GECO®

CONTROLLER OPERATING INSTRUCTIONS

GH08NA

FOR CONTROL OF CH BOILERS FOR SOLID FUEL WITH AN AIR SUPPLY FAN

V01a

USER MANUAL

Please, read the manual very carefully and understand it before connecting and starting any of our devices. In case of any doubts, please contact us from 8 a.m. to 4 p.m.

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1. Controller Description

The GH08NA Controller is a microprocessor-based device manufactured using the Surface Mount Technology (SMT).

The controller is designed to control the processes of preparation Domestic Hot Water (DHW) and the main space heating (CH) water circuit. Control parameters can be adjusted to the current operating conditions and boiler type. The Controller includes a system protecting it from power outages and various other disturbances. Any occurring failure, after it is identified, is indicated visually and audibly by a controller in the form of a specific alarm condition or note and stored in the controller's memory. The controller enables automatic control of three setup configurations, which completely satisfy the installer's requirements. The device can handle: two temperature sensor inputs and an additional input for a universal room thermostat and an external alarm.

The GH08NA Controller is fitted with:

- temperature inputs:
  - for the measurement of boiler outlet water temperature;
  - for the measurement of boiler water temperature – DHW / CH return temperature;
- input
  - for connection of an universal room thermostat;
  - STB / External alarm
- Outputs from external devices:
  - fan;
  - CH pump;
  - DHW pump/mixing pump;

2. Technical data.

Power supply	230V ~ +10% -15%
Operating temperature range	from +5°C to +40°C
Humidity	20% to 80% RH
Protection – fan, feeder	3.15 A
Sensor type	NTC 2.2kΩ
Operating range of the temperature sensor	NTC: 0°C÷100°C

Output	Maximum continuous load	
DHW pump / Mix.	1A	250 W
CH Pump	1A	250 W
Fan*	1A	250 W

NTC sensors resistance characteristics	
Temp. °C	**Resistance Ω**
0	7174.89
10	4374.83
20	2747.10
30	1774.91
40	1172.09
50	795.08
60	547.95
70	384.62
80	275.86
90	202.37
100	149.16

*** if a contactor or intermediate transmitter is connected, use a dedicated suppressor circuit (e.g. varistor-based). Ignoring such protection may result in incorrect operation or damaging the controller output.**

3. Requirements for the electrical installation.

NOTE!
Wiring of the controller and connection of process equipment can be performed only by a person with a valid license for installing electrical systems. It is recommended that such work should be performed by a qualified installer.

The following are the basic requirements pertaining to electrical system providing power supply to the controller in question:

1. Any repairs, maintenance and other activities can be performed only power supply voltage disconnected at the main disconnecting switch.
2. The room where the controller is installed should be equipped with a 230V/50 Hz electrical system, according to the applicable regulations.
3. The controller must be supplied from a dedicated circuit of the 230 V AC/50 Hz grid, protected with an overcurrent switch
4. The power supply cable for the controller, due to mechanical strength should have a gauge of at least 2.5 [mm^2]
5. The cable must be protected against mechanical damage, by laying it a plastic tube or a cable tray.

4. Graphical and textual description of the controller connection.

After the preparation of wiring you can start connecting the controller power supply and the sensors, the room thermostat and the external devices:

- The 230 V power supply must be connected to the controller terminals described as "L, N";
- The universal room thermostat and the NTC temperature sensors must be connected to inputs in accordance with the tables provided in Section 8 of the manual: "System operation arrangement" – according to the selected installation diagram. You need to keep in mind that the number of temperature sensors depends on the type of the system operated, and the inputs of unused sensors can be left unconnected;
- The process equipment (the pumps and the fan) can be connected to outputs, according to the tables provided in section 8: "System operation arrangement" – according to the selected installation diagram.

The description of input parameters is presented in the following tables:

Controller inputs description		
Power supply	230 V AC	01-02
External protection/Limiter	Fuse/STB	03-04
Description of controller inputs – temperature sensors		
Temperature sensor	**Input type**	**Designation on the controller**
Boiler outlet water	NTC	15-16
Water in the boiler DHW/Return	NTC	13-14
Description of controller inputs – Room panel		
Room thermostat type	**Input type**	**Designation on the controller**
Universal thermostat type	-	11-12
Description of controller outputs – Process equipment		
System equipment	**Input type**	**Designation on the controller**
CH Pump	transmitter	09-10
DHW Pump/Mix pump	transmitter	07-08
Fan	triac	05-06

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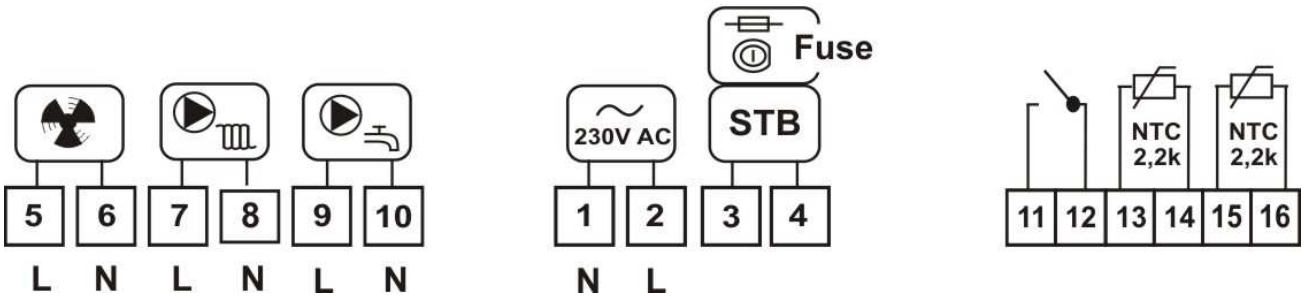
01-02 - Power supply Un = 230 VAC Imax = 8A
03-04 - External protection (Fuse. / STB)
05-06 - Fan
07-08 - C.H Pump
09-10 - D.H.W. Pump/Mix Pump
11-12 - Standard room thermostat
13-14 - D.H.W. temp. sensor/Return sensor
15-16 - Boiler temperature sensor

Model:**GH08NA**
Ns: Date Prod.:



EQUIPMENT CAN BE CONNECTED TO THE GH08NA CONTROLLER ONLY BY A PERSON LICENSED TO PERFORM ELECTRICAL INSTALLATION WORK.

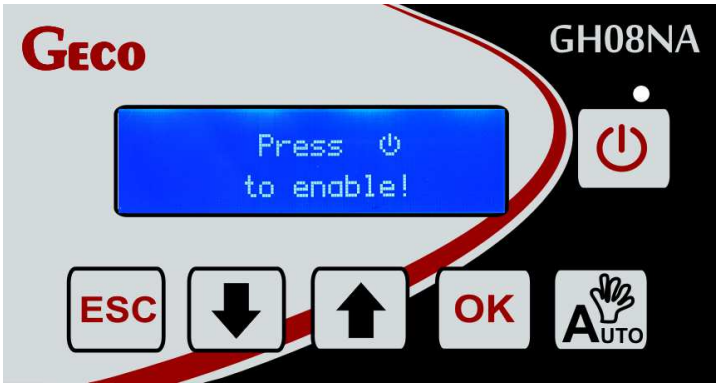
5. Controller operation mode.

Four operation modes of the controller are available:

- **standby** – the condition of the controller immediately after switching the power supply on, before the ON/OFF switch is activated. The control algorithm is not running, whereas the RTC real time clock is running, previous settings and the selected system arrangement is stored,
- **automatic** – there are four sub-modes: firing up, heating, sustaining and panel.
  Firing up – this is the first stage of the automatic mode preceding the heating mode. The firing up mode is activated when the temperature in the boiler is sufficiently low.
  Heating – in this mode one of the selected control algorithms is carried out, depending on the fuel type and requirements of the heating system.
  Sustaining – the controller goes to this operation mode, when the boiler temperature reaches the setpoint value. In this mode an individual sustain algorithm is carried out.
  Sustain Panel – the controller goes to the sustain mode when the boiler is locked by the universal room thermostat
- **manual** – this mode is used only for verification (tests) of switching on and off of individual process equipment of the system, therefore you need to remember to switch back to the automated mode when you are done testing.
- **alarm condition** – an alarm occurs and prevents further operation of the system. Alarms conditions also include notes which are informative in nature and do not affect operation of the controller.

5.1. Standby mode.

After performing the installation activities from the aforementioned sections the power-up controlled goes through automatic panel calibration and goes to the standby mode. In this mode the screen displays information about how to switch on the controller and go to the manual mode.



When the controller is in standby mode it can be switched to manual mode using the button. During normal operation of the controller it can be switched to standby mode at any time by pressing the button. In standby mode all outputs and audio signals of alarms are disabled.

