

Controllers

USER'S MANUAL

EU-408N

EN



WWW.TECHSTEROWNIKI.PL

I. 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 should measure earthing resistance of the electric motors as well as the insulation resistance of the cables.
- The regulator should not be operated by children.

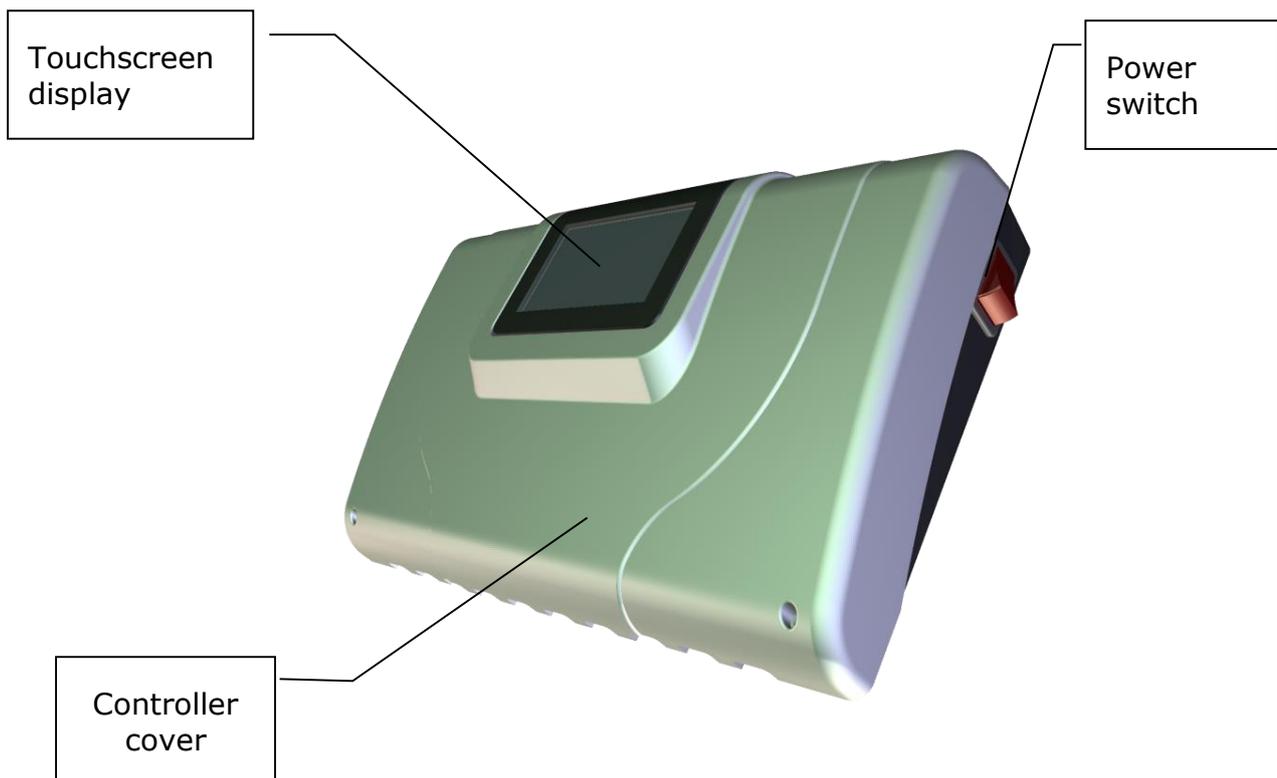
WARNING

- 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.

II. Description of the device

EU-409N controller is a multi-function device intended for controlling central heating systems. Thanks to advanced software, the device offers a wide range of functions:

- Smooth control of two mixing valves;
- Control of the circulating pump;
- Return temperature protection – a function preventing the water in the short CH boiler circulation from boiling and ensuring that the temperature of water returning to the CH boiler is not too low;
- Weather-based control;
- Weekly control;
- Two configurable no-voltage outputs
- Two configurable voltage outputs
- Supporting three room regulators with traditional communication (two-state)
- Supporting a room regulator with RS communication.
- Possibility of connecting ST-65 GSM module – it enables the user to control certain controller functions via a mobile phone.
- Possibility of connecting ST-500 Ethernet module – it enables the user to control certain functions and view some of the parameters via the Internet.
- Possibility of connecting two additional modules controlling the valves (e.g. ST-61 or ST-431N) – it enables control of two additional valves.



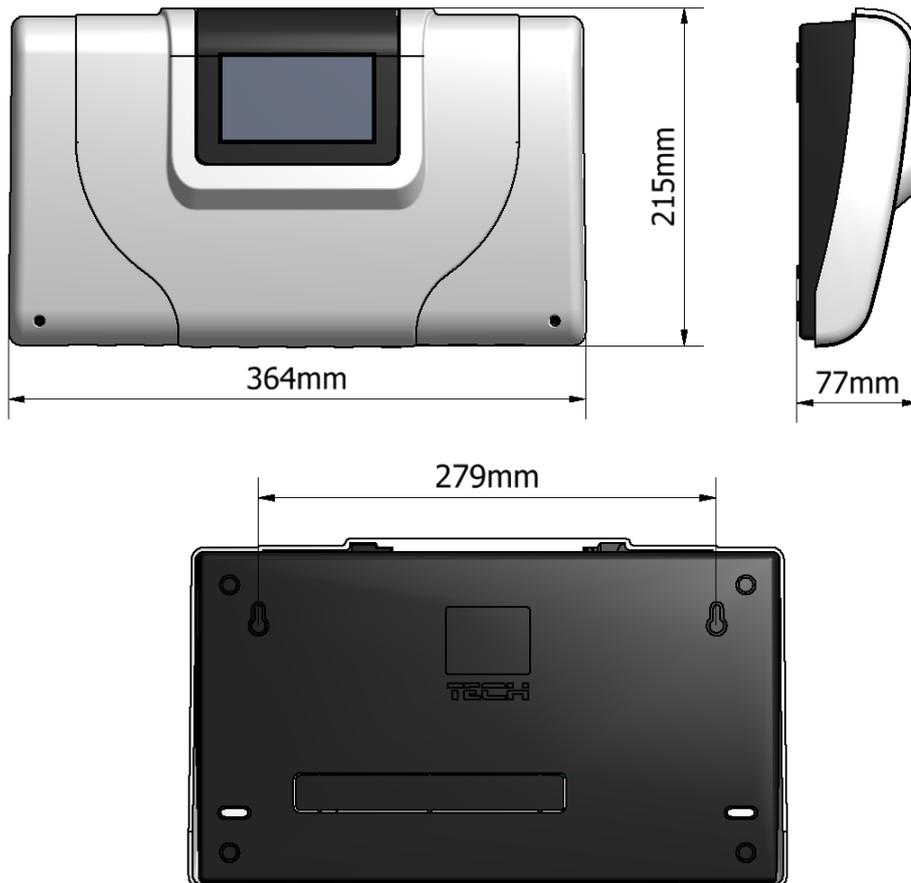
III. Installation

Controller should be installed by a qualified person.

