction of the use of certain hazardous substances in electrical and electronic equipment*, implementing provisions of **RoHS directive 2011/65/EU.**

For compliance assessment, harmonized standards were used:

PN-EN 60730-2-9:2011, PN-EN 60730-1:2016-10.

PAWEŁ JURA JANUSZ MASTER
WŁAŚCICIELE TECH SPÓŁKA Z OGRANICZONĄ ODPOWIEDZIALNOŚCIĄ SP. K.

Wieprz, 06. 03. 2018



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