5.2. Automatic mode – firing up

The first stage of the automatic mode is firing up. This mode is activated when the following temperature condition is satisfied: **Tboiler < *Boiler temperature setting* – S29 (factory setting is 10°C)**. The current boiler temperature must be greater or equal to the temperature setpoint minus the S29 service parameter.

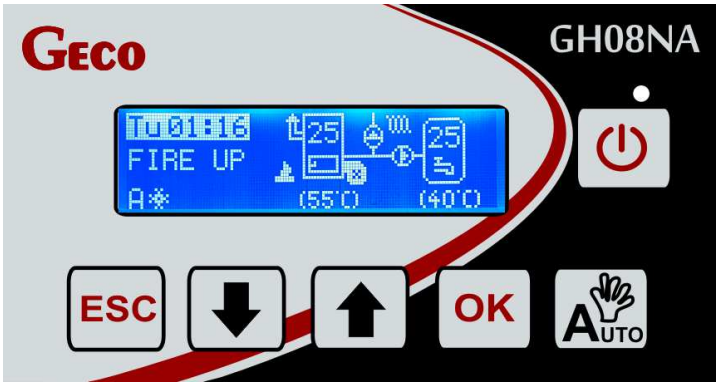
The process will be automatically ended, when the boiler outlet water temperature reaches the value of the ***Boiler temperature setpoint – S29* (10˚C is the factory setting).**. If the fire goes out during firing up, it is indicated with the AL 14 message on the main displays of the controller.

Controller operation in automatic mode is indicated by a text message in the top part of the screen: **FIRE UP.**

In the "Only Pumps" control mode there is no firing up.

5.3. Automatic mode – Heating

When the boiler outlet water temperature reaches the value of ***Boiler temperature setpoint – S29*** **(10˚C factory setting)** the controller goes to the **HEATING mode.** In the automatic mode, after the completion of firing up the controller runs the control algorithm for the selected heating scheme, depending on the control type. There are two types of control: standard and only pumps. The main display shows the essential information about the system, including among others, the system diagram, temperature setpoints and actual temperatures, operation mode, active functions, device switching on and any alarms or notes.



Controller operation in automatic mode is indicated by a text message in the left part of the screen:

HEATING – when the standard control mode is set
PUMP.T – when the control mode is set to – "Only pumps"

A detailed description of all control modes is provided in section 7

5.4. Automatic mode – Sustaining.

If during operation in the HEATING mode the condition of *Current temperature* ≥ *Temperature setpoint* is satisfied, the controller goes to the SUSTAIN mode.

The Controller exits the SUSTAIN mode and returns to the HEATING mode, if the boiler temperature drops to the value equal to: (*"Boiler temperature"* – "*Boiler temp. hysteresis*"). The setpoint of boiler temperature hysteresis is editable by the user and available in the menu.

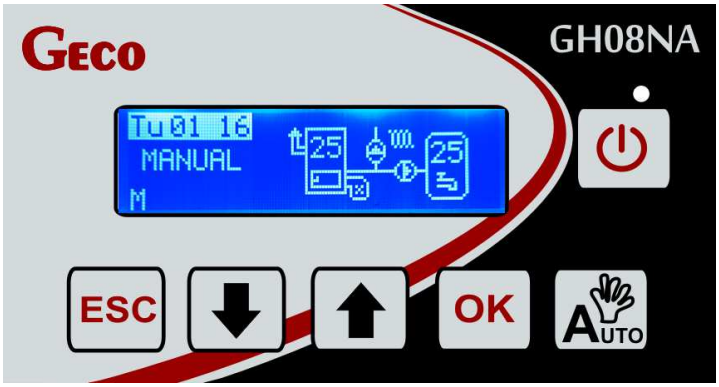
Controller operation in the automatic sustain mode is indicated by a text message in the top part of the screen:

SUSTAIN – when the standard control mode is set
PANEL – when a thermostat lock occurs

In the "Only Pumps" control mode there is no Sustaining mode.

5.5. Manual mode.

In manual mode the controller does not run the control algorithm, and the interval and type of process equipment switched on depends on the user, who assumes the responsibility for correct operation of the equipment. The main screen always displays the current temperature of the boiler. The selected type of control does not affect the operation of the system in manual mode. In this case the user will decide on their own which piece of equipment will be controlled by the controller.



After entering the manual mode operation of all equipment is automatically stopped. Controller operation in manual mode is indicated by a text message in the left part of the screen: “MANUAL”.

Switching on equipment in manual mode:

ESC CH pump activation

DHW/MIX pump activation

Fan activation

The Anti-Stop function described in section 7 is available only in manual mode.

5.6. Alarm conditions mode.

An alarm condition means the occurrence of an alarm which prevents further operation of the system or allows conditional operation. Alarms conditions also include notes which are informative in nature and do not affect operation of the controller.

Alarm number	Name
AL1	STB activated or external fuse blown
AL2	Boiler water outlet temperature sensor damaged
AL4	Damaged temperature sensor for DHW/return
AL10	Anti-legionella function was not performed
AL12	Boiler overheating
AL13	Boiler burnout
AL14	Burnout when firing up

If the DHW/Mix temperature sensor is damaged, the controller makes it possible to change the system configuration to a simpler one, without support for the pump and the DHW/Mix sensor.

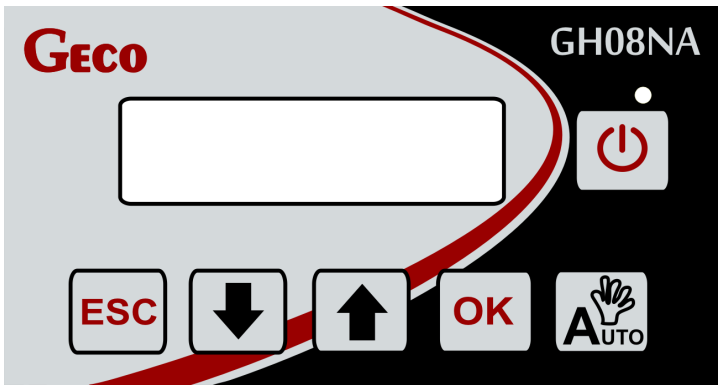
During most alarms the customer is able to check the service data with the manufacturer or the installer.

All component changes must be performed with the controller switched off!

6. Controller operation.

This chapter describes operation of the controller: switching on, using the key, preview of operation of the measuring system, reading of text information and symbols on the display and editing the user editable parameters.