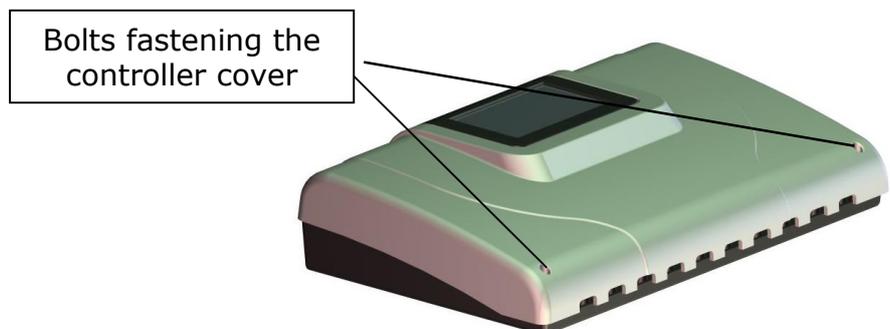
⚠ DANGER

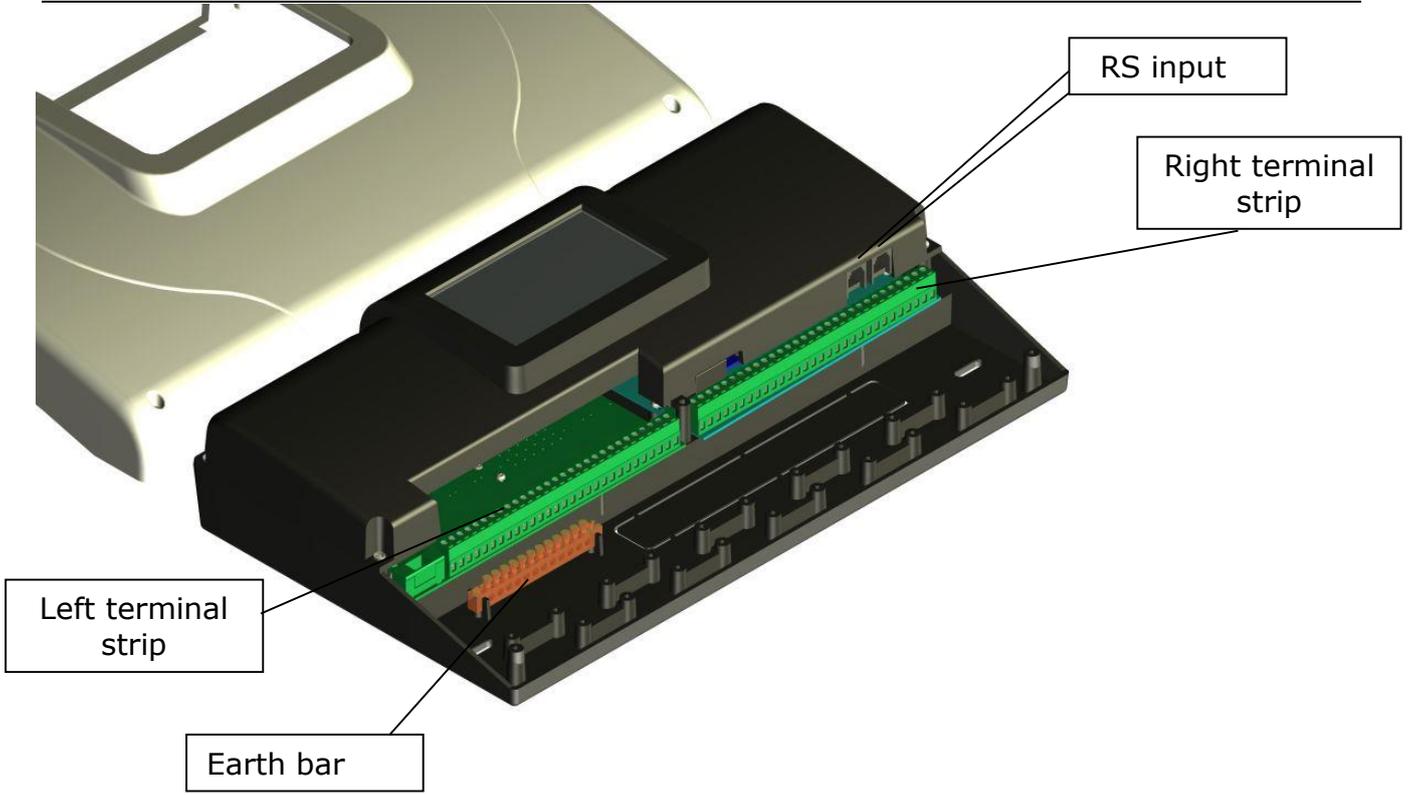
Risk of fatal electric shock from touching live connections. Before working on the controller switch off the power supply and prevent it from being switched on again.

EU-408N regulator may be installed as a free-standing device or as a panel mountable on a wall.

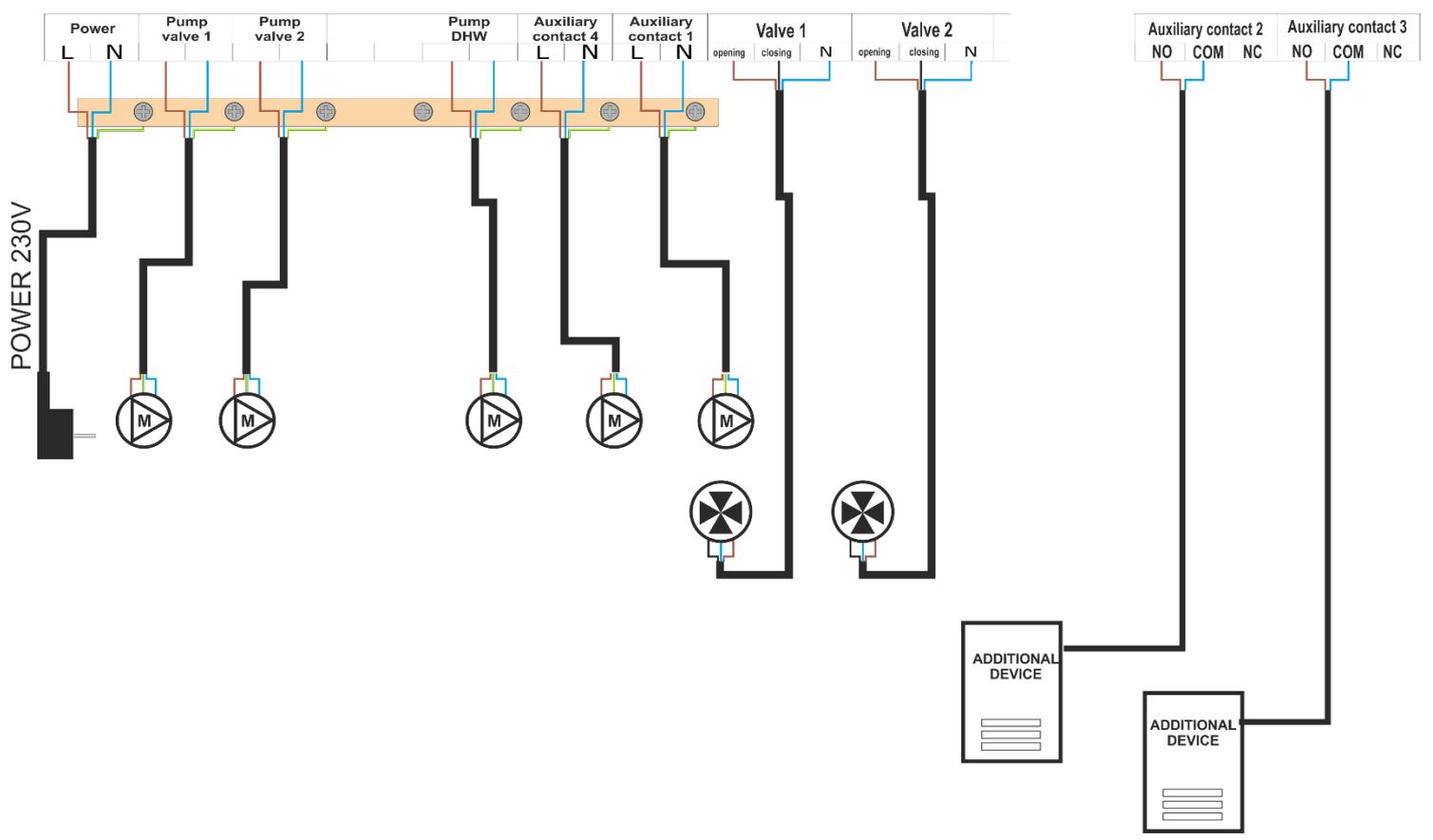


In order to wire up the controller, the cover should be removed.

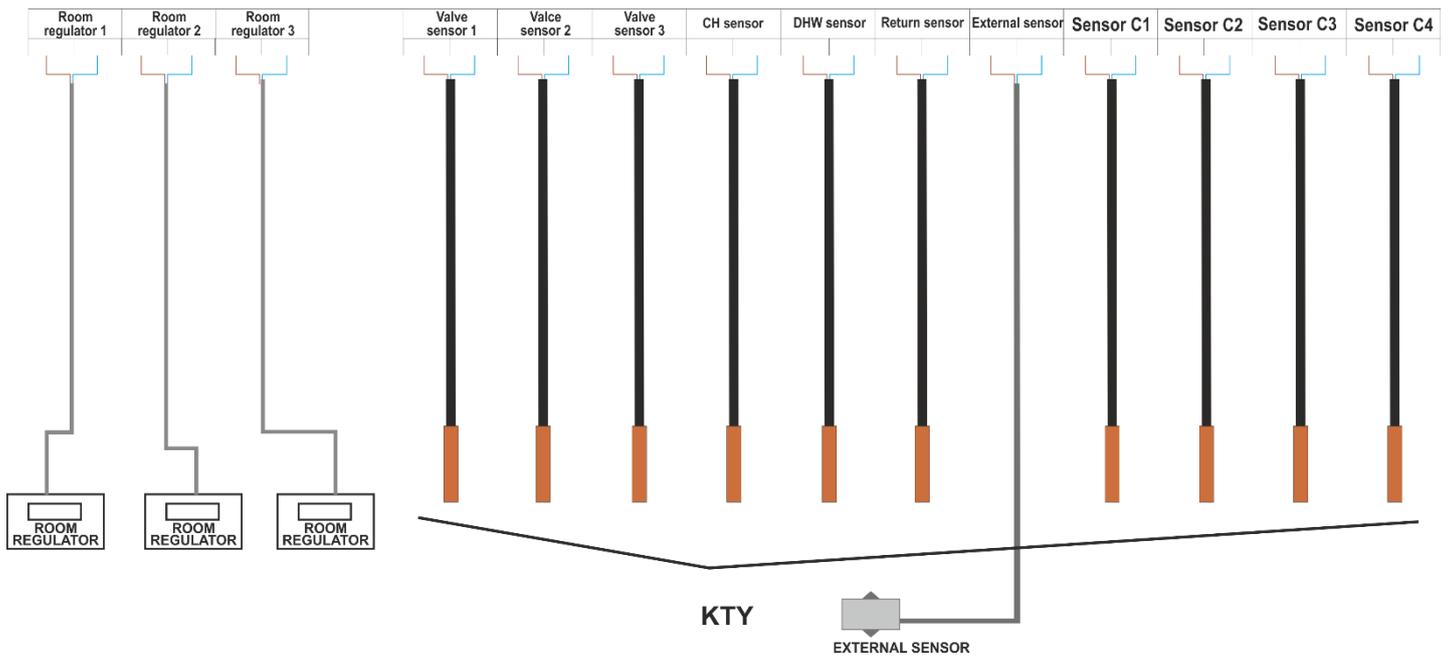




Connection diagram – left terminal strip:



Connection diagram – right terminal strip:



⚠ CAUTION

In case of no flow in the short CH boiler circuit (improper installation), the return sensor should be placed on CH boiler hot water outlet to prevent the water from boiling.