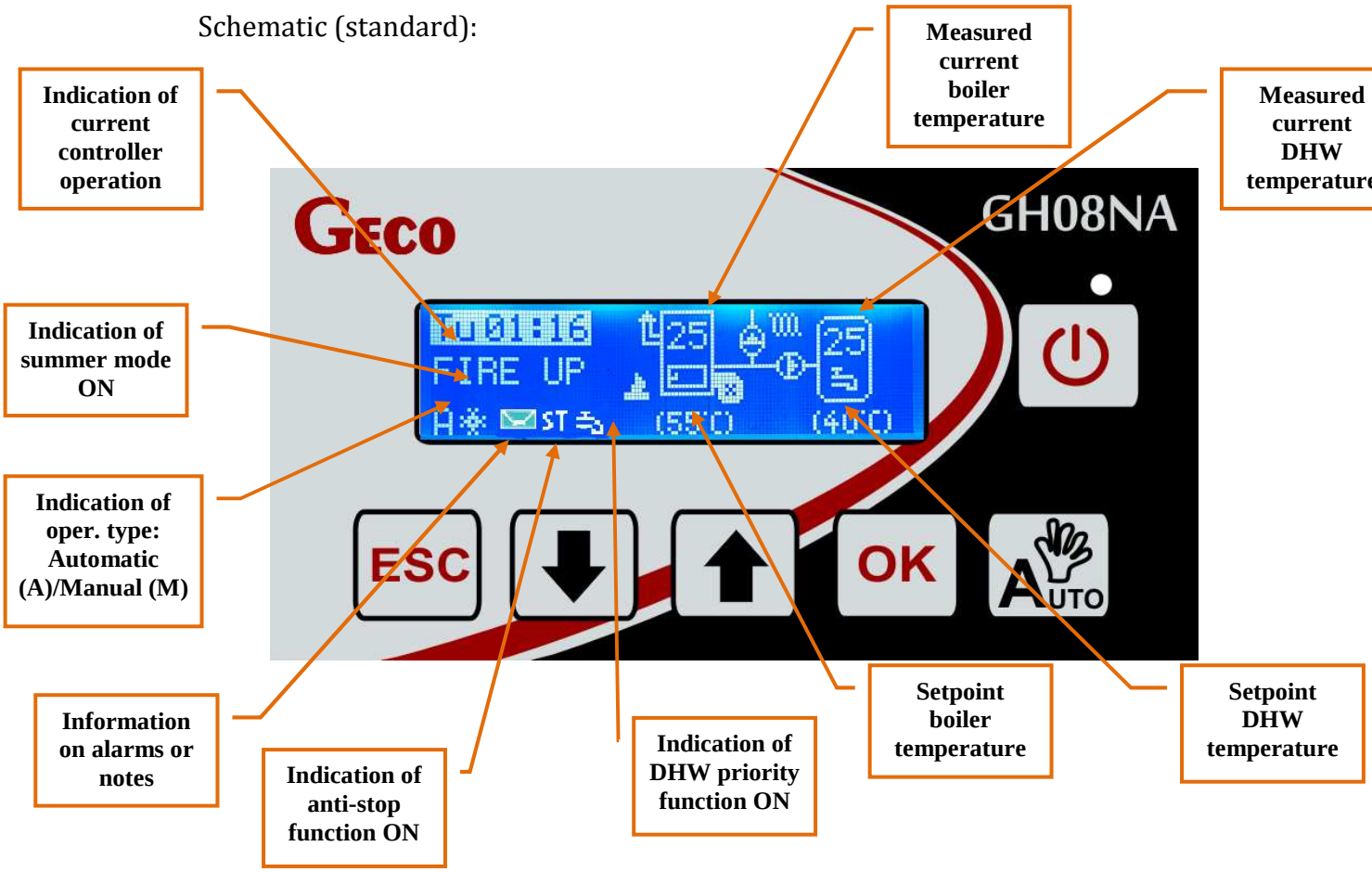
6.1. Head film of the controller



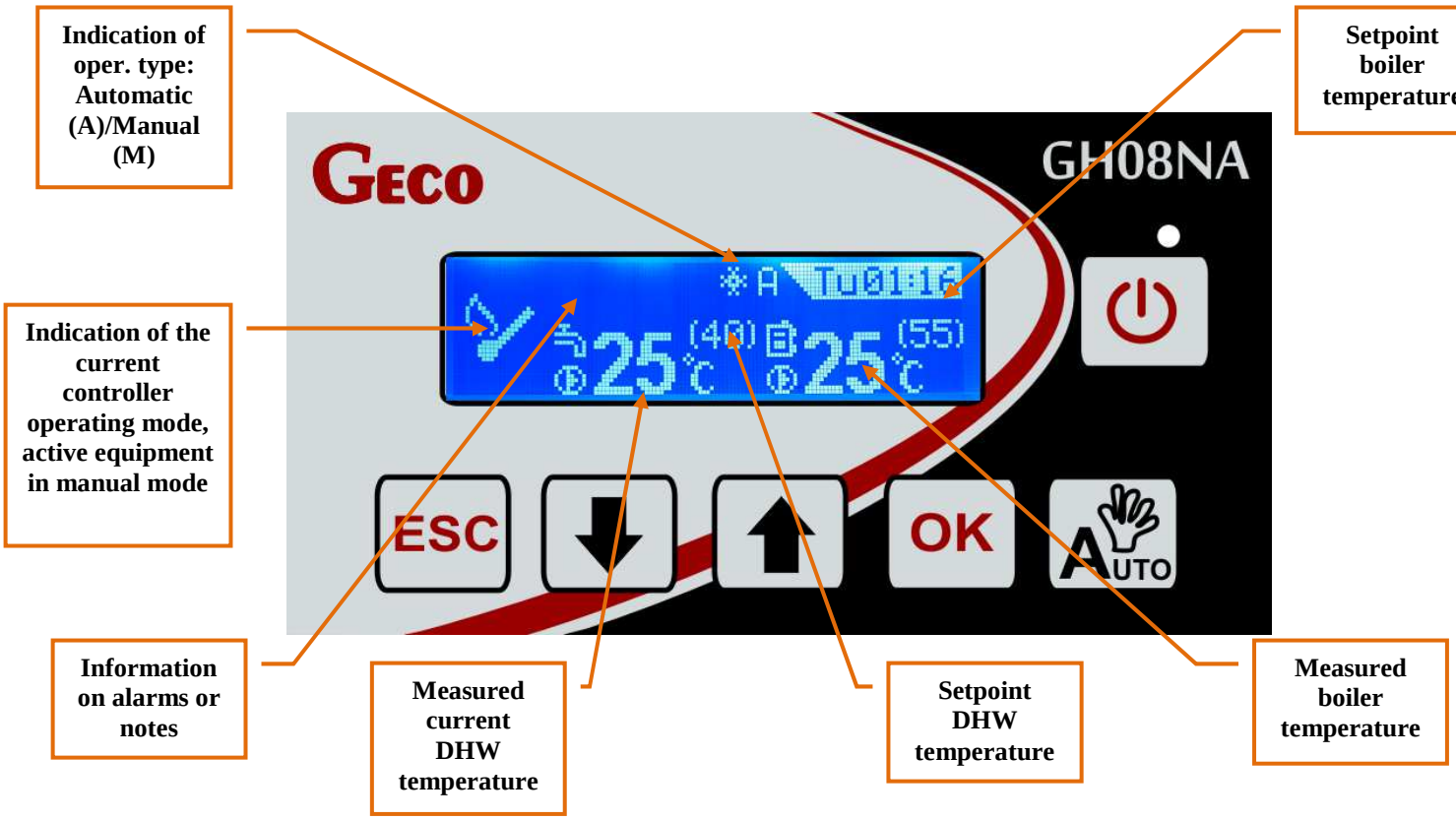
BUTTON	DESCRIPTION	INTERACTION
	Switch the controller on/off	The main screen in manual mode appears
	Operation mode change. Switching between modes: manual **(M)**/ automatic **(A)**	The screen in manual mode shows MANUAL, whereas in automatic mode it shows: HEATING, PUMP.T, SUSTAIN, PANEL, FIRE UP
	Confirmation of change. Entering the controller “MENU” from the main screen item.	Storing the change. The “MENU” screen is displayed from the main screen.
	Exit without change. Switching on the CH pump in manual mode	Return to previous screen / higher menu level
	Arrow key up. Increasing value. Switching on the DHW pump in manual mode	Going to the next item up. Increasing the value by one.
	Arrow key down. Reducing value. Switching on the fan in manual mode:	Going to the next item down. Reducing the value by one.

6.2. Description of the main display profiles.

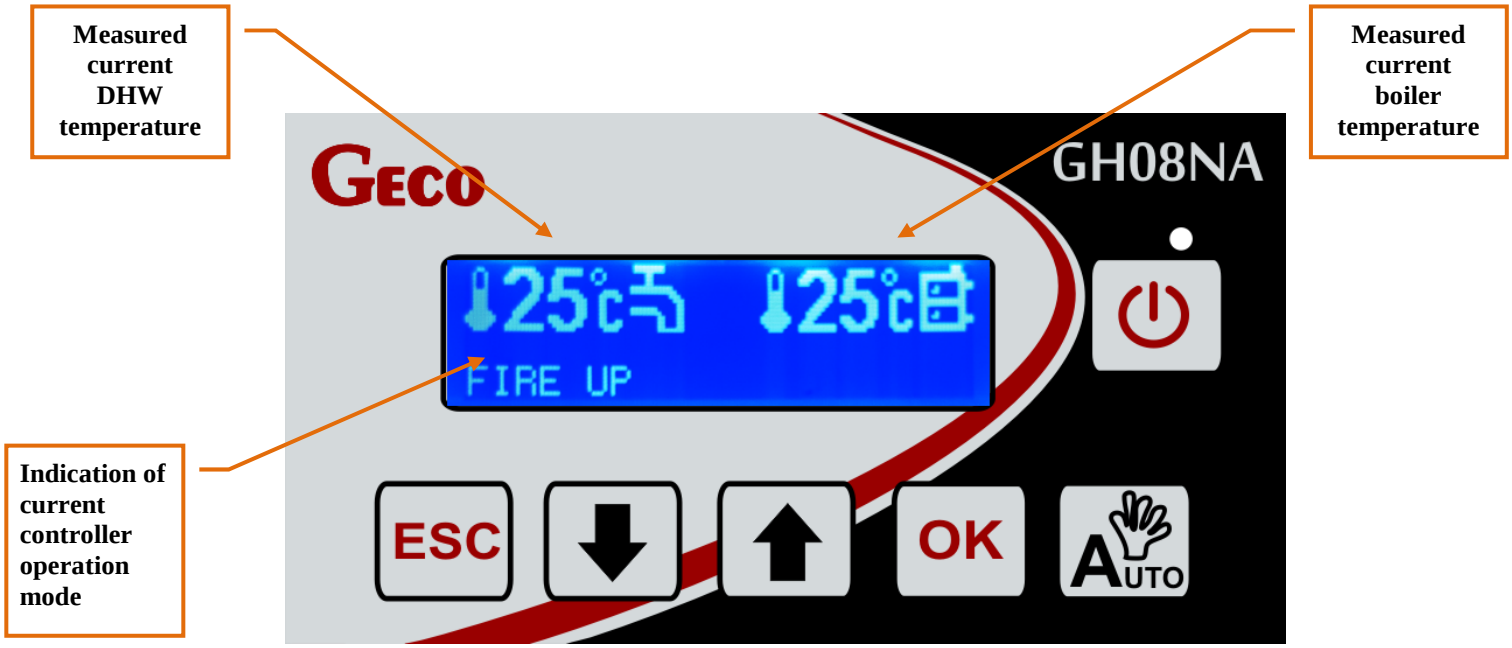
Schematic (standard):

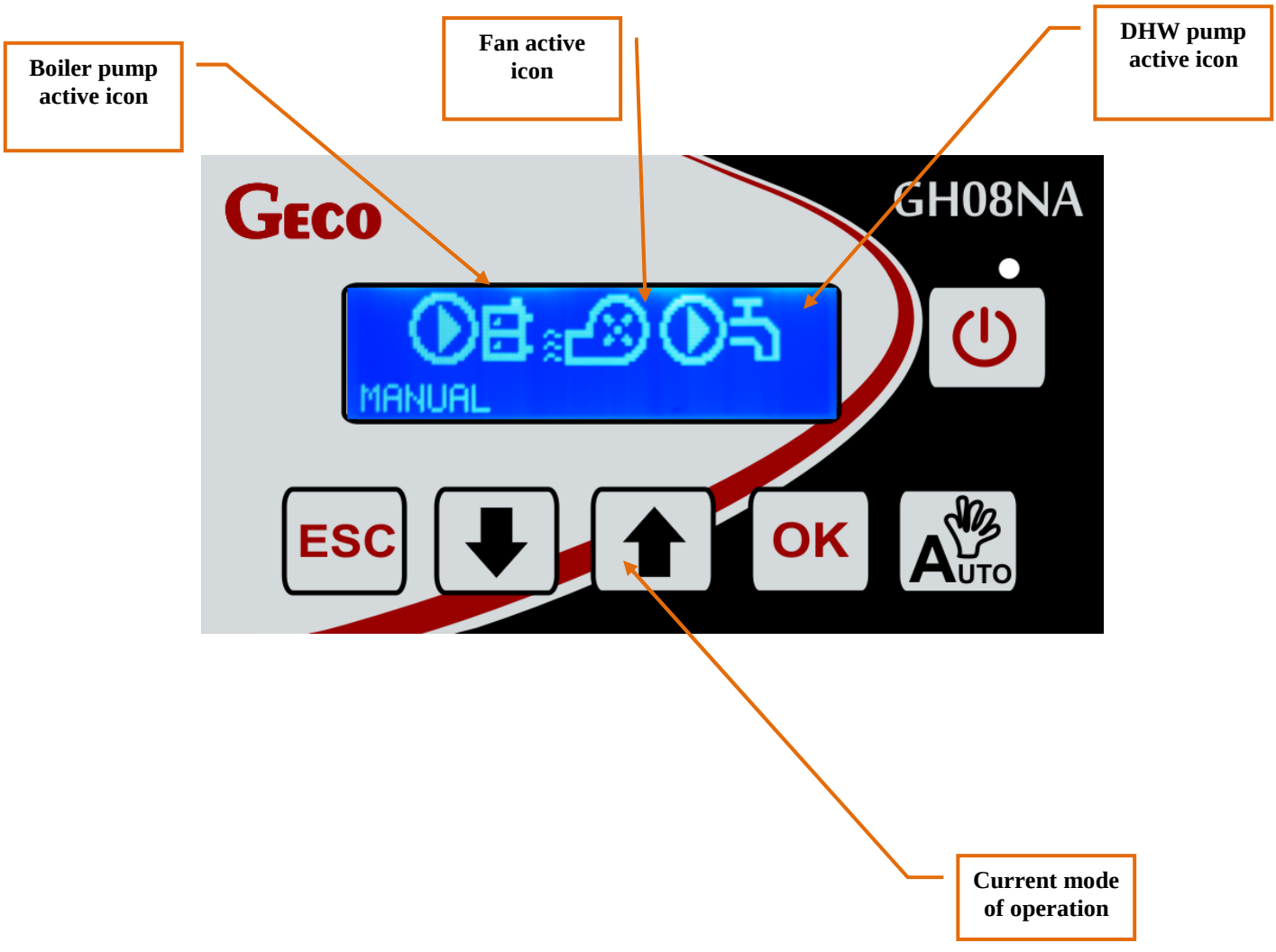


Modern:

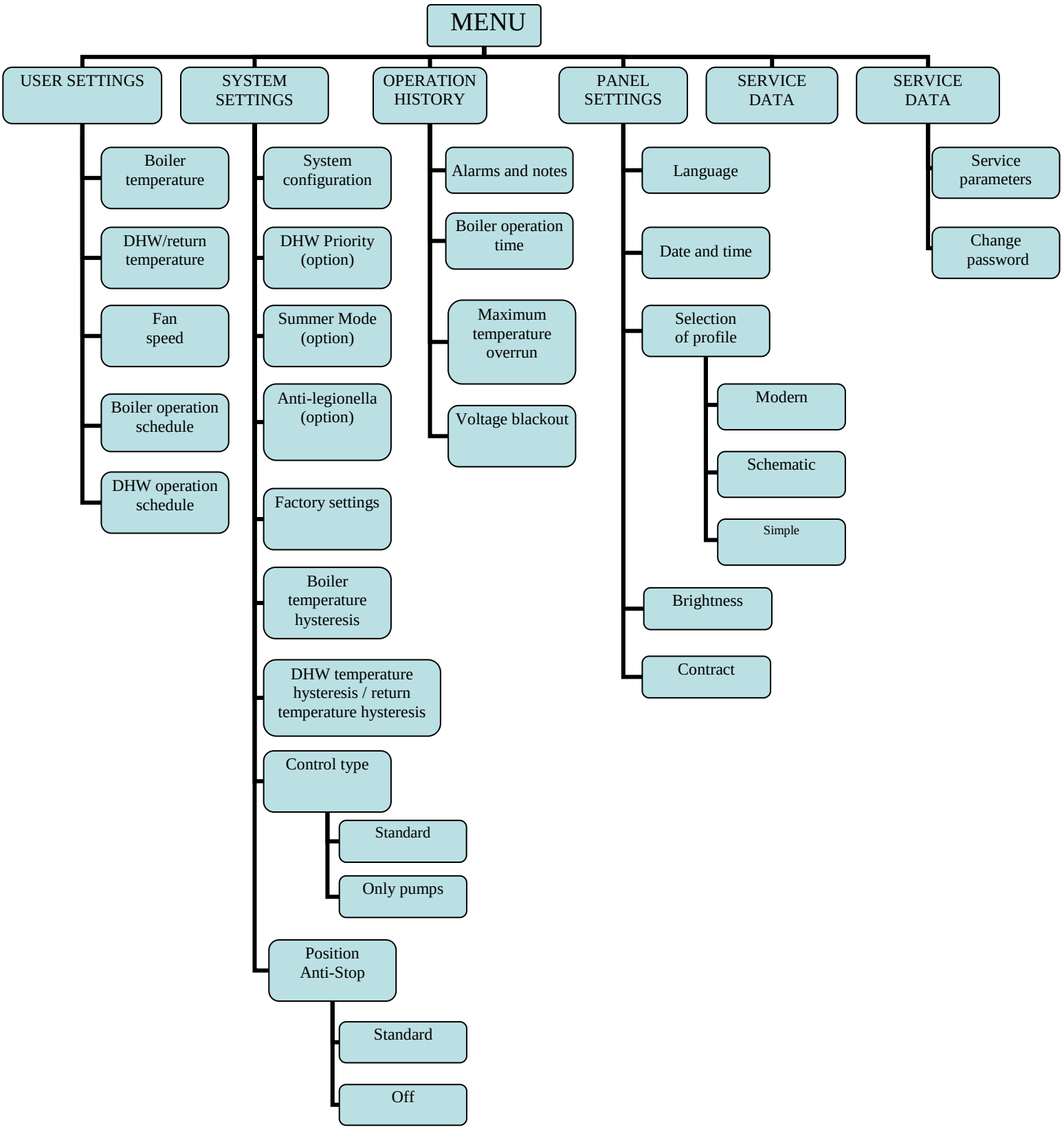


Simple:


Measured current DHW temperature
Measured current boiler temperature
GECO
GH08NA
25°C
25°C
FIRE UP
Indication of current controller operation mode
ESC
OK
AUTO


Boiler pump active icon
Fan active icon
DHW pump active icon
GECO
GH08NA
MANUAL
ESC
OK
AUTO
Current mode of operation