IV. First start-up

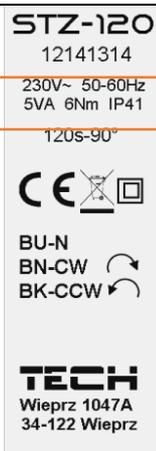
In order for the controller to operate correctly, the following steps must be followed when starting the device for the first time:

1. Wire up the controller.
2. Set the valve actuators manually at 50%.



Actuator set at 50% opening

3. Switch the controller on.
4. After the device is switched on, the valves are calibrated automatically to 100%. If a valve opens the wrong way, the user should change the opening direction in the menu of this valve.
5. Enter the opening time of the valve in the corresponding menu – the value may be found on the actuator casing.



Opening time of the valve actuator found on a rating plate

NOTE

For the testing period the return protection function and the CH boiler protection function may be deactivated in the menu of a given valve.

V. Operating the controller

V.a) Principle of operation

Controller operation involves mixing the hot circulating water with the water returning from the heating circuit in order to reach and maintain the pre-set temperature.

Pumps which are connected to each valve circuit help to distribute the water throughout the system. A pump should be connected behind the mixing valve whereas the temperature sensor should be placed behind both the pump and the valve in order to ensure accurate measurement of the valve output temperature.

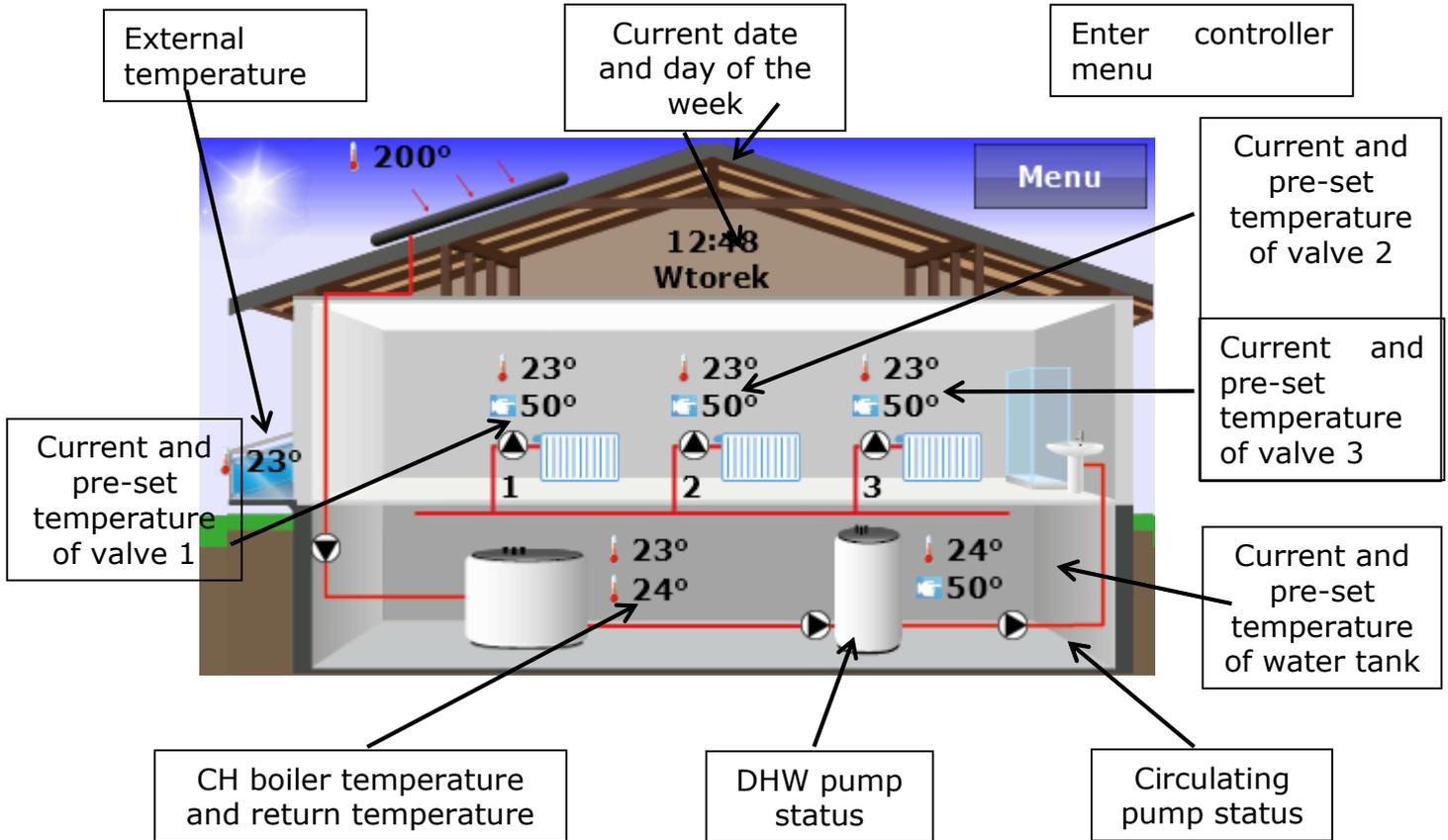
NOTE

If the valve controller and the CH boiler controller operate simultaneously in one circuit, the pump may be connected to the CH boiler controller (the pump output in the EU-408N regulator or in the additional module is not used).

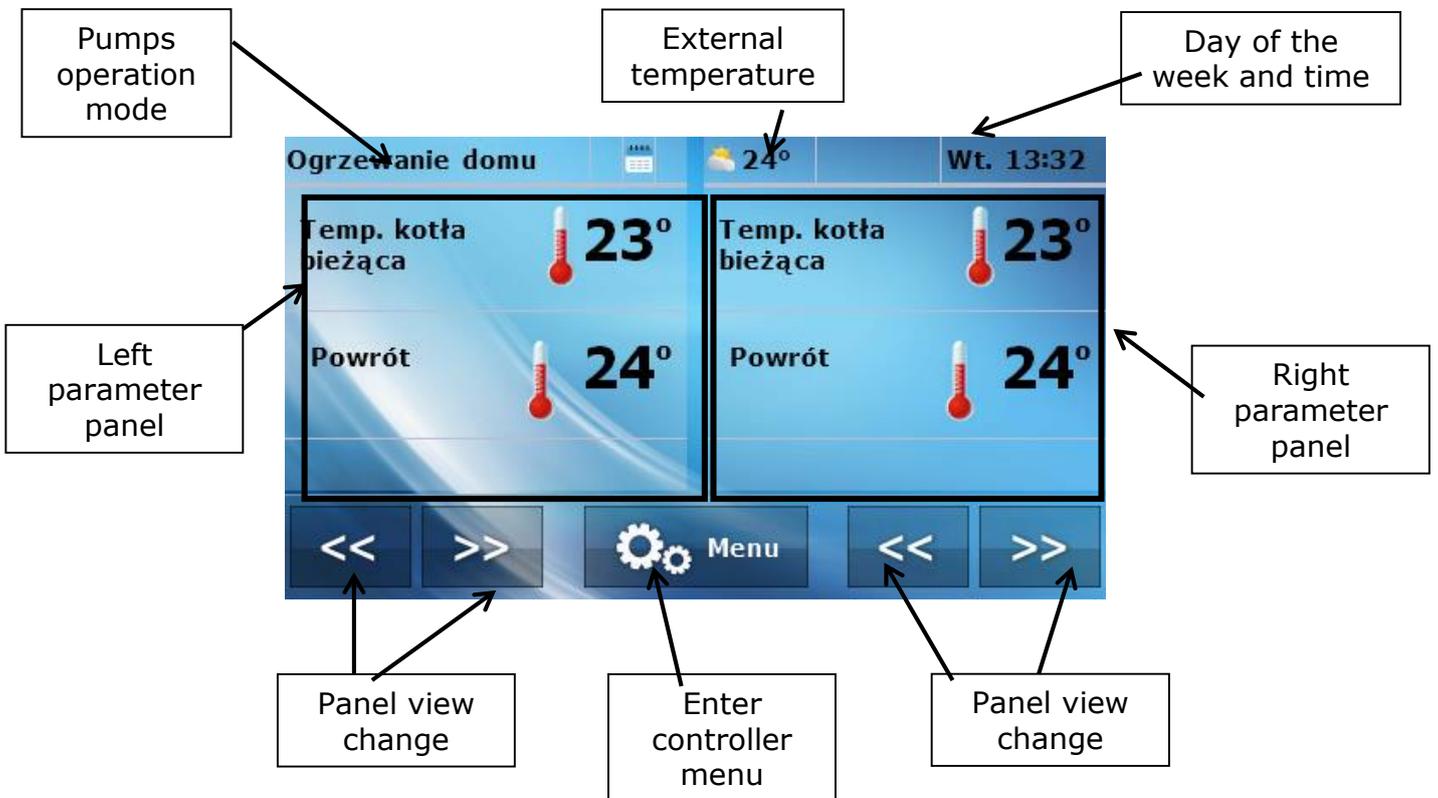
V.b) Main screen view

The device is controlled using a touchscreen. The user may choose between the two screen views: house view (default) and panel view.