6.3. Controller menu -graphics tree.

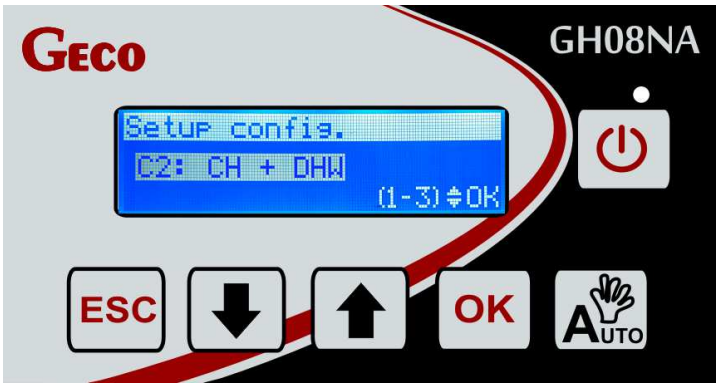


6.3.1 User settings

Description	Min.	Max.	Step	Factory setting
Boiler temperature setting	*'S3'*	*'S4'*	1°C	60°C
Fan speed	1	10	1	5
DHW set temperature	35	70	1°C	40°C
Return set temperature	40	60	1°C	50°C
Boiler temperature hysteresis	*'S5'*	10	1°C	5°C
DHW temperature hysteresis	*'S50'*	10	1°C	5°C
Return temperature hysteresis	2	10	1°C	5°C

6.3.2 Installation settings.

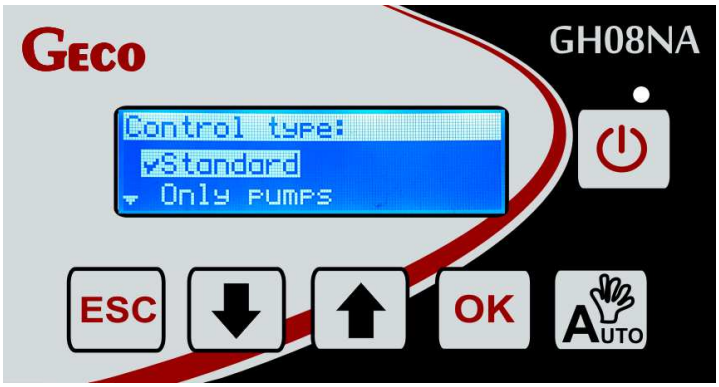
- **System configuration** – Enables selection of the heating system operated by the controller with an additional pump or without it. System description in section 8;



- **DHW priority** – With this function enabled, heating of warm water becomes the priority function in the controller. Functionality description in item 7;
- **Summer mode** – a function that allows you to turn off the CH pump for the summer season, and the boiler operates only to supply the DHW water. Functionality description in section 7;
- **Anti-Legionella** – Its purpose is to limit the growth of bacteria of genus *Legionella pneumophilia* in the domestic hot water system. Functionality description in section 7;

- **Factory settings** – Restoring controller factory settings.

- **Boiler temperature hysteresis** – boiler temperature hysteresis value, at which the controller exists the sustain mode and returns to the HEATING mode;
- **DHW/Return temperature hysteresis** – The DHW tank temperature hysteresis value, at which the DHW pump is switched on or the controller exits the sustain mode (if it is in sustain mode). Boiler return temperature hysteresis at which the mixing pump is switched on or the controller exits the sustain mode (if it is in sustain mode);
- **Control type** – Ability to adapt the system operation algorithm to the current fuel type and the technical combustion capabilities. Standard control and 'only pumps' control.



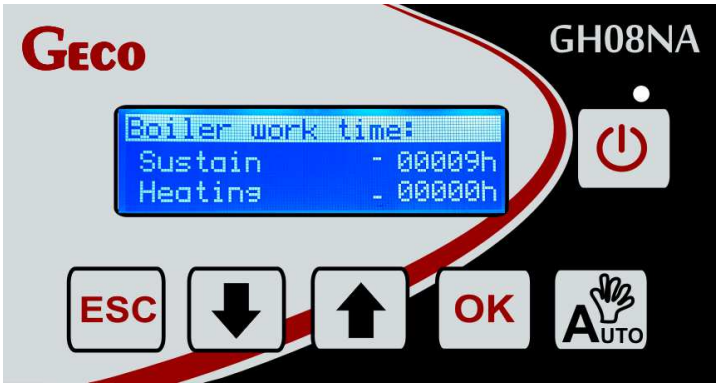
- **Anti-Stop Function** – Option to enable a function to protect process equipment from stagnation during the summer season. Activation only when the controller is in MANUAL MODE. Functionality description in section 7;

6.3.3 Operation history

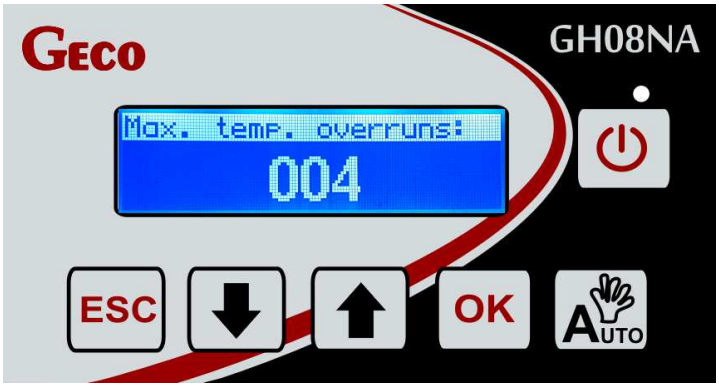
Operation history is a set of information about irregularities in controller operation. All failures and abnormalities identified by the software are stored and archived as an alarm or note, depending on the severity of risk.

The controller is able to archive 8 most recent detected alarm conditions. Alarms and notes are displayed in chronological order. In the report an alarm is indicated with the letters AL, and a note – with the letters UW. Information about the alarm condition contains the alarm condition symbol indicating the type of risk, as well as accurate date and time of occurrence. All new alarm conditions appear on the work history list with an envelope icon, indicating that the user should open and review them.

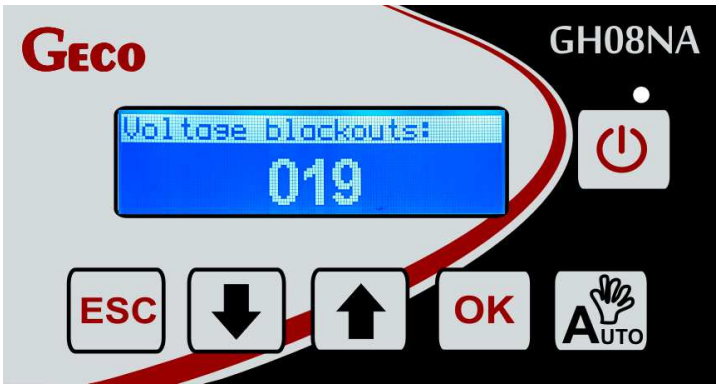
Boiler operation time – The screen shows the operation time statistics in automatic mode, divided into the sustain and heating mode. The measurement unit is an hour [h].



Maximum temperature overrun – The screen presents the statistics for the number of overruns of the maximum temperature of 85°C. The controller provides the total number of overruns.

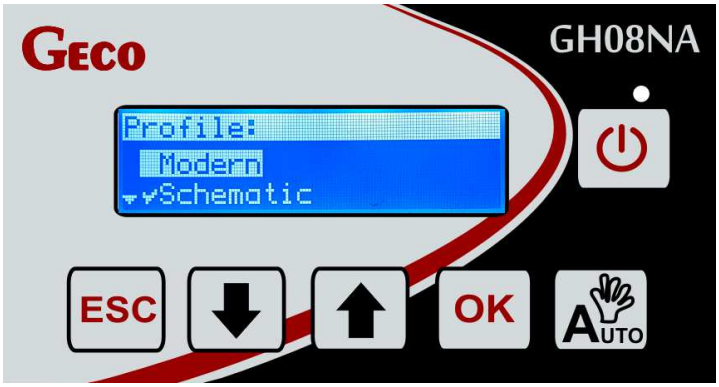


Voltage blackout – The screen shows the statistics of the number of voltage blackouts. The controller indicates the total number of power failures.



6.3.4 Panel settings.

Display selection – The user is able to select an individual profile of the main display, depending on the type of information to be included on it. In the panel's settings menu there is a number of suggested settings for the main display. The standard screen is not set by default.



Display types: Modern, Schematic and Simple.

7. Description of additional functions.

7.1. DHW Priority function.

The GH08NA Controller allows to set operation of the DHW pump with priority. If you choose this mode of DHW pump operation, the domestic hot water heating becomes a higher priority function in the controller, and heating of the CH circuit is of secondary importance. The functionality is available only for the second schematic configuration.

To enable a function, you need to set the value of **"YES"** for the parameter in question in the menu.

7.2. Summer mode function.

The GH08NA Controller is equipped with a SUMMER MODE option that allows you to turn off the CH pump for the summer season, and the boiler operates only to supply the DHW water. For the function to run, a system arrangement that supports the DHW pump must be enabled.