House view:



Panel view:



Panel view change buttons enable the user to view the screens showing current status of all connected devices:

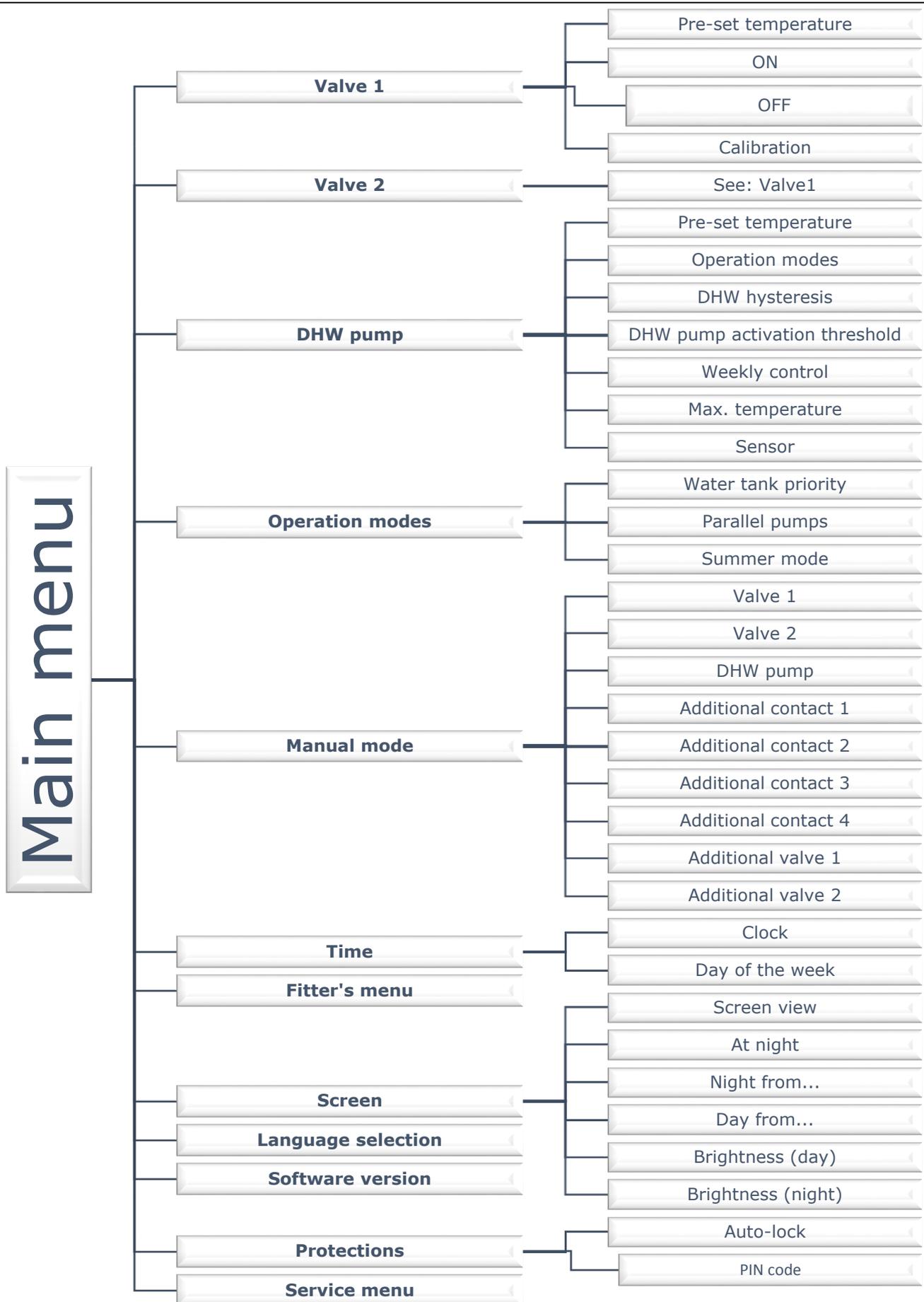
- Current CH boiler temperature and return temperature
- Current and pre-set temperature of the water tank
- Operating status of particular valves: valve pump status (ON /OFF), degree of valve opening, current and pre-set valve temperature
- Diagram illustrating current CH boiler temperature
- Diagram illustrating current water tank temperature
- Diagram illustrating current temperature of particular valves
- Status of additional contacts – e.g. sensor temperature reading, pump status (active/inactive) etc.

V.c) Controller functions – Main Menu

Due to numerous functions offered by the controller, the menu is divided into Main menu and Fitter's menu.

In Main menu the user adjusts basic controller settings such as functions of the pumps and built-in valves, operation modes as well as time and screen view.

V.c.1) Block diagram – Main Menu



V.c.2) Parameters of the built-in valves

The first options in the menu enable the user to activate a given built-in valve and adjust basic parameters.

- **Pre-set temperature**



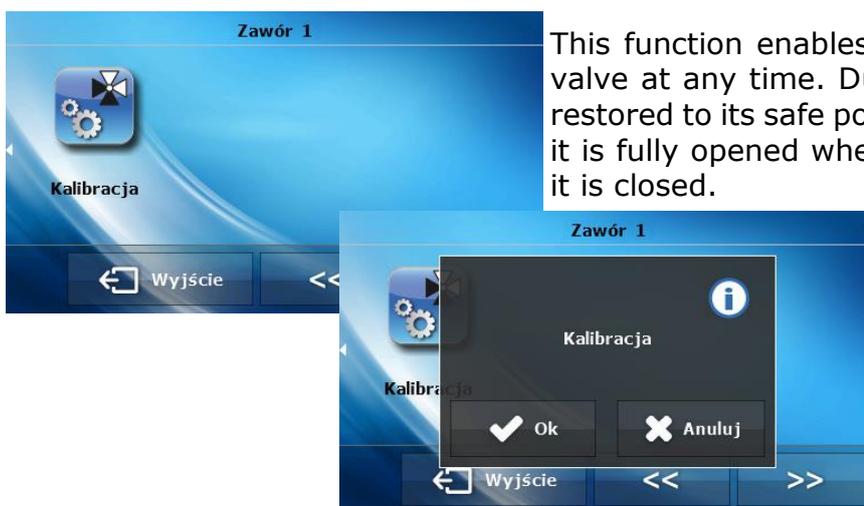
This option is used to set the desired temperature which will be maintained by valve 1. The temperature may also be adjusted directly from the main screen, when *Temp 1* is active. During proper operation, the temperature of water behind the valve approaches the pre-set temperature of the valve.

- **ON/OFF**



This option is used to activate valve 1. When the valve is turned off, the pump is also inactive. After connecting the controller to the power source, the valve is always calibrated, even if it is deactivated. It prevents the valve from remaining in dangerous position.

- **Calibration**



This function enables the user to calibrate a given 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.

V.c.3) DHW pump parameters

This function is used to adjust operation parameters of DHW pump.



- **Pre-set DHW temperature**



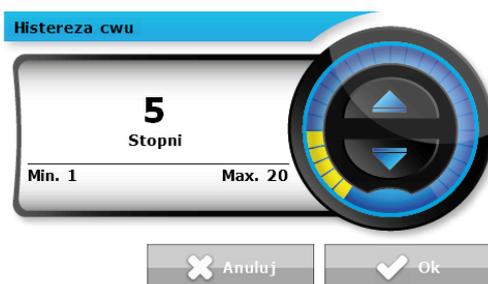
This function is used to adjust the pre-set temperature of domestic water. It may be done from the main screen view when *DHW* view is active. After the water in the water tank reaches this temperature value, the controller switches off the DHW pump. The pump is enabled again when the temperature drops below the set value minus *DHW hysteresis*.

- **Operation modes**



This function enables the user to switch off the DHW pump if it is not used, or to activate automatic operation mode (the pump operates according to parameters described in the following section) or heating mode (the pump operates when the sensor temperature is lower than the pre-set value, regardless of DHW pump activation threshold).

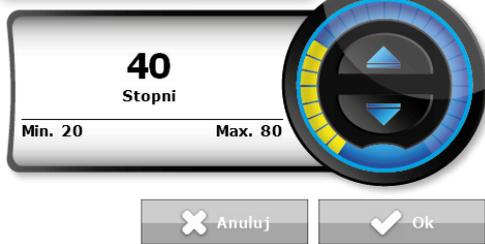
- **DHW hysteresis**



This option is used to define the hysteresis of the pre-set water tank temperature. It is the difference between the pre-set temperature (desired temp. of the water tank) and the temperature of returning to operation mode. For example, if the pre-set temperature is 55°C and the hysteresis value is 5 °C, the DHW pump is switched off when the temperature of 55°C is reached, and it is activated again when the temperature drops to 50 °C.

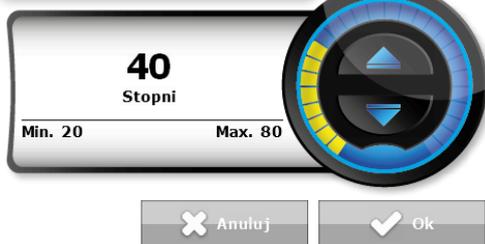
- **DHW pump activation threshold**

Próg zał. pompy cwu



This option is used to set the temperature of DHW pump activation (it is the temperature measured by the CH boiler sensor). Below this value the pump is inactive, whereas above this value the pump is switched on and operates until the pre-set temperature is reached.

Próg zał. pompy cwu



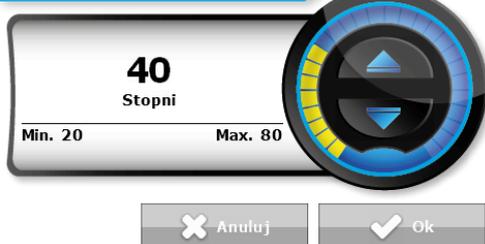
- **Weekly control of DHW pump**

This function is used to program daily changes of the water boiler temperature. The range of set temperature deviation is +/- 10°C.

Weekly control is explained in detail in the next section of the manual.

- **Maximum temperature**

Próg zał. pompy cwu



This function is used to set the maximum DHW temperature. After it has been reached, the DHW pump is switched off.