The functionality is available only for the second schematic configuration.

To enable a function, you need to set the value of **"YES"** for the parameter in question in the menu.

7.3. Anti-Legionella function

The controller is provided with the Anti-Legionella function, the purpose of which is to limit the growth of bacteria of genus Legionella pneumophilia in the domestic hot water system.

Bacteria of genus Legionella develop in a water environment, optimally at the temperature of 38–42^{0}C. Growth of these bacteria is also augmented by stagnation of warm water in water piping, heaters, and DHW tanks. Bacteria of the genus Legionella cause a non-specific variant of pneumonia known as the legionnaires' disease, i.e. legionellosis. Legionellosis has been officially recognized by the Ministry of Health as an infectious disease. The Anti-Legionella function is performed by the GH08NA controller to ensure such conditions in the DHW system (the tank) that are not conducive to the growth of bacteria of genus Legionella.

To enable the function, you need to set the value of **"YES"** for the parameter in question in the menu. Enabling of the function and its running is indicated by the inverted „**LE**" symbol on the main display on the right side of the DHW symbol. You can use the key to get an overview of system operation. This function has higher priority over other functions, therefore it is performed by the controller in the first order (superior function).

When the function is activated, the temperature of water in the boiler is increased to 70°C and maintained for a period of 10 minutes. The user has to enable the function each time. If up to 120 minutes after enabling the function the temperature is not reached, the function is disabled by the controller and a text message is displayed, notifying that it cannot be performed. The functionality is available only for the second schematic configuration.

ENABLING THE ANTI-LEGIONELLA FUNCTION CAUSES A TEMPERATURE INCREASE OF DOMESTIC HOT WATER TO THE LEVEL OF 70^{0}C. SPECIAL CARE MUST BE EXERCISED WHEN USING DOMESTIC HOT WATER. A RISK OF HOT WATER BURN EXISTS!!!

7.4. Standard room thermostat

An external thermostat can be connected to the GH08NA controller. The activated thermostat will close its input contacts and put the boiler in a locked state.

The room thermostat can lock the controller by closing the controller input handling the thermostat (it is the active state of the thermostat).

The locked state consists in disabling the CH pump after 4 minutes after occurrence of the active state at thermostat input (thermostat contacts closed) and forcing a switching of the panel from the automatic operation condition to the sustain mode.

Switching of the controller from the automatic operation condition to the sustain condition by the panel will take place only when the outlet water temperature is higher than the minimum value set in the ***'S03'*** service parameter and when it is not require to heat the DHW (regardless of whether DHW priority is set or not). When the controller is in sustain mode forced by the active state at the input of the room thermostat, Anti-legionella function is active, and outlet water temperature drops below the value set in the ***'S03'*** parameter or it is necessary to heat the DHW, when the DHW priority is active (Tboiler = Tdhw + 10°C), the controller returns to the automatic operation mode until the outlet water reaches the ***'S03'*** temperature or the dhw is heated.

7.5. Boiler burnout detection.

7.5.1 *No Fuel.*

If during automatic operation the boiler outlet water temperature remains below the ***S08*** setting for a period of time set in the ***S09*** setting, then the Controller considers the boiler as "burned out" and enters the *AL13* alarm condition.

If ***'S08'***=0, the detection based on boiler water temperature is disabled.

7.5.2 Sudden drop of outlet water temperature.

If during automatic operation the boiler outlet water temperature drops by 10°C, and during that dropping period the temperature does not rise by 4°C, then the SH and DHW pumps are switched off, and the Controller goes into the burnout detection mode.

The Controller waits for the period of time set in the S10 setting, during which it checks whether a rise of 4°C occurs.

- If YES, then the burnout detection condition is stopped, and the SH and DHW pumps (if necessary) are started.
- If NOT, this means that the furnace is burned out – the Controller enters the *AL13* alarm condition.

7.6. Anti-Stop function

In the GH08NA it is possible to enable the ANTI-STOP function protecting the process equipment against stagnation during the summer season. The function forces switching on of the equipment every 7 days for 30 second, ensuring their good operating condition.

The controller differentiates two settings of the function activity:

- Standard – all equipment in the system;
- Disabled – the function is not active;

The ANTI-STOP function is active only in the manual mode of the controller. When it is active, the user is not able to switch on the equipment in the system manually. Ability to manually control the external equipment is enabled by software only when the function is disabled.

7.7. Standard mode.

The GH08NA controller is set by default to the "Standard" automatic mode. The algorithm is adapted to control solid fuel boilers with an air supply fan. All three external devices are supported in this mode.

The current mode is indicated on the main display with the text: "HEATING" in the operation mode, or "SUSTAIN" indicating the mode which sustains the temperature reached.

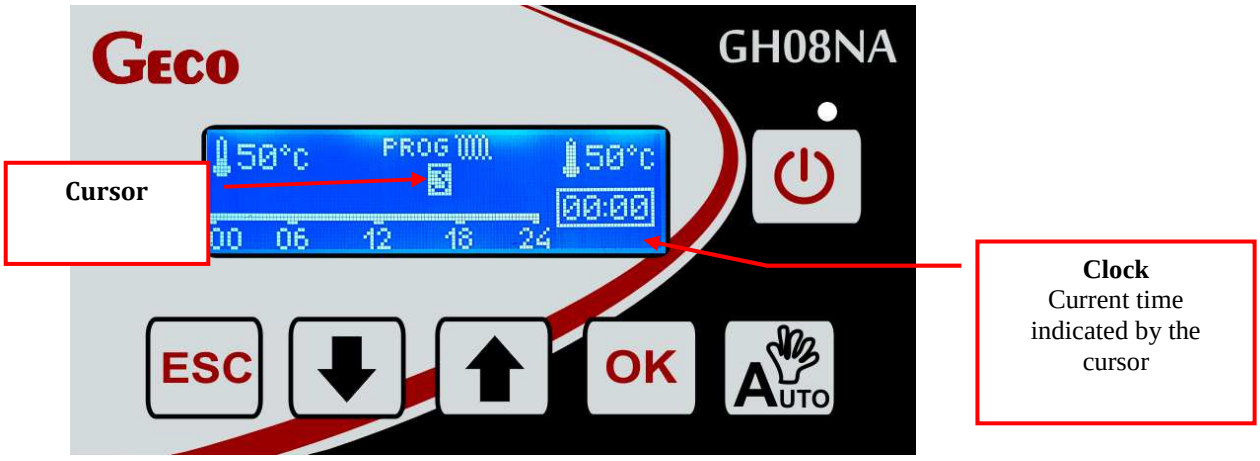
7.8. Only the pump mode.

In the GH08NA controller it is possible to change the control algorithm to "Pumps only". The fan is not controlled in this mode. It is usually used during a temporary change of fuel type example when it is necessary to use firewood or a different ECO fuel without the need to augment firing with a fan.

The controller operates only pumps. The current mode is indicated on the main display with the text: "T.PUMPS".

7.9 The boiler temperature and DHW setpoint – Daily program

Access to the daily zone is affected by entering user settings in the controller menu. The user has 9 daily programs available. The first two programs are not editable, they are imposed by the manufacture as standard programs. The other seven programs can be freely configured by the user.



The OK buttons are used to select the item to edit (program number, “day” and “night” temperature (the DHW temperature is set in user settings) or edit the daily cycle. The item to be edited is highlighted. In the event of editing the daily zone the availability for editing is indicated by a frame around the displayed clock. To change the value of a selected item use the ↓ ↑ buttons. The unit of time that the cursor moves by is 15 minutes whereas the accurate position of the cursor determines the indication of the clock. Editing of this strip, taking into account the division between the day and night mode (in the case of DHW heating or no heating of the boiler) is performed by means of ↑ buttons for daytime temperature and ↓ which determines the area of night-time temperature. Entry of the daily heating mode for a selected time is indicated with a vertical bar for the corresponding pixel, while in the night mode there is no vertical bar. To confirm the changes made, use the OK button. To return to a higher level, use the ESC button.