- **Sensor**

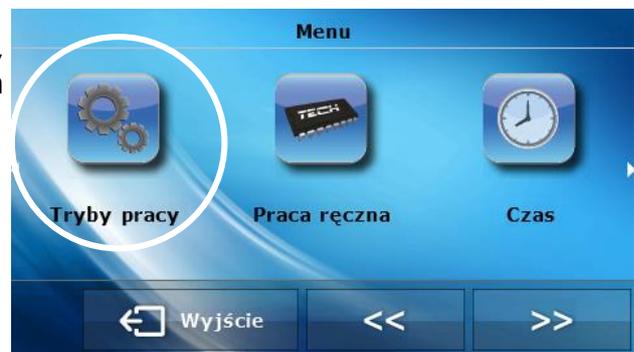
Próg zał. pompy cwu



This function enables the user to choose the sensor which will serve as the DHW sensor.

V.c.4) Operation modes

In this function, depending on current needs, the user may choose one of three operation modes available.



- **Water tank priority**



In this mode, the DHW pump is activated first and it operates until the pre-set DHW temperature is reached (the valves close completely and the valve pumps are switched off). After the set temperature has been reached, the pump is switched off and the mixing valves are activated (along with the pumps – according to their settings).

The valves operate continuously until the water tank temperature drops below the pre-set value minus *hysteresis*. Then, the valve pumps are switched off and the DHW pump is switched on.

- **Parallel pumps**



In this mode, all active pumps and valves operate simultaneously. The valves maintain the pre-set temperature and the water tank is heated to the pre-set temperature.

- **Summer mode**



In this mode, the **CH valves** are closed to prevent unnecessary house heating. In case the CH boiler temperature is too high, the valve is be opened as an emergency procedure (it requires activation of return protection!)

In this mode the water tank pump and the floor valves operate normally according to their settings.

V.c.5) Manual mode

This function enables the user to check if each device works properly. Each unit (DHW pump, circulating pump, additional contacts) may be switched on manually. It is also possible to initiate closing or opening of the valves (or additional vales if they are active). switch on/off each valve pump, DHW pump, circulating pump as well as the additional contacts in order to check if the device works properly. The user may also check if a given valve pump works properly.



V.c.6) Time

This option enables the user to set current time and day of the week.

⚠ NOTE

Setting the time is essential for *weekly control* to operate correctly.



- **Clock**



Using *up* and *down* buttons the user may set hour and minute.

- **Day of the week**

The user sets current day of the week.

V.c.7) Fitter's menu

The following sections provide detailed information on all functions which are available in the fitter's menu.

V.c.8) Screen

After selecting *Screen* option, the user may customize the main screen settings for different times of the day.



- **Screen view**



With this function the user can change the screen view switching between *panel screen* and *installation screen 1* or *2*. All screen views are described in part V.b. The setting applies during daytime.

- **At night**



By selecting *At night* option the user enters the panel enabling him/her to adjust the screen view at night: *As at daytime*, *Clock* or *Switched off*. The selected screen view is activated during nighttime, after the screen has not been touched for 20 seconds. In order to return to the main menu, touch the screen.

- **Night from... and Day from...**



In the following part of the menu the user may set the exact time of entering night mode (*Night from*) and returning to day mode (*Day from*).

- **Brightness during the day and Brightness at night**



This part of menu enables the user to adjust the screen brightness for both nighttime and daytime.

V.c.9) Language selection

Here the user chooses the language version of the controller.



V.c.10) Software version

When this option is selected, the display shows the logo of the CH boiler manufacturer as well as the software version used in the regulator.

⚠ NOTE

When contacting TECH Service Department, the user should provide the software version number.



V.c.11) Protections

After selecting *Protection* icon, the main menu shows a panel enabling the user to adjust the settings of the parental lock. When *Auto-lock* is selected, a panel used for activating and deactivating the lock appears on the screen. In order to set the PIN code, which is essential to operate the controller when the lock is active, press *PIN code* icon.

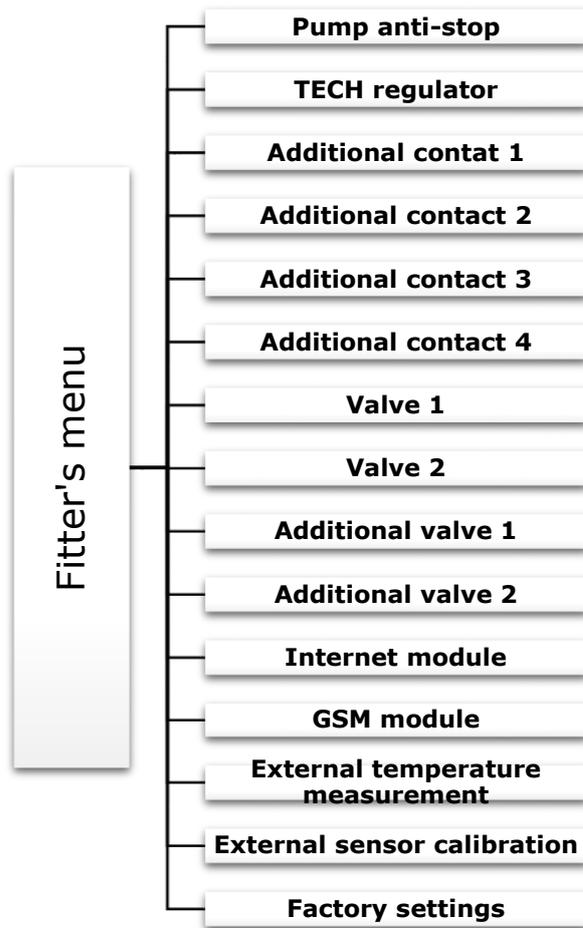
**V.c.12) Service menu**

Access to the service menu is restricted to qualified service staff and therefore it is secured with a code available at TECH company.

V.d) Controller functions – Fitter's menu

Fitter's menu should be accessed by a qualified person. It is intended for adjusting additional functions of the controller, such as the control of additional valves, additional contacts, room regulators etc. It also enables the user to access detailed settings of the basic functions (e.g. parameters of the built-in valves).

Block diagram of the fitter's menu is presented below:



V.d.1) Pump anti-stop

Anti-stop function prevents limestone depositing during long periods of pump standstill outside the heating season. When this function is active, the valve pump is switched on for 2 minutes every 10 days.



V.d.2) TECH regulator

This option allows the user to activate the function of TECH room regulator with RS communication (e.g. ST-280 or ST-298). In order for the regulator to cooperate with the right valve, the user should activate this type of room regulator and choose an appropriate operation mode in the valve menu.

TECH regulator supports RS communication and it is connected to the controller with a four-core cable (RJ12 telephone-type plugs).

If TECH room regulator (with RS communication) is switched on, apart from room temperature regulation, the user may adjust the pre-set temperature of the active valves and the water boiler directly from the room regulator, without having to go to the boiler room. Another asset of the device is that it enables the user to view the history of



temperatures in the form of clear diagrams. Moreover, all controller alarms are signalled. The user may also check the outdoor temperature and set the weekly program.

V.d.3) Additional contacts (1-4)

This option allows the user to activate/deactivate an additional contact. Contacts 1 and 4 are connected to the 230V output whereas contacts 2 and 3 are connected to voltage-free outputs.

Additional contacts may be used to connect various devices e.g. CH pump, DHW pump, circulating pump, room regulator, buffer etc. After a device is connected, the user may adjust its operating parameters as well as choose the sensor which is to provide temperature information.

After entering the menu of a given contact, the user should select the function which the connected device is to fulfil. By pressing the function icon again the user enters the submenu where the operating parameters of this device may be adjusted.

Block diagram of additional contact settings is presented below. It is the same for all additional contacts.

Additional contacts 1-4	CH	Pump activation threshold
		Hysteresis
		Sensor
		Pump activation threshold
		Hysteresis
	DHW	Pre-set DHW temperature
		Maximum temperature
		Sensor 1
		Sensor 2
		Standard regulator 1
	Standard regulator 2	
Room regulator	Standard regulator 3	
	TECH regulator	
	DHW	
Weekly control	Monday - Sunday	
	Pre-set buffer temp. top	
Buffer	Pre-set buffer temp. bottom	
	Upper sensor	
	Lower sensor	
	Pre-set buffer temp. top	
	Pre-set buffer temp. bottom	
	Upper hysteresis	
DHW buffer	Lower hysteresis	
	Delay	
	Weekly control	
	Upper sensor	
	Lower sensor	
	Pre-set temp.	
	Hysteresis	
	Delay	
Operation control	Delay after error	
	Sensor	
	Additional contact	
	Weekly control	
	Sensor	
Heating need	Valve 1	
	Valve 2	
	Valve 3	
	Additional valve 1	
	Additional valve 2	
	ON	
	OFF	
Circulating pump	Operation schedule	
OFF	Operation time	
	Pause time	
	Delete settings	
Alarm	ON/OFF	

- **CH**

This option should be selected if e.g. the CH pump is connected to the controller. The following parameters should be configured:



➤ **Activation threshold** – this option is used to set the temperature of device activation. When the temperature is below the set value, the device is inactive whereas when the temperature exceeds this value, the device is enabled.

➤ **Hysteresis** – the temperature difference between device activation and its deactivation (e.g. when the activation threshold is set at 60°C and the hysteresis value is 3°C, the device will be activated when the temperature reaches 60°C and it will be disabled when the temperature drops to 57°C).

➤ **Sensor** – this option is used to select which sensor will provide temperature information needed for the operation of the device connected to the additional contact.

- **DHW**

This option should be selected if e.g. the DHW pump is connected to the controller. The following parameters should be configured:



➤ **Activation threshold** – this option is used to set the temperature of device activation. When the temperature is below the set value, the device is inactive whereas when the temperature exceeds this value, the device is enabled and operates until the set temperature is reached.

➤ **Hysteresis** – this option is used to set the hysteresis of the set temperature. After the set temperature is reached, the device is switched off. It is switched on again after the temperature on the sensor drops below the set temperature minus hysteresis value (e.g. when the set temperature is 60°C and the hysteresis value is 3°C, the device will be switched off when the temperature reaches 60°C and it will return to operation when the temperature drops to 57°C).

➤ **Pre-set temperature** - This function is used to define the pre-set temperature for a given device. After the temperature value is reached, the device is switched off.

➤



➤ **Maximum temperature** – this function is used to set the maximum temperature after it is reached, the device is switched off.

➤ **Sensor 1** – this option is used to select which sensor will provide temperature information needed for the operation of the device connected to the additional contact (activation threshold).

➤ **Sensor 2** – this option is used to select which sensor will provide temperature information needed for the operation of the device connected to the additional contact (pre-set temperature).

sensor will provide temperature information needed for the operation of the device connected to the additional contact (pre-set temperature).

• Room regulator

This option should be selected if the device connected to the additional contact is to operate using the signal from the room regulator. When the regulator has not reached the set temperature – the contact is closed (the device is active). After the temperature has been reached, the contact opens (the device is switched off).



It is possible for the additional device to work according to the signal from the maximum of 4 room regulators. Then, the device will switch off only when each of the regulators signals that its pre-set temperature has been reached.

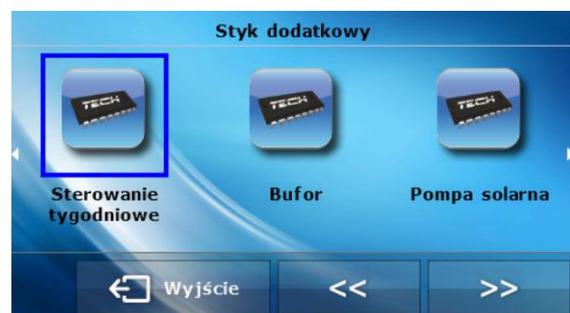
Standard regulator 1, 2 or 3 – these are two-state room regulator.

TECH regulator – it is a room regulator with RS communication.



• Weekly control

When this option is selected, the device connected to the additional contact operates according to the weekly program – the user sets time intervals (with the accuracy of 30 minutes) at which the contact will close.





After selecting day of the week, the user sets the time when the device will operate. Using arrows the user selects the exact time of device activation and then chooses ON or OFF status. **Copy** button is used to copy a given status for subsequent hours.

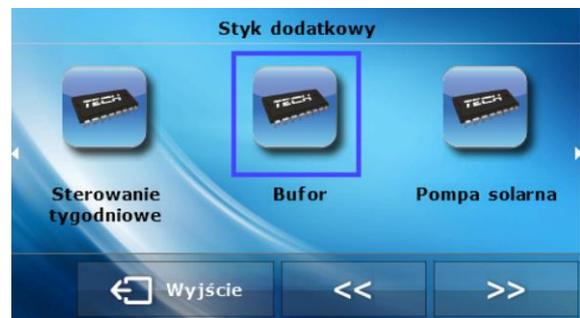
Copy button enables the user to copy the day settings into other days.



Delete button enables the user to delete the settings for a given day.

• **Buffer**

This option should be selected when buffer is connected to the additional contact. The device will operate until the pre-set temperature of buffer 'down' has been reached. After the temperature drops below the pre-set value of the buffer 'up', the device is switched on again.



The user may choose the sensors which will serve as upper and lower sensors.

• **DHW buffer**

This option should be selected when DHW buffer is connected to the additional contact. The device will operate until the pre-set temperature values of buffer 'up' and 'down' are reached – in order for the pump to be switched off, both sensors must reach the pre-set temperature. After the pre-set temperature of buffer 'up' is reached, the pump will still operate for the period of time set by the user as the *delay time*.



Moreover, the device may operate according to weekly program (described in detail in the following section), which controls the temperature of the upper sensor. The user may choose which sensors will serve as upper and lower sensors.



Pre-set buffer temp. top – this function enables the user to define the pre-set temperature for the upper part of the buffer (sensor should be placed in the upper part of the tank). After this value is reached and the delay time elapses, the pump is disabled

(provided that the *pre-set buffer temperature bottom* has also been reached).

- **Pre-set buffer temp. bottom** – this function enables the user to define the pre-set temperature for the lower part of the buffer (sensor should be placed in the lower part of the tank).
- **Upper hysteresis** – this option is used to set the hysteresis for the upper sensor. After *pre-set buffer temp. top* and *pre-set buffer temp. bottom* have been reached, the device is switched off. It is activated again when the sensor temperature drops to the pre-set value minus *upper hysteresis*. (for example: if the *pre-set buffer temp. top* is 70 °C and the hysteresis value is 5 °C, the device will be switched off when the temperature reaches 70 °C whereas its operation will be restored when the temperature drops to 55 °C).



- **Lower hysteresis** – this option is used to set the hysteresis for the lower sensor.
- **Delay** – this device enables the user to define how long the device should remain active after the *pre-set buffer temp. top* has been reached.
- **Weekly control** – this function enables the user to program temperature changes of the *pre-set buffer temp. top*. Weekly control is explained in detail in the next part of the manual.
- **Upper sensor** – this option is used to select the sensor which will serve as the upper sensor. It should be placed in the upper part of the tank.
- **Lower sensor** – this option is used to select the sensor which will serve as the lower sensor. It should be placed in the lower part of the tank.



• Operation control

If the user selects this option, the additional contact will control the operation of another contact. If the device which is connected to the controlled contact fails to switch on and the selected sensor fails to reach the pre-set temperature within the delay time, the controller activates the device which is connected to the controlling contact. For this function to work correctly, the following settings need to be configured:



- **Pre-set temp.** –this function is used to define the set temperature which must be reached by the selected sensor. If the temperature is reached, it means that the device connected to the controlled contact works correctly.
- **Hysteresis** – This option is used to define the pre-set temperature hysteresis for a selected sensor.
- **Delay** – if the selected sensor fails to reach the pre-set temperature after this time elapses, the controlled contact does not work properly. The controller will force activation of the device connected to the controlling contact – the device will be active until the sensor reaches the pre-set temperature.



➤ **Delay after error** – if, after the error of the controlled contact, the pre-set temperature of the selected sensor will not be reached within this period of time, the controller will force reactivation of the device connected to the controlling contact.

➤ **Sensor** – this function allows the user to choose which sensor will provide the information about the temperature.

➤ **Additional contact** – this function enables the user to choose the additional contact, the operation of which will be controlled.

➤ **Weekly control**

The user may specify the days and time when operation control should be active. For this purpose it is necessary to activate weekly control function and configure its parameters. Detailed instruction is included in the previous section of the manual.

user to choose the additional contact, the operation of which will be controlled.



• **Heating**

need

If the device connected to additional contact is to serve this function, it is switched on in order to help increase the temperature of a selected valve if its pre-set temperature may not be reached otherwise.

After selecting this option the user chooses the sensor which will provide temperature information. If the temperature read by the sensor is lower than the pre-set value, the device is activated in order to increase the valve temperature.



Example: The controller is used in CH boiler system with 3 valves. The system includes a heater connected to additional contact (*Heating need* function). Pre-set temperature of the valves is 50 °C. *Heating need* function operates using information provided by CH sensor. When the CH boiler temperature drops below 50 °C (CH boiler is not able to increase the temperature to the pre-set value), the controller activates the heater.

• **Circulating pump**

This function is used to control the pump which mixes hot water between the CH boiler and DHW receivers. After activating this function the user sets the 24-hour cycle of pump pause and activation (with the accuracy of 30 minutes).

In order to make setting the 24-hour cycle easier, the user may copy a selected time interval into the next one. After the operation schedule is defined, the user sets the pump operation time and the pump pause time while the previously selected time interval is active. The user may easily delete the previously saved settings in order to introduce new intervals.

- **OFF**

This function enables the user to deactivate the additional contact.