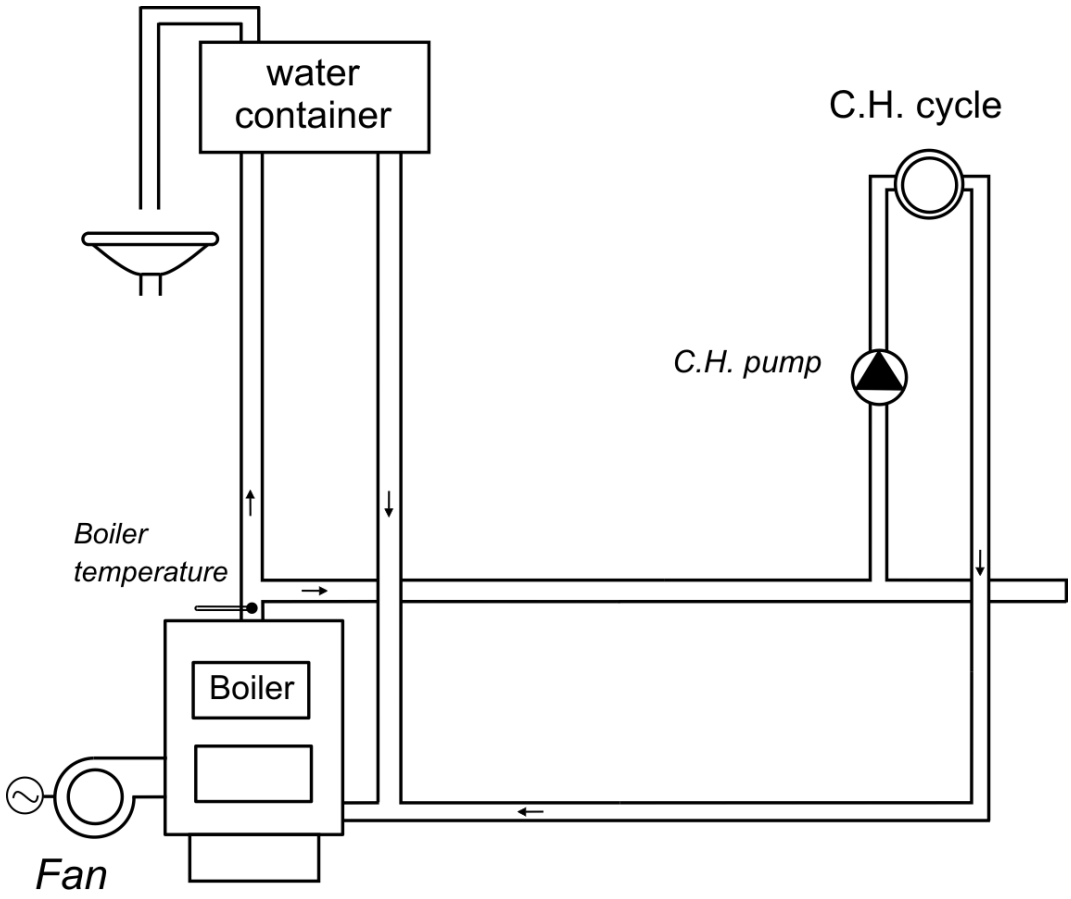
7.10 The boiler temperature setpoint and DHW setpoint – Weekly program

Access to the daily zone is effected by entering user settings in the controller menu or from a main screen item, by pressing the ↓ key (CH program) and ↑ key (DHW program). Here you can select the programs assigned to specific days of the week. You can select a different program for each day of the week.

To move between days while storing the settings of the current day is done with the OK button, and to change the program number use the ↓ ↑ buttons. The heating temperature values displayed (for day and night) correspond with the settings for the program indicated by the cursor. The heating temperature changes with the change of the program. Switching between days of the week takes place in a loop. To return to a higher level without confirming the changes, use the ESC button. If you entered the weekly zones from the level of the main display by means of the quick access button, then you will return directly to the main display.

8. System operation arrangement.

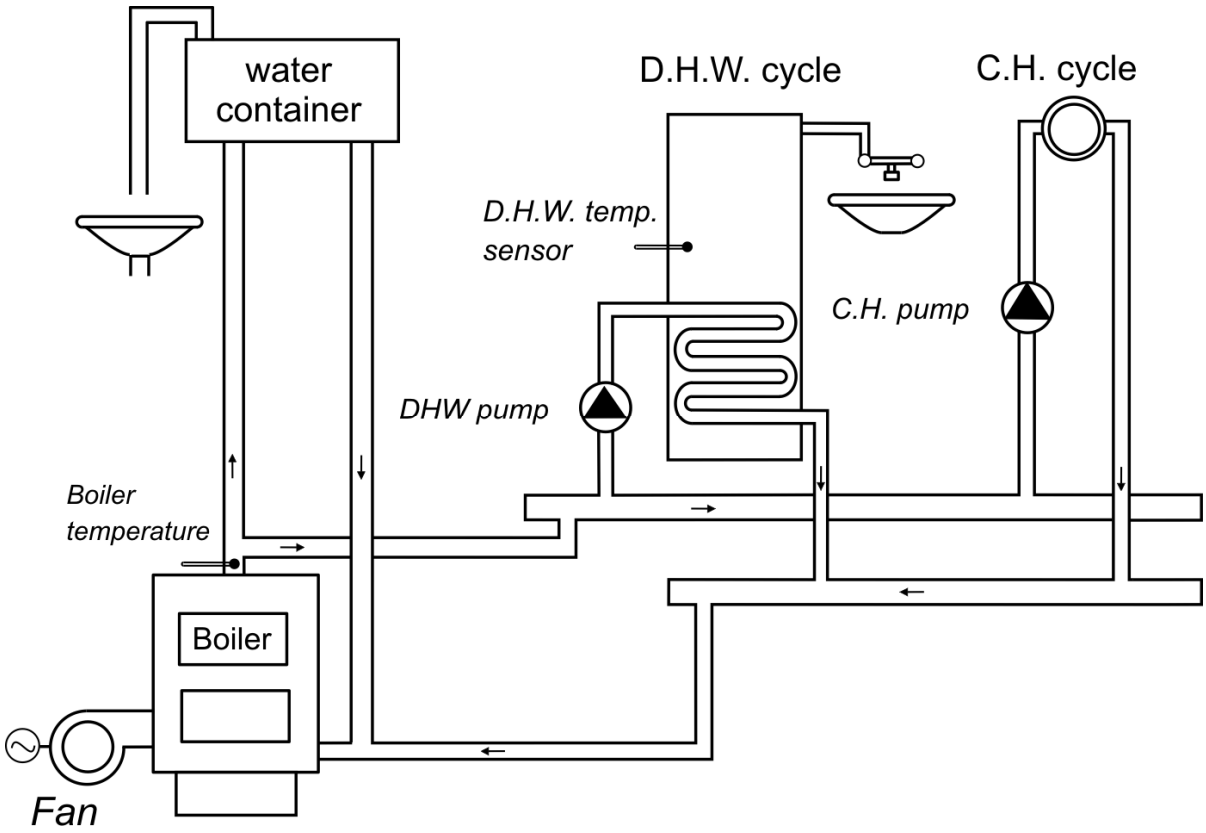
8.1 Heating system no. 1 Boiler without a pump.



The following is a list of parameters available for the user and assignment of outputs to process equipment and inputs to temperature sensors.

Diagram no. 1 – List of user parameters		
Parameter	**Range**	**Factory settings**
Boiler temperature setting	S3 ÷ S4	60°C
Fan speed	1 ÷ 10	5
Boiler temperature hysteresis	*S5* ÷ 10	5
Diagram no. 1 – assignment of controller outputs		
Output	**Device connected**	
O5-O6	Fan	
O7-O8	---	
09-10	CH Pump	
Diagram no. 1 – assignment of inputs		
Input	**Description**	
11-12	Room thermostat (optional)	
13-14	---	
15-16	Boiler outlet water sensor	

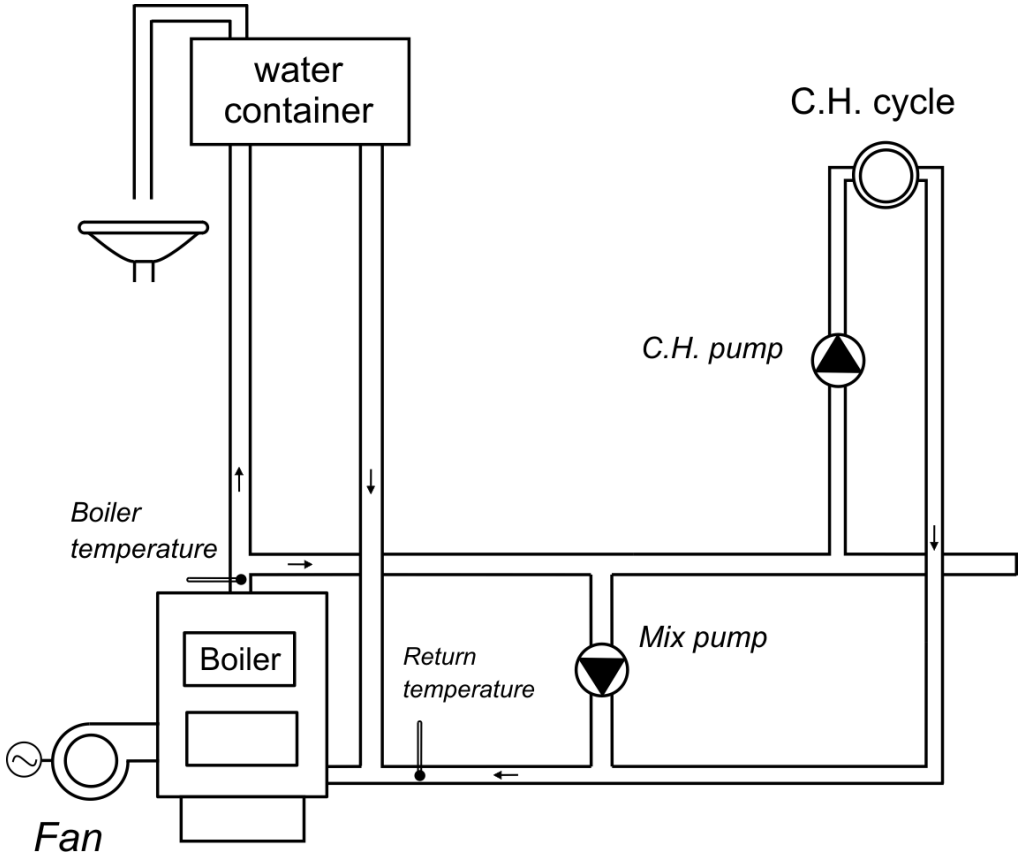
8.2 Heating system no. 2 Boiler + DHW pump.