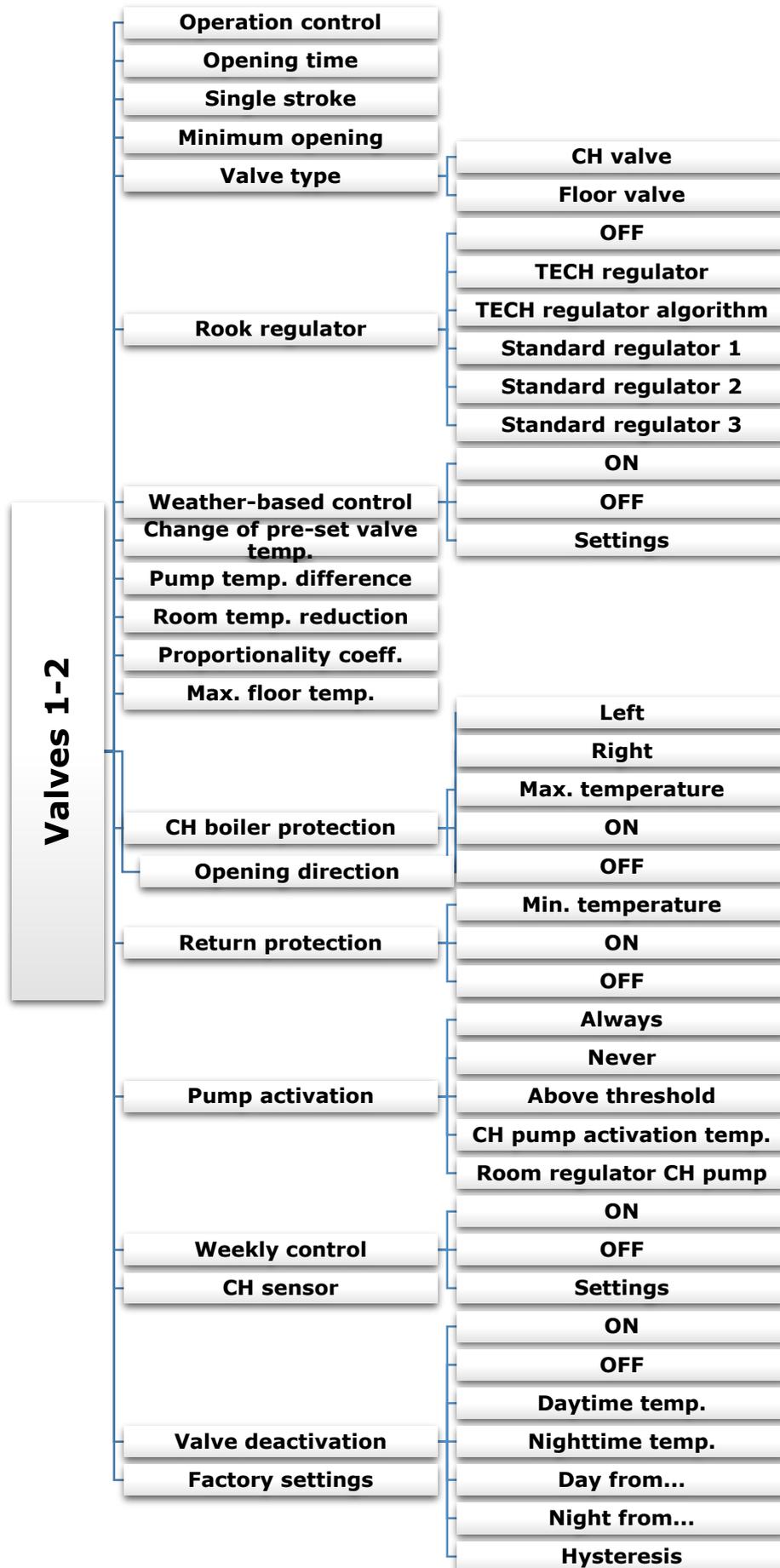
- **Alarm**

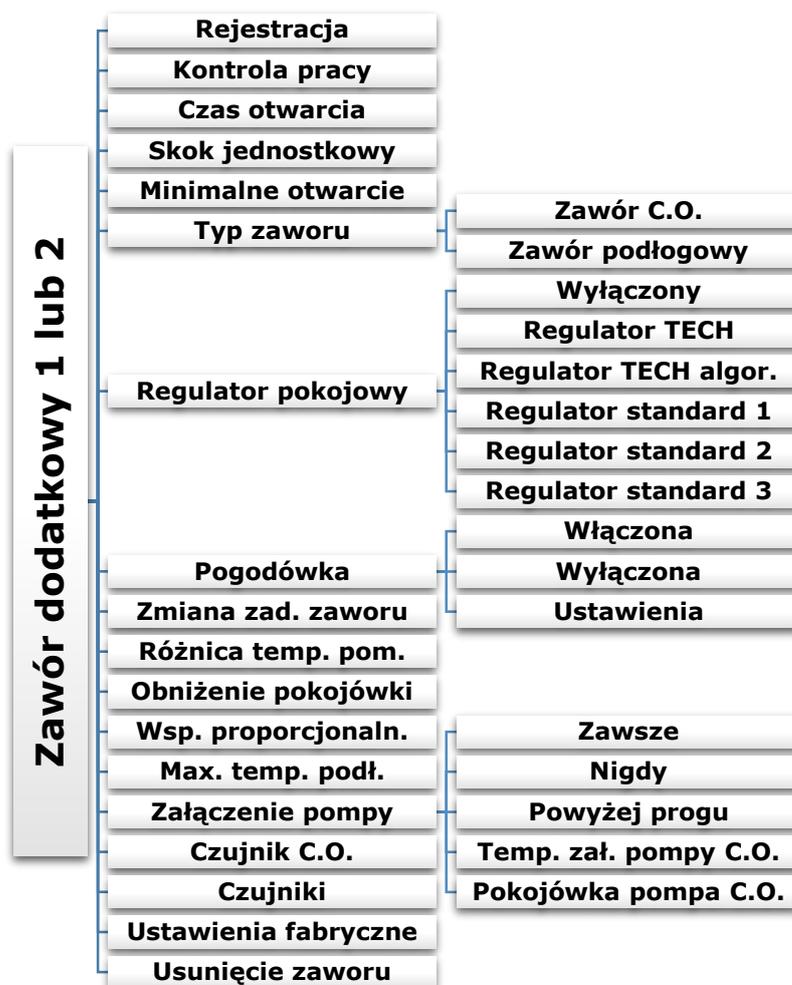
This function enables the user to decide if the device connected to the additional contact should be switched on or off if an alarm occurs.



V.d.4) Build-in valves and additional valves - settings

EU-408N controller is equipped with built-in modules controlling up to 3 mixing valves. It is possible to connect 2 additional modules controlling the valves (e.g. ST-431N). There is a range of settings enabling the user to configure the valve operation and adjust it to individual needs. The parameters of both the built-in valves and the additional valves are similar. It is illustrated with the block diagram presented below:



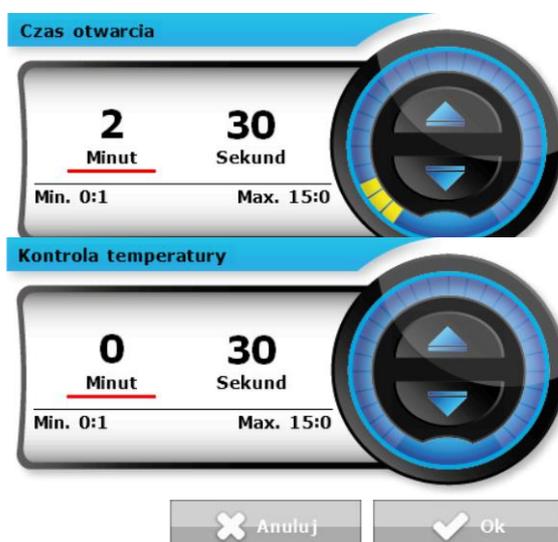


• Temperature control

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

• Opening time

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



- **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 *PROP_COEFF* 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.



- **Minimum opening**

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



- **Valve type**

By means of this setting the user selects the type of controlled valve out of the following:

- **CH** – selected if the user wants to control the CH circuit temperature.
- **Floor**- selected if the user wants to control the temperature of the underfloor heating circuit. It protects the underfloor heating installation 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.



- **Room regulator**

This function enables the user to activate and choose the type of room regulator which will be assigned to a given valve

- **TECH regulator** (with RS communication)

When this type of regulator is selected, the valve works according to <room temperature reduction> parameter. Activation of this regulator enables the user to view the current temperature of the CH boiler, water tank and the valves. This regulator should be plugged to RJ (telephone-type) socket of the EU-408N controller using a four-core cable with appropriate pins (to the RS socket).

TECH regulator algorithm (with RS communication) - When this type of regulator is selected, the valve works according to <change in pre-set valve temp.> and <room temperature difference> parameters. Activation of this regulator enables the user to view the current temperature of the CH boiler, water tank and the valves. This regulator should be plugged to RJ (telephone-type) socket of the EU-408N controller using a four-core cable with appropriate pins (to the RS socket).

Standard regulator 1- 3 - When this type of two-state regulator is selected, the valve works according to <room temperature reduction> parameter. This regulator should be connected to the controller in the place labelled *Room regulator 1-3* using a two-core cable.



- **Weather-based control**

For the function of weather control to be active, the external sensor mustn't be exposed to sunlight or influenced by the weather conditions. After it is installed in an appropriate place, *weather control* function needs to be activated in the controller menu.

For the valve to operate correctly, the user defines the pre-set temperature (behind the valve) for 4 intermediate external temperatures: -20°C, -10°C, 0°C and 10°C.



The user selects external temperature value using LEFT and RIGHT arrows and defines a corresponding pre-set temperature value using DOWN and UP arrows. Subsequently, the display shows the heating curve.

Heating curve – it is a curve according to which the pre-set controller temperature is determined, on the basis of external temperature. In our controller, this curve is constructed on the basis of four pre-set temperatures for respective values of external temperatures.

The more points constructing the curve, the greater its accuracy, which allows its flexible shaping. In our opinion, four points seem a very good compromise ensuring decent accuracy and easiness of setting the course of this curve.

⚠ NOTE

After *weather-based control* is switched on, **pre-set valve temp.** parameter is not available. (Main menu-valve settings)

- **Change in pre-set valve temp.**

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.



- **Room temperature difference**

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 set temperature of the valve will be introduced (function available only with TECH room regulator with RS communication).

Example:

setting: room temperature difference **0,5°C**

setting: change in pre-set valve temperature

1°C

setting: pre-set temperature of the valve **40°C**

setting: pre-set temperature of **the room regulator 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).

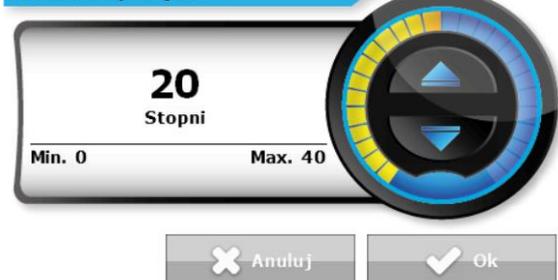
Różnica temp. pomieszczenia



- **Room temperature reduction**

This function is active only if the valve cooperates with the two-state (standard) room regulator. The user defines the value of valve temperature reduction which will be performed when the room regulator reaches the pre-set temperature.

Obniżenie pokojówki.

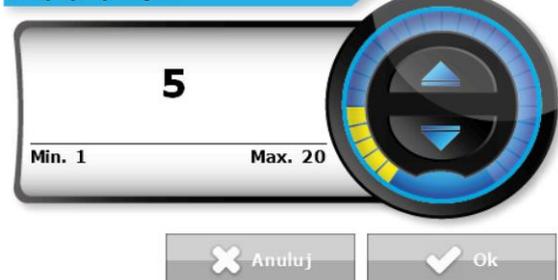


- **Proportionality coefficient**

Proportionality coefficient is used for defining valve stroke. The closer 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:

$$\frac{(\text{PRE-SET_TEMP} - \text{SENSOR_TEMP})}{(\text{PROP_COEFF} / 10)} *$$

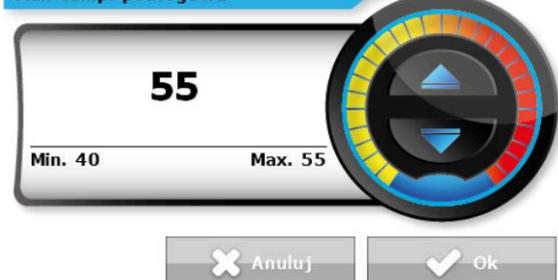
Wsp. proporcjon.



- **Maximum floor temperature**

It is the maximum temperature which does no damage the underfloor heating installation. This setting is used when the valve type is set as floor valve. After this temperature is reached, the valve closes completely and the user is informed about it by means of an appropriate alarm. When the maximum floor temperature is reached, *CH boiler protection* function is deactivated. In such a case, protection of the underfloor heating installation is assigned higher priority.

Max temp. podłogowa



- **Opening direction**

! NOTE

Function available only for built-in valves.

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*.



- **CH boiler protection**

! NOTE

Function available only for built-in valves.

The protection against too high return temperature serves to prevent the hazardous growth in CH boiler temperature. The user sets the maximum acceptable return temperature. In case of the hazardous growth in temperature, the valve begins to open to house installation in order to cool the CH boiler down. This function is activated permanently (it may be deactivated only in service menu).



- **Return protection**

! NOTE

Function available only for built-in valves.

This function permits setting the 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. After activating it, the user presets the minimum acceptable return temperature.



- **Pump activation**

This option enables the user to select the working mode of a pump. A pump will be activated:

- **always** (the pump operates all the time, regardless of temperatures),
- **never** (the pump is permanently deactivated and the regulator controls only valve operation),
- **above the threshold** (the pump is activated above the pre-set *activation temperature*). If the pump is to be activated above the threshold, the user should also define the threshold

temperature of pump activation. When the **CH pump room regulator** function is activated, the CH pump is switched off after reaching the pre-set temperature (if **always** or **above the threshold** option is selected).



- Weekly control (weekly program)**

This function is used for programming daily changes of the temperature behind the valve. The set temperature deviations are in the range of $\pm 10^{\circ}\text{C}$.



Step 1:

First the user must set current time and date (Fitter's menu>Timer)

Step 2:

The user sets temperature values for particular days of the week (Set Mode 1):

Monday - Sunday

In this mode, specific time and the requested deviations from the pre-set temperature should be defined (by how many degrees the temperature should rise or drop at a given time) for each day of the week. Additionally, to facilitate the use of the device, it is possible to copy the settings.



Example:

Monday

set: 3⁰⁰ AM, temp -10°C (temperature change -10°C)

set: 4⁰⁰ AM, temp -10°C (temperature change -10°C)

set: 5⁰⁰ AM, temp -10°C (temperature change -10°C)



In this case, if the set temperature of the valve is 60°C , from 3⁰⁰ AM to 6⁰⁰ AM on Monday the set temperature will drop by 10°C , so it will be 50°C .



Instead of setting the temperature for particular days, mode 2 enables the user to set the temperature for all working days (Monday-Friday) and for the weekend (Saturday-Sunday) – *Set mode 2:*

Monday-Friday ; Saturday- Sunday

In this mode, specific time and the requested deviations from the preset temperature should be defined for both working days (Monday-Friday) and the weekend (Saturday-Sunday)

Example:

Monday-Friday

set: 3⁰⁰ AM, temp -10°C (temperature change -10°C)

set: 4⁰⁰ AM, temp -10°C (temperature change -10°C)

set: 5⁰⁰ AM, temp -10°C (temperature change -10°C)

Saturday-Sunday

set: 4⁰⁰ PM, temp 5°C (temperature change $+5^{\circ}\text{C}$)

set: 5⁰⁰ PM, temp 5°C (temperature change $+5^{\circ}\text{C}$)

set: 6⁰⁰ PM, temp 5°C (temperature change $+5^{\circ}\text{C}$)

In this case, if the set temperature of the valve is 60°C, on each weekday from Monday-Friday from 3⁰⁰AM to 6⁰⁰AM the set temperature will drop by 10°C, so it will be 50°C. During the weekend, from 4⁰⁰ PM to 6⁰⁰ PM the set temperature of the valve will increase by 5°C, so it will be 65°C.

Step 3 (Mode):

The user activates one of the two previously defined modes (Mode 1, Mode2) or deactivates weekly control completely.

After one of the modes has been activated, the value of the currently set deviation will be flashing on the controller main page, informing the user that the weekly control is active

Delete data function allows the user to easily delete all previously saved settings of the weekly program, in order to introduce new settings.

- **CH sensor**

This function enables the user to choose which sensor will serve as CH sensor. For this purpose the user may choose any sensor connected to the controller.



- **Valve deactivation**

⚠ NOTE

Function available only for built-in valves

When this function is selected, the valve operation depends on the external temperature. The user may set the temperature at which the valve should be deactivated during the day and at night. It is possible to define the time when the controller will operate in day mode and night mode. The user sets the hysteresis of valve deactivation temperature for the night mode and day mode.



- **Factory settings**

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



- Valve registration

NOTE

Function available only for additional valves.

After each additional valve is connected, it must be **registered** by entering the module number (written on ST-61 casing). Only then may the additional valve be configured.



- Valve removal

NOTE

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).



V.d.5) Internet module

NOTE

*This type of control is available only after purchasing and connecting an additional controlling module **ST-500** which is not included in the standard controller set.*



Internet module is a device enabling the user remote control of the CH boiler via the Internet or local network. The user controls the status of all Ch boiler system devices on the home computer screen and the operation of each device is presented in the form of animation.

valves.

Apart from the possibility to view the temperature of every sensor, the user can change the set temperatures for both the pumps and the mixing

After switching the module on and selecting DHCP option, the controller automatically downloads such parameters as IP address, IP mask, gateway address and DNS address from the local network. If any problems arise when downloading the network parameters, they may be set manually. The procedure of obtaining these parameters is described in detail in the instruction manual of the Internet Module.

Module password reset function may be used when the user has changed the default password on the login page. If the user's new password is lost, the default password may be restored by resetting the module password.

V.d.6) GSM module

⚠ 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.



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 set temperatures is also possible after the authorisation code is entered.

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 preset 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 the GSM Module is to be used with the EU-408N controller, it should be activated by selecting ON option (MENU>Fitter's menu>GSM Module>ON).

V.d.7) External temperature measurement

This parameter defines how often the temperature value measured by the external sensor should be averaged. The temperature is measured continuously and the value is averaged and refreshed every 60 seconds (factory setting). The setting range available is 1-600 seconds.



V.d.8) External sensor calibration

External sensor calibration is performed when mounting the regulator or after it has been used for a long time, if the external temperature displayed on the sensor differs from the actual temperature. Calibration setting range is from -10°C to +10°C with the accuracy of 0,1°C.



V.d.9) Factory settings

This option enables the user to restore factory settings defined by the manufacturer.



VI. Protections and alarms

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.

To restore operation, touch the screen.

During an alarm, manual operation is available. However, the user should ensure that such activity will not cause any damage.

The controller is equipped with the following alarm protection:

1. Temperature alarm – it stops the valve temperature regulation and sets the valve in its safest position - the floor valve will be closed whereas the CH valve will be opened.

2. Alarm - *C1-4 SENSOR* – it may mean that: 1) no sensor is connected, 2) the sensor has been connected incorrectly, 3) the sensor is damaged

The regulator has a WT 1,6A tube fuse-link protecting the network.

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

VII. Maintenance and technical data

Before and during the heating season, the EU-408N controller should be checked for condition of its cables. You should also check if the controller is properly mounted and clean it if dusty or dirty.

Technical data

Range of CH valve temperature regulation	10°C : 90°C
Range of floor valve temperature regulation	10°C : 55°C
Range of DHW tank temperature regulation	1°C : 80°C

Range of CH valve temperature regulation	10°C : 90°C
Supply voltage	230V/50Hz +/- 10%
Power consumption	max. 4W
Thermal resistance of the sensors	-25°C : 90°C
Ambient temperature	5°C : 50°C
Load on each output	0,5A
Fuse link	6,3A



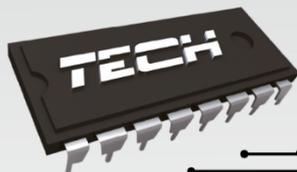
Care for the natural environment is our priority. Being aware of the fact that we manufacture electronic devices obligates us to dispose of used elements and electronic equipment in a manner which is safe for nature. As a result, the company has received a registry number assigned by the Main Inspector of Environmental Protection. The symbol of a crossed out rubbish bin on a product means that the product must not be thrown out to ordinary waste bins. By segregating waste intended for recycling, we help protect the natural environment. It is the user's responsibility to transfer waste electrical and electronic equipment to the selected collection point for recycling of waste generated from electronic and electrical equipment.

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