The following is a list of parameters available for the user and assignment of outputs to process equipment and inputs to temperature sensors.

Diagram no. 2 – List of user parameters		
Parameter	**Range**	**Factory settings**
Boiler temperature setting	S3 ÷ S4	60°C
DHW set temperature	35 ÷ 65	40°C
Fan speed	1 ÷ 10	5
Boiler temperature hysteresis	*S5* ÷ 10	5
DHW temperature hysteresis	*S50* ÷ 10	5
Diagram no. 2 – assignment of controller outputs		
Output	**Device connected**	
O5-O6	Fan	
O7-O8	DHW pump	
09-10	CH Pump	
Diagram no. 2 – assignment of inputs		
Input	**Description**	
11-12	Room thermostat (optional)	
13-14	DHW sensor	
15-16	Boiler outlet water sensor	

8.3 Heating system no. 3 Boiler + Mixing pump.



The following is a list of parameters available for the user and assignment of outputs to process equipment and inputs to temperature sensors.

Diagram no. 3 – List of user parameters		
Parameter	**Range**	**Factory settings**
Boiler temperature setting	S3 ÷ S4	60°C
Return set temperature	40 ÷ 60	50°C
Fan speed	1 ÷ 10	5
Boiler temperature hysteresis	*S5* ÷ 10	5
Return temperature hysteresis	2 ÷ 10	5
Diagram no. 3 – assignment of controller outputs		
Output	**Device connected**	
O5-O6	Fan	
O7-O8	Mixing pump	
09-10	CH Pump	
Diagram no. 3 – assignment of inputs		
Input	**Description**	
11-12	Room thermostat (optional)	
13-14	Return sensor	
15-16	Boiler outlet water sensor	

9. Process equipment control algorithms.

9.1 Firing up.

The first stage of the automatic mode is firing up. This mode is activated when the following temperature condition is satisfied: **Tboiler < *Boiler temperature setting* – S29**. The current boiler temperature must be greater or equal to the temperature setpoint minus the S29 service parameter.

The process will be automatically ended, when the boiler outlet water temperature reaches the value of the ***Boiler temperature setpoint – S29*** . If the fire goes out during firing up, it is indicated with the AL 14 message on the main displays of the controller.

Controller operation in automatic mode is indicated by a text message in the top part of the screen: **FIRE UP.**

In the FIRE UP mode the fan starts from the minimum speed (speed 1) and increases its speed according to the **S31** setting, until reaching of the maximum speed set in the user parameter: "fan speed."

9.2 Heating.

If boiler temperature < *Boiler temperature setpoint* – S29, the controller will go from the firing up mode to the heating mode.

When ***'S53'*** = 1, the fan speed is changed in accordance with the adaptation algorithm described below. When ***'S53'*** = 0, the fan is controlled in the on-off mode, and is turned on at maximum speed always when the algorithm indicates that it is to be switched on (regardless of the blowing power resulting from the algorithm).

In the adaptive algorithm, when the firing up mode is successful, and the *boiler* temperature has not achieved the "boiler temperature setpoint", the fan operation depends on the current boiler temperature and boiler temperature setpoint, and the temperature speed increase. The algorithm also adapts blowing power depending on the setpoint entered by the user as "fan speed".

If during operation in SUSTAIN mode the condition of ***T current of the boiler*** ≤ ***Temperature setpoint*** – ***Boiler hysteresis,*** the controller will switch to the HEATING mode.

9.3 Sustaining

If during operation in HEATING mode the condition of ***'T$_{boiler}$'*** ≥ ***'Tz$_{boiler}$'*** (temperature setpoint) the controller goes to SUSTAIN mode.

After reaching the boiler setpoint temperature the fan switches to periodic blow-through. Duration of the blow-through is in accordance with the value set in the '***S26'*** parameter, and the fan runs at its maximum capacity. The blowthrough intervals are in accordance with the '***S27' parameter. In*** the SUSTAIN mode the fan works with the capacity set in the '***S32'*** parameter.If during the SUSTAIN mode the condition of ***'T$_{boiler}$'*** ≤ ***'Tz$_{boiler}$'*** (temperature setpoint) – ***'Boiler hysteresis'*** the controller switches to the heating MODE.

9.4 Firing up, Heating, Sustaining – CH Pump.

In the AUTO mode, the CH pump is activated when the temperature of the boiler water is higher or equal to the value set in the "CH Setpoint temperature.

The Controller deactivates the pump when the water temperature drops to the activation temperature minus the "CH temperature hysteresis"

In the event of locking by the room thermostat the pump is switched off when the service parameter S52 = 0, or if the condition S52>0 is met, the pump is switched on with the interval of S13 set in the S52 service parameter.

9.5 Firing up, Heating, Sustaining – DHW Pump/Mixing

In the AUTO mode, the CH/Mixing pump is activated when the temperature of the boiler water is higher or equal to the value set in the DHW/Mix set point temperature.

The Controller deactivates the pump when the water temperature drops to the pump activation temperature minus the "DHW/Mix temperature hysteresis".

10. Temperature limiter (STB)

The GH08NA controller is equipped with an additional mechanical protection, independent of the automation, called the safe temperature barrier (STB).
The same input can be also used to connect the external alarm and a fuse.

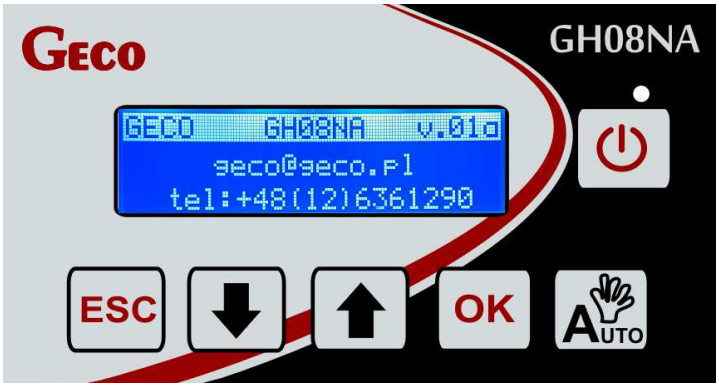
11. Voltage blackout.

After a power outage the controller resumes operation according to the condition it was in before the voltage blackout, i.e.:

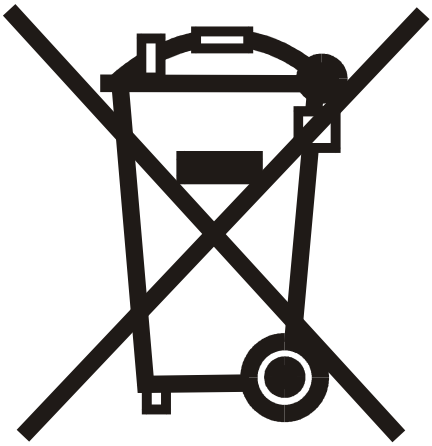
- if it was on, it will remain on
- if it was in preview condition, it will return to this condition,
- if the controller was in automatic operation mode, it will return to the automatic condition with programmed parameters.
- if the controller was in manual operation mode, it will return to manual mode with the programmed parameters.
- If it was in an ALARM condition, the controller will return to the off condition.

12. Service data.

The menu provides the user with access to the entered service information of the manufacturer or the installer.



13. Information on Marking and Collection of Waste Electric and Electronic Equipment



NOTE!
The symbol placed on a product or on its packaging indicates that it is subject to selective collection of waste electric and electronic equipment. This means that the product should not be discarded with other household waste. Appropriate removal of old and waste electric and electronic equipment will prevent potentially harmful effects on the environment and human health.
The obligation of selective equipment collection rests on the user who should deliver the equipment to a collection point.

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